2006-08 ENGINE

Mechanical - Overhaul - 2.0L (LF) & 2.3L (L3) - Mazda6 & MX-5 Miata

ENGINE IDENTIFICATION

Engine can be identified by engine model and number

ENGINE IDENTIFICATION CODE

Engine	Code
2.0L 4-Cylinder	LF
2.3L 4-Cylinder	L3

MECHANICAL

ENGINE OVERHAUL SERVICE WARNING

WARNING:

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

ENGINE MOUNTING/DISMOUNTING

1. Install the **SSTs** (arms) to the cylinder block holes as shown, and hand-tighten the bolts **(part No.: 9YA20-1003) or M10 x 1.5T length 90 mm {3.55 in}.**

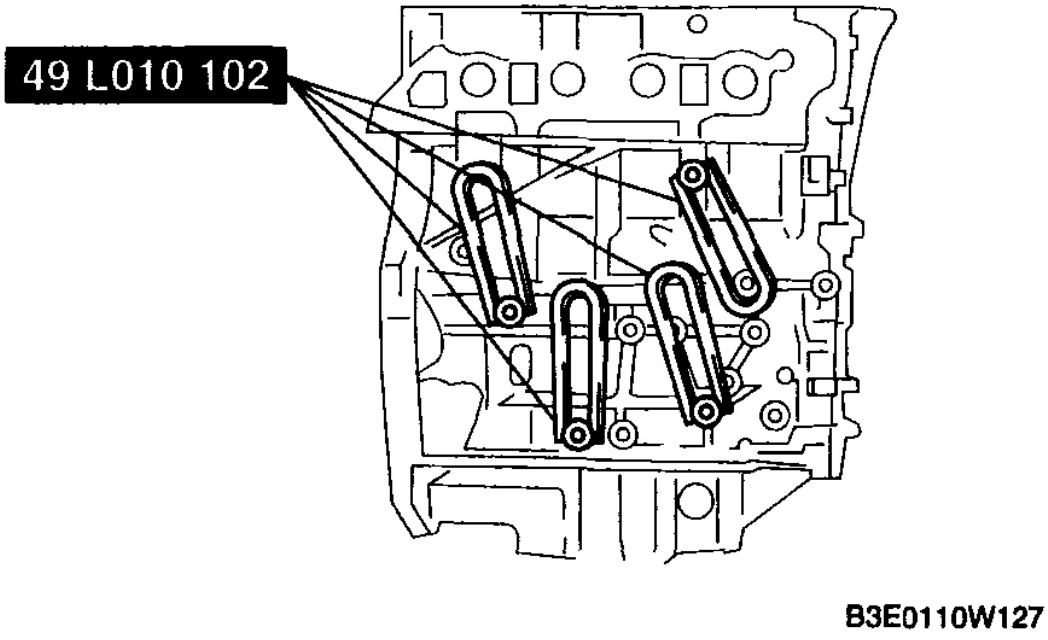


Fig. 1: Installing SST (Arms) To Cylinder Block Holes
Courtesy of MAZDA MOTORS CORP.

2. Assemble the **SSTs** (bolts, nuts and plate) to the specified positions.
3. Adjust the **SSTs** (bolts) so that less than **20 mm {0.79 in}** of thread is exposed.
4. Make the **SSTs** (arms and plate) parallel by adjusting the **SSTs** (bolts and nuts).

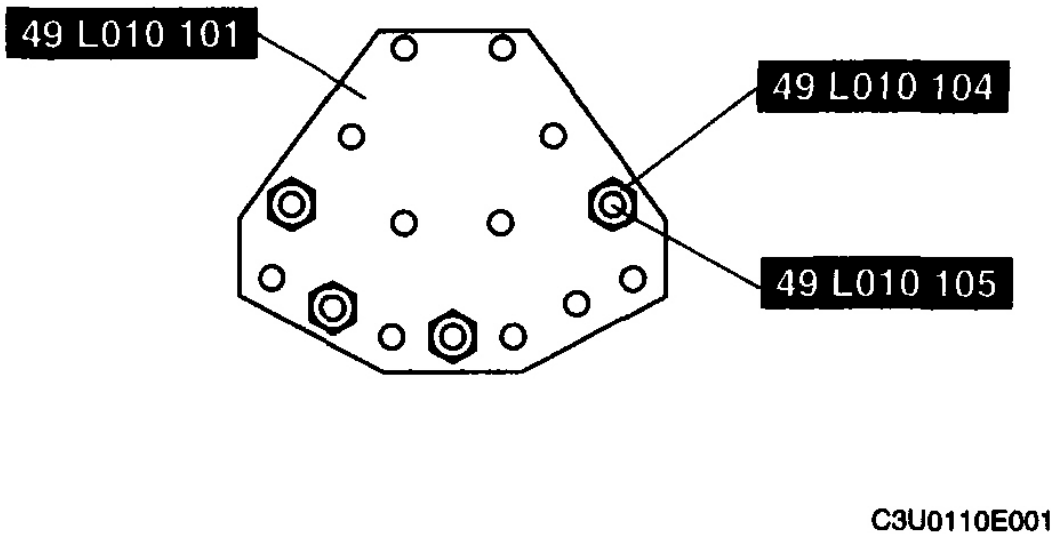


Fig. 2: Assembling SSTs (Bolts, Nuts And Plate) To Positions
Courtesy of MAZDA MOTORS CORP.

5. Tighten the **SSTs** (bolts and nuts) to affix the **SSTs** firmly.

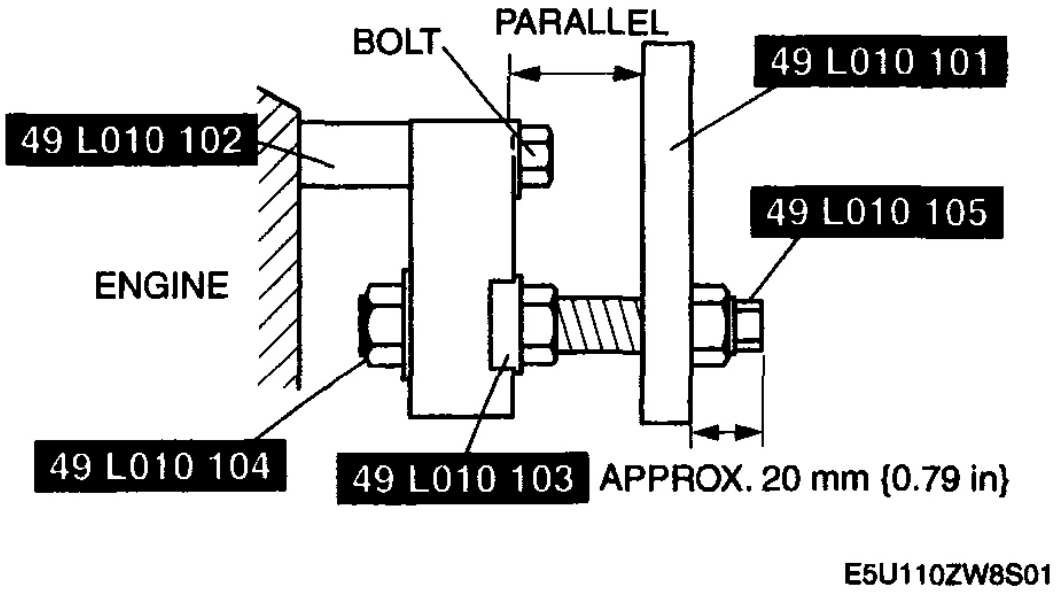


Fig. 3: Identifying SST Bolts, Nuts & Parallel Plates

Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Self-locking brake system of the engine stand may not be effective when the engine is held in an unbalanced position. This could lead to sudden, rapid movement of the engine and mounting stand handle and cause serious injury. Never keep the engine in an unbalanced position, and always hold the rotating handle firmly when turning the engine.**

6. Mount the engine on the **SST** (engine stand).
7. Drain the engine oil into a container.
8. Install the oil pan drain plug.
    - With washer
        1. Install the oil pan drain plug with a new washer.

        Tightening torque

        30-41 N.m {3.1-4.1 kgf.m, 23-30 ft.lbf}

    - Without washer
        1. Inspect the seal rubber of the oil pan drain plug and make sure there are no cracks or damage. - If necessary, replace the oil pan drain plug.
        2. Clean the flange surface (seal rubber) on the oil pan drain plug, then install the oil pan drain plug.

    Tightening torque

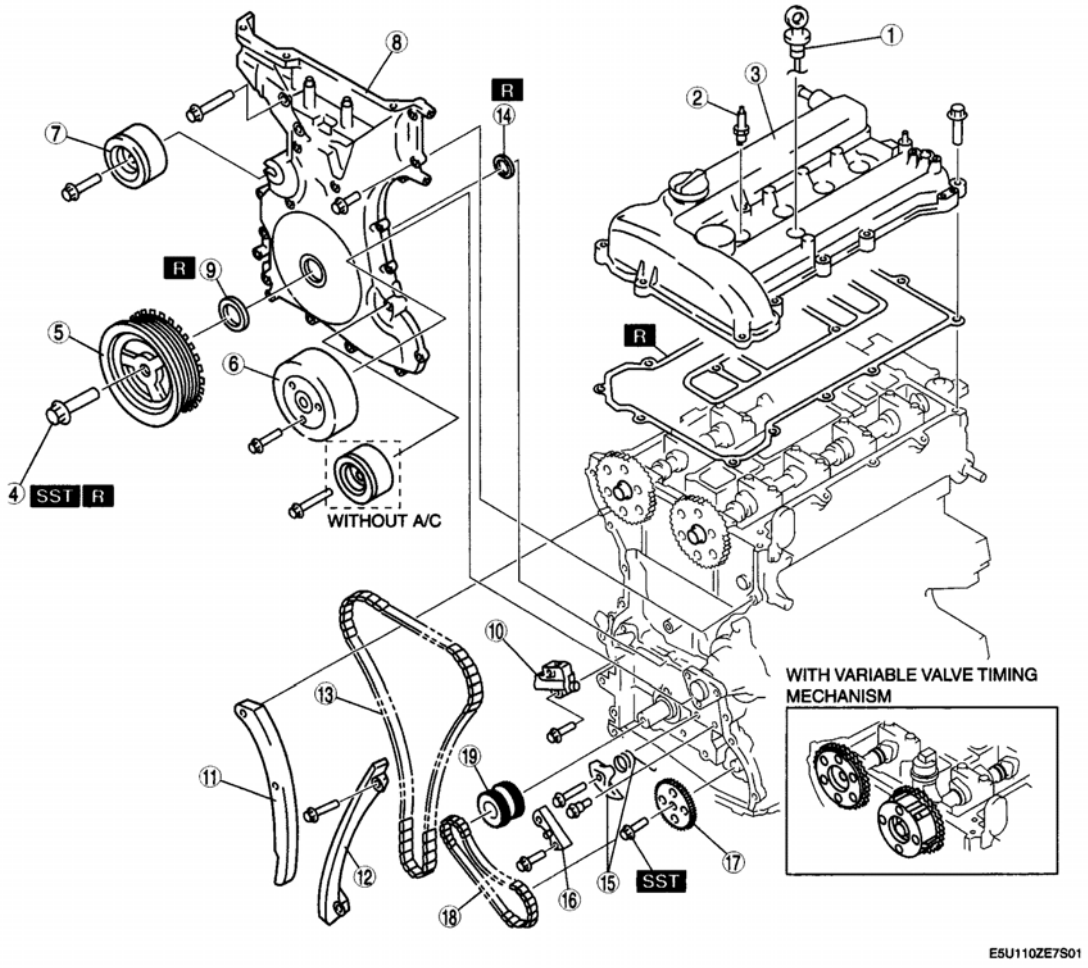
    22-30 N.m {2.2-3.1 kgf.m, 16-22 ft.lbf}

DISMOUNTING

- Dismount in the reverse order of mounting.

TIMING CHAIN DISASSEMBLY

1. Disassemble in the order indicated in the table.



1	Oil level gauge (if equipped)
2	Spark plug
3	Cylinder head cover
4	Crankshaft pulley lock bolt
5	Crankshaft pulley
6	Water pump pulley
7	Drive belt idler pulley (Without stretch-type A/C drive belt)
8	Engine front cover
9	Front oil seal

10	Chain tensioner
11	Tensioner arm
12	Chain guide
13	Timing chain
14	Seal (With variable valve timing mechanism)
15	Oil pump chain tensioner
16	Oil pump chain guide
17	Oil pump sprocket
18	Oil pump chain
19	Crankshaft sprocket

Fig. 4: Exploded View Of Timing Chain Components
Courtesy of MAZDA MOTORS CORP.

Crankshaft Pulley Lock Bolt Disassembly Note

1. Install the **SST** to the ring gear to lock the crankshaft against rotation.

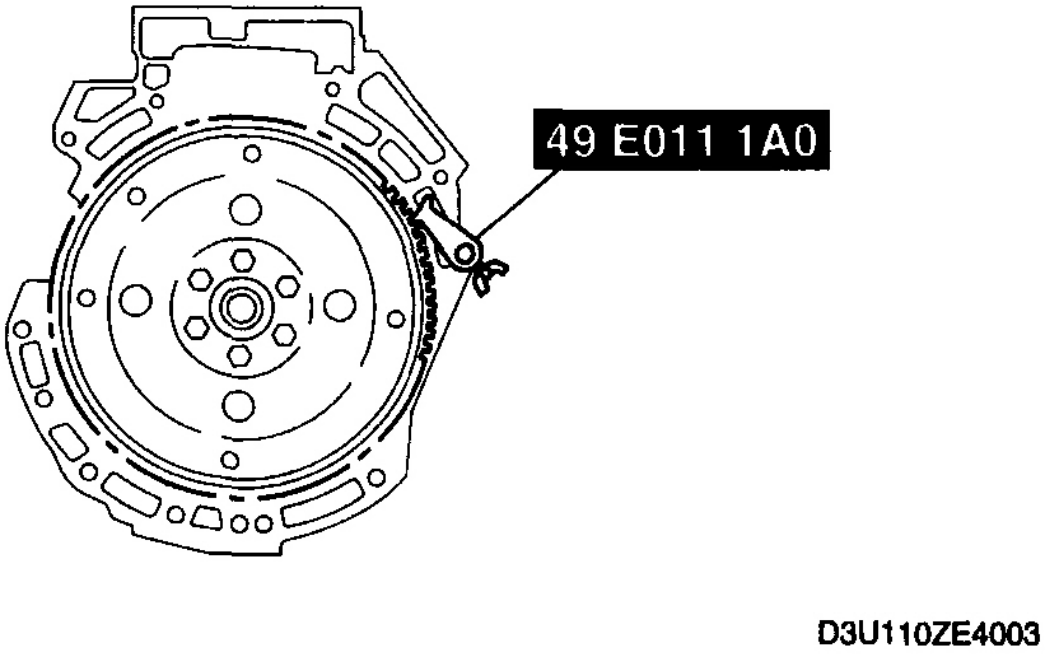


Fig. 5: Installing SST Ring Gear To Lock Crankshaft Against Rotation
Courtesy of MAZDA MOTORS CORP.

Front Oil Seal Disassembly Note

1. Remove the oil seal using a screwdriver.

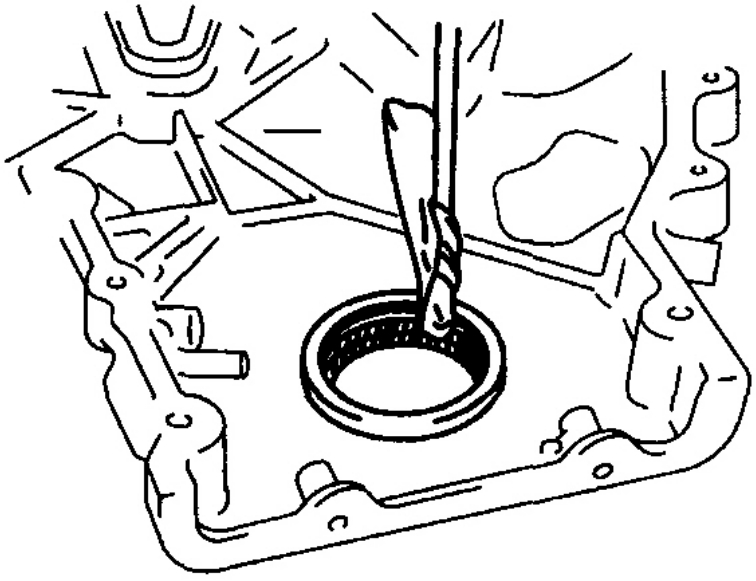


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Fig. 6: Removing Oil Seal
Courtesy of MAZDA MOTORS CORP.

Chain Tensioner Disassembly Note

1. Unlock the chain tensioner ratchet using a suitable screw driver or equivalent tool.
2. Slowly press the tensioner piston.
3. Hold the chain tensioner piston with a **1.5 mm {0.06 in}** wire or paper clip.

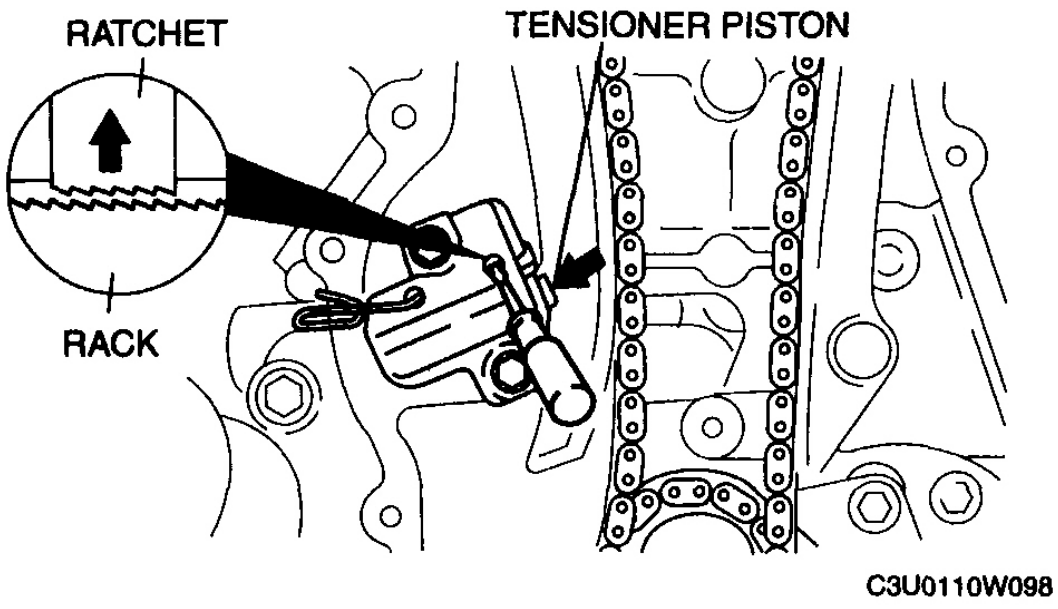


Fig. 7: Disassembling Chain Tensioner
Courtesy of MAZDA MOTORS CORP.

Oil Pump Sprocket Disassembly Note

1. Hold the oil pump sprocket using the **SST** .

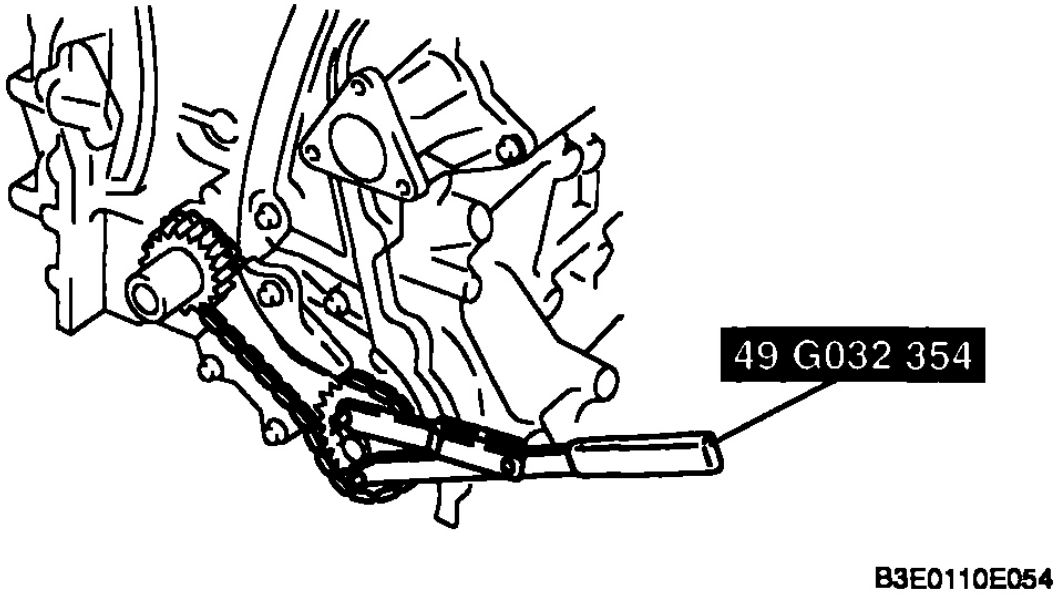
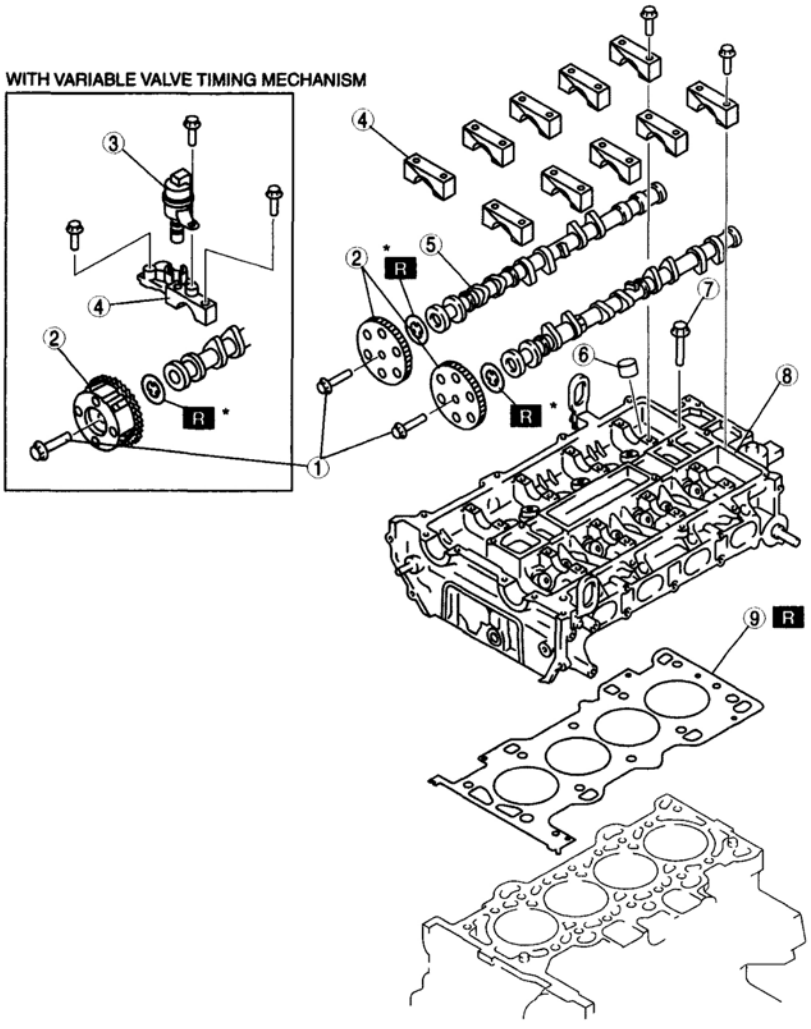


Fig. 8: Holding Oil Pump Sprocket Using SST
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD (I) DISASSEMBLY

1. Disassemble in the order indicated in the table.



*:EXCEPT FOR MAZDA6 ARE EQUIPPED. IF WASHER IS NOT INSTALLED TO THE ENGINE, INSTALL A NEW WASHER.

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1	Camshaft sprocket lock bolt, variable valve timing actuator lock bolt (With variable valve timing mechanism)
2	Camshaft sprocket, variable valve timing actuator (With variable valve timing mechanism)
3	Oil control valve (OCV) (with variable valve timing mechanism)
4	Camshaft cap
5	Camshaft
6	Tappet
7	Cylinder head bolt
8	Cylinder head
9	Cylinder head gasket

Fig. 9: Exploded View Of Cylinder Head (I) Disassembly
Courtesy of MAZDA MOTORS CORP.

Camshaft Sprocket Lock Bolt, Variable Valve Timing Actuator Lock Bolt Disassembly Note

1. Hold the camshaft by using a wrench on the cast hexagon as shown, and loosen the camshaft sprocket

installation bolt or variable valve timing actuator installation bolt (With variable valve timing mechanism).

Without variable valve timing mechanism

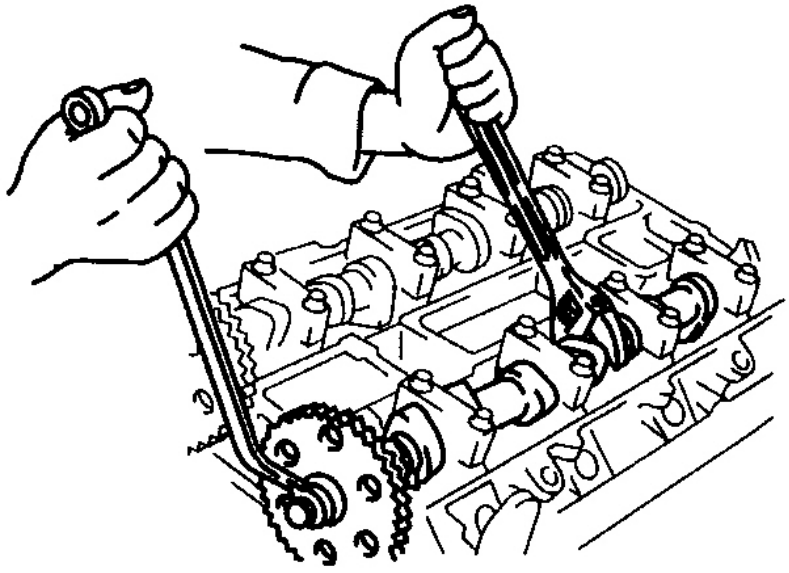

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Fig. 10: Using Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

With variable valve timing mechanism

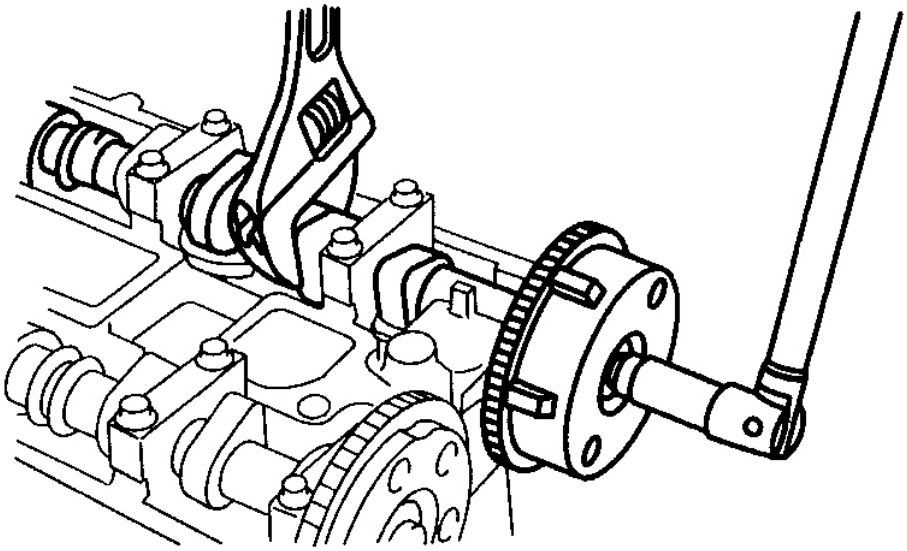

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Fig. 11: Using Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

Camshaft Cap Disassembly Note

1. Before removing the camshaft caps, inspect the following:
   - Camshaft end play and camshaft journal oil clearance (See **CAMSHAFT INSPECTION**).

NOTE:

- **The camshaft caps are numbered to make sure they are assembled in their original positions. When removed, keep the caps with the cylinder head they were removed from. Do not mix the caps.**

2. Loosen the camshaft caps bolts in 2--3 steps in the order shown in the figure.

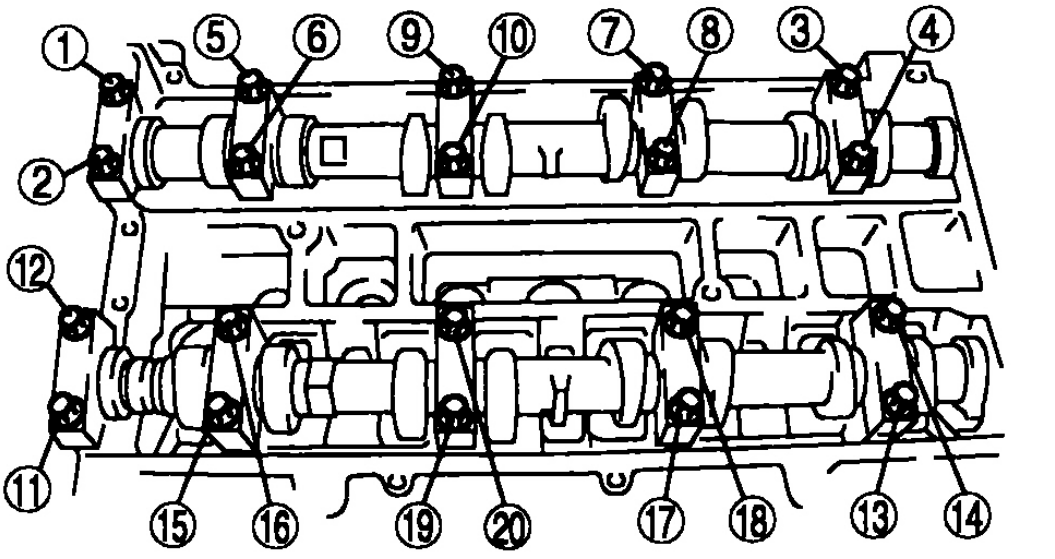


Fig. 12: Identifying Loosening Sequence Of Camshaft Cap Bolts
Courtesy of MAZDA MOTORS CORP.

Tappet Disassembly Note

NOTE:

- **The tappets are numbered to make sure they are assembled in their original positions. When removed, keep the tappets with the cylinder head they were removed from. Do not mix the tappets.**

Cylinder Head Bolt Disassembly Note

1. Loosen the cylinder head bolts in 2-3 steps in the order shown in the figure.

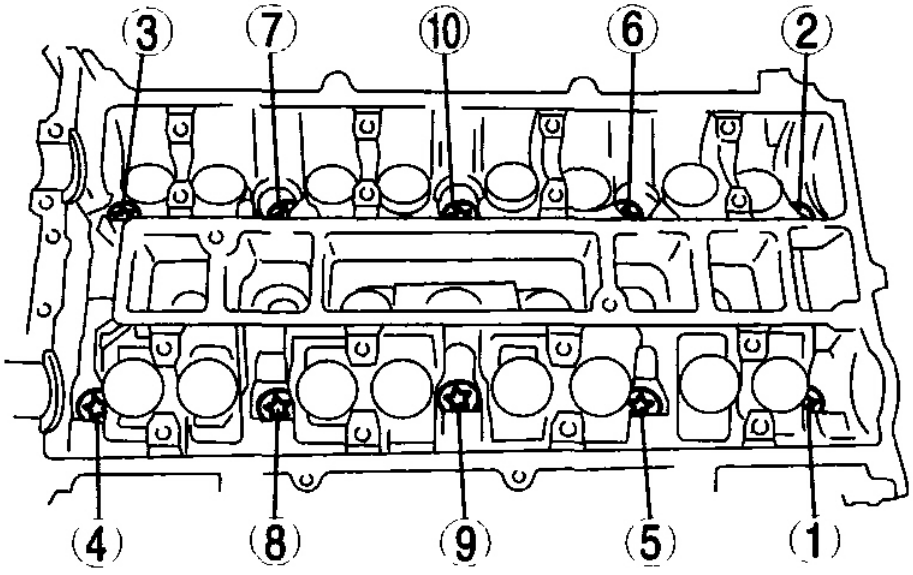
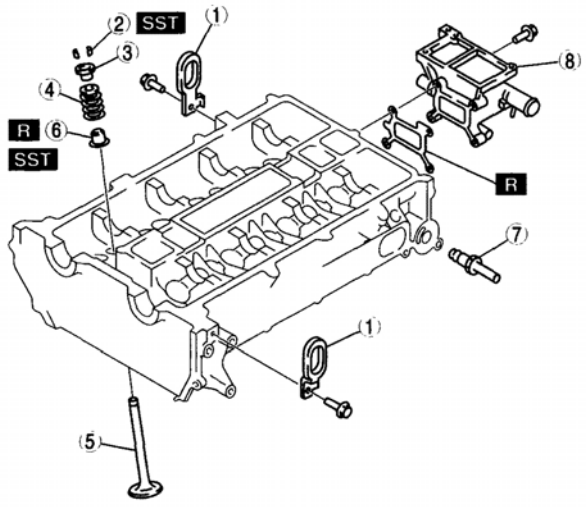


Fig. 13: Loosening Cylinder Head Bolts
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD (II) DISASSEMBLY

1. Disassemble in the order indicated in the table.



1	Engine hanger	5	Valve
2	Valve keeper	6	Valve seal
3	Upper valve spring seat	7	EGR pipe
4	Valve spring	8	Water outlet

Fig. 14: Exploded View Of Cylinder Head (II) Disassembly
Courtesy of MAZDA MOTORS CORP.

Valve Keeper Disassembly Note

1. Remove the valve keeper using the **SSTs** .

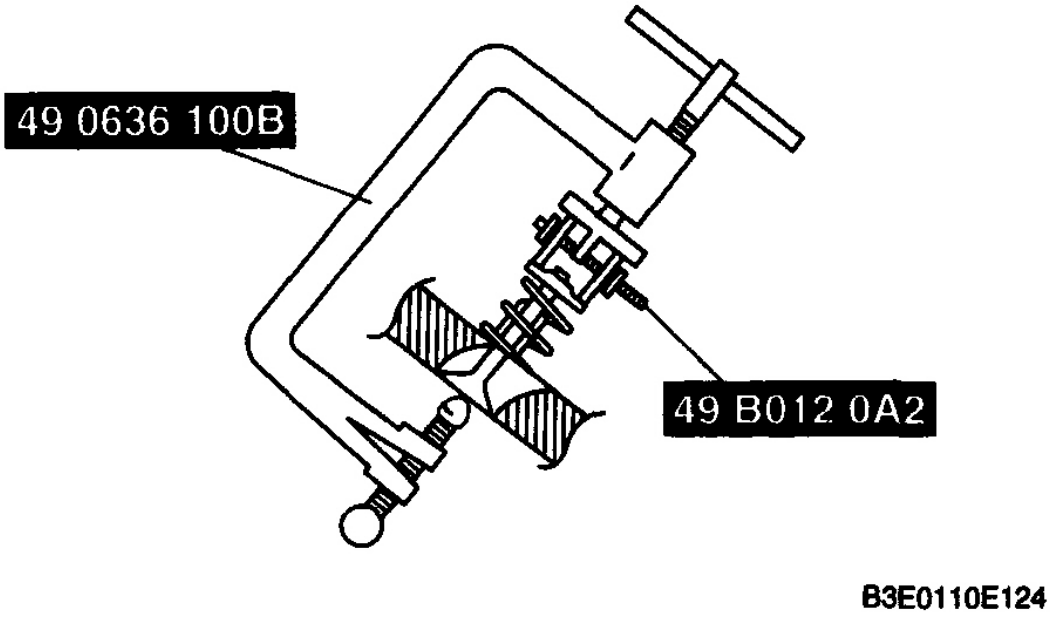


Fig. 15: Removing Valve Keeper
Courtesy of MAZDA MOTORS CORP.

Valve Seal Disassembly Note

1. Remove the valve seal using the **SST.**

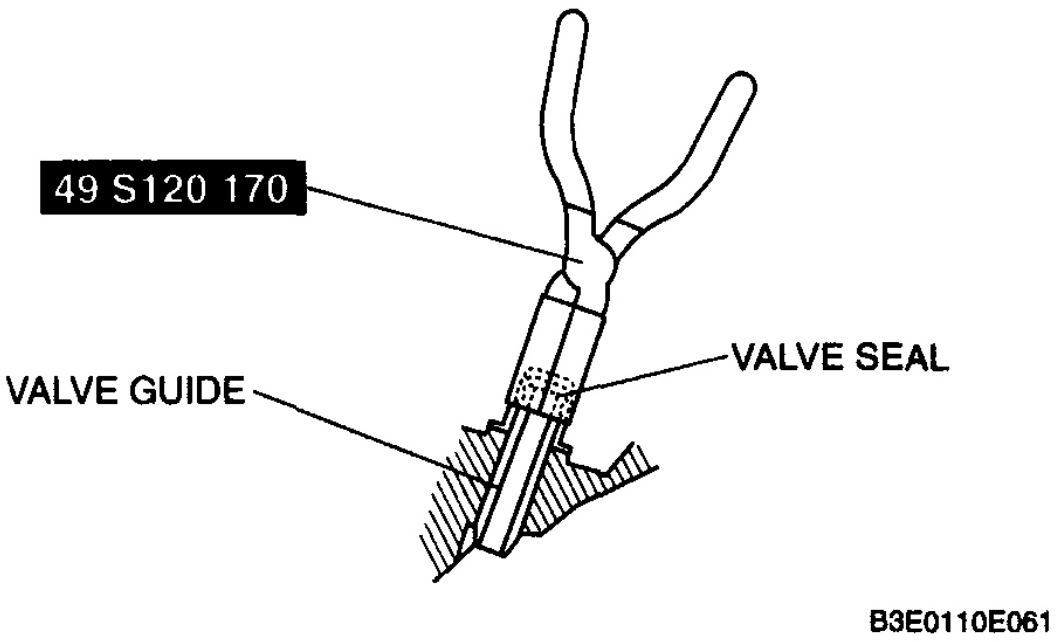
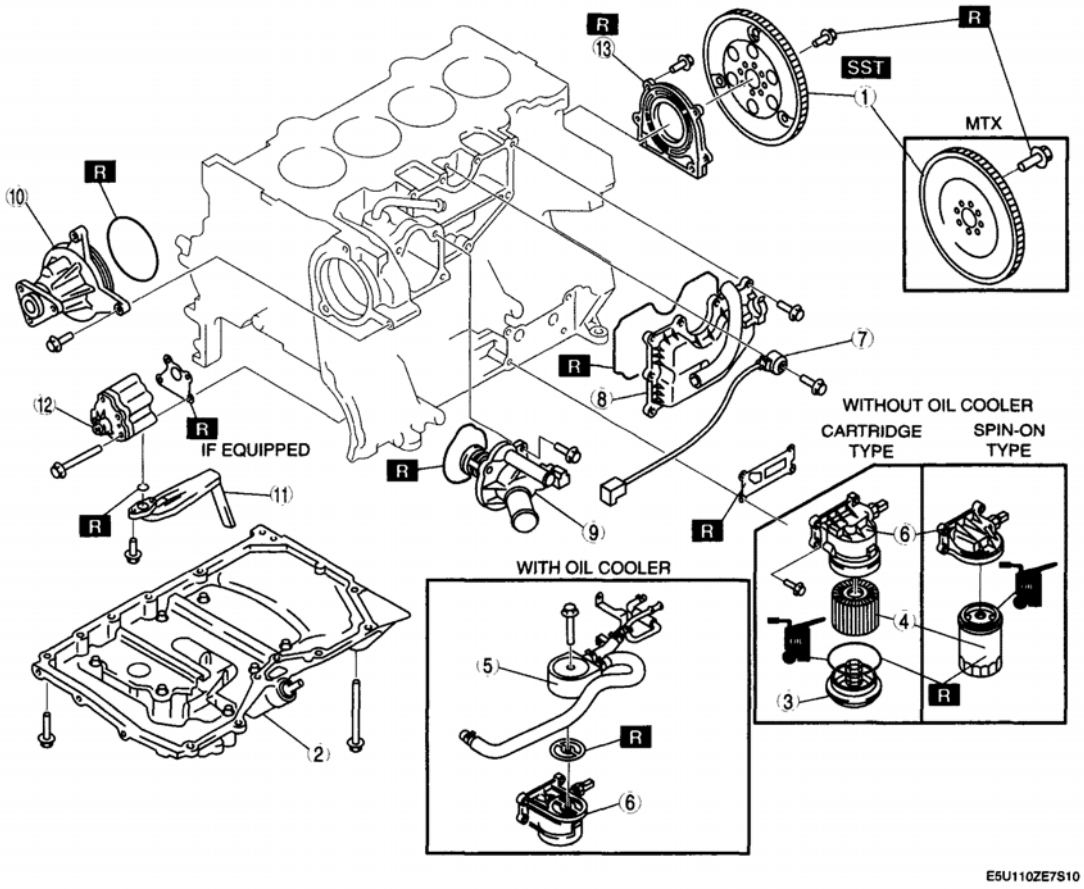


Fig. 16: Removing Valve Seal
Courtesy of MAZDA MOTORS CORP.

CYLINDER BLOCK (I) DISASSEMBLY

1. Disassemble in the order indicated in the table.



1	Flywheel (MTX), Drive plate (ATX)
2	Oil pan
3	Oil filter cover (cartridge type)
4	Oil filter
5	Oil cooler
6	Oil filter adapter

7	Knock sensor
8	Oil separator
9	Thermostat
10	Water pump
11	Oil strainer
12	Oil pump
13	Rear oil seal

Fig. 17: Exploded View Of Cylinder Block (I) Disassembly
Courtesy of MAZDA MOTORS CORP.

Drive Plate (ATX), Flywheel (MTX) Disassembly Note

1. Hold the crankshaft using the **SST.**
2. Remove the bolts in several passes.

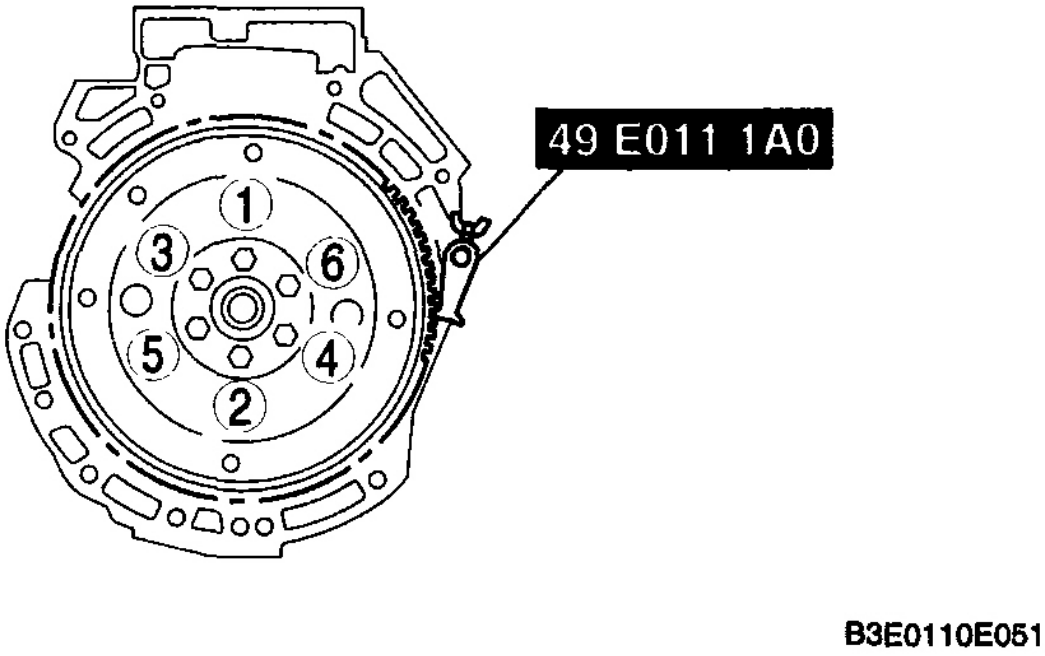
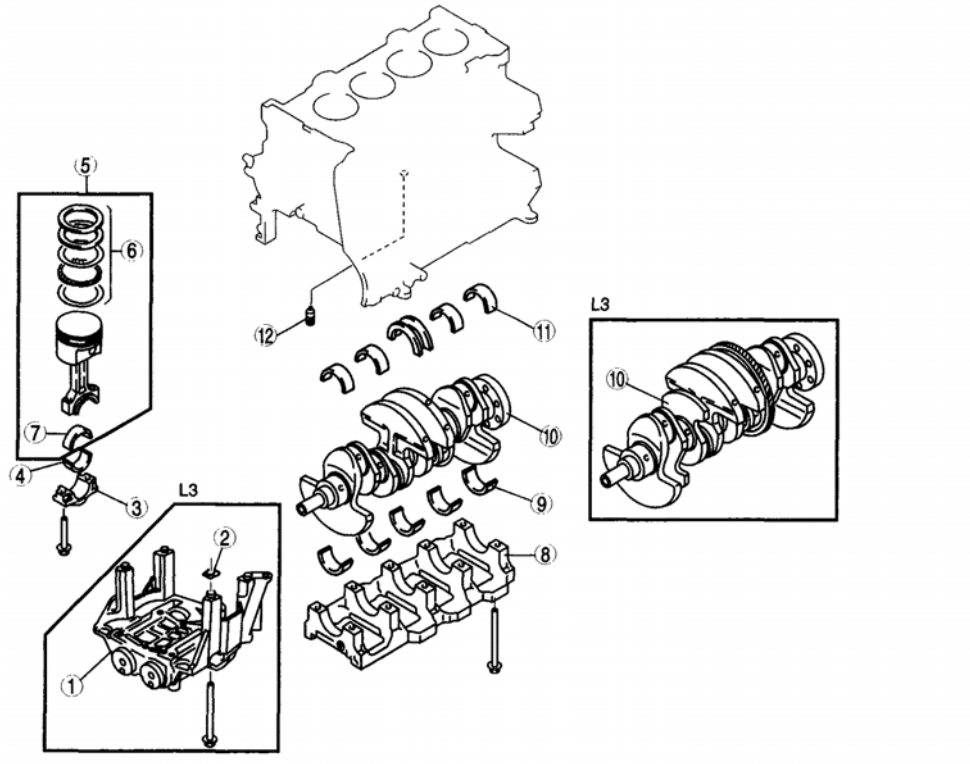


Fig. 18: Removal Sequence Of Drive Plate Or Flywheel Bolts
Courtesy of MAZDA MOTORS CORP.

CYLINDER BLOCK (II) DISASSEMBLY

1. Disassemble in the order indicated in the table.



1	Balancer unit
2	Adjustment shim
3	Connecting rod cap
4	Lower connecting rod bearing
5	Connecting rod, Piston component
6	Piston ring

7	Upper connecting rod bearing
8	Main bearing cap
9	Lower main bearing, thrust bearing
10	Crankshaft
11	Upper main bearing, thrust bearing
12	Oil jet valve

Fig. 19: Exploded View Of Cylinder Block (II) Disassembly
Courtesy of MAZDA MOTORS CORP.

Connecting Rod Cap Disassembly Note

1. Before removing connecting rod inspect the connecting rod side clearance. (See **CONNECTING ROD INSPECTION**).
2. Remove the connecting rod bolt from the connecting rod cap by tapping the bolt with a plastic hammer.

NOTE:

- **The tappets are numbered to make sure they are assembled in their original positions. When removed, keep the tappets with the cylinder head they were removed from. Do not mix the tappets.**

Main Bearing Cap Disassembly Note

1. Before removing main bearing cap inspect the crankshaft end play. (See **CRANKSHAFT**

INSPECTION).

2. Loosen the main bearing cap bolts in two or three steps in the order shown in the figure.

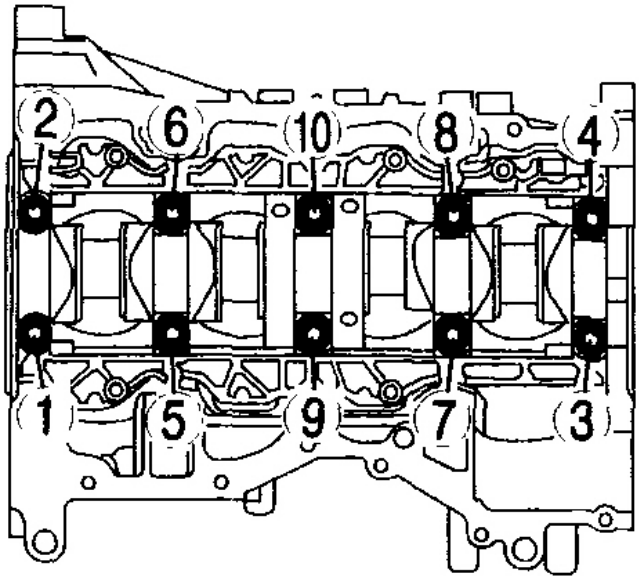


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Fig. 20: Loosening Main Bearing Cap Bolts
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD INSPECTION

1. Perform color contrast penetrate examination on the cylinder head surface.
   - Replace the cylinder head if necessary.
2. Inspect for the following and repair or replace if necessary.
   1. Sunken valve seats
   2. Excessive camshaft oil clearance and end play
3. Measure the cylinder head for distortion in six directions as shown in the figure.
   - If it exceeds the maximum specification, replace the cylinder head.

Cylinder head gasket contact surface distortion (Maximum)

0.10 mm {0.004 in}

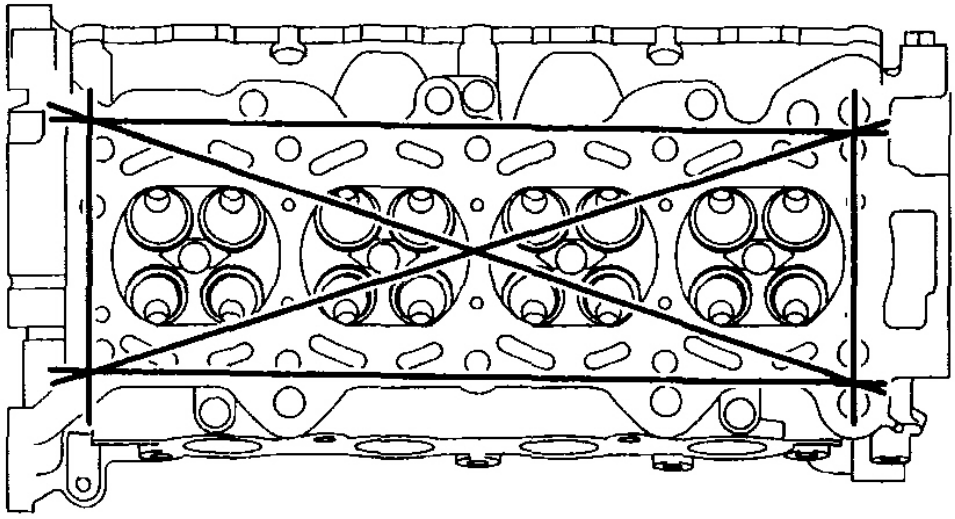

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Fig. 21: Measuring Cylinder Head For Distortion
Courtesy of MAZDA MOTORS CORP.

4. Measure the manifold contact surface distortion as shown in the figure.

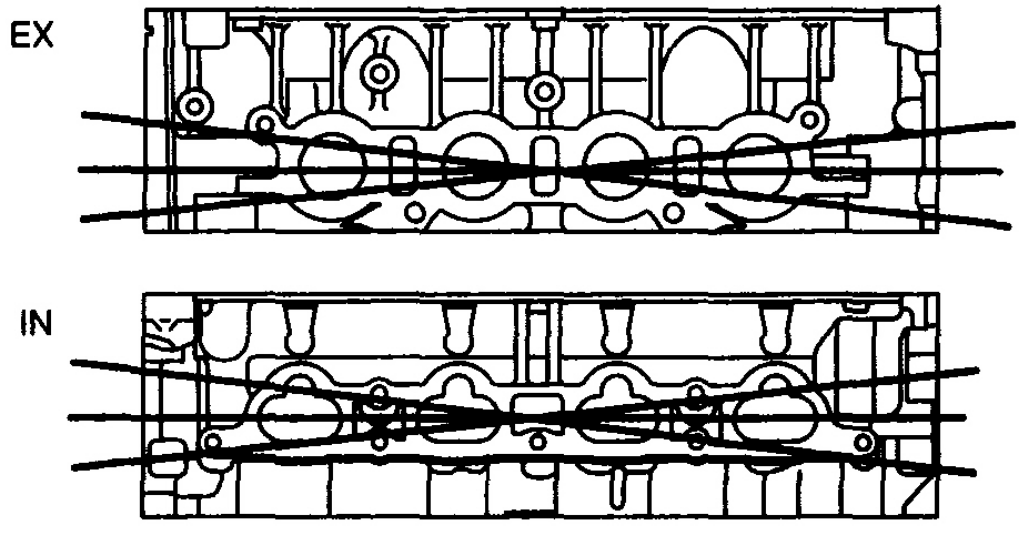

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Fig. 22: Measuring Manifold Contact Surface Distortion
Courtesy of MAZDA MOTORS CORP.

- If it exceeds the maximum specification, grind the surface or replace the cylinder head.

Manifold contact surfaces distortion (Maximum)

0.10 mm {0.004 in}

Manifold contact surfaces distortion (Maximum grinding)

0.15 mm {0.006 in}

VALVE, VALVE GUIDE INSPECTION

1. Measure the valve head margin thickness of each valve.
   - If it is less than the specification, replace the valve.

Valve head margin thickness (Minimum)

IN: 1.62 mm {0.0637 in}

EX: 1.82 mm {0.0716 in}

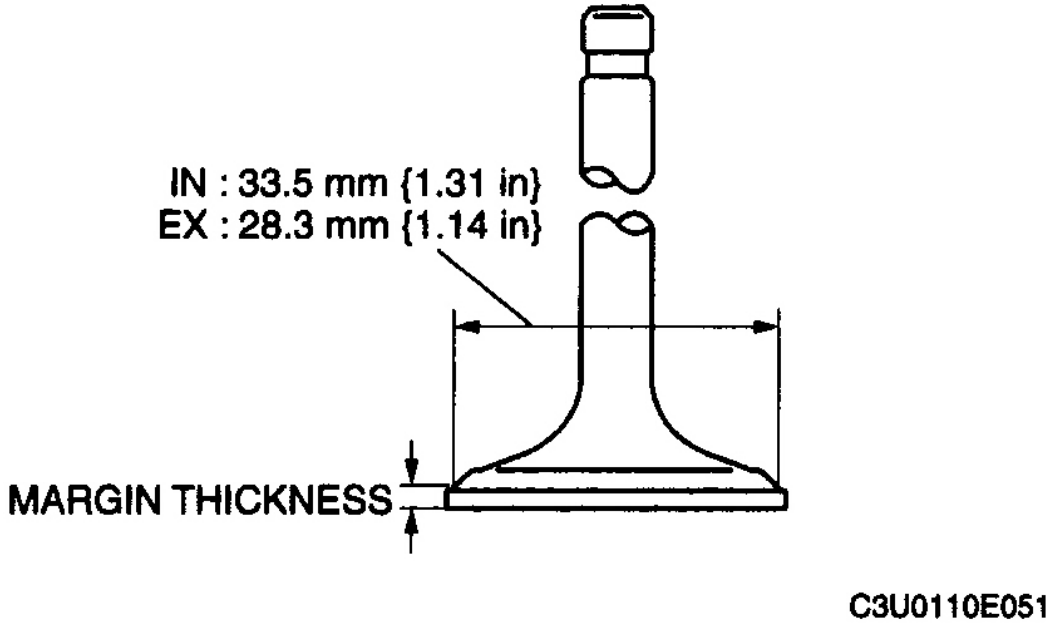

Fig. 23: Measuring Valve Head Margin Thickness Of Each Valve
Courtesy of MAZDA MOTORS CORP.

2. Measure the length of each valve. Replace the valve if necessary.
   - If it is less than the specification, replace the valve.

Valve length (Standard)

IN: 102.99-103.79 mm {4.055-4.086 in}

EX: 104.25-105.05 mm {4.105-4.135 in}

Valve length (Minimum)

IN: 102.99 mm {4.055 in}

EX: 104.25 mm {4.104 in}

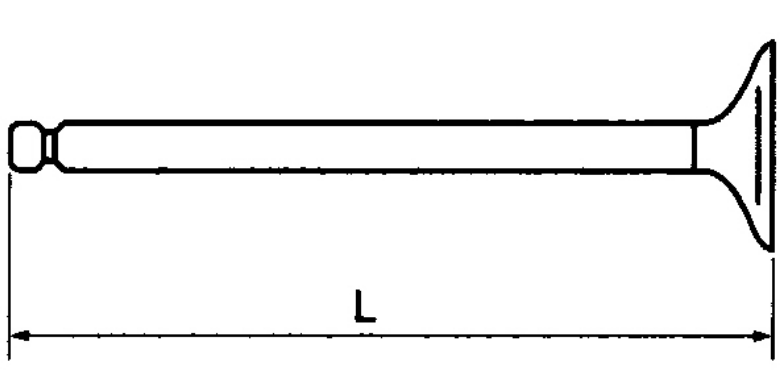

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Fig. 24: Measuring Length Of Each Valve
Courtesy of MAZDA MOTORS CORP.

3. Measure the stem diameter of each valve in X and Y directions at the three points (A, B, and C) as indicated in the figure.
   - If it exceeds the specification, replace the valve.

Valve stem diameter (Standard)

IN: 5.470-5.485 mm {0.2154-0.2159 in}

EX: 5.465-5.480 mm {0.2152-0.2157 in}

Valve stem diameter (Minimum)

IN: 5.440 mm {0.2142 in}

EX: 5.435 mm {0.2140 in}

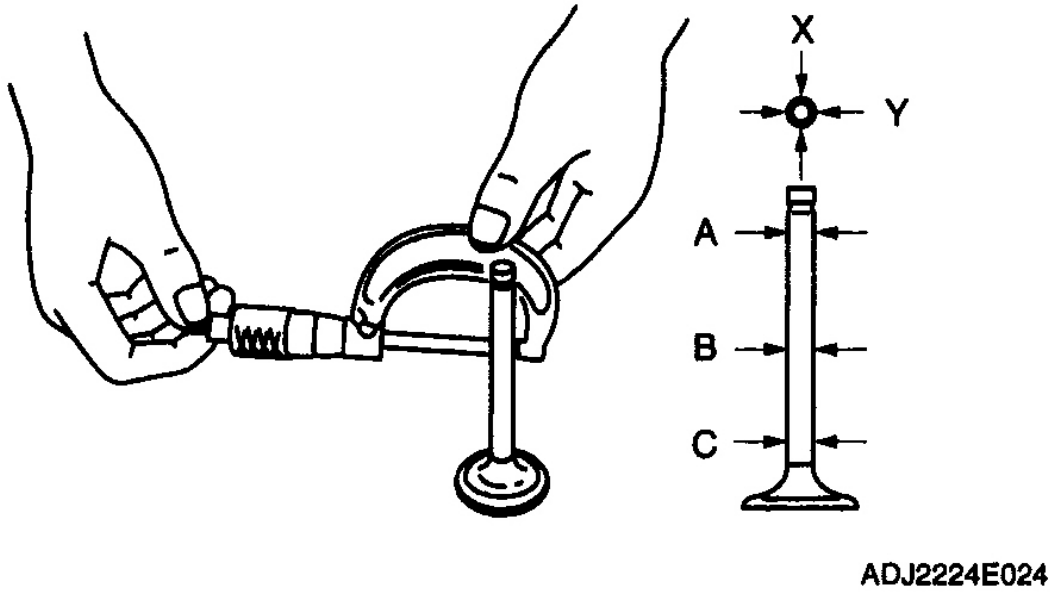

Fig. 25: Measuring Stem Diameter
Courtesy of MAZDA MOTORS CORP.

4. Measure the inner diameter of each valve guide in X and Y directions at the three points (A, B, and C) as indicated in the figure.
   - If not as specified, replace the valve guide.

Valve guide inner diameter (Standard)

5.509-5.539 mm {0.2169-0.2180 in}

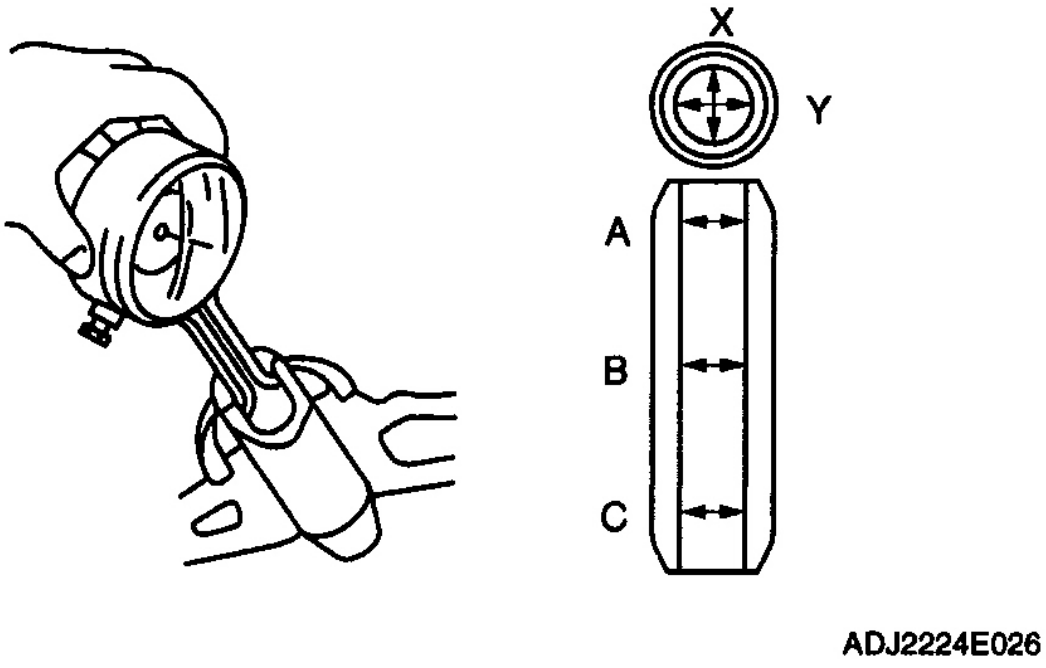

Fig. 26: Measuring Valve Guise Inner Diameter
Courtesy of MAZDA MOTORS CORP.

5. Calculate the valve stem to guide clearance by subtracting the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.
    - If it exceeds the specification, replace the valve and/or the valve guide.

Valve stem to guide clearance (Standard)

IN: 0.024-0.069 mm {0.0009-0.0027 in}

EX: 0.029-0.074 mm {0.0012-0.0029 in}

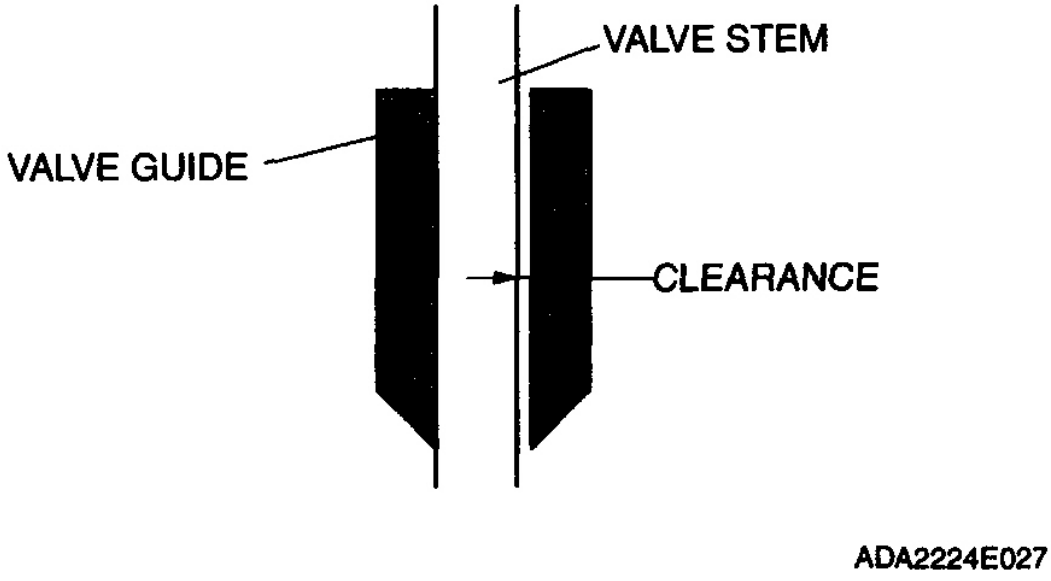

Fig. 27: Calculating Valve Stem To Guide Clearance
Courtesy of MAZDA MOTORS CORP.

Valve stem to guide clearance (Maximum) 0.10 mm {0.004 in}

6. Measure the protrusion height (dimension A) of each valve guide without lower valve spring seat.
    - If not within the specified, replace the valve guide.

Valve guide protrusion height (standard) 12.2-12.8 mm {0.481-0.503 in}

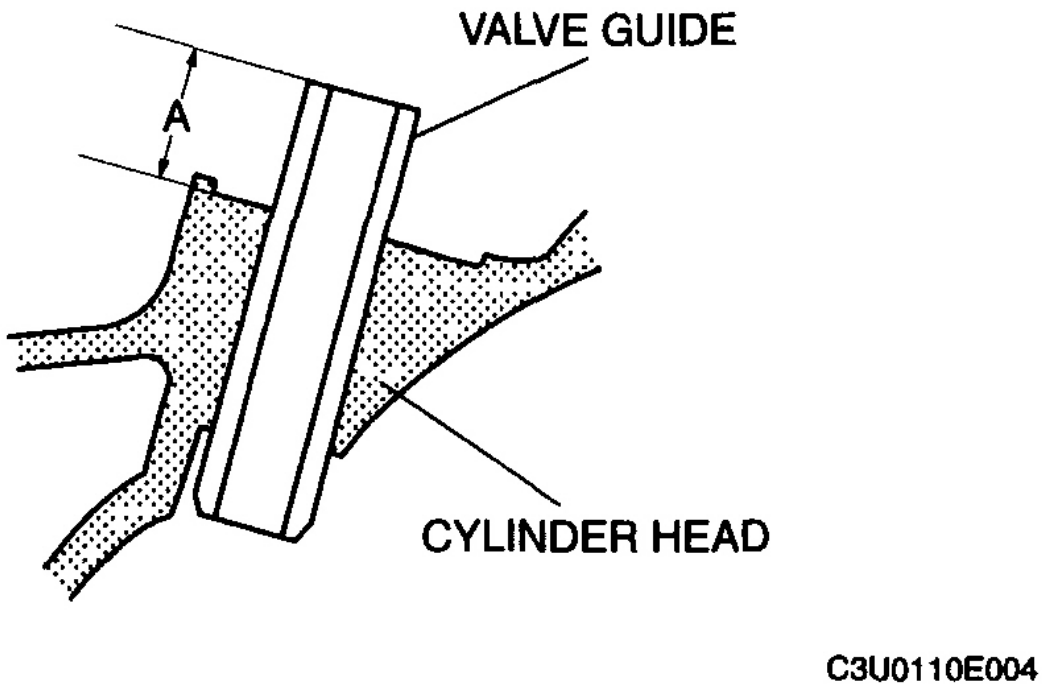

Fig. 28: Measuring Protrusion Height (Dimension A) Of Each Valve Guide
Courtesy of MAZDA MOTORS CORP.

VALVE GUIDE REPLACEMENT

Valve Guide Removal

1. Remove the valve guide from the combustion chamber side using the **SST** .

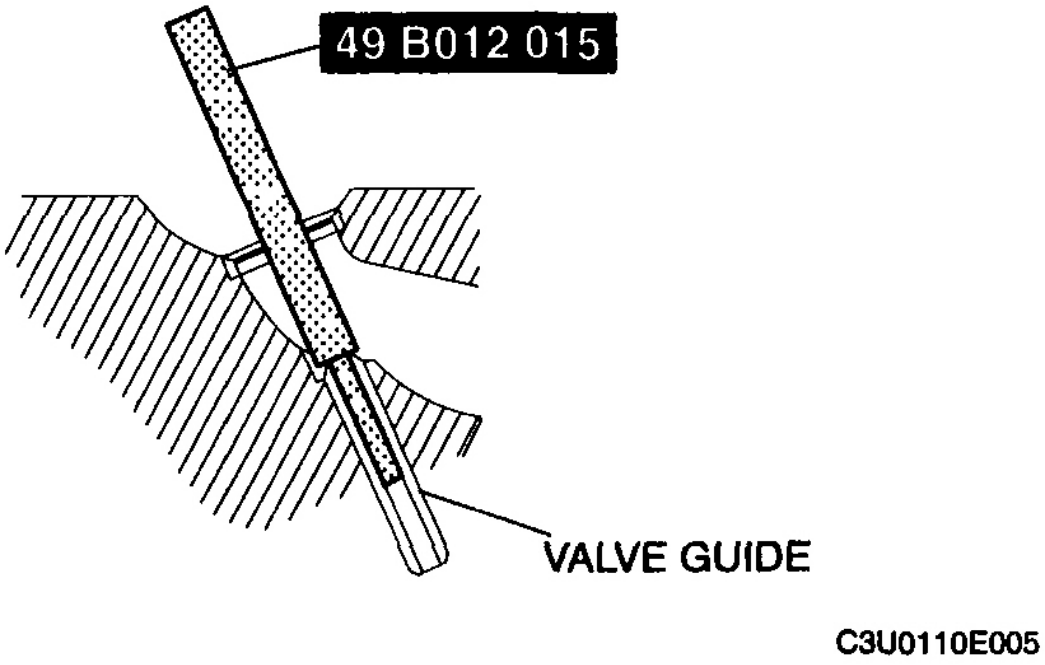

Fig. 29: Removing Valve Guide From Combustion Chamber Side
Courtesy of MAZDA MOTORS CORP.

Valve Guide Installation

1. Assemble the **SSTs** so that depth L is as specified.

   Valve guide protrusion height (standard)

   12.2-12.8 mm {0.481-0.503 in}

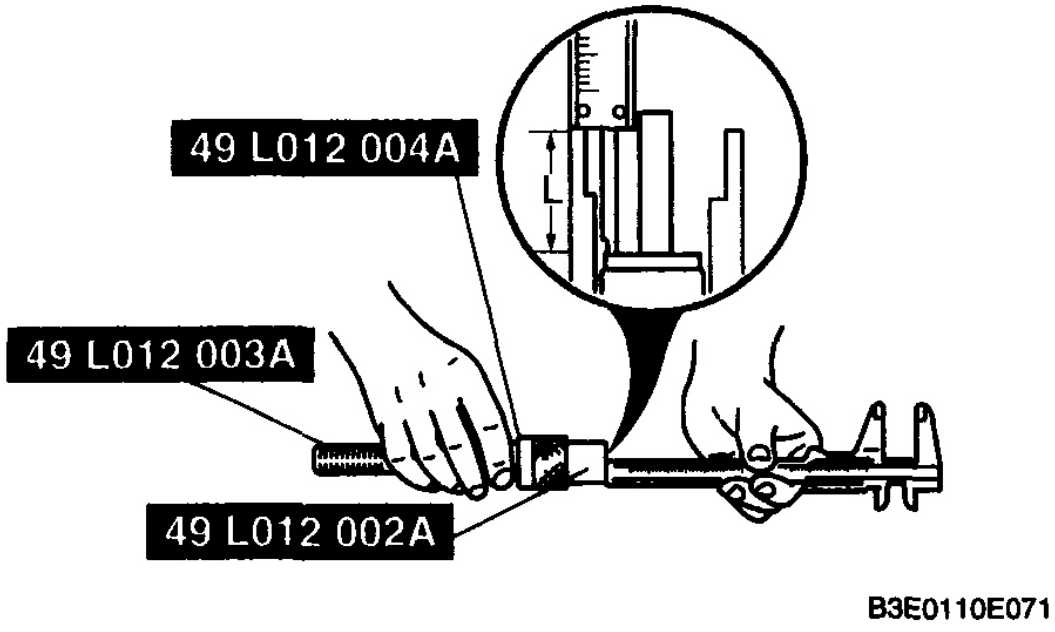

Fig. 30: Measuring Valve Guide Protrusion Height
Courtesy of MAZDA MOTORS CORP.

2. Tap the valve guide in from the top of the cylinder head until the **SSTs** contacts the cylinder head.

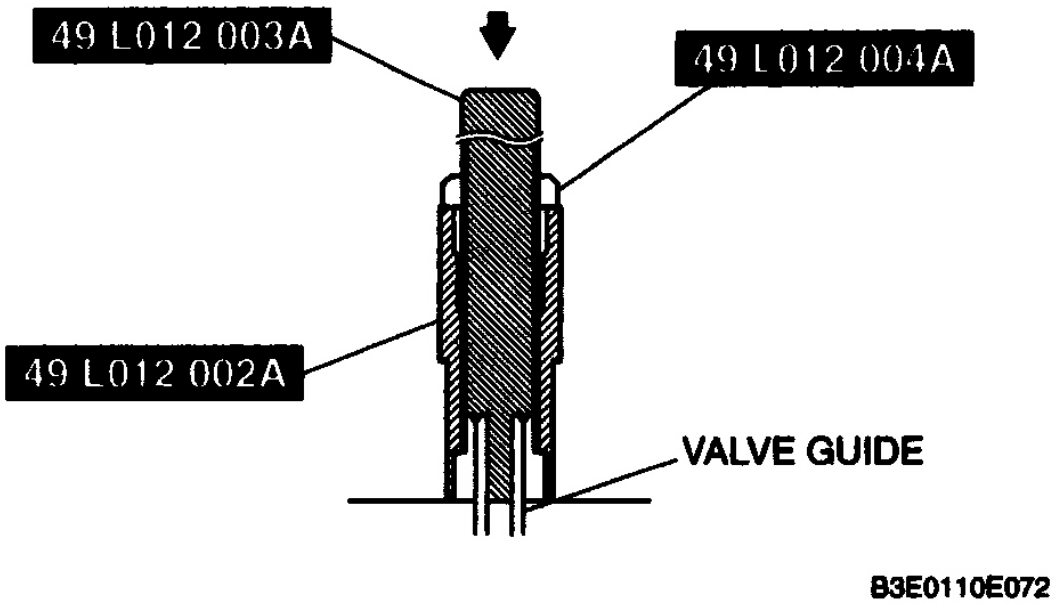

Fig. 31: Installing Valve Guide
Courtesy of MAZDA MOTORS CORP.

3. Verify that the valve guide protrusion height (dimension A) is within the specification.

   Valve guide protrusion height (standard)

   12.2-12.8 mm {0.481-0.503 in}

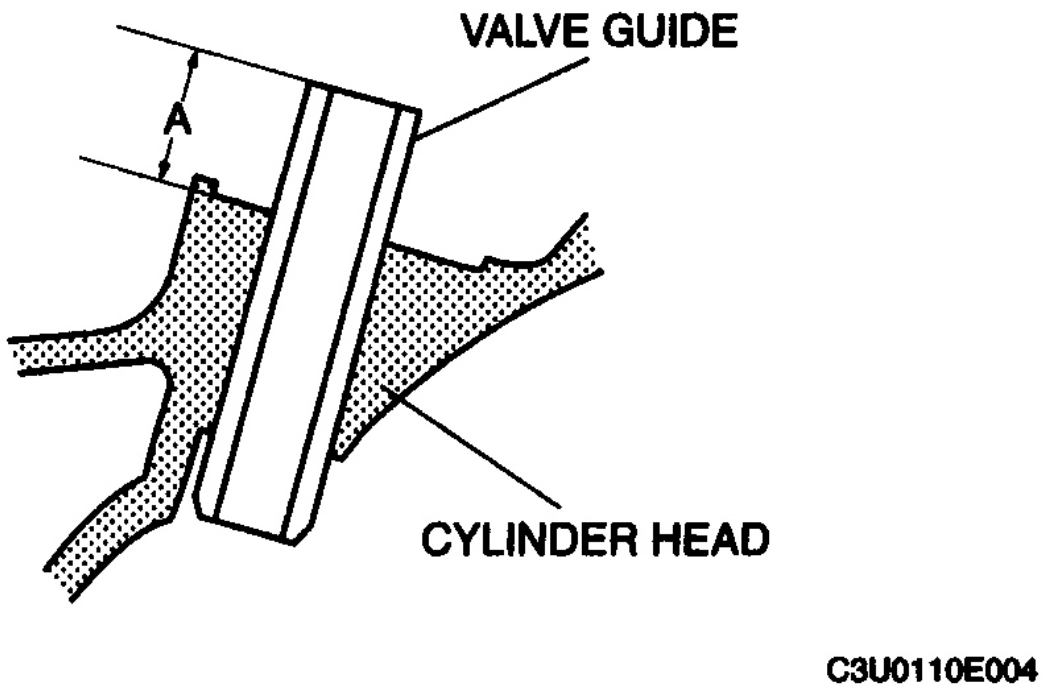

Fig. 32: Verifying Valve Guide Height
Courtesy of MAZDA MOTORS CORP.

VALVE SEAT INSPECTION/REPAIR

1. Measure the seat contact width.
    - If not within the specification, resurface the valve seat using a **45°** valve seat cutter and/or resurface the valve face.

Valve seat contact width (Standard)

1.2-1.6 mm {0.048-0.062 in}

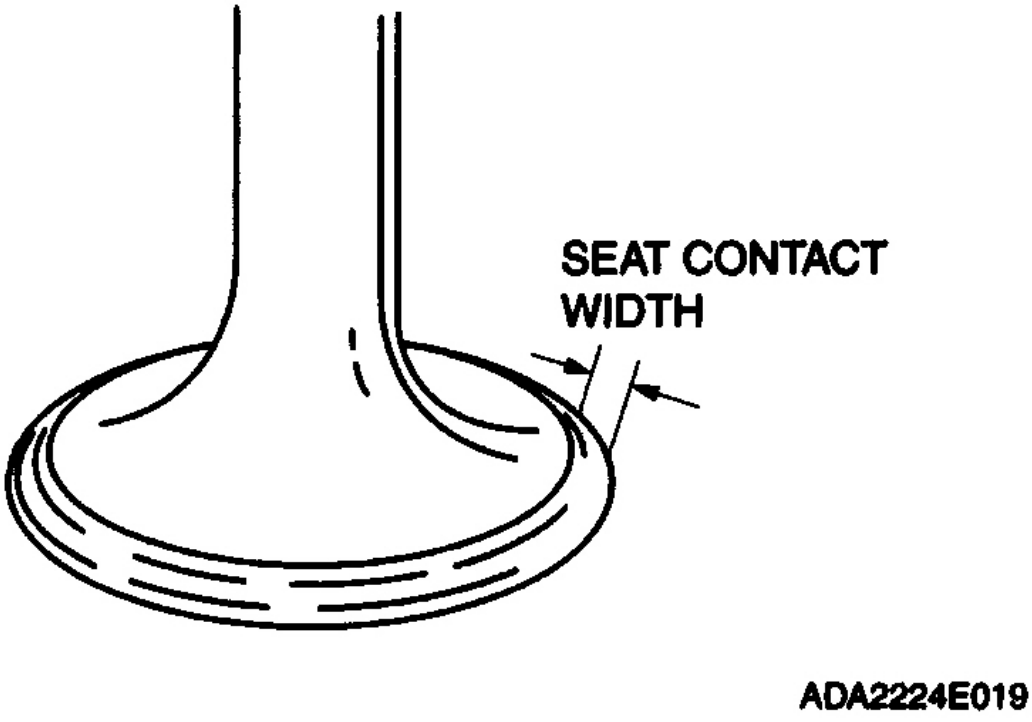

Fig. 33: Measuring Seat Contact Width
Courtesy of MAZDA MOTORS CORP.

2. Verify that the valve seating position is at the center of the valve face.
    1. If the seating position is too out side, correct the valve seat using a **70°** (IN) or **65°** (EX) cutter, and a **45°** cutter.
    2. If the seating position is too inner side, correct the valve seat using a **35°** (IN) cutter, and a **30°** (EX) cutter, and a **45°** cutter.

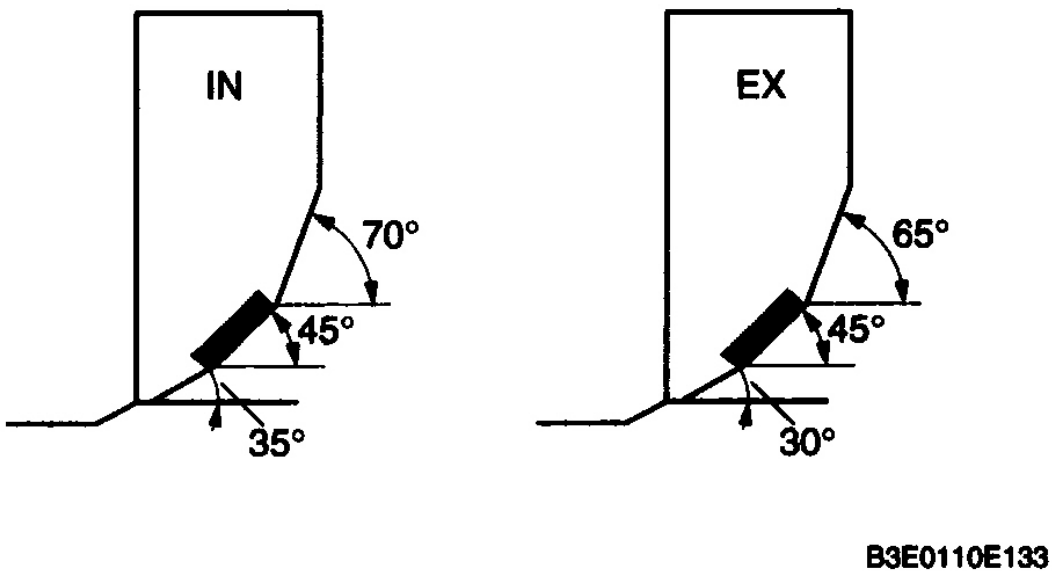

Fig. 34: Positioning Center Of Valve Face
Courtesy of MAZDA MOTORS CORP.

3. Inspect the sinking of the valve seat. Measure the protruding length (dimension L) of the valve stem.
   - If not specified, replace the cylinder head.

Valve protrusion height (Standard)

IN: 40.64-42.24 mm {1.600-1.662 in}

EX: 40.50-42.10 mm {1.595-1.657 in}

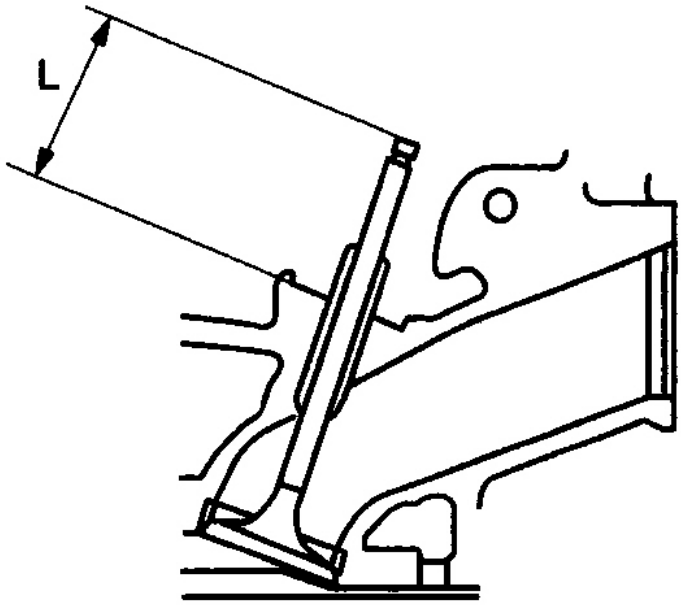

Fig. 35: Measuring Protruding Length (Dimension L) Of Valve Stem
Courtesy of MAZDA MOTORS CORP.

VALVE SPRING INSPECTION

1. Apply pressing force to the pressure spring and inspect the spring height.
   - If it is less than the specification, replace the valve spring.

Valve spring pressing force

390 N {39.76 kgf, 87.67 lbf}

Valve spring standard height H

28.68 mm {1.129 in}

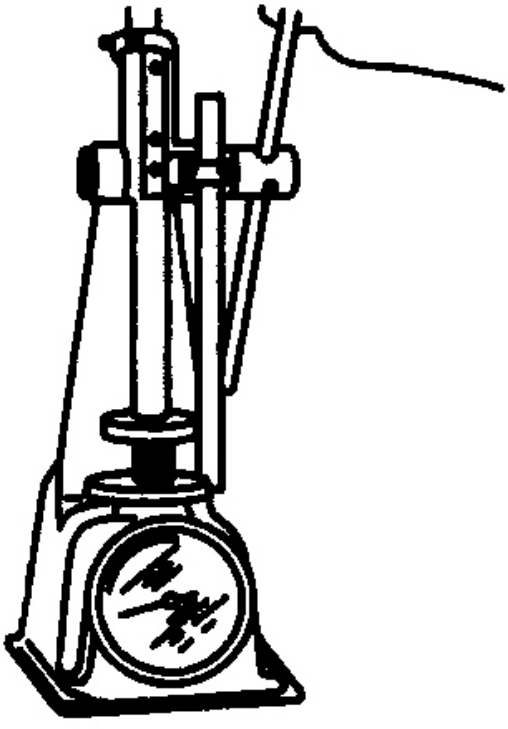

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Fig. 36: Performing Valve Spring Inspection
Courtesy of MAZDA MOTORS CORP.

2. Measure the out-of-square of the valve spring, using a square, as shown in the figure.
    1. Rotate the valve spring one full turn and measure "A" at the point where the gap is the largest.
        - If it exceeds the specification, replace the valve spring.

Valve spring out-of-square (Maximum)

1.95 mm {0.0767 in}

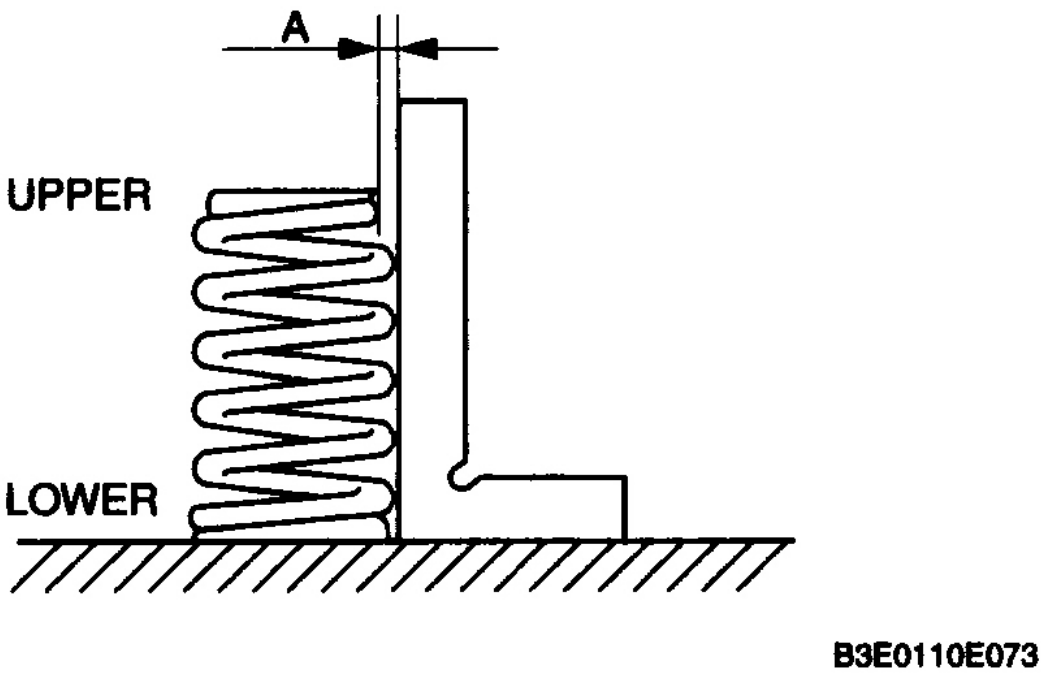

Fig. 37: Measuring Valve Spring Out-Of-Square
Courtesy of MAZDA MOTORS CORP.

CAMSHAFT INSPECTION

1. Set the No. 1 and No.5 journals on V-blocks.
2. Measure the camshaft runout.
   - If it exceeds the specification, replace the camshaft.

Maximum runout (Maximum)

0.03 mm {0.0012 in}

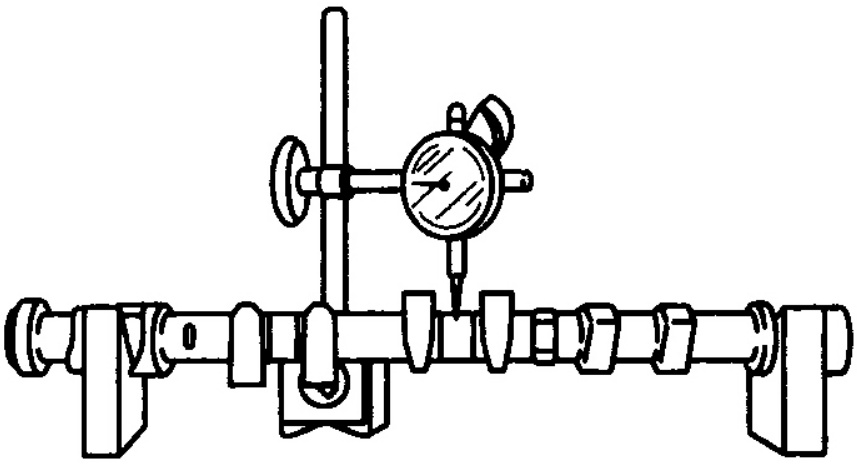

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Fig. 38: Measuring Camshaft Runout
Courtesy of MAZDA MOTORS CORP.

3. Measure the cam lobe height at the two points as shown in the figure.
   - If it is less than the specification, replace the camshaft.

Camshaft standard height (mm {in})

With variable valve timing mechanism

IN: 42.44 {1.671}

EX: 41.18 {1.621}

Without variable valve timing mechanism

IN: 42.12 {1.659}

EX: 41.08 {1.618}

Camshaft minimum height (mm {in})

With variable valve timing mechanism

IN: 42.33 {1.666}

EX: 41.06 {1.616}

Without variable valve timing mechanism

IN: 42.01 {1.653}

EX: 40.96 {1.612}

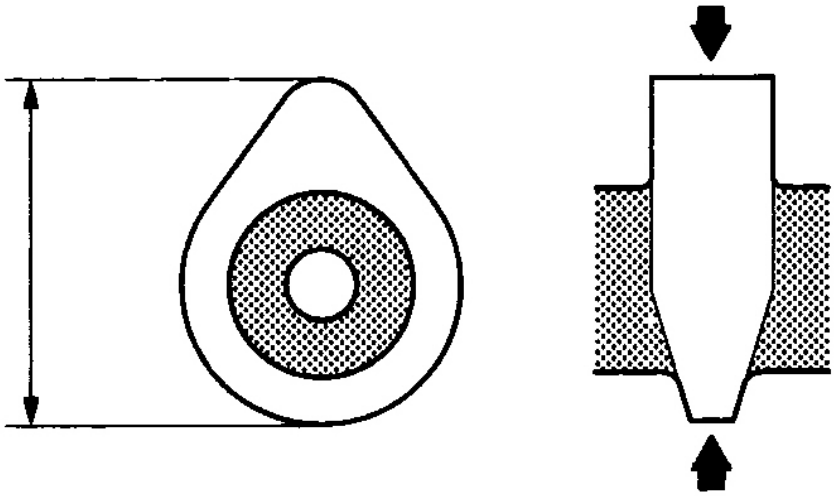

Fig. 39: Measuring Cam Lobe Height At Two Points
Courtesy of MAZDA MOTORS CORP.

4. Measure the journal diameters in X and Y directions at the two points (A and B) as indicated in the figure.
    - If it is less than the specification, replace the camshaft.

Camshaft journal diameter (Standard)

24.96-24.98 mm {0.9827-0.9834 in}

Camshaft journal diameter (Minimum)

24.95 mm {0.982 in}

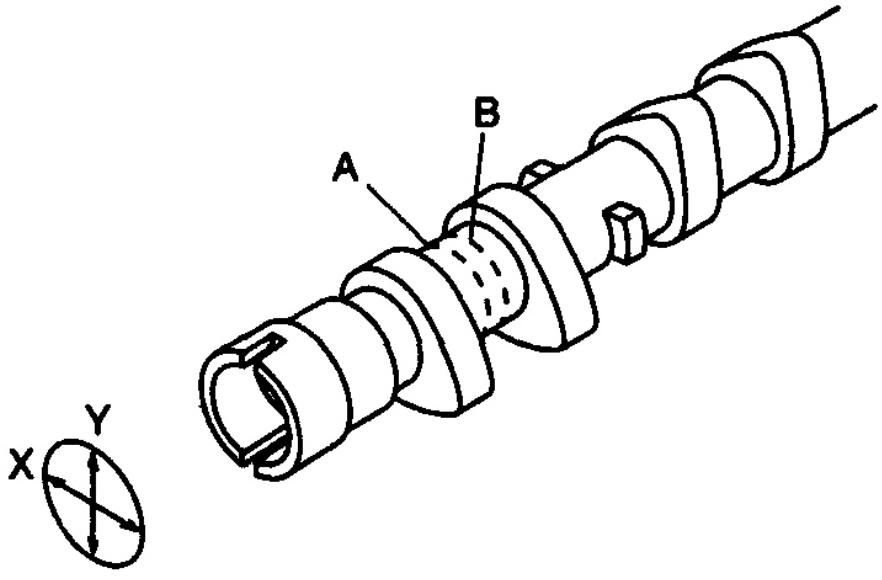

Fig. 40: Measuring Journal Diameters In X And Y Directions At Two Points (A And B)
Courtesy of MAZDA MOTORS CORP.

5. Remove the tappet.
6. Position a plastigage atop the journals in the axial direction.
7. Install the camshaft cap. (See **CAMSHAFT ASSEMBLY NOTE**).
8. Remove the camshaft cap. (See **CAMSHAFT CAP DISASSEMBLY NOTE**).
9. Measure the oil clearance.
    - If it exceeds the specification, replace the cylinder head.

Camshaft journal oil clearance (Standard)

0.035-0.080 mm {0.0014-0.0031 in}

Camshaft journal oil clearance (Maximum)

0.09 mm {0.0035 in}

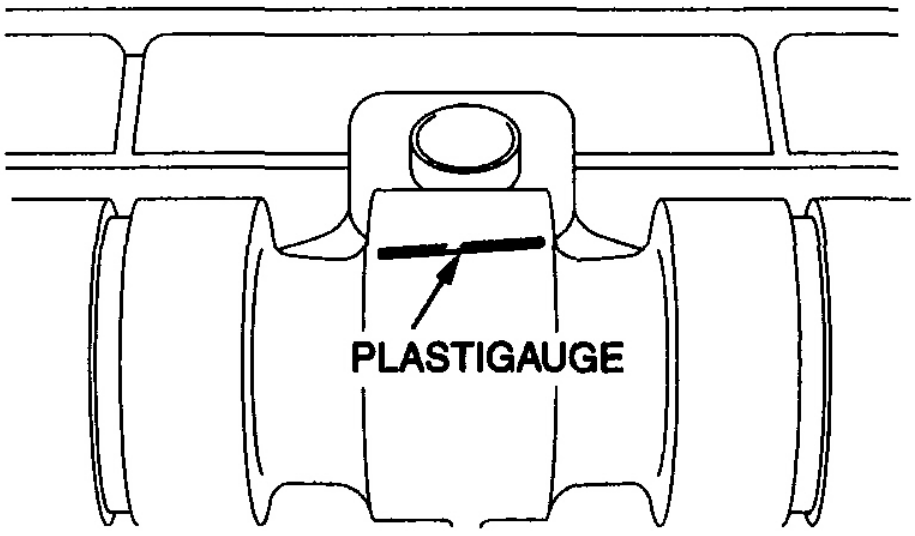

Fig. 41: Measuring Oil Clearance Using Plastigauge
Courtesy of MAZDA MOTORS CORP.

10. Install the camshaft cap. (See **CAMSHAFT ASSEMBLY NOTE**).
11. Measure the camshaft end play.
    - If it exceeds the specification, replace the cylinder head or camshaft.

    Camshaft end play (Standard)

    0.09-0.24 mm {0.0035-0.0094 in}

    Camshaft end play (Maximum)

    0.25 mm {0.0098 in}

12. Remove the camshaft cap. (See **CAMSHAFT CAP DISASSEMBLY NOTE**).

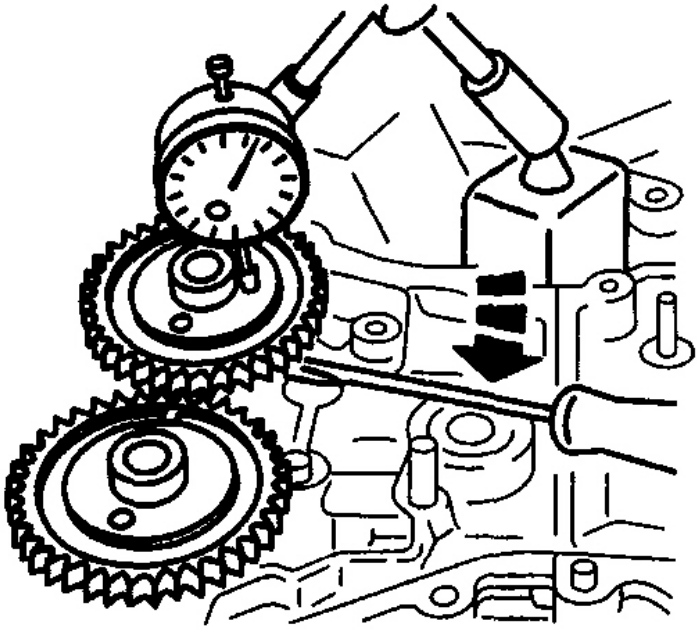

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Fig. 42: Measuring Camshaft End Play
Courtesy of MAZDA MOTORS CORP.

TAPPET INSPECTION

1. Measure the tappet hole inner diameter in X and Y directions at the two points (A and B) shown in the figure.

   Tappet bore diameter (Standard)

   31.000-31.030 mm {1.2205-1.2216 in}

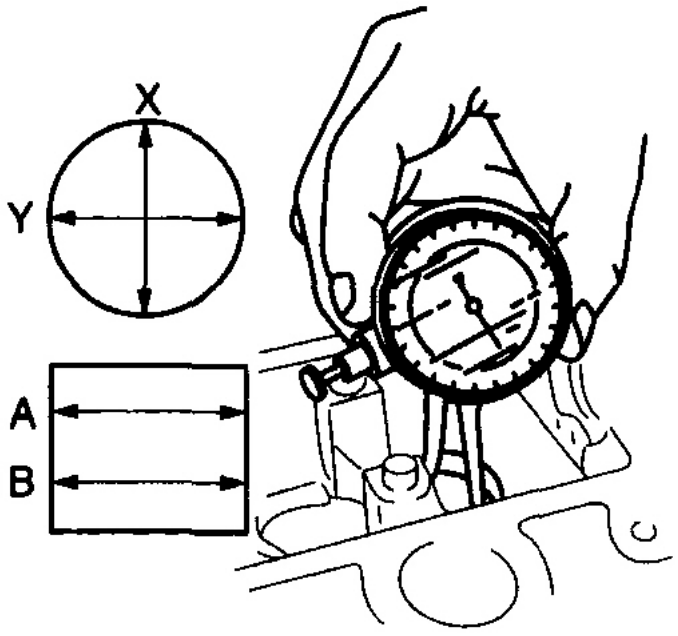

Fig. 43: Measuring Tappet Hole Inner Diameter
Courtesy of MAZDA MOTORS CORP.

2. Measure the tappet body outer diameter in X and Y directions at the two points (A and B) shown in the figure.

   Tappet diameter (Standard)

   30.970-30.980 mm {1.2193-1.2196 in}

3. Subtract the tappet body outer diameter from the tappet hole inner diameter.
   - If it exceeds the specification, replace the tappet or cylinder head.

   Tappet-to-Tappet bore oil clearance (Standard)

   0.02-0.06 mm {0.0008-0.0023 in}

   Tappet-to-Tappet bore oil clearance (Maximum)

   0.15 mm {0.006 in}

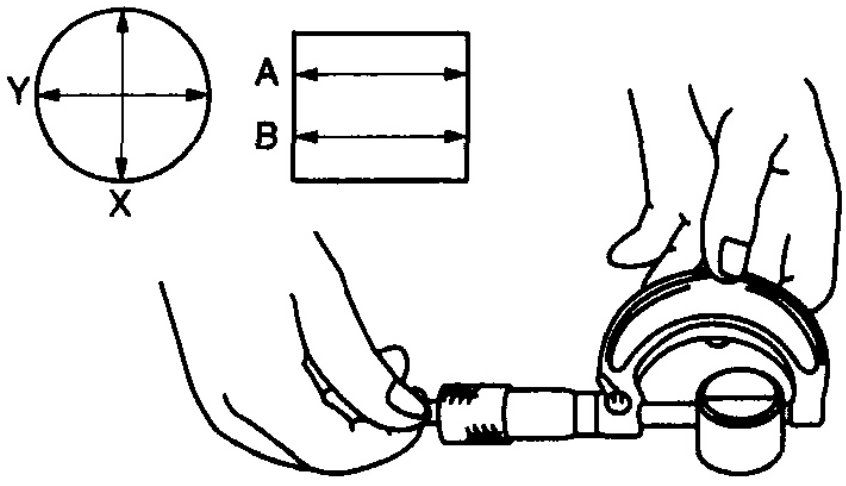

Fig. 44: Measuring Tappet Body Outer Diameter In X And Y Directions At Two Points (A And B)
Courtesy of MAZDA MOTORS CORP.

CYLINDER BLOCK INSPECTION

1. Measure the distortion of the cylinder block top surface in six directions as indicated in the figure.
   - If it exceeds the maximum, replace the cylinder block.

   Cylinder head gasket contact surfaces distortion (Maximum)

   0.10 mm {0.004 in}

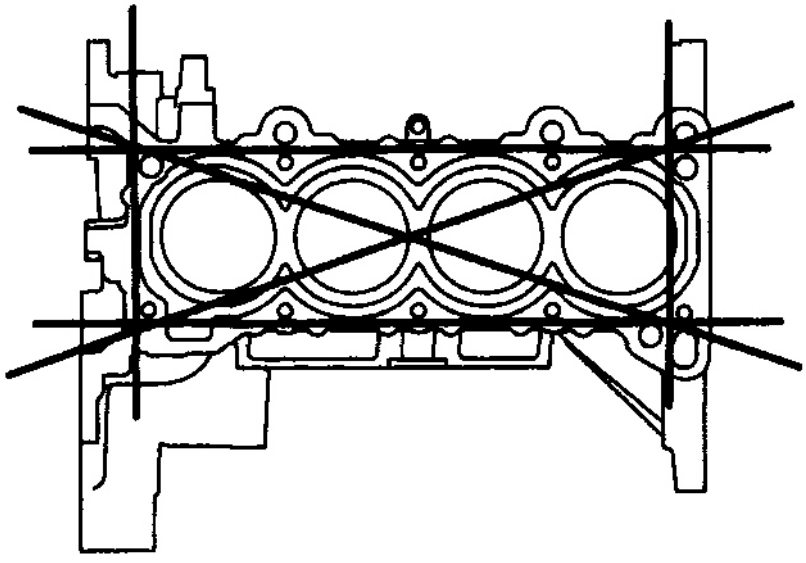

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Fig. 45: Measuring Distortion Of Cylinder Block Top Surface In Six Directions
Courtesy of MAZDA MOTORS CORP.

2. Measure the cylinder bores in X and Y directions at 42 mm {1.65 in} below the top surface.
   - If not within the specification, replace the cylinder block.

Cylinder bore diameter (Standard)

87.500-87.530 mm {3.4449-3.4460 in}

Minimum / maximum bore diameter limit

87.440-87.590 mm {3.4425-3.4484 in}

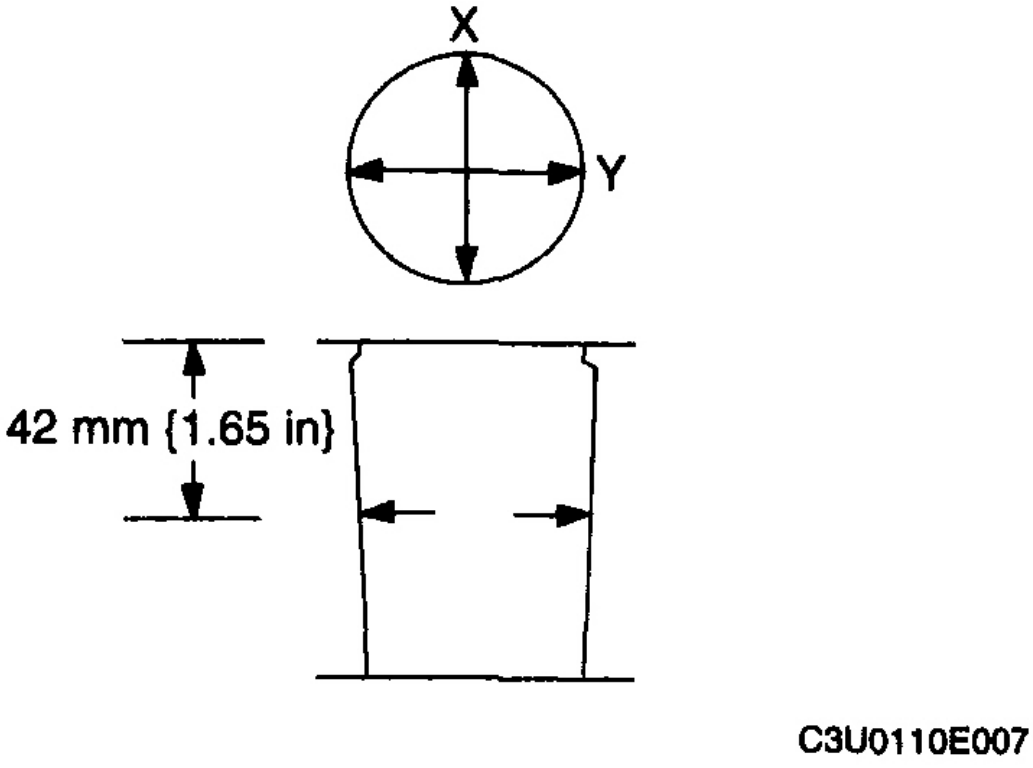

Fig. 46: Measuring Cylinder Bores In X And Y Directions At Below Top Surface
Courtesy of MAZDA MOTORS CORP.

OIL JET VALVE INSPECTION

1. Apply compressed air to oil jet valve A and verify that air passes through oil jet valve B.
   - If air does not flow, replace the oil jet valve.

Oil jet valve air pressure

216-274 kPa {2.2-2.7 kgf.cm^2 31.4-39.7 psi}

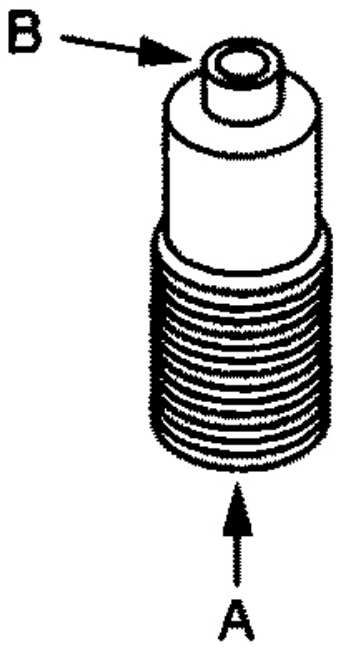

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Fig. 47: Inspecting Oil Jet Valve
Courtesy of MAZDA MOTORS CORP.

PISTON INSPECTION

CAUTION:
- **The piston and connecting rod cannot be disassembled.**
- **When replacing the piston, piston pin, piston ring and connecting rod, replace them together as a single unit.**

1. Measure the outer diameter of each piston at right angle 90° to the piston pin, 10.0 mm {0.40 in} above the under of the piston.
   - If not within the specification, replace the piston, piston pin, piston ring and connecting rod as a single unit.

Piston diameter (Standard)

87.465-87.495 mm {3.4435-3.4446 in}

2. Measure the piston-to-cylinder clearance.
   - If not within the specification, replace the piston, piston pin, piston ring and connecting rod as a single unit.

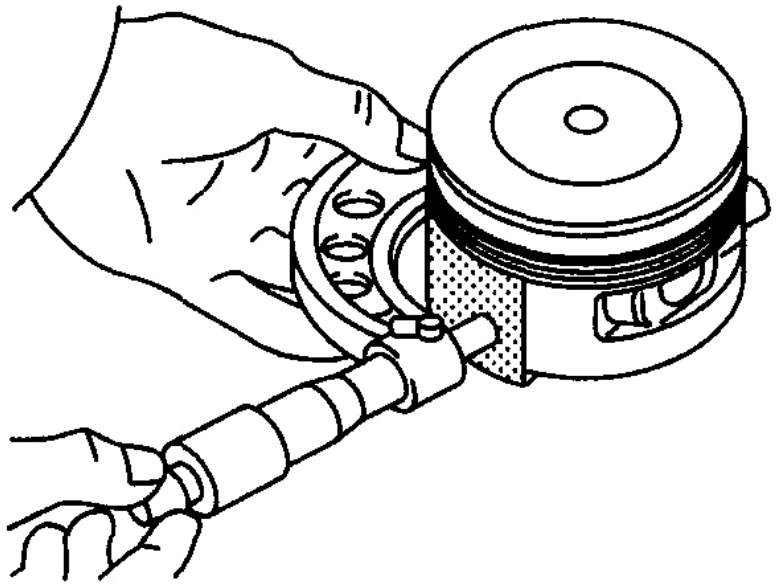

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Fig. 48: Measuring Piston-To-Cylinder Clearance
Courtesy of MAZDA MOTORS CORP.

Piston-to-cylinder clearance (Standard)

0.025-0.045 mm {0.0010-0.0017 in}

Piston-to-cylinder clearance (Maximum)

0.11 mm {0.0043 in}

3. Measure the piston ring-to-ring groove clearance around the entire circumference.
   - If it exceeds the specification, replace the piston, piston pin, piston ring and connecting rod as a single unit.

Piston ring-to-ring groove clearance (Standard)

Top: 0.03-0.08 mm {0.0012-0.0031 in}

Second: 0.03-0.07 mm {0.0012-0.0027 in}

Oil: 0.03-0.07 mm {0.0012-0.0027 in}

Piston ring-to-ring groove clearance (Maximum)

Top: 0.17 mm {0.0067 in}

Second, Oil: 0.15 mm {0.0059 in}

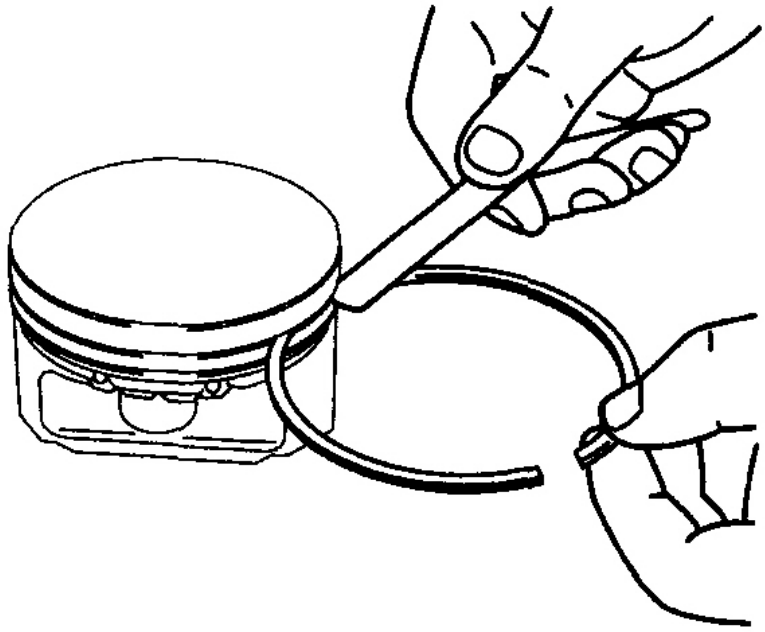

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Fig. 49: Measuring Piston Ring-To-Ring Groove Clearance
Courtesy of MAZDA MOTORS CORP.

4. Insert the piston ring into the cylinder by hand and use the piston to push it to the bottom of the ring travel.
5. Measure each piston ring end gap with a feeler gauge.
    - If it exceeds the specification, replace the piston, piston pin, piston ring and connecting rod as a single unit.

Piston end gap (Standard)

Top: 0.16-0.31 mm {0.0063-0.0122 in}

Second: 0.33-0.48 mm {0.0130-0.0189 in}

Oil (rail): 0.20-0.70 mm {0.0079-0.0275 in}

Piston end gap (Maximum)

1.0 mm {0.0393 in}

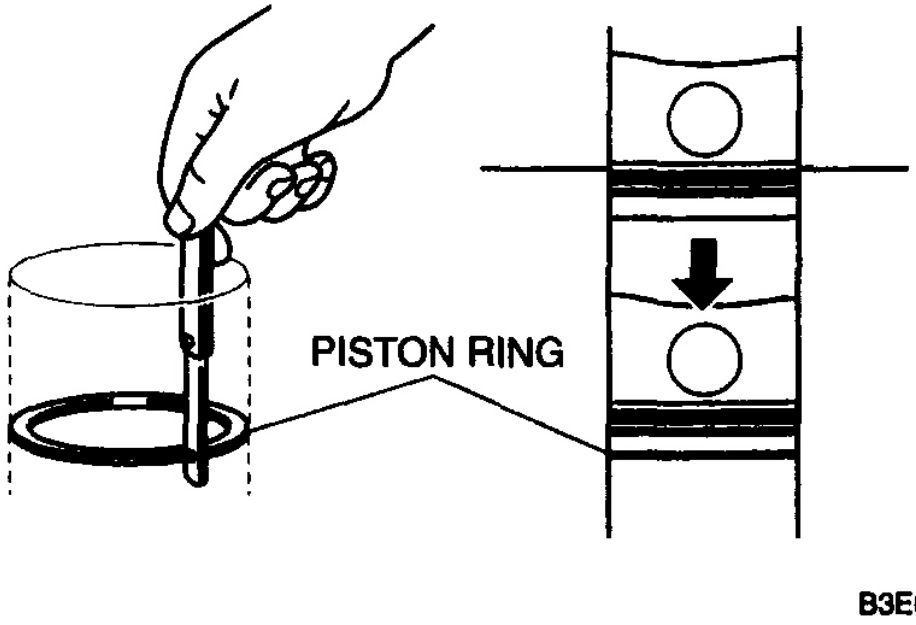

Fig. 50: Measuring Each Piston Ring End Gap With Feeler Gauge
Courtesy of MAZDA MOTORS CORP.

CRANKSHAFT INSPECTION

1. Install the main bearing cap. (See **MAIN BEARING CAP ASSEMBLY NOTE**).
2. Measure the crankshaft end play.
   - If it exceeds the specification, replace the thrust bearing or crankshaft so that the specified end play is obtained.

Crankshaft end play (Standard)

0.22-0.45 mm {0.0087-0.0177 in}

Crankshaft end play (Maximum)

0.55 mm {0.0216 in}

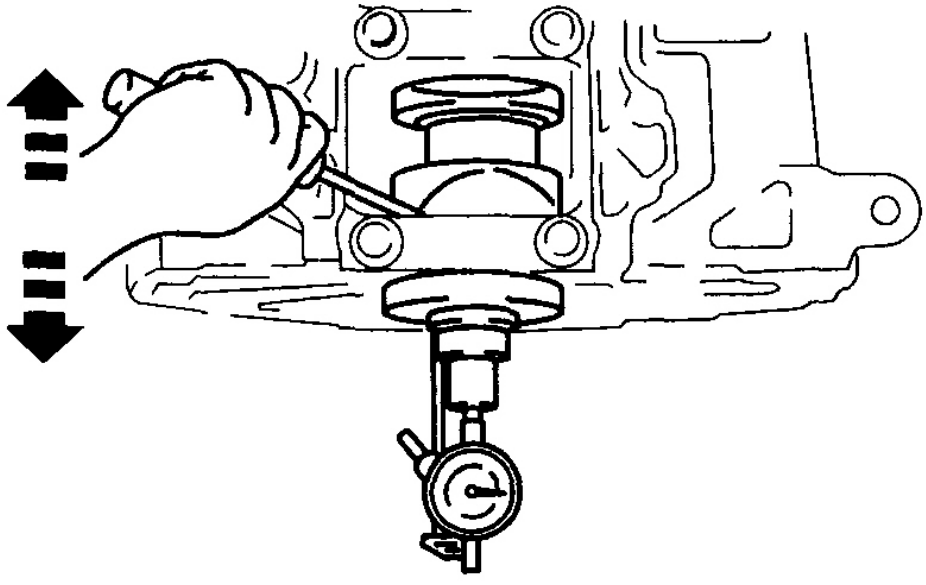

Fig. 51: Measuring Crankshaft End Play
Courtesy of MAZDA MOTORS CORP.

3. Remove the main bearing cap. (See **MAIN BEARING CAP DISASSEMBLY NOTE**).
4. Measure the crankshaft runout.
   - If it exceeds the specification, replace the crankshaft.

Crankshaft runout (Maximum)

0.05 mm {0.0019 in}

5. Measure the journal diameter in X and Y directions at the two points (A and B) as indicated in the figure.
   - If it exceeds the specification, replace the crankshaft or grind the journal and install the undersize bearing.

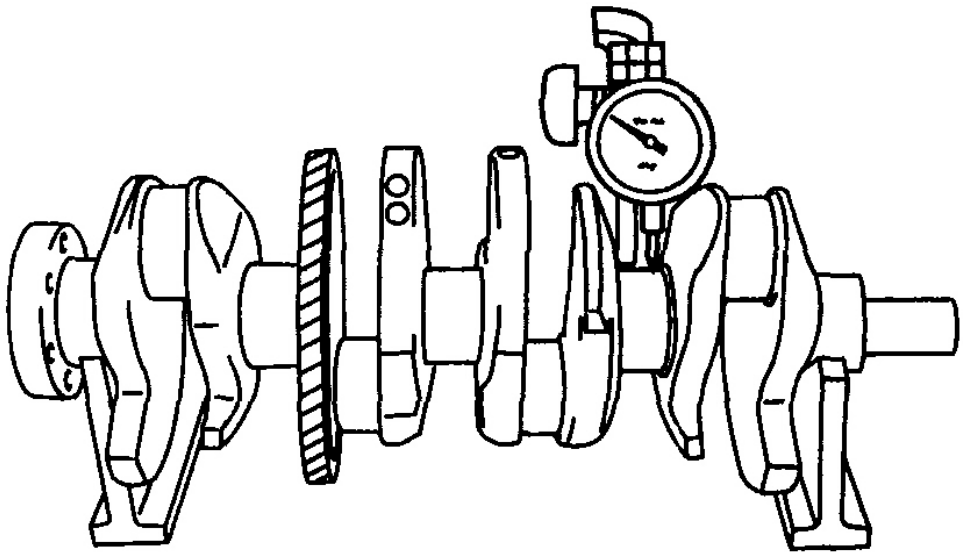

Fig. 52: Measuring Crankshaft Runout
Courtesy of MAZDA MOTORS CORP.

Main journal bearing size

STD: 51.980-52.000 mm {2.0464-2.0472 in}

US0.25: 51.730-51.750 mm {2.0366-2.0373 in}

Main journal out of round (Maximum)

0.05 mm {0.0019 in}

Crank pin journal diameter [LF]

STD: 46.980-47.000 mm {1.8497-1.8503 in}

US0.25: 46.730-46.750 mm {1.8398-1.8405 in}

Crank pin journal diameter [L3]

STD: 49.980-50.000 mm {1.9677-1.9685 in}

US0.25: 49.730-49.750 mm {1.9579-1.9586 in}

Crank pin out of round (Maximum)

0.05 mm {0.0019 in}

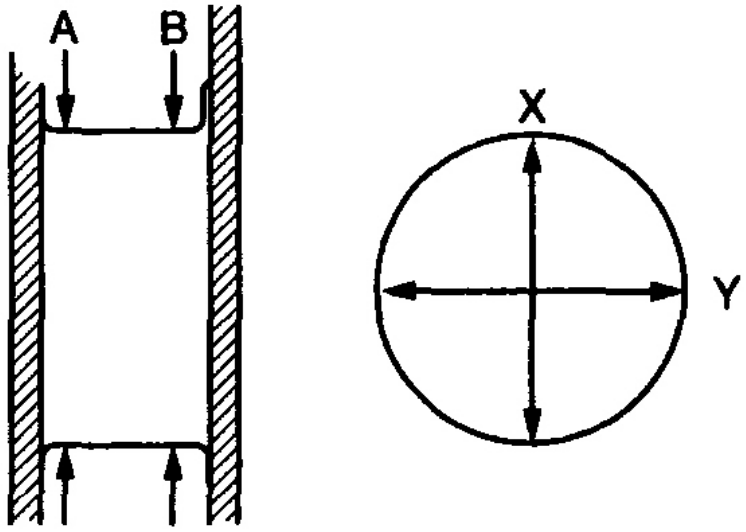

Fig. 53: Measuring Journal Diameter In X And Y Directions At Two Points (A And B)
Courtesy of MAZDA MOTORS CORP.

6. Install the main bearing caps and crankshaft.
7. Position a plastigage atop the journals in the axial direction.
8. Install the main bearing caps and cylinder block. (See **MAIN BEARING CAP ASSEMBLY NOTE**).
9. Remove the main bearing caps. (See **MAIN BEARING CAP DISASSEMBLY NOTE**).
10. Measure the main journal oil clearance.
    - If it exceeds the specification, replace the main bearing using the main bearing selection table or grind the main journal and install the oversize bearings so that the specified oil clearance is obtained.

Main journal oil clearance (Standard)

0.019-0.035 mm {0.0007-0.0013 in}

Main journal oil clearance (Maximum)

0.10 mm {0.0039 in}

Main bearing size

STD: 2.506-2.509 mm {0.0987-0.0988 in}

OS0.25: 2.628-2.634 mm {0.1034-0.1037 in}

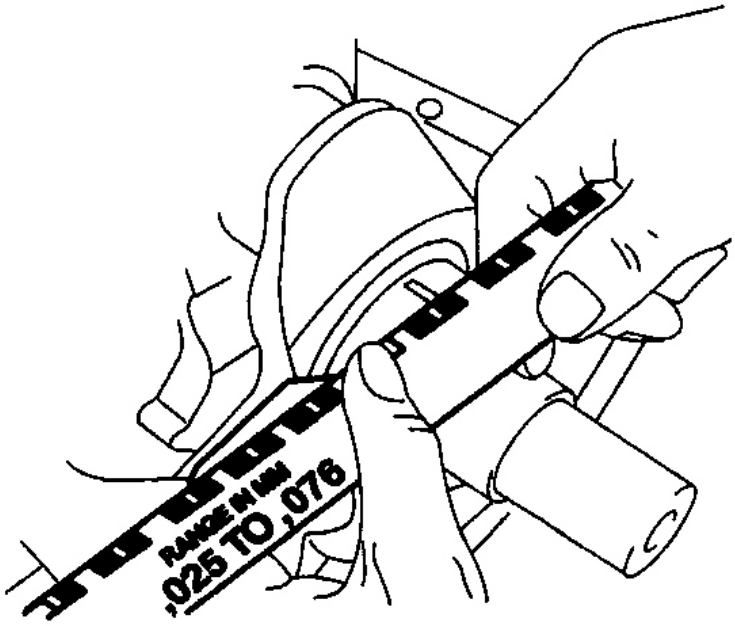

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Fig. 54: Measuring Main Journal Oil Clearance
Courtesy of MAZDA MOTORS CORP.

CONNECTING ROD INSPECTION

CAUTION:
- **The piston and connecting rod cannot be disassembled.**
- **When replacing the piston, piston pin, piston ring and connecting rod, replace them together as a single unit.**

1. Install the connecting rod cap. (See **CONNECTING ROD CAP ASSEMBLY NOTE**).
2. Measure the connecting rod large end side clearance.
   - If it exceeds the specification, replace the piston, piston pin, piston ring and connecting rod as a

single unit.

Connecting rod side clearance (Standard)

0.14-0.36 mm {0.0056-0.0141 in}

Connecting rod side clearance (Maximum)

0.435 mm {0.0172 in}

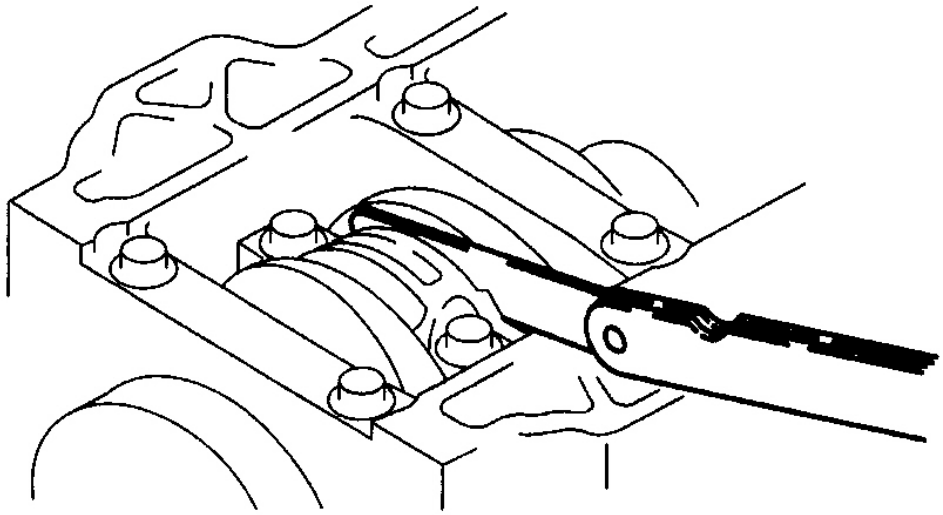

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Fig. 55: Measuring Connecting Rod Large End Side Clearance
Courtesy of MAZDA MOTORS CORP.

3. Remove the connecting rod cap.
4. Position plastigage atop the journals in the axial direction.
5. Install the connecting rod bearing and connecting rod cap. (See **CONNECTING ROD CAP ASSEMBLY NOTE**).
6. Remove the connecting rod cap.
7. Measure the connecting rod oil clearance.
   - If it exceeds the specification, replace the connecting rod bearing or grind the crank pin and use oversize bearings so that the specified clearance is obtained.

Connecting rod bearing oil clearance (Standard)

0.026-0.052 mm {0.0011-0.0020 in}

Connecting rod bearing oil clearance (Maximum)

0.1 mm {0.0039 in}

Connecting rod bearing size [LF]

STD: 1.498-1.504 mm {0.0589-0.0592 in}

OS0.25: 1.623-1.629 mm {0.0639-0.0641 in}

Connecting rod bearing size [L3]

STD: 1.496-1.502 mm {0.0589-0.0591 in}

OS0.25: 1.621-1.627 mm {0.0639-0.0641 in}

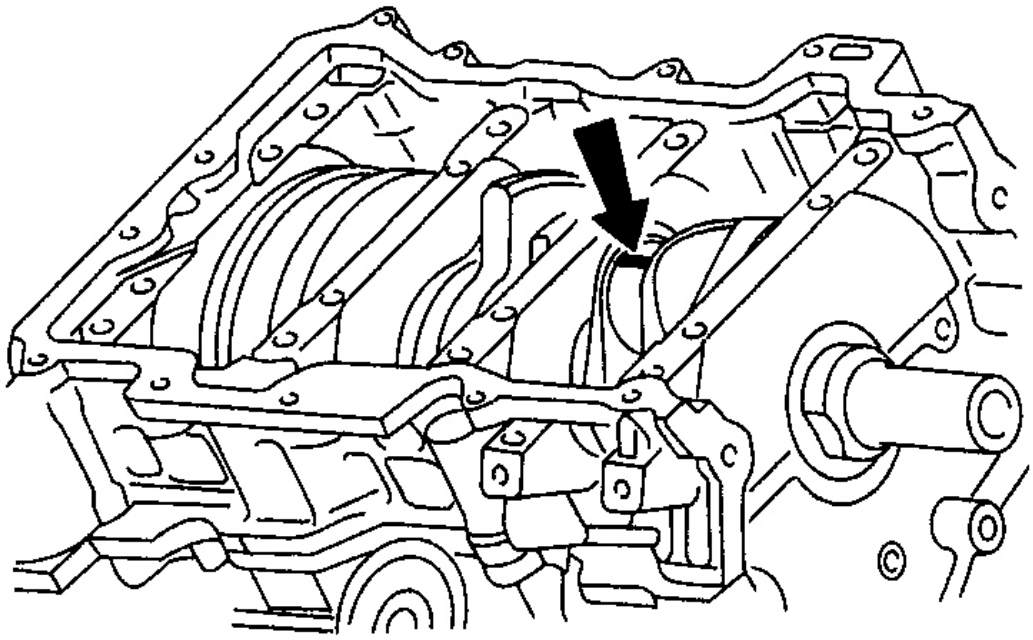

Fig. 56: Measuring Connecting Rod Oil Clearance
Courtesy of MAZDA MOTORS CORP.

BOLT INSPECTION

1. Measure the length of each bolt.
   - If it exceeds the specification, replace the bolt.

Bolt length (mm {in})

Cylinder head bolt (With washer)

Standard: 149.2-149.8 {5.87-5.90}

Maximum: 150.5 {5.91}

Cylinder head bolt (Without washer)

Standard: 145.2-145.8 {5.72-5.74}

Maximum: 146.5 {5.77}

Connecting rod bolt

Standard: 44.7-45.3 {1.75-1.78}

Maximum: 46.0 {1.81}

Main bearing cap bolt (Plastic region tightening bolt only)

Standard: 110.0-110.6 {4.33-4.35}

Maximum: 111.3 {4.38}

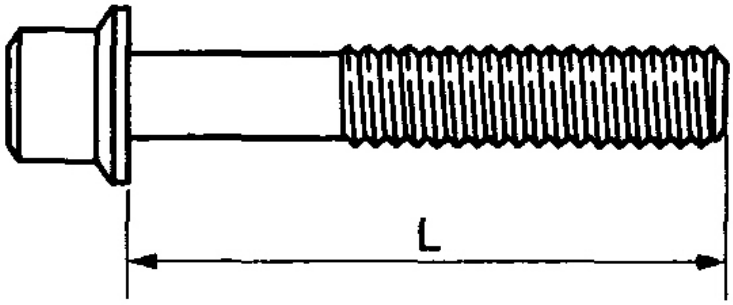

Fig. 57: Measuring Length Of Each Bolt
Courtesy of MAZDA MOTORS CORP.

VARIABLE VALVE TIMING ACTUATOR INSPECTION [WITH VARIABLE VALVE TIMING MECHANISM]

CAUTION:
- **Variable valve timing actuator cannot be disassembled because it is a precision unit.**

1. Confirm that the groove of the rotor and notch of the cover at the variable valve timing actuator are aligned and fixed.
   - If the notch and the bump are not aligned, rotate the rotor toward the valve timing retard position by hand until they are in place.
   - If the rotor and cover are not fixed even though their notch and groove are aligned, replace the variable valve timing actuator.

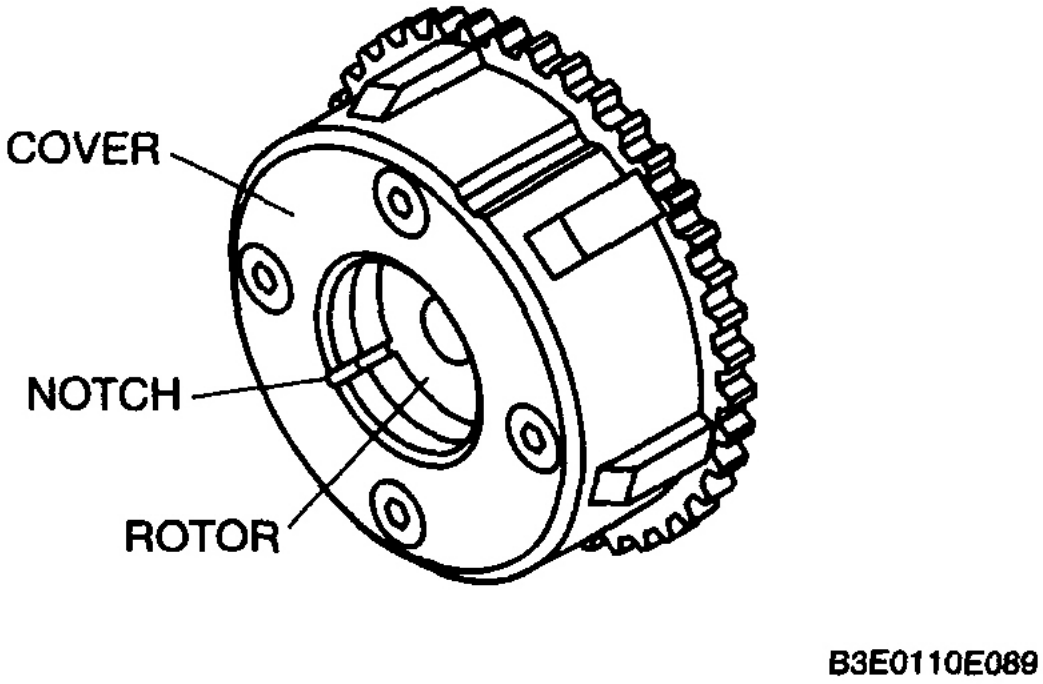

Fig. 58: Aligning Actuator Rotor Groove & Notch
Courtesy of MAZDA MOTORS CORP.

OIL CONTROL VALVE (OCV) INSPECTION [WITH VARIABLE VALVE TIMING MECHANISM]

Coil Resistance Inspection

1. Disconnect the negative battery cable.
2. Disconnect the oil control valve (OCV) connector.
3. Measure the resistance between terminals A and B using an ohmmeter.
   - If not as specified, replace the oil control valve (OCV).

Specification

6.9-7.9 ohms [20 °C {68 °F}]

4. Connect the oil control valve (OCV) connector.

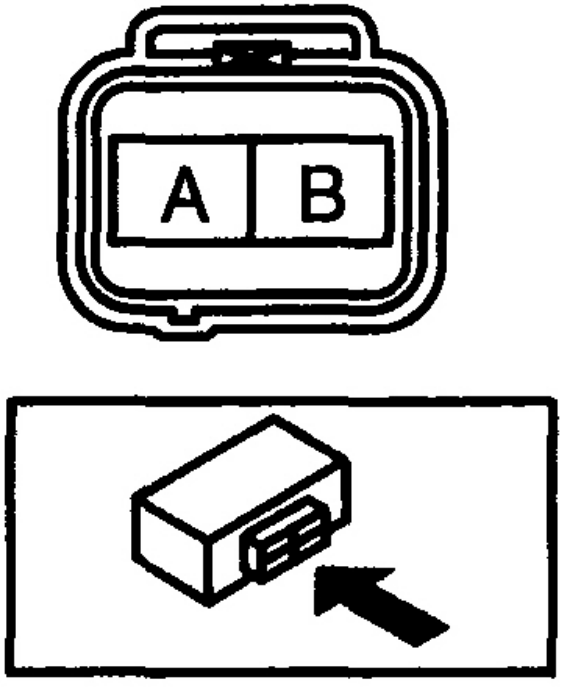

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Fig. 59: Identifying Coil Control Valve Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Spool Valve Operation Inspection

1. Disconnect the negative battery cable.
2. Remove the oil control valve (OCV).
3. Verify that the spool valve in the oil control valve (OCV) is in the maximum valve timing retard position as indicated in the figure.
    - If it exceeds the specification, replace the oil control valve (OCV).
4. Verify that the battery is fully charged.
    - If it is less than specification, recharge the battery.

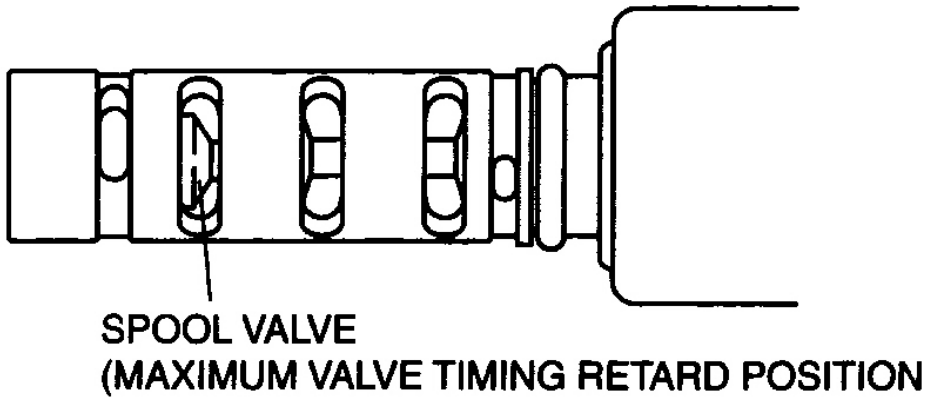

Fig. 60: Identifying Spool Valve
Courtesy of MAZDA MOTORS CORP.

5. Apply battery positive voltage between the oil control valve (OCV) terminals and verify that the spool valve operates and moves to the maximum valve timing advance position.
   - If it exceeds the specification, replace the oil control valve (OCV).

NOTE:

- **When applying battery positive voltage between the oil control valve (OCV) terminals, the connection can be either of the following:**
  - **Positive battery cable to terminal A, negative battery cable to terminal B**
  - **Positive battery cable to terminal B, negative battery cable to terminal A**

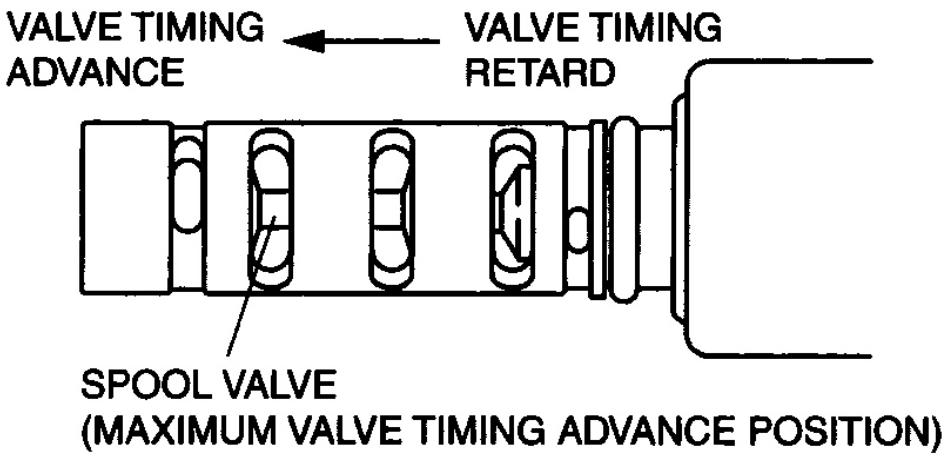

Fig. 61: Positioning Spool Valve Operates And Moves To Maximum Valve Timing Advance
Courtesy of MAZDA MOTORS CORP.

6. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing retard position.
    - If it exceed the specification, replace the oil control valve (OCV).

VALVE CLEARANCE INSPECTION

1. Measure the valve clearance as follows.
    1. Turn the crankshaft clockwise so that the No. 1 piston is at TDC of the compression stroke.
    2. Measure the valve clearance at A in the figure.
        - If the valve clearance exceeds the standard, replace the tappet. (See **VALVE CLEARANCE ADJUSTMENT**).

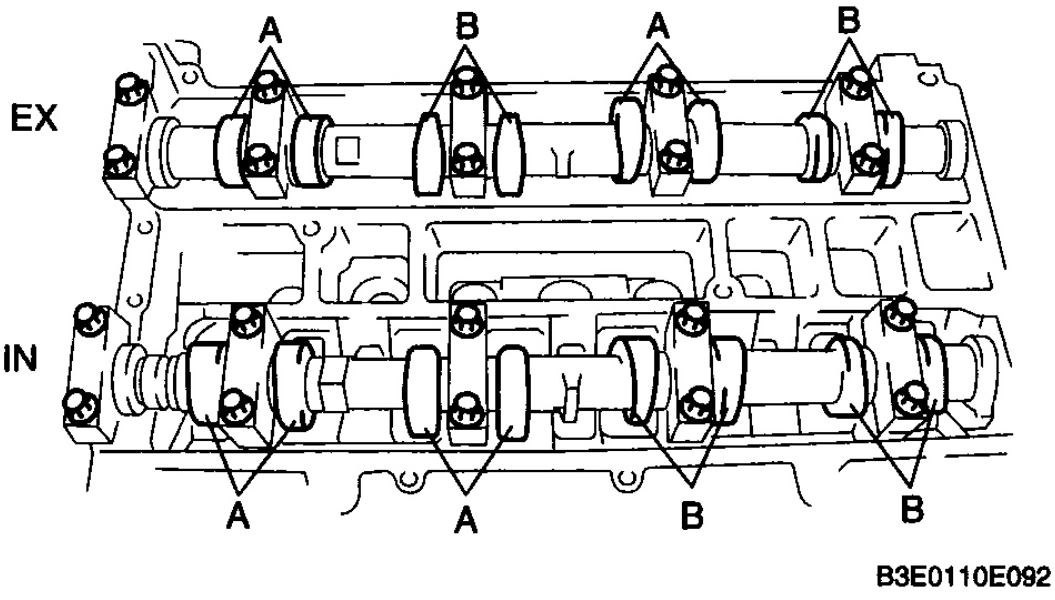

Fig. 62: Measuring Valve Clearance At Point A
Courtesy of MAZDA MOTORS CORP.

NOTE:
- **Make sure to note the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0106-0.0130 in}

3. Turn the crankshaft **360°** clockwise so that the No.4 piston is at TDC of the compression stroke.
4. Measure the valve clearance at B in the figure.
   - If the valve clearance exceeds the standard, replace the tappet. (See **VALVE CLEARANCE ADJUSTMENT**).

NOTE:
- **Make sure to note the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0106-0.0130 in}

VALVE CLEARANCE ADJUSTMENT

1. Remove the engine front cover lower blind plug.
2. Remove the engine front cover upper blind plug.
3. Remove the cylinder block lower blind plug.
4. Install the SST as shown in the figure.

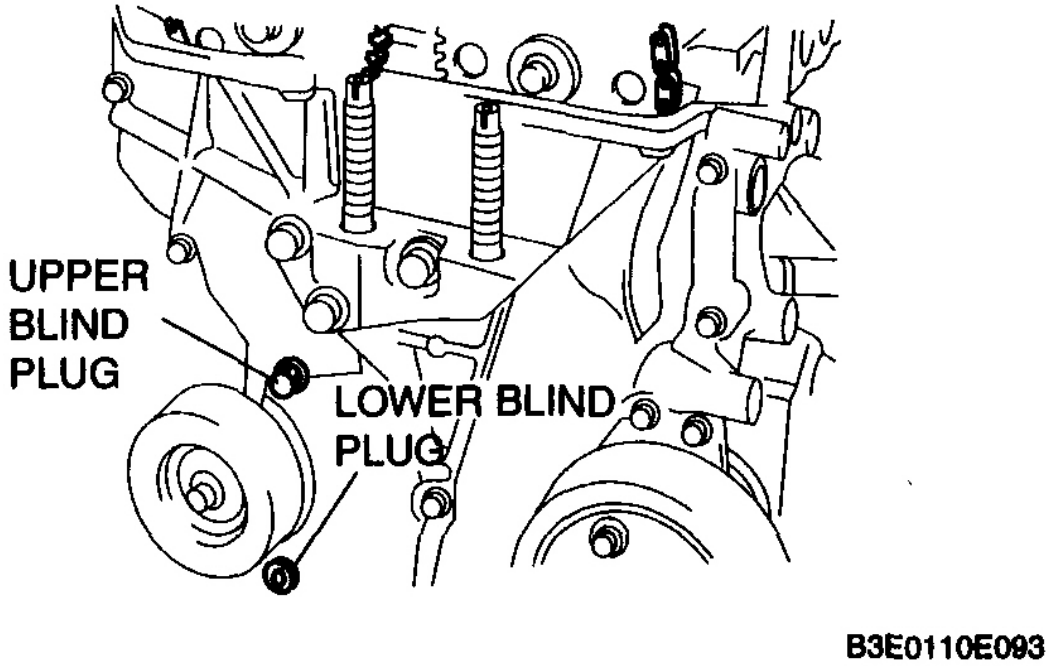

Fig. 63: Locating Engine Front Cover Upper & Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

CAUTION:
- **Removal of this SST is extremely important. If you crank the engine with this SST installed, the cylinder block will be damaged.**

5. Turn the crankshaft clockwise so that the crankshaft is in the No. 1 cylinder TDC position.

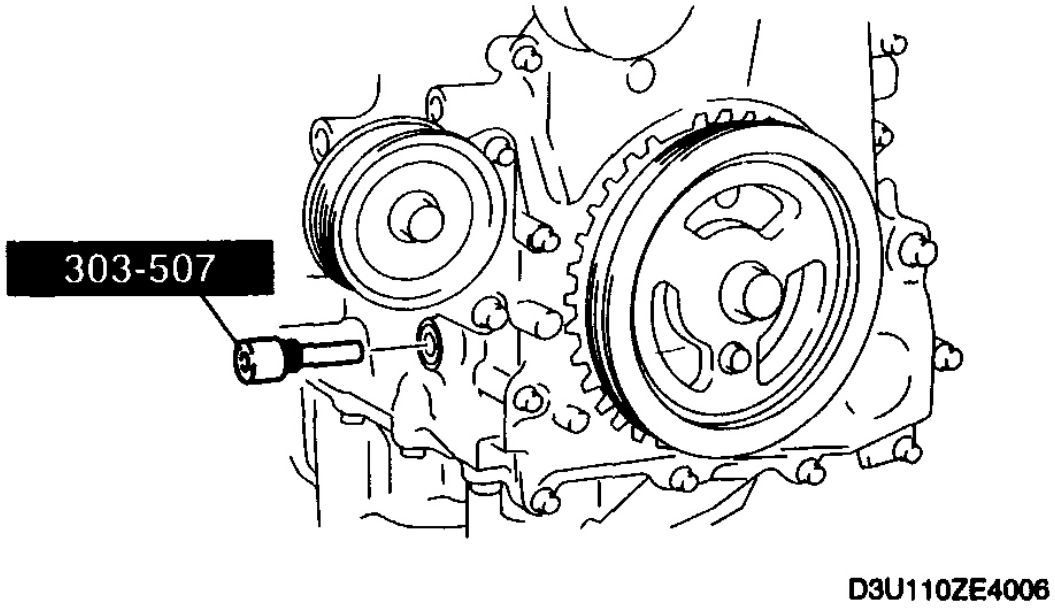

Fig. 64: Locating Cylinder Block SST
Courtesy of MAZDA MOTORS CORP.

6. Loosen the timing chain.
    1. Using a suitable screwdriver or equivalent tool, unlock the chain tensioner ratchet.
    2. Turn the exhaust camshaft clockwise using a suitable wrench on the cast hexagon and loosen the timing chain.
    3. Placing the suitable bolt **(M6 x 1.0 Length 25-35 mm {0.9-1.3 in})** at the engine front cover upper blind plug, secure the chain guide at the position where the tension is released.

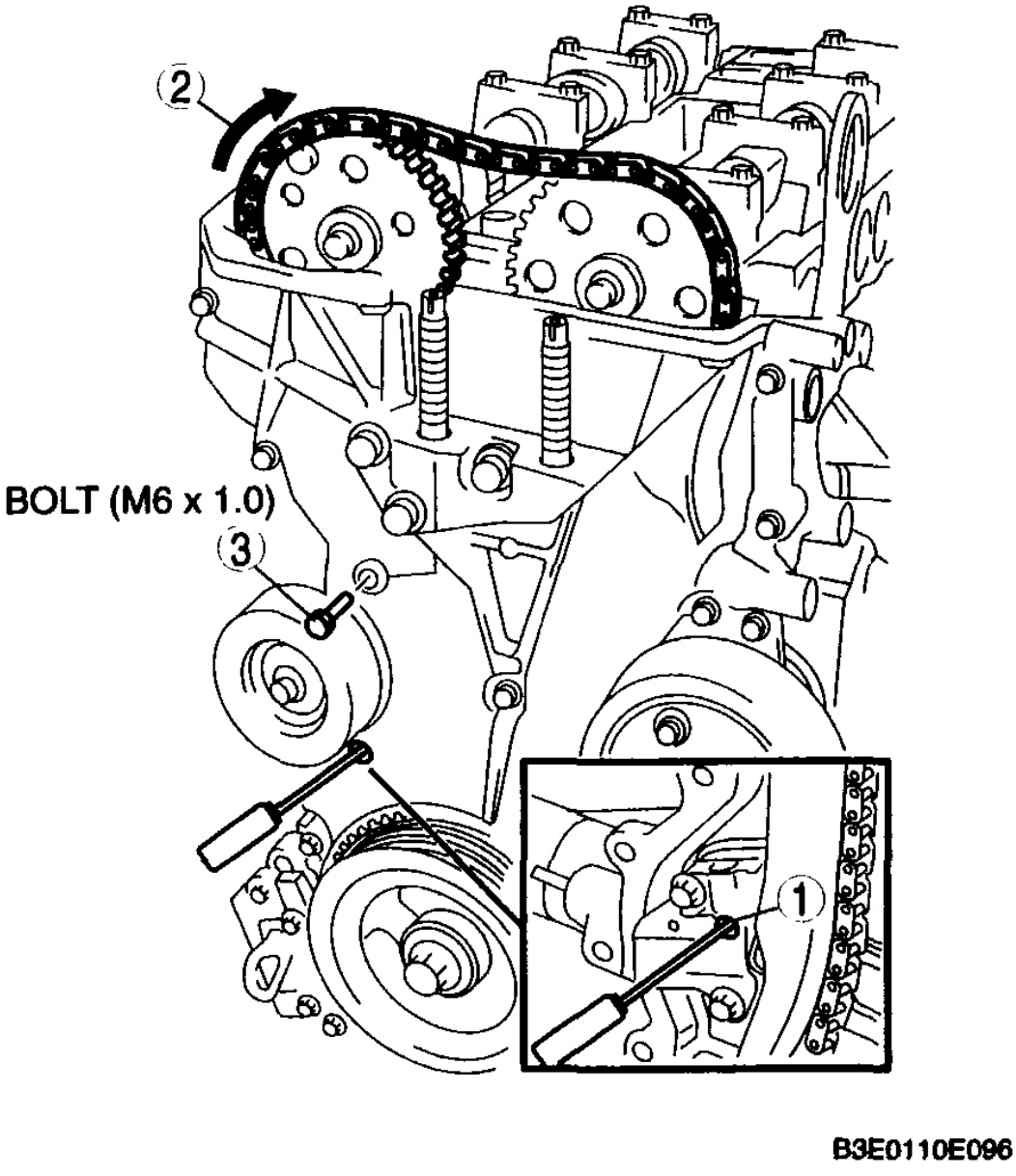

Fig. 65: Loosening Timing Chain
Courtesy of MAZDA MOTORS CORP.

7. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.

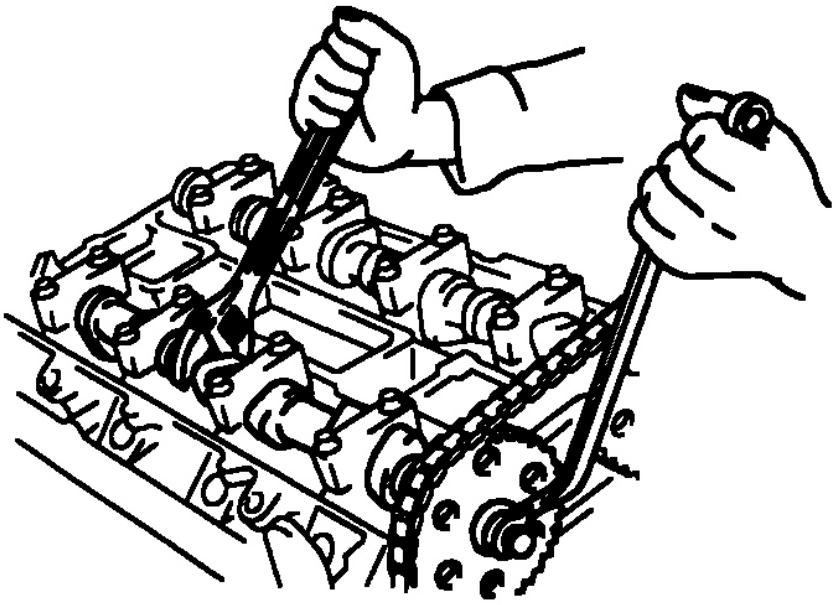

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Fig. 66: Holding Camshaft Using Suitable Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

8. Remove the exhaust camshaft sprocket.

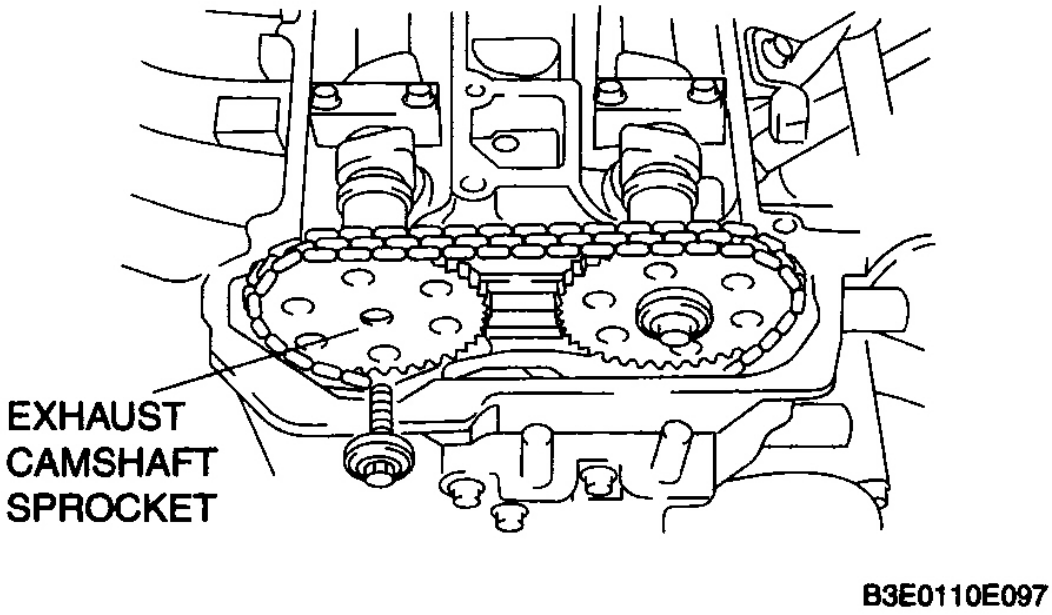

Fig. 67: Removing Exhaust Camshaft Sprocket
Courtesy of MAZDA MOTORS CORP.

9. Loosen the camshaft cap bolts in several passes in the order shown in the figure.

NOTE:

- **The cylinder head and the camshaft caps are numbered to make sure they are reassembled in their original position. When removed, keep the caps with the cylinder head they were removed from. Do not mix the caps.**

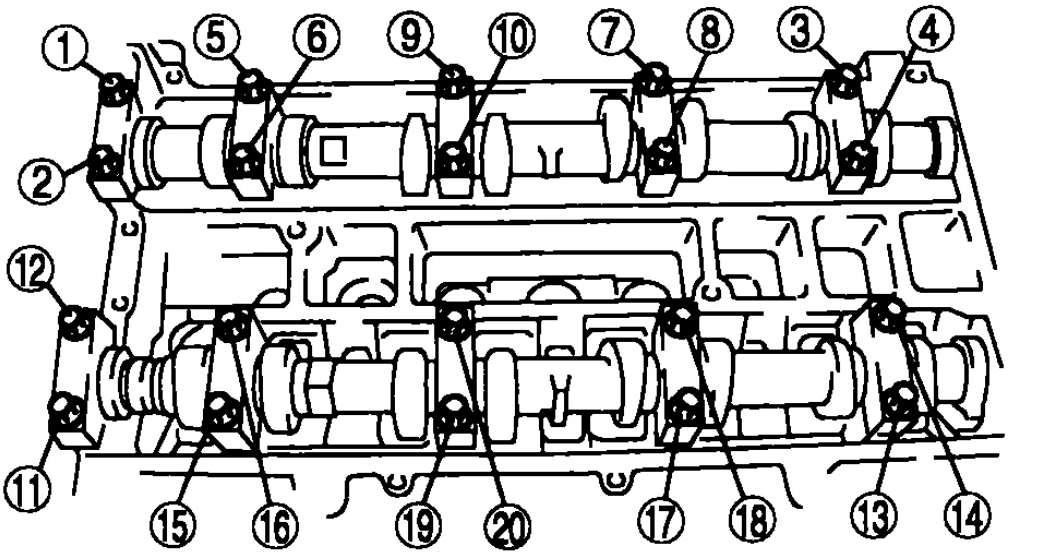

Fig. 68: Identifying Loosening Sequence Of Camshaft Cap Bolts
Courtesy of MAZDA MOTORS CORP.

10. Remove the camshaft.
11. Remove the tappet.
12. Select proper adjustment shim.

    New adjustment shim

    = Removed shim thickness + Measured valve clearance - Standard valve clearance (IN: 0.25 mm {0.0098 in}, EX: 0.30 mm {0.0118 in})

    Valve clearance [Engine cold]

    IN: 0.22-0.28 mm {0.0087-0.0110 in}

    EX: 0.27-0.33 mm {0.0106-0.0130 in}

13. Install the camshaft with No. 1 cylinder aligned with the TDC position.
14. Tighten the camshaft cap bolt using the following two steps.

    Tightening torque

    1. **5.0-9.0 N.m**

{51.0-91.7 kgf.cm, 44.3-79.5 in.lbf}

2. **14.0-17.0 N.m**

   {1.43-1.73 kgf.m, 10.4-12.5 ft.lbf}

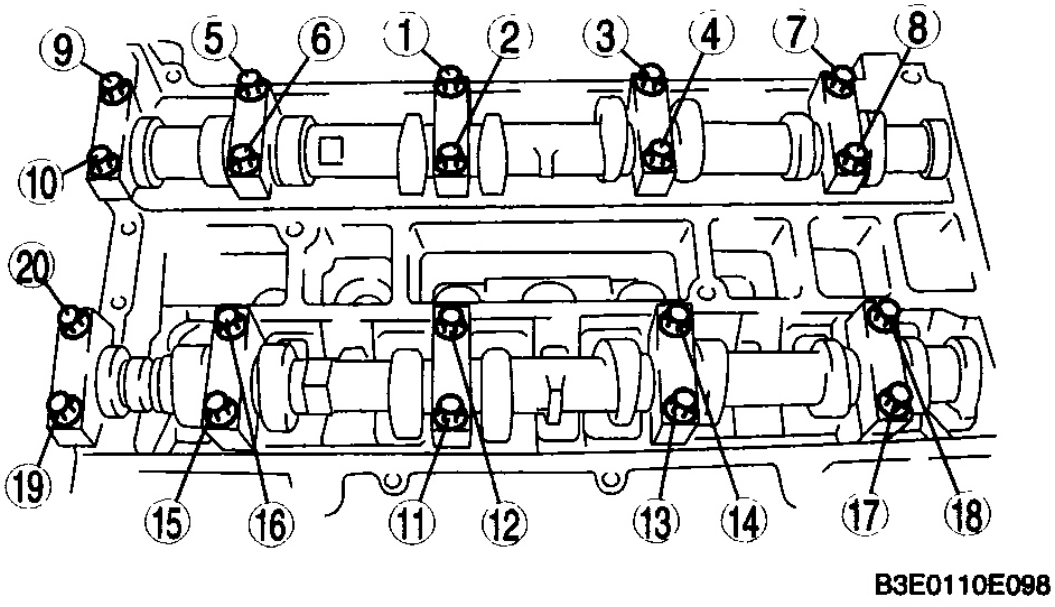

Fig. 69: Camshaft Cap Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

15. Install a new washer (except for Mazda6).

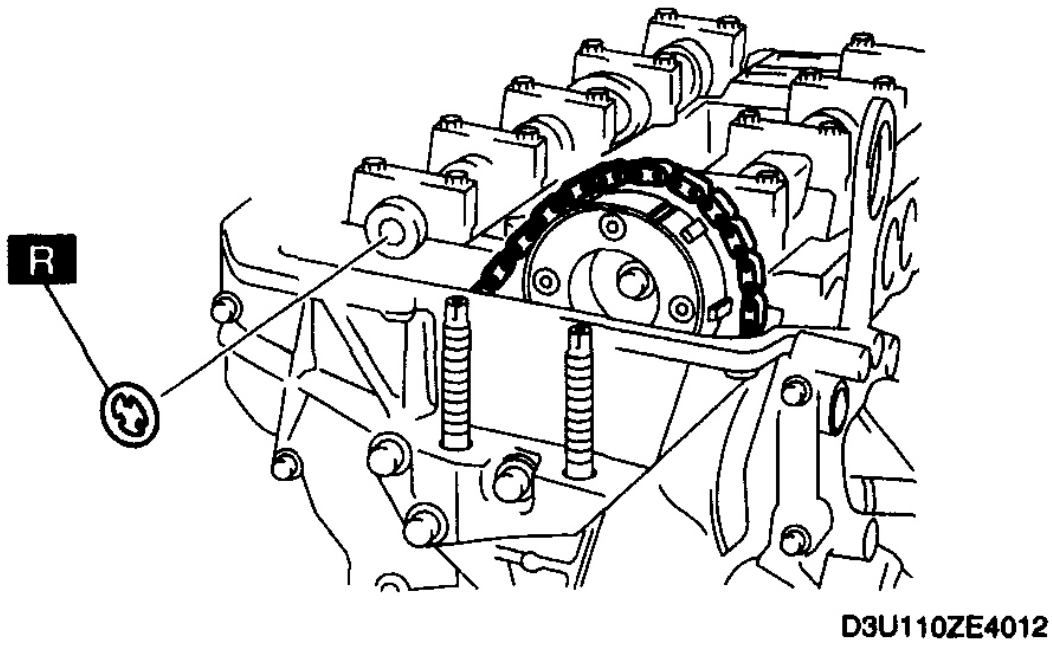

Fig. 70: Camshaft Sprocket Washer
Courtesy of MAZDA MOTORS CORP.

16. Install the exhaust camshaft sprocket.

NOTE:

- **Do not tighten the bolt for the camshaft sprocket during this step. First confirm the valve timing, then tighten the bolt.**

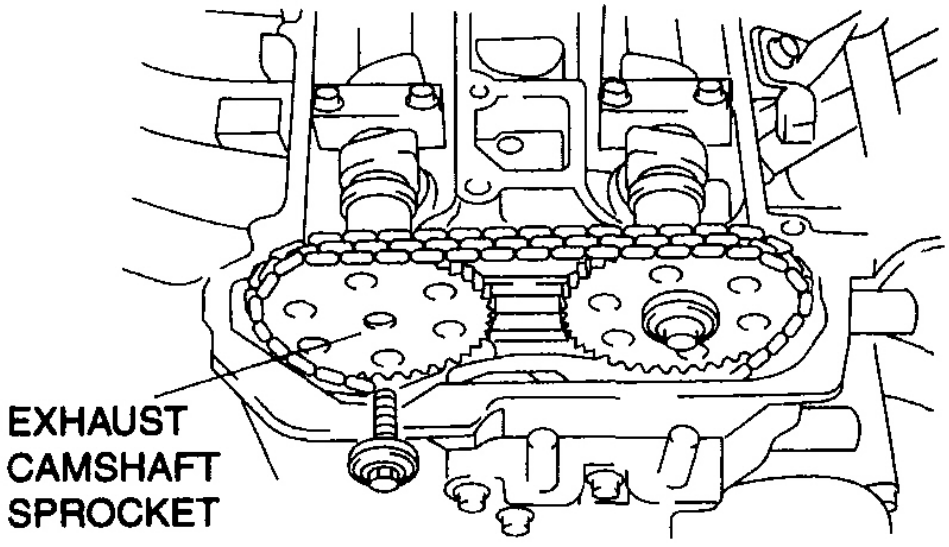

Fig. 71: Exhaust Camshaft Sprocket
Courtesy of MAZDA MOTORS CORP.

17. Install the **SST** to the camshaft as shown in the figure.
18. Remove the M6 x 1.0 bolt from the engine front cover to apply tension to the timing chain.
19. Turn the crankshaft clockwise so that the crankshaft is in the No. 1 cylinder TDC position.

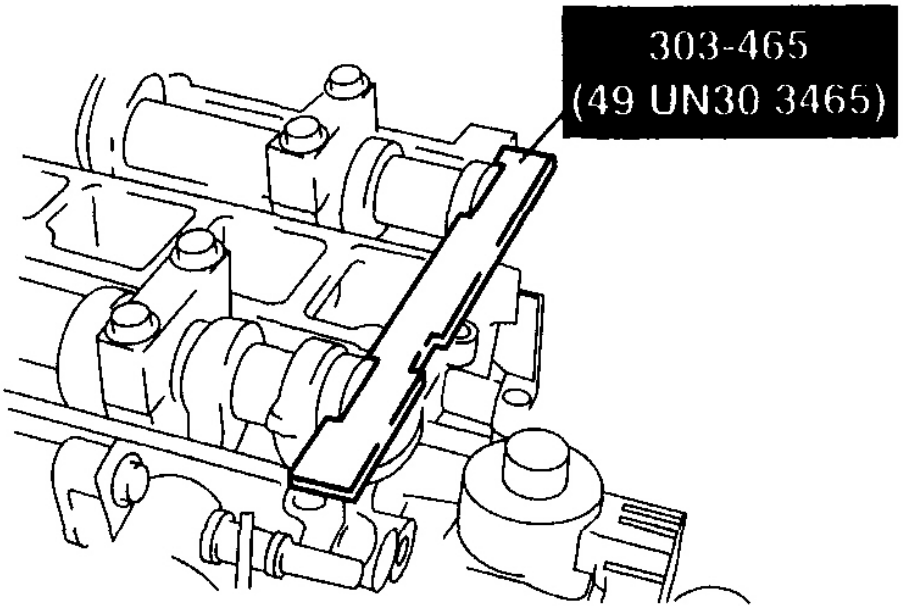

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Fig. 72: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

20. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in the figure.
21. Tighten the exhaust camshaft sprocket lock bolt.

Tightening torque

69-75 N.m {7.1-7.6 kgf.m, 50.9-55.3 ft.lbf}

22. Remove the **SST** from the camshaft.
23. Remove the **SST** from the block lower blind plug.
24. Rotate the crankshaft clockwise two turns until the TDC position.
    - If not aligned, loosen the camshaft sprocket lock bolt and repeat from Step 17.

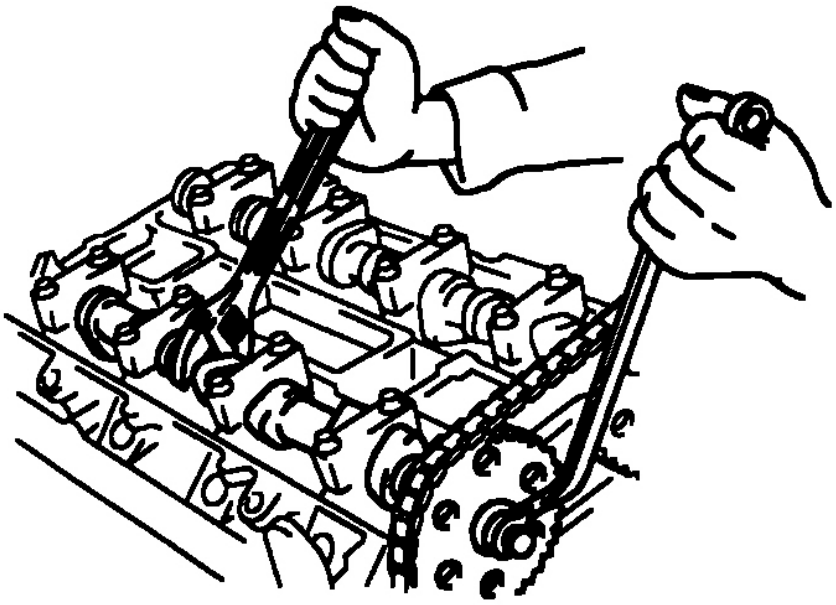

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Fig. 73: Holding Camshaft Using Suitable Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

25. Install the new engine front cover upper blind plug.

Tightening torque

8.0-11.5 N.m {82-117 kgf.cm, 71-101 in.lbf}

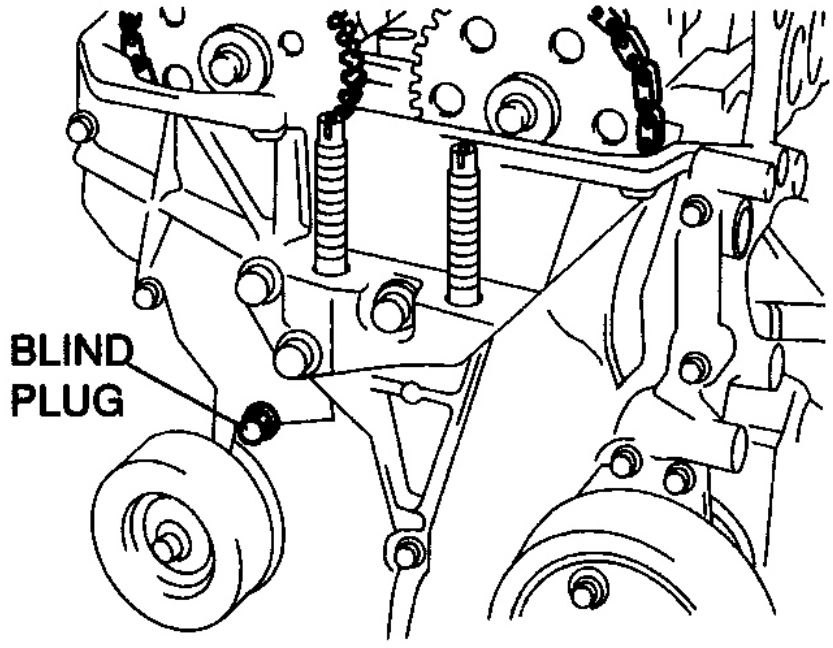


Fig. 74: Installing Engine Front Cover Upper Blind Plug
Courtesy of MAZDA MOTORS CORP.

26. Install the cylinder block lower blind plug.

Tightening torque

18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbf}

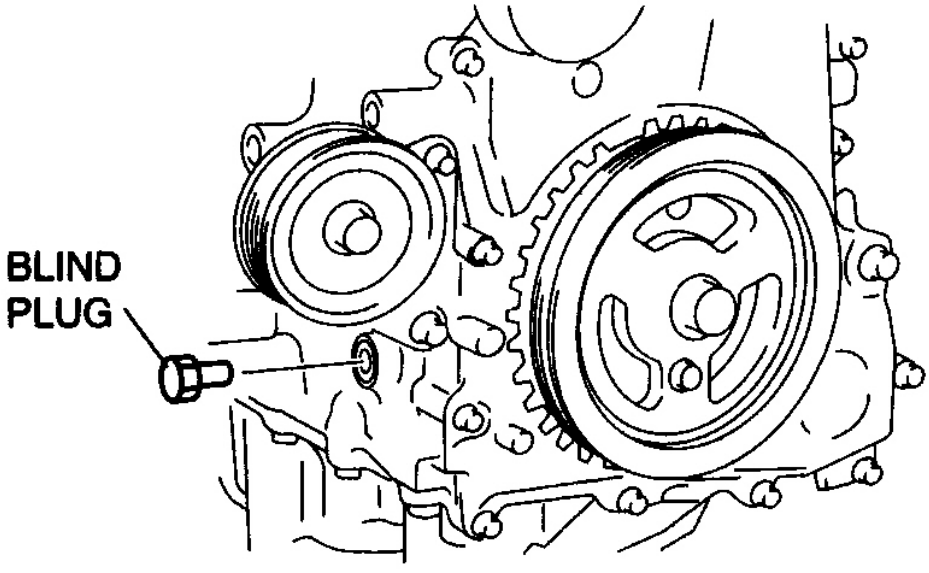


Fig. 75: Installing Cylinder Block Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

27. Install the new engine front cover lower blind plug.

Tightening torque

10-14 N.m {102-142 kgf.cm, 89-123 in.lbf}

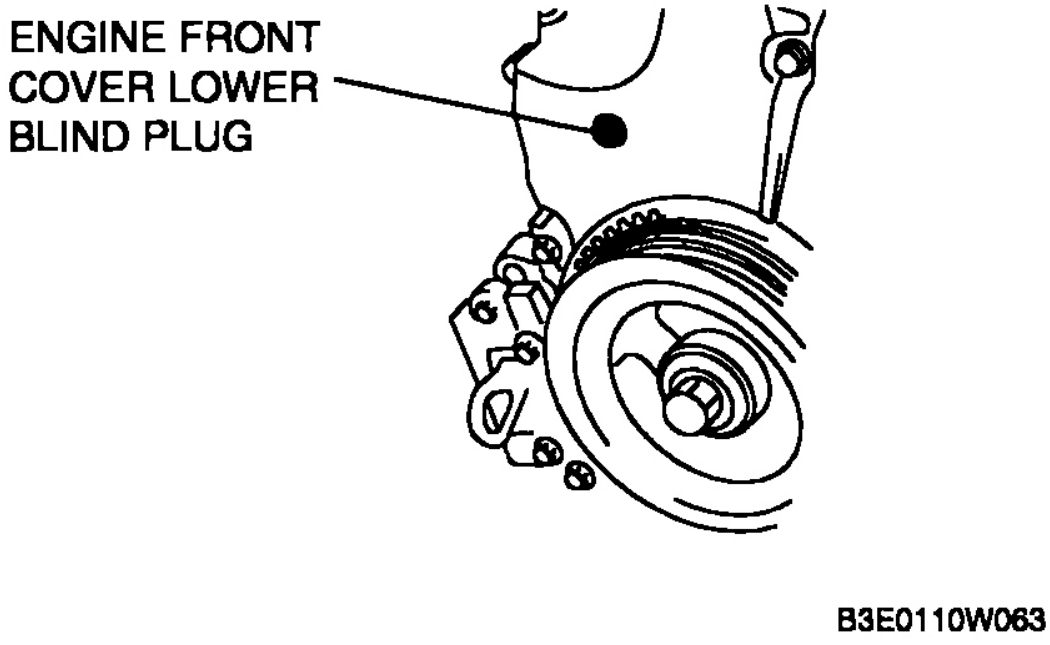
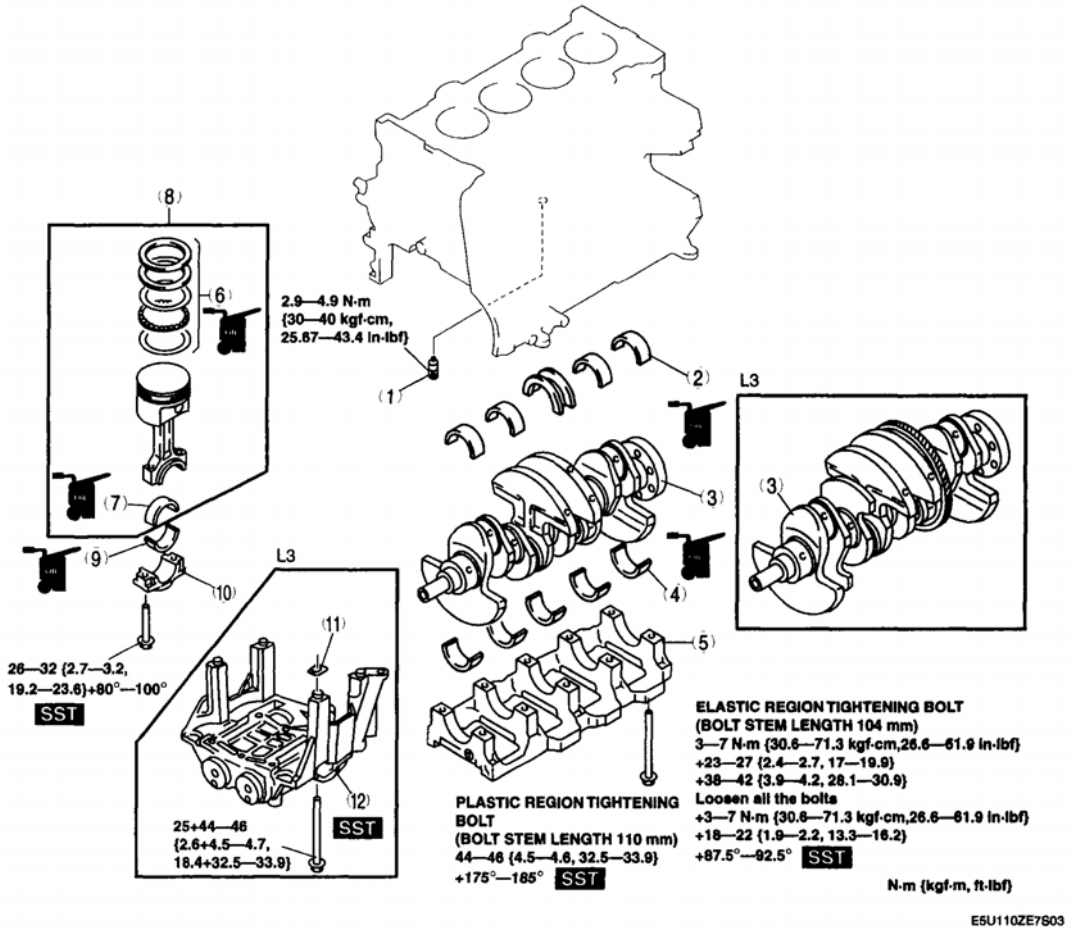


Fig. 76: Identifying Engine Front Cover Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

CYLINDER BLOCK (I) ASSEMBLY

1. Assemble in the order indicated in the table.



1	Oil jet valve
2	Upper main bearing, thrust bearing
3	Crankshaft
4	Lower main bearing, thrust bearing
5	Main bearing cap
6	Piston ring
7	Upper connecting rod bearing

8	Connecting rod, piston assembly
9	Lower connecting rod bearing
10	Connecting rod cap
11	Adjustment shim
12	Balancer unit

Fig. 77: Exploded View Of Cylinder Block (I) Assembly & Torque Specification
Courtesy of MAZDA MOTORS CORP.

Main Bearing Cap Assembly Note

1. Install the main bearing caps in the order indicated in the figure.
2. Tighten the main bearing cap bolts using the **SST (49 D032 316).**

Tightening torque

Plastic region tightening bolt (Bolt stem length 110 mm)

1. **44-46 N.m {4.5-4.6 kgf.m, 32.5-33.9 ft.lbf}**
2. **175°-185°**

Elastic region tightening bolt (Bolt stem length 104 mm)

1. **Apply engine oil to all bolts.**
2. **3-7 N.m {30.6-71.3 kgf.cm, 26.6-61.9 in.lbf}**
3. **23-27 N.m {2.4-2.7 kgf.m, 17-19.9 ft.lbt}**
4. **38-42 N.m {3.9-4.2 kgf.m, 28.1-30.9 ft.lbt}**
5. **Loosen all the bolts. (no remaining torque).**
6. **3-7 N.m {30.6-71.3 kgf.cm, 26.6-61.9 in.lbt}**
7. **18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbt}**
8. **87.5°-92.5°**

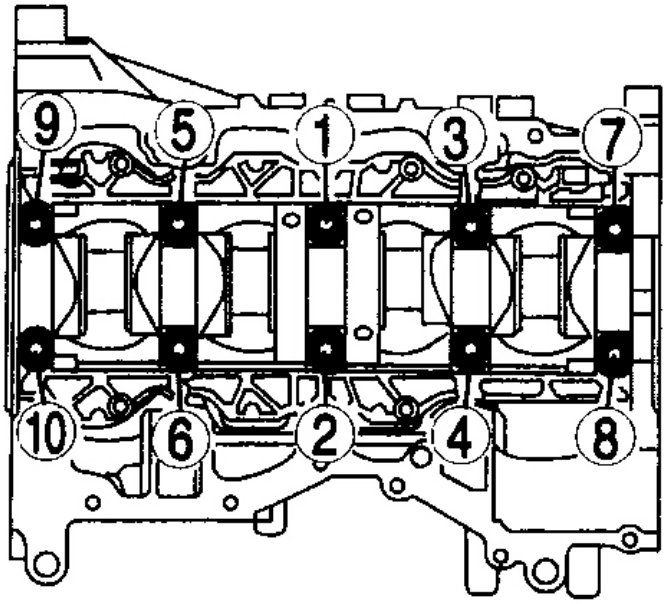


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Fig. 78: Tightening Sequence Of Main Bearing Cap Bolts
Courtesy of MAZDA MOTORS CORP.

Piston Ring Assembly Note

1. Install the two oil control ring segments and spacer.
2. Verify that the second ring is installed with scraper face side downward.
3. Verify that the top ring is installed with scraper face side inner of upper.

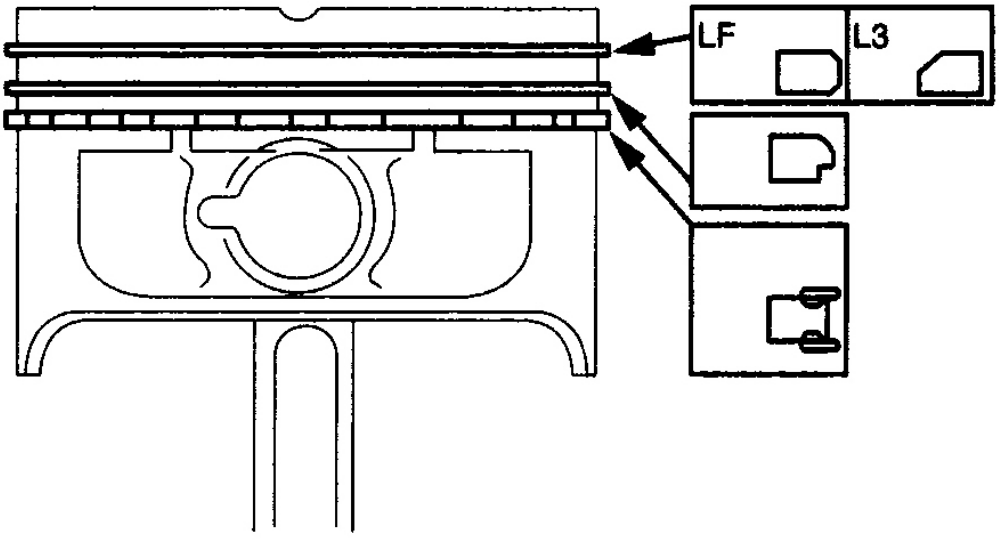

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Fig. 79: Identifying Piston Rings
Courtesy of MAZDA MOTORS CORP.

Piston Assembly Note

1. Position the end gap of each ring as indicated in the figure.

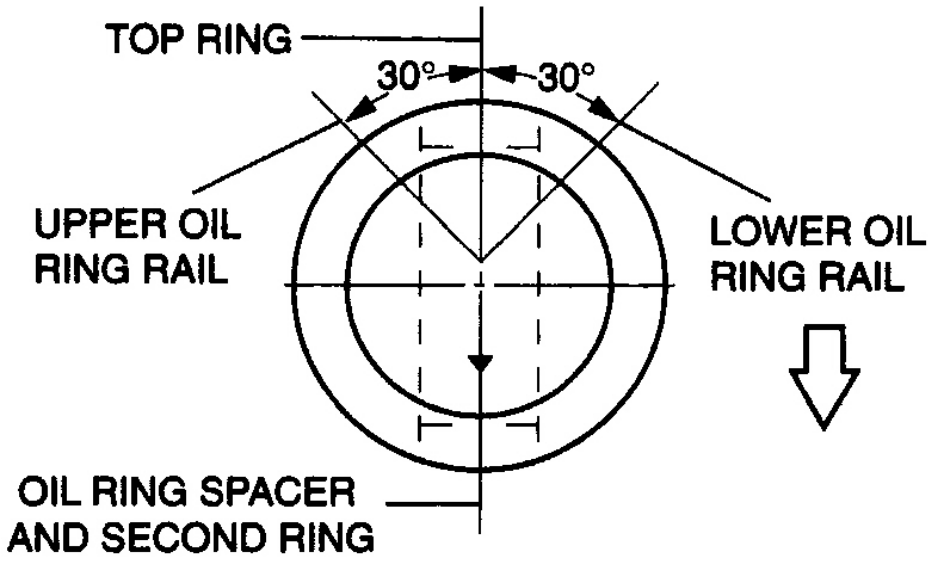

Fig. 80: Positioning End Gap Of Each Ring
Courtesy of MAZDA MOTORS CORP.

2. Insert the piston and connecting rod into the cylinder with the arrow mark to front of the engine.

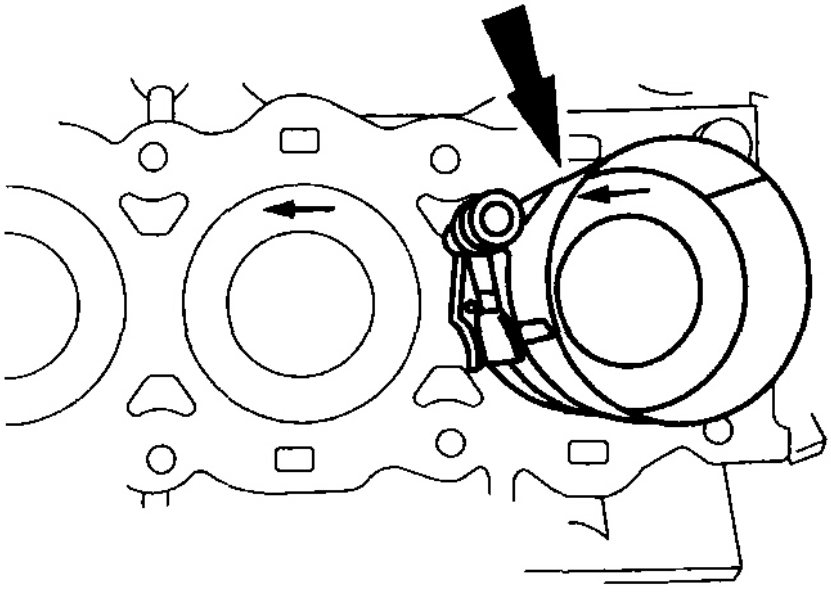

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Fig. 81: Inserting Piston And Connecting Rod Into Cylinder Bore
Courtesy of MAZDA MOTORS CORP.

Connecting Rod Bearing Assembly Note

1. Install the connecting rod bearing to the connecting rod and connecting rod caps, as shown in the figure.

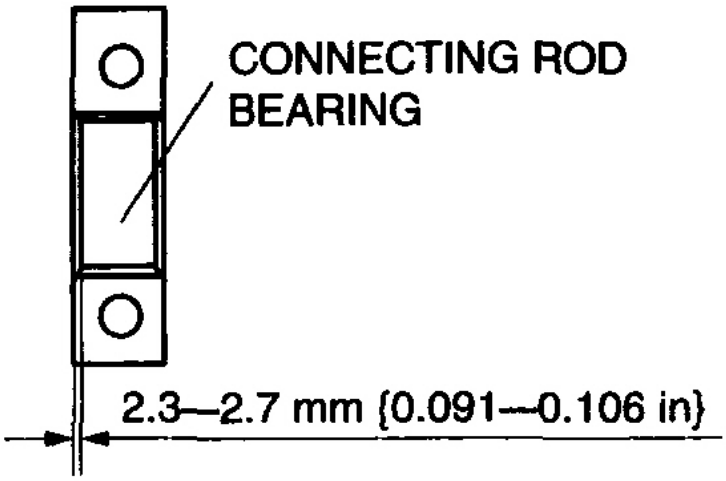

Fig. 82: Installing Connecting Rod Bearing
Courtesy of MAZDA MOTORS CORP.

Connecting Rod Cap Assembly Note

CAUTION:
- **When assembling the connecting rod caps, align the broken, rough faces of the connecting rods and connecting rod caps.**

1. Tighten the connecting rod bolts in two steps using the **SST (49 D032 316).**

   Tightening torque

   1. **26-32 N.m**

      {2.7-3.2 kgf.m, 19.2-23.6 ft.lbf}

   2. **80°-100°**

Balancer Unit Assembly Note

1. Confirm by visual inspection that there is no damage to the balancer unit gear and verify that the shaft turns smoothly.
   - If there is any damage or malfunction, replace the balancer unit.

CAUTION:
- **Due to the precision interior construction of the balancer unit, it cannot be disassembled.**

2. Install the **SST** as shown in the figure.

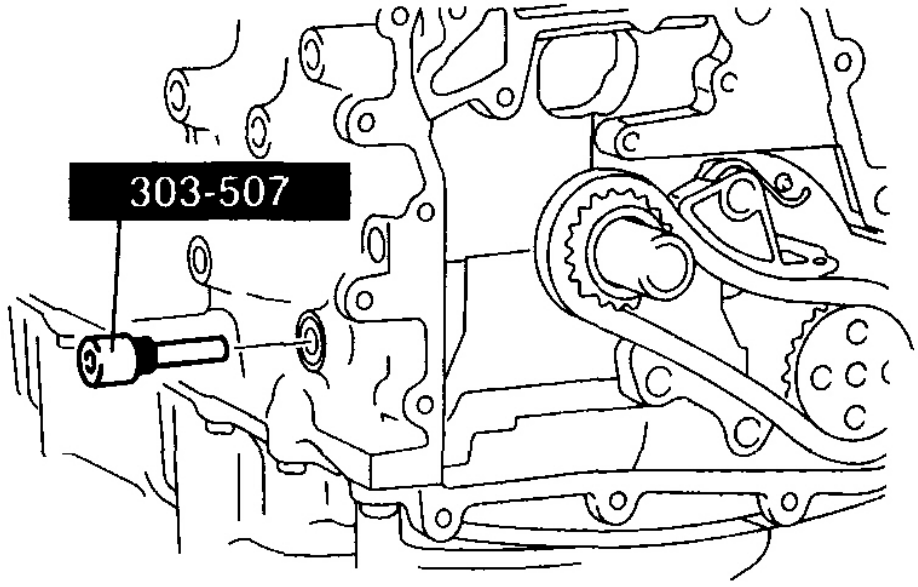

Fig. 83: Attaching SST To Balancer
Courtesy of MAZDA MOTORS CORP.

3. Turn the crankshaft clockwise the crankshaft is in the No. 1 cylinder TDC position (until the balance weight is attached to the **SST**).
4. Install the adjustment shim to the seat face of the balancer unit.
5. With the balancer unit marks at the exact top center, assemble the unit to the cylinder block.

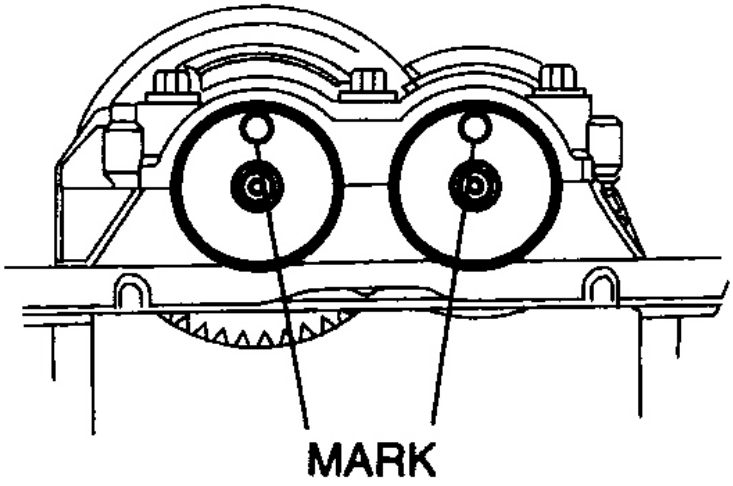

Fig. 84: Identifying Marks At Exact Top Center
Courtesy of MAZDA MOTORS CORP.

6. Set the **SST** as shown, then measure the gear backlash using a dial gauge.

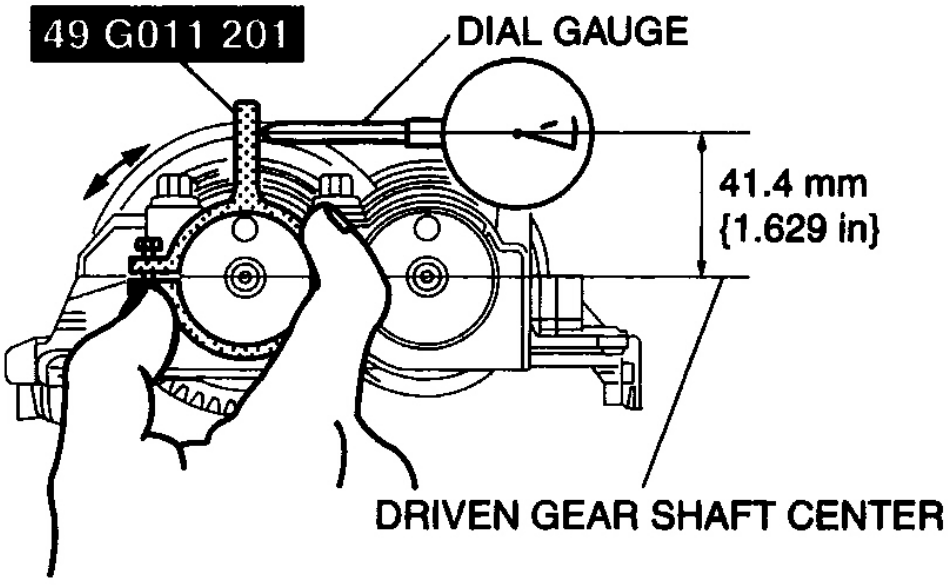

Fig. 85: Measuring Gear Backlash Using Dial Gauge
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **For an accurate measurement of gear backlash, insert a screwdriver into the crankshaft No. 1 balance weight area and set both the rotation and the thrust direction with the screwdriver, using a prying action, as shown in the figure.**

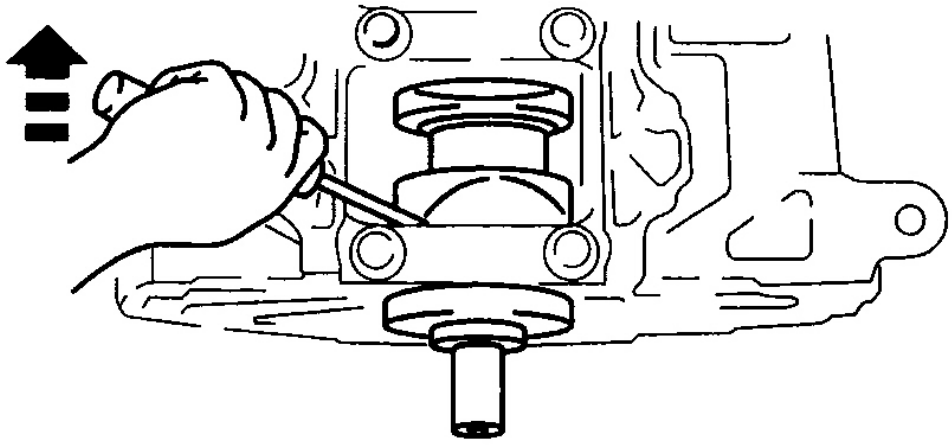

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Fig. 86: Measuring Gear Backlash
Courtesy of MAZDA MOTORS CORP.

- **If the backlash exceeds the specified range, remeasure the backlash and, using the adjustment shim selection table, select the proper shim, according to the following procedure.**

CAUTION:
- **When measuring the backlash, rotate the crankshaft one full rotation and verify that it is within the specified range at all of the following six positions: 10°, 30°, 100°, 190°, 210°, 280° ATDC.**

Value range

0.005-0.101 mm {0.00019-0.0039 in}

1. Using master adjustment shim (No.50), assemble the balancer unit to the cylinder block, then measure the backlash.
2. Select the proper adjustment shim according to the measured value.
3. Install the selected adjustment shim to the balancer unit, then assemble the balancer unit to the cylinder block.

Adjustment shim selection table

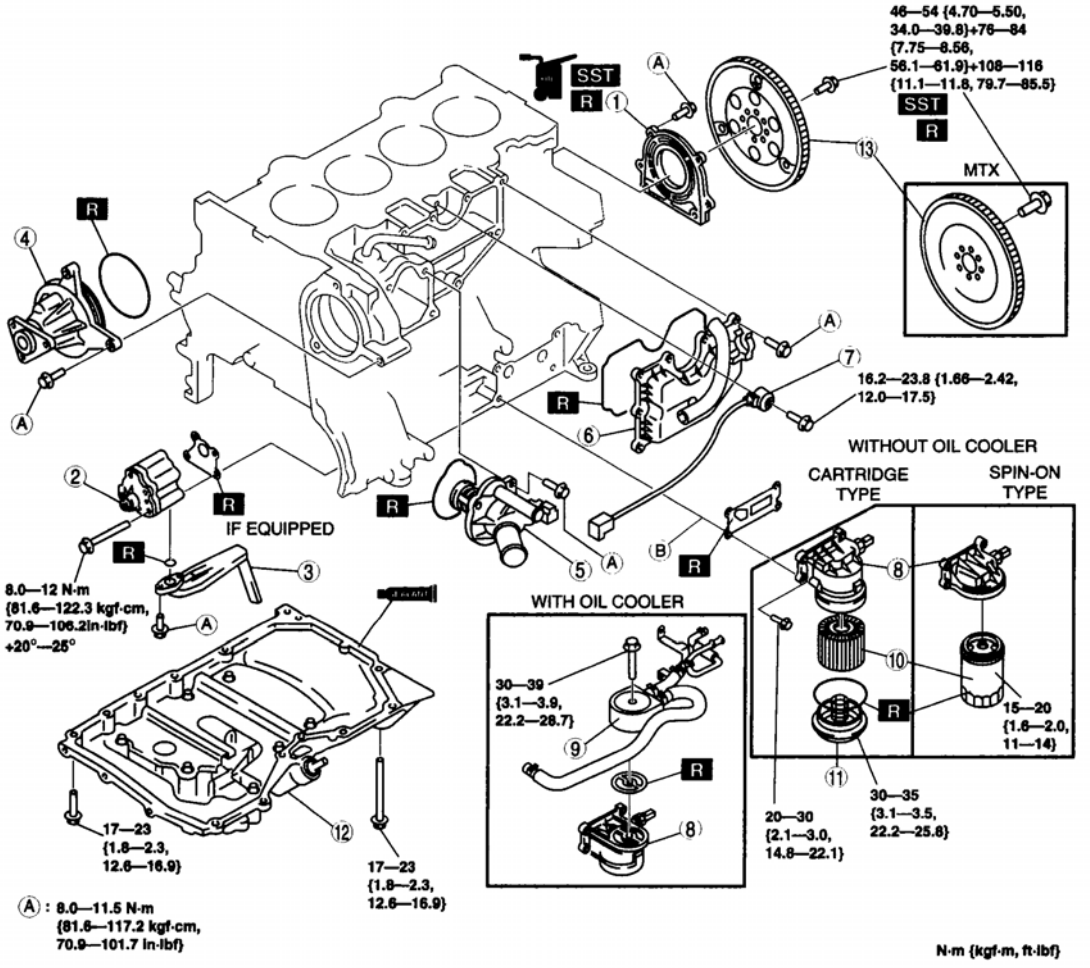
ADJUSTMENT SHIM SELECTION CHART

Backlash mm {in}	Selection shim (No).	Shim thickness mm {in}	Backlash mm {in}	Selection shim (No).	Shim thickness mm {in}
0.267-0.273 {0.01051-0.01074}	15	1.15 {0.0452}	0.127-0.133 {0.00500-0.00523}	35	1.35 {0.0531}
0.260-0.266 {0.01023-0.01047}	16	1.16 {0.0456}	0.120-0.126 {0.00472-0.00496}	36	1.36 {0.0535}
0.253-0.259 {0.00996-0.01019}	17	1.17 {0.0460}	0.113-0.119 {0.00444-0.00468}	37	1.37 {0.0539}
0.246-0.252 {0.00968-0.00992}	18	1.18 {0.0464}	0.106-0.112 {0.00417-0.00440}	38	1.38{0.0543}
0.239-0.245 {0.00940-0.00964}	19	1.19 {0.0468}	0.099-0.105 {0.00389-0.00413}	39	1.39 {0.0547}
0.232-0.238 {0.00913-0.00937}	20	1.20 {0.0472}	0.092-0.098 .087 {0.00362-0.00385}	40	1.40 {0.0551}
0.225-0.231 {0.00885-0.00909}	21	1.21 {0.0476}	0.085-0.091 {0.00334-0.00358}	41	1.41 {0.0555}
0.218-0.224 {0.00858-0.00881}	22	1.22 {0.0480}	0.078-0.084 {0.00307-0.00330}	42	1.42 {0.0559}
0.211-0.217 {0.00830-0.00854}	23	1.23 {0.0484}	0.071-0.077 {0.00279-0.00303}	43	1.43 {0.0562}
0.204-0.210 {0.00803-0.00826}	24	1.24 {0.0488}	0.064-0.070 {0.00251-0.00275}	44	1.44 {0.0566}
0.197-0.203 {0.00775-0.00799}	25	1.25 {0.492}	0.057-0.063 {0.00224-0.00248}	45	1.45 {0.0570}
0.190-0.196 {0.00748-0.00771}	26	1.26 {0.496}	0.050-0.056 {0.00196-0.00220}	46	1.46 {0.0574}
0.183-0.189 {0.00720-0.00744}	27	1.27 {0.499}	0.043-0.049 {0.00169-0.00192}	47	1.47 {0.0578}
0.176-0.182 {0.00692-0.00716}	28	1.28 {0.503}	0.036-0.042 {0.00141-0.00165}	48	1.48 {0.0582}

0.169-0.175 {0.00665-0.00688}	29	1.29 {0.507}	0.029-0.035 {0.00114-0.00137}	49	1.49 {0.0586}
0.162-0.168 {0.00637-0.00661}	30	1.30 {0.511}	0.022-0.028 {0.000866-0.00110}	50 (master)	1.50 {0.0590}
0.155-0.161 {0.00610-0.00633}	31	1.31 {0.515}	0.015-0.021 {0.00059-0.000826}	51	1.51 {0.0594}
0.148-0.154 {0.00582-0.00606}	32	1.32 {0.519}	0.008-0.014 {0.000314-0.000551}	52	1.52 {0.0598}
0.141-0.147 {0.00555-0.00578}	33	1.33 {0.523}	0.001-0.007 {0.00003-0.000275}	53	1.53 {0.0602}
0.134-0.140 {0.00527-0.00551}	34	1.34 {0.527}	0.000-0.000 {0.000-0.000}	54	1.54 {0.0606}

CYLINDER BLOCK (II) ASSEMBLY

1. Assemble in the order indicated in the table.



1	Rear oil seal
2	Oil pump
3	Oil strainer
4	Water pump
5	Thermostat
6	Oil separator
7	Knock sensor

8	Oil filter adapter
9	Oil cooler
10	Oil filter
11	Oil filter cover (cartridge type)
12	Oil pan
13	Flywheel (MTX), Drive plate (ATX)

Fig. 87: Exploded View Of Cylinder Block (II) Assembly & Torque Specification
Courtesy of MAZDA MOTORS CORP.

Rear Oil Seal Assembly Note

1. Apply clean engine oil to the new oil seal lip.
2. Install the rear oil seal using the **SST** as shown in the figure.

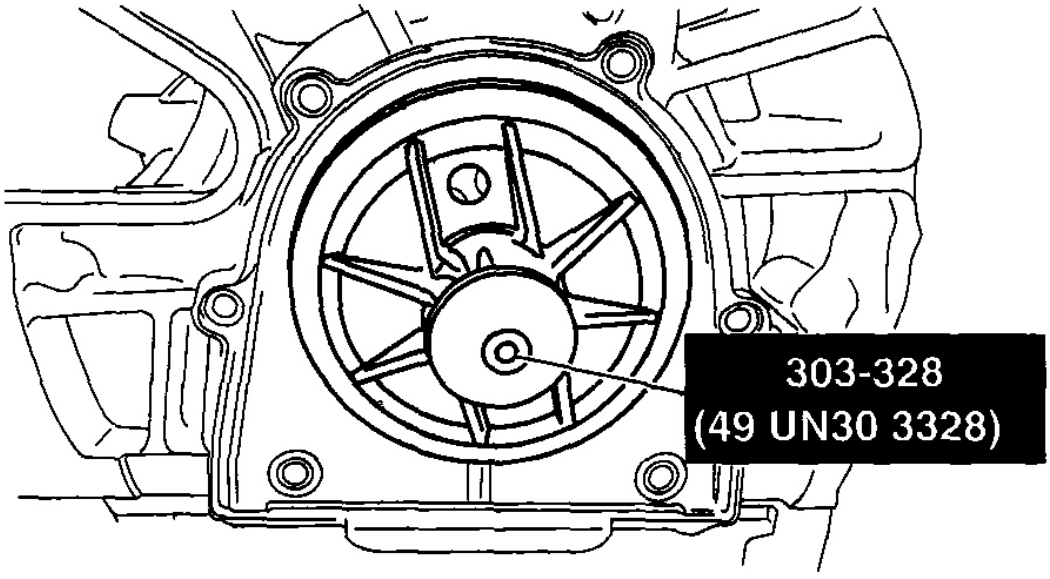


Fig. 88: Installing Rear Oil Seal Using SST
Courtesy of MAZDA MOTORS CORP.

3. Tighten the rear oil seal bolts in the order as shown in the figure.

Tightening torque

8.0-11.5 N.m

{81.6-117.2 kgf.cm, 70.9-101.7 in.lbf}

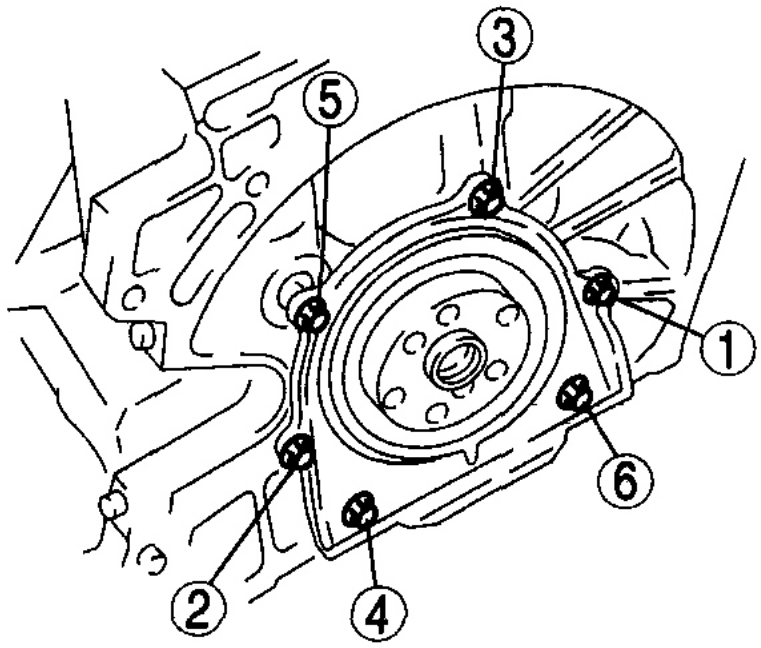


Fig. 89: Rear Oil Seal Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

Drive Plate (ATX), Flywheel (MTX) Assembly Note

1. Hold the crankshaft using the **SST** .
2. Tighten the bolts in the 3 steps in the figure.

Tightening torque

1. **46-54 N.m**

   {4.70-5.50 kgf.m, 34.0-39.8 ft.lbf

2. **76-84 N.m**

   {7.75-8.56 kgf.m, 56.1-61.9 ft.lbf

3. **108-116 N.m**

   {11.1-11.8 kgf.m, 79.7-85.5 ft.lbf

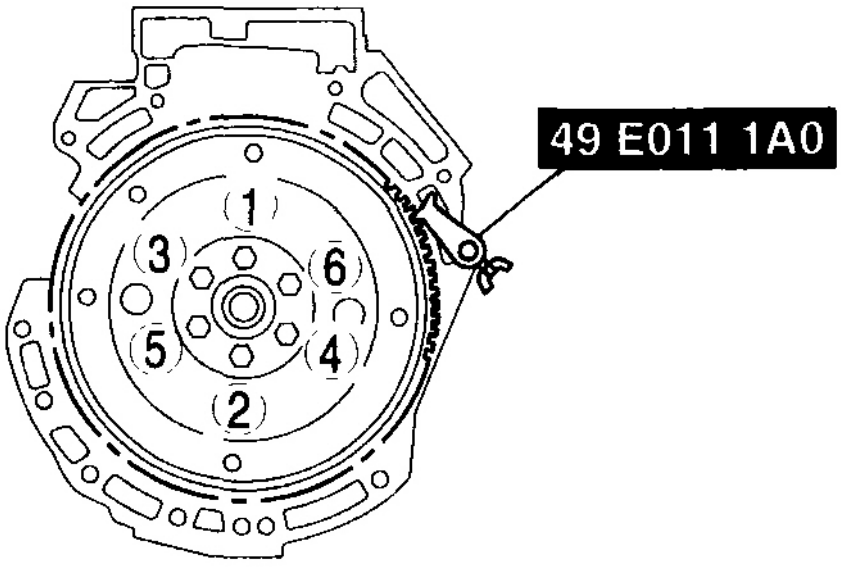


Fig. 90: Tightening Sequence Of Drive Plate Or Flywheel Bolts (Performed In 3 Steps)
Courtesy of MAZDA MOTORS CORP.

Oil pan Assembly Note

1. Apply a continuous bead of silicone sealant to the oil pan as indicated in the figure.

CAUTION:
- **Install the oil pan within 10min of applying the silicone sealant**
- **Make sure that there is no oil or dust on the seal side of oil pan.**

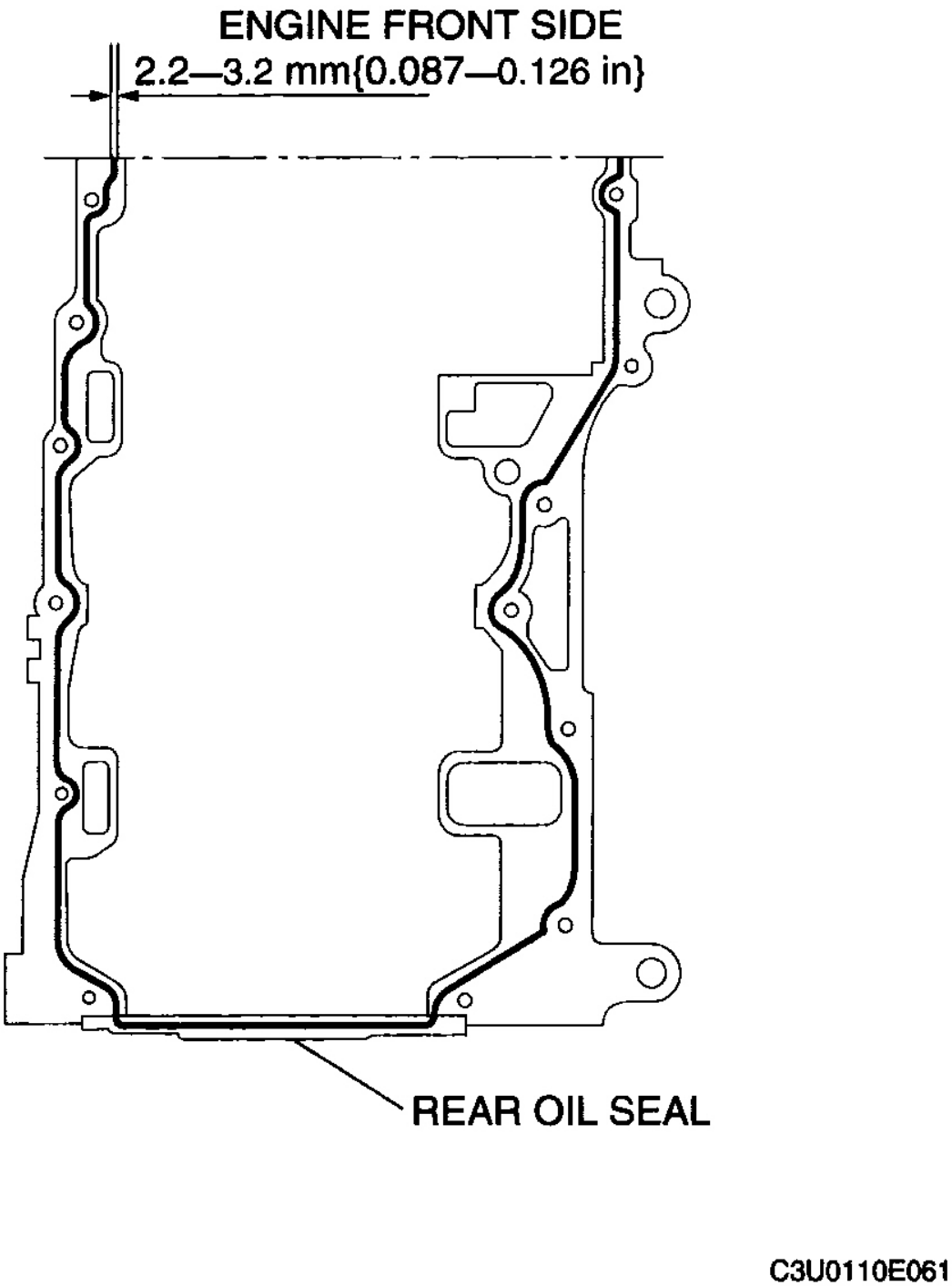


Fig. 91: Installing Silicone Sealant To Oil Pan
Courtesy of MAZDA MOTORS CORP.

2. Use a square ruler to unite the oil pan and the cylinder block junction side on the engine front cover side.

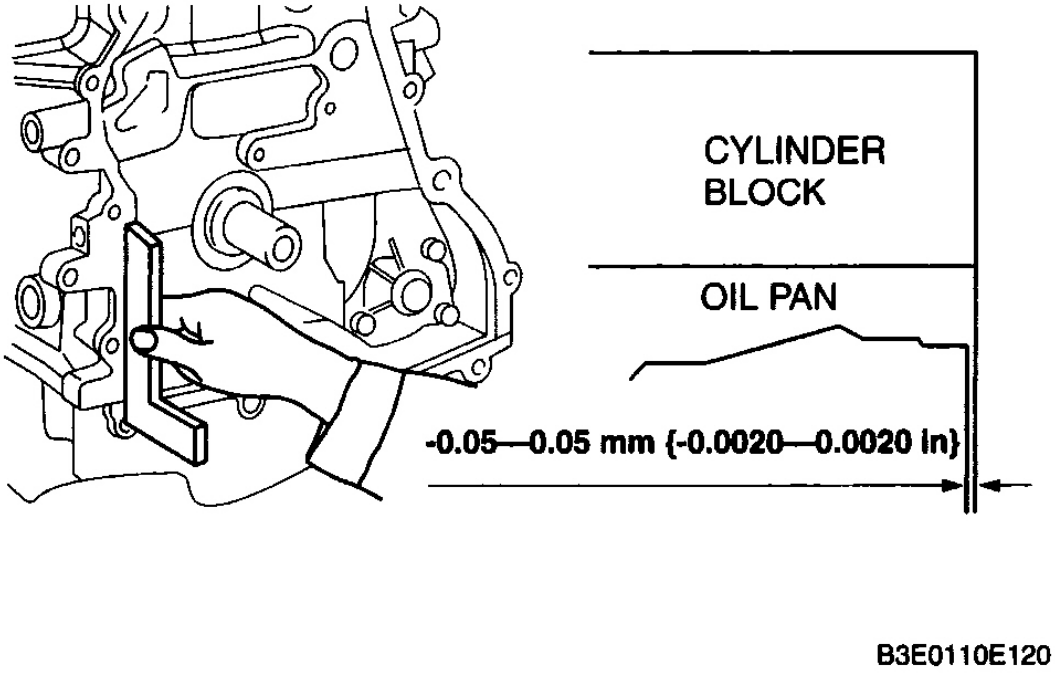


Fig. 92: Using Square Ruler To Align Oil Pan & Cylinder Block
Courtesy of MAZDA MOTORS CORP.

3. Tighten the rear oil pan bolts in the order as shown in the figure.

Tightening torque

17-23 N.m

{1.8-2.3 kgf.m, 12.6-16.9 ft.lbf}

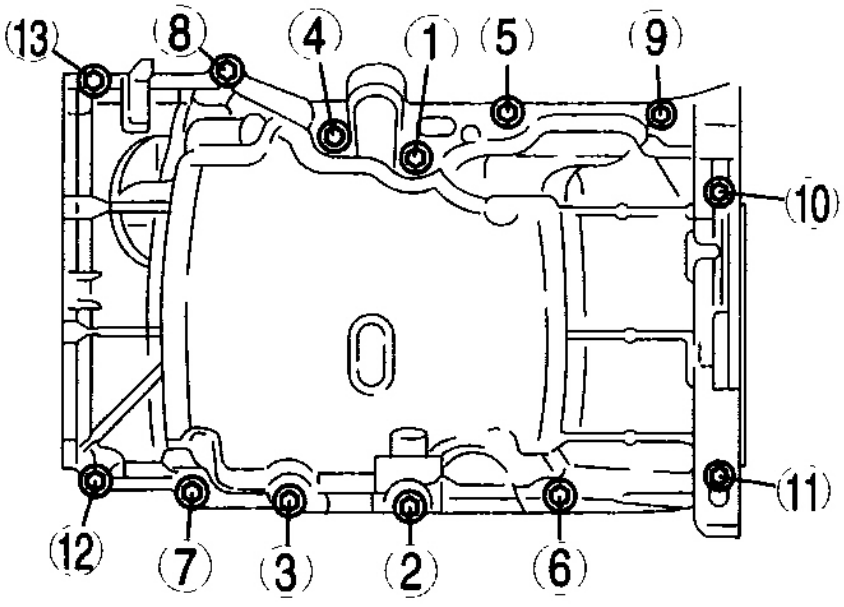


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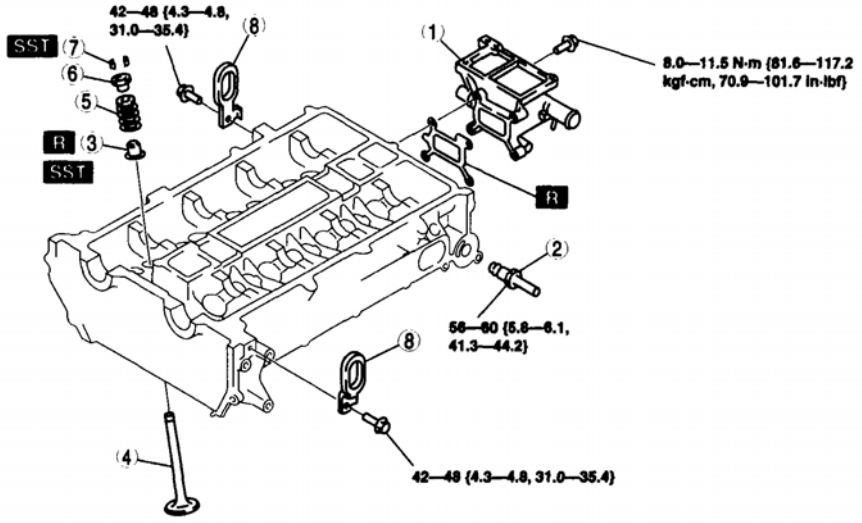
Fig. 93: Rear Oil Pan Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD (I) ASSEMBLY

1. Assemble in the order indicated in the table.



1	Water outlet	5	Valve spring
2	EGR pipe	6	Upper valve spring seat
3	Valve seal	7	Valve keeper
4	Valve	8	Engine hanger

Fig. 94: Exploded View Of Cylinder Head (I) Assembly & Torque Specification
Courtesy of MAZDA MOTORS CORP.

Valve Seal Assembly Note

1. Press the valve seal onto the valve guide by hand.
2. Lightly tap the **SST** using a plastic hammer.

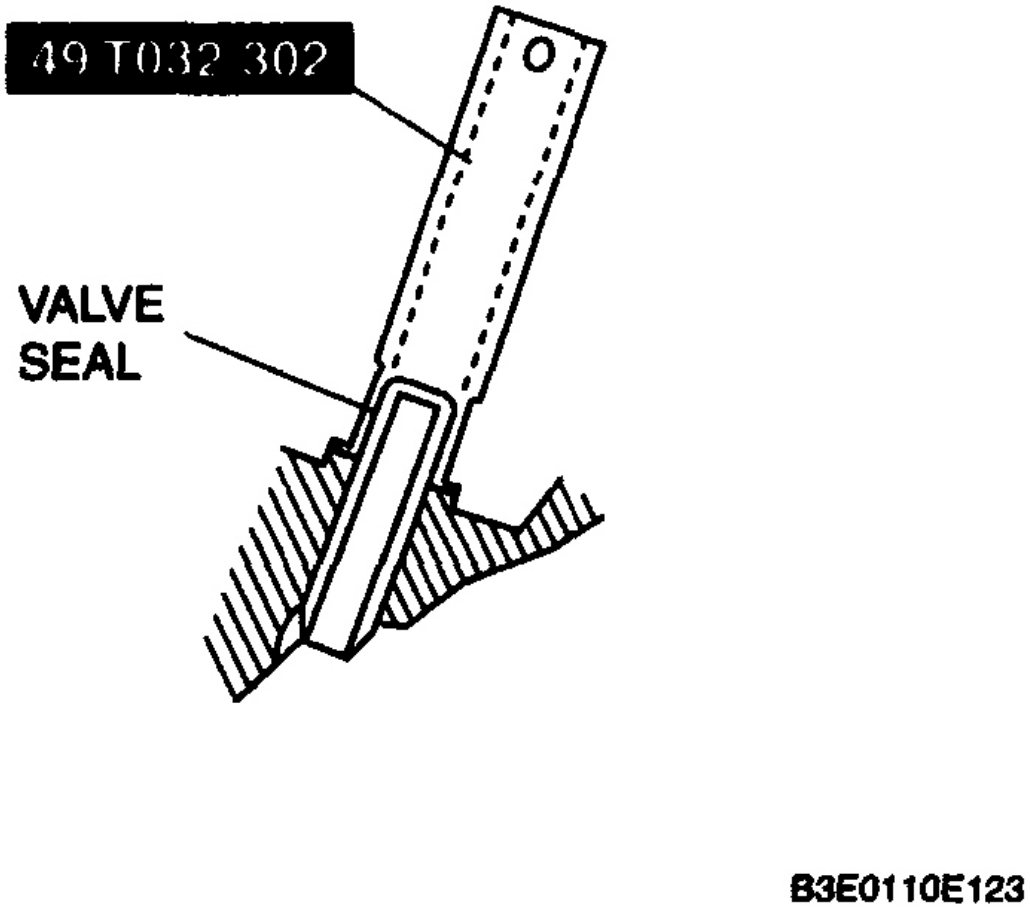


Fig. 95: Pressing Valve Seal
Courtesy of MAZDA MOTORS CORP.

Valve Keeper Assembly Note

1. Install the valve keeper using the **SSTs** .

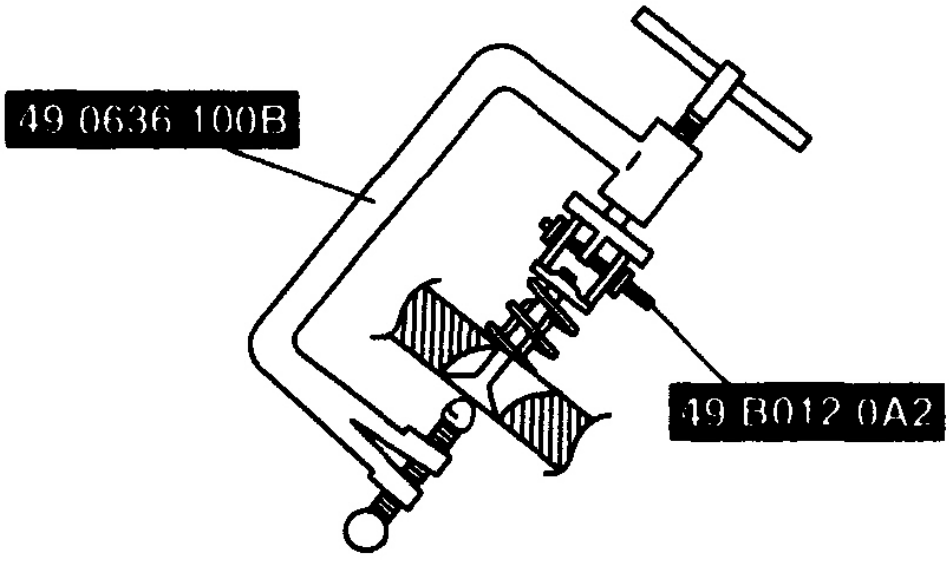
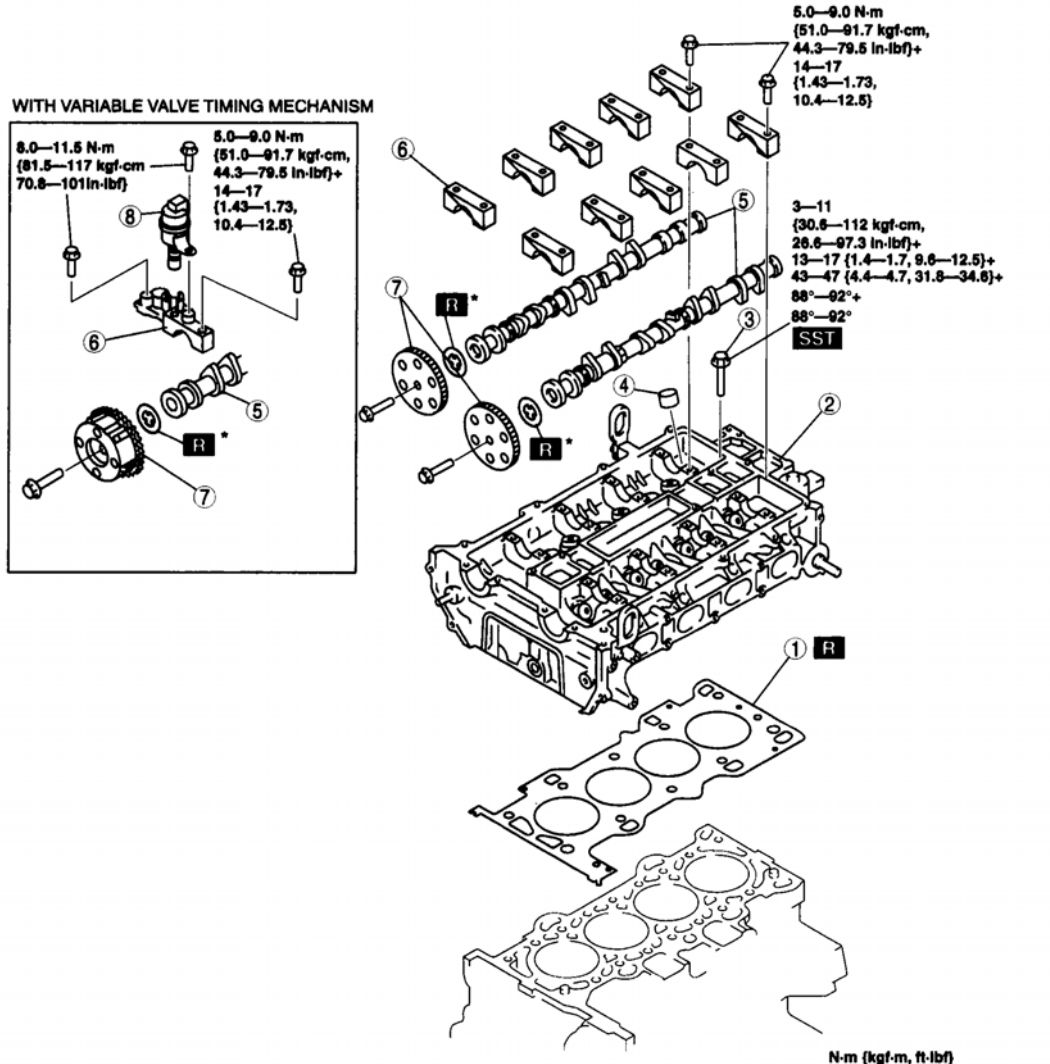


Fig. 96: Installing Valve Keeper
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD (II) ASSEMBLY

1. Assemble in the order indicated in the table.



*:EXCEPT FOR MAZDA6 ARE EQUIPPED. IF WASHER IS NOT INSTALLED TO THE ENGINE, INSTALL A NEW WASHER.

E5U110ZE7S04

1	Cylinder head gasket
2	Cylinder head
3	Cylinder head bolt
4	Tappet
5	Camshaft

6	Camshaft cap
7	Camshaft sprocket, variable valve timing actuator
8	Oil control valve (OCV) (With variable valve timing mechanism)

Fig. 97: Exploded View Of Cylinder Head (II) Assembly & Torque Specification
Courtesy of MAZDA MOTORS CORP.

Cylinder Head Bolt Assembly Note

1. Tighten the cylinder head bolts in the order indicated in the figure in 5 steps using the **SST (49 D032 316).**

Tightening torque

1. **3-11 N.m**

   {30.6-112 kgf.cm, 26.6-97.3 in.lbf}

2. **13-17 N.m**

   {1.4-1.7 kgf.m, 9.6-12.5 ft.lbf}

3. **43-47 N.m**

   {4.4-4.7 kgf.m, 31.8-34.6 ft.lbf}

4. **88°-92°**
5. **88°-92°**

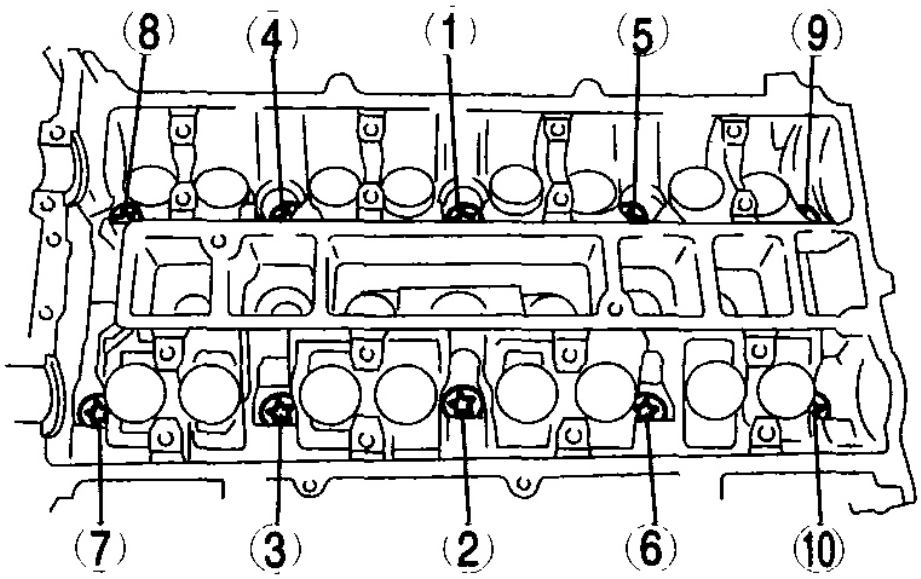


Fig. 98: Cylinder Head Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

Camshaft Assembly Note

1. Set the cam position of No. 1 cylinder at the top dead center (TDC) and install the camshaft.
2. Temporarily tighten the camshaft bearing caps evenly in 2-3 steps.
3. Tighten the camshaft cap bolt in the order shown two steps.

Tightening torque

1. **5.0-9.0 N.m**

   {51.0-91.7 kgf.cm, 44.3-79.5 in.lbf}

2. **14-17 N.m**

   {1.43-1.73 kgf.m, 10.4-12.5 ft.lbf}

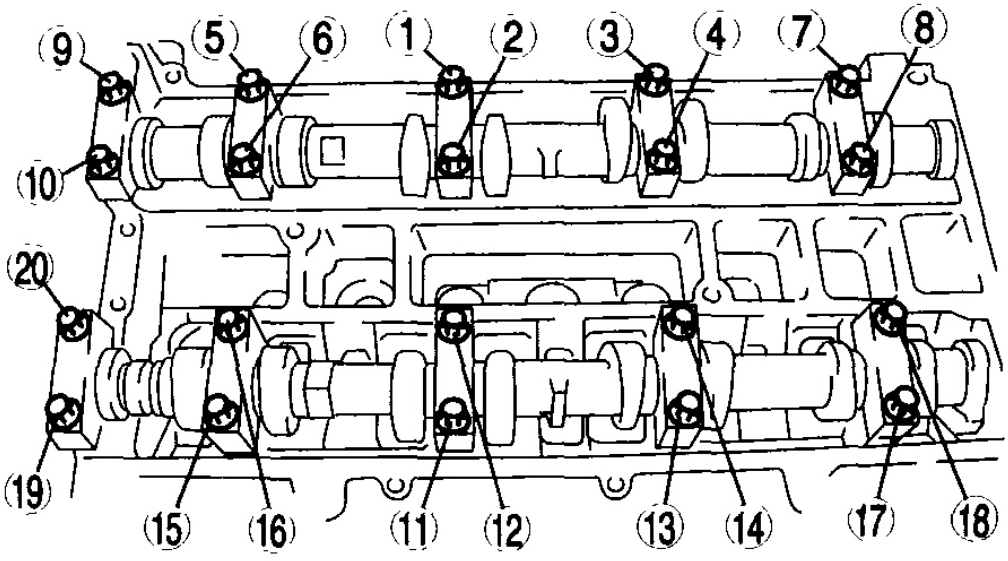


Fig. 99: Camshaft Cap Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

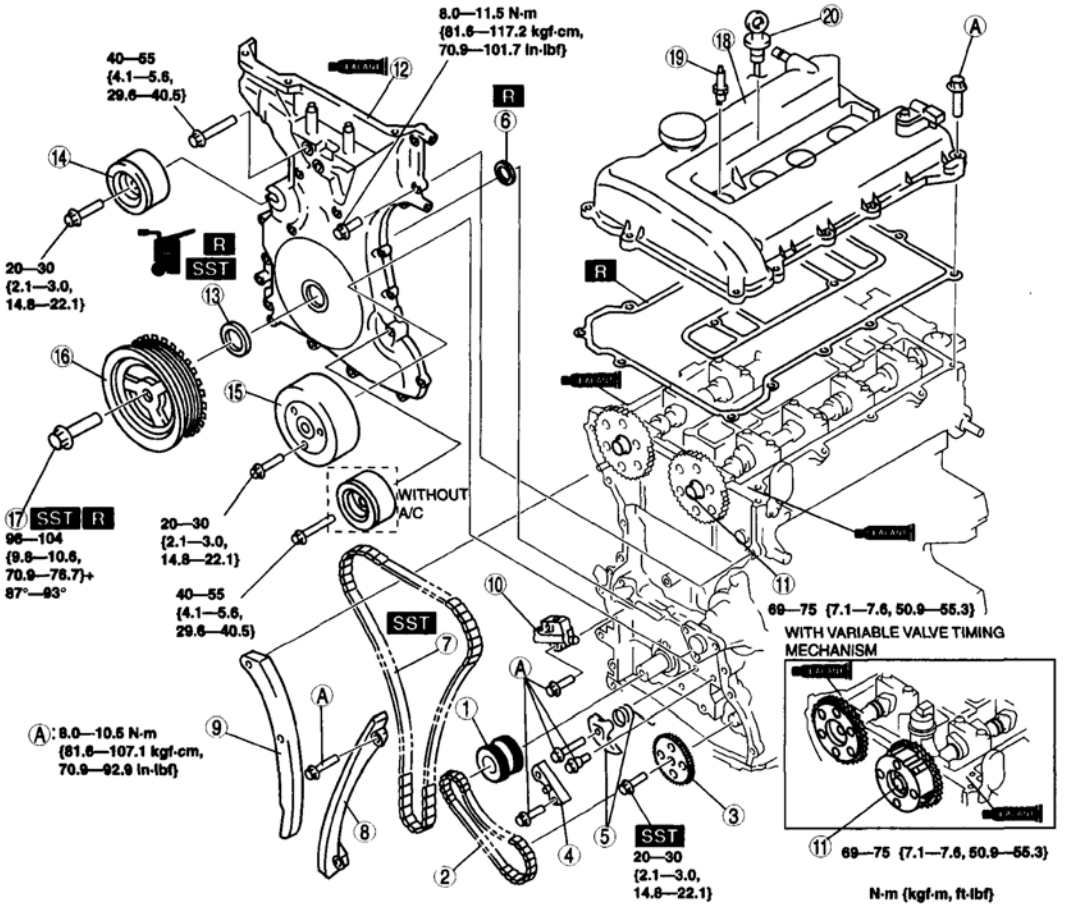
Camshaft Sprocket, Variable Valve Timing Actuator Assembly Note

1. Temporarily tighten the camshaft sprocket or variable valve timing actuator installation bolts by hand until the timing chain is installed.
2. Fully tighten the camshaft sprocket or variable valve timing actuator installation bolts after timing chain

installation.

TIMING CHAIN ASSEMBLY

1. Assemble in the order indicated in the table.



1	Crankshaft sprocket
2	Oil pump chain
3	Oil pump sprocket
4	Oil pump chain guide
5	Oil pump chain tensioner
6	Seal (With variable valve timing mechanism)
7	Timing chain
8	Chain guide
9	Tensioner arm
10	Chain tensioner
11	Camshaft sprocket, variable valve timing actuator

12	Engine front cover
13	Front oil seal
14	Drive belt idler pulley (Without stretch-type A/C drive belt)
15	Water pump pulley
16	Crankshaft pulley
17	Crankshaft pulley lock bolt
18	Cylinder head cover
19	Spark plug
20	Dipstick (if equipped)

Fig. 100: Exploded View Of Timing Chain Assembly & Torque Specification
Courtesy of MAZDA MOTORS CORP.

Oil Pump Sprocket Assembly Note

1. Hold the oil pump sprocket using the **SST** .

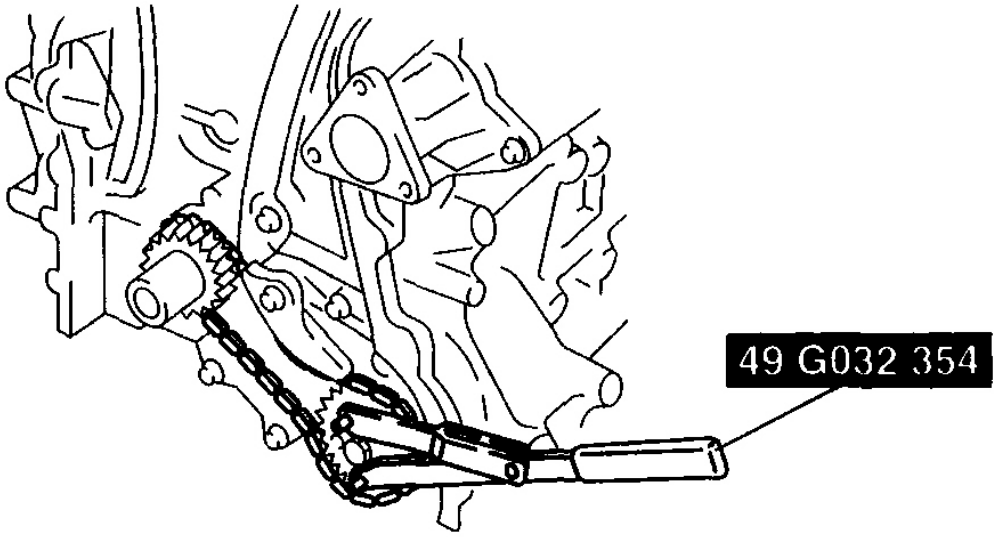


Fig. 101: Assembling Oil Pump Sprocket
Courtesy of MAZDA MOTORS CORP.

Timing Chain Assembly Note

1. Install the **SST** to the camshaft, then align the No. 1 camshaft position with the TDC.

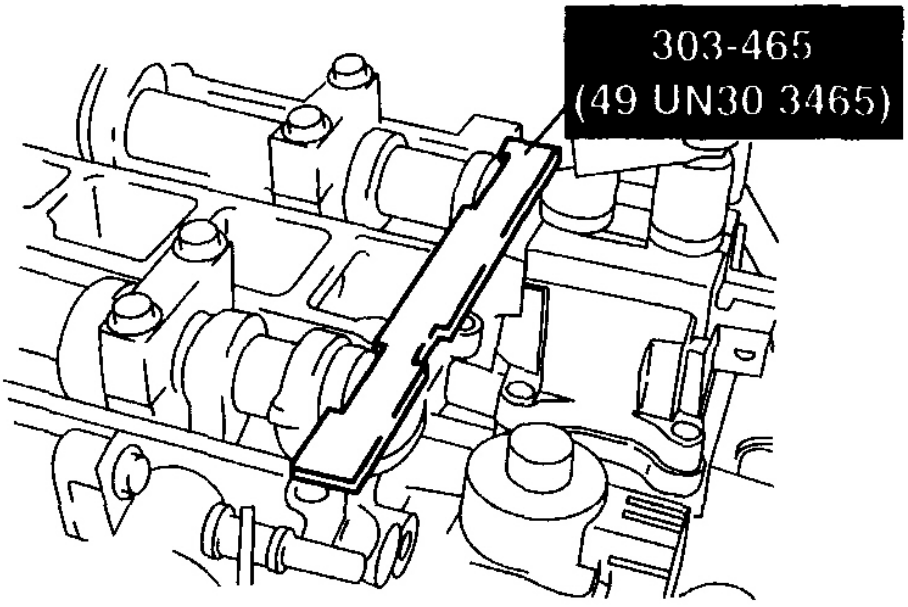


Fig. 102: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

2. Remove the cylinder block lower blind plug.
3. Install the **SST** as shown in the figure.

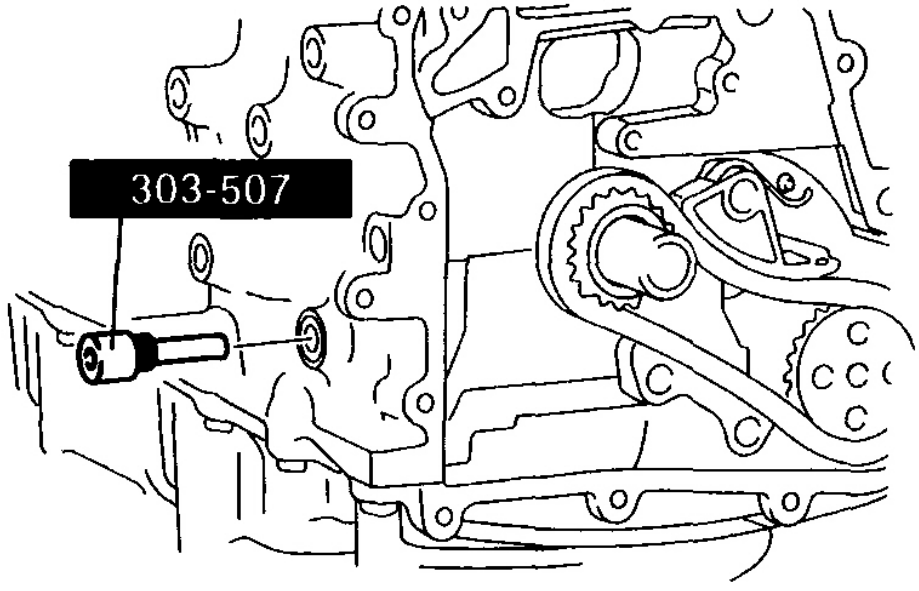


Fig. 103: Installing SST In Place Of Cylinder Block Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

4. Turn the crankshaft clockwise so that the crankshaft is in the No. 1 cylinder TDC position.
5. Install the timing chain.
6. Install the chain tensioner and remove the retaining wire.

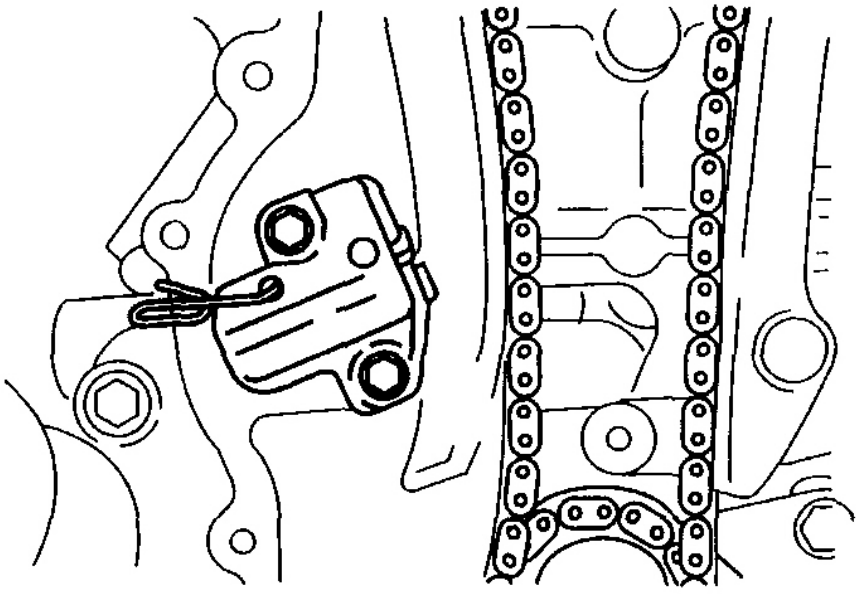


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Fig. 104: Chain Tensioner Retaining Wire
Courtesy of MAZDA MOTORS CORP.

Camshaft Sprocket, Variable Valve Timing Actuator Assembly Note

1. Hold the camshaft using a suitable wrench on the cast hexagon as shown in the figure.
2. Tighten the camshaft sprocket lock bolt.

Tightening torque

69-75 N.m {7.1-7.6 kgf.m, 50.9-55.3 ft.lbf}

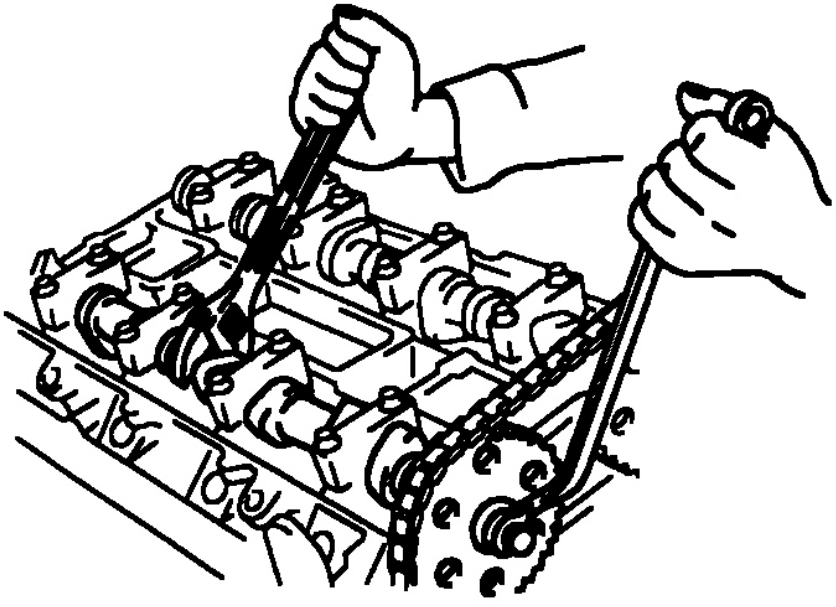

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Fig. 105: Holding Camshaft Using Suitable Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

Front Oil Seal Assembly Note

1. Apply clean engine oil to the oil seal.
2. Push the oil seal slightly in by hand.
3. Compress the oil seal using the **SST** and a hammer.

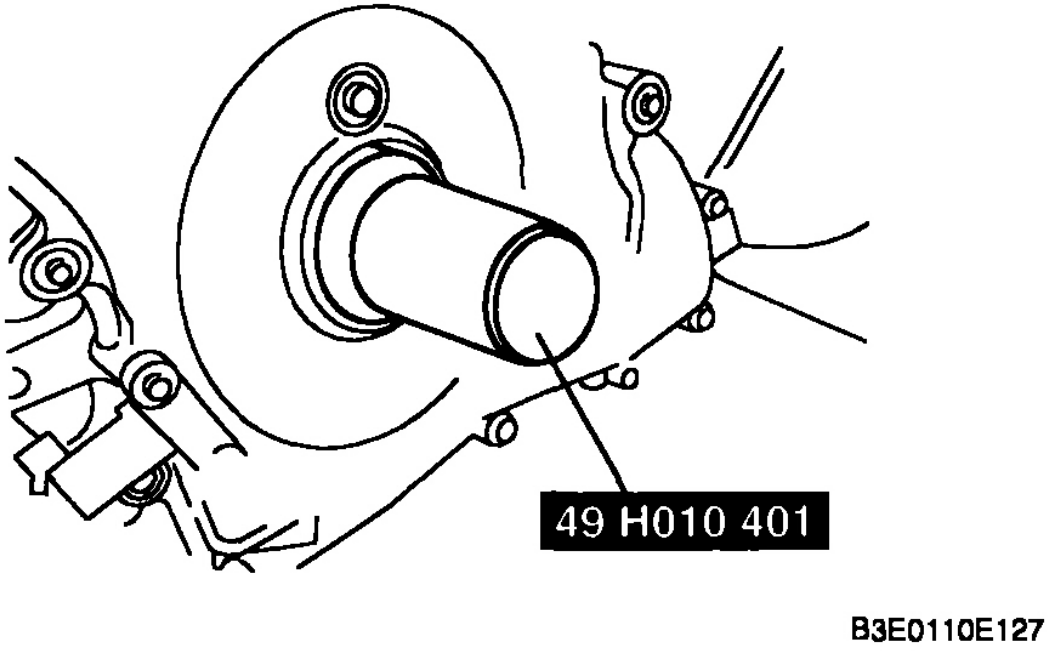

Fig. 106: Installing Front Oil Seal
Courtesy of MAZDA MOTORS CORP.

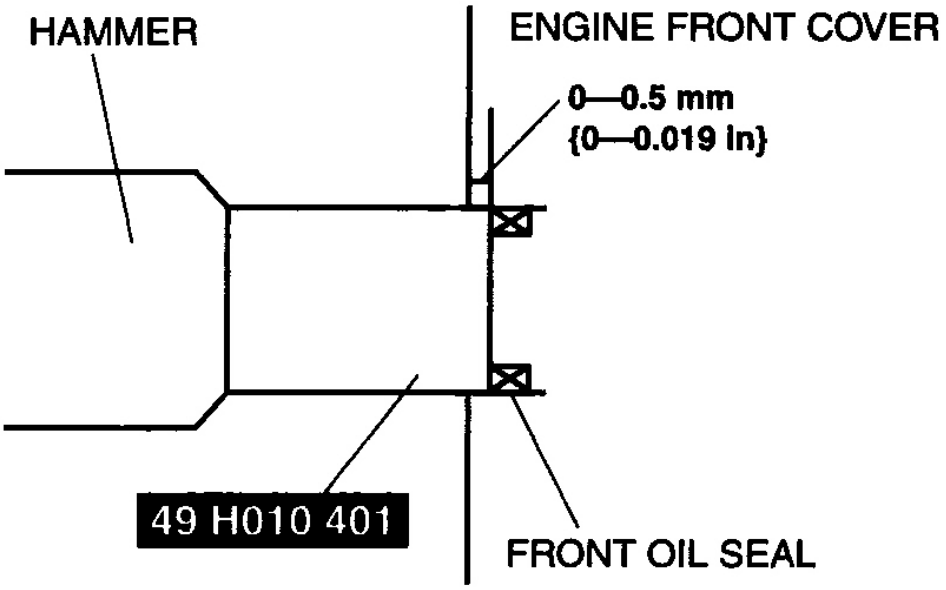

Fig. 107: Using SST And Hammer
Courtesy of MAZDA MOTORS CORP.

Engine Front Cover Assembly Note

1. Apply silicone sealant to the engine front cover as shown in the figure.

CAUTION:
- **Install the cylinder head cover within 10 min of applying the silicone sealant.**
- **Silicone sealant is not need in area C as indicated below due to an existing. (With variable valve timing mechanism)**
- **Make sure that there is no oil or dust on the seal side of oil pan.**

Thickness

A: 2.2-3.2 mm {0.087-0.125 in}

B: 1.5-2.5 mm {0.059-0.098 in}

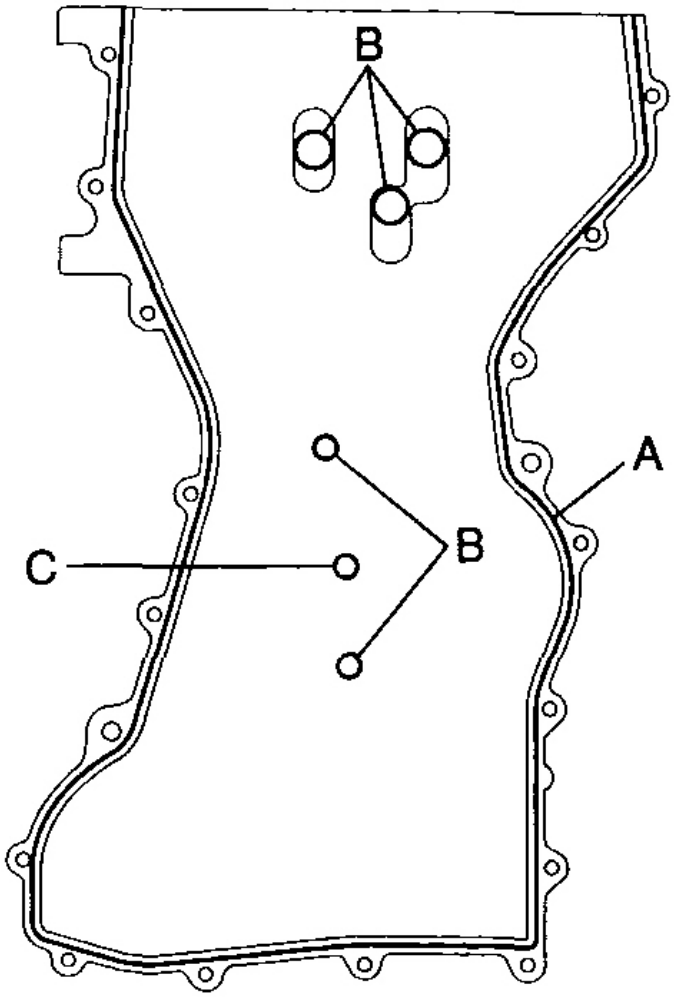

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Fig. 108: Applying Silicone Sealant To Engine Front Cover
Courtesy of MAZDA MOTORS CORP.

2. Install the cylinder head cover bolts in the order as shown in the figure.

CYLINDER HEAD COVER BOLTS SPECIFICATION

Bolt No.	Tightening torque N.m {kgf.m, ft.lbf}

1-18	8.0-11.5 N.m {81.6-117.2 kgf.cm, 70.9-101.7 in.lbf}
19-22	40-55 {4.1-5.6, 29.6-40.5}

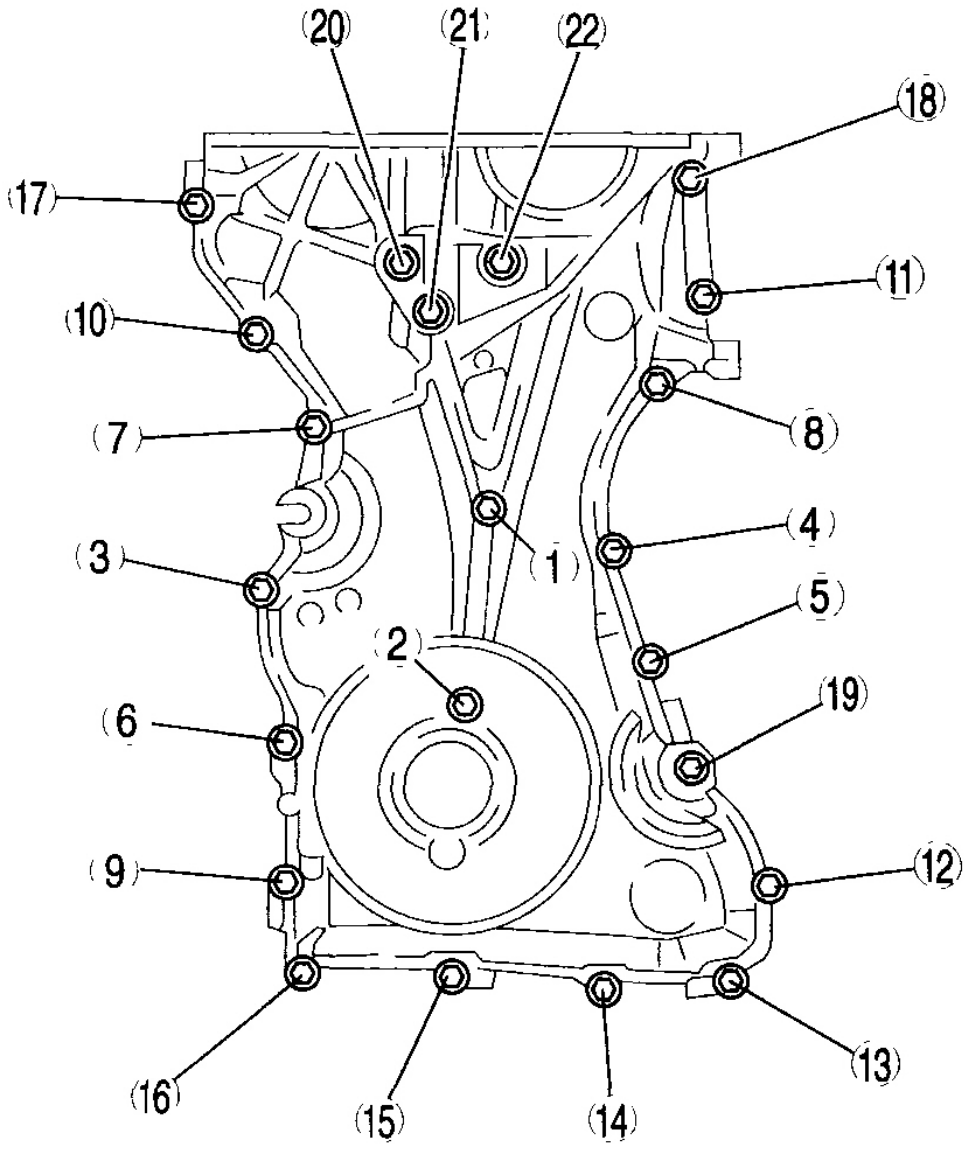


Fig. 109: Engine Front Cover Bolt Tightening Sequence

Courtesy of MAZDA MOTORS CORP.

Crankshaft Pulley Lock Bolt Assembly Note

1. Install the **SST** to the camshaft as shown in the figure.

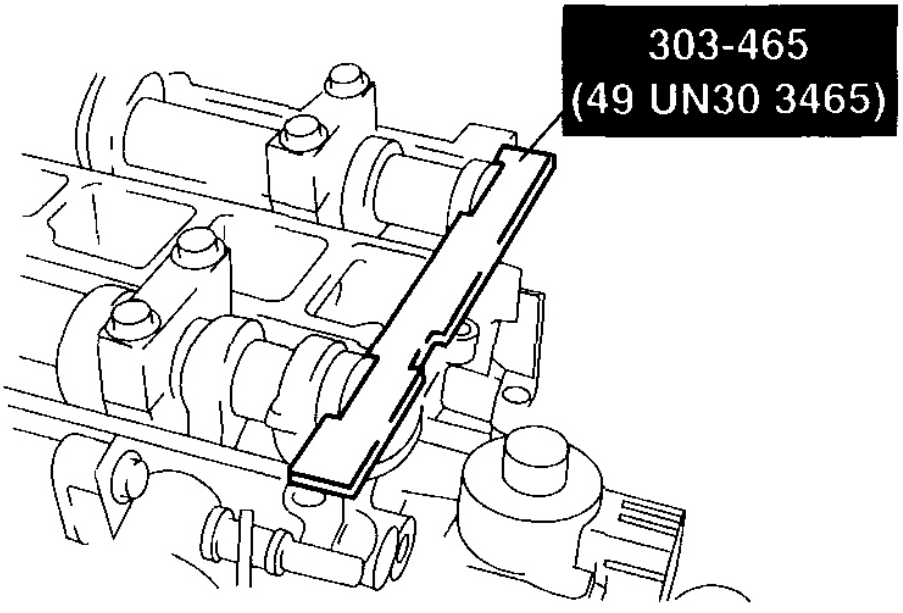


Fig. 110: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

2. Install the M6 x 1.0 bolt in by hand.
3. Turn the crankshaft clockwise so that the crankshaft is in the No. 1 cylinder TDC position.

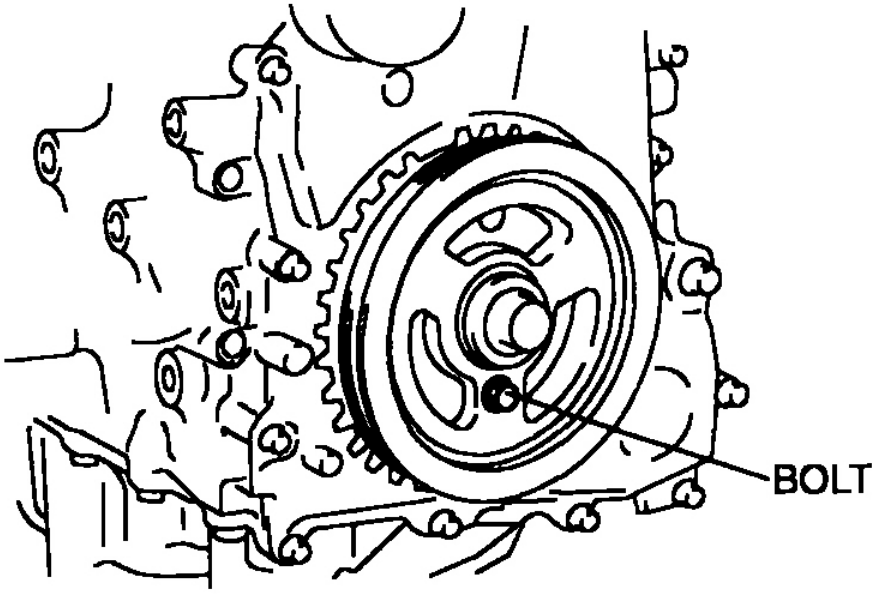


Fig. 111: Installing M6 X 1.0 Bolt On Crankshaft Pulley
Courtesy of MAZDA MOTORS CORP.

4. Hold the crankshaft pulley using the **SST** .
5. Tighten the crankshaft pulley lock bolt in the order shown following two steps using the **SST (49 D032 316).**

   Tightening torque

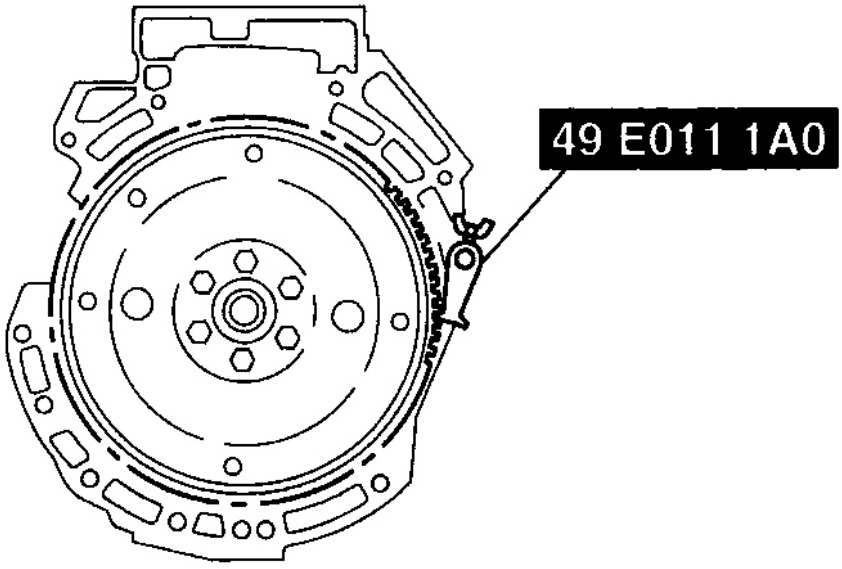
   1. **96-104 N.m**

      {9.8-10.6 kgf.m, 70.9-76.7 ft.lbf}

   2. **87°-93°**
6. Remove the M6 x 1.0 bolt.
7. Remove the **SST** from the camshaft.
8. Remove the **SST** from the block lower blind plug.
9. Rotate the crankshaft clockwise two turns until the TDC position.
   - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.
10. Install the cylinder block lower blind plug.

    Tightening torque

18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbf}



E5U110ZE7S11

Fig. 112: Locking Flywheel Using SST
Courtesy of MAZDA MOTORS CORP.

Cylinder Head Cover Assembly Note

1. Apply silicone sealant to the mating faces as shown in the figure.

CAUTION:
- **Install the cylinder head cover within 10 min of applying the silicone sealant.**

Dot diameter

4.0-6.0 mm {0.16-0.23 in}

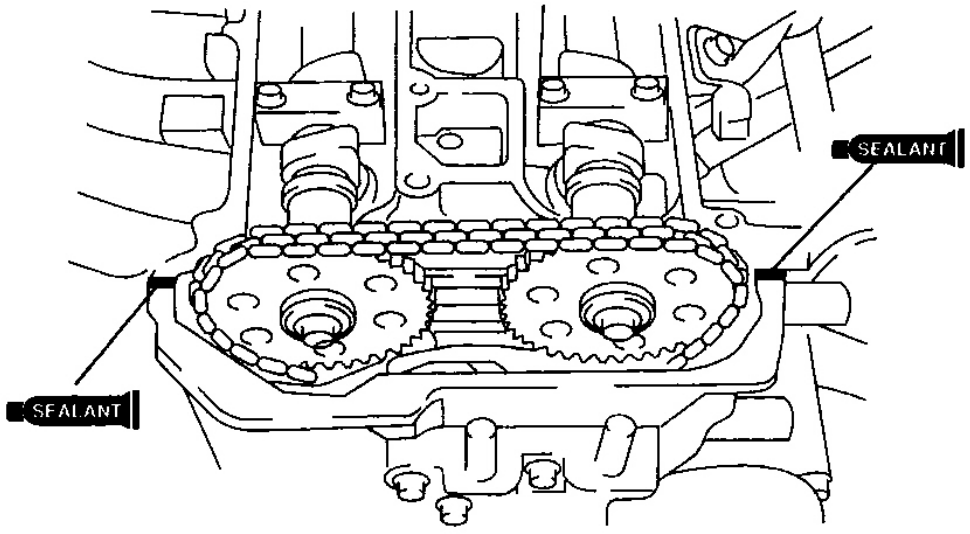


Fig. 113: Applying Silicone Sealant To Mating Faces
Courtesy of MAZDA MOTORS CORP.

2. Install the cylinder head cover with a new gasket.
3. Tighten the bolts in the order shown in the figure.

Tightening torque

8.0-10.5 N.m

{81.6-107.1 kgf.cm, 70.9-92.9 in.lbf}

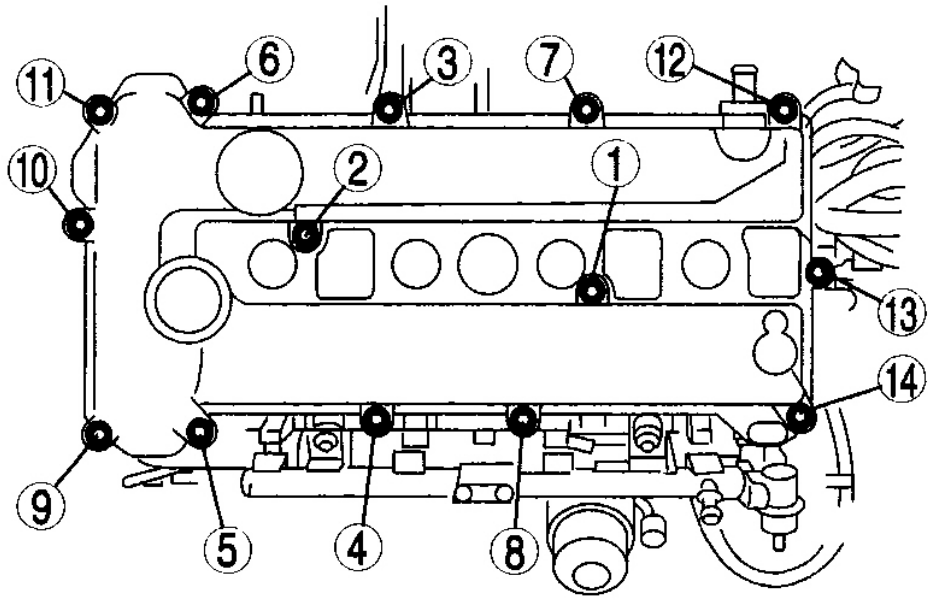


Fig. 114: Cylinder Head Cover Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

01-50 TECHNICAL DATA

ENGINE TECHNICAL DATA

ENGINE TECHNICAL DATA SPECIFICATION

Item	Specification
Cylinder head gasket contact surface distortion (Maximum)	0.10 mm {0.004 in}
Manifold contact surfaces distortion (Maximum)	0.10 mm {0.004 in}
Manifold contact surfaces distortion (Maximum grinding)	0.15 mm {0.006 in}
Valve head margin thickness (Minimum)	IN: 1.62 mm {0.0637 in} EX: 1.82 mm {0.0716 in}
Valve length (Standard)	IN: 102.99-103.79 mm {4.055-4.086 in} EX: 104.25-105.05 mm {4.105-4.135 in}
Valve length (Minimum)	IN: 102.99 mm {4.055 in} EX: 104.25 mm {4.104 in}

Valve stem diameter (Standard)	IN: 5.470-5.485 mm {0.2154-0.2159 in} EX: 5.465-5.480 mm {0.2152-0.2157 in}
Valve stem diameter (Minimum)	IN: 5.440 mm {0.2142 in} EX: 5.435 mm {0.2140 in}
Valve guide inner diameter (Standard)	5.509-5.539 mm {0.2169-0.2180 in}
Valve stem to guide clearance (Standard)	IN: 0.024-0.069 mm {0.0009-0.0027 in} EX: 0.029-0.074 mm {0.0012-0.0029 in}
Valve stem to guide clearance (Maximum)	0.10 mm {0.004 in}
Valve guide protrusion height (standard)	12.2-12.8 mm {0.481-0.503 in}
Valve seat contact width (Standard)	1.2-1.6 mm {0.048-0.062 in}
Valve protrusion height (Standard)	IN: 40.64-42.24 mm {1.600-1.662 in} EX: 40.50-42.10 mm {1.595-1.657 in}
Valve spring pressing force	390 N {39.76 kgf, 87.67 lbf}
Valve spring standard height H	28.68 mm {1.129 in}
Valve spring out-of-square (Maximum)	1.95 mm {0.0767 in}
Maximum runout (Maximum)	0.03 mm {0.0012 in}
Camshaft standard height (mm {in})	With variable valve timing mechanism IN: 42.44 {1.671} EX: 41.18 {1.621} Without variable valve timing mechanism IN: 42.12 {1.659} EX: 41.08 {1.618}
Camshaft minimum height (mm {in})	With variable valve timing mechanism IN: 42.33 {1.666} EX: 41.06 {1.616} Without variable valve timing mechanism IN: 42.01 {1.653} EX: 40.96 {1.612}
Camshaft journal diameter (Standard)	24.96-24.98 mm {0.9827-0.9834 in}
Camshaft journal diameter (Minimum)	24.95 mm {0.982 in}
Camshaft journal oil clearance (Standard)	0.035-0.080 mm {0.0014-0.0031 in}
Camshaft journal oil clearance (Maximum)	0.09 mm {0.0035 in}
Camshaft end play (Standard)	0.09-0.24 mm {0.0035-0.0094 in}
Camshaft end play (Maximum)	0.25 mm {0.0098 in}
Tappet bore diameter (Standard)	31.000-31.030 mm {1.2205-1.2216 in}
Tappet diameter (Standard)	30.970-30.980 mm {1.2193-1.2196 in}
Tappet-to-Tappet bore oil clearance (Standard)	0.02-0.06 mm {0.0008-0.0023 in}
Tappet-to-Tappet bore oil clearance (Maximum)	0.15 mm {0.006 in}
Cylinder head gasket contact surfaces distortion (Maximum)	0.10 mm {0.004 in}
Cylinder bore diameter (Standard)	87.500-87.530 mm {3.4449-3.4460 in}
Minimum / maximum bore diameter limit	87.440-87.590 mm {3.4425-3.4484 in}
Oil jet valve air pressure	216-274 kPa {2.2-2.7 kgf.cm^2 31.4-39.7 psi}

Piston diameter (Standard)	87.465-87.495 mm {3.4435-3.4446 in}
Piston-to-cylinder clearance (Standard)	0.025-0.045 mm {0.0010-0.0017 in}
Piston-to-cylinder clearance (Maximum)	0.11 mm {0.0043 in}
Piston ring-to-ring groove clearance (Standard)	Top: 0.03-0.08 mm {0.0012-0.0031 in} Second: 0.03-0.07 mm {0.0012-0.0027 in} Oil: 0.03-0.07 mm {0.0012-0.0027 in}
Piston ring-to-ring groove clearance (Maximum)	Top: 0.17 mm {0.0067 in} Second, Oil: 0.15 mm {0.0059 in}
Piston end gap (Standard)	Top: 0.16-0.31 mm {0.0063-0.0122 in} Second: 0.33-0.48 mm {0.0130-0.0189 in} Oil (rail): 0.20-0.70 mm {0.0079-0.0275 in}
Piston end gap (Maximum)	1.0 mm {0.0393 in}
Crankshaft end play (Standard)	0.22-0.45 mm {0.0087-0.0177 in}
Crankshaft end play (Maximum)	0.55 mm {0.0216 in}
Crankshaft runout (Maximum)	0.05 mm {0.0019 in}
Main journal bearing size	STD: 51.980-52.000 mm {2.0464-2.0472 in} US0.25: 51.730-51.750 mm {2.0366-2.0373 in}
Main journal out of round (Maximum)	0.05 mm {0.0019 in}
Crank pin journal diameter [LF]	STD: 46.980-47.000 mm {1.8497-1.8503 in} US0.25: 46.730-46.750 mm {1.8398-1.8405 in}
Crank pin journal diameter [L3]	STD: 49.980-50.000 mm {1.9677-1.9685 in} US0.25: 49.730-49.750 mm {1.9579-1.9586 in}
Crank pin out of round (Maximum)	0.05 mm {0.0019 in}
Main journal oil clearance (Standard)	0.019-0.035 mm {0.0007-0.0013 in}
Main journal oil clearance (Maximum)	0.10 mm {0.0039 in}
Main bearing size	STD: 2.506-2.509 mm {0.0987-0.0988 in} OS0.25: 2.628-2.634 mm {0.1034-0.1037 in}
Connecting rod side clearance (Standard)	0.14-0.36 mm {0.0056-0.0141 in}
Connecting rod side clearance (Maximum)	0.435 mm {0.0172 in}
Connecting rod bearing oil clearance (Standard)	0.026-0.052 mm {0.0011-0.0020 in}
Connecting rod bearing oil clearance (Maximum)	0.1 mm {0.0039 in}
Connecting rod bearing size [LF]	STD: 1.498-1.504 mm {0.0589-0.0592 in} OS0.25: 1.623-1.629 mm {0.0639-0.0641 in}
Connecting rod bearing size [L3]	STD: 1.496-1.502 mm {0.0589-0.0591 in} OS0.25: 1.621-1.627 mm {0.0639-0.0641 in}
Bolt length (mm {in})	Cylinder head bolt (With washer) Standard: 149.2-149.8 {5.87-5.90} Maximum: 150.5 {5.91} Cylinder head bolt (Without washer) Standard: 145.2-145.8 {5.72-5.74} Maximum: 146.5 {5.77} Connecting rod bolt Standard: 44.7-45.3 {1.75-1.78}

	Maximum: 46.0 {1.81} Main bearing cap bolt (Plastic region tightening bolt only) Standard: 110.0-110.6 {4.33-4.35} Maximum: 111.3 {4.38}
Valve clearance [Engine cold]	IN: 0.22-0.28 mm {0.0087-0.0110 in} EX: 0.27-0.33 mm {0.0106-0.0130 in}
Value range	0.005-0.101 mm {0.00019-0.0039 in}

01-60 SERVICE TOOLS

ENGINE SST

1. Mazda **SST** number
2. Global **SST** number

Example

1. 49 UN20 5072
2. 205-072

Holder

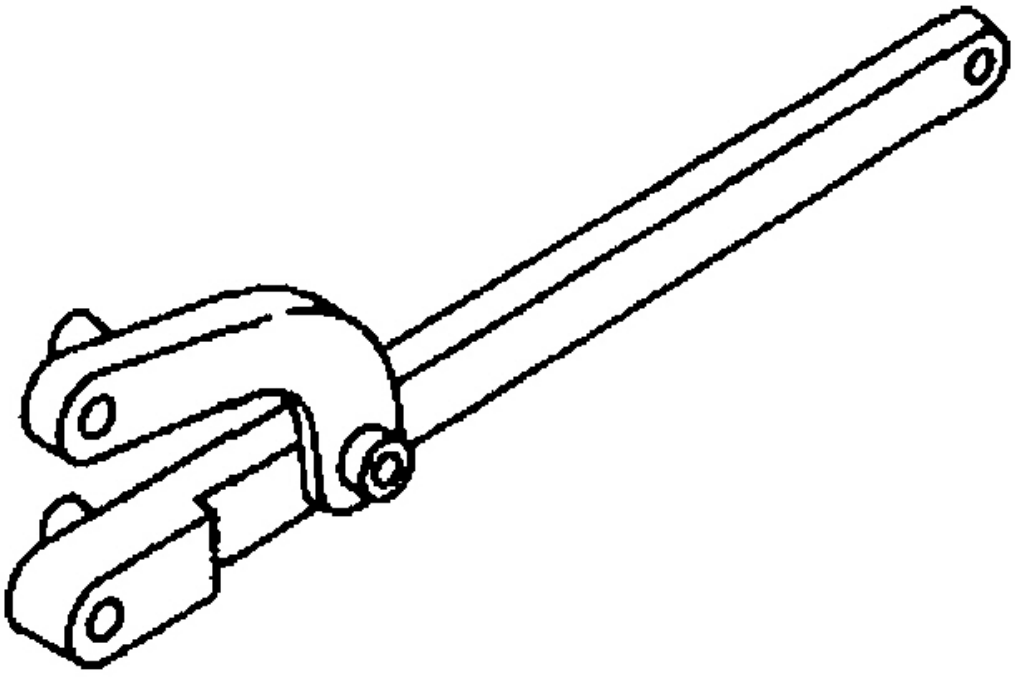
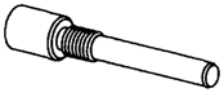
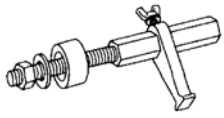
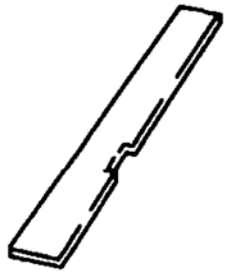
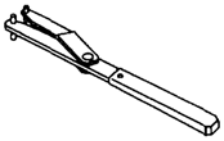
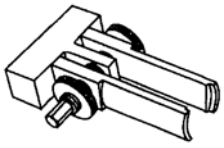
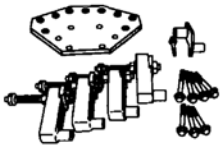
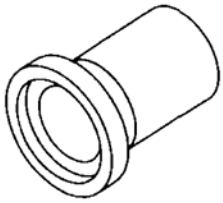
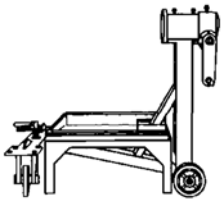
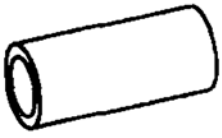
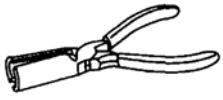
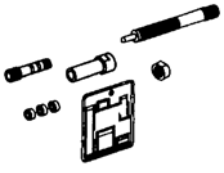
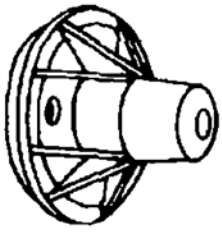
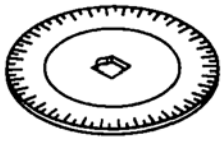
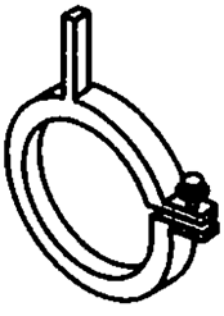


Fig. 115: Identifying Engine SST Holder
Courtesy of MAZDA MOTORS CORP.

ENGINE SERVICE TOOLS SPECIFICATION

1: - 2: 303-507 Crankshaft TDC setting peg 	1: 49 E011 1A0 2:- Ring gear brake set 	1: 49 UN30 3465 2: 303-465 Camshaft Alignment timing Tool 
1: 49 G032 354 2:- Adjusting wrench 	1: 49 B012 015 2:- Valve guide installer	1: 49 0636 100B 2:- Valve spring lifter arm
	1: 49 L010	

1: 49 B012 0A2 2:- Pivot		1A0 2:- Engine hanger set		1: 49 H010 401 2:- Oil seal installer	
1: 49 0107 680A 2:- Engine stand		1: 49 T032 302 2:- Bearing installer		1: 49 S120 170 2:- Valve seal remover	
1: 49 L012 0A0B 2:- Valve seal and valve guide installer set		1: 49 UN30 3328 2: 303-328 Rear oil seal replacer		1: 49 D032 316 2:- Protractor	
1: 49 G011 201 2:- Attachment		-		-	

2007 BRAKES

On-Board Diagnostic (ABS) - MX-5 Miata

ABS SYSTEM WIRING DIAGRAM

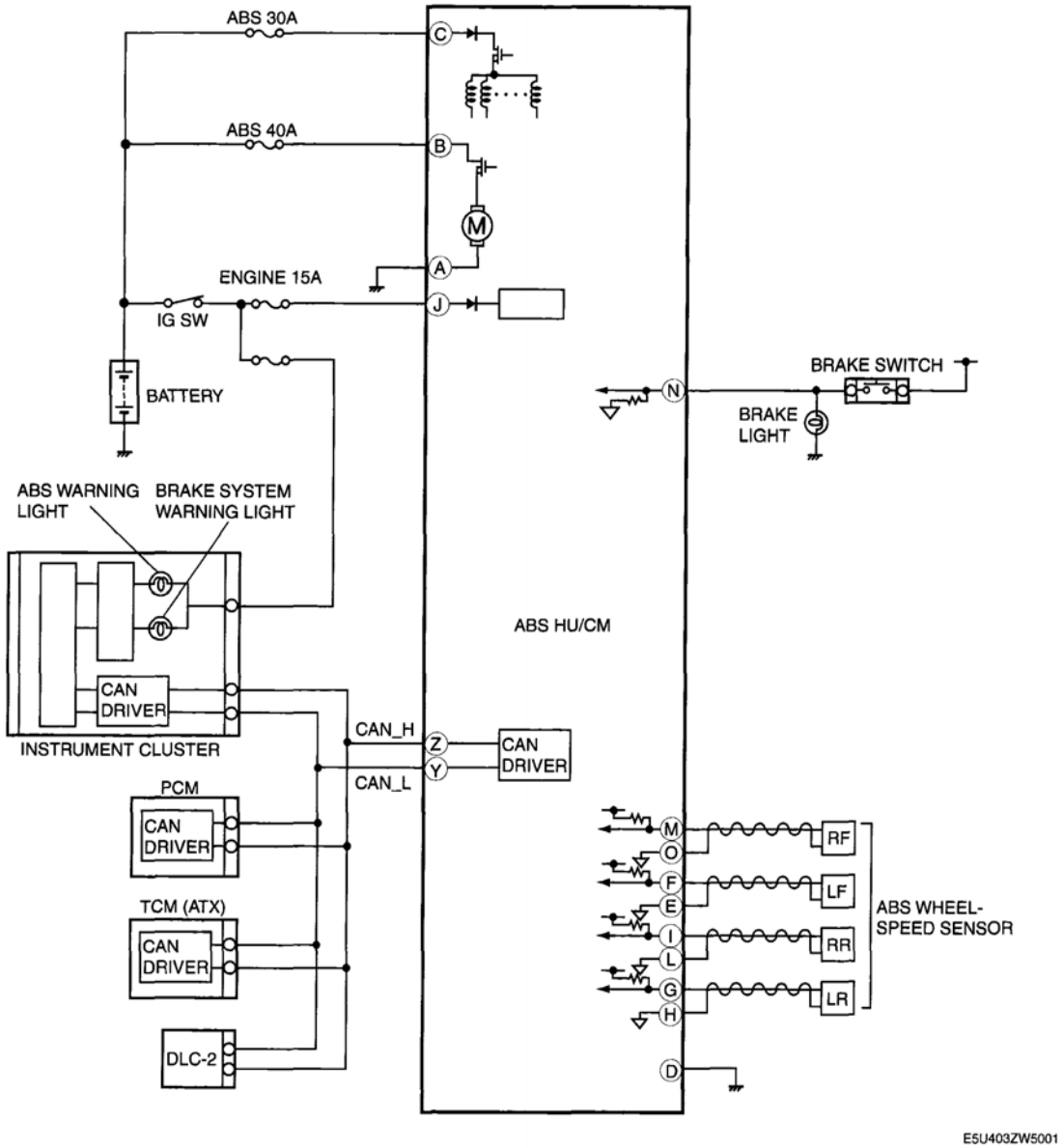


Fig. 1: ABS System Wiring Diagram
Courtesy of MAZDA MOTORS CORP.

ON-BOARD DIAGNOSIS [ABS]

ON-BOARD DIAGNOSTIC (OBD) TEST DESCRIPTION

- The OBD test inspects the integrity and function of the ABS and outputs the results when requested by the specific tests.
- On-board diagnostic test also:
  - Provides a quick inspection of the ABS usually performed at the start of each diagnostic procedure.
  - Provides verification after repairs to ensure that no other faults occurred during service.
- The OBD test is divided into 3 tests:
  - Read/clear diagnostic results, PID monitor and record and active command modes.

READ/CLEAR DIAGNOSTIC RESULTS

- This function allows you to read or clear DTCs in the ABS HU/CM memory.

PID/DATA MONITOR AND RECORD

- This function allows you to access certain data values, input signals, calculated values, and system status information.

ACTIVE COMMAND MODES

- This function allows you to control devices through the M-MDS.

READING DTCS PROCEDURE

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
   - When using the IDS (laptop PC)
     - Select the "Toolbox" tab.
     - Select "Self Test".
     - Select "Modules".
     - Select "ABS".
   - When using the PDS (Pocket PC)
     - Select "Modules Tests".
     - Select "ABS".
     - Select "Self Test".
3. Verify the DTC according to the directions on the screen.
   - If any DTCs are displayed, perform troubleshooting according to the corresponding DTC inspection.
4. After completion of repairs, clear all DTCs stored in the ABS.

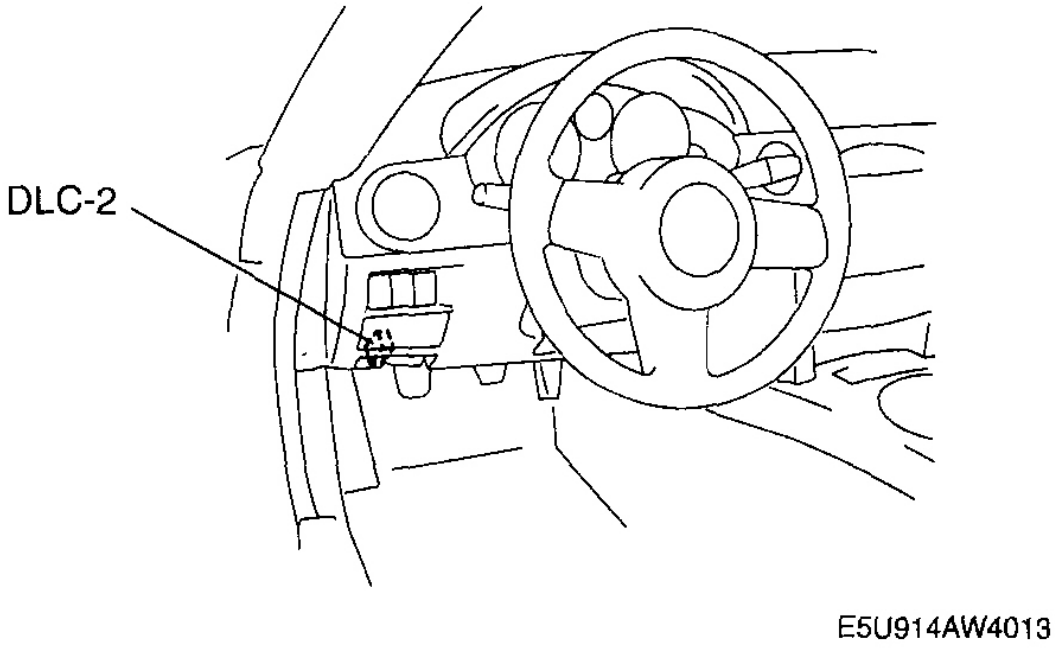


Fig. 2: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

CLEARING DTCS PROCEDURES

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        - Select the "Toolbox" tab.
        - Select "Self Test".
        - Select "Modules".
        - Select "ABS".
    - When using the PDS (Pocket PC)
        - Select "Modules Tests".
        - Select "ABS".
        - Select "Self Test".
3. Verify the DTC according to the directions on the screen.
4. Press the clear button on the DTC screen to clear the DTC.
5. Verify that no DTC are displayed.

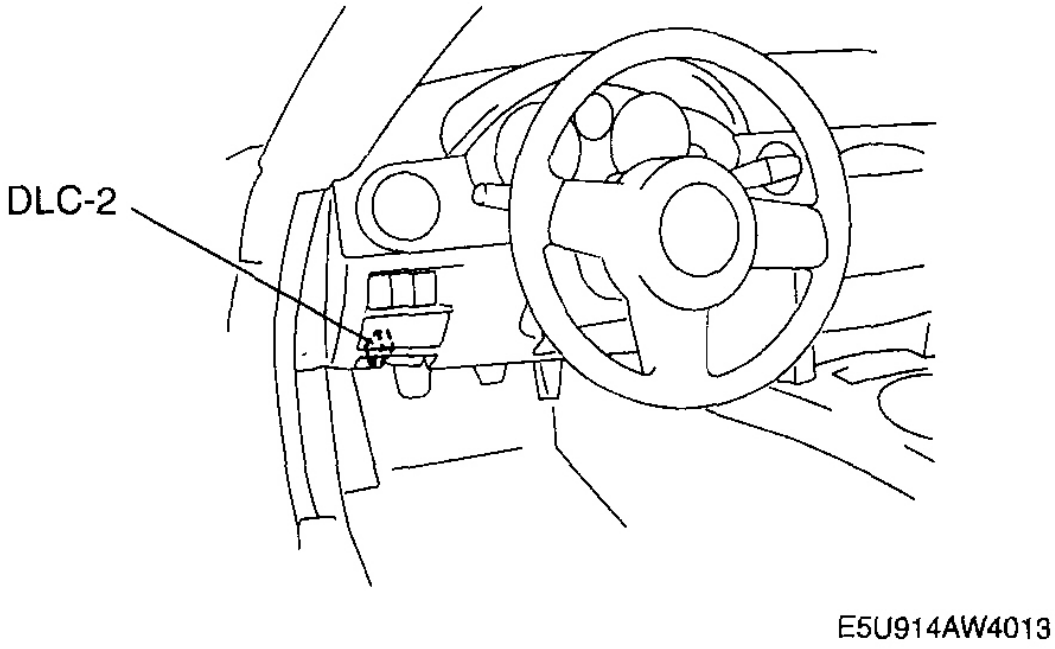


Fig. 3: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

PID/DATA MONITOR AND RECORD PROCEDURE

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        - Select the "Toolbox" tab.
        - Select "DataLogger".
        - Select "Modules".
        - Select "ABS".
    - When using the PDS (Pocket PC)
        - Select "Modules Tests".
        - Select "Optional" tab.
        - Select "ABS".
        - Select "DataLogger".
3. Select the applicable PID from the PID table.
4. Verify the PID data according to the directions on the screen.

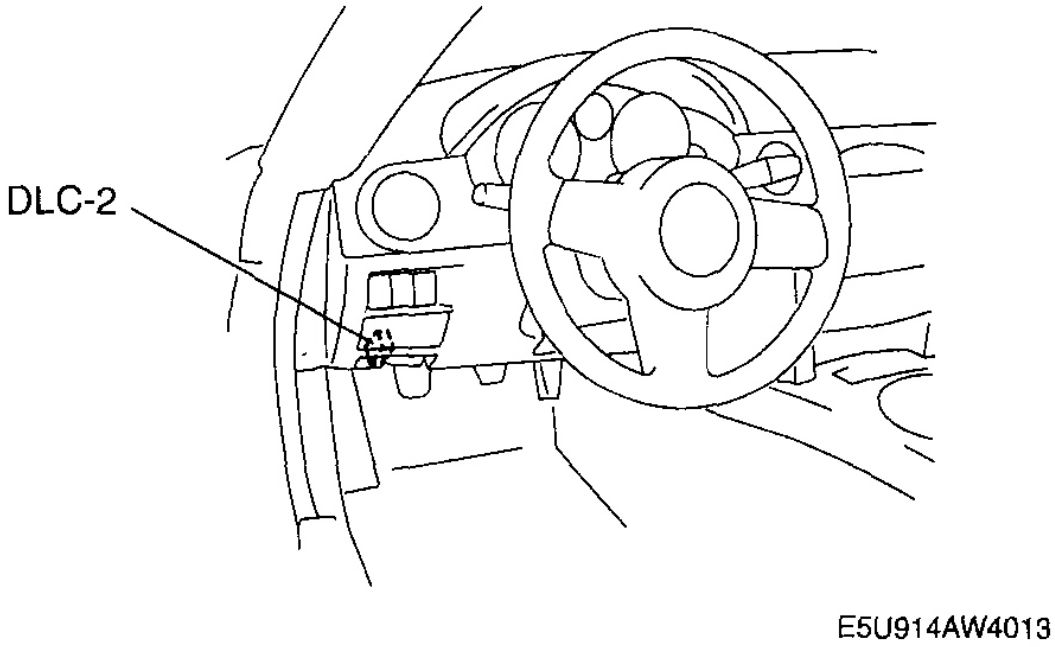


Fig. 4: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

NOTE: The PID data screen function is used for monitoring the calculated value. Therefore, if the monitored value of the output parts is not within specification, inspection of the monitored value of input parts corresponding to applicable output part control is necessary. In addition, because the system does not display output part malfunction as abnormality in the monitored value, it is necessary to inspect the output part individually using a active command modes function.

ACTIVE COMMAND MODES PROCEDURE

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        - Select the "Toolbox" tab.
        - Select "DataLogger".
        - Select "Modules".
        - Select "ABS".
    - When using the PDS (Pocket PC)
        - Select "Modules Tests".

- Select "ABS".
- Select "DataLogger".

3. Select the active command modes from the PID table.
4. Perform the active command modes, inspect the operations for each parts.
    - If there is no operation sound from the relay, motor, and solenoid after the active command mode inspection is performed, it is possible that there is an open or short circuit in the wiring harness, relay, motor or solenoid, or sticking and operation malfunction.

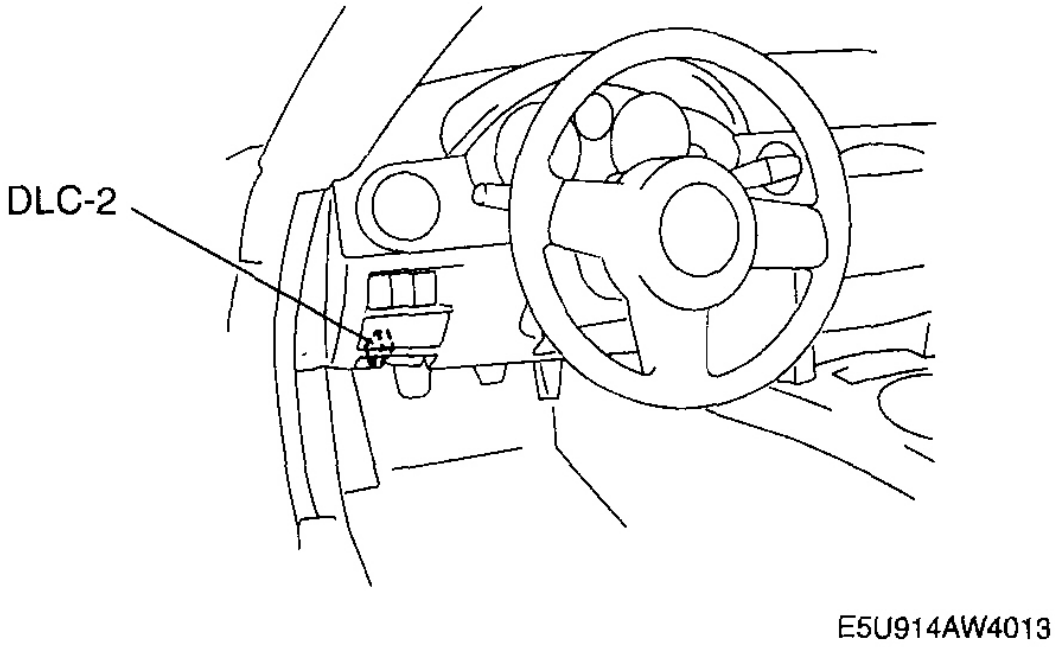


Fig. 5: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

DTC TABLE

DTC TABLE

DTC M-MDS	System malfunction location
B1317	Power supply system
B1318	Power supply system
B1342	ABS HU/CM system
B1484	Brake switch system
B2477	ABS HU/CM configuration

C1095	Pump motor, motor relay system
C1096	Pump motor, motor relay system
C1141	LF ABS sensor rotor system
C1142	RF ABS sensor rotor system
C1143	LR ABS sensor rotor system
C1144	RR ABS sensor rotor system
C1145	RF ABS wheel-speed sensor system
C1148	RF ABS wheel-speed sensor system
C1155	LF ABS wheel-speed sensor system
C1158	LF ABS wheel-speed sensor system
C1165	RR ABS wheel-speed sensor system
C1168	RR ABS wheel-speed sensor system
C1175	LR ABS wheel-speed sensor system
C1178	LR ABS wheel-speed sensor system
C1186	Fail-safe relay system
C1194	LF outlet solenoid valve system
C1198	LF inlet solenoid valve system
C1210	RF outlet solenoid valve system
C1214	RF inlet solenoid valve system
C1233	LF ABS wheel-speed sensor/ABS sensor rotor system
C1234	RF ABS wheel-speed sensor/ABS sensor rotor system
C1235	RR ABS wheel-speed sensor/ABS sensor rotor system
C1236	LR ABS wheel-speed sensor/ABS sensor rotor system
C1242	LR outlet solenoid valve system
C1246	RR outlet solenoid valve system
C1250	LR inlet solenoid valve system
C1254	RR inlet solenoid valve system
C1266	Fail-safe relay system
C1805	Incorrect ABS HU/CM installed
DTC U0073, U2516[MULTIPLEX COMMUNICATION SYSTEM]	CAN system communication error
DTC TABLE[MULTIPLEX COMMUNICATION SYSTEM]	Communication error to other module
DTC TABLE[MULTIPLEX COMMUNICATION SYSTEM]	Abnormal message from PCM

PID/DATA MONITOR TABLE

PID/DATA MONITOR TABLE

PID name (definition)	Unit/Condition	Operation condition (reference)	Action	ABS HU/CM terminal

ABS_VOLT (System battery voltage value)	V	• Ignition switch at ON: • **Approx. 12.2 V** • Idling: **Approx. 14.1 V**	Inspect the power supply circuit. (See **ABS SYSTEM INSPECTION** .)	J
ABSLF_I (Left front inlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSLF_O (Left front outlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSLR_I (Left rear inlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSLR_O (Left rear outlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSPMPRLY (Motor relay output state)	On/Off	• Relay activated: On • Relay not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSRF_I (Right front inlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSRF_O (Right front outlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSRR_I (Right rear inlet		• Solenoid valve activated: On	Inspect the ABS HU/CM.	

solenoid valve output state)	On/Off	• Solenoid valve not activated: Off	(See **ABS HU/CM INSPECTION** .)	-
ABSRR_O (Right rear outlet solenoid valve output state)	On/Off	• Solenoid valve activated: On • Solenoid valve not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
ABSVLVRLY (Fail-safe relay output state)	On/Off	• Fail-safe relay is activated: On • Fail-safe relay is deactivated: Off	Inspect ABS HU/CM. (See **ABS HU/CM INSPECTION**)	-
BOO_ABS (Brake pedal switch input)	On/Off	• Brake pedal depressed: On • Brake pedal released: Off	Inspect the brake switch.	N
CCNTABS (Number of continuous codes)	-	• DTCs detected: **1-255** • No DTCs detected: **0**	Perform the DTC inspection.	-
LF_WSPD (Left front ABS wheel-speed sensor input)	KPH, MPH	• Vehicle stopped: **0 KPH, 0 MPH** • Vehicle running: Vehicle speed	Inspect the ABS wheel-speed sensor.	E, F
LR_WSPD (Left rear ABS wheel-speed sensor input)	KPH, MPH	• Vehicle stopped: **0 KPH, 0 MPH** • Vehicle running: Vehicle speed	Inspect the ABS wheel-speed sensor.	G, H
PMP_MOTOR (Pump motor output state)	On/Off	• Pump motor activated: On • Pump motor not activated: Off	Inspect the ABS HU/CM. (See **ABS HU/CM INSPECTION** .)	-
RF_WSPD (Right front ABS wheel-speed sensor input)	KPH, MPH	• Vehicle stopped: **0 KPH, 0 MPH** • Vehicle running: Vehicle speed	Inspect the ABS wheel-speed sensor.	M, O
RR_WSPD (Right rear ABS wheel-speed sensor input)	KPH, MPH	• Vehicle stopped: **0 KPH, 0 MPH** • Vehicle running: Vehicle speed	Inspect the ABS wheel-speed sensor.	I, L

ACTIVE COMMAND MODES TABLE

Command name	Output part	Operation	Operating condition
LF_INLET	LF inlet solenoid valve	On/Off	Ignition switch at ON
LF_OUTLET	LF outlet solenoid valve		
LR_INLET	LR inlet solenoid valve		
LR_OUTLET	LR outlet solenoid valve		
PMP_MOTOR	Pump motor		
RF_INLET	RF inlet solenoid valve		
RF_OUTLET	RF outlet solenoid valve		
RR_INLET	RR inlet solenoid valve		
RR_OUTLET	RR outlet solenoid valve		

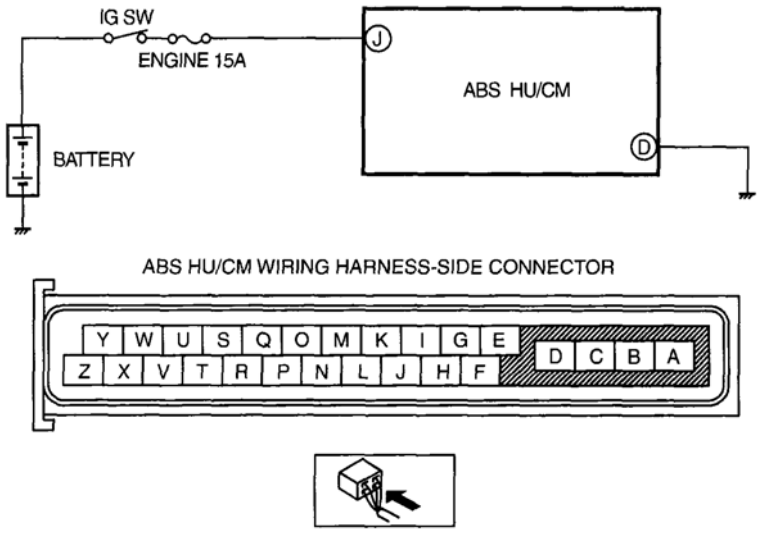
DTC B1317, B1318 [ABS]

DTC B1317, B1318 POSSIBLE CAUSE TABLE

DTC B1317, B1318	Power supply system

DETECTION CONDITION	• B1317
	  ○ The voltage at ABS HU/CM terminal J is **16.8 V** or more.
	• B1318
	  ○ The vehicle speed exceeds **6 km/h** and the voltage at ABS HU/CM terminal J is less than **9.6 V**

POSSIBLE CAUSE	• ENGINE 15 A fuse malfunction • Open circuit or short to ground in the wiring harness between the ABS HU/CM terminal J and the battery • Open circuit or faulty ground in the wiring harness between the ABS HU/CM terminal D and the body ground • Battery deterioration • Generator malfunction • Poor connection at connectors (female terminal)



DIAGNOSTIC PROCEDURE

DTC B1317, B1318 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT BATTERY VOLTAGE** • Is the battery terminal voltage normal?	Yes	Make sure that battery terminal connection is normal. Go to the next step.
		No	Charge or replace the battery, then go to Step 6. (See **BATTERY RECHARGING [LF]** .) (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2	**INSPECT BATTERY GRAVITY** • Is battery specific gravity as specified?	Yes	Go to the next step.
		No	Replace the battery, then go to Step 6. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3	**INSPECT CHARGING SYSTEM** • Are the generator and drive belt tensions normal?	Yes	Go to the next step.
		No	Replace generator and/or drive belt as necessary, then go to Step 6. (See **DRIVE BELT REPLACEMENT [LF]** .) (See **GENERATOR REMOVAL/INSTALLATION [LF]** .)

4	**INSPECT ABS HU/CM POWER SUPPLY FOR OPEN CIRCUIT** • Start the engine. • Measure the voltage between ABS HU/CM terminal J and ground. • Is the voltage **approx. 10 V?**	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit between the ABS HU/CM and ground, then go to Step 6.
5	**INSPECT ABS HU/CM GROUND FOR POOR GROUND OR OPEN CIRCUIT** • Turn the ignition switch off. • Measure the resistance between ground and ABS HU/CM terminal D. • Is the resistance within **0-1 ohm?**	Yes	Go to the next step.
		No	If there is no continuity. • Repair or replace the wiring harness for open circuit between the ABS HU/CM and ground, then go to the next step. If the resistance is not within **0-1 ohm:** • Repair or replace harness for poor ground, then go to the next step.
6	**VERIFY TROUBLESHOOTING COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Is the same DTC present?	Yes	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
7	**VERIFY AFTER REPAIR PROCEDURE**	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)

	• Are any other DTCs present?	No	DTC troubleshooting completed.

DTC B1342 [ABS]

DTC B1342 POSSIBLE CAUSE TABLE

DTC B1342	ABS HU/CM system
DETECTION CONDITION	• The ABS HU/CM on-board diagnostic function detects control module malfunction.
POSSIBLE CAUSE	• ABS HU/CM internal malfunction

DIAGNOSTIC PROCEDURE

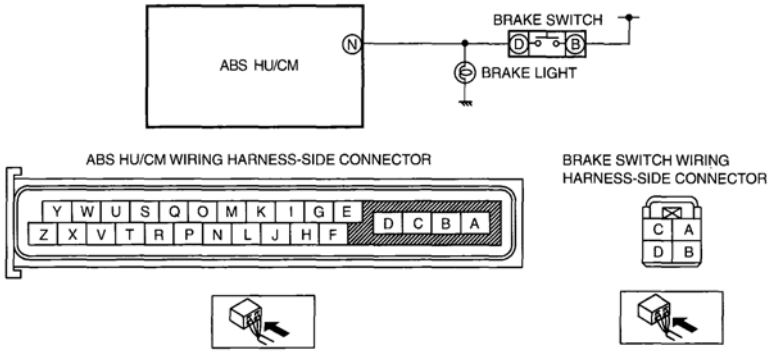
DTC B1342 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**VERIFY CURRENT STATUS OF MALFUNCTION** • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Is same DTC present?	Yes	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
2	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC B1484 [ABS]

DTC B1484 POSSIBLE CAUSE TABLE

DTC B1484	Brake switch system
DETECTION CONDITION	• Open circuit in the wiring harness between the ABS HU/CM terminal and the brake switch terminal
POSSIBLE CAUSE	• Brake switch malfunction • Open circuit in the wiring harness between the ABS HU/CM terminal N and the brake switch terminal D



DIAGNOSTIC PROCEDURE

DTC B1484 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT ABS HU/CM TO BRAKE SWITCH FOR OPEN CIRCUIT** • Turn the ignition switch off. • Disconnect the ABS HU/CM and brake switch connector. • Inspect for continuity ABS HU/CM terminal N and brake switch terminal D. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit between ABS HU/CM and brake switch, then go to the next step.
2	**INSPECT BRAKE SWITCH** • Inspect the brake switch. • (See **BRAKE SWITCH INSPECTION** .) • Is the brake switch normal?	Yes	Go to the next step.
		No	Replace the brake switch, then go to the next step. (See **BRAKE PEDAL REMOVAL/INSTALLATION** .)
3	**VERIFY TROUBLESHOOTING COMPLETED**	Yes	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)

	• Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Are the same DTCs present?	No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTC present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC B2477 [ABS]

DTC B2477 POSSIBLE CAUSE TABLE

DTC B2477	ABS HU/CM configuration
DETECTION CONDITION	• Configuration setting failure is detected.
POSSIBLE CAUSE	• Module configuration procedure was not completed properly.

DIAGNOSTIC PROCEDURE

DTC B2477 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**VERIFY CONFIGURATION** • Has the ABS HU/CM configuration been performed?	Yes	Go to the next step.
		No	Perform configuration using the M-MDS. (See **ABS CONFIGURATION** .)
2	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Clear the DTC from the memory. • (See **CLEARING DTCS**	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM. (See **ABS HU/CM REMOVAL/INSTALLATION** .)

	PROCEDURES .) • Is the same DTC present?	No	Go to the next step.
3	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

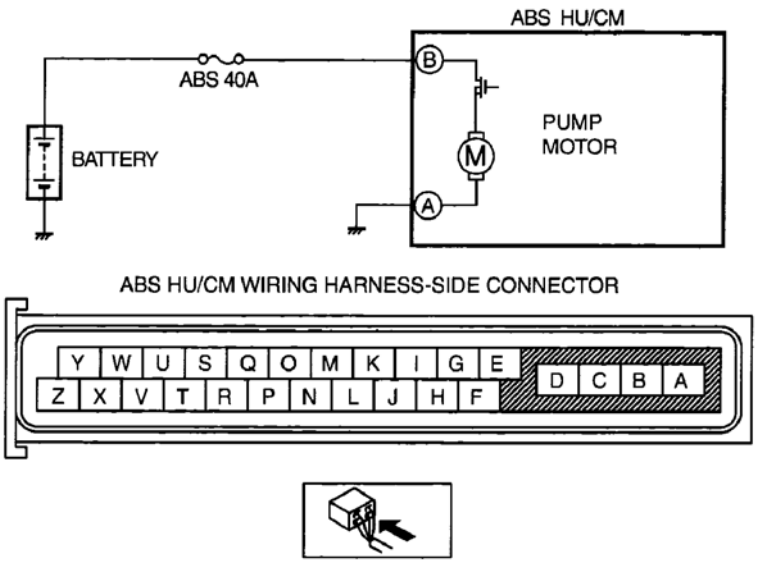
DTC C1095, C1096 [ABS]

DTC C1095, C1096 POSSIBLE CAUSE TABLE

DTC C1095, C1096	Pump motor, motor relay system

DETECTION CONDITION	• C1095
	  ○ When the pump motor monitor voltage remains at **2.0 V or more** for **1 s**
	  ○ ABS motor monitor OFF signal is input within specified time limit when the motor signal is switched from ON to OFF by ABS HU/CM.
	• C1096
	  ○ When the difference between the battery power supply voltage and pump motor power supply voltage remains at **4.0 V or more** for **0.1 s** or more while the pump motor is operating

POSSIBLE CAUSE	• ABS 40 A fuse malfunction • Open or short to ground circuit in the wiring harness between the battery and the ABS HU/CM terminal B • Open circuit in the wiring harness between the ABS HU/CM terminal A and the body ground • Open or short circuit in the ABS HU/CM internal motor relay, or stuck motor relay • Open or short circuit in the ABS HU/CM internal motor, or frozen motor • Fail-safe relay malfunction • Poor connection at connectors (female terminal)



DIAGNOSTIC PROCEDURE

DTC C1095, C1096 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT ABS FUSE CONDITION** • Is the ABS 40A fuse normal?	Yes	Go to the next step.
		No	Replace the fuse, then go to Step 5.
2	**INSPECT MOTOR RELAY POWER SUPPLY FOR OPEN CIRCUIT** • Turn the ignition switch off. • Disconnect ABS HU/CM connector. • Turn the ignition switch to the ON position (engine off). • Measure voltage between ABS HU/CM terminal B (harness-side) and ground. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for open circuit between battery positive terminal and ABS HU/CM terminal B, then go to Step 5.
3	**INSPECT PUMP MOTOR**	Yes	Go to the next step.

	GROUND FOR OPEN CIRCUIT • Turn the ignition switch off. • Inspect for continuity between ABS HU/CM terminal A (harness-side) and ground. • Is there continuity?	No	Repair or replace the wiring harness for open circuit between ABS HU/CM terminal A and ground, then go to Step 5.
4	**VERIFY PUMP MOTOR OPERATION** • Turn the ignition switch off. • Connect the M-MDS to the DLC-2. • Turn the ignition switch to the ON position (engine off). • Access PMP_MOTOR active command modes using M-MDS. • Does the pump motor operate?	Yes	Go to the next step.
		No	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
5	**VERIFY TROUBLESHOOTING COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Gradually slow down and stop the vehicle.	Yes	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.

	• Is the same DTC present?		
6	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC C1141, C1142, C1143, C1144 [ABS]

DTC C1141, C1142, C1143, C1144 POSSIBLE CAUSE TABLE

DTC	**C1141** **C1142** **C1143** **C1144**	**LF ABS sensor rotor system** **RF ABS sensor rotor system** **LR ABS sensor rotor system** **RR ABS sensor rotor system**
DETECTION CONDITION		• Periodic abnormality is detected in the signal wave pattern from the ABS wheel-speed sensors.
POSSIBLE CAUSE		• ABS wheel-speed sensor malfunction • ABS sensor rotor malfunction (foreign material adhering) • Improper installation of ABS wheel-speed sensor and/or sensor rotor • Excessive clearance between the ABS wheel-speed sensor and sensor rotor

DIAGNOSTIC PROCEDURE

DTC C1141, C1142, C1143, C1144 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT PID FOR ABS WHEEL-SPEED SENSOR OUTPUT ERROR USING M-MDS** • Turn the ignition switch off.	Yes	Go to Step 4.

	• Connect the M-MDS to the DLC-2. • Select the following PIDs using the M-MDS: LF_WSPD LR_WSPD RF_WSPD RR_WSPD • Drive the vehicle. • Verify that the vehicle speeds detected by the four ABS wheel-speed sensors are approximately the same. • Are the vehicle speeds approximately the same?	No	Go to the next step.
2	**INSPECT IF MALFUNCTION OCCURRED DUE TO IMPROPER SENSOR CLEARANCE.** • Inspect the clearance between the ABS wheel-speed sensor and the ABS sensor rotor. • (See **FRONT ABS WHEEL-SPEED SENSOR INSPECTION** .) • (See **REAR ABS WHEEL-SPEED SENSOR INSPECTION** .) • Is the clearance normal?	Yes	Go to the next step.
		No	Replace the ABS wheel-speed sensor, then go to Step 4. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .) (See **REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)

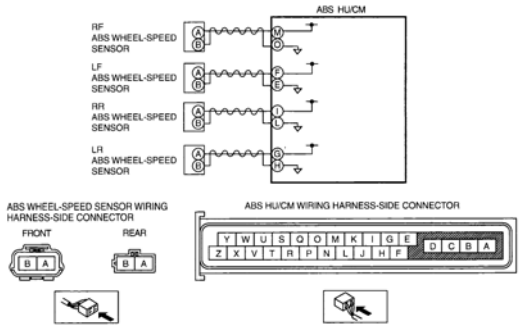
	Clearance Front: **0.3-1.0 mm {0.012-0.057 in}** **Rear: 0.8-1.6 mm {0.032-0.062 in}**		
3	**VISUALLY INSPECT ABS SENSOR ROTOR FOR FOREIGN MATERIAL ADHERING OR IMPROPER INSTALLATION** • Is the result normal?	Yes	Go to the next step.
		No	Replace the front wheel hub component or rear drive shaft, then go to the next step. (See **WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION** .) (See **REAR DRIVE SHAFT REMOVAL/INSTALLATION** .)
4	**VERIFY THAT THE SAME DTC IS NOT PRESENT** • Clear the DTCs from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Are the same DTCs present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
5	**VERIFY THAT NO OTHER DTCS ARE PRESENT** • Are any other DTCs output?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC C1145, C1155, C1165, C1175 [ABS]

DTC C1145, C1155, C1165, C1175 POSSIBLE CAUSE TABLE

	C1145	**RF ABS wheel-speed sensor (open circuit) system** **LF ABS wheel-speed sensor**

DTC	**C1155**	**(open circuit) system**
	C1165	**RR ABS wheel-speed sensor (open circuit) system**
	C1175	**LR ABS wheel-speed sensor (open circuit) system**
DETECTION CONDITION		• Open circuit or short to ground has been detected in the ABS wheel-speed sensor wiring harness on any of the four vehicle wheels.
POSSIBLE CAUSE		• Open circuit or short to ground in the wiring harness between the following ABS HU/CM terminal and the ABS wheel-speed sensor terminal: ○ ABS HU/CM terminal M-RF ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal O-RF ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal F-LF ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal E-LF ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal I-RR ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal L-RR ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal G-LR ABS wheel-speed sensor terminal A

	○ ABS HU/CM terminal H-LR ABS wheel-speed sensor terminal B • ABS wheel-speed sensor malfunction • Poor connection at connectors (female terminal)
	

DIAGNOSTIC PROCEDURE

DTC C1145, C1155, C1165, C1175 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT PID TO VERIFY THAT WHEEL SPEED-SIGNALS ARE TRANSMITTED FROM ABS WHEEL - SPEED SENSOR USING M-MDS** • Turn the ignition switch off. • Connect the M-MDS to the DLC-2. • Select the following PIDs using the M-MDS: LF_WSPD LR_WSPD RF_WSPD RR_WSPD	Yes	Go to Step 3.
		No	Go to the next step.

	• Drive the vehicle. • Verify that the wheel speed-signals are transmitted from each ABS wheel-speed sensor. • Are the wheel-speed signals transmitted?		
2	**INSPECT FOR OPEN CIRCUIT IN WIRING HARNESS BETWEEN ABS HU/CM AND ABS WHEEL-SPEED SENSOR** • Turn the ignition switch off. • Disconnect the ABS HU/CM connector and ABS wheel-speed sensor. • Inspect for continuity in the wiring harness between the following ABS wheel-speed sensor connectors on the vehicle wiring harness-side and ABS HU/CM connectors. ○ RF ABS wheel-speed sensor (+): M-A ○ RF ABS wheel-speed sensor (-): O-B ○ LF ABS wheel-speed sensor (+): F-A ○ LF ABS wheel-speed sensor (-): E-B ○ RR ABS wheel-speed sensor (+): I-A ○ RR ABS wheel-	Yes	Replace the ABS wheel-speed sensor, then go to the next step. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .) (See **REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)

	speed sensor (-): L-B ○ LR ABS wheel-speed sensor (+): G-A ○ LR ABS wheel-speed sensor (-): H-B • Is there continuity?	No	Repair or replace the wiring harness, then go to the next step.
3	**VERIFY THAT THE SAME DTC IS NOT PRESENT** • Clear the DTCs from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Are the same DTCs present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
4	**VERIFY THAT NO OTHER DTCS ARE PRESENT** • Are any other DTCs output?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC C1148, C1158, C1168, C1178 [ABS]

DTC C1148, C1158, C1168, C1178 POSSIBLE CAUSE TABLE

DTC	**C1148**	**RF ABS wheel-speed sensor/ABS sensor rotor system**
	C1158	**LF ABS wheel-speed sensor/ABS sensor rotor system**
	C1168	**RR ABS wheel-speed sensor/ABS sensor rotor system**
	C1178	**LR ABS wheel-speed sensor/ABS sensor rotor system**
DETECTION CONDITION		• Vehicle wheel speed signals of any of the four vehicle

	wheels indicate abnormal acceleration that exceeds specification. • Vehicle wheel speed signals of any of the four vehicle wheels indicate speed that exceeds specification.
POSSIBLE CAUSE	• ABS wheel-speed sensor malfunction (low output, metal shavings on sensor) • ABS sensor rotor malfunction (chipping of sensor rotor teeth) • Poor installation of ABS wheel-speed sensor and/or sensor rotor (If the sensor rotor is installed at an angle, it may cause output of abnormal wave pattern at high speeds.) • Excessive clearance between the ABS wheel-speed sensor and sensor rotor

DIAGNOSTIC PROCEDURE

DTC C1148, C1158, C1168, C1178 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT PID FOR ABNORMAL OUTPUT FROM ABS WHEEL-SPEED SENSOR USING M-MDS** • Turn the ignition switch off. • Connect the M-MDS to the DLC-2. • Select the following PIDs using the M-MDS: LF_WSPD	Yes	Go to Step 4.
		No	If there is a difference in speeds of the four wheels, go to the next step.

	LR_WSPD RF_WSPD RR_WSPD • Start the engine and drive the vehicle. • Verify that the PIDs of the four ABS wheel-speed sensors correspond approximately. • Do the vehicle speeds correspond?		
2	**INSPECT IF MALFUNCTION OCCURRED DUE TO IMPROPER SENSOR CLEARANCE** • **Inspect the clearance between the ABS wheel-speed sensor and the ABS sensor rotor.** **Clearance** **Front: 0.3-1.0 mm {0.012-0.057 in}** Rear: 0.8-1.6 mm {0.032-0.062 in}	Yes	Go to the next step.
		No	Replace the rear ABS wheel-speed sensor, then go to Step 4. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .) (See **REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)
3	**VISUALLY INSPECT ABS SENSOR ROTOR FOR FOREIGN MATERIAL ADHERING OR IMPROPER INSTALLATION** • Is the result normal?	Yes	Go to the next step.
		No	Replace the front wheel hub component or rear drive shaft, then go to the next step. (See **WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION** .) (See **REAR DRIVE SHAFT REMOVAL/INSTALLATION** .)
4	**VERIFY DTC TROUBLESHOOTING COMPLETED**	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the DSC HU/CM.

	• Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory. • (See **Clearing DTCs Procedures** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Are the same DTCs present?		(See **DSC HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

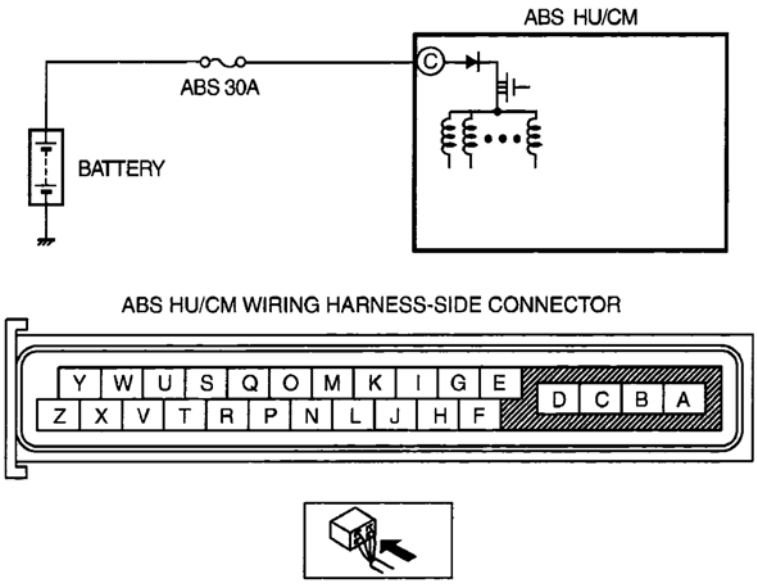
DTC C1186, C1266 [ABS]

DTC C1186, C1266 POSSIBLE CAUSE TABLE

DTC C1186, C1266	Fail-safe relay system

DETECTION CONDITION	• C1186
	  ○ ABS HU/CM internal valve relay remains OFF when valve relay ON is commanded.
	• C1266
	  ○ ABS HU/CM internal valve relay remains ON (stuck) when valve relay OFF is commanded.

POSSIBLE CAUSE	• ABS 30 A fuse malfunction • Open circuit or short to ground in the wiring harness between the battery and the ABS HU/CM terminal C • Open or short circuit in the ABS HU/CM internal valve relay, or stuck valve relay • Poor connection at connectors (female terminal)



DIAGNOSTIC PROCEDURE

DTC C1186, C1266 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT ABS FUSE CONDITION** • Is the ABS 30 A fuse normal?	Yes	Go to the next step.
		No	Replace the fuse, then go to Step 3.
2	**INSPECT VALVE RELAY POWER SUPPLY FOR OPEN CIRCUIT** • Turn the ignition switch off. • Disconnect ABS HU/CM connector. • Turn the ignition switch to the ON position (engine off). • Measure voltage between ABS HU/CM terminal C (harness-side) and ground. • Is voltage **B+?**	Yes	Go to the' next step.
		No	Repair or replace the wiring harness for open circuit between battery positive terminal and DSC HU/CM terminal C, then go to the next step.

3	**VERIFY TROUBLESHOOTING COMPLETED** • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Is the same DTC present?	Yes	Replace the ABS HU/CM, then go to next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
4	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC C1194, C1198, C1210, C1214, C1242, C1246, C1250, C1254 [ABS]

DTC C1194, C1198, C1210, C1214, C1242, C1246, C1250, C1254 POSSIBLE CAUSE TABLE

DTC	**C1194**	**LF outlet solenoid valve system**
	C1198	**LF inlet solenoid valve system**
	C1210	**RF outlet solenoid valve system**
	C1214	**RF inlet solenoid valve system**
	C1242	**LR outlet solenoid valve system**
	C1246	**RR outlet solenoid valve system**
	C1250	**LR inlet solenoid valve system**
	C1254	**RR inlet solenoid valve system**
DETECTION CONDITION		• Solenoid valve operation does not correspond to solenoid ON/OFF commands from the ABS HU/CM.
POSSIBLE CAUSE		• Open or short circuit in the ABS HU/CM internal solenoid valves • Solenoid valve malfunction • Poor connection at connectors

	(female terminal)

DIAGNOSTIC PROCEDURE

DTC C1194, C1198, C1210, C1214, C1242, C1246, C1250, C1254 DIAGNOSTIC PROCEDURE TABLE

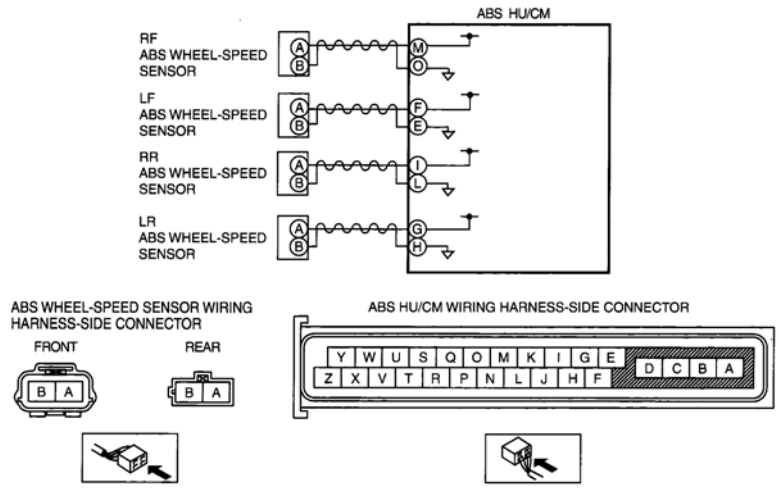
STEP	INSPECTION		ACTION
1	**VERIFY SOLENOID VALVE OPERATION** • Turn the ignition switch off. • Connect the M-MDS to the DLC-2. • Turn the ignition switch to the ON position (engine off). • Access the active command mode for the solenoid valve using the M-MDS. • Does the solenoid valve operate?	Yes	Go to the next step.
		No	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
2	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Gradually slow down and stop vehicle. • Are the same DTCs present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
3	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

DTC C1233, C1234, C1235, C1236 [ABS]

DTC C1233, C1234, C1235, C1236 POSSIBLE CAUSE TABLE

DTC	**C1233**	**LF ABS wheel-speed sensor (short to ground) system**
	C1234	**RF ABS wheel-speed sensor (short to ground) system**
	C1235	**RR ABS wheel-speed sensor (short to ground) system**
	C1236	**LR ABS wheel-speed sensor (short to ground) system**
DETECTION CONDITION		• The vehicle wheel speed of any of the four vehicle wheels is **2.75 km/h {1.71 mph} or less** when driving at the specified vehicle speed or more.
POSSIBLE CAUSE		• Short to ground in the wiring harness between the following ABS HU/CM terminal and the ABS wheel-speed sensor terminal: ○ ABS HU/CM terminal M-RF ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal O-RF ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal F-LF ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal E-LF ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal I-RR ABS wheel-speed sensor terminal A ○ ABS HU/CM

	terminal L-RR ABS wheel-speed sensor terminal B ○ ABS HU/CM terminal G-LR ABS wheel-speed sensor terminal A ○ ABS HU/CM terminal H-LR ABS wheel-speed sensor terminal B • ABS wheel-speed sensor malfunction • Poor connection at connectors (female terminal)



DIAGNOSTIC PROCEDURE

DTC C1233, C1234, C1235, C1236 DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	**INSPECT PID TO VERIFY THAT WHEEL SPEED-SIGNALS ARE TRANSMITTED FROM ABS WHEEL - SPEED SENSOR USING M-MDS** • Turn the ignition switch off.	Yes	Go to Step 3.

	• Connect the M-MDS to the DLC-2. • Select the following PIDs using the M-MDS: LF_WSPD LR_WSPD RF_WSPD RR_WSPD • Drive the vehicle. • Verify that the wheel speed-signals are transmitted from each ABS wheel-speed sensor. • Are the wheel-speed signals transmitted?	No	Go to the next step.
2	**INSPECT A SHORT TO GROUND IN THE WIRING HARNESS BETWEEN THE ABS HU/CM AND THE ABS WHEEL-SPEED SENSOR** • Turn the ignition switch off. • Disconnect the ABS HU/CM connector and the ABS wheel-speed sensor connector. • Inspect for a short to ground in the wiring harness between the following ABS wheel-speed sensor connectors on the vehicle wiring harness-side and ABS HU/CM connectors. ○ RF ABS wheel-	Yes	Replace the ABS wheel-speed sensor, then go to the next step. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .) (See **REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)

	speed sensor (+): M-A ○ RF ABS wheel-speed sensor (-): O-B ○ LF ABS wheel-speed sensor (+): F-A ○ LF ABS wheel-speed sensor (-): E-B ○ RR ABS wheel-speed sensor (+): I-A ○ RR ABS wheel-speed sensor (-): L-B ○ LR ABS wheel-speed sensor (+): G-A ○ LR ABS wheel-speed sensor (-): H-B • Is there continuity?	No	Repair or replace the wiring harness, then go to the next step.
3	**VERIFY THAT THE SAME DTC IS NOT PRESENT** • Clear the DTCs from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Start the engine and drive the vehicle at **10 km/h {6.2 mph} or more.** • Are the same DTCs present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.
4	**VERIFY THAT NO OTHER DTCS ARE PRESENT** • Are any other DTCs	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)

	output?		

DTC C1805 [ABS]

DTC C1805 POSSIBLE CAUSE TABLE

DTC C1805	Incorrect ABS HU/CM installed
DETECTION CONDITION	• The programmed vehicle information and the data received from the CAN do not correspond.
POSSIBLE CAUSE	• The correct ABS HU/CM is not installed.

DIAGNOSTIC PROCEDURE

DTC C1805 DIAGNOSTIC PROCEDURE TABLE

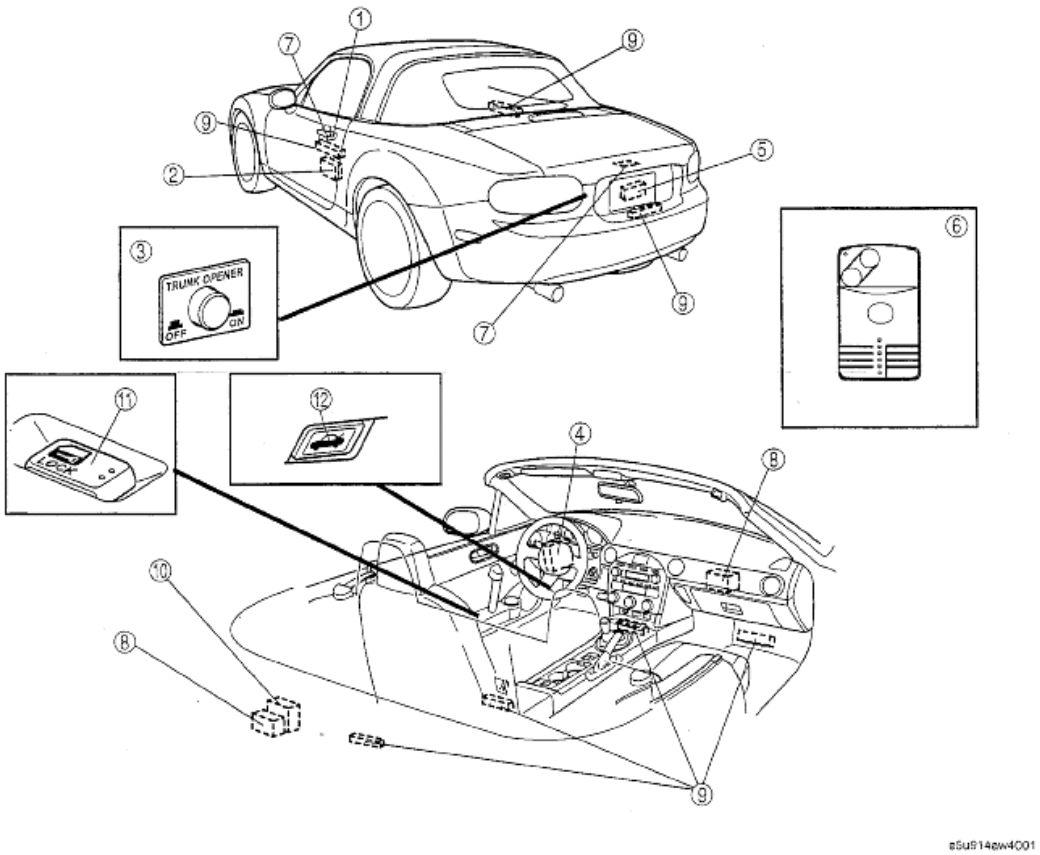
STEP	INSPECTION		ACTION
1	**VERIFY THAT THE CORRECT ABS HU/CM IS INSTALLED** • Verify the part number of the ABS HU/CM. • Is the part number correct?	Yes	Go to the next step.
		No	After replacing the ABS, go to Step 3. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
2	**PERFORM CONFIGURATION** • Was configuration performed normally?	Yes	Go to the next step.
		No	Replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
3	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Make sure to reconnect all disconnected connectors. • Clear the DTC from the memory. • (See **CLEARING DTCS PROCEDURES** .) • Is the same DTC present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the ABS HU/CM, then go to the next step. (See **ABS HU/CM REMOVAL/INSTALLATION** .)
		No	Go to the next step.

4	**VERIFY AFTER REPAIR PROCEDURE** • Are any other DTCs present?	Yes	Go to the applicable DTC inspection. (See **DTC Table** .)
		No	DTC troubleshooting completed.

2007 ACCESSORIES & BODY, CAB

Security and Locks (Advanced Keyless System) - MX-5 Miata

POWER DOOR LOCK SYSTEM AND KEYLESS ENTRY SYSTEM LOCATION INDEX[ADVANCED KEYLESS SYSTEM]



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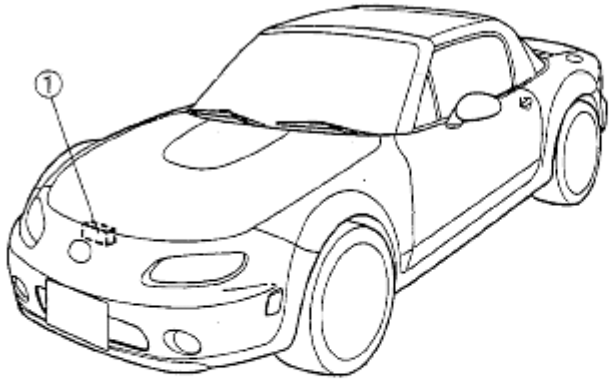
1	Door key cylinder (See DOOR KEY CYLINDER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM])
2	Door latch and lock actuator (See DOOR LATCH AND LOCK ACTUATOR REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See DOOR LOCK ACTUATOR INSPECTION[ADVANCED KEYLESS SYSTEM])
3	Trunk lid opener cancel switch (See TRUNK LID OPEN CANCEL SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See TRUNK LID OPEN CANCEL SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])
4	Keyless control module (See KEYLESS CONTROL MODULE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See KEYLESS CONTROL MODULE INSPECTION[ADVANCED KEYLESS SYSTEM]) (See STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]) (See KEYLESS CONTROL MODULE CONFIGULATION[ADVANCED KEYLESS SYSTEM])
5	Trunk lid latch and opener (See TRUNK LID OPENER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See TRUNK LID OPENER INSPECTION[ADVANCED KEYLESS SYSTEM])

6	Card key (transmitter) (See CARD KEY BATTERY REPLACEMENT[ADVANCED KEYLESS SYSTEM]) (See CARD KEY ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM])
7	Request switch (See REQUEST SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See REQUEST SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])
8	Keyless receiver (See KEYLESS RECEIVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See KEYLESS RECEIVER INSPECTION[ADVANCED KEYLESS SYSTEM])
9	Keyless antenna (See KEYLESS ANTENNA REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM])
10	Keyless beeper (See KEYLESS BEEPER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM])
11	Door lock switch (See DOOR LOCK SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See DOOR LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])
12	Trunk lid opener switch (See TRUNK LID OPENER SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See TRUNK LID OPENER SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])

Fig. 1: Identifying Power Door Lock System And Keyless Entry System Components Location

Courtesy of MAZDA MOTORS CORP.

THEFT-DETERRENT SYSTEM LOCATION INDEX[ADVANCED KEYLESS SYSTEM]



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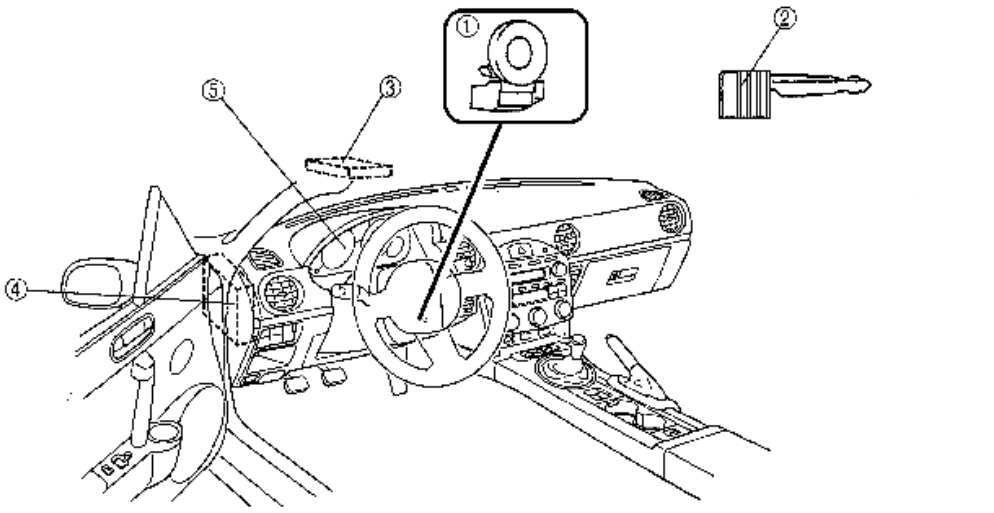
1	Hood latch (See HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See HOOD LATCH SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])

Fig. 2: Identifying Hood Latch
Courtesy of MAZDA MOTORS CORP.

IMMOBILIZER SYSTEM LOCATION INDEX[ADVANCED KEYLESS SYSTEM]



1	Coil antenna (See COIL ANTENNA REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM])
2	Key (transponder) (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM])
3	PCM (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM])
4	Keyless control module (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM])
5	Instrument cluster (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM])

Fig. 3: Identifying Immobilizer System Components Location
Courtesy of MAZDA MOTORS CORP.

DOOR KEY CYLINDER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM

1. Remove the following parts:
    1. Door trim (See **DOOR TRIM REMOVAL/INSTALLATION** .)
    2. Door glass (See **DOOR GLASS REMOVAL/INSTALLATION** .)
    3. Door speaker (See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
    4. Door unit (See **DOOR UNIT REMOVAL/INSTALLATION** .)
    5. Outer handle (See **OUTER HANDLE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]**.)
2. Detach the door key cylinder rod.
3. Turn the door key cylinder so that the tab is aligned with the notch.
4. Remove the door key cylinder by pulling it out from the front door.
5. Install in the reverse order of removal.

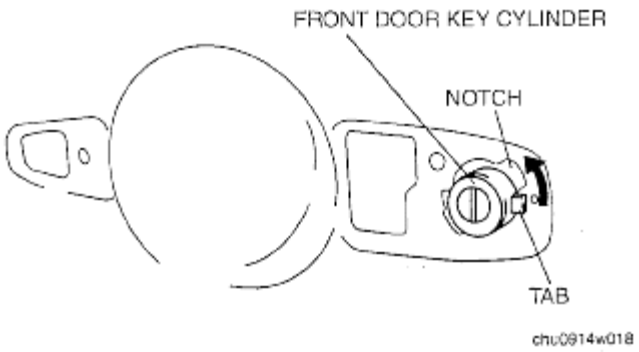


Fig. 4: Turning Door Key Cylinder
Courtesy of MAZDA MOTORS CORP.

DOOR LATCH AND LOCK ACTUATOR REMOVAL/INSTALLATION [ADVANCED KEYLESS SYSTEM]

1. Remove the following parts:
    1. Door trim (See **DOOR TRIM REMOVAL/INSTALLATION** .)
    2. Door glass (See **DOOR GLASS REMOVAL/INSTALLATION** .)
    3. Door speaker (See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
    4. Door unit (See **DOOR UNIT REMOVAL/INSTALLATION** .)
2. Detach the cables from the inner handle and the door lock knob.
3. Detach the rods from the key cylinder and the outer handle.
4. Remove the screws, then remove the door latch and lock actuator.
5. Install in the reverse order of removal.

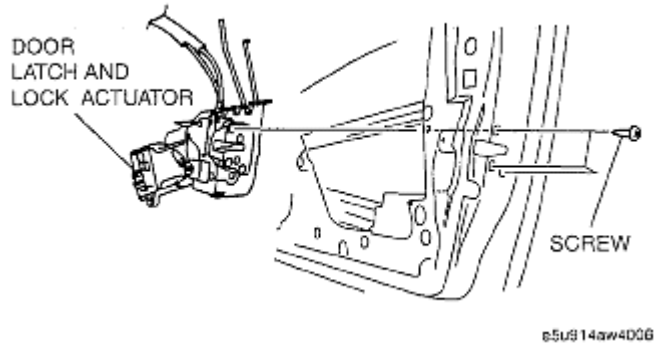


Fig. 5: Identifying Door Latch And Lock Actuator
Courtesy of MAZDA MOTORS CORP.

DOOR LOCK SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

RH

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
3. Remove the screws, then remove the door lock switch.
4. Install in the reverse order of removal.

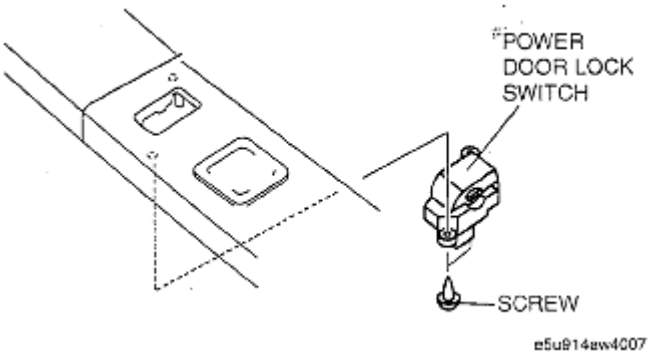


Fig. 6: Identifying Power Door Lock Switch And Screw
Courtesy of MAZDA MOTORS CORP.

DOOR LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Inspect for continuity between the door lock switch terminals.
   - If not as specified, replace the door lock switch.

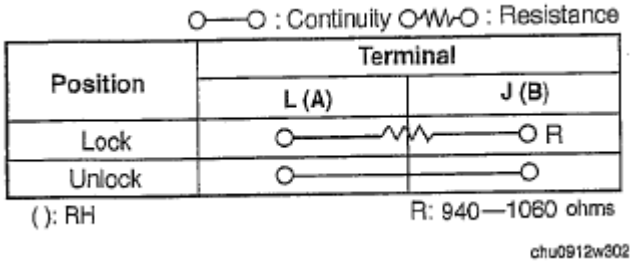


Fig. 7: Door Lock Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

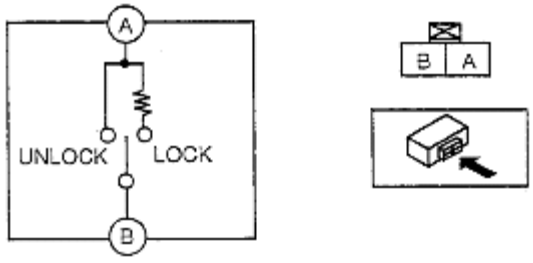


Fig. 8: Door Lock Switch Connector Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

DOOR LOCK STRIKER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the screws, and then remove the door lock striker.
2. Install in the reverse order of removal.
3. Adjust the door. (See **DOOR ADJUSTMENT** .)

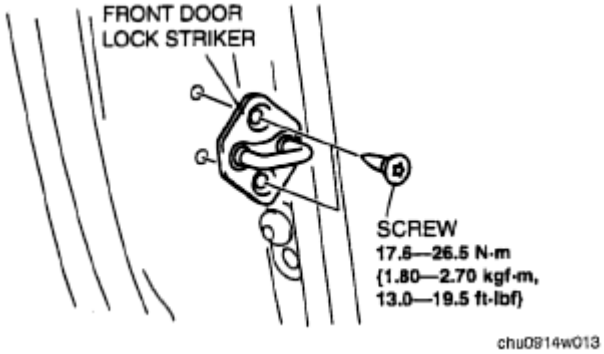


Fig. 9: Identifying Front Door Lock Striker And Screw With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

DOOR LOCK ACTUATOR INSPECTION[ADVANCED KEYLESS SYSTEM]

DOOR LOCK ACTUATOR

1. Disconnect the door lock actuator connector.
2. Apply battery positive voltage and connect the ground to the corresponding door lock actuator terminals and inspect the door lock actuator operation.
   - If not as specified, replace the door lock actuator.

DOOR LOCK ACTUATOR OPERATION CHART

	Connection	

Actuator operation	B+	GNB
lock	A (F)	B (E)
Unlock	B (E)	A (F)
(): RH		

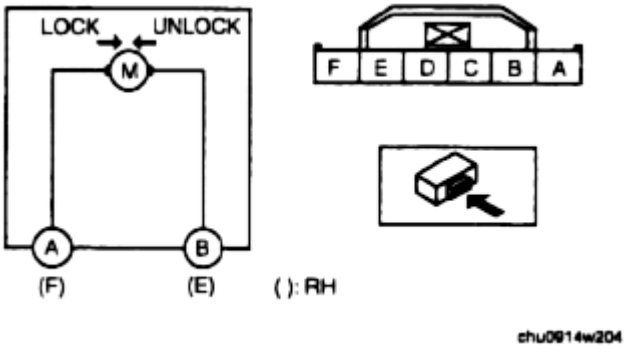


Fig. 10: Identifying Door Lock Actuator Connector Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

DOOR LOCK-LINK SWITCH

1. Disconnect the door lock actuator connector.
2. Inspect for continuity between the door lock-link switch terminals.
   - If not as specified, replace the door lock actuator.

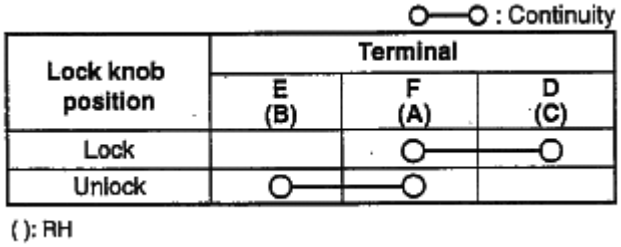


Fig. 11: Door Lock-Link Switch Continuity Chart
Courtesy of MAZDA MOTORS CORP.

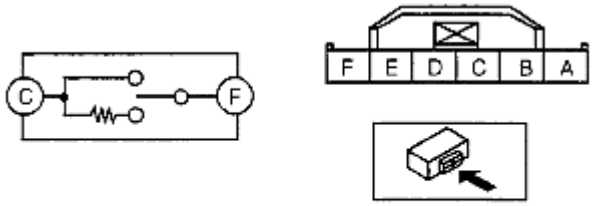


Fig. 12: Identifying Door Lock-Link Switch Connector Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

DOOR KEY CYLINDER SWITCH

1. Disconnect the door lock actuator connector.
2. Inspect for continuity between the door lock-link switch terminals.
    - If not as specified, replace the door lock actuator.

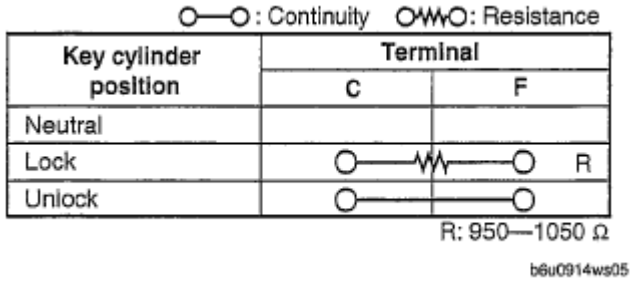


Fig. 13: Door Key Cylinder Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

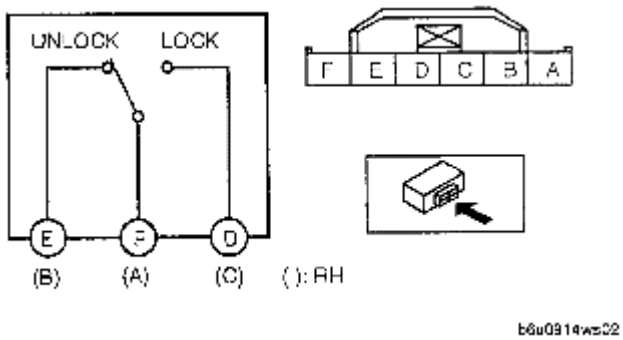


Fig. 14: Identifying Door Key Cylinder Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

OUTER HANDLE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the following parts:
    1. Door trim (See **DOOR TRIM REMOVAL/INSTALLATION** .)
    2. Door glass (See **DOOR GLASS REMOVAL/INSTALLATION** .)
    3. Door speaker (See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
    4. Door unit (See **DOOR UNIT REMOVAL/INSTALLATION** .)
2. Detach the rod from the outer handle.
3. Remove the cover.
4. Remove the bolts.

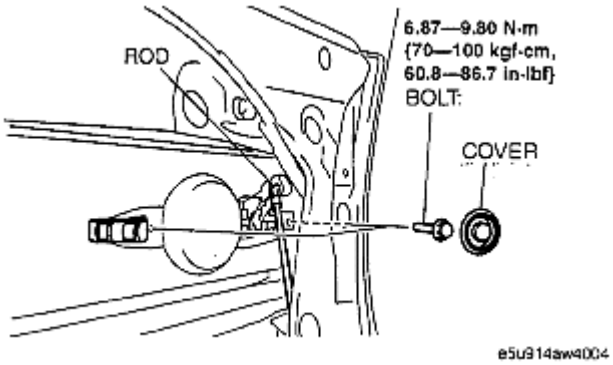


Fig. 15: Identifying Outer Handle Bolts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

5. Secure the rear part of the front outer handle and, with the front outer handle lever pulled outward (1), remove the rear part of the front outer handle from the front door.
6. Pull out the front part of the front outer handle from the front door.
7. Install in the reverse order of removal.

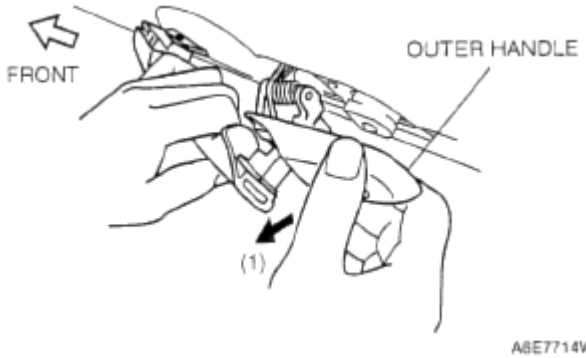


Fig. 16: Removing Rear Part Of Front Outer Handle From Front Door
Courtesy of MAZDA MOTORS CORP.

INNER HANDLE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
2. Remove the screws, then remove the inner handle.
3. Detach the cables from the inner handle and door lock knob.
4. Install in the reverse order of removal.

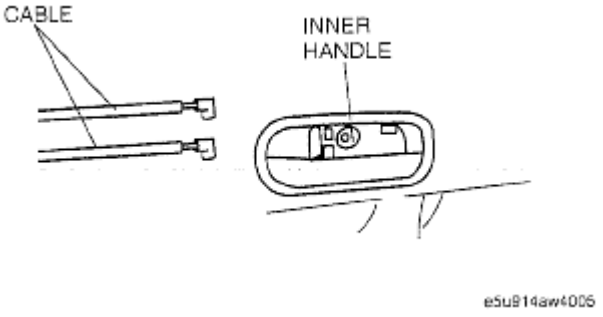


Fig. 17: Identifying Inner Handle And Cable
Courtesy of MAZDA MOTORS CORP.

OPEN HOOK REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat back bar lower garnish (See **SEAT BACK BAR LOWER GARNISH REMOVAL/INSTALLATION** .)
2. Remove the bolts.
3. Remove the open hook.
4. Install in the reverse order of removal.

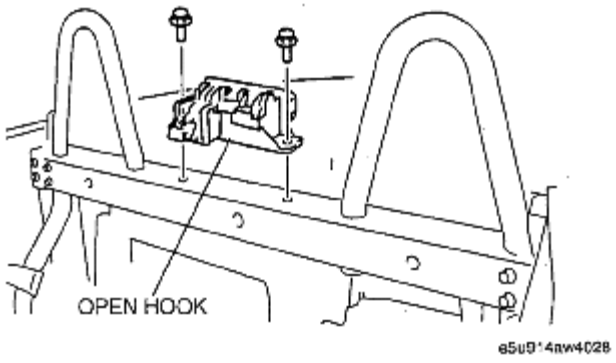
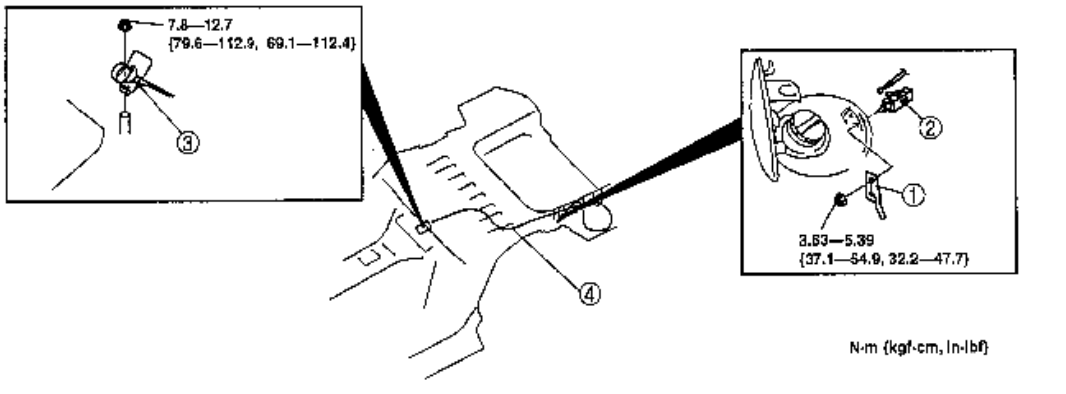


Fig. 18: Identifying Open Hook
Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER LID OPENER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. To remove the fuel-filler lid opener, remove the trunk side trim (LH). (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
2. When removing the fuel-filler lid opener lever and cable, perform the following procedure:
    1. Remove the seats. (See **SEAT REMOVAL/INSTALLATION** .)
    2. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
    3. Remove the seat back bar lower garnish. (See **SEAT BACK BAR LOWER GARNISH REMOVAL/INSTALLATION** .)
3. Remove in the order indicated in the table.



1	Lift spring
2	Fuel-filler lid opener
3	Fuel-filler lid opener lever
4	Fuel-filler lid opener cable

Fig. 19: Identifying Fuel-Filler Lid Opener Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

5. Adjust the fuel-filler lid. (See **FUEL-FILLER LID ADJUSTMENT** .)

COIL ANTENNA REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

NOTE:

- **Do not remove the coil antenna unless you are replacing it.**
- **When only the coil antenna is replaced, the immobilizer system reprogram procedure is not necessary.**

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the column cover.
3. Remove in the order indicated in the table.

1	Connector
2	Coil Antenna (See 09-14A-9 Coil Antenna Installation Note)

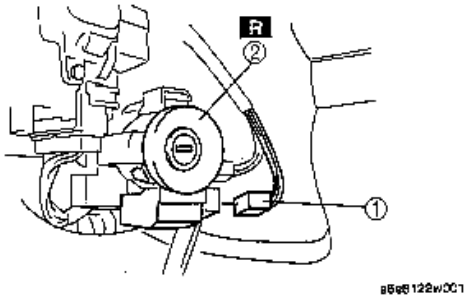


Fig. 20: Identifying Coil Antenna And Connector
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

COIL ANTENNA INSTALLATION NOTE

1. Install the hole of coil antenna to the tab of steering lock.
2. Install the hook of coil antenna to the steering lock.

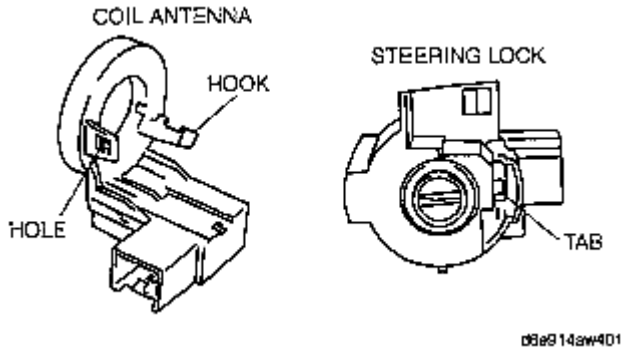


Fig. 21: Identifying Hole Of Coil Antenna And Tab Of Steering Lock
Courtesy of MAZDA MOTORS CORP.

IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM]

FOREWORD

- When performing the following procedures, the immobilizer resetting procedure using the M-MDS must also always be performed: "Keyless control module replacement", "PCM replacement", "Steering lock unit replacement", "Keyless control module and PCM joint replacement", "Keyless control module, PCM, and steering lock unit joint replacement", and "Key ID number clearing". The engine will not start unless all work is performed using the M-MDS.
- A card key that can start the engine is necessary for the key programming. If there is no card key that can start the engine, perform the key programming after the card key programming.(See **CARD KEY ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]**.)
- There are two ways to add supplemental key: Using the M-MDS or using two keys that can start the engine to program.
- When replacing any of the immobilizer system component parts, adding/clearing keys, or performing other functions, refer to the following table and perform the applicable procedure (No.1 to 5).
- Verify that the room fuse is equipped.

IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING PROCEDURE [ADVANCED KEYLESS SYSTEM]

Ref. No.	Condition	Items necessary for procedure (prepare before starting procedure)	Cautionary notes
1	Since two or more keys that can start the engine are necessary, make a spare key. Or program an additional key.	• Programming key	• The M-MDS is necessary for the additional key programming if "Customer spare key programming disable" is performed before the procedure using the M-MDS. In this case, perform No. 2.
2	If there is only one key that can start the engine, make a spare key. If there is no key, program an additional key.	• Programmed card key • Programming key • M-MDS	-
3	Replacing the PCM only.	• New PCM • Programmed card key • Programming keys (two or more) • M-MDS	-
4	Changing the additional		

4	key programming procedure. (Method for programming other keys using two keys that can start the engine is disabled.)	• M-MDS	• The additional key programming using No. 1 cannot be performed after the procedure. It is possible to restore the setting. For restoring the setting, the M-MDS is necessary.
4	Changing the additional key programming procedure. Allows programming using two keys that can start the engine.	• M-MDS	• New vehicles have this setting.
3	Clearing the programmed key ID number.	• Programming keys (two or more) • M-MDS	• Carry out the following procedure using the M-MDS, then go to **NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE RELATED PARTS (PCM, KEYLESS CONTROL MODULE, INSTRUMENT CLUSTER, OR STEERING LOCK UNIT**) • Ignition Key Code Erase
3	Replacing all the keys. (Steering lock unit is not replaced)	• Programmed card key • Programming keys (two or more) • M-MDS	
5	Replacing the steering lock unit.	• New steering lock unit • Programmed card key • New keys (two or more) • M-MDS	• Carry out the following procedure using the M-MDS, then go to **NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE RELATED PARTS (PCM, KEYLESS CONTROL MODULE, INSTRUMENT CLUSTER, OR STEERING LOCK UNIT**) • Ignition Key Code Erase • STEERING LOCK UNIT PROGRAMMING
5	Replacing the keyless control module.	• New keyless control module • Card key • Programming keys (two or more)	• Carry out the following procedure using the M-MDS, then go to **NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE RELATED PARTS (PCM, KEYLESS CONTROL MODULE, INSTRUMENT CLUSTER, OR STEERING LOCK UNIT**) • Ignition Key Code Erase

		• M-MDS	• CARD KEY PROGRAMMING • STEERING LOCK UNIT PROGRAMMING
5	Replacing the instrument cluster.	• New instrument cluster • Card key • Programming keys (two or more) • M-MDS	• Carry out the following procedure using the M-MDS, then go to **NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE RELATED PARTS (PCM, KEYLESS CONTROL MODULE, INSTRUMENT CLUSTER, OR STEERING LOCK UNIT**) • Ignition Key Code Erase • Parameter Reset
-	Replacing the coil antenna.	• New coil antenna	• Immobilizer system resetting is not necessary.

CAUTION:

- **The following conditions may cause poor signal communication between the key and vehicle, resulting in the engine not starting or a key registration error. Do not perform any work under the following conditions:**
  - **Placing the following items close to the key grip or contacting it.**
  - **Spare keys**
  - **Keys for other vehicles equipped with an immobilizer system**
  - **Any metallic object**
  - **Any electronic device, or any credit or other card with magnetic strips**
- **Do not place the following devices in the vehicle while programming, otherwise programming cannot be performed:**
  - **M-MDS**
  - **Personal computer**
  - **Devices that can send/receive the radio waves**

NOTE:

- **The "valid key" used in this manual indicates the key that can start the engine.**
- **If the key adding, programming, clearing, and immobilizer system construction parts replacement are performed, verify that the all keys can start the engine within 5 s after the procedure.**
- **When verifying that the engine starts, wait at least 5 s or more before**

starting the engine using the next key.

- **If the engine cannot be started using a programmed key, repeat the procedure from the beginning.**
- **Do not start the engine unless indicated in the procedure. If the engine is started during the programming procedure, programming is stopped at that point. Repeat the procedure starting from the beginning if the engine is started before completion.**
- **Do not place the card key in the vehicle or bring it within approx. 1 m of the vehicle unless indicated in the procedure.**
- **Two or more key ID numbers must be programmed for the engine to start.**
- **A maximum of eight key ID numbers can be programmed for one vehicle. The M-MDS can be used to verify the number of key ID numbers programmed to a single vehicle.**
- **Do not select a M-MDS screen menu other than one indicated in the procedure.**

M-MDS CONNECTING PROCEDURE

CAUTION:
- **Do not place the M-MDS in the vehicle while programming, otherwise programming cannot be performed.**

1. Fully lower the door glass.
2. Connect the M-MDS to the DLC-2.
3. Pull out the M-MDS cable from the door glass opening and set the M-MDS outside the vehicle.

CAUTION:
- **Protect the cable and body contact area with a clean rag, otherwise they could be damaged.**

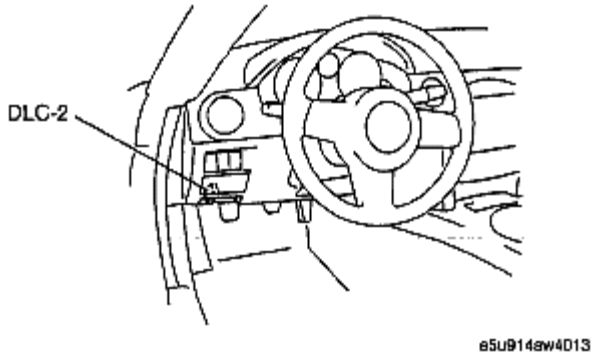


Fig. 22: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

NO.1 ADDITIONAL KEY PROGRAMMING PROCEDURE (USING TWO VALID KEYS)

CAUTION:

- **Do not place the following devices in the vehicle while programming, otherwise programming cannot be performed:**
- **Card key**
- **M-MDS**
- **Personal computer**
- **Devices that can send/receive the radio waves**

Condition

- Have two or more valid keys.

NOTE:

- **A maximum of eight keys can be programmed for one vehicle. If key programming is not successful and DTC 15 appears even though the procedure was performed properly, use the PID/data monitor function of the M-MDS and verify the number of keys that have been programmed.**
- **If eight keys have already been programmed, and it is necessary to program other keys, the previously programmed key ID numbers must first be cleared. To clear the key, refer to "NO.3 PCM REPLACEMENT PROCEDURE".**

Procedure

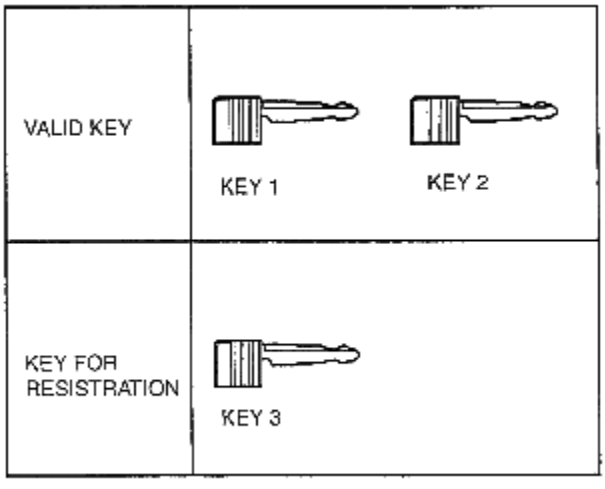


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Fig. 23: Identifying Valid Key And Key For Registration
Courtesy of MAZDA MOTORS CORP.

1. Prepare key 3 for programming.
2. Start the engine using key 1.
3. Verify that the security light illuminates for **approx. 3 s** , and then goes out.

4. Turn the ignition switch to the LOCK position.
5. Using key 1, turn the ignition switch to the ON position.
6. Verify that the security light illuminates for approx. 3 s, and then goes out.
7. Using key 1, turn the ignition switch to the LOCK position **within approx. 4 s** after the security light goes out.
8. Remove key 1.
9. Repeat Steps 2-5 using key 2 instead of key 1.
10. Repeat Steps 5-8 using key 3 instead of key 1.
11. If additional keys need to be programmed, repeat Steps 1-10, and replace key 3 in Step 10 with the key to be programmed (key 4).

NO. 2 KEY ADDITIONAL PROGRAMMING PROCEDURE (USING THE M-MDS)

Condition

- There is only one valid key. Or, there is no valid key but there is a card key that can start the engine.

NOTE:

- **A maximum of eight keys can be programmed for one vehicle. If key registration is not successful and DTC 15 appears even though the procedure was performed properly, use the PID/data monitor function of the M-MDS and verify the number of keys that have been programmed.**
- **If eight keys have already been programmed, and it is necessary to program other keys, the previously programmed key ID numbers must first be cleared. To clear the key ID number, refer to " NO.3 PCM REPLACEMENT PROCEDURE".**

Procedure

1. Prepare key 1 for programming.
2. Start the engine using a valid key or card key.

CAUTION:

- **Do not place the card key in the vehicle when starting the engine with the valid key, otherwise programming cannot be performed. If the engine is started with the card key, remove the card key from the vehicle after the engine is started.**

3. Verify that the security light illuminates for **approx. 3 s** , and then goes out.
4. Turn the ignition switch to the LOCK position.
5. Connect the M-MDS to the DLC-2. (See **M-MDS CONNECTING PROCEDURE**.)
6. Using key 1, turn the ignition switch to the ON position.

NOTE:

- **Although the security light flashes and DTC 15 is displayed, this does**

not indicate an improper procedure. Continue to perform the procedure as indicated.

7. Select "BODY/SECURITY/PATS functions" from the M-MDS screen menu.
8. Select "Program additional ignition key" from the M-MDS screen menu.

NOTE:

- **After selecting the above menu, "operation is successful" is displayed. At this point, the key that turned the ignition switch to the ON position is completely programmed.**

  - In this procedure, the necessary number of the keys are completely programmed. To finish the additional key programming, go to Step 13.
  - If additional keys need to be programmed, go to the next step.

9. Perform the security access according to the directions on the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.)
10. After verifying that the PATS function menu is displayed again on the M-MDS screen, turn the ignition switch to the LOCK position and remove key 1.
11. Using the key to be programmed, turn the ignition switch to the ON position.
12. Return to the Step 6.
13. After verifying that the PATS function menu is displayed again on the M-MDS screen, select the "Exit (From This Menu)" to finish the M-MDS procedure.
14. After Step 10, wait **5 s or more** , and then turn the ignition switch to the LOCK position.

NO.3 PCM REPLACEMENT PROCEDURE

Condition

- Have two or more keys to be programmed after the key ID number clearing.

CAUTION:

- **Before starting Step 1, complete the procedure for PCM replacement.**

Procedure

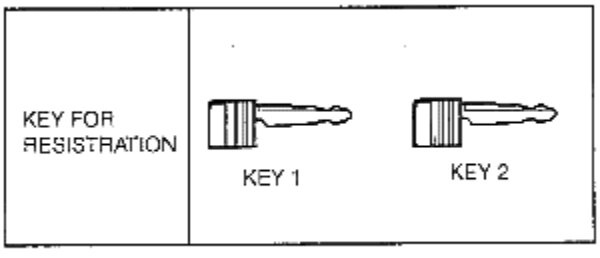

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Fig. 24: Identifying Key For Resistration
Courtesy of MAZDA MOTORS CORP.

1. Prepare two or more keys to be programmed after the key ID number clearing.
2. Connect the M-MDS to the DLC-2. (See **M-MDS CONNECTING PROCEDURE**.)
3. Using key 1, turn the ignition switch to the ON position.

NOTE:
- **Although the security light flashes and DTC 15 or 21 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

4. Verify that the keyless warning light illuminates for **approx. 3 s** , and then goes out.
5. Select "BODY/SECURITY/PATS functions" from the menu.
6. Perform the security access according to the direction of the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.)
7. Select "Parameter Reset" from the M-MDS screen menu.
8. After verifying that the PATS function menu is displayed again on the M-MDS screen, select "Exit (From This Menu)" to finish the M-MDS procedure.
9. After Step 8, wait **5 s or more** , and then turn the ignition switch to the LOCK position.
10. Using key 1, turn the ignition switch to the ON position.
11. After verifying that the security light and keyless warning light illuminates **for 3 s or more** turn the ignition switch to the LOCK position and remove key 1.

NOTE:
- **Although the security light flashes and DTC 21 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

12. Using key 2, turn the ignition switch to the ON position.
13. Verify that the security light and keyless warning light illuminates **for approx. 3 s** , and then goes out.
14. After verifying that the security light goes out, turn the ignition switch to the LOCK position using key 2, and then remove key 2.
15. If an additional key needs to be programmed, repeat Steps 13-14 with the additional key being key 3. If the ignition switch is held in the ON position **for 1 min or more** , the additional key programming procedure according to Steps 13-14 will not be possible. If this occurs, refer to "**NO.1 ADDITIONAL KEY PROGRAMMING PROCEDURE (USING TWO VALID KEYS**)" to register any additional keys.
16. Start the engine with the key 1.
17. Verify that the security light and keyless warning light operate as follows:
    - From the point when the ignition switch is turned to the ON position, the security light illuminates **for approx. 3 s** and goes out.
    - The keyless warning light illuminates with the ignition switch turned to the ON position, and after **approx. 1 s** after the engine is started, it goes out and displays the number of programmed keys.

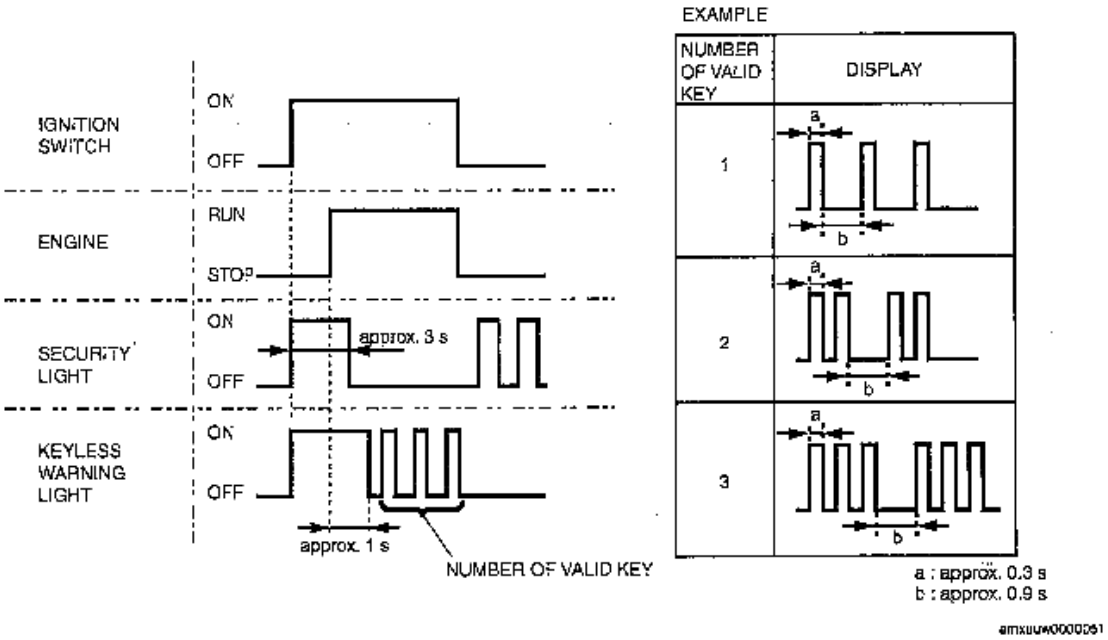

Fig. 25: Security Light And Keyless Warning Light Blinking Pattern
Courtesy of MAZDA MOTORS CORP.

18. After verifying that the keyless warning light goes out, turn the ignition switch to the LOCK position using key 1.
19. Repeat Steps 17-18 using key 2 instead of key 1.

NOTE:
- **Perform Steps 17-18 as well when there are three or more programmed keys.**

20. Start the engine with the card key and remove any key from the key cylinder.

CAUTION:
- **Remove any key from the key cylinder.**

21. Verify that the security light and keyless warning light operate as follows:
    - From the point when the ignition switch is turned to the ON position, the security light illuminates **for approx. 3 s** , and goes out.
    - The keyless warning light illuminates when the ignition switch is turned to the ON position, and after **approx. 1 s** after the engine is started, it goes out.
22. Turn the ignition switch to the LOCK position after verifying that the keyless warning light goes out.

NO. 4 KEY ADDITIONAL PROGRAMMING PROCEDURE CHANGING

NOTE:
- **This procedure is performed for enabling/disabling the "No.1 Additional**

Key Programming Procedure (Using Two Valid Keys)" setting.

- **This procedure is possible when the vehicle is new, and when replacing the keyless unit with a new one.**
- **If "No.1 Additional Key Programming Procedure (Using Two Valid Keys)" is set to disable, the additional key programming can be only performed using the M-MDS preventing the forging of a spare key by using two keys that can start the engine. This function is for use by rental car agencies or other companies with vehicle fleets.**

Procedure

1. Using the key, turn the ignition switch to the ON position. (The key can be either the valid key or an unprogrammed key)

NOTE:

- **Although the security light flashes and DTC 15 is displayed when an unprogrammed key is used, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

2. Connect the M-MDS to the DLC-2.
3. Select "BODY/SECURITY/PATS functions" from the M-MDS screen menu.
4. Select "Customer spare key programming enable" or "Customer spare key programming disable" from the M-MDS screen menu. The key additional programming procedure is as follows according to the selected menu:

ADDITIONAL KEY PROGRAMMING PROCEDURE

Setting	Additional key programming procedure	
	Method using two valid keys	Method using the M-MDS
Customer spare key programming enable	-	-
Customer spare key programming disable	x	-
-: Available x: Unavailable		

5. Perform the security access according to the directions on the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.)
6. After verifying that the PATS function menu is displayed again on the M-MDS screen, select "Exit (From This Menu)" to finish the M-MDS procedure.
7. After Step 6, wait **5 s or more** and then turn the ignition switch to the LOCK position.

NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE RELATED PARTS (PCM, KEYLESS CONTROL MODULE, INSTRUMENT CLUSTER, OR STEERING LOCK UNIT)

Condition

- When the keyless control module is replaced
  - Have one or more card keys to be programmed after the replacement.
  - Have two or more keys to be programmed after the replacement.
- When the keyless control module is not to be replaced

- Have one or more card keys to be programmed.
- Have two or more keys to be programmed after the replacement.

CAUTION:

- **Perform the procedures in the following order: "Ignition Key Code Erase", "Program Additional card key", "Steering lock unit programming", and "Program additional ignition key". If there is a failure in the programming, the engine may not be started.**
- **When replacing only the PCM, start from Step 2. Key 1 in the procedure can be any valid key.**
- **Perform the "card key programming procedure" in Step 11 only when the keyless control module is replaced.**
- **Perform the "steering lock unit programming procedure" in Step 12 only when either the keyless control module or steering lock unit is replaced.**

Procedure

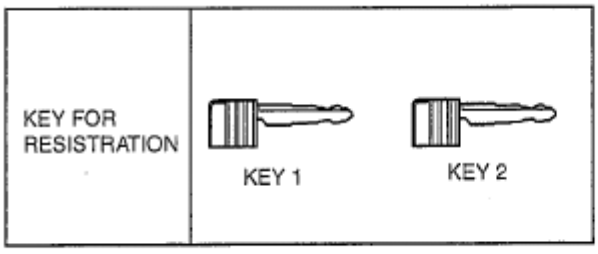

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Fig. 26: Identifying Key For Registration
Courtesy of MAZDA MOTORS CORP.

1. Prepare two or more keys to be programmed after the key ID number is cleared.
2. Connect the M-MDS to the DLC-2. (See **M-MDS CONNECTING PROCEDURE**.)
3. Using key 1, turn the ignition switch to the ON position.
4. Verify that the keyless warning light illuminates for **approx. 3 s** and then goes out.
5. Select "BODY/SECURITY/PATS functions" from the M-MDS screen menu.
6. Select "Ignition Key Code Erase" from the M-MDS screen menu and perform the procedure according to the M-MDS screen.
7. Perform the security access according to the directions on the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.

CAUTION:

- **The M-MDS displays "At least two or more keys must be programmed", however, do not perform the key programming and proceed to Step 8. If the procedure is not followed, the engine may not be started.**

The key programming procedure is performed at Step 13-16.

8. Select "Parameter Reset" from the M-MDS screen menu.
9. Perform security access again as indicated on the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.)
10. Select the replaced part as indicated on the M-MDS screen.
    - When replacing only the PCM: Select "PCM".
    - When replacing only the instrument cluster: Select "HEC".
    - When replacing only the keyless control module: Select "RKE".

NOTE:

- **At this time, do not select any other parts from the M-MDS screen menu.**

11. Perform "Program Additional card key". (When replacing keyless control module) (See **CARD KEY ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]**.)
12. Perform "Steering Lock Unit Programming". (When steering lock unit) (See **STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]**.)
13. After verifying that the PATS function menu is displayed again on the M-MDS screen, select "Exit (From This Menu)" to finish the M-MDS procedure.
14. After Step 13, wait **5 s or more** and then turn the ignition switch to the LOCK position.
15. Using key 1, turn the ignition switch to the ON position.
16. After verifying that the security light and keyless warning light illuminate **for 3 s or more,** turn the ignition switch to the LOCK position and remove key 1.

NOTE:

- **Although the security light flashes and DTC 21 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

17. Using key 2, turn the ignition switch to the ON position.
18. Verify that the security light and keyless warning light illuminate **for approx. 3 s,** and then goes out.
19. After verifying that the security light goes out, turn the ignition switch to the LOCK position using key 2, and then remove key 2.
20. If additional keys need to be programmed, repeat Steps 13-14 with the additional key to be programmed being key 3. If the ignition switch is held in the ON position **for 1 min or more** , additional key programming according to Steps 18-19 will not be possible. If this occurs, refer to "**NO.1 ADDITIONAL KEY PROGRAMMING PROCEDURE (USING TWO VALID KEYS)**" to program

any additional keys.

21. Start the engine with key 1.
22. Verify that the security light and keyless warning light operate as follows:
    - From the point when the ignition switch is turned to the ON position, the security light illuminates **for approx. 3 s** , and goes out.
    - The keyless warning light illuminates when the ignition switch is turned to the ON position, and the light goes out after **approx. 1 s,** and then displays the number of the programmed keys.

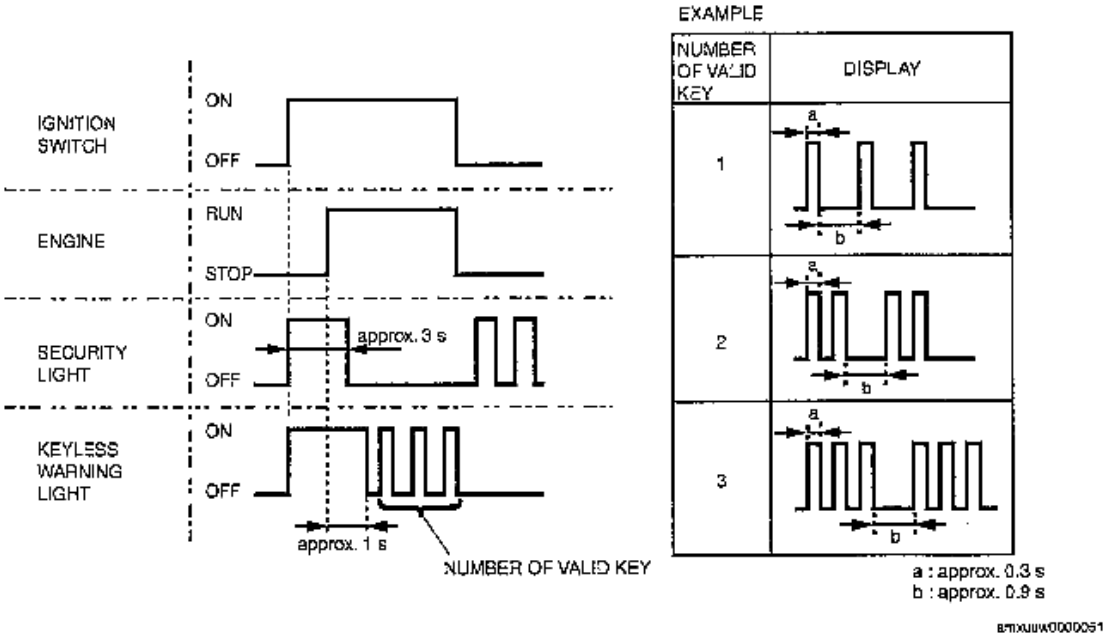


Fig. 27: Security Light And Keyless Warning Light Blinking Pattern
Courtesy of MAZDA MOTORS CORP.

23. After verifying that the keyless warning light goes out, turn the ignition switch to the LOCK position using key 1, and then remove the key.
24. Repeat Steps 22-23 using key 2 instead of key 1.

NOTE:
- **Perform Steps 22-23 as well when three or more keys are to be programmed.**

25. Start the engine using the card key.

CAUTION:
- **Remove any key from the key cylinder.**

26. Verify that the security light and keyless warning light operate as follows:
    - From the point that ignition switch is turned to the ON position, the security light illuminates **for**

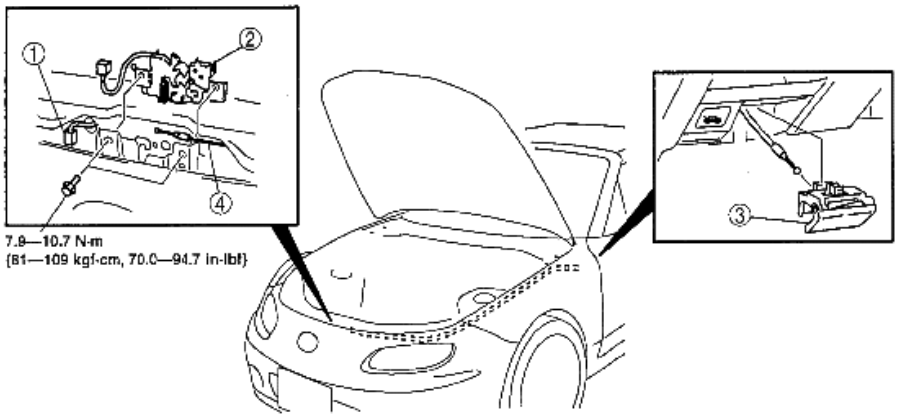
approx. 3 s, and goes out.

- The keyless warning light illuminate when the ignition switch is turned to the ON position for **approx. 1 min,** and goes out.

27. After verifying that the keyless warning light goes out, turn the ignition switch to the LOCK position.

HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION [ADVANCED KEYLESS SYSTEM]

1. Remove in the order indicated in the table.



1	Connector	3	Hood release lever (See Hood Release Lever Removal Note.)
2	Hood latch	4	Hood release cable

Fig. 28: Identifying Hood Latch And Release Lever Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

2. Install in the reverse order of removal.
3. Adjust the hood. (See **HOOD ADJUSTMENT** .)

HOOD RELEASE LEVER REMOVAL NOTE

1. Pull the lever.
2. While pushing the tab in the direction of the arrow using a tape-wrapped, small flathead screwdriver, detach it from the dashboard.

CAUTION:
- **Remove the hood release lever while taking care not to damage the hood release cable with the flathead screwdriver.**

3. Under the condition in Step 2, pull the hood release lever outward, then remove it from the dashboard.

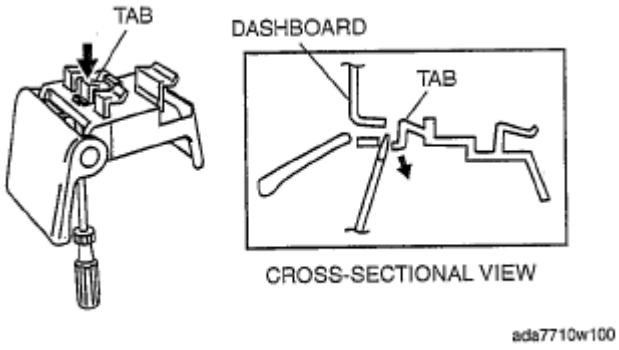


Fig. 29: Removing Hood Release Lever From Dashboard
Courtesy of MAZDA MOTORS CORP.

HOOD LATCH SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Open the hood.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the hood latch switch connector.
4. Inspect for continuity between the hood latch switch terminals A and B.
    - If there is no continuity, replace the hood latch switch.

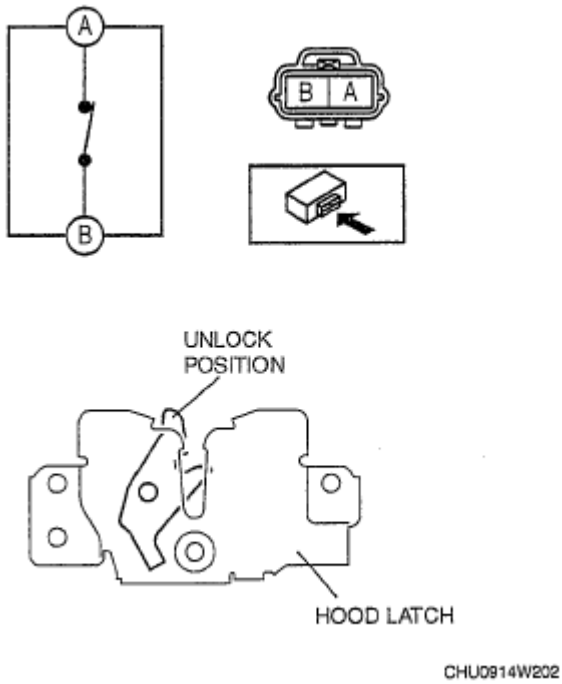


Fig. 30: Identifying Hood Latch Switch Terminals A And B
Courtesy of MAZDA MOTORS CORP.

5. Lock the hood latch using a flathead screwdriver or equivalent as shown.

6. Inspect for continuity between the hood latch switch terminals A and B
   - If there is continuity, replace the hood latch.

CAUTION:
- **After the inspection, unlock the hood latch. If closing the hood with the hood latch locked, the hood latch and/or hood striker may be broken.**

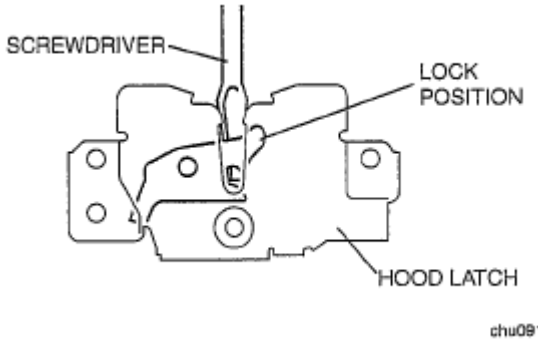


Fig. 31: Locking Hood Latch Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

OPEN HOOK REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the following parts:
   1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
   2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
   3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
   4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
   5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
   6. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
   7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
   8. Seat back bar lower garnish (See **SEAT BACK BAR LOWER GARNISH REMOVAL/INSTALLATION** .)
2. Remove the bolts.
3. Remove the open hook.
4. Install in the reverse order of removal.

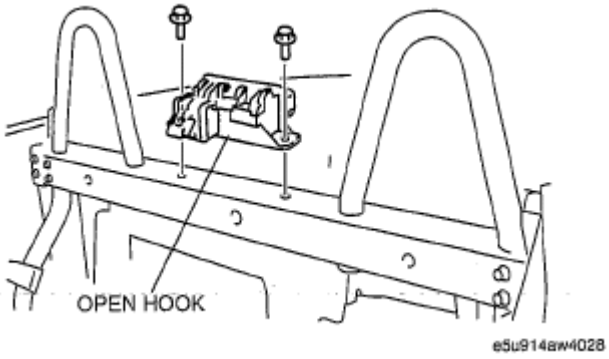


Fig. 32: Identifying Open Hook
Courtesy of MAZDA MOTORS CORP.

HOOD STRIKER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the bolt, then remove the hood striker. HOOD STRIKER
2. Install in the reverse order of removal.

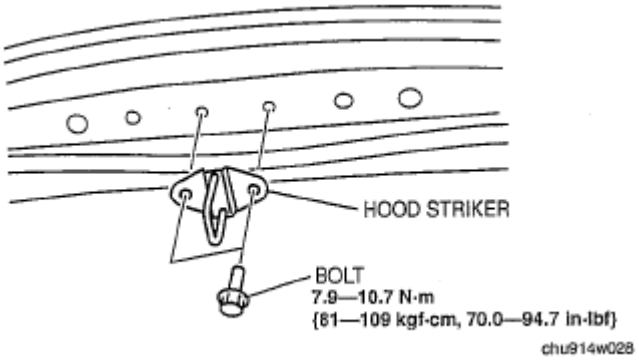


Fig. 33: Identifying Hood Striker And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

CARD KEY BATTERY REPLACEMENT[ADVANCED KEYLESS SYSTEM]

CARD KEY TYPE

1. Pull out the auxiliary key.
2. Replace the cap using a flathead screwdriver, then rotate and remove the cap.

CAUTION:
- **Do not turn the cap excessively. The cap may be damaged.**

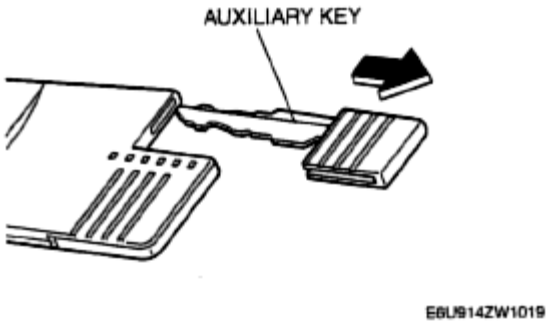


Fig. 34: Pulling Out Auxiliary Key
Courtesy of MAZDA MOTORS CORP.

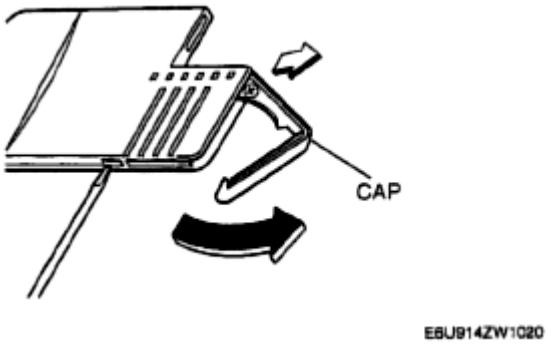


Fig. 35: Removing Cap
Courtesy of MAZDA MOTORS CORP.

3. Insert a flathead screwdriver into the crack and press the battery out.

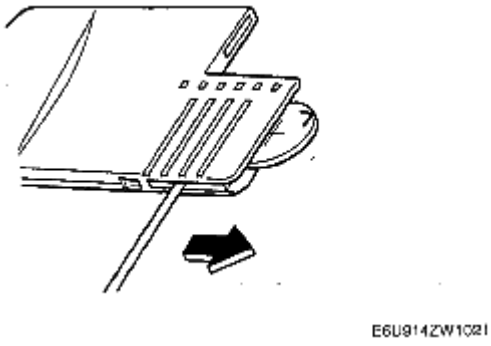


Fig. 36: Removing Battery
Courtesy of MAZDA MOTORS CORP.

4. Insert the new battery (CR2025) with the positive pole (+) facing the (+) mark on the cap.

Battery specification

Lithium CR2025 x 1

NOTE:

- **The batteries will last about 1 years when used 10 times a day.**

Fig. 37: Positions For Inserting New Battery
Courtesy of MAZDA MOTORS CORP.

5. Rotate and close the cap.
6. Reinsert the auxiliary key.

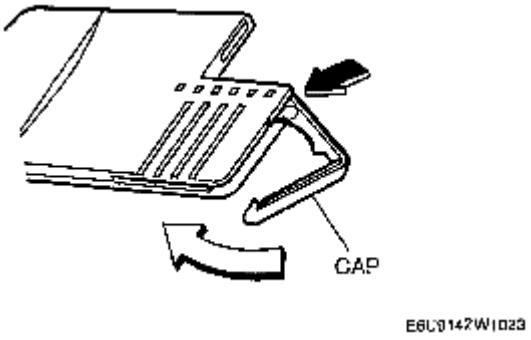


Fig. 38: Closing Cap
Courtesy of MAZDA MOTORS CORP.

KEYLESS CONTROL MODULE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

NOTE:

- **If the keyless control module is replaced, always perform the following procedure.**

  Without immobilizer system

  - **Card key programming (See CARD KEY ID CODE REGISTRATION [ADVANCED KEYLESS SYSTEM].)**
  - **Steering lock unit programming (See STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM].)**

With immobilizer system

- **Card key programming (See CARD KEY ID CODE REGISTRATION [ADVANCED KEYLESS SYSTEM].)**
- **Steering lock unit programming (See STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM].)**
- **Immobilizer system resetting (with immobilizer system) (See IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM].)**

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
3. Remove the bolt and nut.
4. While inclining the keyless control module along the body panel in the direction indicated by the arrow, disengage the bracket tab from the hole in the body panel.
5. Disconnect the keyless control module connector.
6. Remove the keyless control module.

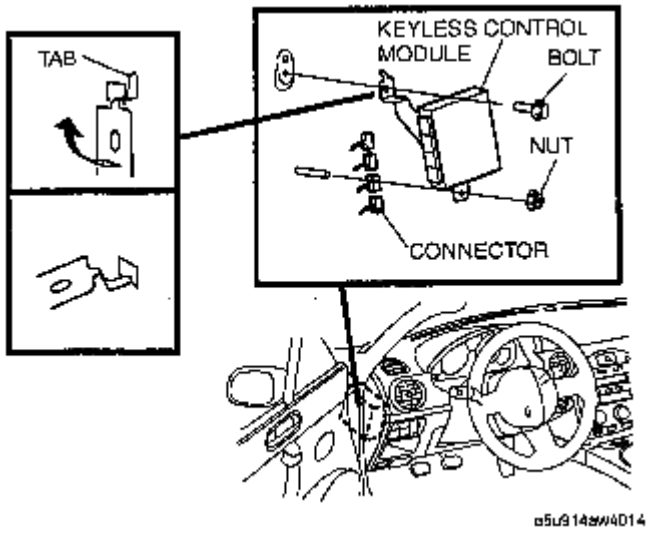


Fig. 39: Disengaging Bracket Tab
Courtesy of MAZDA MOTORS CORP.

7. Remove the screw, then remove the bracket.

NOTE:

- **The screw which fixes the keyless control module and bracket is for a body ground connection. Be sure to secure the screw when installing.**

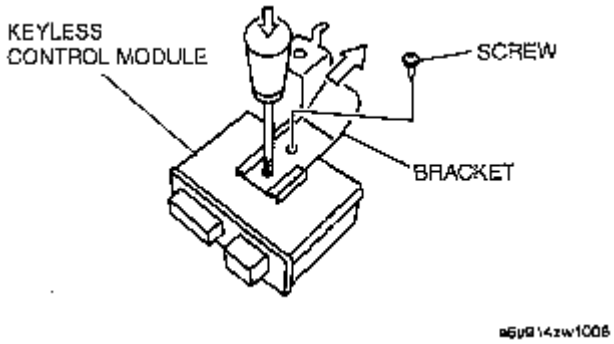


Fig. 40: Removing Bracket & Screw
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

KEYLESS CONTROL MODULE INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Measure the voltage or inspect for continuity according to the Terminal Voltage Table (Reference).
    - If the voltage is not as specified in the Terminal Voltage Table (Reference), inspect the parts under "Inspection item(s)" and related wiring harnesses.

TERMINAL VOLTAGE TABLE (REFERENCE)

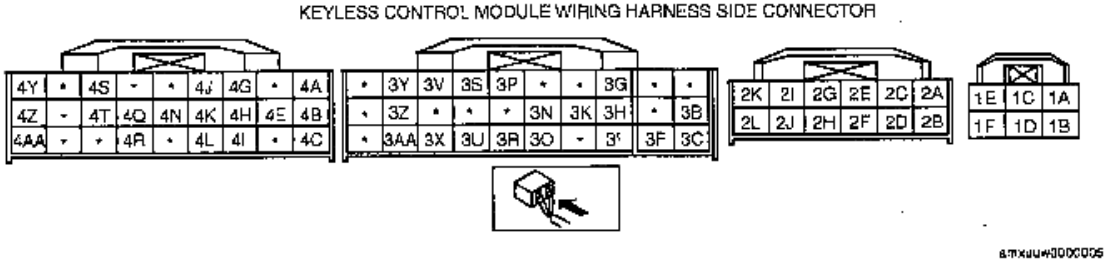


Fig. 41: Identifying Keyless Control Module Wiring Harness Side Connector Terminals
Courtesy of MAZDA MOTORS CORP.

KEYLESS CONTROL MODULE TERMINALS VOLTAGE TABLE (REFERENCE)

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/Continuity	Inspection item(s)
1A	Door unlock control	Door lock actuator (driver's side)	Door lock actuator unlocking	1.0 or less --> B+ --> 1.0 or less	• Door lock actuator (driver's side) • Related wiring harnesses
			Other	1.0 or less	

1B	GND	GND	Under any condition: Inspect for continuity to GND.	Continuity detected	• Related wiring harnesses
1C	Door lock control	Door lock actuator	Door lock actuator locking	1.0 or less rarr; B+ rarr; 1.0 or less	• Door lock actuator • Related wiring harnesses
			Other	1.0 or less	
1D	Door unlock control	Door lock actuator (except driver's side)	Door lock actuator unlocking	1.0 or less rarr; B+ rarr; 1.0 or less	• Door lock actuator (except driver's side) • Related wiring harnesses
			Other	1.0 or less	
1E	Power supply	D.LOCK 30 A fuse	Under any condition	B+	• D.LOCK 30 A fuse • Battery
1F	Power supply	ROOM 15 A fuse	Under any condition	B+	• ROOM 15 A fuse • Battery
2A	keyless antenna (exterior, RF)(+)	keyless antenna (exterior, RF)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, RF)
2BB	keyless antenna (exterior, RF)(-)	keyless antenna (exterior, RF)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, RF)
2C	keyless antenna (exterior, LF)(+)	keyless antenna (exterior, LF)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, LF)
2D	keyless antenna (exterior, LF)(-)	keyless antenna (exterior, LF)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, LF)
2E	keyless antenna (exterior, rear)(+)	keyless antenna (exterior, rear)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, rear)
	keyless antenna	keyless	Under any		

2F	(exterior, rear) (-)	antenna (exterior, rear)	condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (exterior, rear)
2G	keyless antenna (interior, trunk) (+)	keyless antenna (interior, trunk)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, trunk)
2H	keyless antenna (interior, trunk) (-)	keyless antenna (interior, trunk)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, trunk)
2I	keyless antenna (interior, rear) (+)	keyless antenna (interior, rear)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, rear)
2J	keyless antenna (interior, rear) (-)	keyless antenna (interior, rear)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, rear)
2K	keyless antenna (interior, middle) (+)	keyless antenna (interior, middle)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, middle)
2L	keyless antenna (interior, middle) (-)	keyless antenna (interior, middle)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, middle)
3B	IG1	ENGINE 10 A fuse	Ignition switch is at ON position	B+	ENGINE 10 A fuse
			Ignition switch is at LOCK or ACC position	1.0 or less	
3C	GND	body ground	Under any condition: Inspect for continuity to ground.	Continuity detected	GND
3F	Security light	Instrument cluster	Under any condition: Inspect for continuity to instrument cluster.	Continuity detected	Instrument cluster
3G	keyless antenna (interior, front) (+)	keyless antenna (interior, front)	Under any condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, front)
	keyless antenna	keyless	Under any		

3H	(interior, front)(-)	antenna (interior, front)	condition: Inspect for continuity to keyless antenna.	Continuity detected	keyless antenna (interior, front)
3I	ACC	METER 10 A fuse	Ignition switch is at ACC position	B+	METER 10 A fuse
			Ignition switch is at LOCK or ON position	1.0 or less	
3K	Buzzer (interior)	Instrument cluster	Buzzer operated	1.0 or less	Instrument cluster
			Other	5.0	
3N	Start knob (push switch)	Steering lock unit	Start knob is Pushed	B+	Steering lock unit
			Other	1.0 or less	
3O	Key reminder switch	Steering lock unit	Key reminder switch is ON	B+	Steering lock unit
			Other	1.0 or less	
3P	Communication (steering lock unit)	Steering lock unit	Under any condition: Inspect for continuity to steering lock unit.	Continuity detected	Steering lock unit
3R	TPMS signal	Instrument cluster	Under any condition: Inspect for continuity to instrument cluster.	Continuity detected	Instrument cluster
3S	Power supply (keyless receiver, front)	Keyless receiver, front	Under any condition	B+	Keyless receiver, front
3U	Communicatio n (keyless receiver, front)	Keyless receiver, front	Under any condition: Inspect for continuity to keyless receiver, front.	Continuity detected	Keyless receiver, front
3V	Power supply (keyless receiver, rear)	Keyless receiver, rear	Under any condition	B+	Keyless receiver, rear
3X	Communicatio n (keyless receiver, rear)	Keyless receiver, rear	Under any condition: Inspect for continuity to keyless receiver, rear.	Continuity detected	Keyless receiver, rear
3Y (1)	Tx-SKE	Coil antenna	Ignition switch is at ON position	B+	Coil antenna
			Ignition switch is at LOCK or ACC position	1.0 or less	

3Z	Trunk open signal	Trunk compartment light switch	Trunk lid open (trunk compartment light switch on)	1.0 or less	• Trunk compartment light switch • Related wiring harness
			Trunk lid closed (trunk compartment light switch off)	B+	
3AA(1)	Rx-SKE	Coil antenna	Ignition switch is at ON position	5.0	Coil antenna
			Ignition switch is at LOCK or ACC position	1.0 or less	
4A(1)	Tx	Instrument cluster	Ignition switch is at ON position	B+	Instrument cluster
			Ignition switch is at LOCK or ACC position	1.0 or less	
4B	Lock/unlock input	Door lock switch	Door lock switch is locked	2.5	• Door lock switch (driver-side) • Door lock switch (passenger-side) • Related wiring harnesses
			Door lock switch is unlocked	1.0 or less	
			Other	5	
4C(1)	Rx	Instrument cluster	Ignition switch is at ON position	B+	Instrument cluster
			Ignition switch is at LOCK or ACC position	1.0 or less	
4E	Lock signal input	Door lock-link switch (driver-side)	Driver-side door is locked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (driver-side)
			Driver-side door is unlocked: Inspect for continuity to ground.	No continuity	
4G	Lock/unlock input	Driver-side door key cylinder switch	At the moment key cylinder is locked	2.5	• Driver-side door key cylinder switch • Related wiring
			At the moment key cylinder is unlocked	1.0 or less	
			At the moment key cylinder is neutral	5	

			position		harnesses
4H	Request switch input (RH)	Request switch (RH)	Request switch (RH) is ON: Inspect for continuity to ground.	Continuity detected	Request switch (RH)
			Request switch (RH) is OFF: Inspect for continuity to ground.	No continuity	
4I	Unlock signal input	Door lock-link switch (driver-side)	Driver-side door is unlocked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (driver-side)
			Driver-side door is locked: Inspect for continuity to ground.	No continuity	
4J	Request switch input (LH)	Request switch (LH)	Request switch (LH) is ON: Inspect for continuity to ground.	Continuity detected	Request switch (LH)
			Request switch (LH) is OFF: Inspect for continuity to ground.	No continuity	
4K	Unlock input (trunk lid)	Trunk key cylinder switch	At the moment key cylinder is unlocked	1.0 or less	• Trunk key cylinder switch • Related wiring harnesses
			At the moment key cylinder is neutral position	5	
4L	Request switch input (trunk lid)	Request switch (trunk lid)	Trunk lid request switch is ON: Inspect for continuity to ground.	Continuity detected	Request switch (trunk lid)
			Trunk lid request switch is OFF: Inspect for continuity to ground.	No continuity	
4N	Hazard output	Hazard warning light	Press the LOCK button (transmitter)	B+ rarr; 1.0 or less rarr; B+	• Hazard warning light • Related wiring harnesses
			Press the UNLOCK button (transmitter)	B+rarr;1.0 or lessrarr;B+rarr;1.0 or lessrarr;B+	
			Other	B+	
4Q	Door switch signal (RH) output	Door switch	Door open (RH) (Door switch on)	1.0 or less	• Door switch (RH) • Related wiring
			Door closed (RH)	B+	

			(Door switch off)		harnesses
4R	Unlock signal input	Door lock-link switch (passenger-side)	Passenger-side door is unlocked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (passenger-side)
			Passenger-side door is locked: Inspect for continuity to ground.	No continuity	
4S(2)	Serial communication	Power window main switch	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.	-	• Power window main switch • Related wiring harnesses
4T	Door switch signal (LH) output	Door switch	Door open(LH) (Door switch on)	1.0 or less	• Door switch (LH) • Related wiring harnesses
			Door closed (LH) (Door switch off)	B+	
4U	Horn on/off	Horn relay	Other	B+	• Horn relay • Related wiring harnesses
			Transmitter LOCK button is pressed twice within 5 s.	Brarr;1.0or lessrarr;B+	
4V	Hood switch signal	Hood switch	Hood open (Hood latch switch off)	B+	• Hood latch switch • Related wiring harnesses
			Hood closed (Hood latch switch on)	1.0 or less	
4Y	Keyless buzzer output	Keyless buzzer	Keyless buzzer operated	B+	Keyless buzzer
			Other	1.0 or less	
4Z	HS-CAN+	PCM	Under any condition: • Inspect for continuity to PCM. • Inspect for continuity to instrument cluster.	Continuity detected	-
			Under any condition:		

4AA	HS-CAN-	PCM	• Inspect for continuity to PCM. • Inspect for continuity to instrument cluster.	Continuity detected	-

(1) With immobilizer system

(2) With exterior open function (Power window system)

CARD KEY ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]

CAUTION:

- **Do not place the following devices in the vehicle while programming, otherwise programming cannot be performed.**
  - **M-MDS**
  - **Personal computer**
  - **Device that can send/receive radio waves**
- **Verify that the other transmitter is not being operated around the servicing area during card key programming.**

NOTE:

- **Use the M-MDS and start programming if the condition corresponds to the following:**
  - **One or No Programmed Card Keys**
  - **Keyless control module is replaced**
- **If six card keys are already programmed, the programming mode does not activate. If programming is needed, use the M-MDS to erase the unnecessary card key programming.**

WITH TWO PROGRAMMED CARD KEYS

1. Bring the programmed card keys (2) and a unprogrammed card key into the vehicle.
2. Close all doors.
3. Insert the supplementary key into the ignition key cylinder.

NOTE:

- **Complete the procedures up to Step 7 within 30 s after the supplementary key is inserted.**

4. Turn the ignition switch to the ON position.
5. Press the UNLOCK button on card key 1.

6. Press the UNLOCK button on card key 2.
7. From the ignition switch in the ON position, switch the ignition switch in the order indicated below.
   - ACC-->ON-->ACC-->ON-->ACC-->ON
8. Open the driver-side front door, press the door switch **twice** , and then close the door.

NOTE:

- **After Step 3 is completed and the card key programming mode is activated, the door lock actuator operates to lock, and then operates to unlock.**
- **If the door lock actuator does not operate, repeat the procedure from Step 2.**

9. Press the UNLOCK button on the unprogrammed card key **twice.**

NOTE:

- **After Step 8 is completed and the card key is programmed, the door lock actuator operates to lock, and then operates to unlock.**

10. If programming more card keys, remove the supplementary key once, and then repeat the procedure from Step 2.

USING M-MDS

1. Fully lower the driver-side door glass.
2. Connect the M-MDS to the DLC-2.
3. Pull out the M-MDS cable from the door glass opening and set the M-MDS outside the vehicle.

CAUTION:

- **Protect the cable and body contact area with a clean rag, otherwise they could be damaged.**

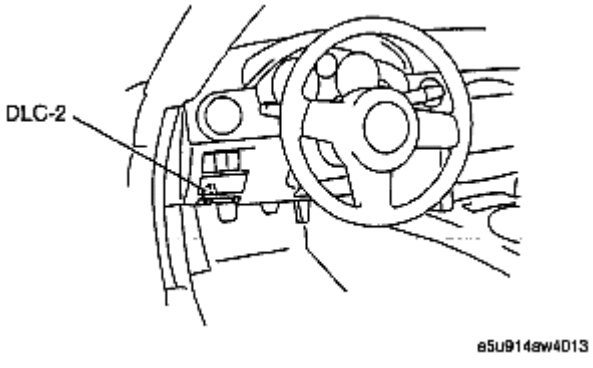


Fig. 42: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

4. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.

- When using the IDS (laptop PC)
    1. Select "BODY"
    2. Select "SECURITY"
    3. Select "PATS functions"
- When using the PDS (Pocket PC)
    1. Select "Programming".
    2. Select "PATS functions"

5. Then, select items from the screen menu in the following order.
    1. Select "Program Additional Card Key".
6. Security access begins and the M-MDS displays the "OUT-CODE".

NOTE:

- **When "OUT-CODE" is first displayed, turning the ignition switch from the LOCK to the ON position 5 times will change the "OUT-CODE".**

7. Input the "IN-CODE" that corresponds to the "OUT-CODE "displayed on the M-MDS screen.
8. Select "CARD KEY PROGRAMMING" from the M-MDS screen menu.

NOTE:

- **After Step 8 is completed and the card key programming is activated, the door lock actuator operates to lock, and then operates to unlock.**

9. Press the unprogrammed card key UNLOCK button **twice.**

NOTE:

- **After Step 9 is completed and the card key is programmed, the door lock actuator operates to lock, and then operates to unlock.**

10. If programming more card keys, remove the supplementary key once, and then repeat the procedure from Step 7 by following the instructions on the M-MDS screen.

CLEARING CARD KEY[ADVANCED KEYLESS SYSTEM]

1. Fully lower the driver-side door glass.
2. Connect the M-MDS to the DLC-2.
3. Pull out the M-MDS cable from the door glass opening and set the M-MDS outside the vehicle.

CAUTION:

- **Protect the cable and body contact area with a clean rag, otherwise they could be damaged.**

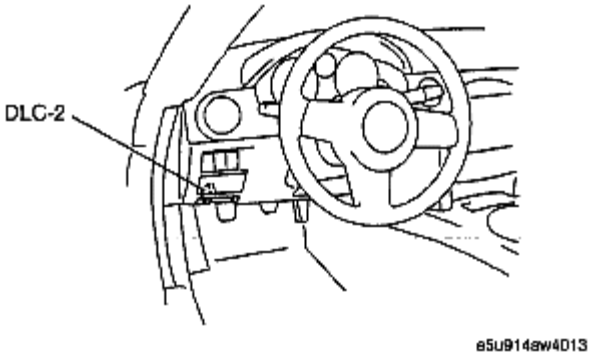


Fig. 43: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

4. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
   - When using the IDS (laptop PC)
     1. Select "BODY"
     2. Select "SECURITY"
   - When using the PDS (Pocket PC)
     1. Select "Programming".
5. Then, select items from the screen menu in the following order.
   1. Select "PATS functions".
   2. Select "Card Key Code Erase".
6. Security access begins and the M-MDS displays the "OUT-CODE".

NOTE:
- **When "OUT-CODE" is first displayed, turning the ignition switch from the LOCK to the ON position 5 times will change the "OUT-CODE".**

7. Input the "IN-CODE" that corresponds to the "OUT-CODE" displayed in the M-MDS screen.

STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]

CAUTION:
- **Do not place the following devices in the vehicle while programming, otherwise programming cannot be performed.**
- **M-MDS**
- **Personal computer**
- **Device that can send/receive radio waves**

NOTE:
- **The steering lock unit and steering lock component are a single unit. Therefore, replace the steering lock component when replacing steering**

lock unit. (See STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION .)

- **For this procedure, a programmed card key is necessary. If there is no programmed card key, perform the steering lock unit programming after the card key programming.**

1. Bring the programmed card key into the vehicle.
2. Fully lower the driver-side door glass.
3. Connect the M-MDS to the DLC-2.
4. Pull out the M-MDS cable from the door glass opening and set the M-MDS outside the vehicle.
5. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
   - When using the IDS (laptop PC)
     1. Select "BODY"
     2. Select "SECURITY"
   - When using the PDS (Pocket PC)
     1. Select "Programming".
6. Then, select items from the screen menu in the following order.
   1. Select "PATS Functions"
   2. Select "Steering Lock Unit Programming"
7. Perform the security access according to the directions on the M-MDS screen. (See **SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]**.)

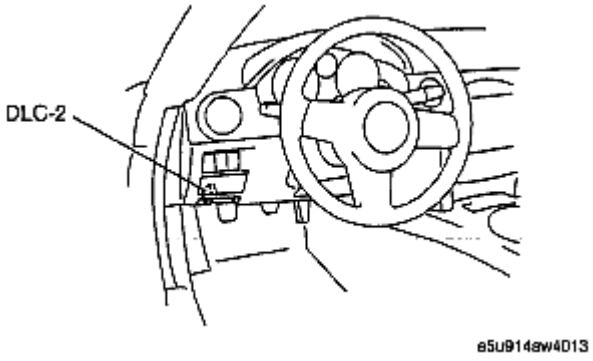


Fig. 44: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

8. The security access begins and the M-MDS displays "OUT-CODE".

NOTE:

- **When "OUT-CODE" is first displayed, turning the ignition switch from the LOCK to the ON position 5 times will change the "OUT-CODE".**

9. Input the "IN-CODE" that corresponds to the "OUT-CODE" displayed on the M-MDS screen.

KEYLESS CONTROL MODULE CONFIGULATION[ADVANCED KEYLESS SYSTEM]

1. Connect the M-MDS to the DLC-2 connector.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        1. Select "Module Programming".
    - When using the PDS (Pocket PC)
        1. Select "Programming".
        2. Select "Module Programming".
3. Then, select the "Programmable Module Installation" and "RKE" from the screen menu.
4. Perform the configuration according to the directions on the screen.
5. Retrieve DTCs using the M-MDS, then verify if DTCs are present.
    - If a DTC is present, perform the applicable DTC inspection. (See **DTC TABLE [IMMOBILIZER SYSTEM (ADVANCED KEYLESS SYSTEM)]** .)

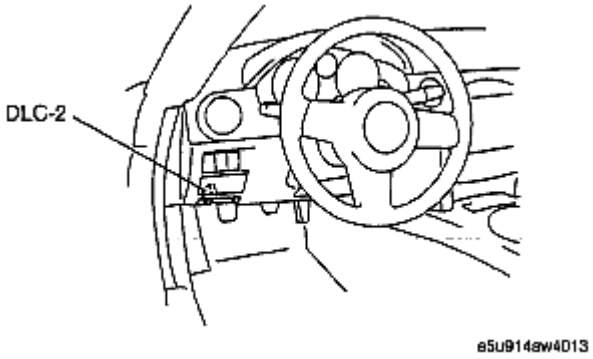


Fig. 45: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

CUSTOMIZED FUNCTION SETTING PROCEDURE[ADVANCED KEYLESS SYSTEM]

1. Connect the M-MDS to the DLC-2 connector.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
    - When using the IDS (laptop PC)
    1. Select "Module Programming".
        - When using the PDS (Pocket PC)
    1. Select "Programming".
    2. Select "Module programming".
3. Then, select items from the screen menu in the following order.

1. Select "Programmable parameters".
2. Select "RKE".

4. Select the item name, and than select either "ON/ OFF".

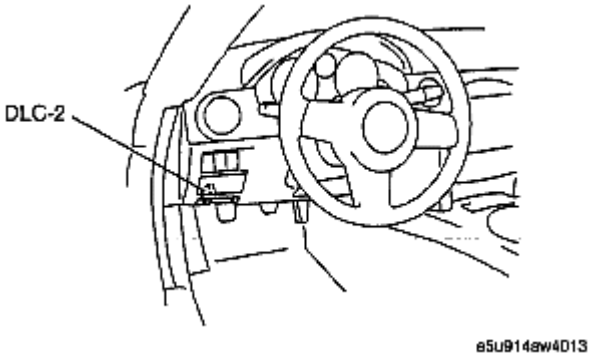


Fig. 46: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

Items

- Automatic Lock
- Answer Back Buzzer
- Card Key Battery Low Warning

KEYLESS RECEIVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

FRONT

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the glove compartment lid. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
3. Disconnect the keyless receiver module connector.
4. Remove the nut, then remove the keyless receiver (front).
5. Install in the reverse order of removal.

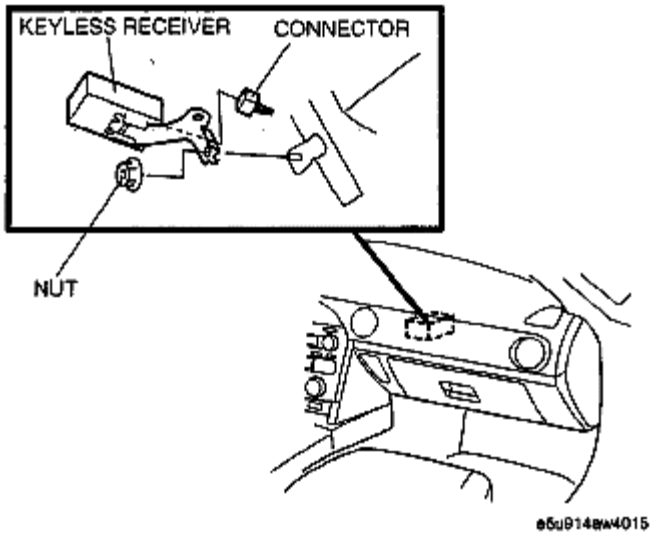


Fig. 47: Identifying Keyless Receiver Remove/Install Components (Front)
Courtesy of MAZDA MOTORS CORP.

REAR

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
3. Remove the nuts.
4. Disconnect the connector.
5. Remove the keyless receiver (rear).
6. Install in the reverse order of removal.

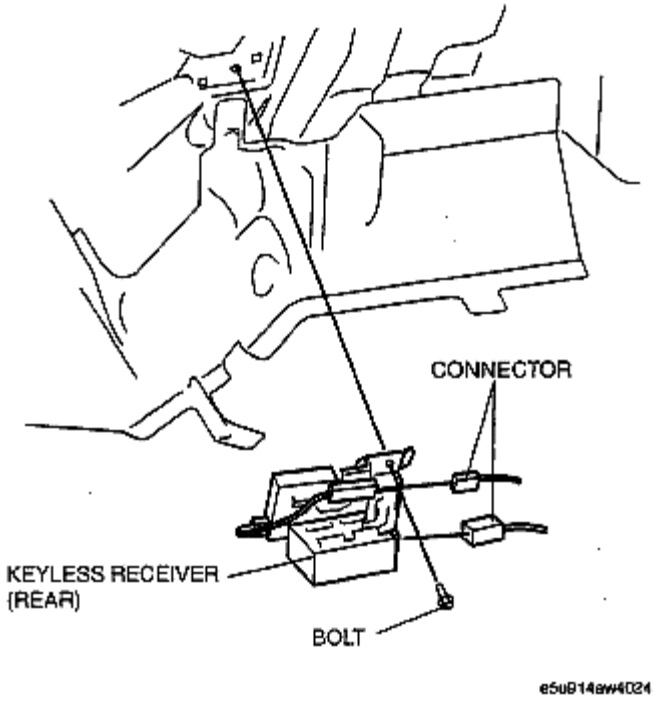


Fig. 48: Identifying Keyless Receiver Remove/Install Components (Rear)
Courtesy of MAZDA MOTORS CORP.

KEYLESS RECEIVER INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Measure the voltage or inspect for continuity according to the Terminal Voltage Table (Reference).
    - If the voltage is not as specified in the Terminal Voltage Table (Reference), inspect the parts under "Inspection item(s)" and related wiring harnesses.

TERMINAL VOLTAGE TABLE (REFERENCE)

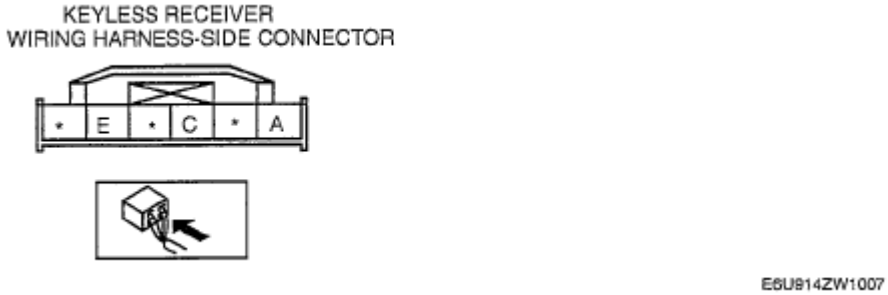


Fig. 49: Identifying Keyless Receiver Connector Terminals
Courtesy of MAZDA MOTORS CORP.

KEYLESS RECEIVER TERMINALS VOLTAGE TABLE (REFERENCE)

Terminal	Signal	Connected to	Measured condition	Voltage (V)/	Inspection item(s)

	name			Continuity	
A	Power supply	Keyless control module	Under any condition	B+	• Keyless control module • Related wiring harnesses
C	Data	Keyless control module	Under any condition: Inspect the wiring harness between the keyless receiver and keyless control module terminal 3U for continuity.	Continuity detected	• Keyless control module • Related wiring harnesses
E	GND	Body ground	Under any condition: Inspect for continuity to ground.	Continuity detected	GND

KEYLESS ANTENNA REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

DRIVER-SIDE/PASSENGER-SIDE DOOR

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
3. Remove the screws.
4. Disconnect the connector, then remove the keyless antenna.
5. Install in the reverse order of removal.

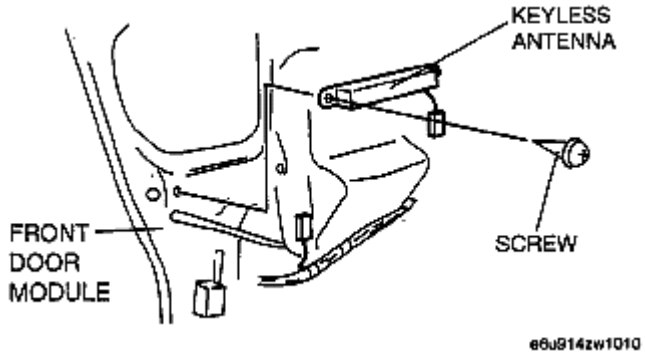


Fig. 50: Identifying Keyless Antenna Remove/Install Components (Door)
Courtesy of MAZDA MOTORS CORP.

EXTERIOR, REAR

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

2. Remove the nuts.
3. Disconnect the connector, then remove the keyless antenna.
4. Install in the reverse order of removal.

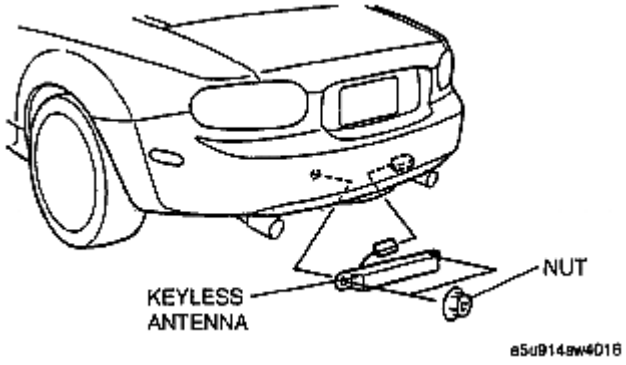


Fig. 51: Identifying Keyless Antenna And Nut
Courtesy of MAZDA MOTORS CORP.

INTERIOR, FRONT

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
3. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
4. Partially peel back the floor covering so that the foot support can be removed.
5. Remove the foot support.
6. Disconnect the connector, then remove the screws.
7. Remove the keyless antenna.

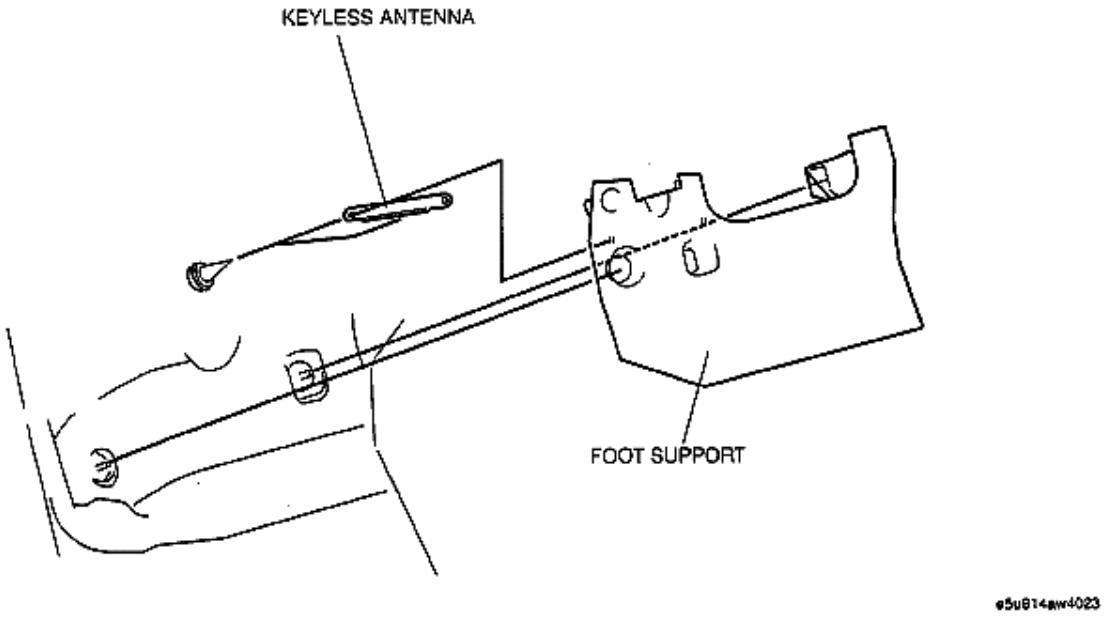


Fig. 52: Identifying Keyless Antenna And Foot Support
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

INTERIOR, MIDDLE

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the console panel. (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
5. Remove the clips.
6. Disconnect the connector, then remove the keyless antenna.
7. Install in the reverse order of removal.

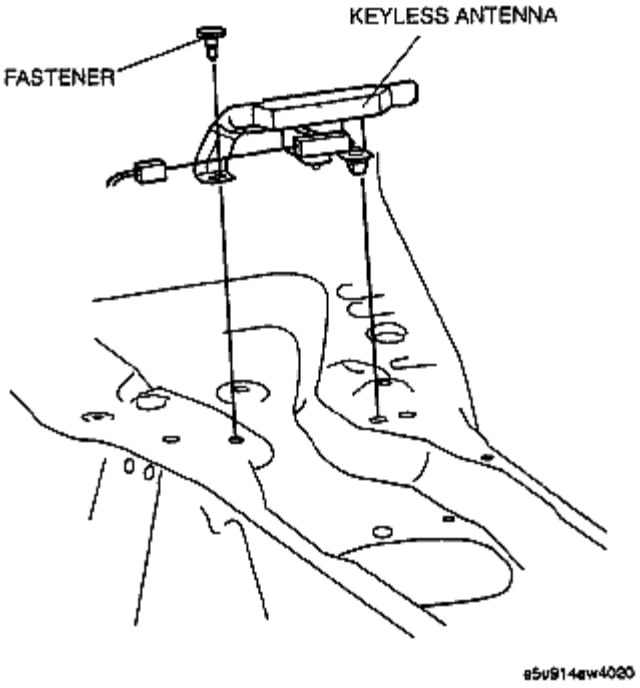


Fig. 53: Identifying Keyless Antenna And Fastener
Courtesy of MAZDA MOTORS CORP.

INTERIOR, REAR

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
3. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
4. Remove the nuts.
5. Disconnect the connector, then remove the keyless antenna.
6. Install in the reverse order of removal.

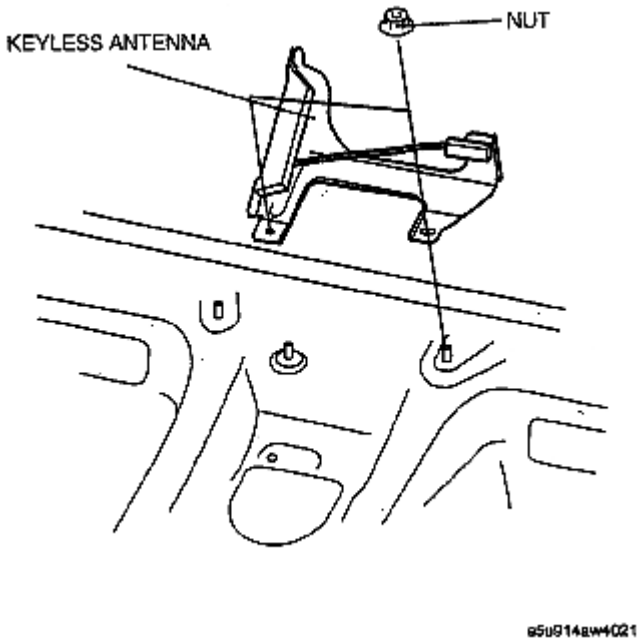


Fig. 54: Identifying Keyless Antenna And Nut
Courtesy of MAZDA MOTORS CORP.

INTERIOR, TRUNK

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
3. Remove the nuts.
4. Disconnect the connector, then remove the keyless antenna.
5. Install in the reverse order of removal.

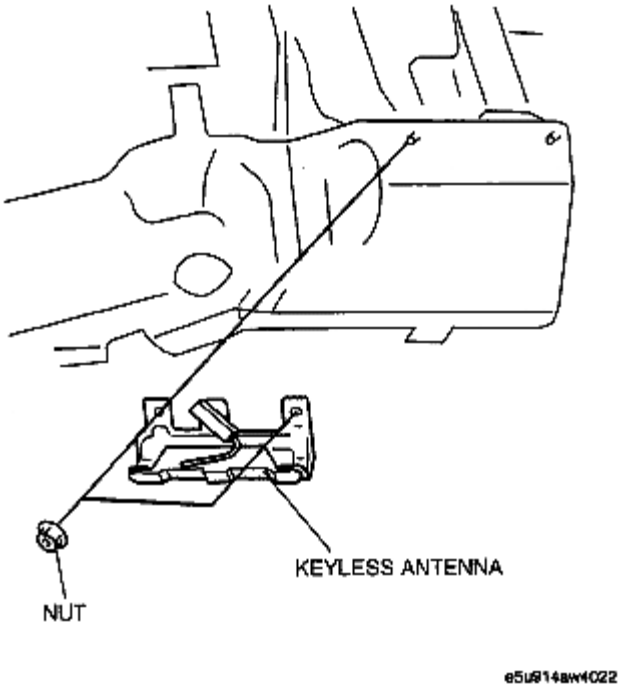


Fig. 55: Identifying Keyless Antenna And Nut
Courtesy of MAZDA MOTORS CORP.

KEYLESS BEEPER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
3. Remove the nuts.
4. Disconnect the connector.
5. Remove the keyless beeper.
6. Install in the reverse order of removal.

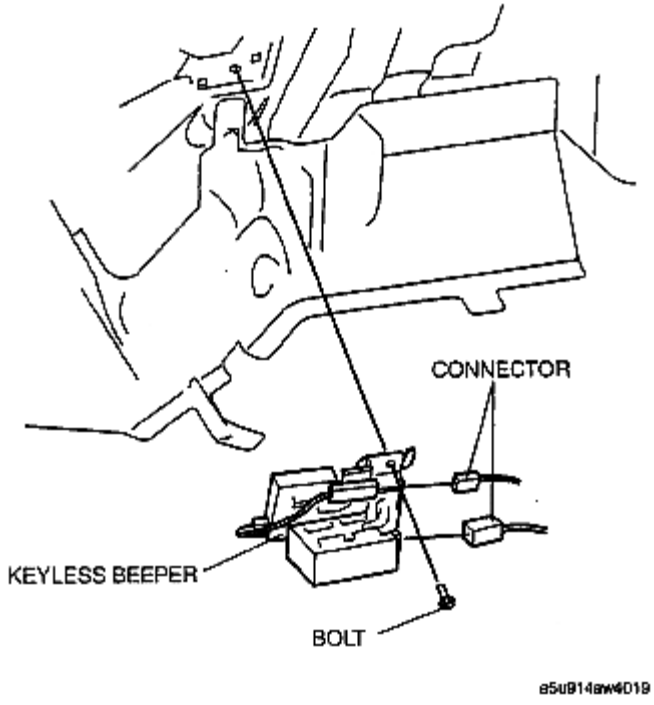


Fig. 56: Identifying Keyless Beeper Remove/Install Components
Courtesy of MAZDA MOTORS CORP.

REQUEST SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

DEIVER-SIDE/PASSENGER-SIDE

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
3. Remove the outer handle. (See **OUTER HANDLE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]**.)
4. Remove the screws A, then remove the handle seat and plate.
5. Remove screw B, then remove the request switch.
6. Install in the reverse order of removal.

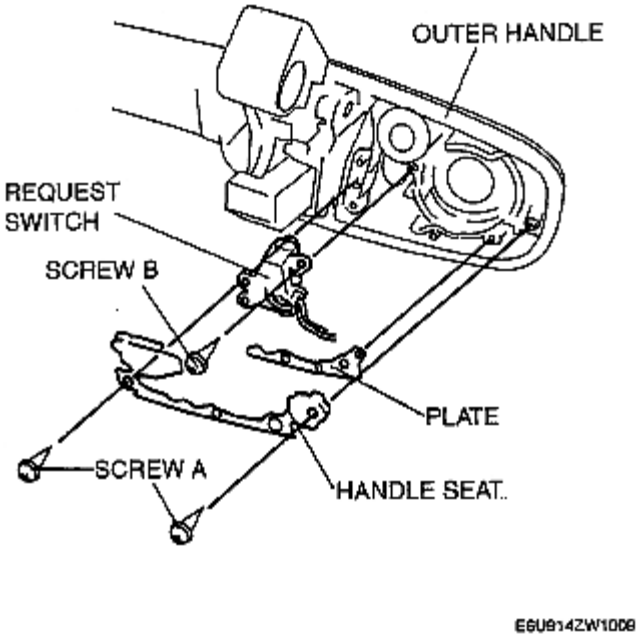


Fig. 57: Identifying Request Switch Remove/Install Components (Driver-Side/Passenger-Side)
Courtesy of MAZDA MOTORS CORP.

TRUNK LID

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Open the trunk lid.
3. Remove the request switch.
4. Install in the reverse order of removal.

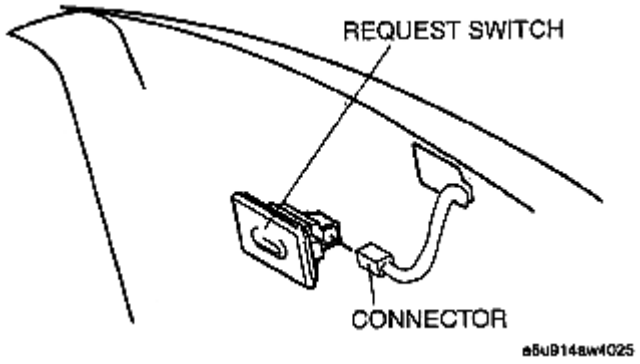


Fig. 58: Identifying Request Switch And Connector
Courtesy of MAZDA MOTORS CORP.

REQUEST SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Inspect for continuity between request switch terminals A and B.

- If not as specified, replace the request switch.

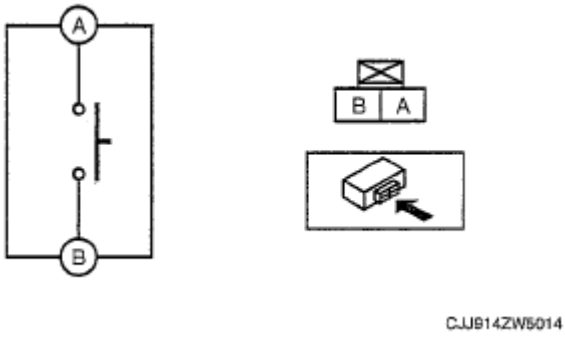
: Continuity

: Continuity

Switch position	Terminal	
	A	B
Push (ON)	○——○	
Not push (OFF)		

E6U914ZW1018

Fig. 59: Request Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.



CJU914ZW5014

Fig. 60: Identifying Request Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

SECURITY ACCESS PROCEDURE[ADVANCED KEYLESS SYSTEM]

1. Connect the M-MDS to the DLC-2.
2. Select "BODY/SECURITY/PATS functions" from the M-MDS screen menu.
3. Select the items to be performed from the following:
   - Program Additional card key
   - Card Key Code Erase
   - Steering Lock Unit Programming
   - Program additional ignition key (with immobilizer system)
   - Ignition Key Code Erase (with immobilizer system)
   - Customer Spare Key Programming Enable (with immobilizer system)
   - Customer Spare Key Programming Disable (with immobilizer system)
4. The security access begins and the M-MDS displays the "OUT-CODE".

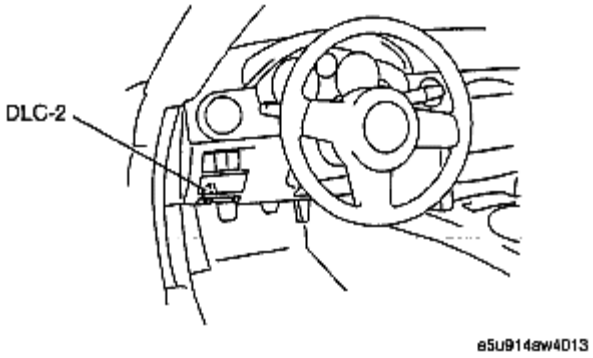


Fig. 61: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **When "OUT-CODE" is first displayed, turning the ignition switch from the LOCK to the ON position 5 times will change the "OUT-CODE".**

5. Input "IN-CODE" corresponding to "OUT-CODE" displayed on the M-MDS screen.
6. If the security access is successful, selected item can be performed.

TRUNK LID STRIKER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
2. Remove the bolts, then remove the trunk lid striker.
3. Install in the reverse order of removal.

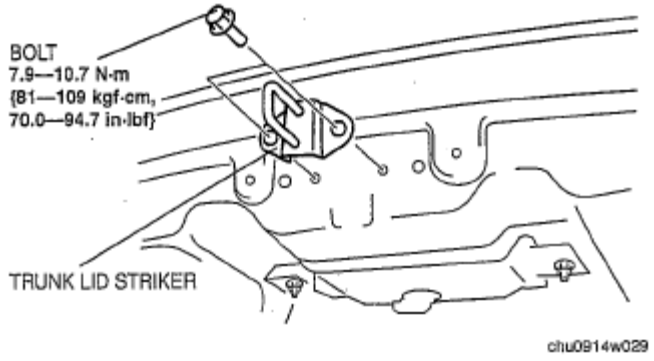


Fig. 62: Identifying Trunk Lid Striker And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPENER INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Apply battery positive voltage and connect the ground to the corresponding the trunk lid opener terminals, and inspect the trunk lid opener operation.

- If the trunk lid opener does not operate as indicated in the table, replace the trunk lid opener.

TRUNK LID OPENER OPERATION REFERENCE

Operation	Terminal	
	A	B
Unlocks	B+	Ground

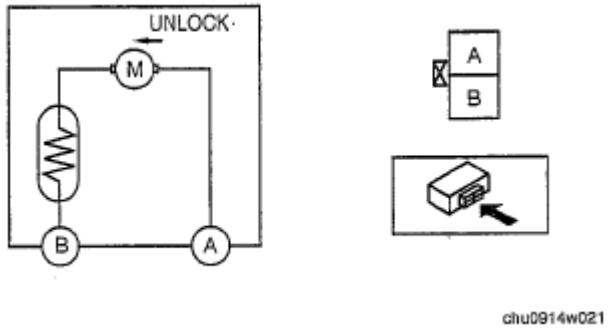


Fig. 63: Identifying Trunk Lid Opener Connector Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPENER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
3. Detach the rod.
4. Disconnect the trunk lid opener connector and the trunk compartment light connector.
5. Remove the bolts, then remove the trunk lid opener.
6. Install in the reverse order of removal.

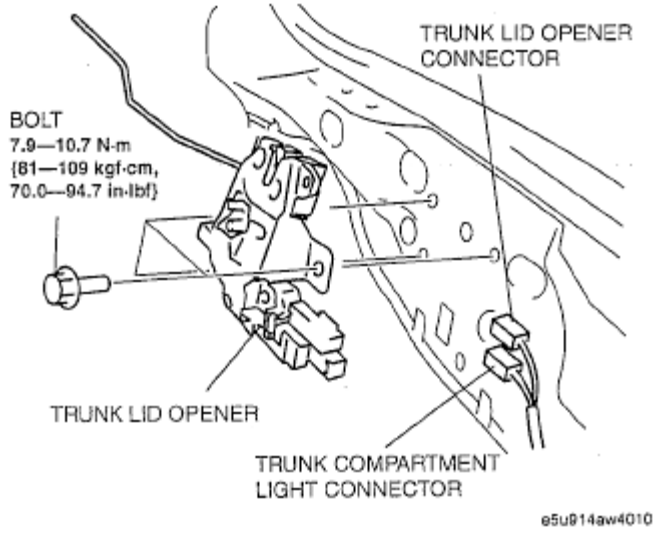


Fig. 64: Identifying Trunk Lid Opener Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPENER SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Using a small flathead screwdriver, detach the tabs of the trunk lid opener switch from the dashboard.
3. Push the trunk lid opener switch into the dashboard and remove.
4. Disconnect the trunk lid opener switch connector.
5. Install in the reverse order of removal.

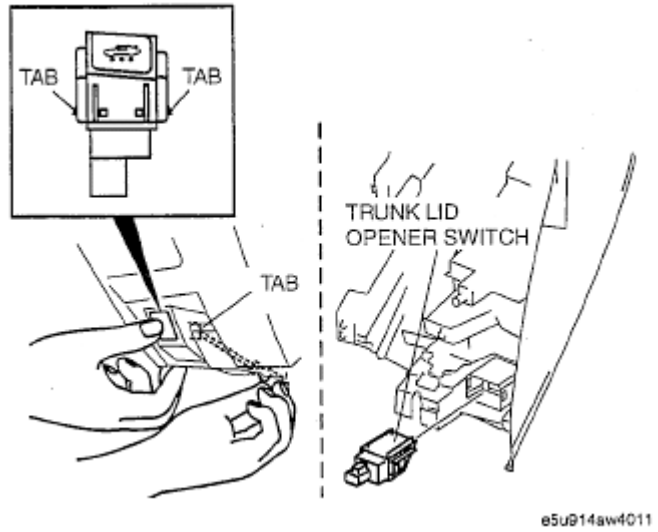


Fig. 65: Removal/Installation View Of Trunk Lid Opener Switch
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPEN CANCEL SWITCH REMOVAL/INSTALLATION [ADVANCED KEYLESS SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
3. Squeeze the tabs of the trunk lid opener cancel switch and pull it forward to remove it.
4. Disconnect the trunk lid opener cancel switch connector.
5. Remove the trunk lid opener cancel switch.
6. Install in the reverse order of removal.

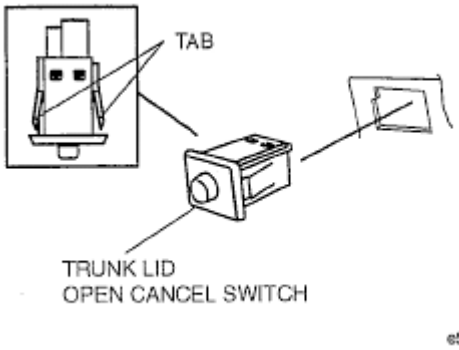


Fig. 66: Identifying Trunk Lid Opener Cancel Switch And Tab
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPEN CANCEL SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Remove the trunk lid open cancel switch.
2. Inspect for continuity between the trunk lid open cancel switch terminals.
   - If not as specified, replace the trunk lid open cancel switch.

: Continuity

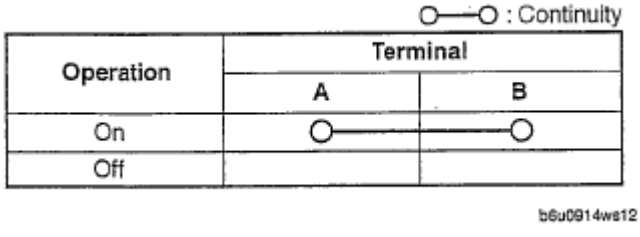


Fig. 67: Trunk Lid Open Cancel Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

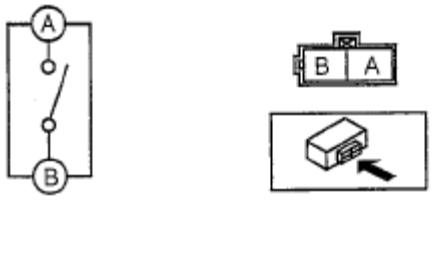


Fig. 68: Identifying Trunk Lid Open Cancel Switch Connector Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

TRUNK KEY CYLINDER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
3. Detach the rod.
4. Remove the nuts, then remove the trunk key cylinder.
5. Install in the reverse order of removal.

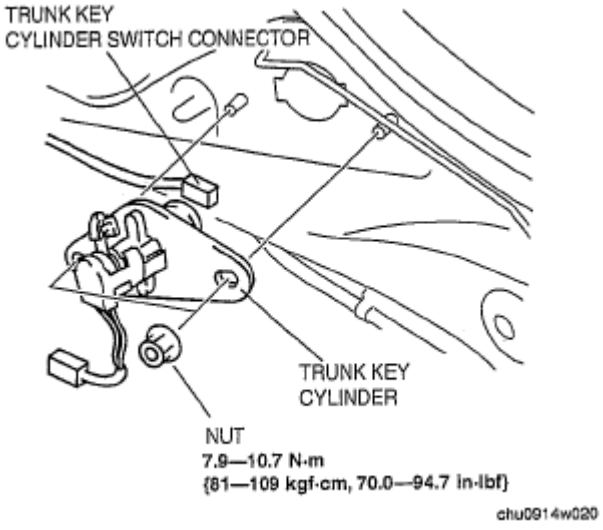


Fig. 69: Identifying Trunk Key Cylinder Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

TRUNK KEY CYLINDER SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Remove the trunk key cylinder switch.
2. Inspect for continuity between the trunk key cylinder switch terminals.

- If not as specified, replace the trunk key cylinder.

: Continuity

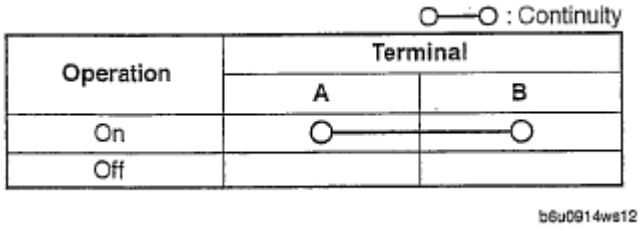


Fig. 70: Trunk Key Cylinder Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

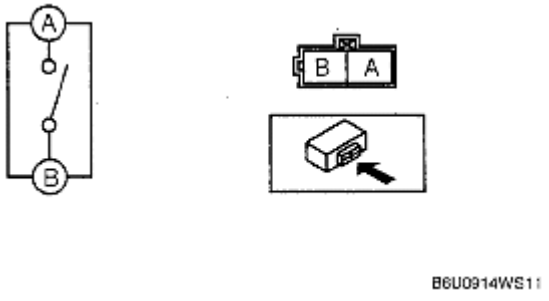


Fig. 71: Identifying Trunk Key Cylinder Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPENER SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Remove the trunk lid open switch.
2. Inspect for continuity between the trunk lid open switch terminals.
   - If not as specified, replace the trunk lid open switch.

: Continuity

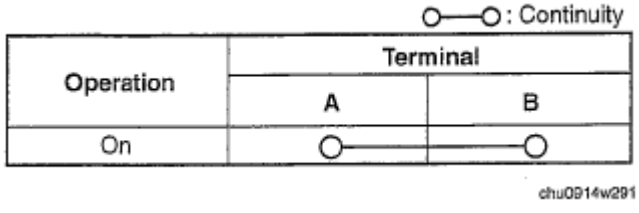


Fig. 72: Trunk Lid Opener Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

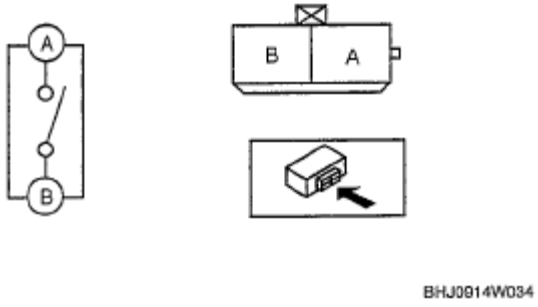


Fig. 73: Identifying Trunk Lid Opener Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

TOP LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]

1. Remove the front header trim. (See **FRONT HEADER TRIM REMOVAL/INSTALLATION** .)
2. Disconnect the striker switch connector.
3. Verify that the continuity between the striker switch terminals is as indicated in the table.
   - If not as indicated in the table, replace the striker.

: Continuity

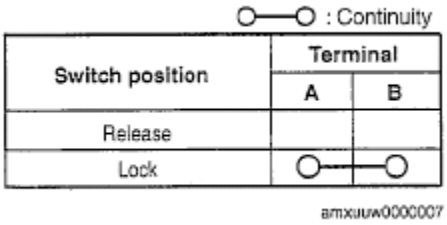


Fig. 74: Striker Switch Continuity Chart
Courtesy of MAZDA MOTORS CORP.

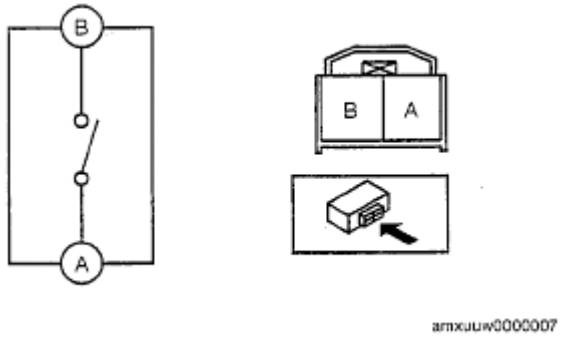
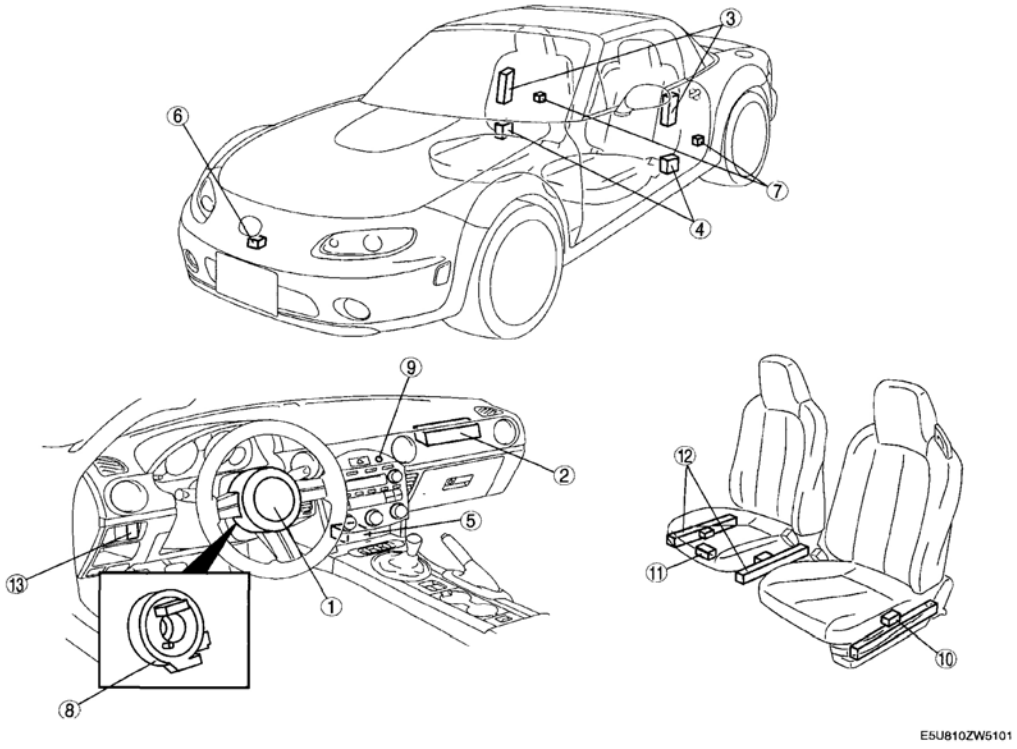


Fig. 75: Identifying Striker Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

2008 RESTRAINTS

Air Bag System - MX-5 Miata

LOCATION INDEX



1	Driver-side air bag module
2	Passenger-side air bag module
3	Side air bag module
4	Pre-tensioner seat belt
5	SAS control module
6	Crash zone sensor
7	Side air bag sensor
8	Clock spring
9	Passenger air bag deactivation (PAD) indicator
10	Seat track position sensor
11	Seat weight sensor control module
12	Seat weight sensor
13	Passenger air bag deactivation (PAD) switch

Fig. 1: Identifying Location Of Airbag Components
Courtesy of MAZDA MOTORS CORP.

AIR BAG SYSTEM SERVICE WARNINGS

AIR BAG MODULE INSPECTION

- **Inspecting an air bag module using a tester can operate (deploy) the air bag module, which may cause serious injury. Do not use a tester to inspect an air bag module. Always use the on-board diagnostic function to diagnose the air bag module for malfunctions.**

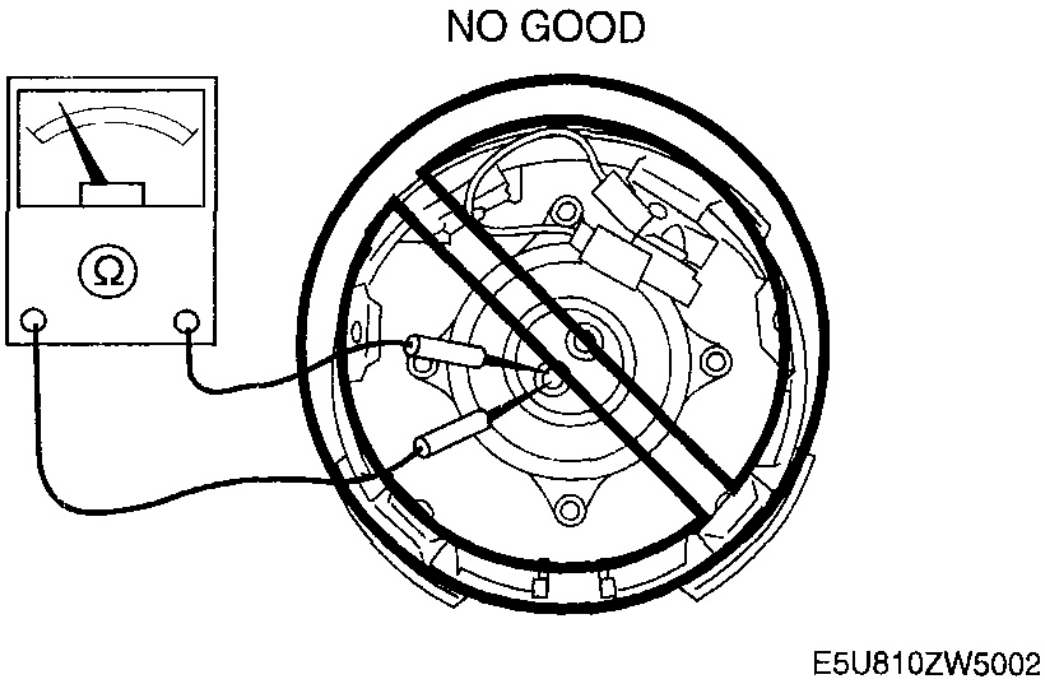


Fig. 2: Inspecting Air Bag Module Caution
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE HANDLING

- **Before removing the air bag module or disconnecting the air bag module connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**
- **Handling a live (undeployed) air bag module that is pointed toward your body could result in serious injury if the air bag module were to accidentally operate (deploy). When carrying a live (undeployed) air bag module, point the deployment surface away from your body to lessen the chance of injury in case it operates (deploys).**

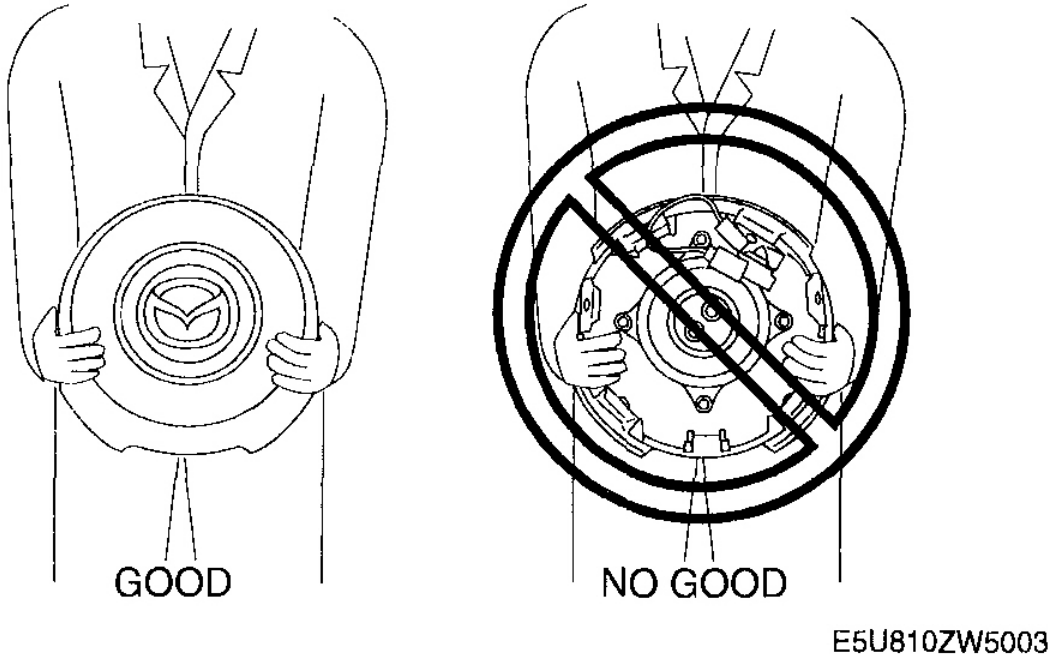


Fig. 3: Air Bag Module Handling (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

- **A live (undeployed) air bag module placed with its deployment surface to ground is dangerous. If the air bag module were to accidentally operate (deploy), it could cause serious injury. Always place a live (undeployed) air bag module with its deployment surface up.**

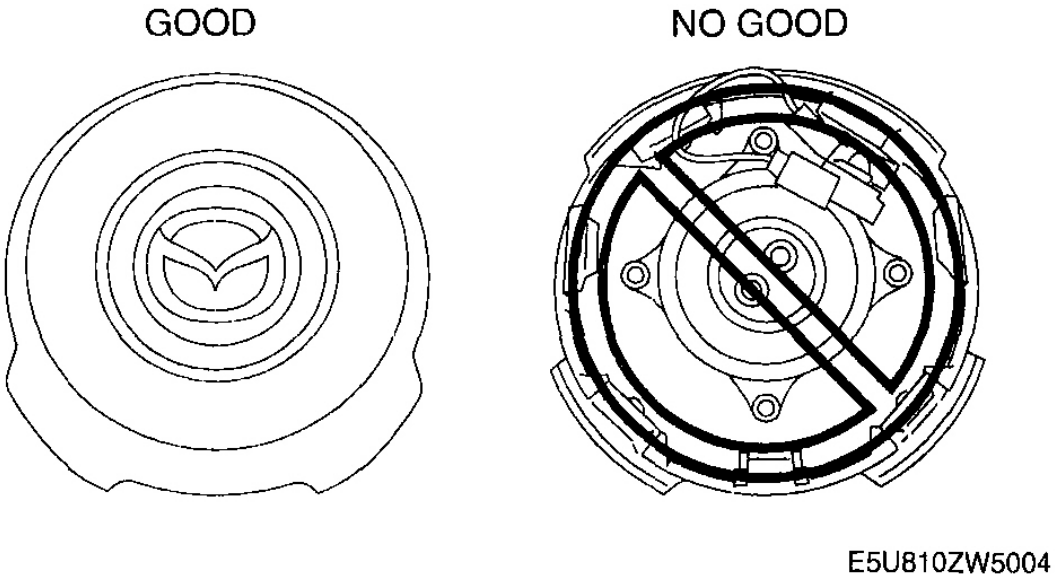


Fig. 4: Air Bag Module Handling (2 Of 2)
Courtesy of MAZDA MOTORS CORP.

SIDE AIR BAG MODULE HANDLING

- **When a side air bag module operates (deploys) due to a collision, the interior of the seat back (pad, frame, trim) may become damaged. If a side air bag does not operate (deploy) normally from a seat back that has been reused, a serious accident may result. After a side air bag has operated (deployed), always replace both the side air bag module and the seat back (pad, frame, trim) with new parts. After servicing, verify that the seat operates normally and that the wiring harness is not caught.**

SEAT WEIGHT SENSOR HANDLING

- **The passenger-side seat and the seat weight sensor may become deformed or otherwise damaged due to operation (deployment) of the front or side air bag in an accident. This may cause the passenger sensing function to operate improperly and result in a serious accident. Always replace the passenger seat and seat weight sensor with new ones after the front or side air bags have operated (deployed). After servicing, verify that the seat operates normally and that the wiring harness is not caught. If the collision is not hard enough to cause the front or side air bags to operate (deploy), inspect the seat weight sensor and replace it if there is any malfunction.**

SAS CONTROL MODULE HANDLING

- **Removing the SAS control module or disconnecting the SAS control module connector with the ignition switch at the ON position can activate the sensor in the SAS control module and operate**

(deploy) the air bags and pre-tensioner seat belts, which may cause serious injury. Before removing the SAS control module or disconnecting the SAS control module connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.

- **Connecting the SAS control module connector with the SAS control module not securely fixed to the vehicle is dangerous. The sensor in the SAS control module could send an electrical signal to the air bag modules and pre-tensioner seat belts. This will operate (deploy) the air bags and pre-tensioner seat belts, which may result in serious injury. Therefore, before connecting the connector, securely fix the SAS control module to the vehicle.**
- **Because a sensor is built into the SAS control module, once the air bags and pre-tensioner seat belts have operated (deployed) due to a collision or other causes, the SAS control module must be replaced with a new one even if the used one does not have any visible external damage or deformation. The used SAS control module may have been damaged internally, which may cause improper operation. If the SAS control module is reused, the air bags and pre-tensioner seat belts may not operate (deploy) normally, which could result in a serious accident. Always replace the SAS control module with a new one. The SAS control module cannot be bench-checked or self-checked.**

CRASH ZONE SENSOR HANDLING

- **Removing the crash zone sensor or disconnecting the crash zone sensor connector with the ignition switch at the ON position can activate the crash zone sensor and operate (deploy) the air bags and pre-tensioner seat belts, which may cause serious injury. Before removing the crash zone sensor or disconnecting the crash zone sensor connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**
- **If the crash zone sensor is subjected to shock or the sensor is disassembled, the air bags and pre-tensioner seat belts may accidentally operate (deploy) and cause injury, or the system may fail to operate normally and cause a serious accident. Do not subject the crash zone sensor to shock or disassemble the sensor.**
- **Because a sensor is built into the crash zone sensor, once the air bags and pre-tensioner seat belts have operated (deployed) due to a collision or other causes, the crash zone sensor must be replaced with a new one even if the used one does not have any visible external damage or deformation. If the crash zone sensor is reused, the air bags and pre-tensioner seat belts may not operate (deploy) normally, which could result in a serious accident. Always replace the crash zone sensor with a new one. The crash zone sensor cannot be bench-checked or self-checked.**

SIDE AIR BAG SENSOR HANDLING

- **Removing the side air bag sensor or disconnecting the side air bag sensor connector with the ignition switch at the ON position can activate the side air bag sensor and operate (deploy) the side air bag, which may cause serious injury. Before removing the side air bag sensor or disconnecting the side air bag sensor connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**

- **If the side air bag sensor is subjected to shock or the sensor is disassembled, the side air bag may accidentally operate (deploy) and cause injury, or the system may fail to operate normally and cause a serious accident. Do not subject the side air bag sensor to shock or disassemble the sensor.**
- **Because a sensor is built into the side air bag sensor, once the air bag has operated (deployed) due to a collision or other causes, the side air bag sensor must be replaced with a new one even if the used one does not have any visible external damage or deformation. If the side air bag sensor is reused, the side air bag may not operate (deploy) normally, which could result in a serious accident. Always replace the side air bag sensor with a new one. The side air bag sensor cannot be bench-checked or self-checked.**

PRE-TENSIONER SEAT BELT INSPECTION

- **Inspecting a pre-tensioner seat belt using a tester can operate (deploy) the pre-tensioner seat belt, which may cause serious injury. Do not use a tester to inspect a pre-tensioner seat belt. Always use the on-board diagnostic function to diagnose the pre-tensioner seat belt for malfunctions.**

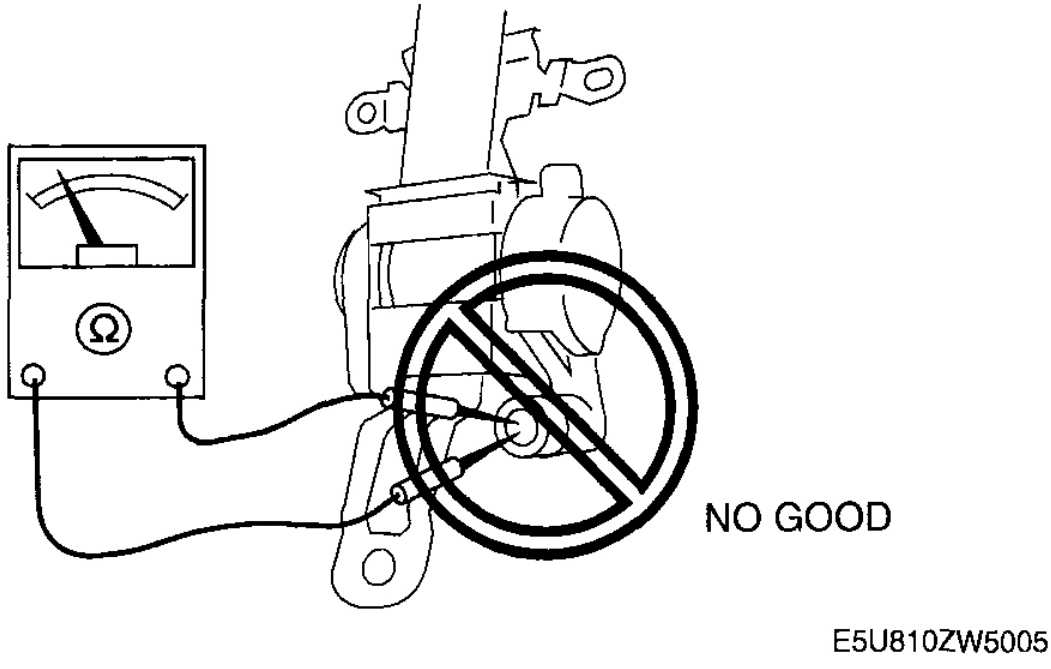


Fig. 5: Inspecting Pre-Tensioner Seat Belt Using Tester Caution
Courtesy of MAZDA MOTORS CORP.

AIR BAG SYSTEM SERVICE CAUTIONS

AIR BAG SYSTEM COMPONENT DISASSEMBLY

- **Disassembling the air bag system components could cause it to not operate (deploy) normally. Never disassemble any air bag system components.**

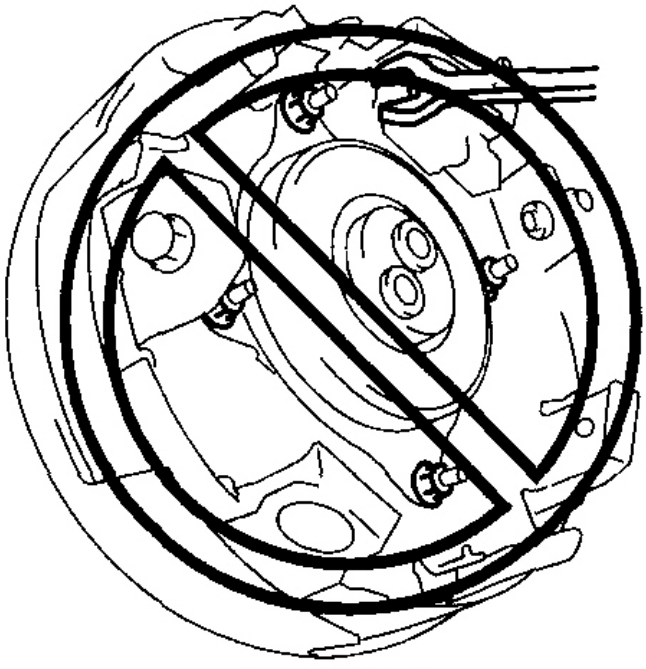


Fig. 6: Air Bag System Service Cautions
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE, PRE-TENSIONER SEAT BELT HANDLING

- **Oil, grease, or water on the air bag modules may cause the air bags and pre-tensioner seat belts to fail to operate (deploy) in an accident. Never allow oil, grease, or water to get on the air bag modules or pre-tensioner seat belts.**
- **Inserting a screwdriver or similar object into the connector of an air bag module or a pre-tensioner seat belt may damage the connector and cause the air bag module or the pre-tensioner seat belt to operate (deploy) improperly, which may cause serious injury. Never insert any foreign objects into the air bag module or seat belt connectors.**

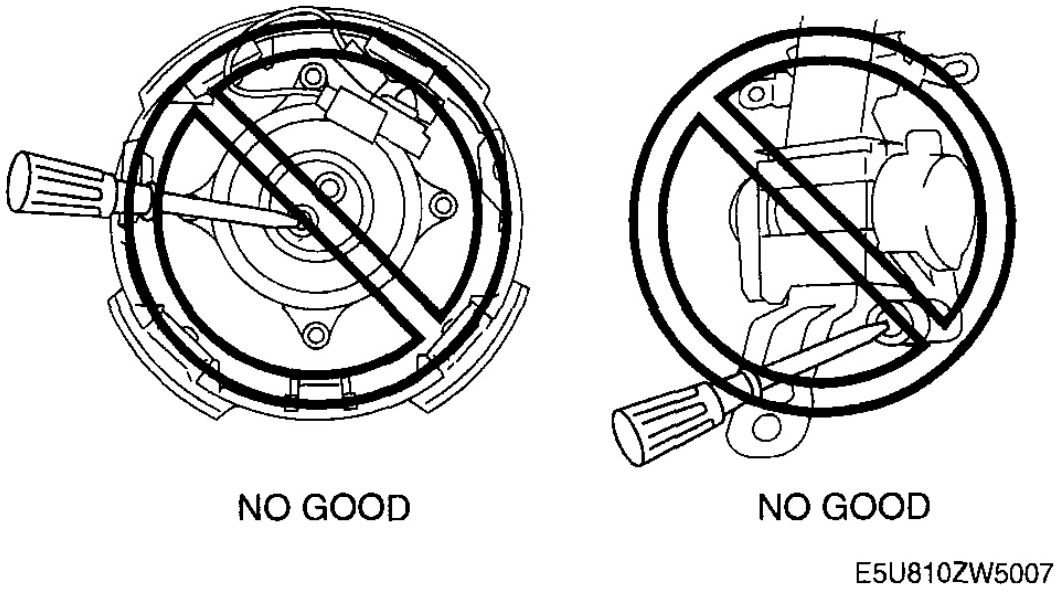


Fig. 7: Air Bag Module & Pre-Tensioner Seat Belt Handling Caution
Courtesy of MAZDA MOTORS CORP.

SEAT WEIGHT SENSOR HANDLING

- **The seat weight sensor has a built-in strain gauge which may operate improperly if the sensor is dropped by itself or when installed to the seat. If it is dropped, replace the seat weight sensor with a new one.**
- **Oil, grease, or water on the seat weight sensor may cause the system to operate (deploy) improperly. Never allow oil, grease, or water to get on the seat weight sensor.**
- **Foreign material in the seat weight sensor components may cause the system to operate (deploy) improperly. Always make sure that no foreign material can get into the seat weight sensor.**
- **Disassembling the seat weight sensor, or tightening any of the nuts and bolts installed to the sensor body may cause it to operate (deploy) improperly. Never disassemble the seat weight sensor or tighten any of the nuts or bolts installed to the body of the sensor.**

AIR BAG MODULE, PRE-TENSIONER SEAT BELT REUSE

- **Even if an air bag module or a pre-tensioner seat belt does not operate (deploy) in a collision and does not have any external signs of damage, it may have been damaged internally, which may cause improper operation. Before reusing a live (undeployed) air bag module and the pre-tensioner seat belts, always use the on-board diagnostic to diagnose the air bag module and the pre-tensioner seat belts to verify that they have no malfunction.**

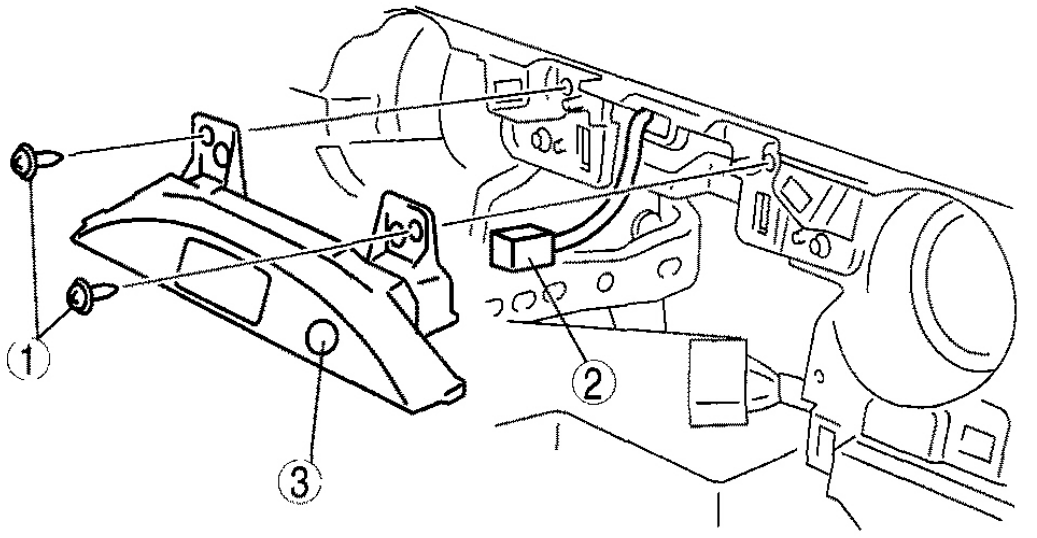
AIR BAG WIRING HARNESS REPAIR

- **Incorrectly repairing an air bag wiring harness can accidentally operate (deploy) the air bag module and pre-tensioner seat belts. If a problem is found in the air bag wiring harness, always replace the wiring harness with a new one.**

Fig. 8: Identifying Air Bag Wiring Harness Repair Caution
Courtesy of MAZDA MOTORS CORP.

PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    2. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
    3. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
    4. Decoration panel (See **DECORATION PANEL REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 9** .



1	Screw
2	Connector
3	Passenger air bag deactivation (PAD) indicator

Fig. 9: View Of Passenger Air Bag Deactivation (PAD) Indicator & Components
Courtesy of MAZDA MOTORS CORP.

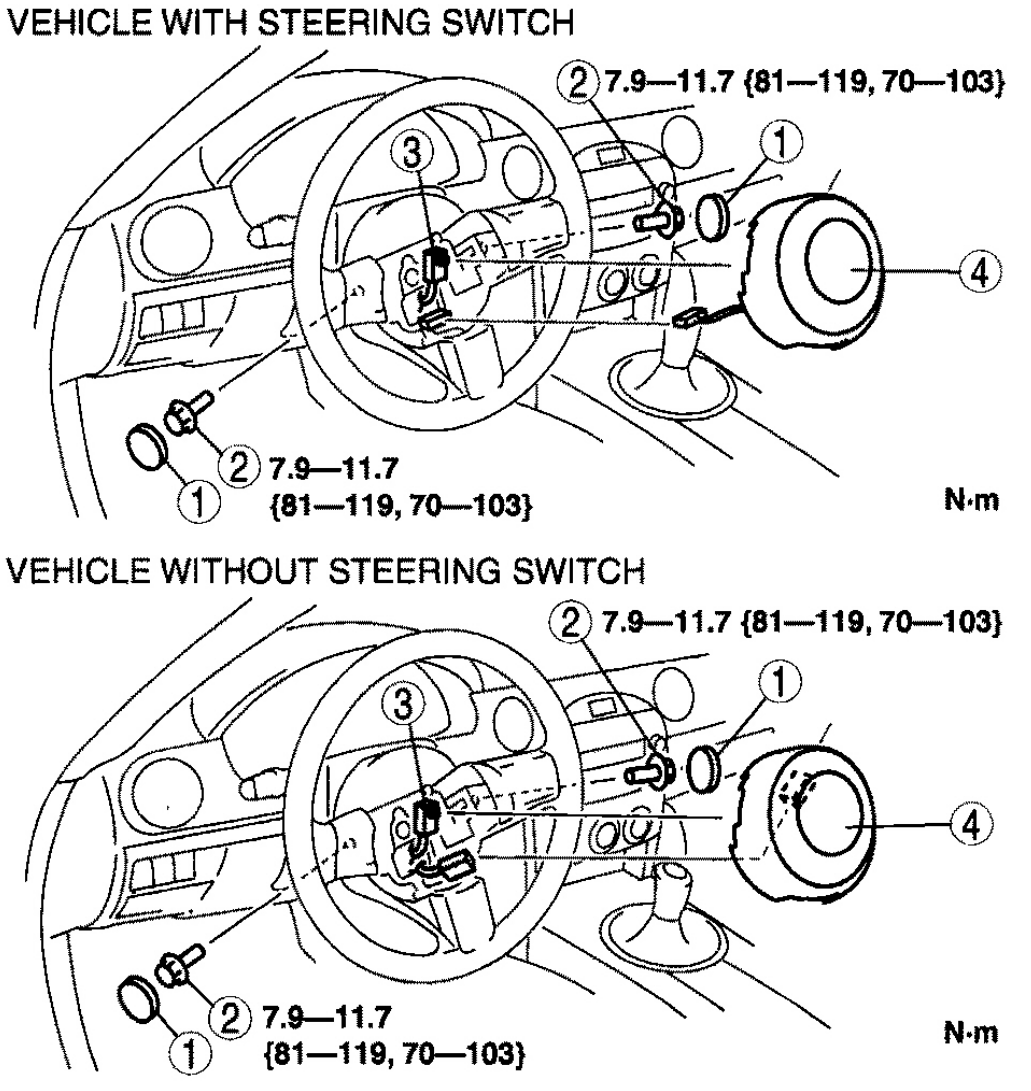
5. Install in the reverse order of removal.

DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION

WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove in the order indicated in **Fig. 10** .



1	Cover
2	Bolt
3	Connector
4	Driver-side air bag module

Fig. 10: View Of Driver-Side Air Bag Module & Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

6. Turn the ignition switch to the ON position.
7. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CONNECTOR REMOVAL NOTE

1. Using a flathead screwdriver, pry out the connector stopper plate.

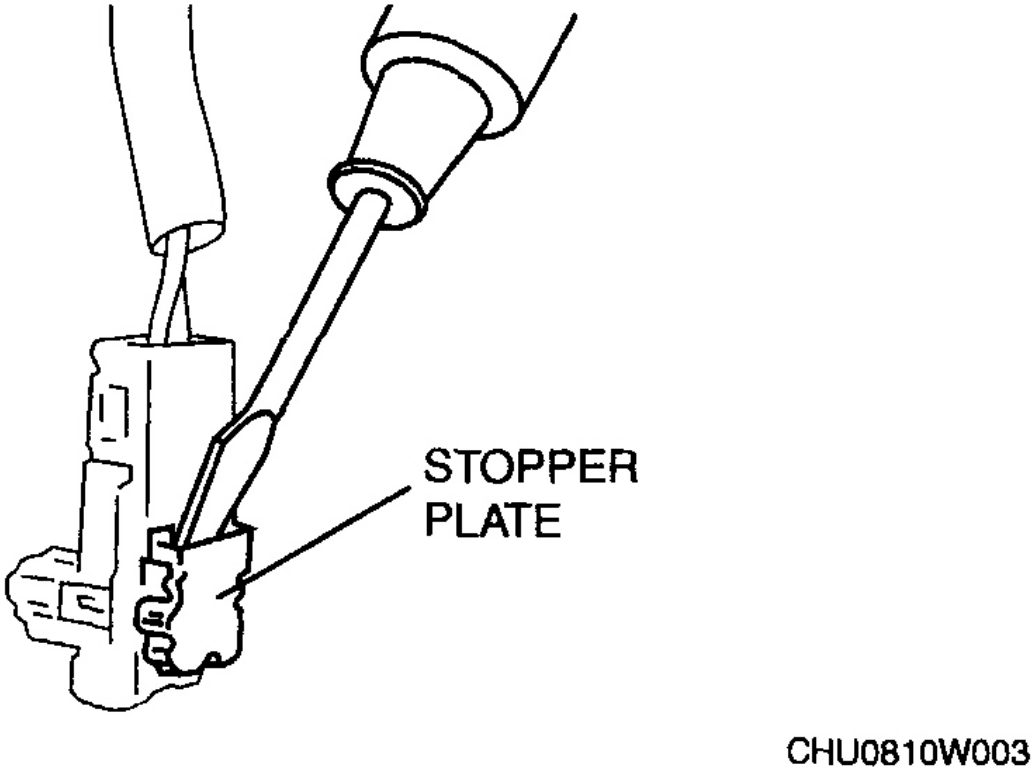


Fig. 11: Prying Out Connector Stopper Plate
Courtesy of MAZDA MOTORS CORP.

2. Disconnect the connector.

PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION

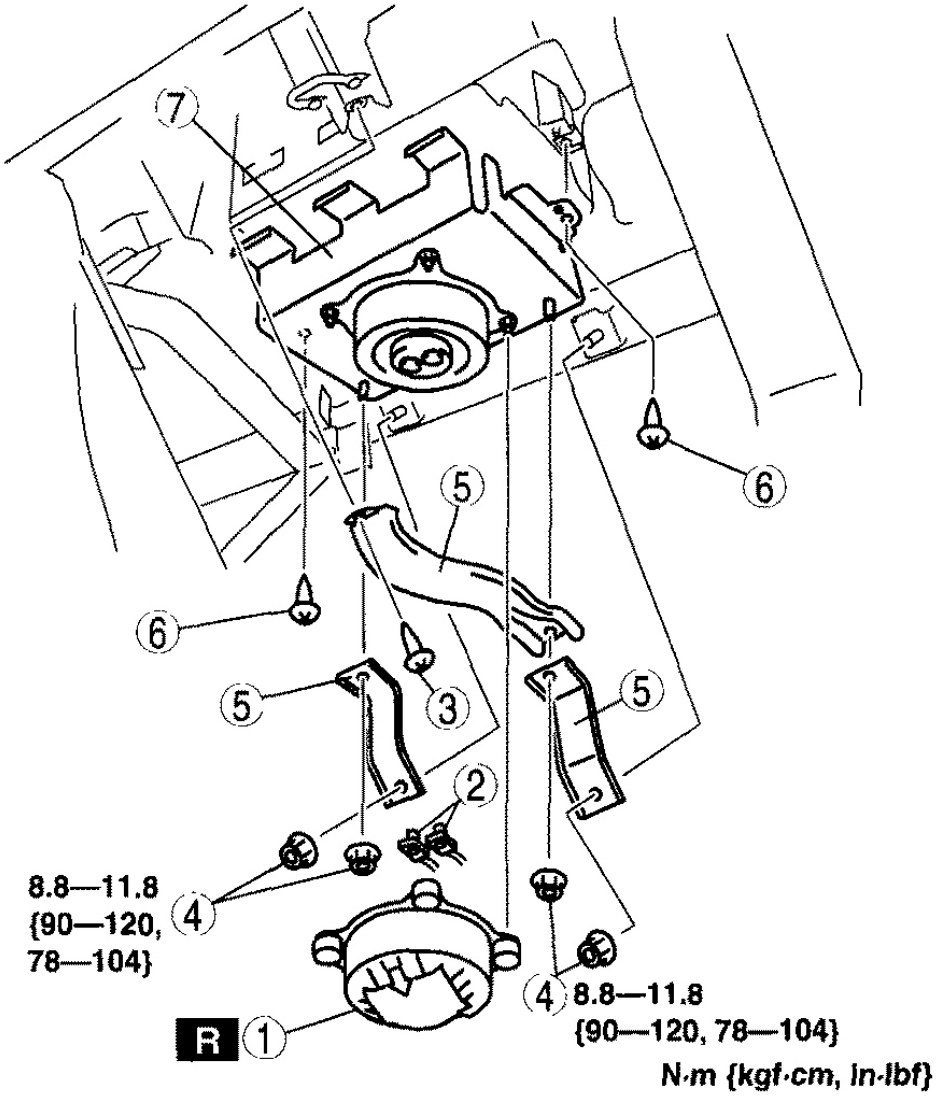
WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read the air bag**

system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)

- **If the passenger-side air bag module is installed with debris in the module, it may be scattered when the air bag module operates (deploys), causing injury. Verify that there is no debris in the passenger-side air bag module before installation.**
- **If a damaged passenger-side air bag module is installed, the vehicle may be damaged or the passenger may be injured when the air bag module operates (deploys). Verify that the passenger-side air bag has no damage before installation.**
- **Due to the adoption of 2-step deployment control in the passenger-side air bag module, depending on the impact force, it is possible that inflator No.2 might not deploy. In such cases, before disposing of the air bag module, make sure to follow the inflator deployment procedures and verify complete deployment of inflators No.1 and 2.**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
5. Remove in the order indicated in **Fig. 12** .



E5U810ZW5109

1	Cap
2	Connector
3	Screw A
4	Nut
5	Bracket
6	Screw B
7	Passenger-side air bag module

Fig. 12: View Of Passenger-Side Air Bag Module & Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.
7. Turn the ignition switch to the ON position.
8. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

PASSENGER-SIDE AIR BAG MODULE REMOVAL NOTE

1. Remove the passenger-side air bag module in the order indicated below.
    1. Disengage the tab locks by sliding the passenger-side air bag module upward.
    2. Slide the passenger-side air bag module rearward.
    3. Remove the passenger-side air bag module by pulling it from the backside and then down.

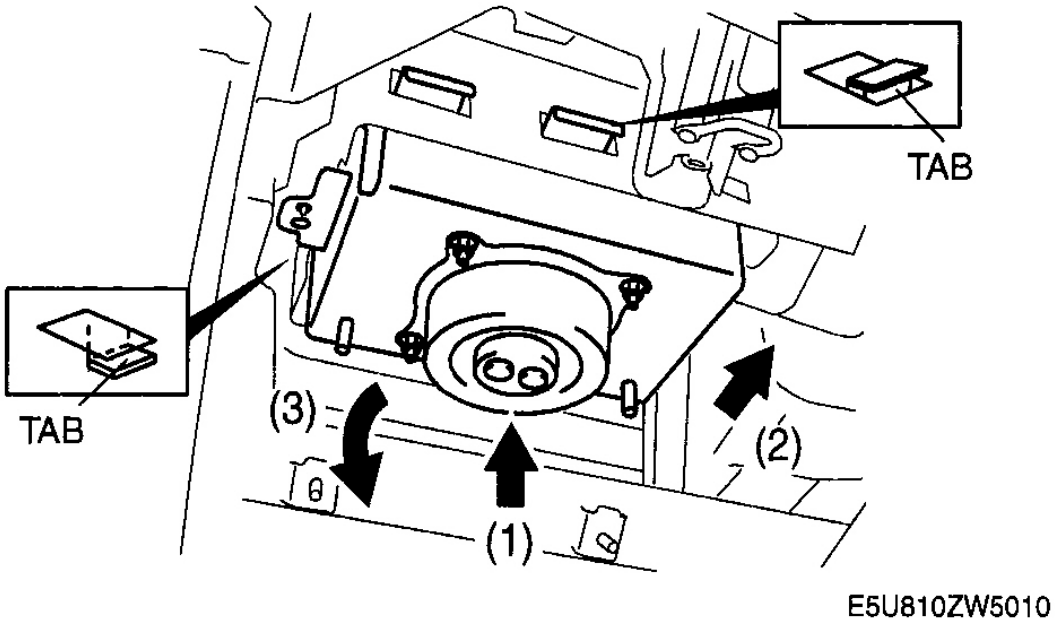


Fig. 13: View Of Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

CONNECTOR REMOVAL NOTE

1. Using a flathead screwdriver, pry out the connector stopper plate.

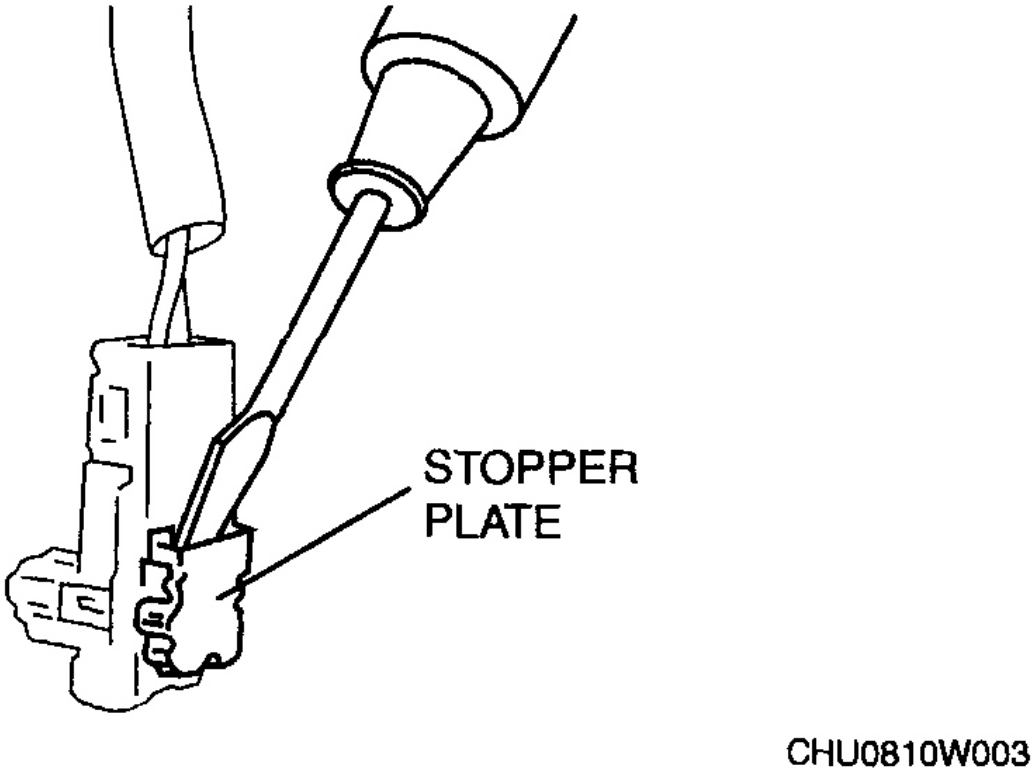


Fig. 14: Prying Out Connector Stopper Plate
Courtesy of MAZDA MOTORS CORP.

2. Disconnect the connector.

CAP INSTALLATION NOTE

1. The cap cannot be reused. Replace the cap with a new one when the cap or the passenger-side air bag module has been removed.

SIDE AIR BAG MODULE REMOVAL/INSTALLATION

WARNING:

- **Handling the air bag module improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**
- **If the side air bag module is installed with debris in the seat back,**

the foreign material may be scattered when the side air bag module operates (deploys), causing injury. Verify that there is no foreign material in the seat back before installing the side air bag module.

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the seat. (See **SEAT REMOVAL/INSTALLATION** .)
5. Detach the tab as shown in **Fig. 15** and remove the connector from the seat connector.

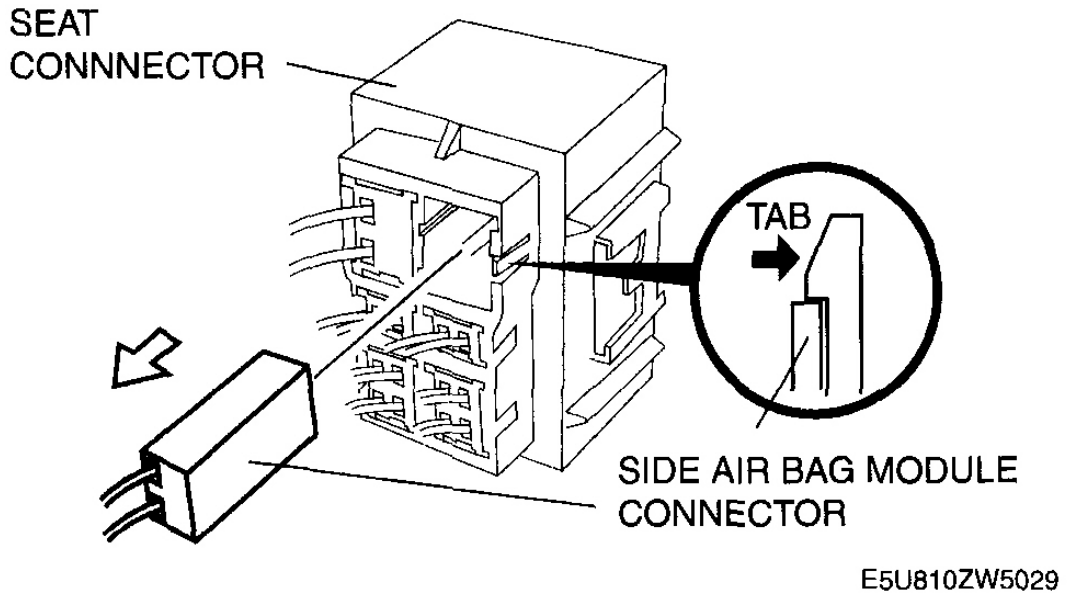
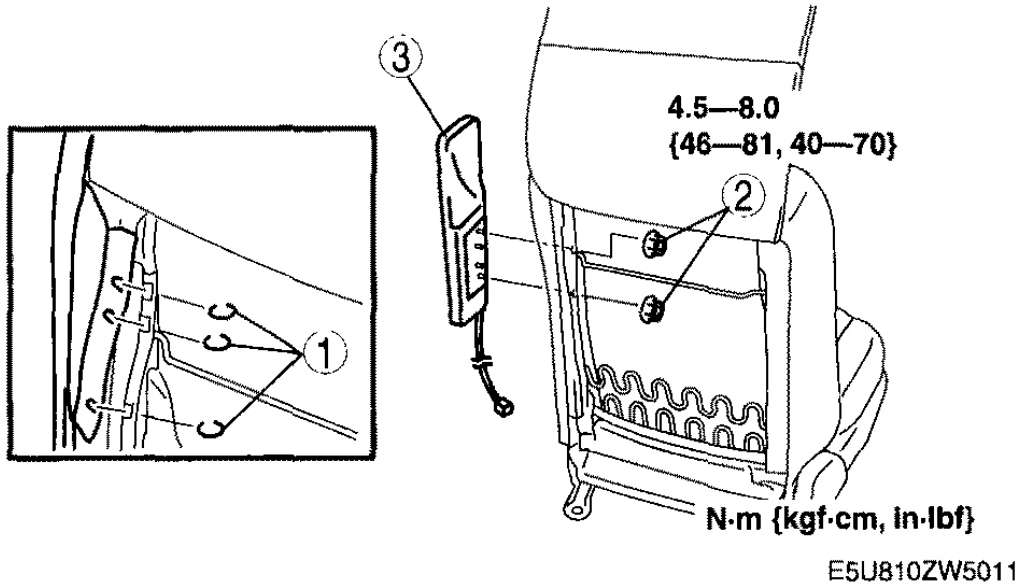


Fig. 15: Detaching Tab
Courtesy of MAZDA MOTORS CORP.

6. Partially peel back the seat back trim.
7. Partially peel back the seat back pad.
8. Remove in the order indicated in **Fig. 16** .



1	Hook
2	Nut
3	Side air bag module

Fig. 16: View Of Side Air Bag Module & Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

9. Install in the reverse order of removal.
10. Turn the ignition switch to the ON position.
11. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

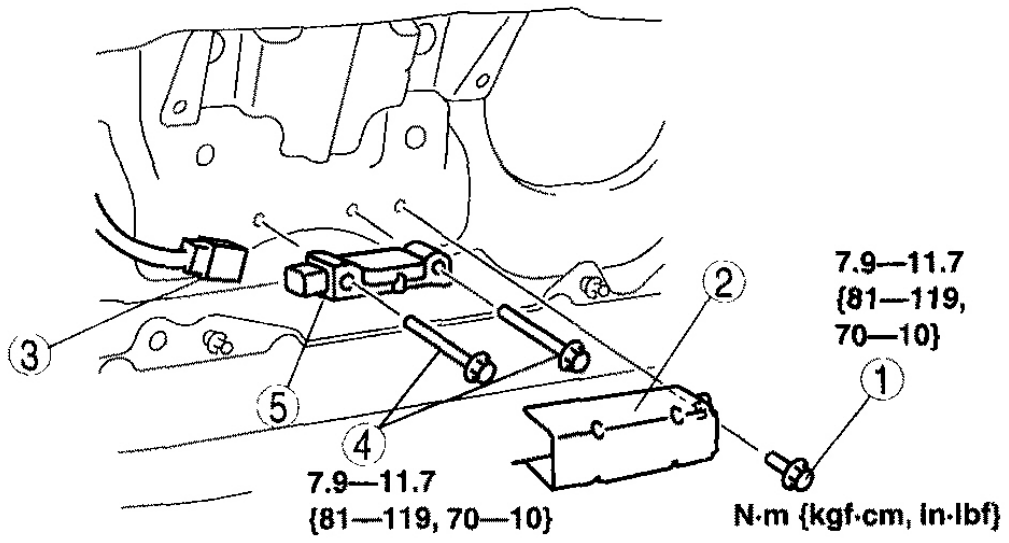
CRASH ZONE SENSOR REMOVAL/INSTALLATION

WARNING:

- **Handling the crash zone sensor improperly can accidentally deploy the air bags and pre-tensioner seat belts, which may seriously injure you. Read the air bag system service warnings and cautions before handling the crash zone sensor. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.

3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
5. Remove the fresh-air duct. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
6. Remove in the order indicated in **Fig. 17** .



1	Bolt A
2	Cover
3	Connector
4	Bolt B
5	Crash zone sensor

Fig. 17: View Of Crash Zone Sensor & Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. Turn the ignition switch to the ON position.
9. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

SAS CONTROL MODULE REMOVAL/INSTALLATION

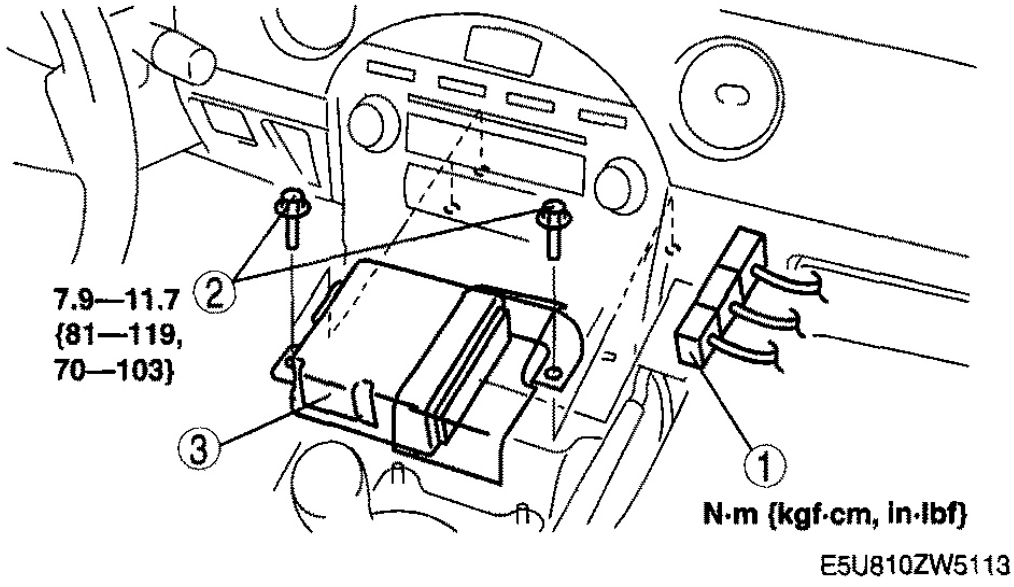
WARNING:

- **Handling the SAS control module improperly can accidentally deploy the air bag modules and pre-tensioner seat belt, which may seriously injure you. Read the air bag system service warnings and cautions before handling the SAS control module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

CAUTION:

- **Handling the SAS control module improperly can accidentally deploy the air bag modules and pre-tensioner seat belt, which may seriously injure you. If configuration is not completed before removing the SAS control module, DTC B2477 will be displayed.**

1. Perform SAS control module configuration when replacing it. (See **SAS CONTROL MODULE CONFIGURATIONS** .)
2. Turn the ignition switch to the LOCK position.
3. Remove the battery cover.
4. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    3. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
6. Remove in the order indicated in **Fig. 18** .



1	Connector
2	Bolt
3	SAS control module

Fig. 18: View Of SAS Control Module Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. Turn the ignition switch to the ON position.
   - If the SAS control module is replaced, turn the ignition switch to the ON position for **20 s or more** after completing the configuration. (See **SAS CONTROL MODULE CONFIGURATION** .)
9. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

SAS CONTROL MODULE CONFIGURATION

1. Connect the M-MDS to the DLC-2 Connector.

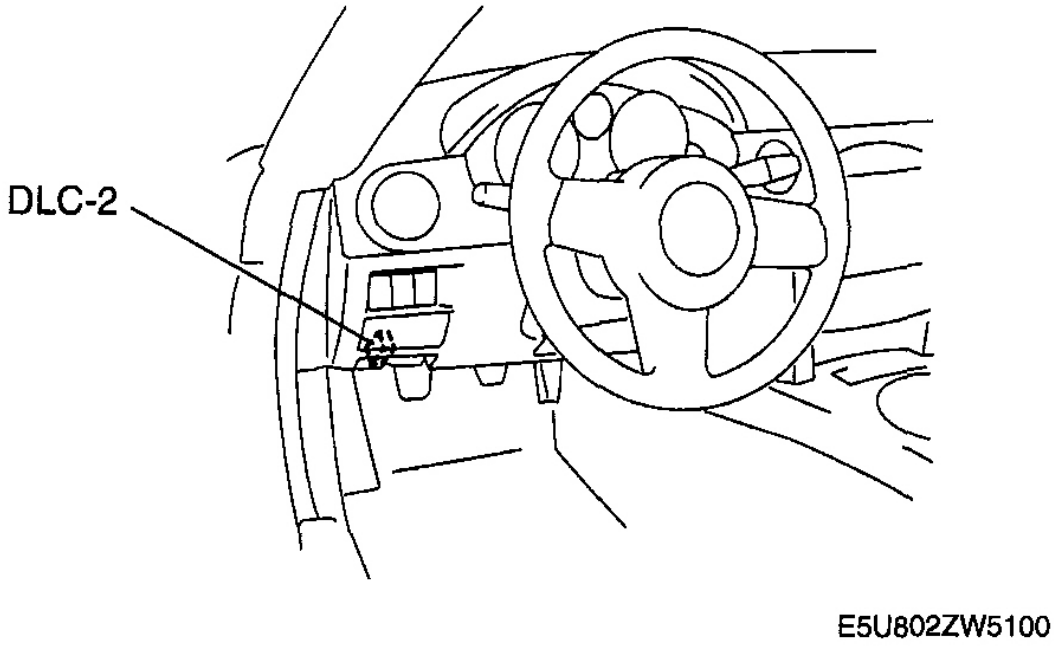


Fig. 19: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (Laptop PC)
        1. Select "Programming".
    - When using the PDS (Pocket PC)
        1. Select "Programming".
        2. Select "Module Programming".
3. Then Select the "Programmable Module Installation" and "RCM" from the screen menu.
4. Perform the configuration according to the directions on the screen.
5. Retrieve DTCs using the M-MDS, then verify if DTCs are present.
    - If a DTC is present, perform the applicable DTC inspection.

SEAT TRACK POSITION SENSOR REMOVAL/INSTALLATION

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the driver's seat. (See **SEAT REMOVAL/INSTALLATION** .)

5. Detach the tab as shown in **Fig. 20** and remove the connector from the seat connector.

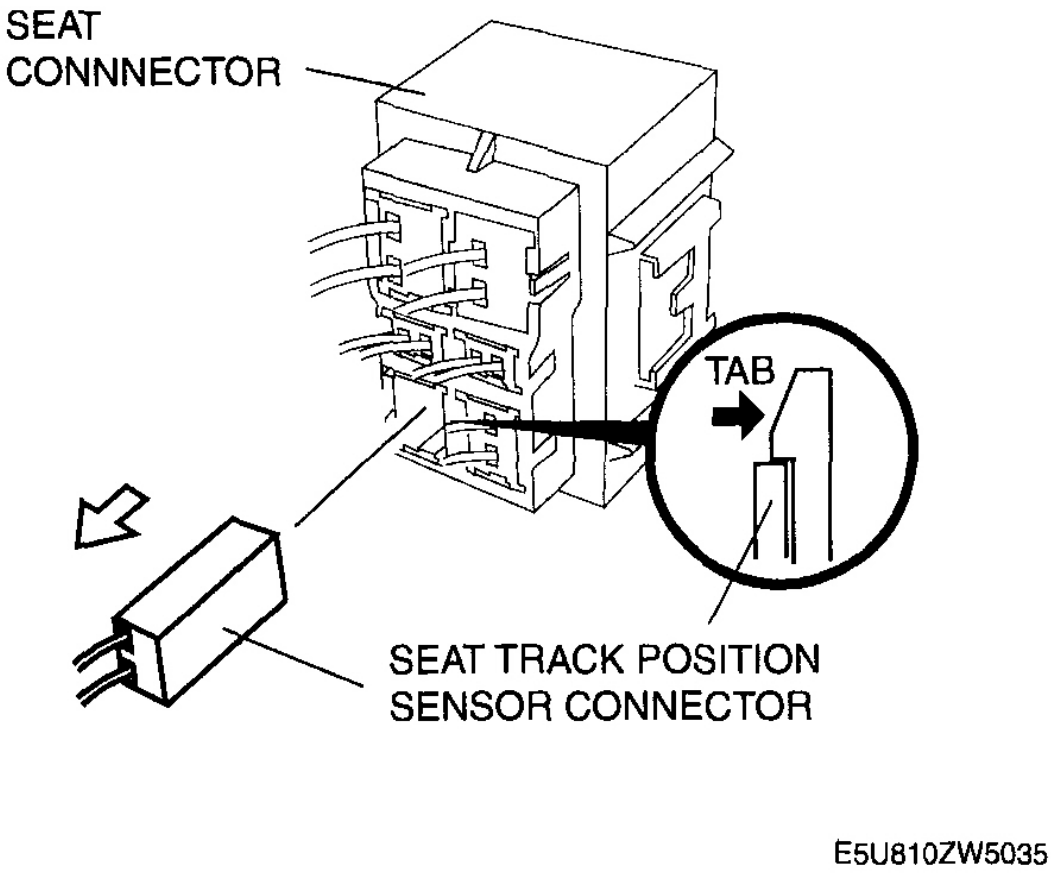
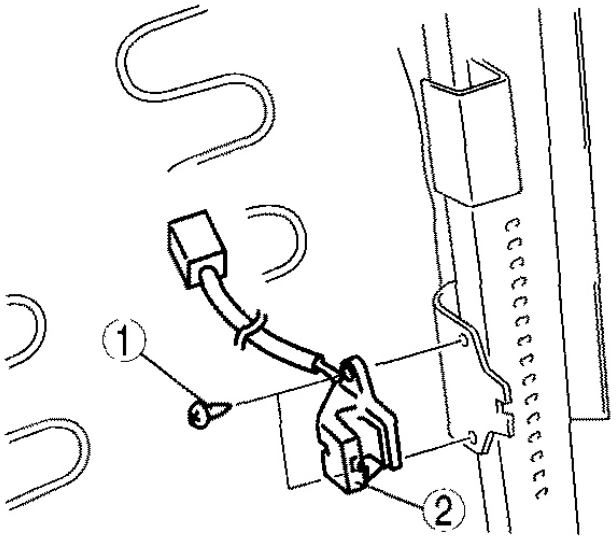


Fig. 20: Detaching Seat Connector Tab & Removing Connector From Seat Connector
Courtesy of MAZDA MOTORS CORP.

6. Remove in the order indicated in **Fig. 21** .



1	Screw
2	Seat track position sensor

Fig. 21: Removing Connector From Seat Connector
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.

SEAT TRACK POSITION SENSOR INSTALLATION NOTE

- Verify that the seat track position sensor is not contacting the metal plate.

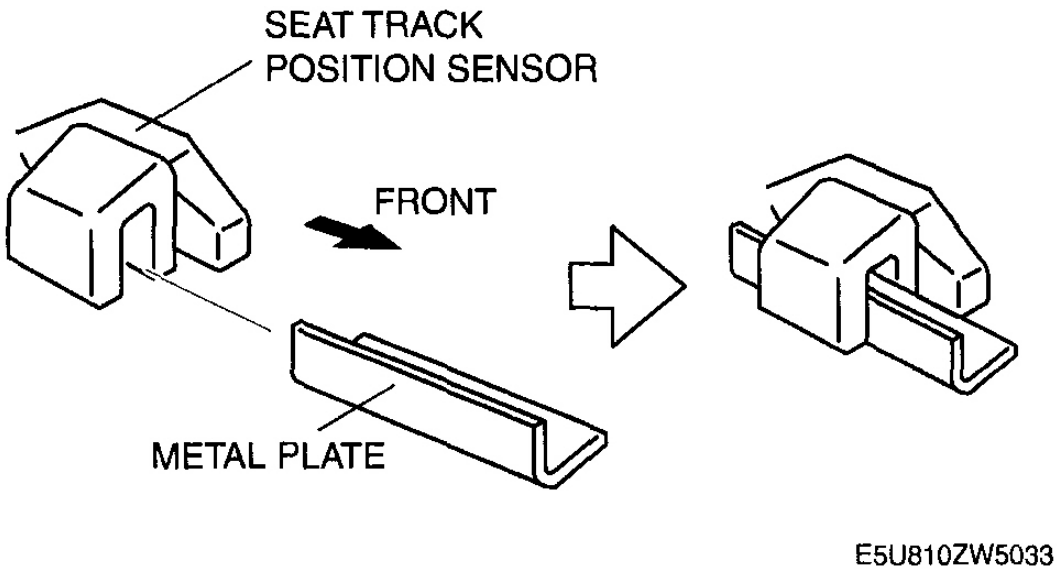
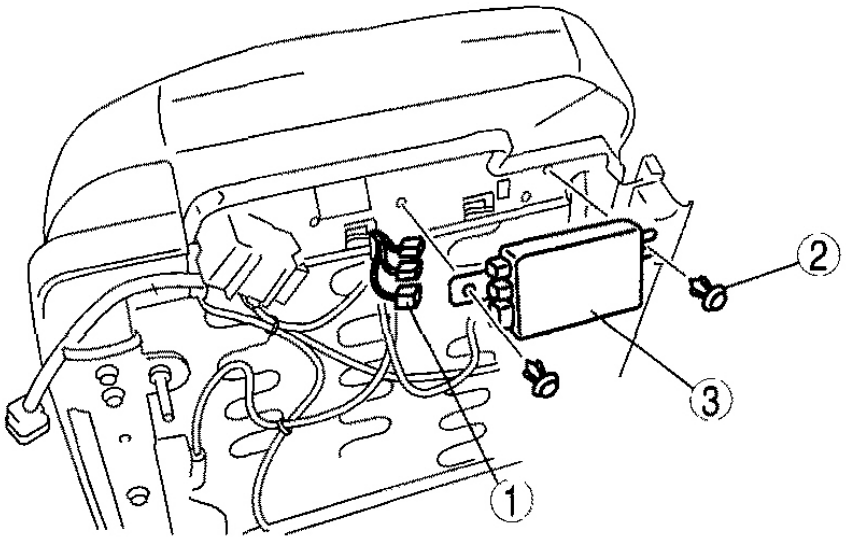


Fig. 22: View Of Seat Track Position Sensor
Courtesy of MAZDA MOTORS CORP.

SEAT WEIGHT SENSOR CONTROL MODULE REMOVAL/INSTALLATION

CAUTION:
- **When the seat weight sensor control module is replaced with a new one, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove in the order indicated in **Fig. 23** .



E5U810ZW5015

1	Connector
2	Fasner
3	Seat weight sensor control module

Fig. 23: View Of Seat Weight Sensor Control Module
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

SEAT WEIGHT SENSOR CALIBRATION

CAUTION:

- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent.**
  - **Replacement with a new seat weight sensor**
  - **Replacement with a new seat weight sensor control module**
  - **Replacement with new passenger-side seat parts**
  - **Disassembly of the passenger-side seat**
- **If any of the following work is performed, perform the seat weight sensor inspection using the WDS or equivalent. (See SEAT WEIGHT SENSOR INSPECTION .)**
  - **Removal of the passenger-side seat**
  - **Loosening and retightening of passenger's seat fixing bolts**

- **Or, the vehicle is involved in a collision**

1. Have two **20 kg {44 lb}** weights ready to use.
2. Connect the WDS or equivalent to the DLC-2 (16-pin).

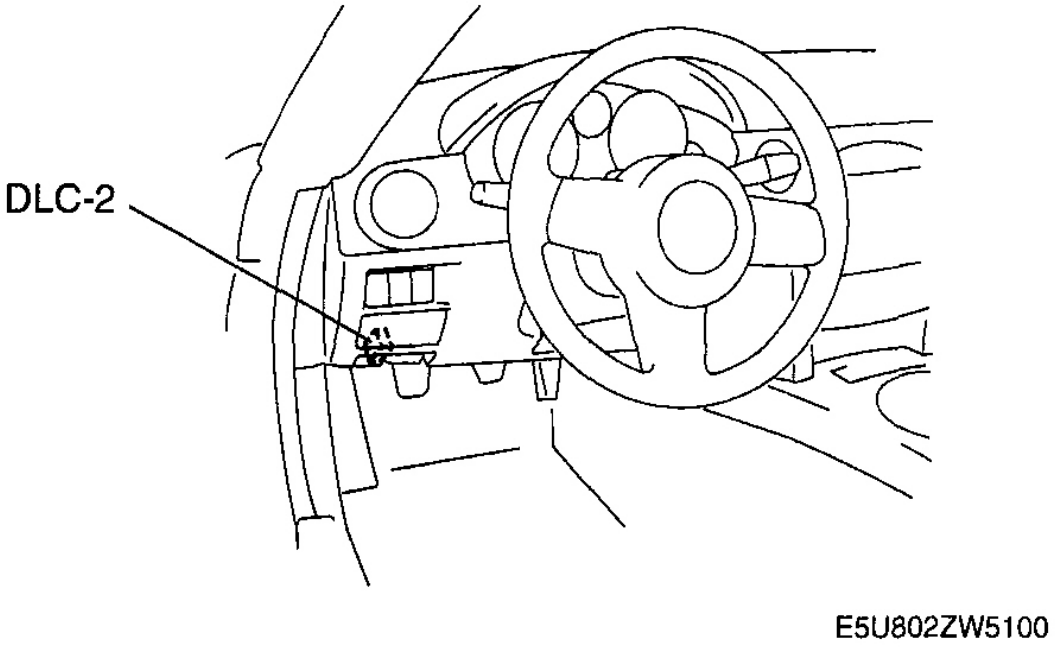


Fig. 24: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

3. Select "Body" from the menu.
4. Select "Restraints".
5. Select "Seat Weight Sensor ReZero Procedure".
6. Perform calibration following the procedures on the WDS or equivalent screen.

NOTE:

- **When "Lightly pat the passenger seat cushion" is displayed on the WDS or equivalent screen, lightly pat horizontally approx. five times on the headrest or upper side of the seat back trim of the passenger-side front seat.**

SEAT WEIGHT SENSOR INSPECTION

CAUTION:

- **If any of the following work is performed, perform the seat weight**

sensor inspection using the WDS or equivalent.

- **Removal of the passenger-side seat**
- **Loosening and retightening of passenger's seat fixing bolts**
- **Or, the vehicle is involved in a collision**

- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**
  - **Replacement with a new seat weight sensor**
  - **Replacement with a new seat weight sensor control module**
  - **Replacement with new passenger-side seat parts**
  - **Disassembly of the passenger-side seat**

1. Connect the WDS or equivalent to the DLC-2 (16-pin).

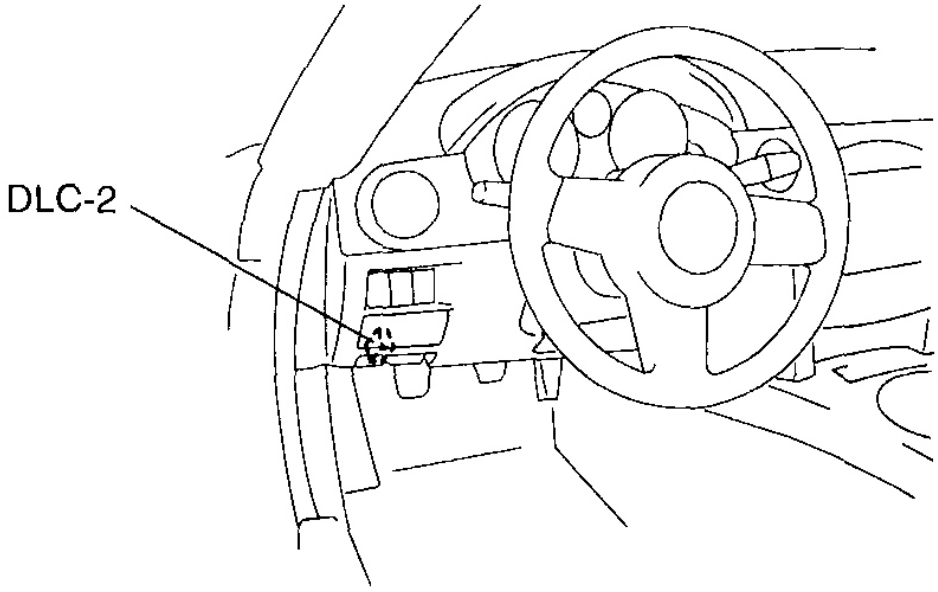


Fig. 25: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

2. Select "Body" from the menu.
3. Select "Restraints".
4. Select "Seat Weight Sensor ReZero Procedure".
5. Perform inspection following the procedures on the WDS or equivalent screen.

PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
4. Disconnect the connector.
5. Remove the PAD switch.

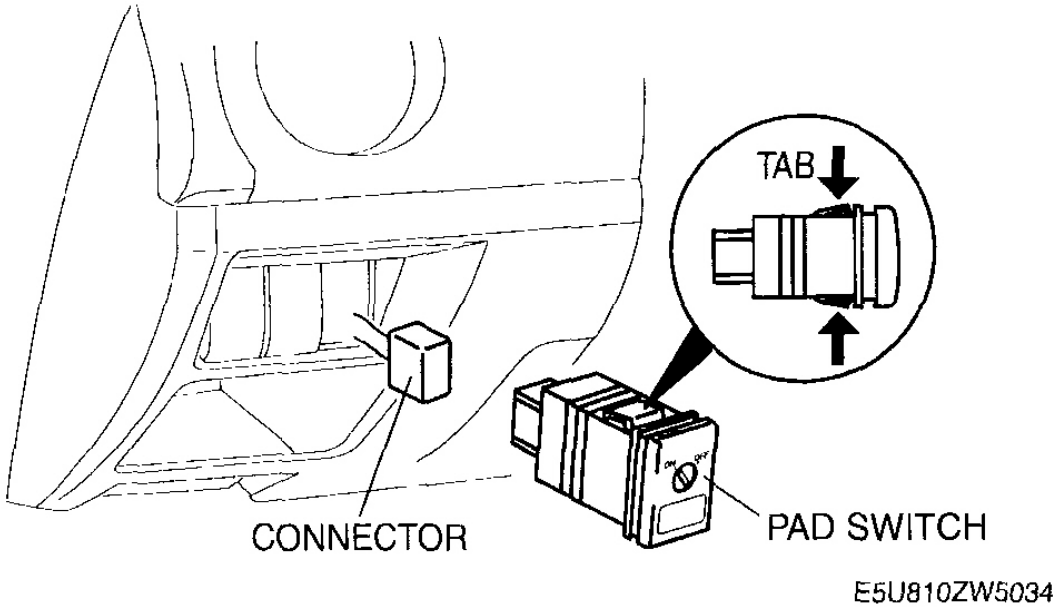


Fig. 26: View Of Passenger Air Bag Deactivation (PAD) Switch
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.
7. Turn the ignition switch to the ON position.
8. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH INSPECTION

1. Remove the PAD switch. (See **PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH REMOVAL/INSTALLATION** .)

2. Verify that the continuity between the PAD switch terminals is as indicated in **Fig. 27** .
   - If not as indicated in **Fig. 27** , replace the PAD switch.

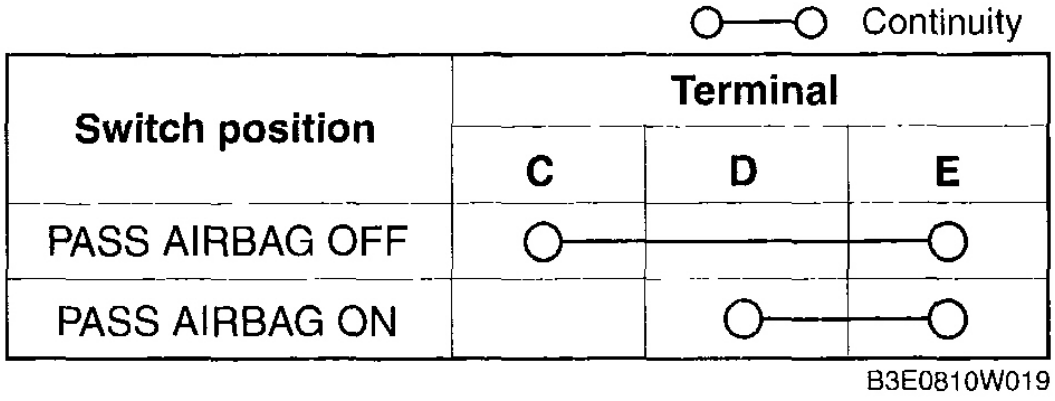


Fig. 27: PAD Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

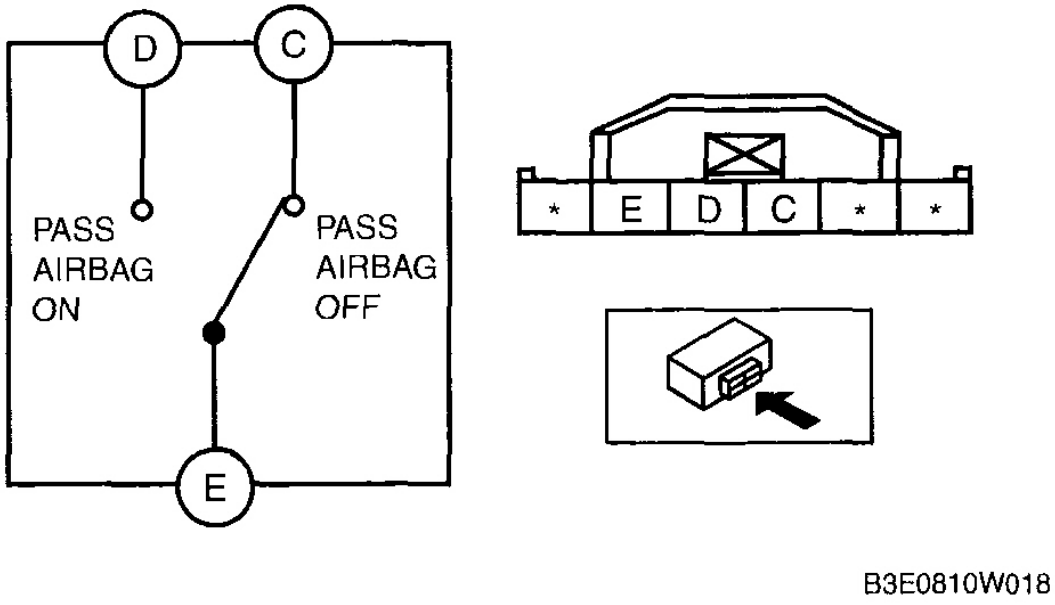


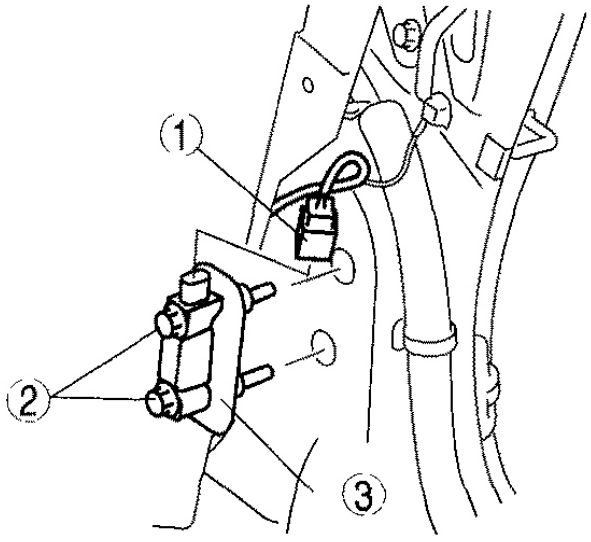
Fig. 28: Inspecting Passenger Air Bag Deactivation (PAD) Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

SIDE AIR BAG SENSOR REMOVAL/INSTALLATION

WARNING:

- **Handling the side air bag sensor improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the side air bag sensor. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
5. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
6. Remove the tire house trim. (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
7. Remove in the order indicated in **Fig. 29** .



E5U810ZW5016

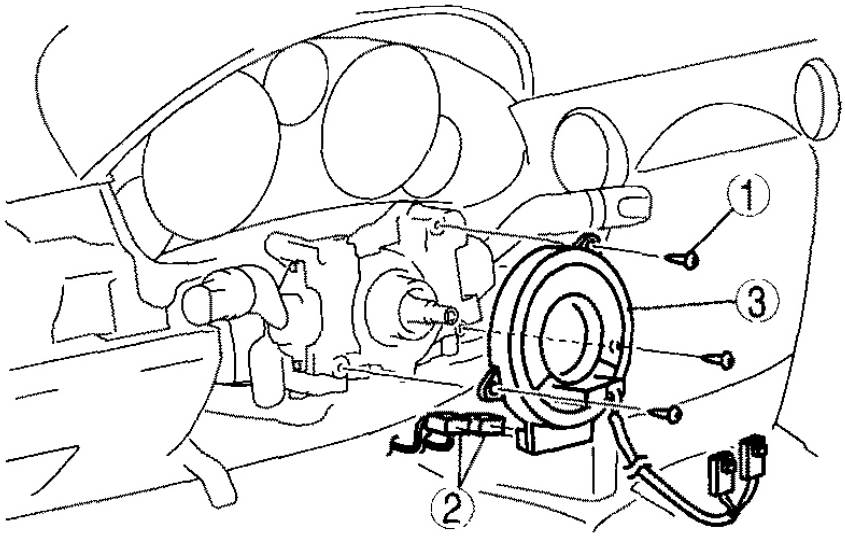
1	Connector
2	Bolt
3	Side air bag sensor

Fig. 29: View Of Side Air Bag Sensor & Components
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Turn the ignition switch to the ON position and hold for **5 s or more** .
10. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CLOCK SPRING REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
    2. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
    3. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 30** .



E5U810ZW5017

1	Screw
2	Connector
3	Clock spring

Fig. 30: View Of Clock Spring Components

Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. Turn the ignition switch to the ON position.
7. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CLOCK SPRING INSTALLATION NOTE

CAUTION:
- **If the clock spring is not adjusted, the spring wire in the clock spring could over-wind and break when the steering wheel is turned. Always adjust the clock spring after installing it.**

1. Adjust the clock spring after installing it. (See **CLOCK SPRING ADJUSTMENT** .)

CLOCK SPRING ADJUSTMENT

NOTE:
- **The adjustment procedure is also specified on the caution label of the clock spring.**

1. Set the front tires straight-ahead.

CAUTION:
- **The clock spring will break if over-wound. Do not forcibly turn the clock spring.**

2. Turn the clock spring clockwise until it stops.

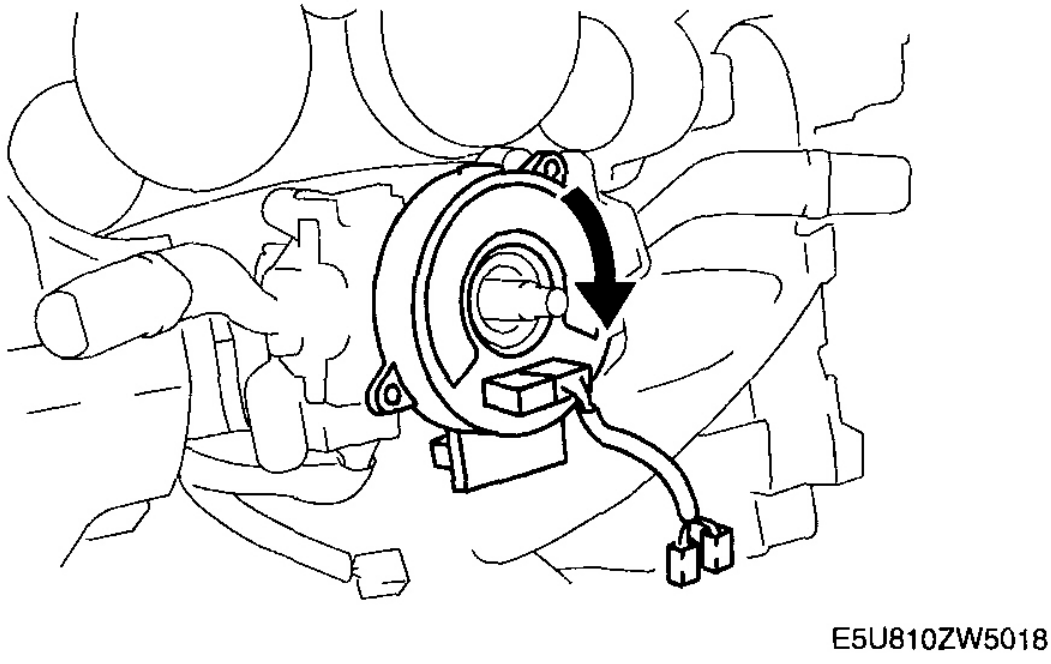


Fig. 31: Turning Clock Spring Clockwise
Courtesy of MAZDA MOTORS CORP.

3. From the stopped position, turn the clock spring counterclockwise **2 3/4 turns** .

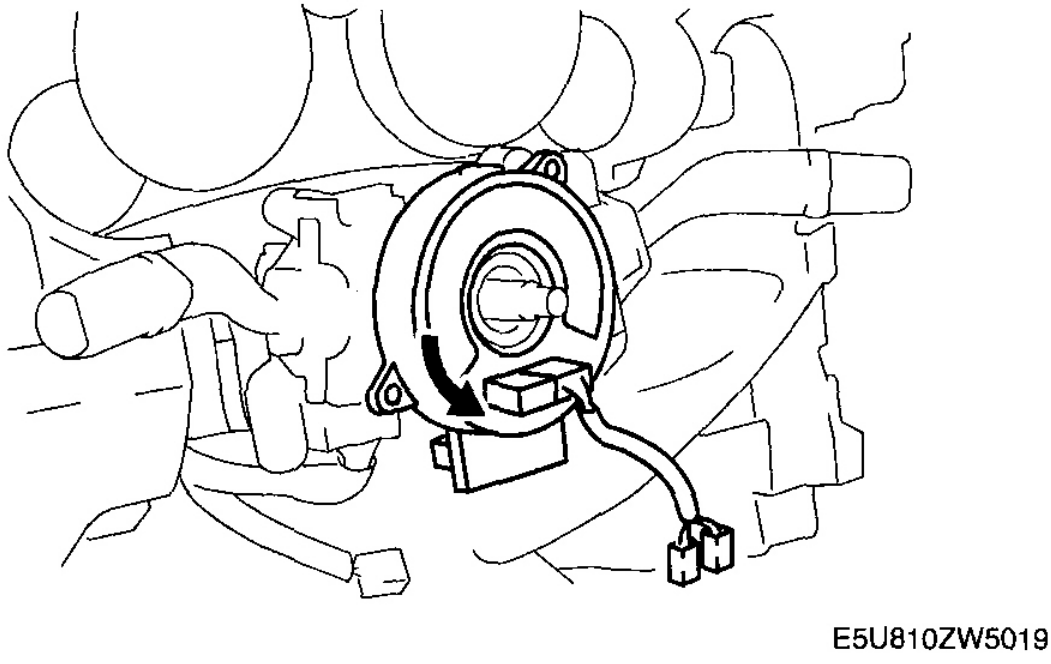


Fig. 32: Turning Clock Spring Counterclockwise 2 3/4 Turns
Courtesy of MAZDA MOTORS CORP.

4. Align the mark on the clock spring with the mark on the outer housing.

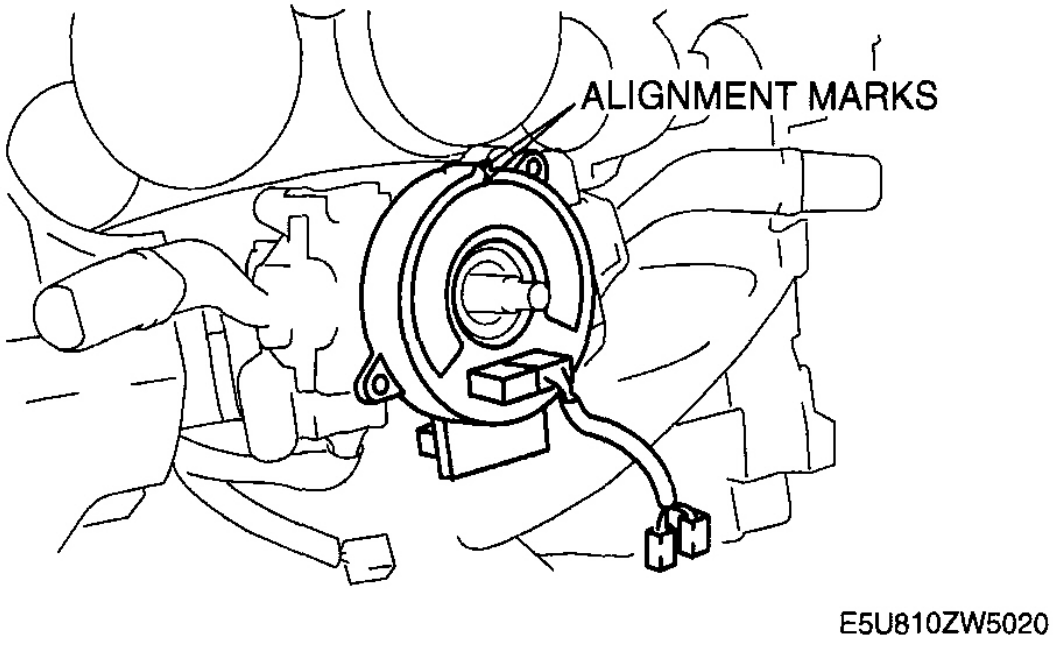


Fig. 33: Aligning Mark On Clock Spring With Mark On Outer Housing
Courtesy of MAZDA MOTORS CORP.

CLOCK SPRING INSPECTION

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Remove the steering wheel. (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
3. Remove the clock spring. (See **CLOCK SPRING REMOVAL/INSTALLATION** .)
4. Verify that the continuity is as indicated in **Fig. 34** .
   - If not as indicated in **Fig. 34** , replace the clock spring.

NOTE:

- **When the vehicle-side connector for the clock spring is disconnected, terminals 1A, 1B, 1C and 1D are shorted to prevent unexpected operation (deployment) of the air bag module.**

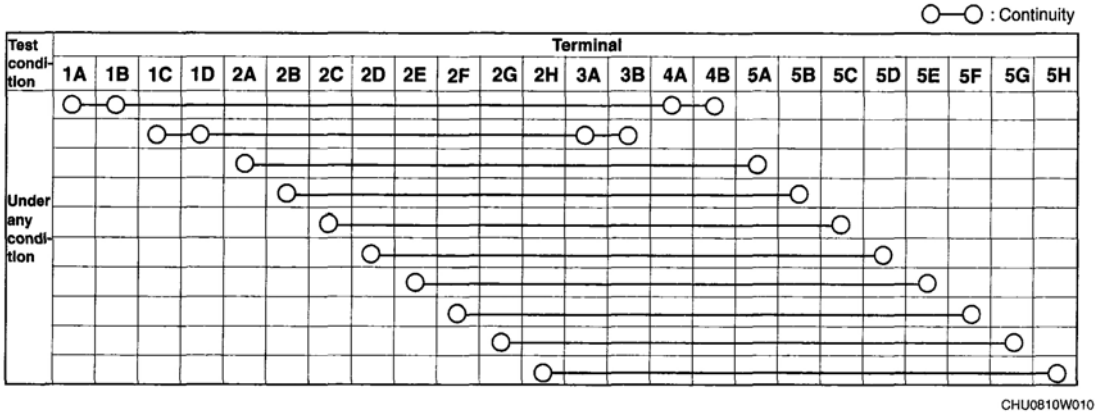


Fig. 34: Clock Spring Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

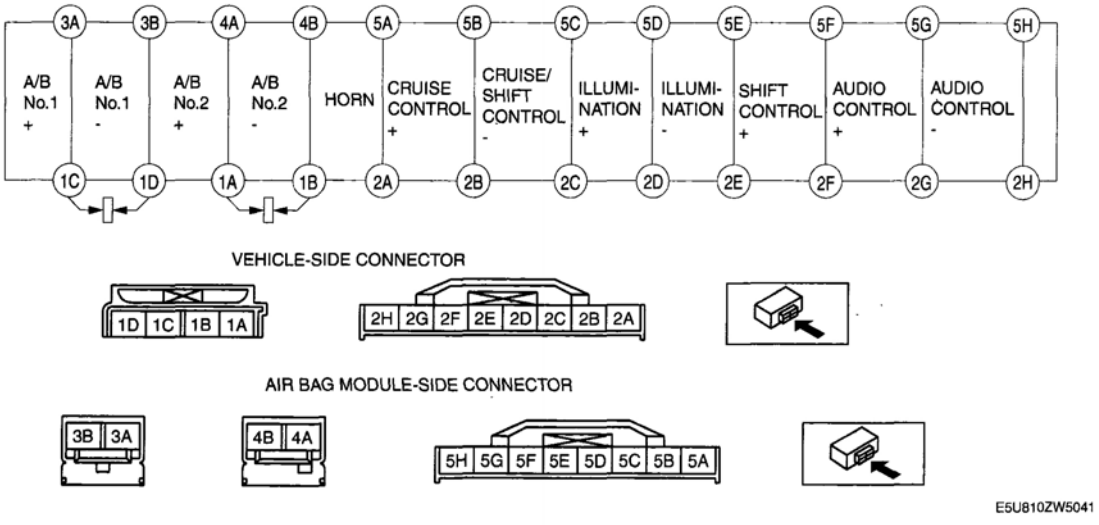


Fig. 35: Identifying Clock Spring Connector Terminals
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DEPLOYMENT PROCEDURES

WARNING:

- **A live (undeployed) air bag module or pre-tensioner seat belt may accidentally operate (deploy) when it is disposed of and cause serious injury. Do not dispose of a live (undeployed) air bag module and pre-tensioner seat belt. If the SSTs (Deployment tool and Adapter harness) are not available, consult the nearest Mazda representative for assistance.**

CAUTION:

- **Deploying the air bag modules and pre-tensioner seat belts inside the vehicle may cause damage to the vehicle interior. When the vehicle is not to be scrapped, always deploy the air bag modules and pre-tensioner seat belts outside the vehicle.**

- If the vehicle is to be scrapped, or when disposing of any air bag modules or pre-tensioner seat belts, operate (deploy) them inside the vehicle by following the deployment procedure below and using the **SST** (Deployment tool).
- When disposing of an operated (deployed) air bag module and pre-tensioner seat belt, refer to **AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DISPOSAL PROCEDURES** .

DEPLOYMENT PROCEDURE FOR INSIDE OF VEHICLE

1. Inspect the **SST** (Deployment tool). (See **INSPECTION OF SST (DEPLOYMENT TOOL)** .)
2. Move the vehicle to an open space, away from strong winds, and close all of the vehicle doors and windows.
3. Turn the ignition switch to the LOCK position.
4. Remove the battery cover.
5. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
6. Follow the procedure below for operating (deploying) the applicable air bag module or pre-tensioner seat belt.

DRIVER-SIDE AIR BAG MODULE

WARNING:

- **The driver-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both driver-side air bag module inflators simultaneously, following the procedure below.**

NOTE:

- **The SSTs , two types of adapter harnesses (for inflators No.1 and No.2) and two deployment tools are to be used to operate (deploy) the driver-side air bag module.**

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the driver-side air bag module as shown in **Fig. 36** .
3. Install the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)

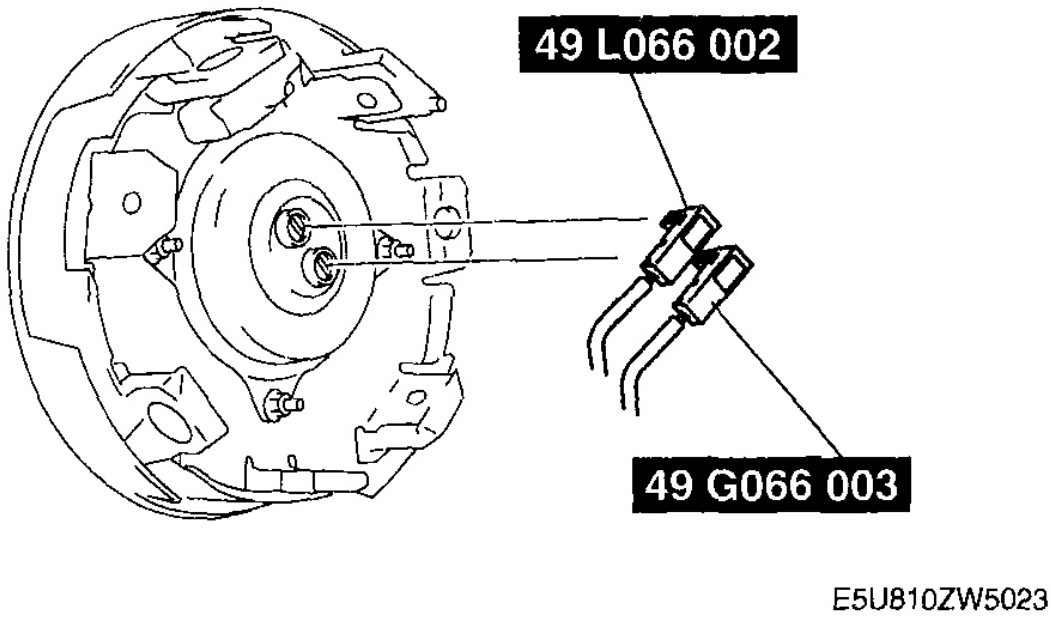


Fig. 36: Connecting SSTs (Adapter Harness) To Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

4. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).

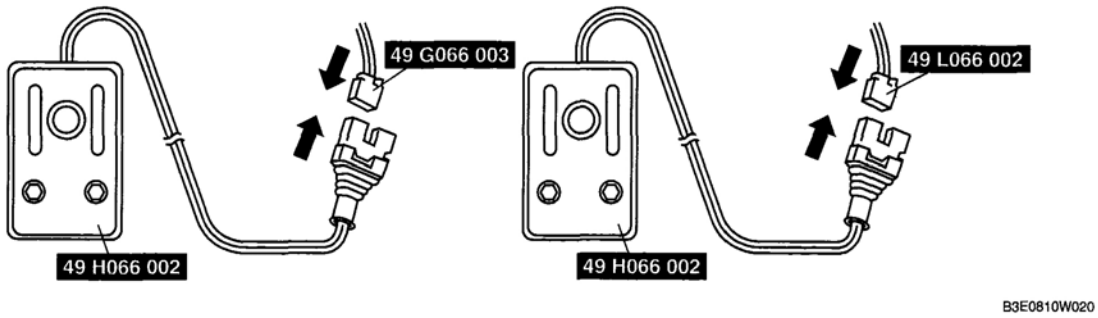


Fig. 37: Connecting SSTs (Deployment tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

5. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.
8. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow

connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

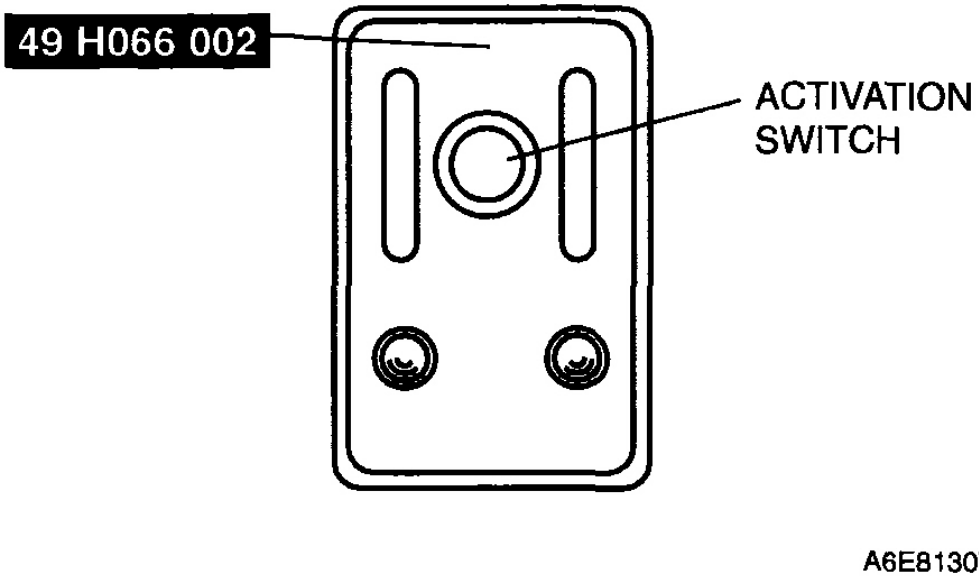


Fig. 38: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can get burned. Do not touch the air bag module for at least 15 min after deployment.**

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

PASSENGER-SIDE AIR BAG MODULE

WARNING:

- **The passenger-side air bag module is a dual inflator type. If one**

inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both passenger-side air bag module inflators simultaneously, following the procedure below.

NOTE:

- **The SSTs , two types of adapter harnesses (for inflators No.1 and No.2) and two deployment tools are to be used to operate (deploy) the passenger-side air bag module.**

1. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
2. Disconnect the passenger-side air bag module connector.
3. Connect the **SSTs** (Adapter harness) to the passenger-side air bag module as shown in **Fig. 39** .
4. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).

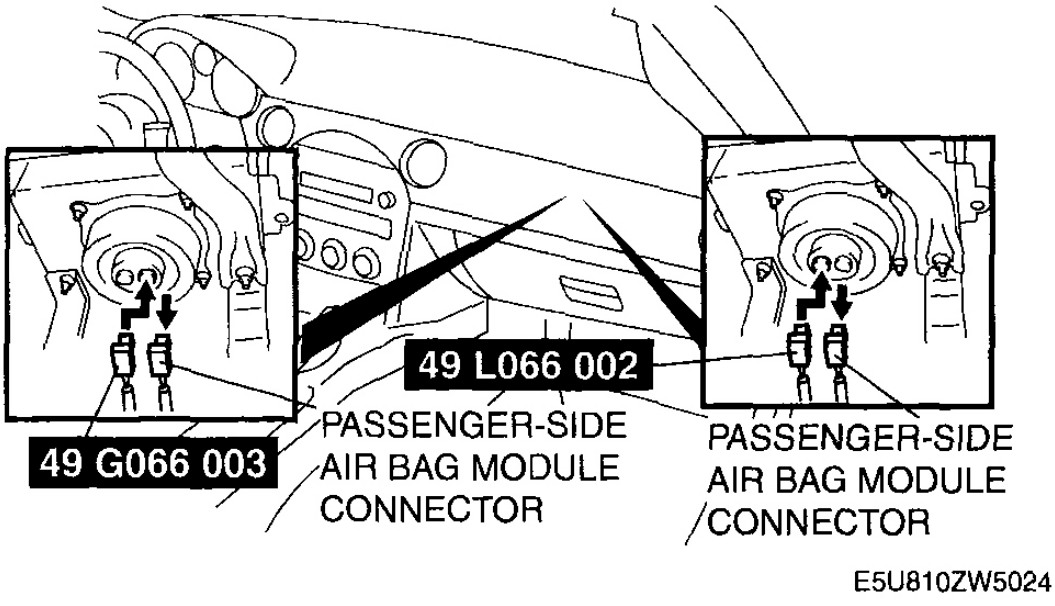


Fig. 39: Connecting SSTs (Adapter Harness) To Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

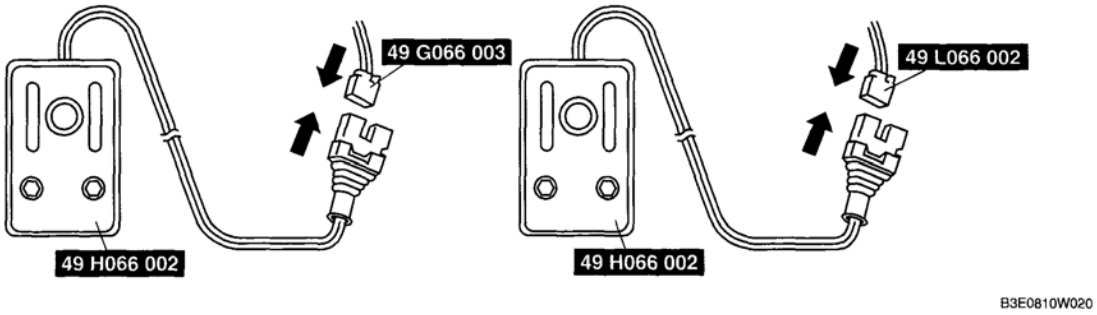


Fig. 40: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

5. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.
8. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

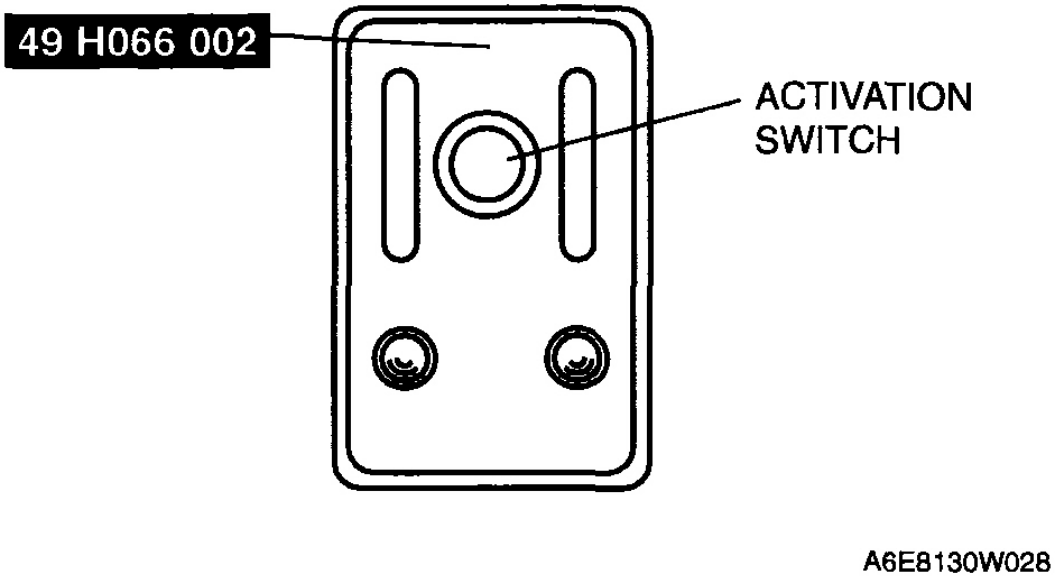


Fig. 41: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

SIDE AIR BAG MODULE

1. Disconnect the seat connector.
2. Connect the **SST** (Adapter harness) to the side air bag module as shown in **Fig. 42** .

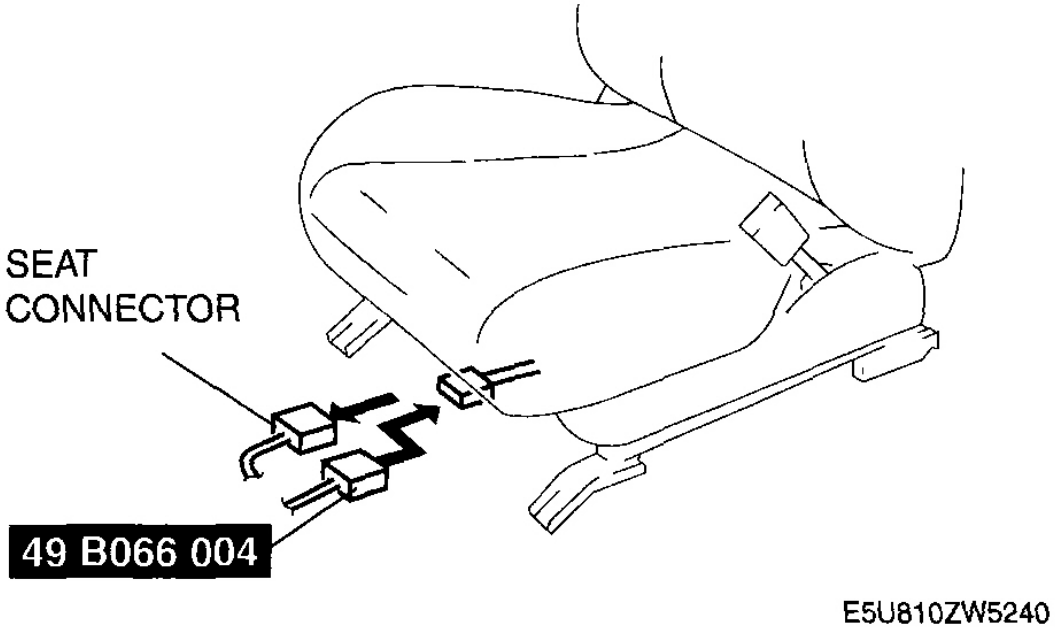


Fig. 42: Connecting SST (Adapter Harness) To Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
4. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
5. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
6. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

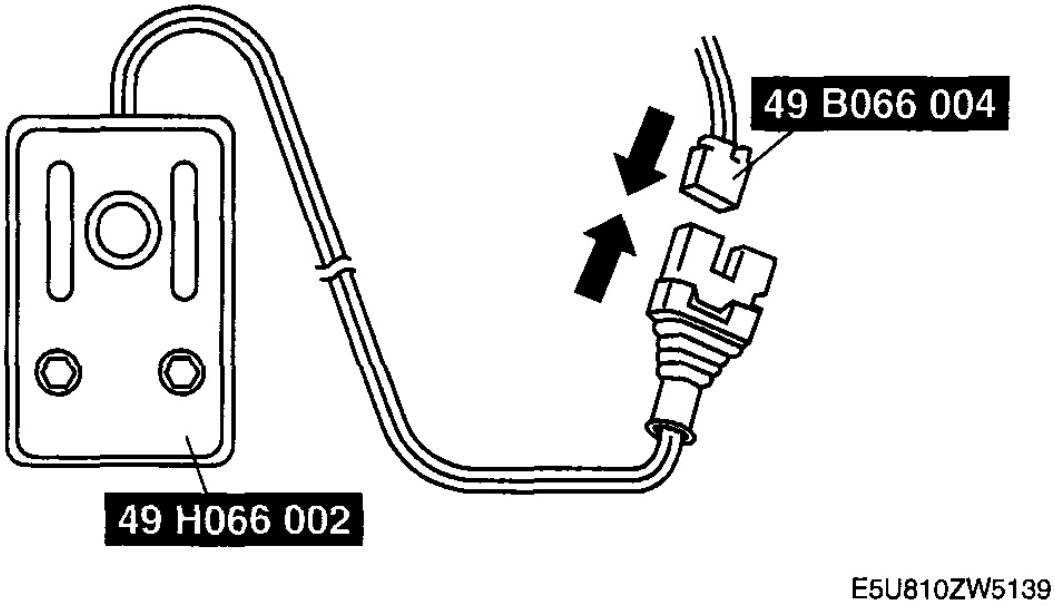


Fig. 43: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

7. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the side air bag module.
8. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

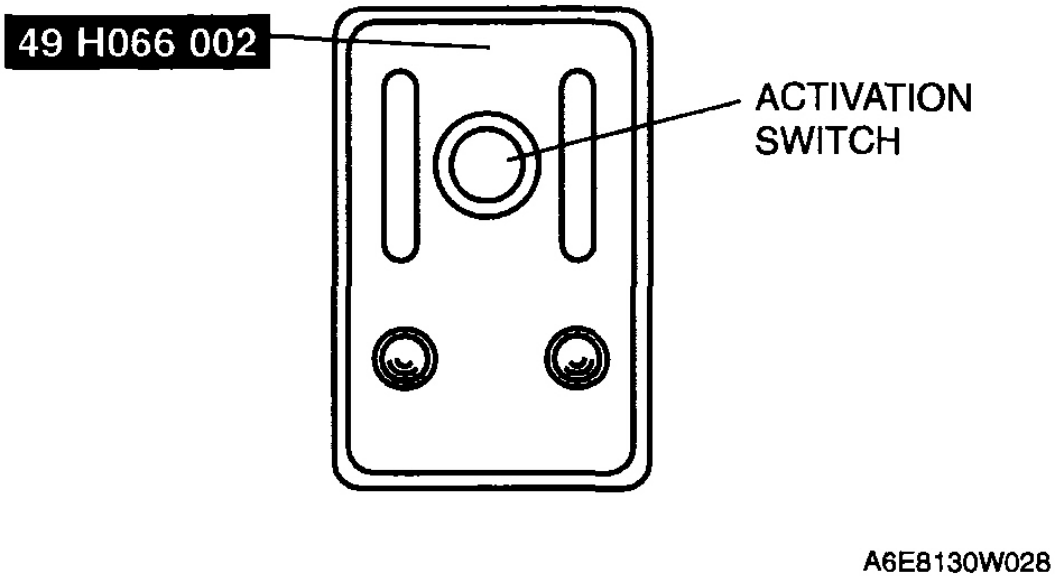


Fig. 44: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

PRE-TENSIONER SEAT BELT

1. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
2. Remove the pre-tensioner seat belt and connect the **SST** (Adapter harness) as shown in **Fig. 45** . (See **SEAT BELT REMOVAL/INSTALLATION** .)

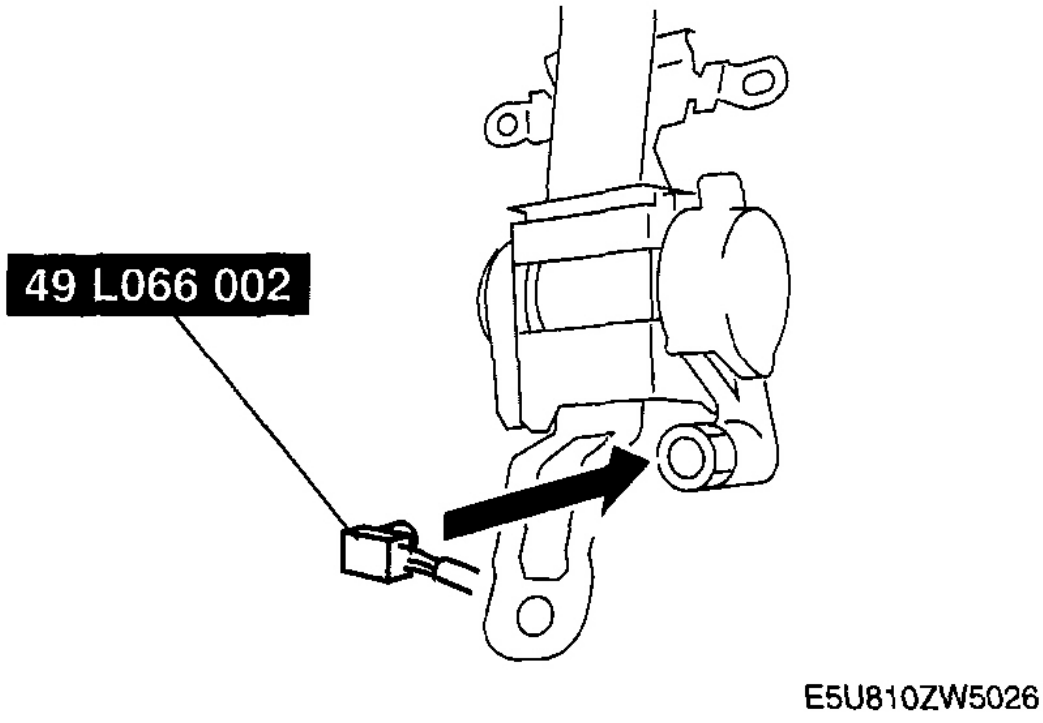


Fig. 45: View Of Pre-Tensioner Seat Belt & SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

3. Install the pre-tensioner seat belt.
4. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
5. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

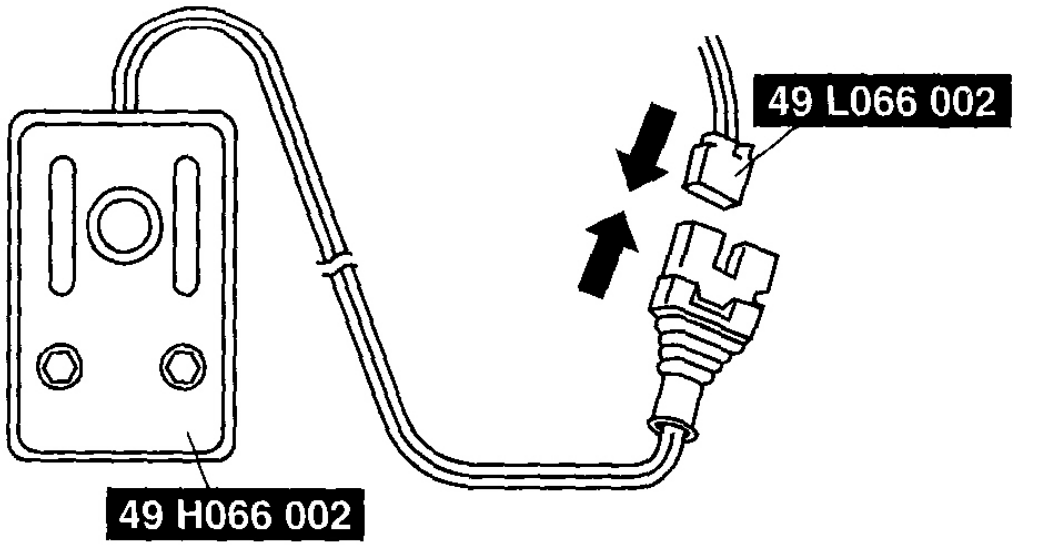


Fig. 46: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

8. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the pre-tensioner seat belt.

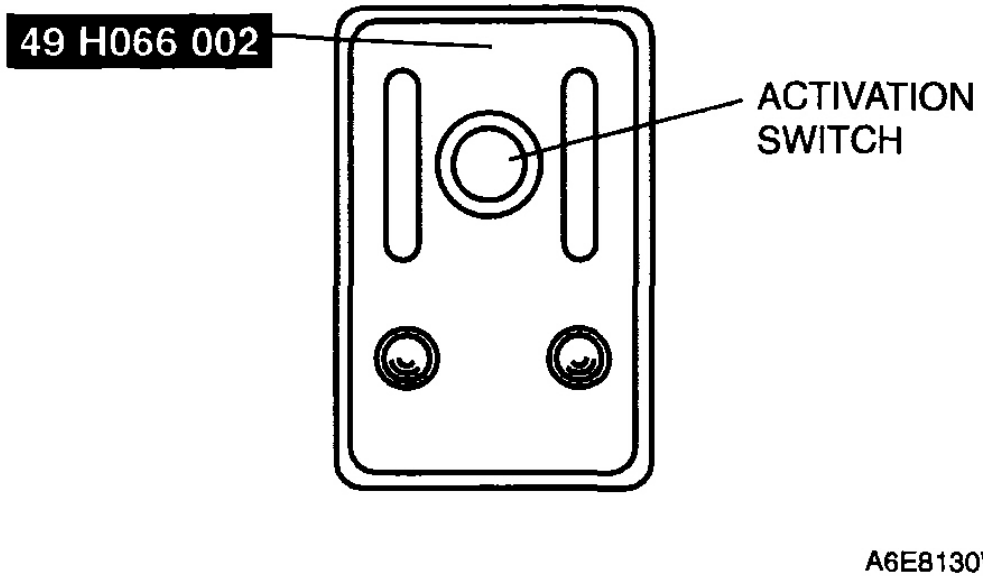


Fig. 47: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

DEPLOYMENT PROCEDURE FOR OUTSIDE OF VEHICLE

1. Inspect the **SST** (Deployment tool). (See **INSPECTION OF SST (DEPLOYMENT TOOL)** .)
2. Turn the ignition switch to the LOCK position.
3. Remove the battery cover.
4. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Follow the procedure below for operating (deploying) the applicable air bag module or pre-tensioner seat belt.

DRIVER-SIDE AIR BAG MODULE

WARNING:

- **The driver-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both driver-side air bag module inflators simultaneously, following the procedure below.**

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the driver-side air bag module as shown in **Fig. 48** .

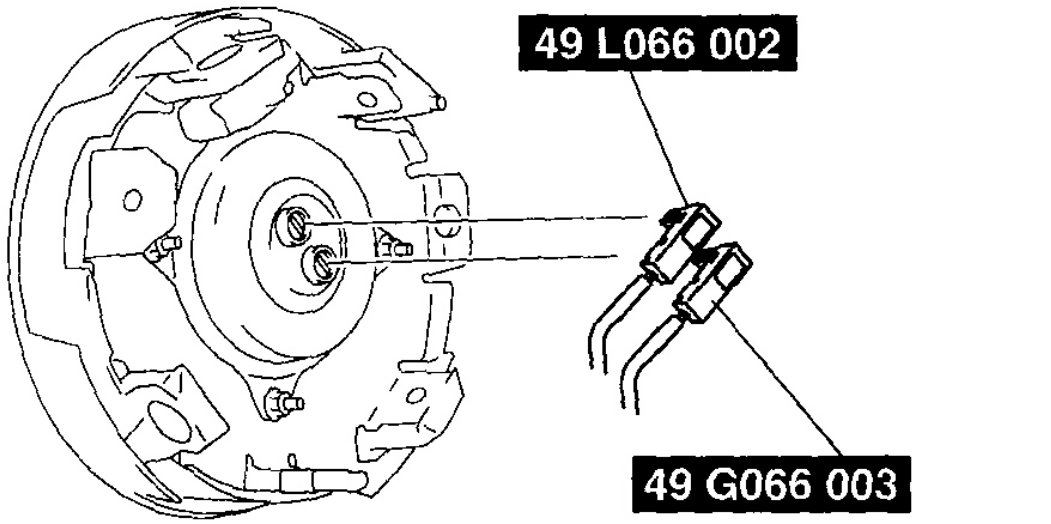


Fig. 48: Connecting SSTs (Adapter Harness) To Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Place the driver-side air bag module on the center of the tire wheel with the padded surface facing up. To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the wheel and the bolt installation holes of the air bag module **at least 4 times** .

WARNING:

- **If the air bag module is not properly installed to the tire wheel, serious injury may occur when the module is operated (deployed). When installing the air bag module to the tire wheel, make sure the padded surface is facing up.**

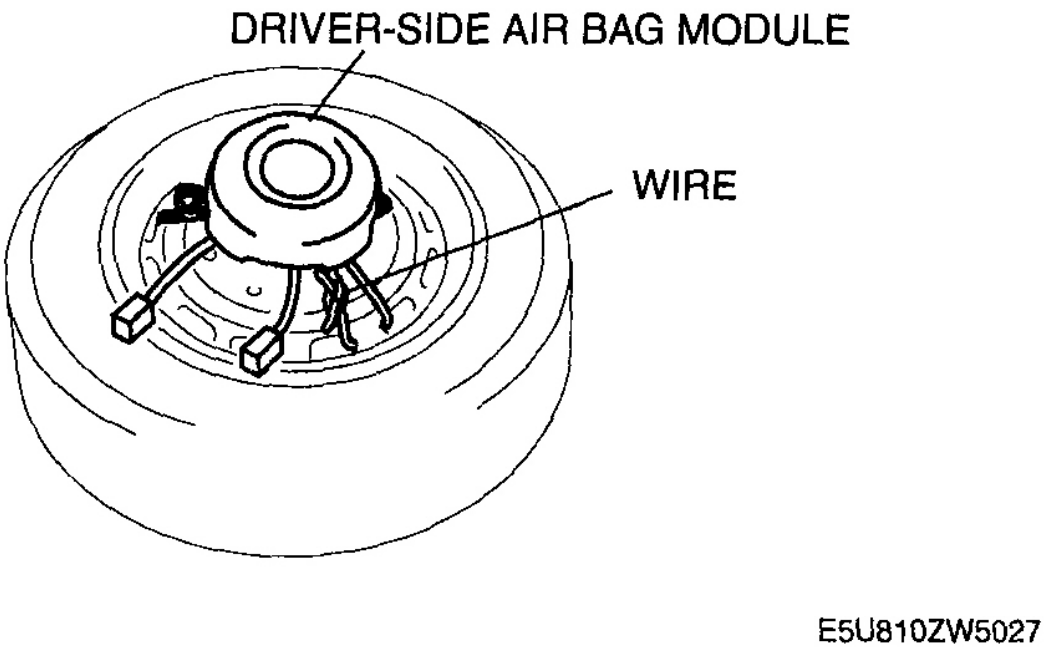


Fig. 49: Placing Driver-Side Air Bag Module On Center Of Tire Wheel
Courtesy of MAZDA MOTORS CORP.

4. Stack three tires without wheels on top of the tire with the driver-side air bag module, and then stack another tire with a wheel on the very top.

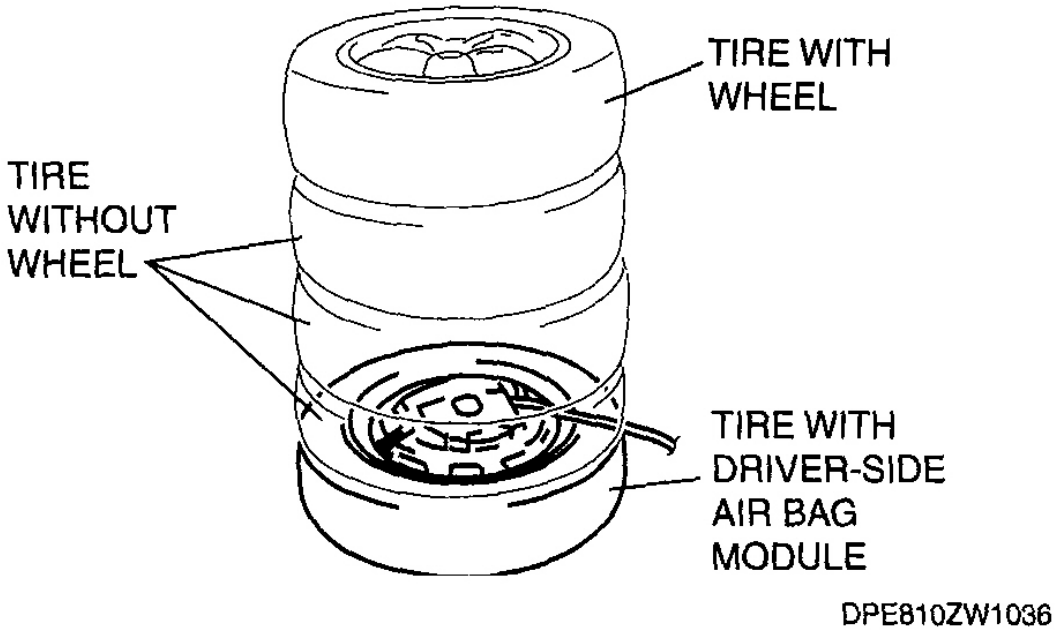


Fig. 50: Stacking Tires Without Wheels On Top Of Tire With Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

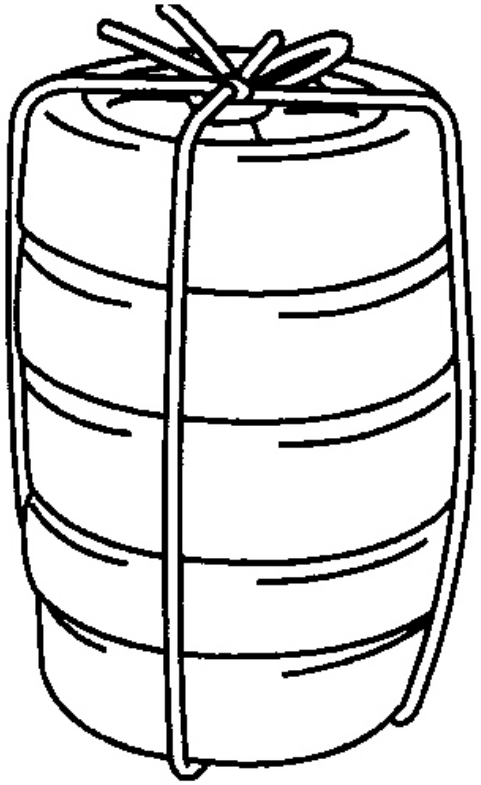


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Fig. 51: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).
7. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

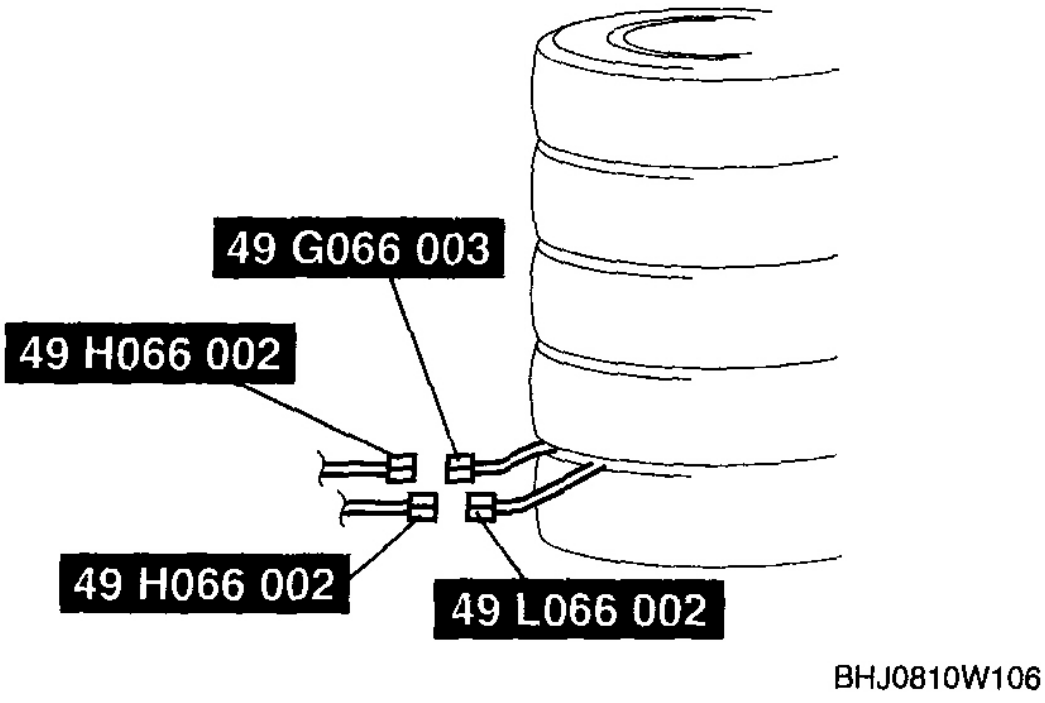

Fig. 52: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

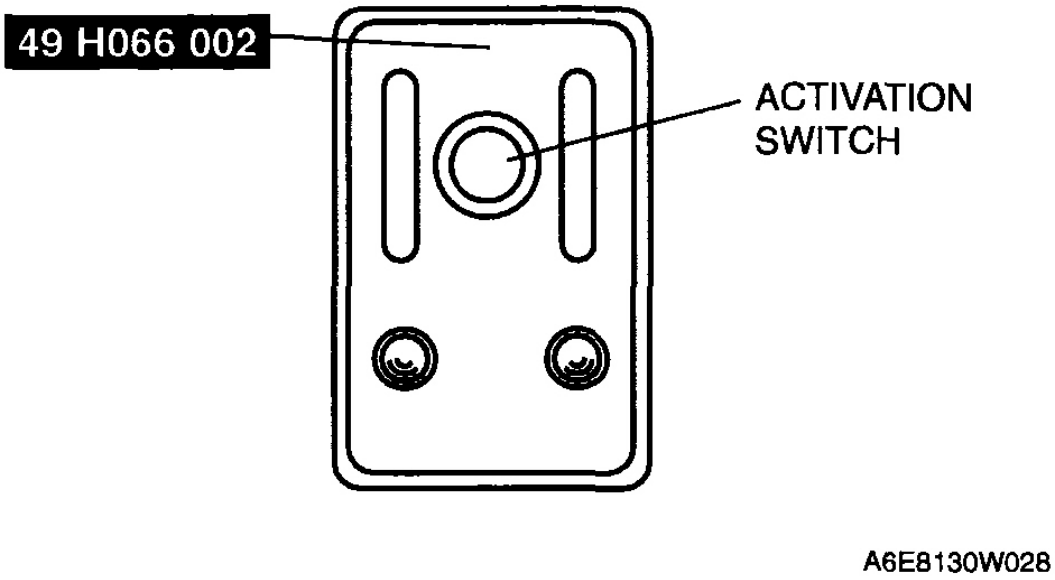

Fig. 53: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

PASSENGER-SIDE AIR BAG MODULE

WARNING:

- **The passenger-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both passenger-side air bag module inflators simultaneously, following the procedure below.**

1. Remove the passenger-side air bag module. (See **PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the passenger-side air bag module as shown in **Fig. 54** .

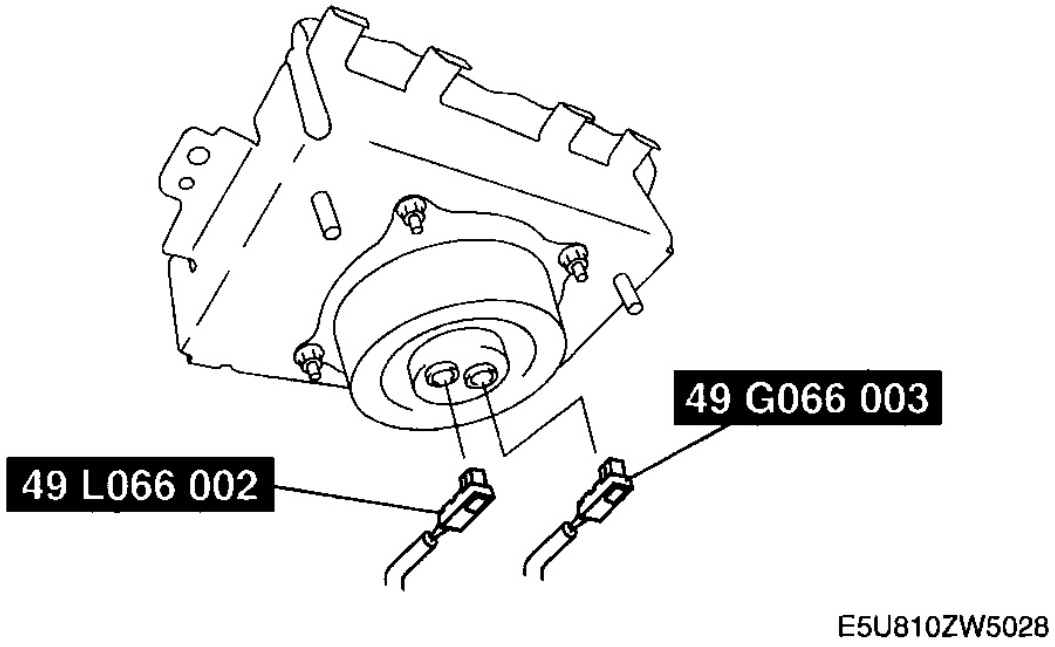

Fig. 54: Connecting SSTs (Adapter Harness) To Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Place the padded surface of the passenger-side air bag module facing the center of the tire as shown in **Fig. 55** . To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the tire and the brackets **at least 4 times** as shown in **Fig. 55** .

WARNING:

- **If the air bag module is not properly secured to the tire, the tires may fall over by the impact of operation (deployment) and cause serious injury. To prevent this, secure the air bag module properly with the padded surface facing the center of the tire.**

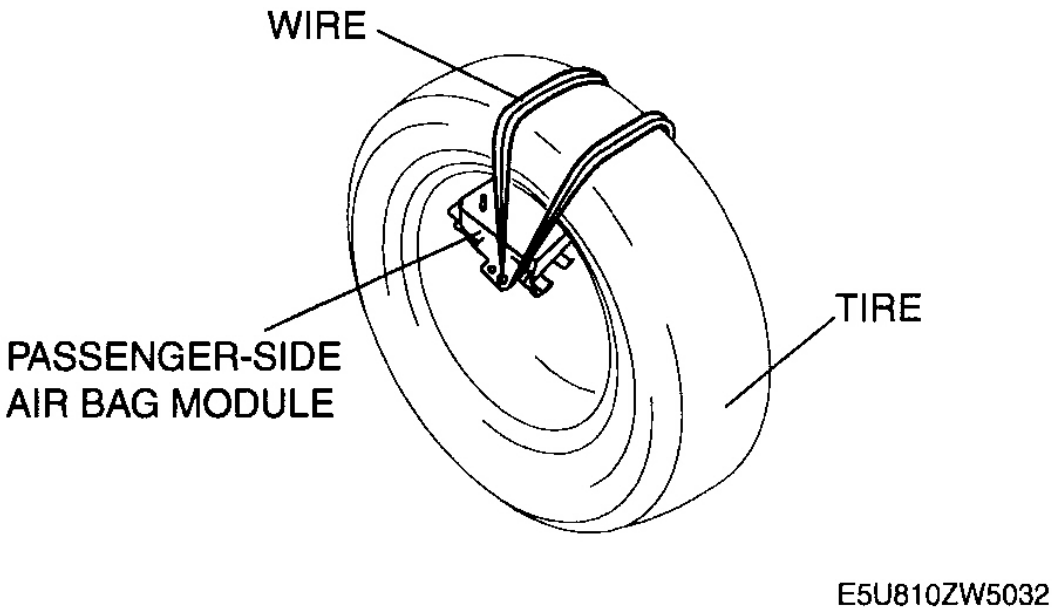

Fig. 55: Wrapping Wire Through Tire & Brackets
Courtesy of MAZDA MOTORS CORP.

4. Stack the tire with the passenger-side air bag module on top of two tires without wheels. Stack a tire without a wheel on top of the tire with the passenger-side air bag module, and then stack another tire with a wheel on the very top.

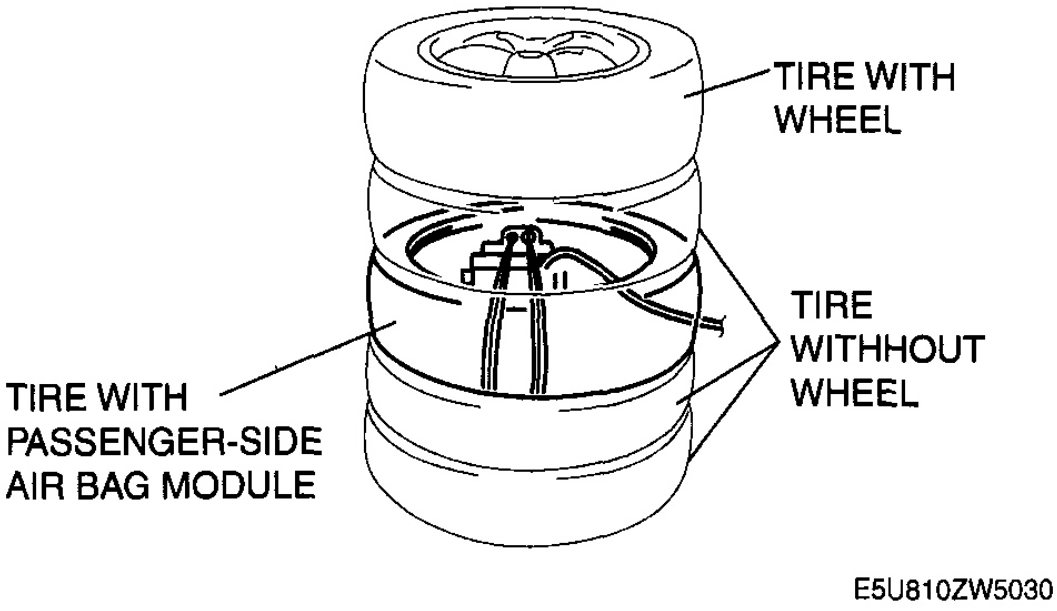

Fig. 56: Stacking Tire With Passenger-Side Air Bag Module On Top Of Two Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

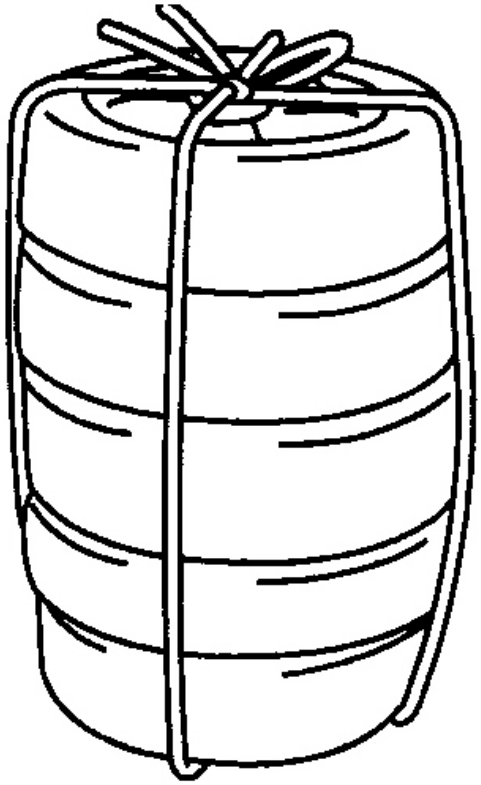

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Fig. 57: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).
7. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

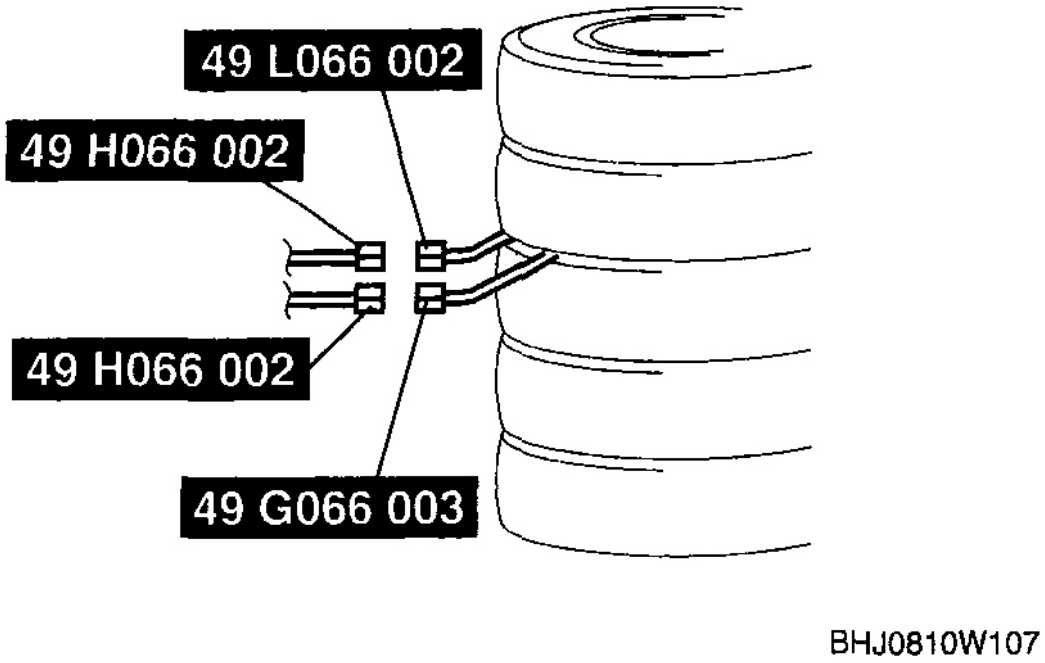

Fig. 58: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

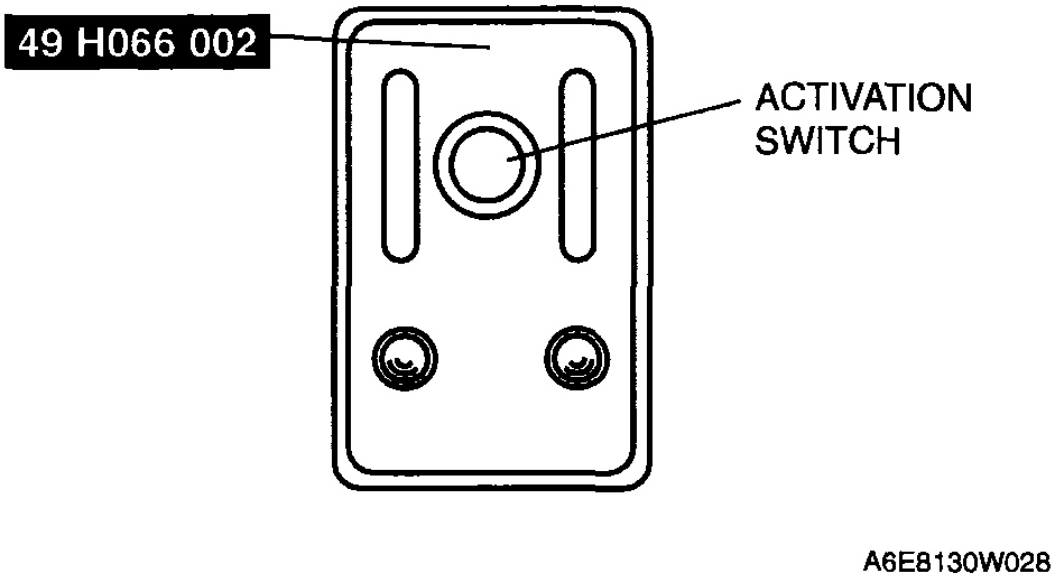

Fig. 59: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

SIDE AIR BAG MODULE

1. Remove the side air bag module. (See **SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Install the nuts to the side air bag module as shown in **Fig. 60** , and connect the **SST** (Adapter harness).

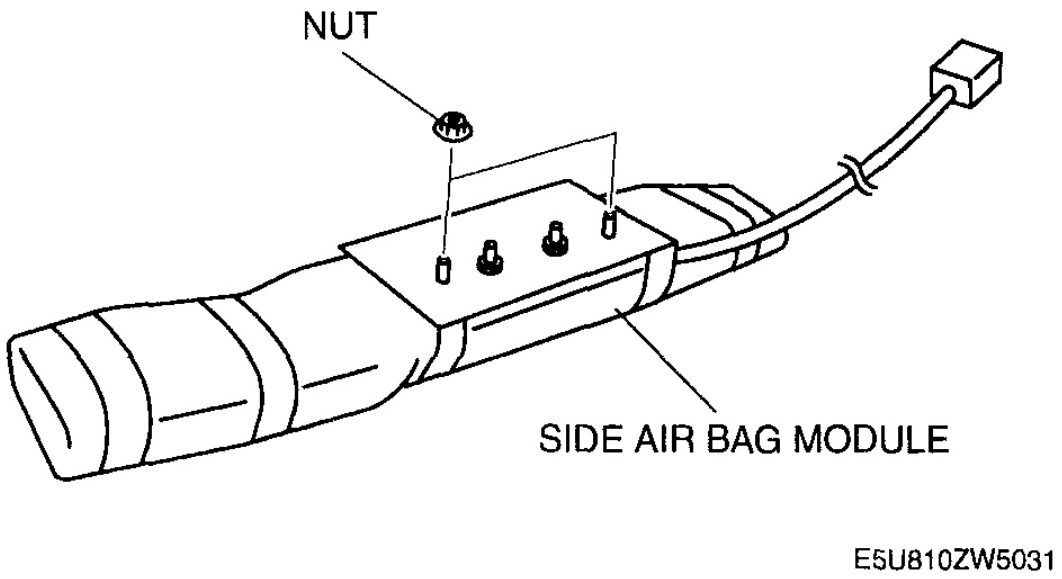

Fig. 60: View Of Nuts On Side Air Bag Module & SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

3. Place the padded surface of the side air bag module facing the center of the tire as shown in **Fig. 61** . To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the tire and around the bolts **at least 4 times** .

WARNING:

- **If the air bag module is not properly secured to the tire, the tires may fall over by the impact of operation (deployment) and cause serious injury. To prevent this, secure the air bag module properly with the padded surface facing the center of the tire.**

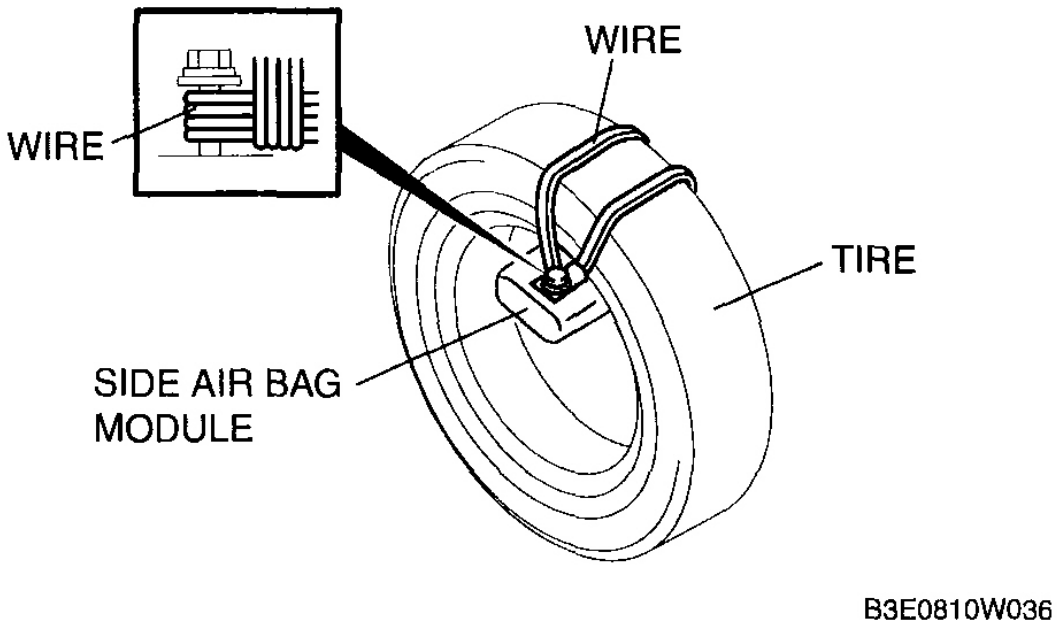

Fig. 61: Placing Padded Surface Of Side Air Bag Module Facing Center Of Tire
Courtesy of MAZDA MOTORS CORP.

4. Connect the **SST** (Adapter harness) to the side air bag module as shown in **Fig. 62** .

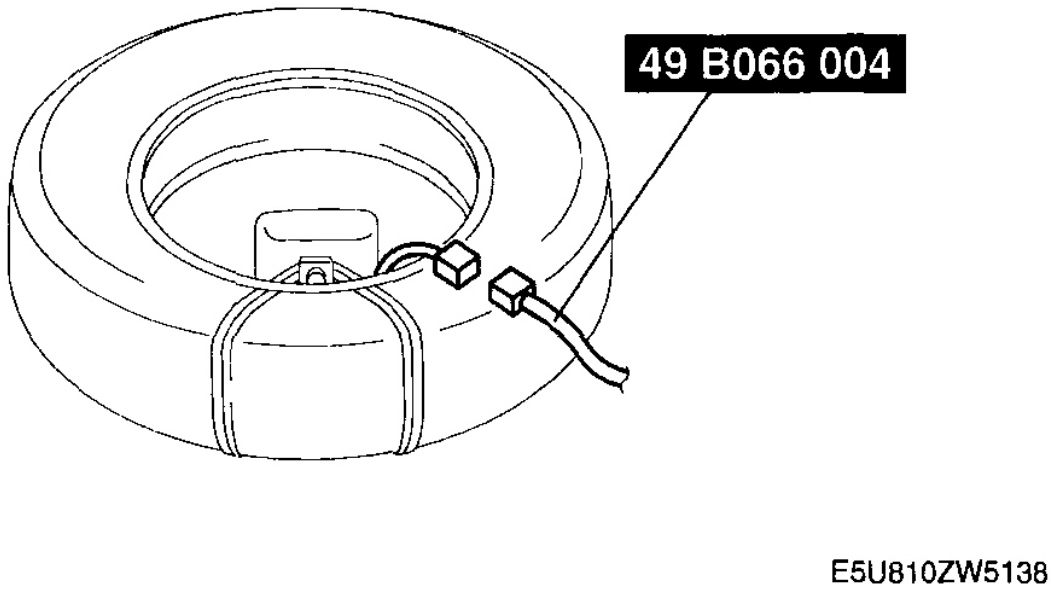

Fig. 62: Connecting SST (Adapter Harness) To Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

5. Stack the tire with the side air bag module on top of two tires without wheels. Stack a tire without a wheel on top of the tire with the side air bag module, and then stack another tire with a wheel on the very top.

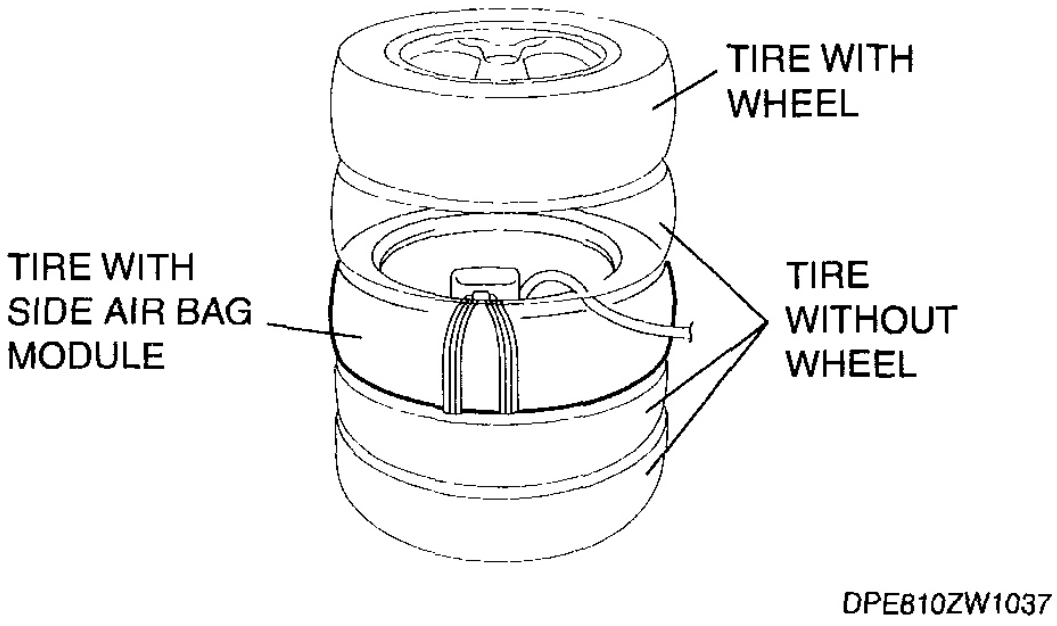

Fig. 63: Stacking Tire With Side Air Bag Module On Top Of Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

6. Secure the tires with wire.

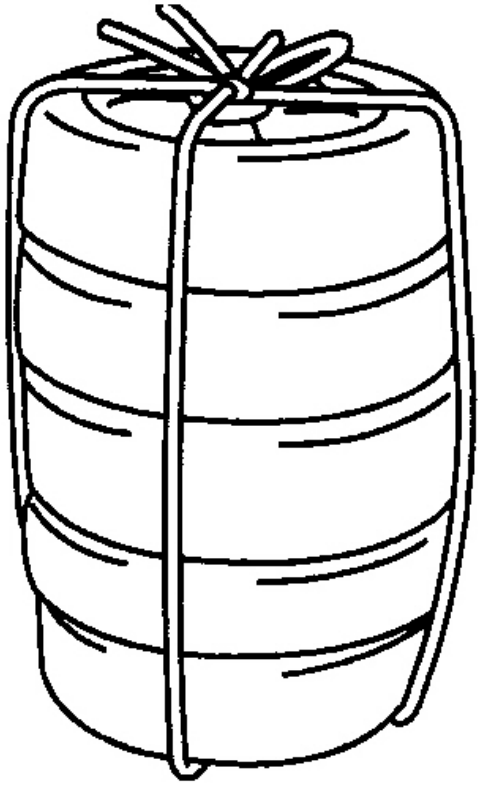

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Fig. 64: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

7. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
8. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
9. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
10. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

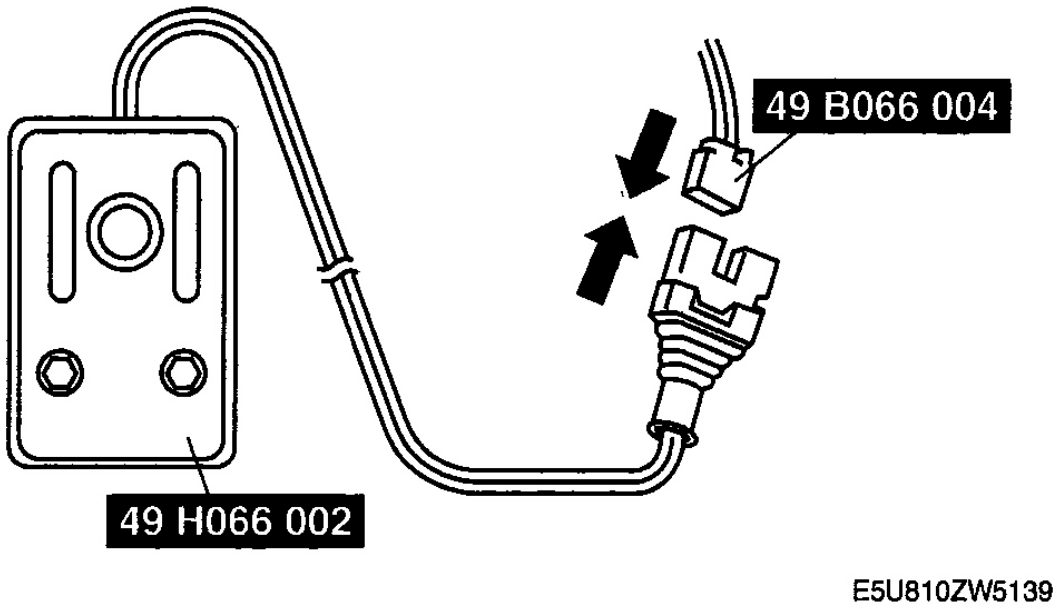

Fig. 65: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

11. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the side air bag module.
12. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

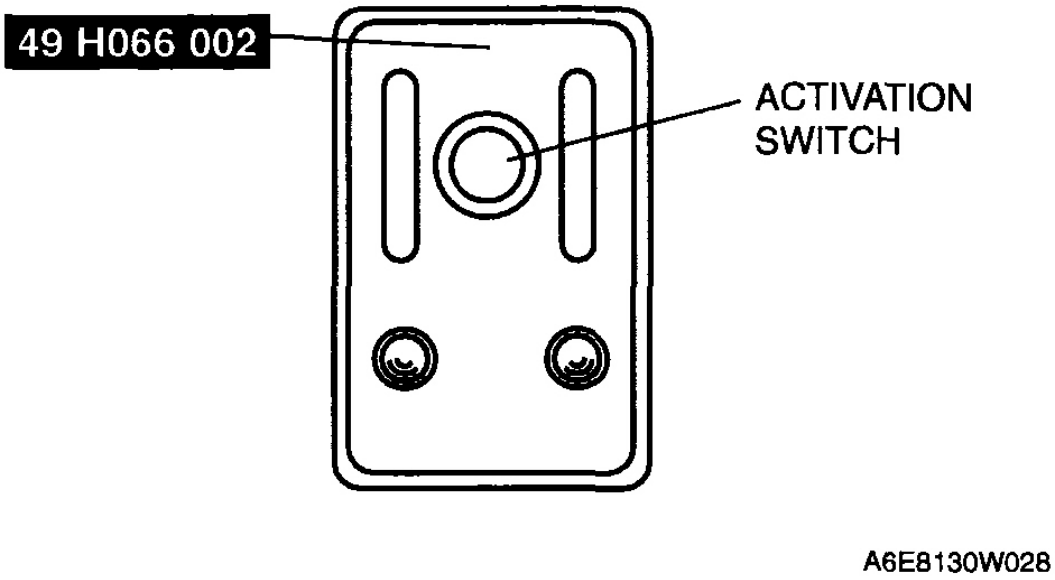

Fig. 66: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

PRE-TENSIONER SEAT BELT

1. Remove the pre-tensioner seat belt. (See **SEAT BELT REMOVAL/INSTALLATION** .)
2. Connect the **SST** (Adapter harness) to the pre-tensioner seat belt as shown in **Fig. 67** .

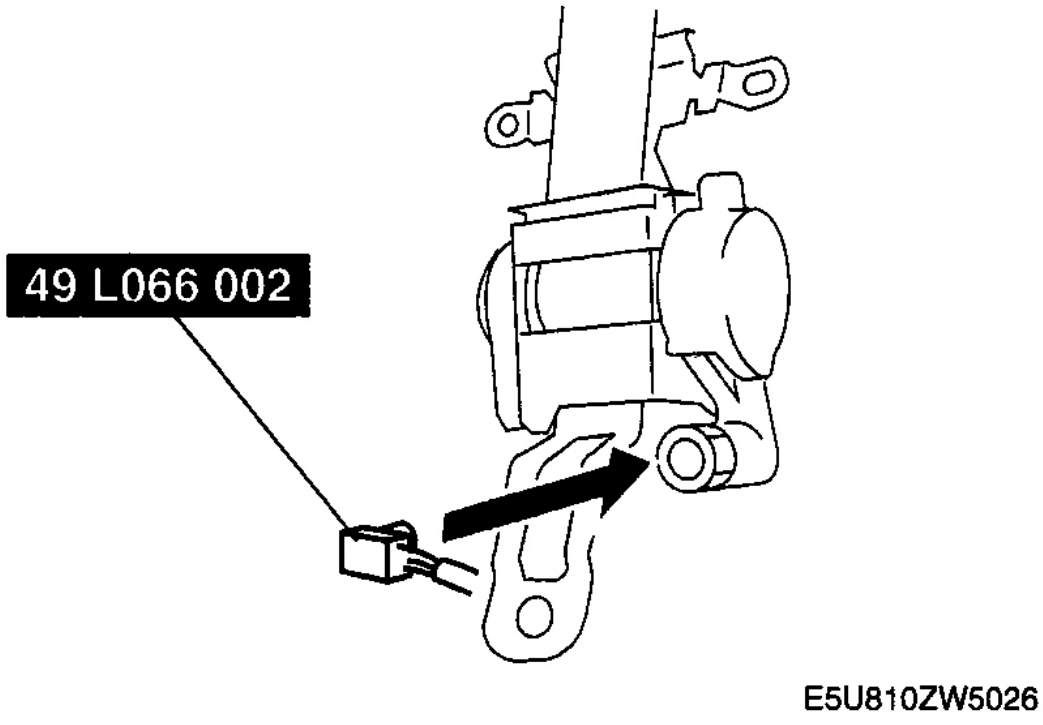

Fig. 67: Connecting SST (Adapter Harness) To Pre-Tensioner Seat Belt
Courtesy of MAZDA MOTORS CORP.

3. Put the pre-tensioner seat belt inside the tire and secure it to the tire by wrapping a wire (cross section of **1.25 mm^2 {0.002 in^2 } or more**) through the tire and the bolt installation holes **at least 4 times** .

WARNING:

- **If the pre-tensioner seat belt is not properly installed to the tire, serious injury may occur when the pre-tensioner part is operated (deployed). When installing the pre-tensioner seat belt to the tire, make sure the pre-tensioner part is inside the tire.**

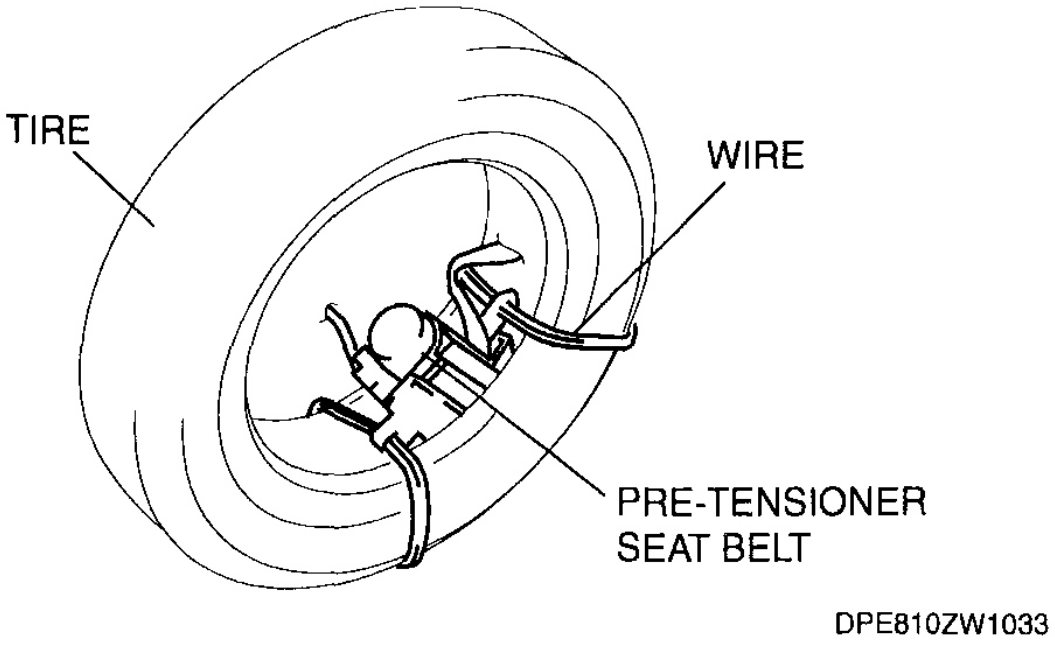

Fig. 68: Putting Pre-Tensioner Seat Belt Inside Tire & Secure To Tire By Wrapping Wire
Courtesy of MAZDA MOTORS CORP.

4. Stack the tire with the pre-tensioner seat belt on two of tires without wheels. Stack a tire without a wheel on top of the tire with the pre-tensioner seat belt, and then stack another tire with a wheel on the very top.

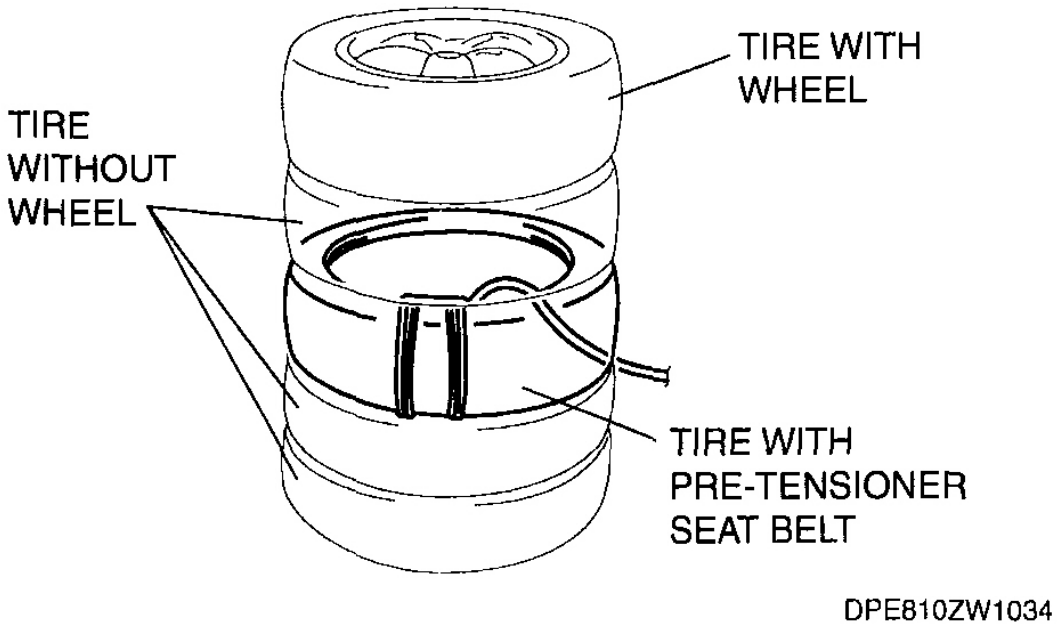

Fig. 69: Stacking Tire With Pre-Tensioner Seat Belt On Two Of Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

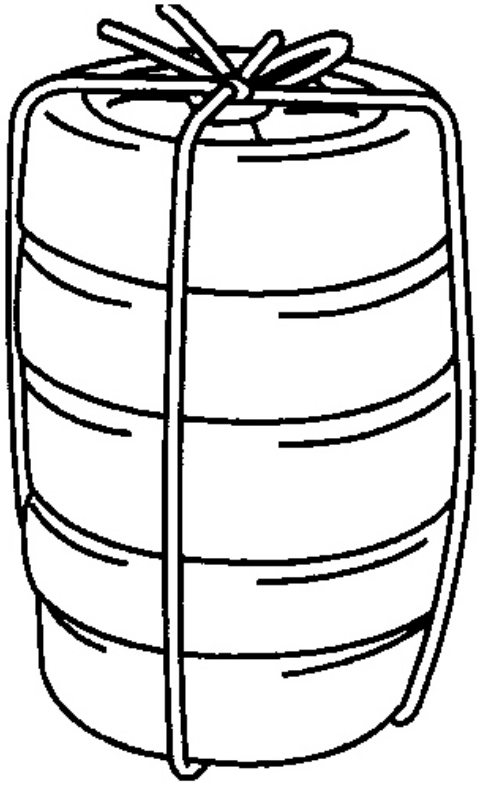

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Fig. 70: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
7. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

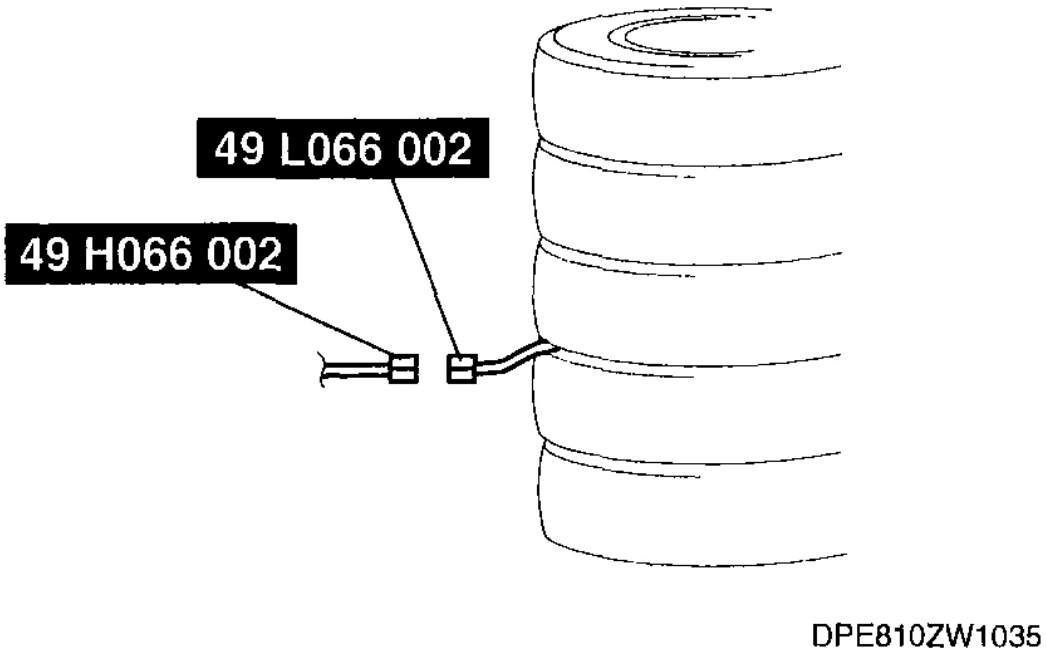

Fig. 71: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the pre-tensioner seat belt.
11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

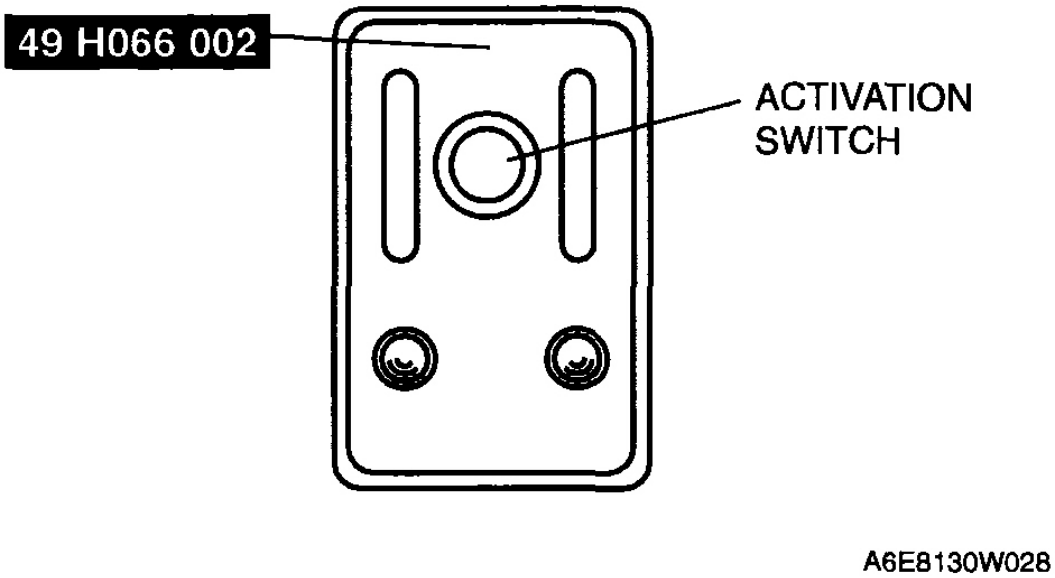

Fig. 72: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DISPOSAL PROCEDURES

WARNING:

- **A live (undeployed) air bag module or pre-tensioner seat belt may accidentally operate (deploy) when it is disposed of and cause serious injury. Always refer to the AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DEPLOYMENT PROCEDURES and dispose of air bag modules and pre-tensioner seat belts in a deployed condition.**
- **The air bag modules and the pre-tensioner seat belts are very hot immediately after they are deployed. You can be burned. Do not touch an air bag module and pre-tensioner seat belt for at least 15 min after deployment.**
- **Pouring water on the deployed air bag module and pre-tensioner seat belt is dangerous. The water will mix with the residual gases to form a gas that can make breathing difficult. Do not pour water on the deployed air bag module and pre-tensioner seat belt.**
- **The deployed air bag module or pre-tensioner seat belt may contain deposits of sodium hydroxide, a caustic byproduct of the gas-generated combustion. If this substance gets into your eyes or on your hands, it can cause irritation and itching. When handling the**

deployed air bag module and pre-tensioner seat belt, wear gloves and safety glasses.

- **Due to the adoption of 2-step deployment control in both the driver and passenger-side air bag modules, depending on the impact force, it is possible that inflator No. 2 might not operate (deploy). Before disposing of the air bag module, always follow the inflator deployment procedures and verify the complete operation (deployment) of inflators No. 1 and 2.**

1. Remove the deployed air bag module or pre-tensioner seat belt.
2. Put the air bag module or pre-tensioner seat belt in a plastic bag, seal the bag, and then dispose of it.

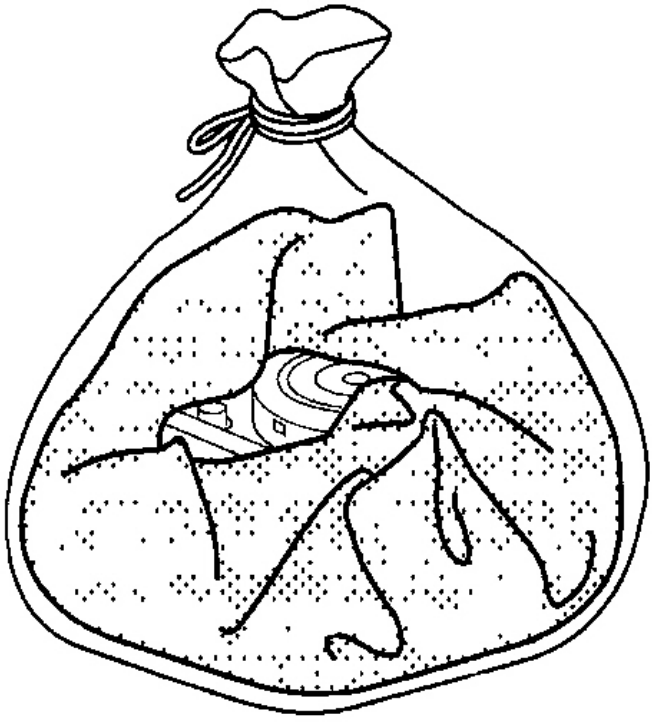

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Fig. 73: Putting Air Bag Module Or Pre-Tensioner Seat Belt In Plastic Bag
Courtesy of MAZDA MOTORS CORP.

INSPECTION OF SST (DEPLOYMENT TOOL)

1. Before using the **SST** (49 H066 002), inspect its operation.

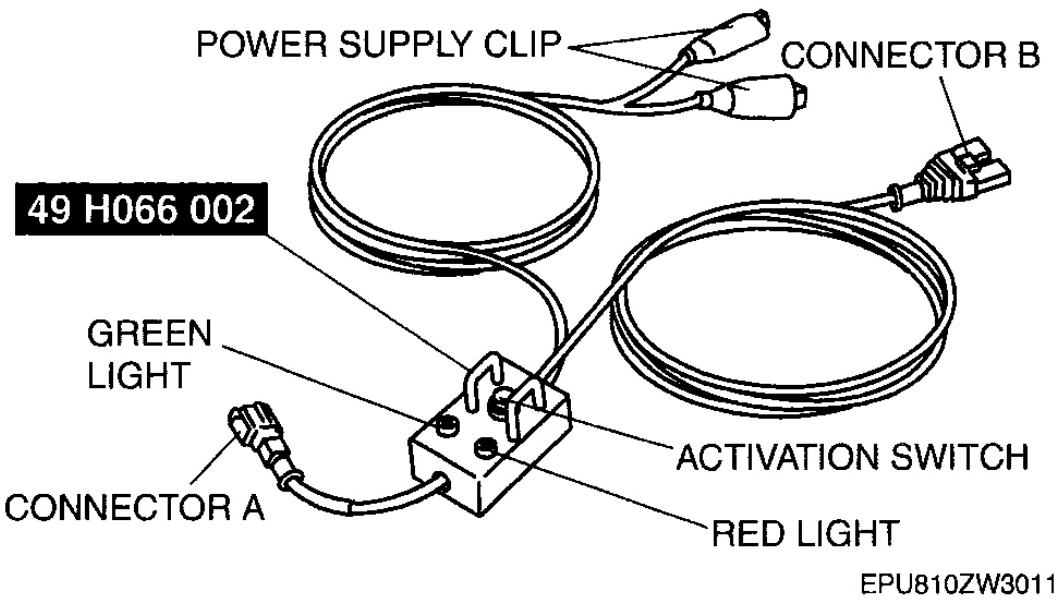


Fig. 74: Inspecting SST (Deployment Tool)
Courtesy of MAZDA MOTORS CORP.

INSPECTION PROCEDURE

1. Follow the steps below to inspect the **SST** (49 H066 002).
   - If not as indicated in **SST INSPECTION REFERENCE TABLE** , replace the **SST** (49 H066 002) because it has a malfunction.

WARNING:
- **Do not use a malfunctioning SST (49 H066 002), otherwise it could cause the air bag module or pre-tensioner seat belt to accidentally operate (deploy).**

CAUTION:
- **Because the permissible voltage for the SST (49 H066 002) is 12 V, do not connect a 24 V power source because it will damage the SST. Always connect only a 12 V power source.**

SST INSPECTION REFERENCE TABLE

Step	Inspection procedure	Light condition	
		Green	Red
1	Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.	On	Off
2	Connect connectors A and B.	Off	On

3	Press the activation switch.	On	Off

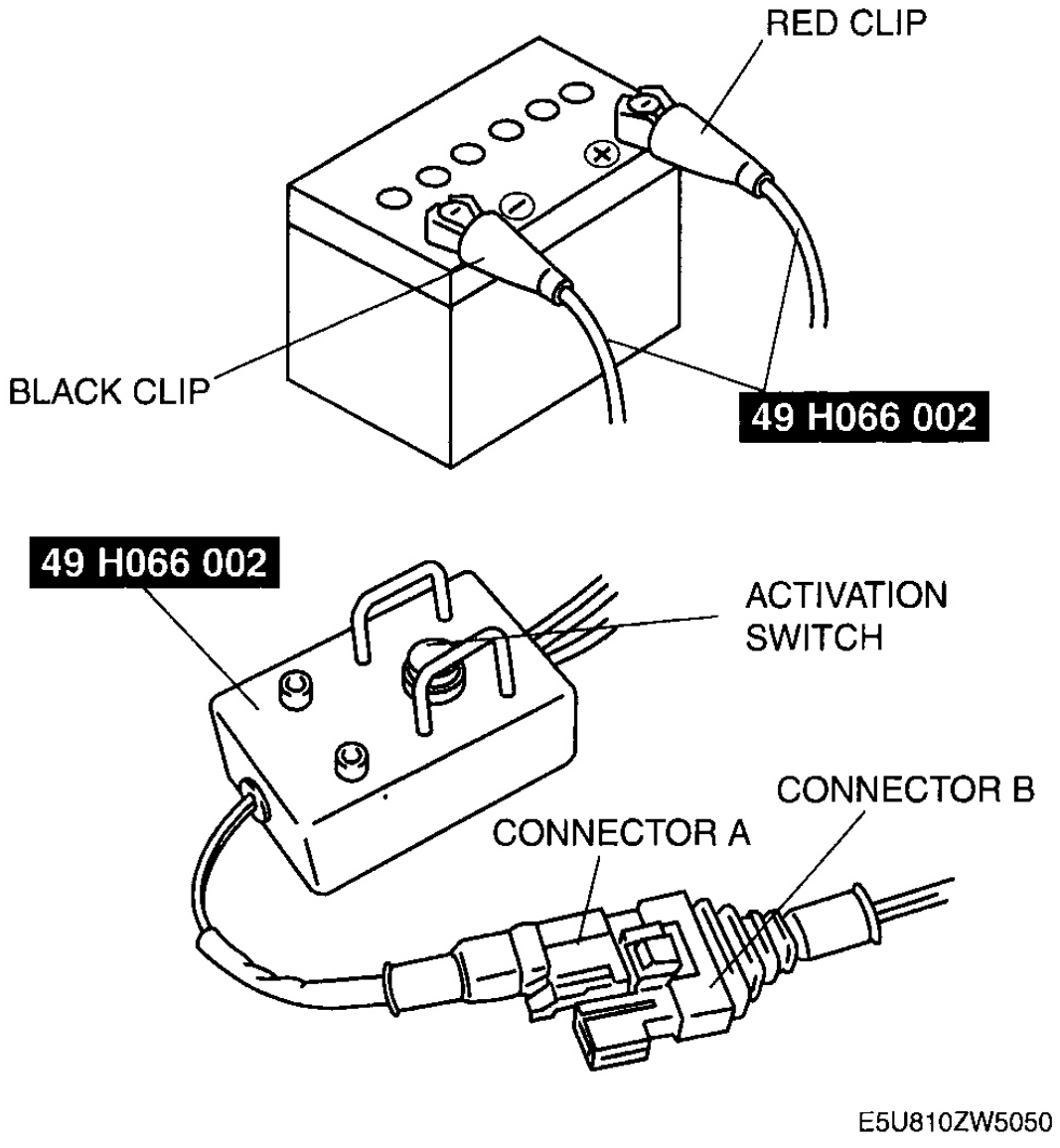
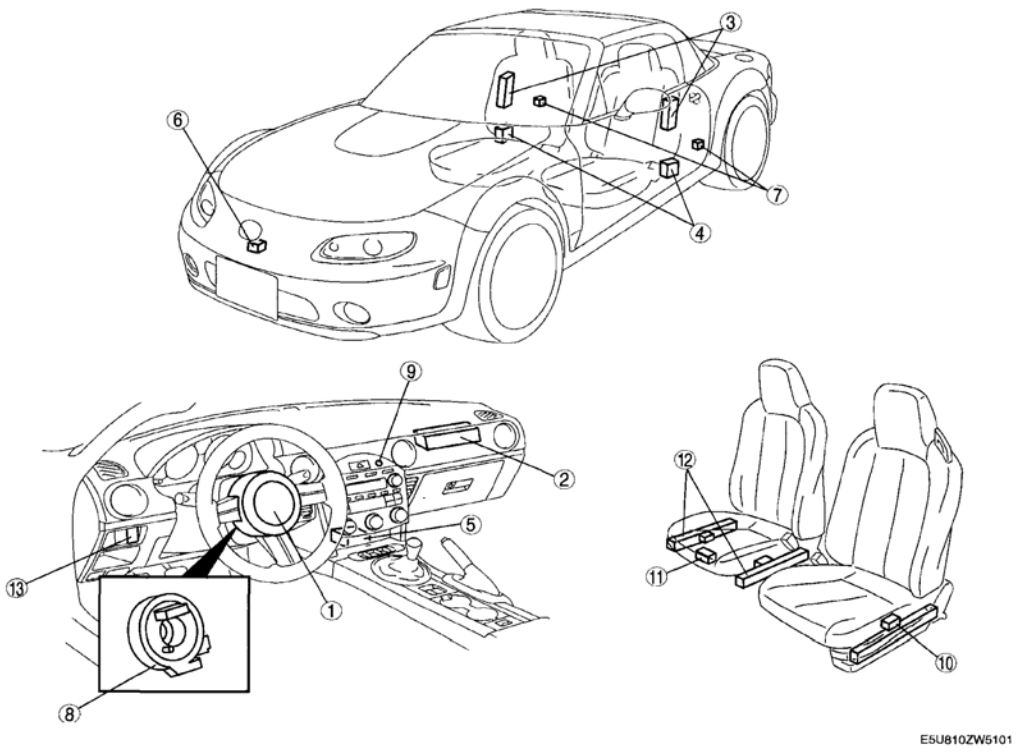


Fig. 75: Inspecting Activation Switch
Courtesy of MAZDA MOTORS CORP.

2007 RESTRAINTS

Air Bag System - MX-5 Miata

LOCATION INDEX



1	Driver-side air bag module
2	Passenger-side air bag module
3	Side air bag module
4	Pre-tensioner seat belt
5	SAS control module
6	Crash zone sensor
7	Side air bag sensor
8	Clock spring
9	Passenger air bag deactivation (PAD) indicator
10	Seat track position sensor
11	Seat weight sensor control module
12	Seat weight sensor
13	Passenger air bag deactivation (PAD) switch

Fig. 1: Identifying Location Of Airbag Components
Courtesy of MAZDA MOTORS CORP.

AIR BAG SYSTEM SERVICE WARNINGS

AIR BAG MODULE INSPECTION

- **Inspecting an air bag module using a tester can operate (deploy) the air bag module, which may cause serious injury. Do not use a tester to inspect an air bag module. Always use the on-board diagnostic function to diagnose the air bag module for malfunctions.**

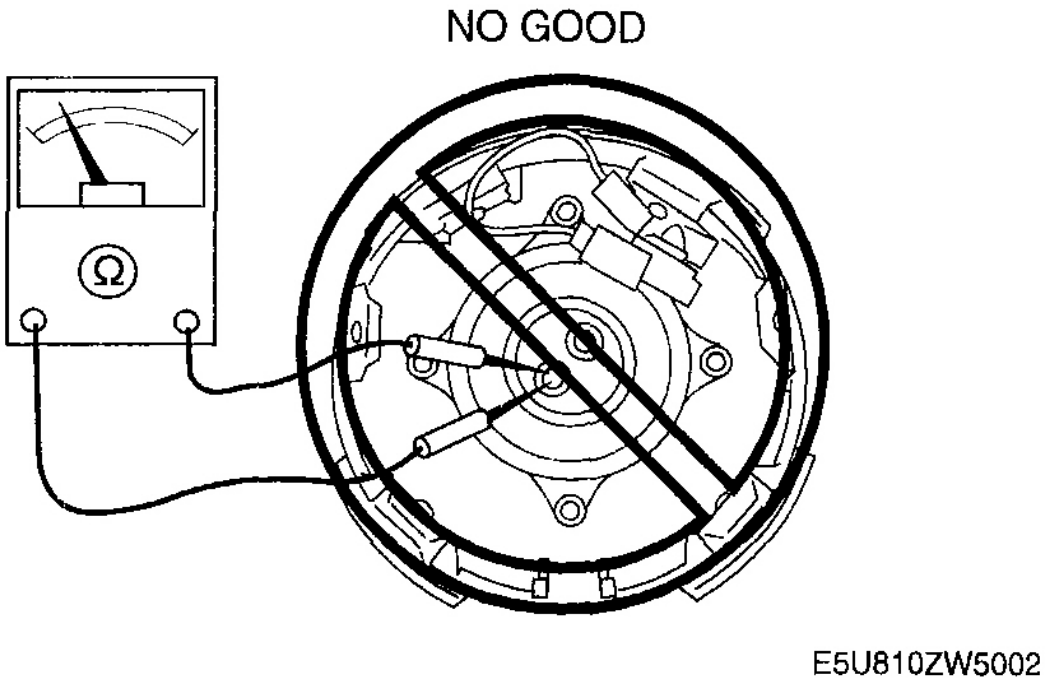


Fig. 2: Inspecting Air Bag Module Caution
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE HANDLING

- **Before removing the air bag module or disconnecting the air bag module connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**
- **Handling a live (undeployed) air bag module that is pointed toward your body could result in serious injury if the air bag module were to accidentally operate (deploy). When carrying a live (undeployed) air bag module, point the deployment surface away from your body to lessen the chance of injury in case it operates (deploys).**

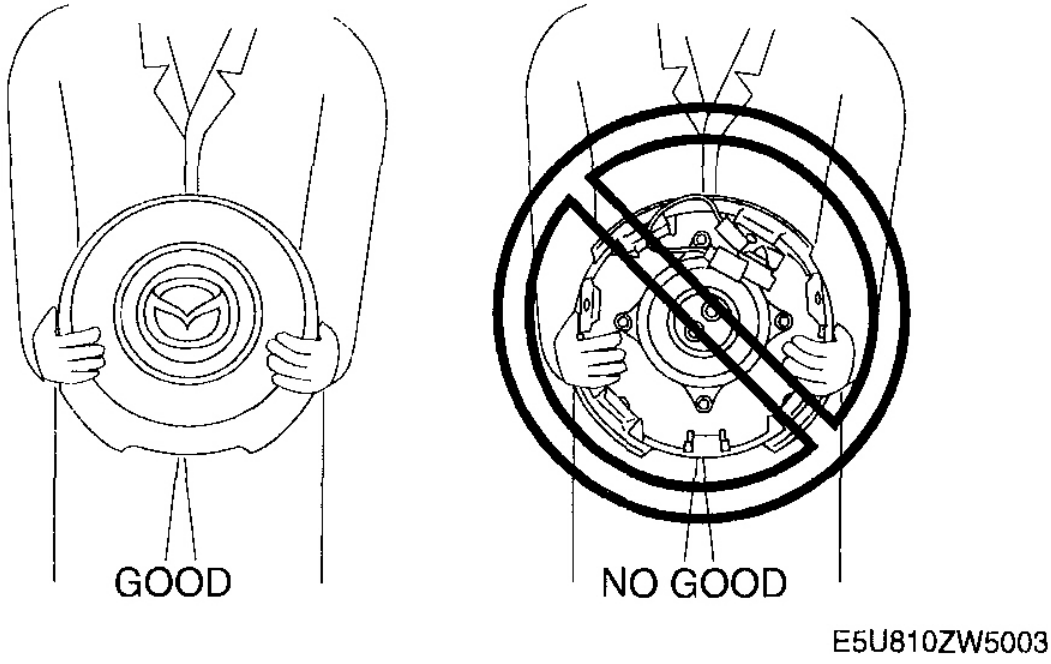


Fig. 3: Air Bag Module Handling (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

- **A live (undeployed) air bag module placed with its deployment surface to ground is dangerous. If the air bag module were to accidentally operate (deploy), it could cause serious injury. Always place a live (undeployed) air bag module with its deployment surface up.**

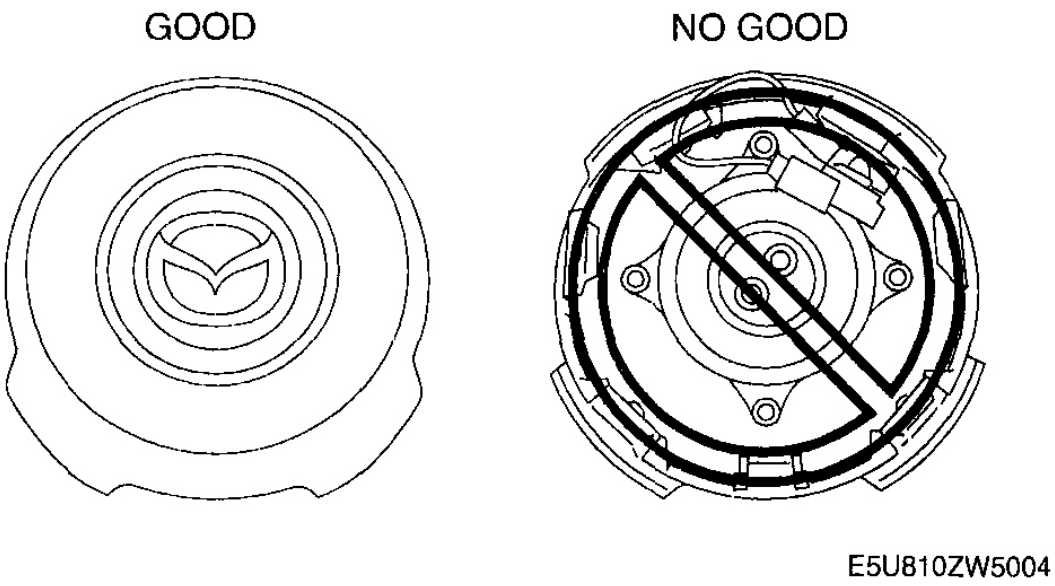


Fig. 4: Air Bag Module Handling (2 Of 2)
Courtesy of MAZDA MOTORS CORP.

SIDE AIR BAG MODULE HANDLING

- **When a side air bag module operates (deploys) due to a collision, the interior of the seat back (pad, frame, trim) may become damaged. If a side air bag does not operate (deploy) normally from a seat back that has been reused, a serious accident may result. After a side air bag has operated (deployed), always replace both the side air bag module and the seat back (pad, frame, trim) with new parts. After servicing, verify that the seat operates normally and that the wiring harness is not caught.**

SEAT WEIGHT SENSOR HANDLING

- **The passenger-side seat and the seat weight sensor may become deformed or otherwise damaged due to operation (deployment) of the front or side air bag in an accident. This may cause the passenger sensing function to operate improperly and result in a serious accident. Always replace the passenger seat and seat weight sensor with new ones after the front or side air bags have operated (deployed). After servicing, verify that the seat operates normally and that the wiring harness is not caught. If the collision is not hard enough to cause the front or side air bags to operate (deploy), inspect the seat weight sensor and replace it if there is any malfunction.**

SAS CONTROL MODULE HANDLING

- **Removing the SAS control module or disconnecting the SAS control module connector with the ignition switch at the ON position can activate the sensor in the SAS control module and operate**

(deploy) the air bags and pre-tensioner seat belts, which may cause serious injury. Before removing the SAS control module or disconnecting the SAS control module connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.

- **Connecting the SAS control module connector with the SAS control module not securely fixed to the vehicle is dangerous. The sensor in the SAS control module could send an electrical signal to the air bag modules and pre-tensioner seat belts. This will operate (deploy) the air bags and pre-tensioner seat belts, which may result in serious injury. Therefore, before connecting the connector, securely fix the SAS control module to the vehicle.**
- **Because a sensor is built into the SAS control module, once the air bags and pre-tensioner seat belts have operated (deployed) due to a collision or other causes, the SAS control module must be replaced with a new one even if the used one does not have any visible external damage or deformation. The used SAS control module may have been damaged internally, which may cause improper operation. If the SAS control module is reused, the air bags and pre-tensioner seat belts may not operate (deploy) normally, which could result in a serious accident. Always replace the SAS control module with a new one. The SAS control module cannot be bench-checked or self-checked.**

CRASH ZONE SENSOR HANDLING

- **Removing the crash zone sensor or disconnecting the crash zone sensor connector with the ignition switch at the ON position can activate the crash zone sensor and operate (deploy) the air bags and pre-tensioner seat belts, which may cause serious injury. Before removing the crash zone sensor or disconnecting the crash zone sensor connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**
- **If the crash zone sensor is subjected to shock or the sensor is disassembled, the air bags and pre-tensioner seat belts may accidentally operate (deploy) and cause injury, or the system may fail to operate normally and cause a serious accident. Do not subject the crash zone sensor to shock or disassemble the sensor.**
- **Because a sensor is built into the crash zone sensor, once the air bags and pre-tensioner seat belts have operated (deployed) due to a collision or other causes, the crash zone sensor must be replaced with a new one even if the used one does not have any visible external damage or deformation. If the crash zone sensor is reused, the air bags and pre-tensioner seat belts may not operate (deploy) normally, which could result in a serious accident. Always replace the crash zone sensor with a new one. The crash zone sensor cannot be bench-checked or self-checked.**

SIDE AIR BAG SENSOR HANDLING

- **Removing the side air bag sensor or disconnecting the side air bag sensor connector with the ignition switch at the ON position can activate the side air bag sensor and operate (deploy) the side air bag, which may cause serious injury. Before removing the side air bag sensor or disconnecting the side air bag sensor connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**

- **If the side air bag sensor is subjected to shock or the sensor is disassembled, the side air bag may accidentally operate (deploy) and cause injury, or the system may fail to operate normally and cause a serious accident. Do not subject the side air bag sensor to shock or disassemble the sensor.**
- **Because a sensor is built into the side air bag sensor, once the air bag has operated (deployed) due to a collision or other causes, the side air bag sensor must be replaced with a new one even if the used one does not have any visible external damage or deformation. If the side air bag sensor is reused, the side air bag may not operate (deploy) normally, which could result in a serious accident. Always replace the side air bag sensor with a new one. The side air bag sensor cannot be bench-checked or self-checked.**

PRE-TENSIONER SEAT BELT INSPECTION

- **Inspecting a pre-tensioner seat belt using a tester can operate (deploy) the pre-tensioner seat belt, which may cause serious injury. Do not use a tester to inspect a pre-tensioner seat belt. Always use the on-board diagnostic function to diagnose the pre-tensioner seat belt for malfunctions.**

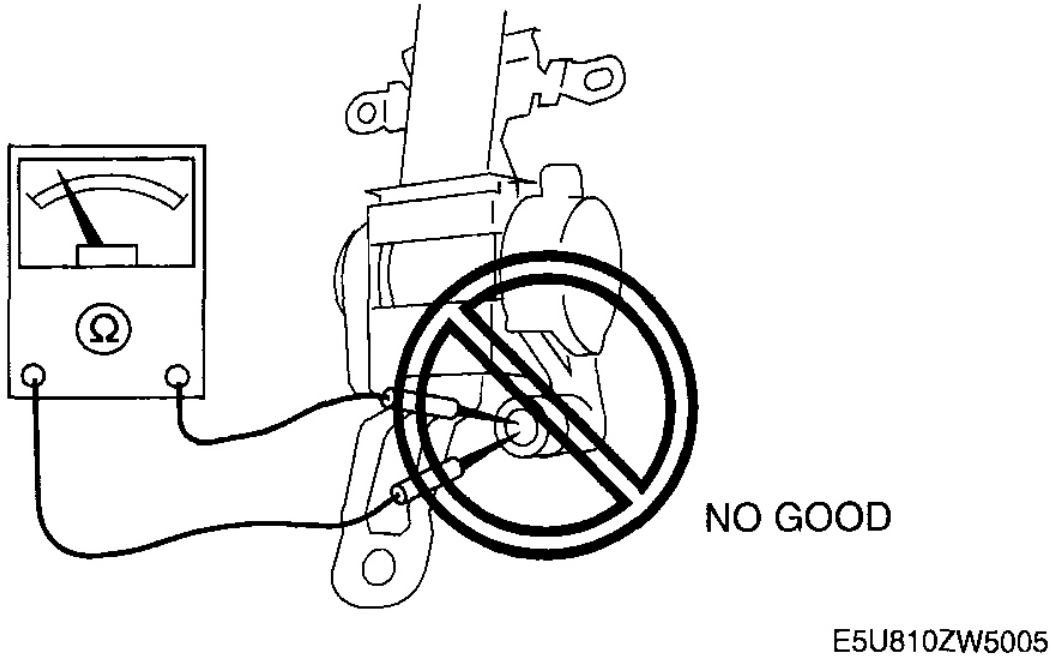


Fig. 5: Inspecting Pre-Tensioner Seat Belt Using Tester Caution
Courtesy of MAZDA MOTORS CORP.

AIR BAG SYSTEM SERVICE CAUTIONS

AIR BAG SYSTEM COMPONENT DISASSEMBLY

- **Disassembling the air bag system components could cause it to not operate (deploy) normally. Never disassemble any air bag system components.**

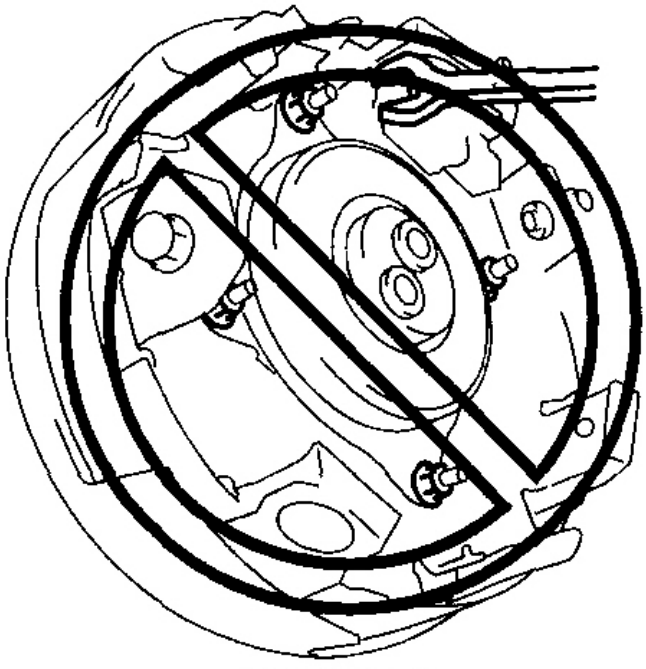


Fig. 6: Air Bag System Service Cautions
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE, PRE-TENSIONER SEAT BELT HANDLING

- **Oil, grease, or water on the air bag modules may cause the air bags and pre-tensioner seat belts to fail to operate (deploy) in an accident. Never allow oil, grease, or water to get on the air bag modules or pre-tensioner seat belts.**
- **Inserting a screwdriver or similar object into the connector of an air bag module or a pre-tensioner seat belt may damage the connector and cause the air bag module or the pre-tensioner seat belt to operate (deploy) improperly, which may cause serious injury. Never insert any foreign objects into the air bag module or seat belt connectors.**

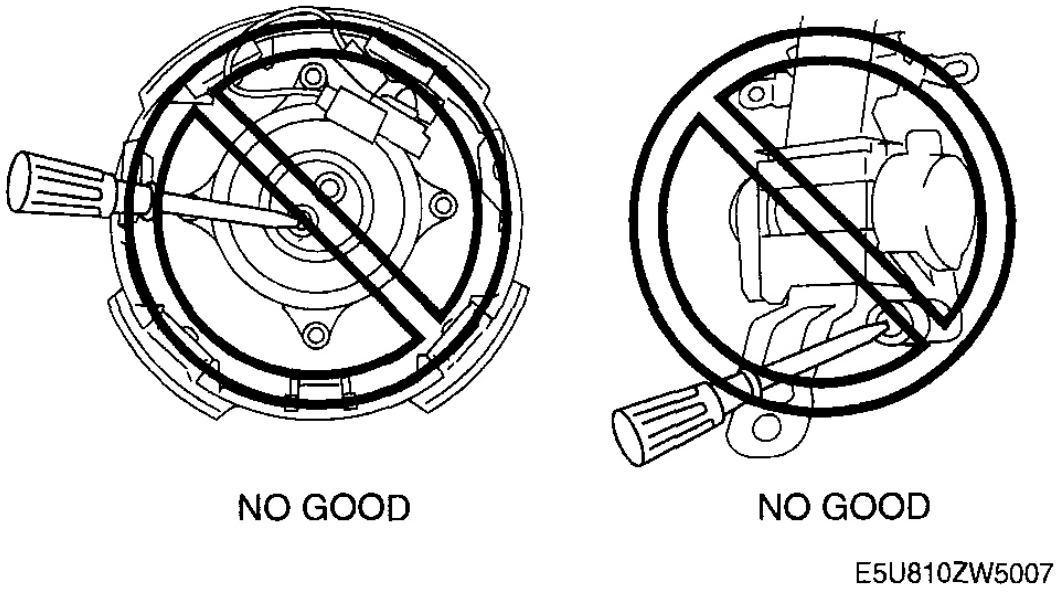


Fig. 7: Air Bag Module & Pre-Tensioner Seat Belt Handling Caution
Courtesy of MAZDA MOTORS CORP.

SEAT WEIGHT SENSOR HANDLING

- **The seat weight sensor has a built-in strain gauge which may operate improperly if the sensor is dropped by itself or when installed to the seat. If it is dropped, replace the seat weight sensor with a new one.**
- **Oil, grease, or water on the seat weight sensor may cause the system to operate (deploy) improperly. Never allow oil, grease, or water to get on the seat weight sensor.**
- **Foreign material in the seat weight sensor components may cause the system to operate (deploy) improperly. Always make sure that no foreign material can get into the seat weight sensor.**
- **Disassembling the seat weight sensor, or tightening any of the nuts and bolts installed to the sensor body may cause it to operate (deploy) improperly. Never disassemble the seat weight sensor or tighten any of the nuts or bolts installed to the body of the sensor.**

AIR BAG MODULE, PRE-TENSIONER SEAT BELT REUSE

- **Even if an air bag module or a pre-tensioner seat belt does not operate (deploy) in a collision and does not have any external signs of damage, it may have been damaged internally, which may cause improper operation. Before reusing a live (undeployed) air bag module and the pre-tensioner seat belts, always use the on-board diagnostic to diagnose the air bag module and the pre-tensioner seat belts to verify that they have no malfunction.**

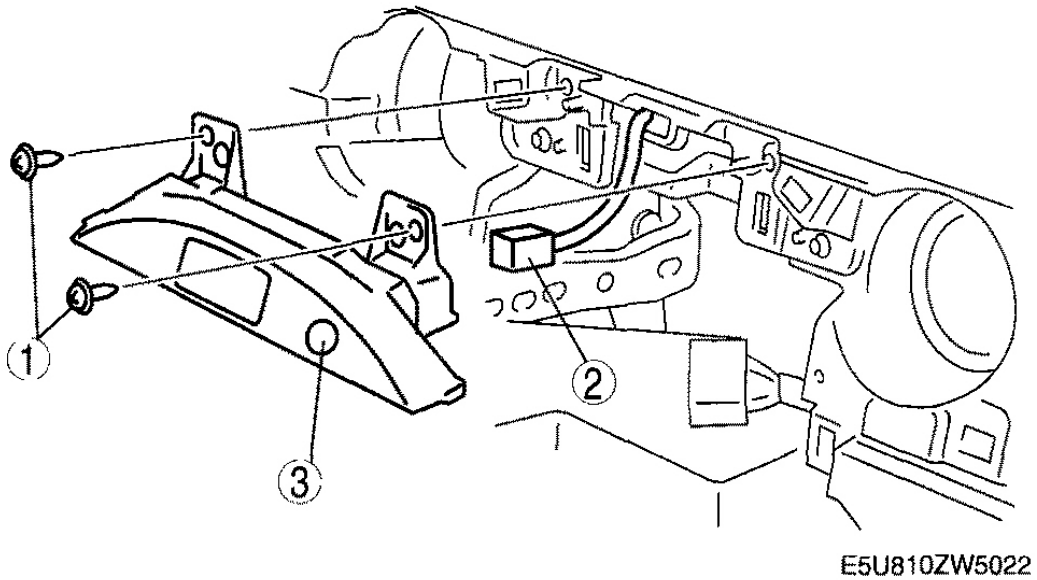
AIR BAG WIRING HARNESS REPAIR

- **Incorrectly repairing an air bag wiring harness can accidentally operate (deploy) the air bag module and pre-tensioner seat belts. If a problem is found in the air bag wiring harness, always replace the wiring harness with a new one.**

Fig. 8: Identifying Air Bag Wiring Harness Repair Caution
Courtesy of MAZDA MOTORS CORP.

PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    2. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
    3. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
    4. Decoration panel (See **DECORATION PANEL REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 9** .



1	Screw
2	Connector
3	Passenger air bag deactivation (PAD) indicator

Fig. 9: Removing/Installing Passenger Air Bag Deactivation (PAD) Indicator
Courtesy of MAZDA MOTORS CORP.

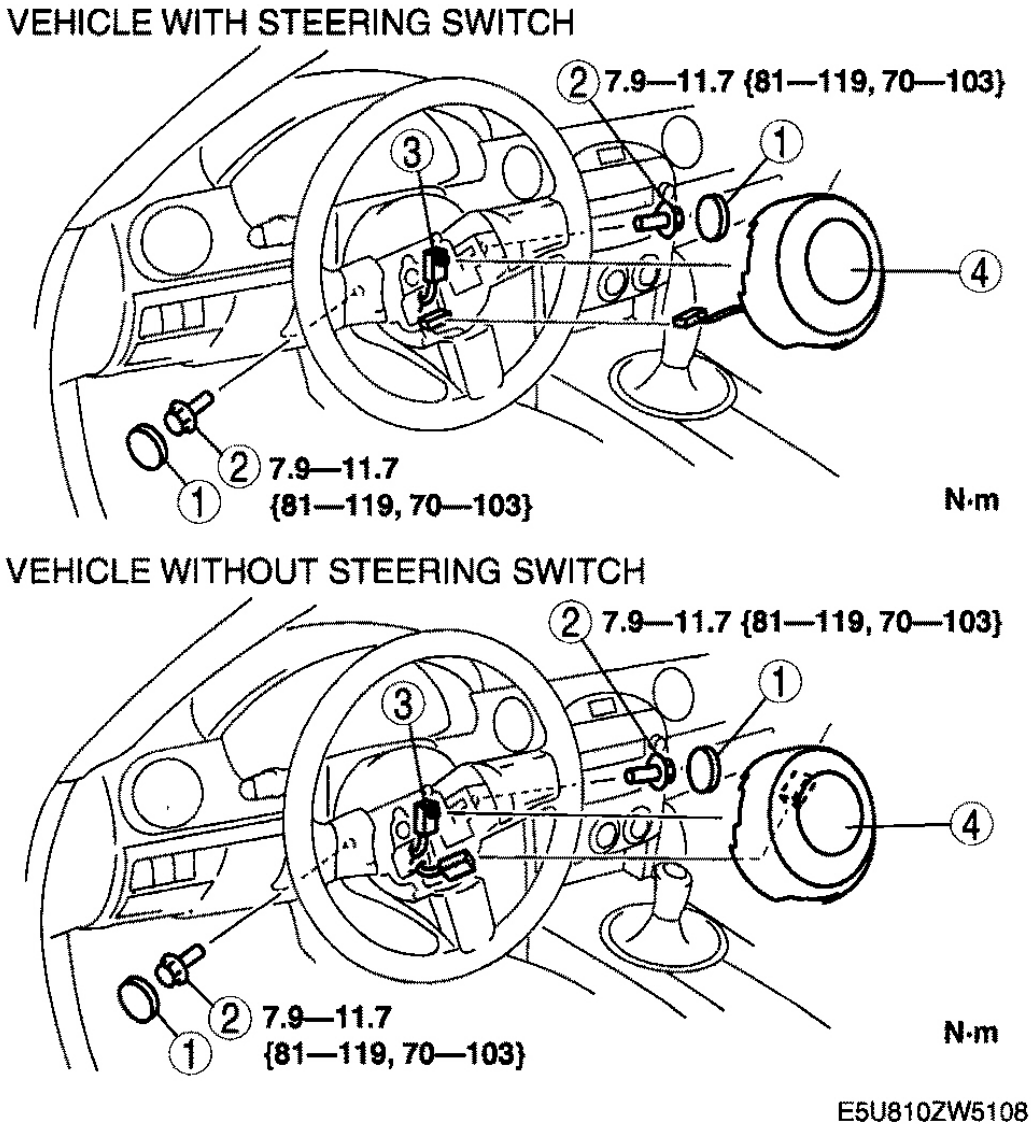
5. Install in the reverse order of removal.

DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION

WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove in the order indicated in **Fig. 10** .



1	Cover
2	Bolt
3	Connector
4	Driver-side air bag module

Fig. 10: Removing/Installing Driver-Side Air Bag Module (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

6. Turn the ignition switch to the ON position.
7. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CONNECTOR REMOVAL NOTE

1. Using a flathead screwdriver, pry out the connector stopper plate.

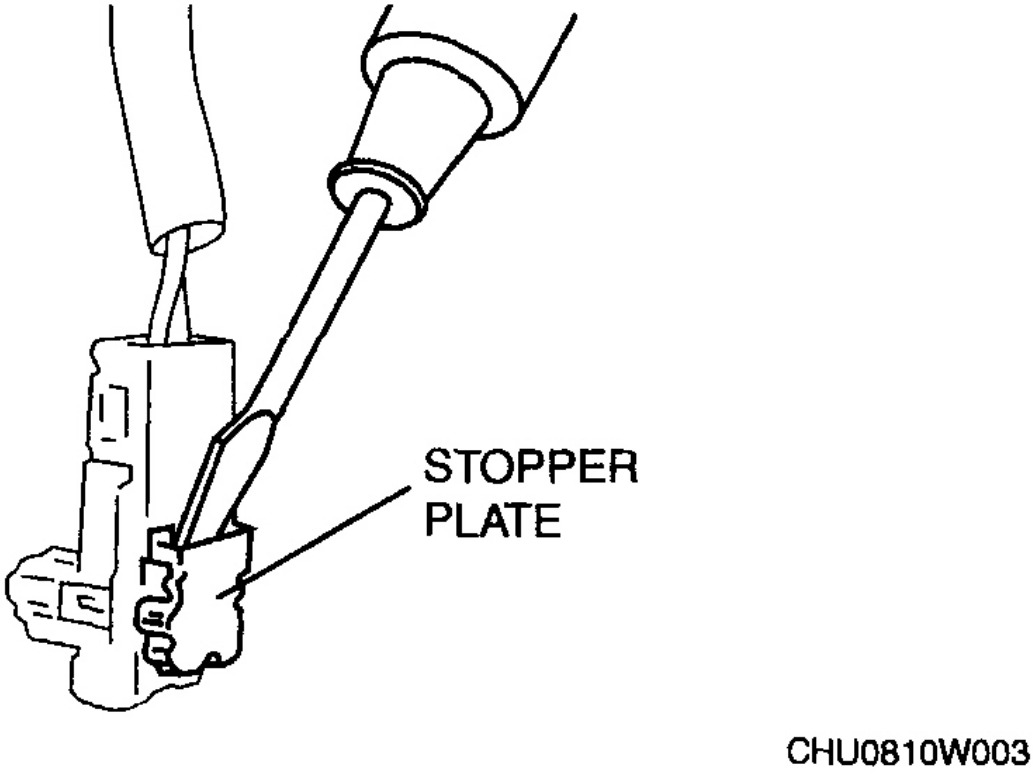


Fig. 11: Prying Out Connector Stopper Plate
Courtesy of MAZDA MOTORS CORP.

2. Disconnect the connector.

PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION

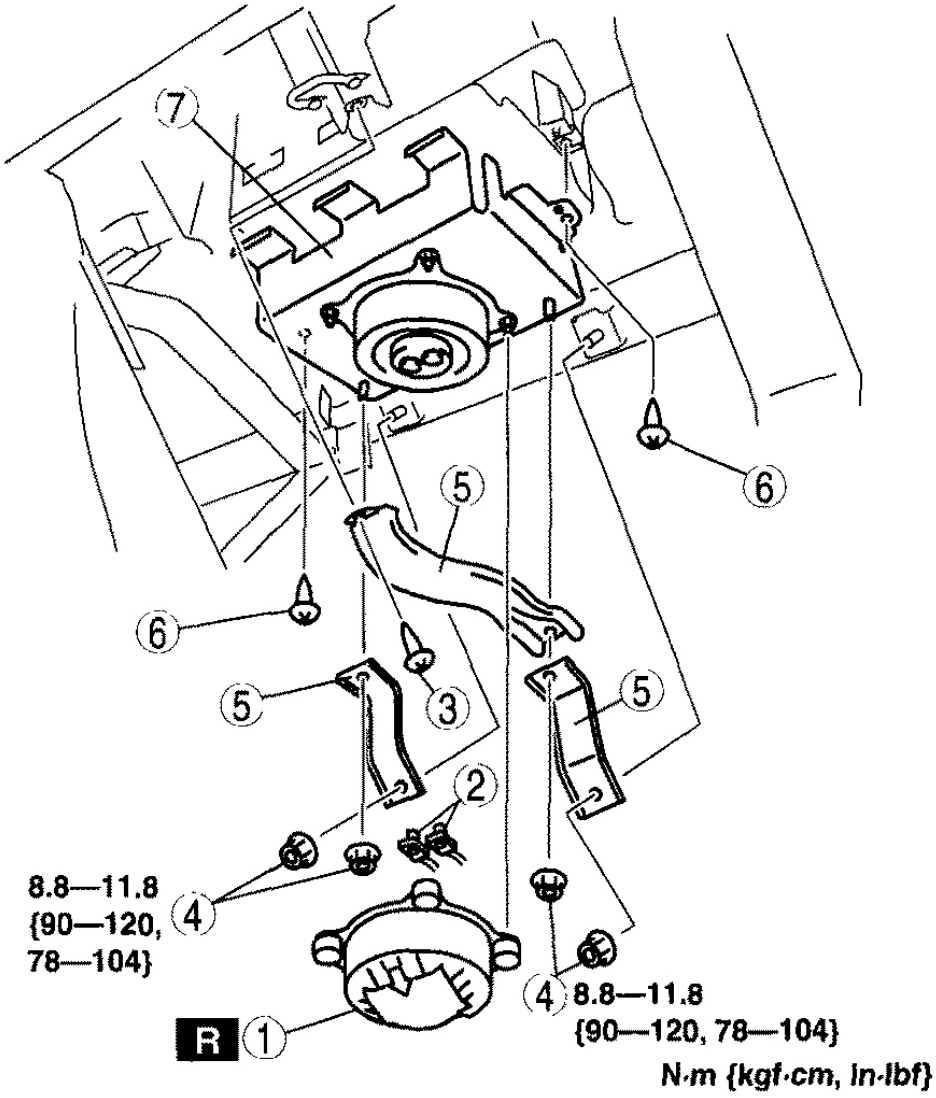
WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read the air bag**

system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)

- **If the passenger-side air bag module is installed with debris in the module, it may be scattered when the air bag module operates (deploys), causing injury. Verify that there is no debris in the passenger-side air bag module before installation.**
- **If a damaged passenger-side air bag module is installed, the vehicle may be damaged or the passenger may be injured when the air bag module operates (deploys). Verify that the passenger-side air bag has no damage before installation.**
- **Due to the adoption of 2-step deployment control in the passenger-side air bag module, depending on the impact force, it is possible that inflator No.2 might not deploy. In such cases, before disposing of the air bag module, make sure to follow the inflator deployment procedures and verify complete deployment of inflators No.1 and 2.**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
5. Remove in the order indicated in **Fig. 12** .



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1	Cap
2	Connector
3	Screw A
4	Nut
5	Bracket
6	Screw B
7	Passenger-side air bag module

Fig. 12: Removing/Installing Passenger-Side Air Bag Module (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.
7. Turn the ignition switch to the ON position.
8. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

PASSENGER-SIDE AIR BAG MODULE REMOVAL NOTE

1. Remove the passenger-side air bag module in the order indicated below.
    1. Disengage the tab locks by sliding the passenger-side air bag module upward.
    2. Slide the passenger-side air bag module rearward.
    3. Remove the passenger-side air bag module by pulling it from the backside and then down.

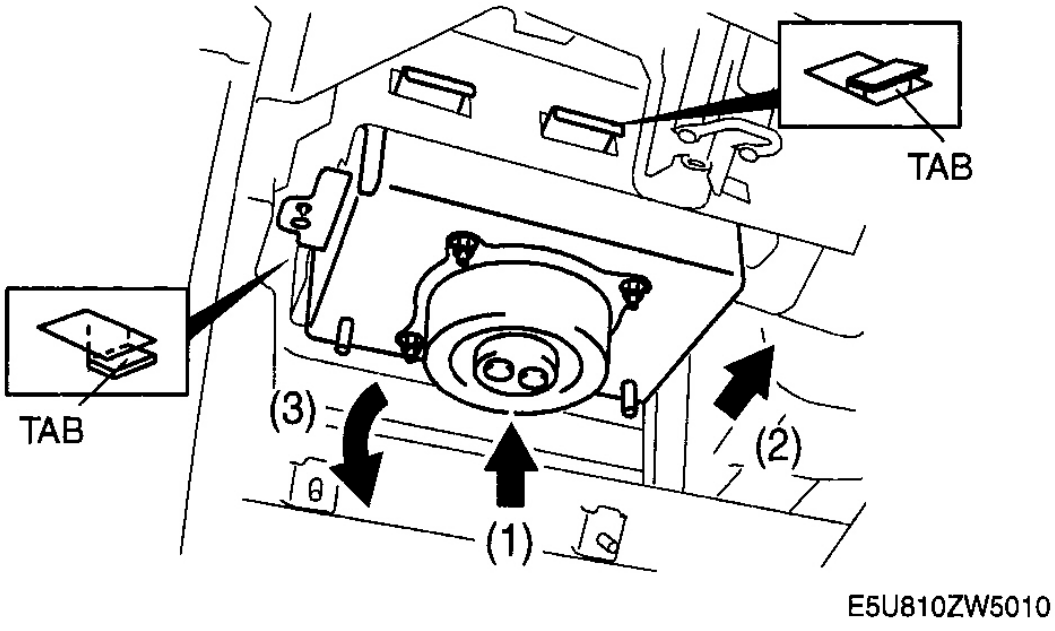


Fig. 13: Removing Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

CONNECTOR REMOVAL NOTE

1. Using a flathead screwdriver, pry out the connector stopper plate.

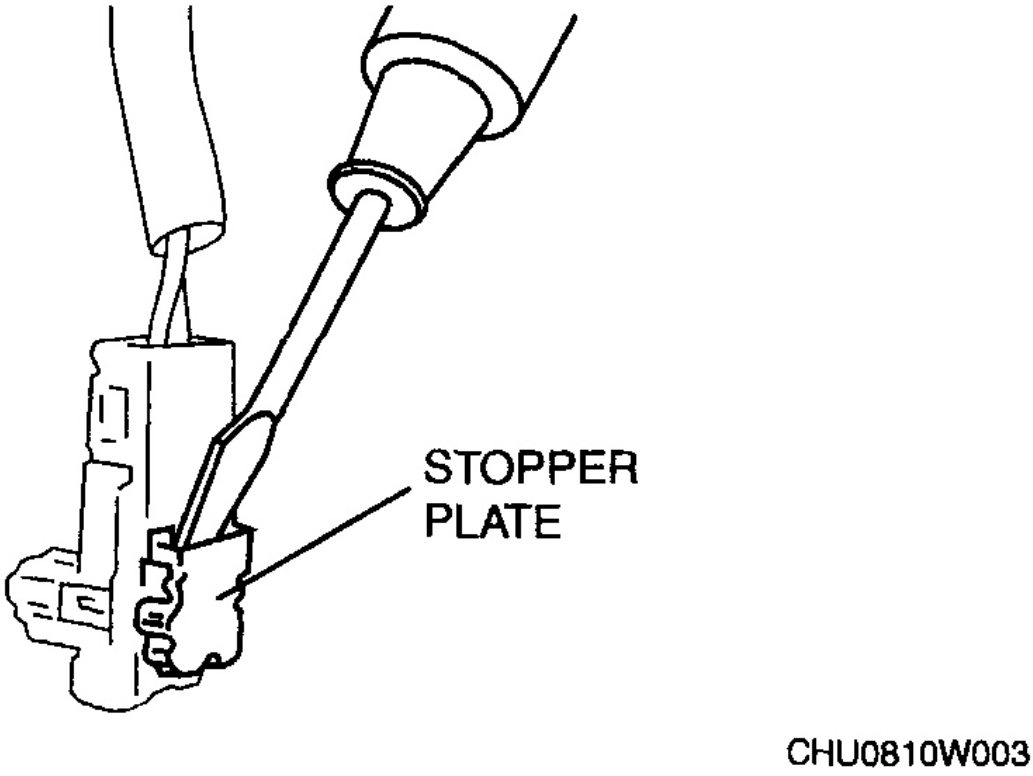


Fig. 14: Prying Out Connector Stopper Plate
Courtesy of MAZDA MOTORS CORP.

2. Disconnect the connector.

CAP INSTALLATION NOTE

1. The cap cannot be reused. Replace the cap with a new one when the cap or the passenger-side air bag module has been removed.

SIDE AIR BAG MODULE REMOVAL/INSTALLATION

WARNING:

- **Handling the air bag module improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**
- **If the side air bag module is installed with debris in the seat back,**

the foreign material may be scattered when the side air bag module operates (deploys), causing injury. Verify that there is no foreign material in the seat back before installing the side air bag module.

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the seat. (See **SEAT REMOVAL/INSTALLATION** .)
5. Detach the tab as shown in **Fig. 15** and remove the connector from the seat connector.

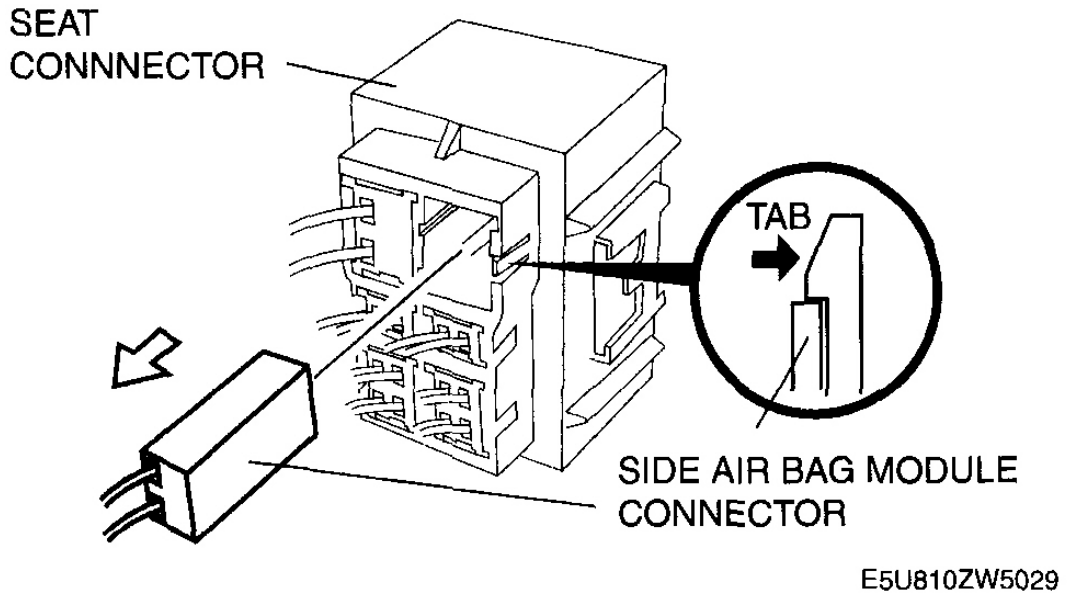
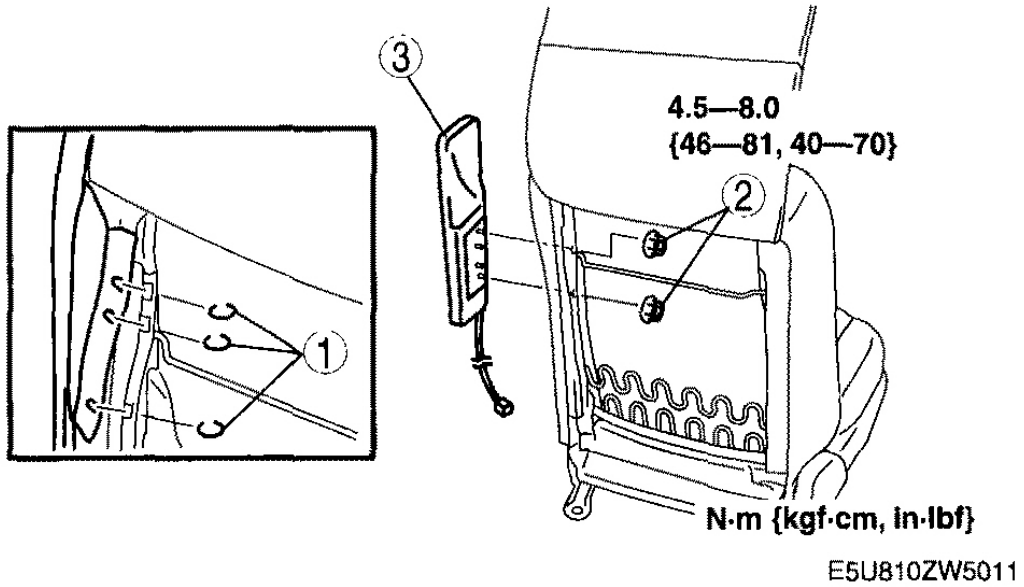


Fig. 15: Detaching Tab
Courtesy of MAZDA MOTORS CORP.

6. Partially peel back the seat back trim.
7. Partially peel back the seat back pad.
8. Remove in the order indicated in **Fig. 16** .



1	Hook
2	Nut
3	Side air bag module

Fig. 16: Removing Side Air Bag Module (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

9. Install in the reverse order of removal.
10. Turn the ignition switch to the ON position.
11. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

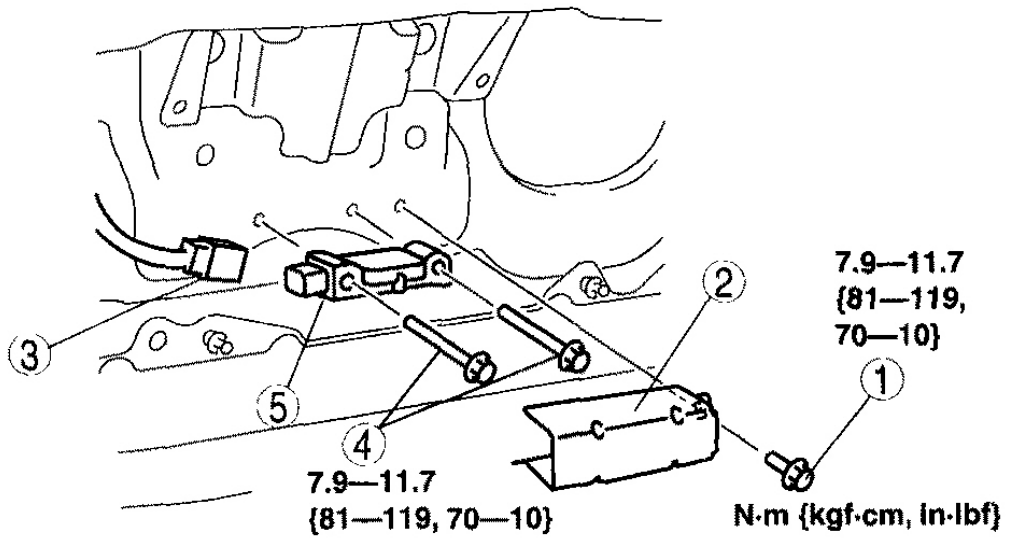
CRASH ZONE SENSOR REMOVAL/INSTALLATION

WARNING:

- **Handling the crash zone sensor improperly can accidentally deploy the air bags and pre-tensioner seat belts, which may seriously injure you. Read the air bag system service warnings and cautions before handling the crash zone sensor. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.

3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
5. Remove the fresh-air duct. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
6. Remove in the order indicated in **Fig. 17** .



1	Bolt A
2	Cover
3	Connector
4	Bolt B
5	Crash zone sensor

Fig. 17: Removing/Installing Crash Zone Sensor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. Turn the ignition switch to the ON position.
9. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

SAS CONTROL MODULE REMOVAL/INSTALLATION

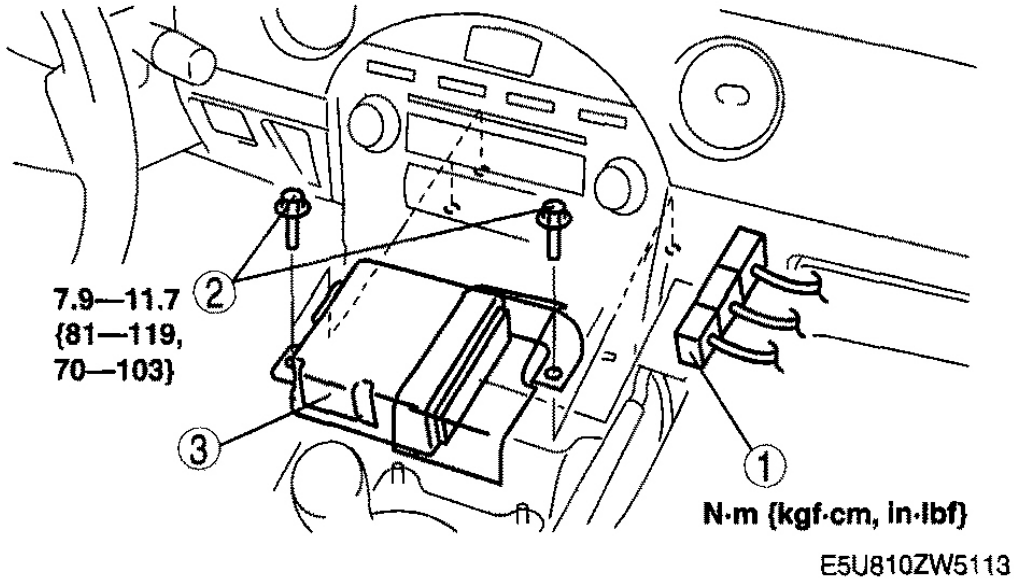
WARNING:

- **Handling the SAS control module improperly can accidentally deploy the air bag modules and pre-tensioner seat belt, which may seriously injure you. Read the air bag system service warnings and cautions before handling the SAS control module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

CAUTION:

- **Handling the SAS control module improperly can accidentally deploy the air bag modules and pre-tensioner seat belt, which may seriously injure you. If configuration is not completed before removing the SAS control module, DTC B2477 will be displayed.**

1. Perform SAS control module configuration when replacing it. (See **SAS CONTROL MODULE CONFIGURATIONS** .)
2. Turn the ignition switch to the LOCK position.
3. Remove the battery cover.
4. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    3. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
6. Remove in the order indicated in **Fig. 18** .



1	Connector
2	Bolt
3	SAS control module

Fig. 18: Removing/Installing SAS Control Module (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. Turn the ignition switch to the ON position.
   - If the SAS control module is replaced, turn the ignition switch to the ON position for **20 s or more** after completing the configuration. (See **SAS CONTROL MODULE CONFIGURATION** .)
9. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

SAS CONTROL MODULE CONFIGURATION

1. Connect the M-MDS to the DLC-2 Connector.

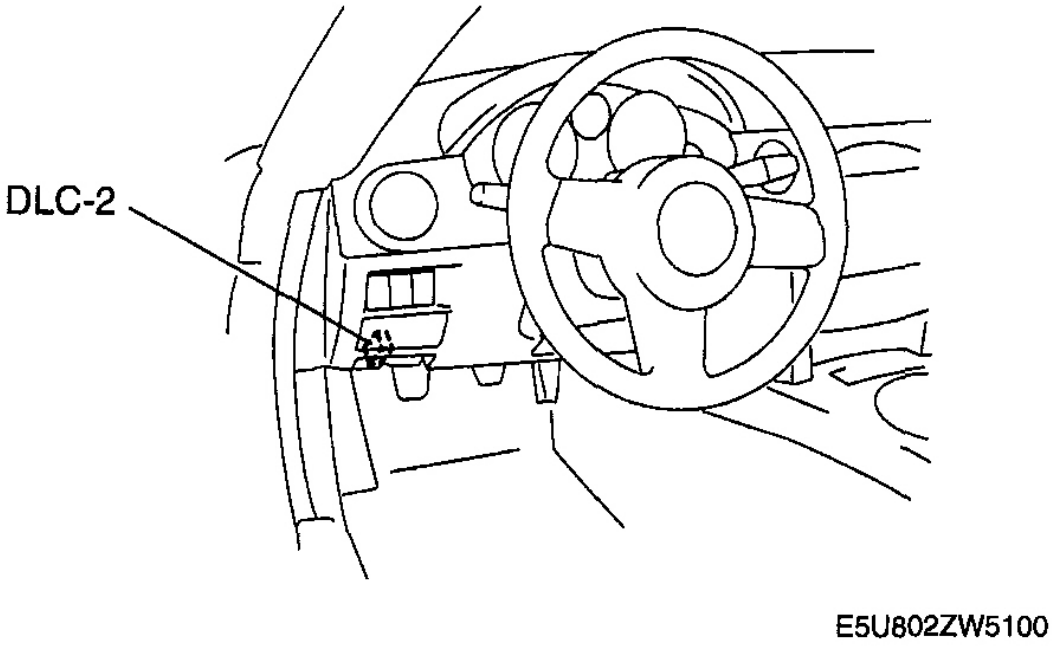


Fig. 19: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (Laptop PC)
        1. Select "Programming".
    - When using the PDS (Pocket PC)
        1. Select "Programming".
        2. Select "Module Programming".
3. Then Select the "Programmable Module Installation" and "RCM" from the screen menu.
4. Perform the configuration according to the directions on the screen.
5. Retrieve DTCs using the M-MDS, then verify if DTCs are present.
    - If a DTC is present, perform the applicable DTC inspection.

SEAT TRACK POSITION SENSOR REMOVAL/INSTALLATION

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the driver's seat. (See **SEAT REMOVAL/INSTALLATION** .)

5. Detach the tab as shown in **Fig. 20** and remove the connector from the seat connector.

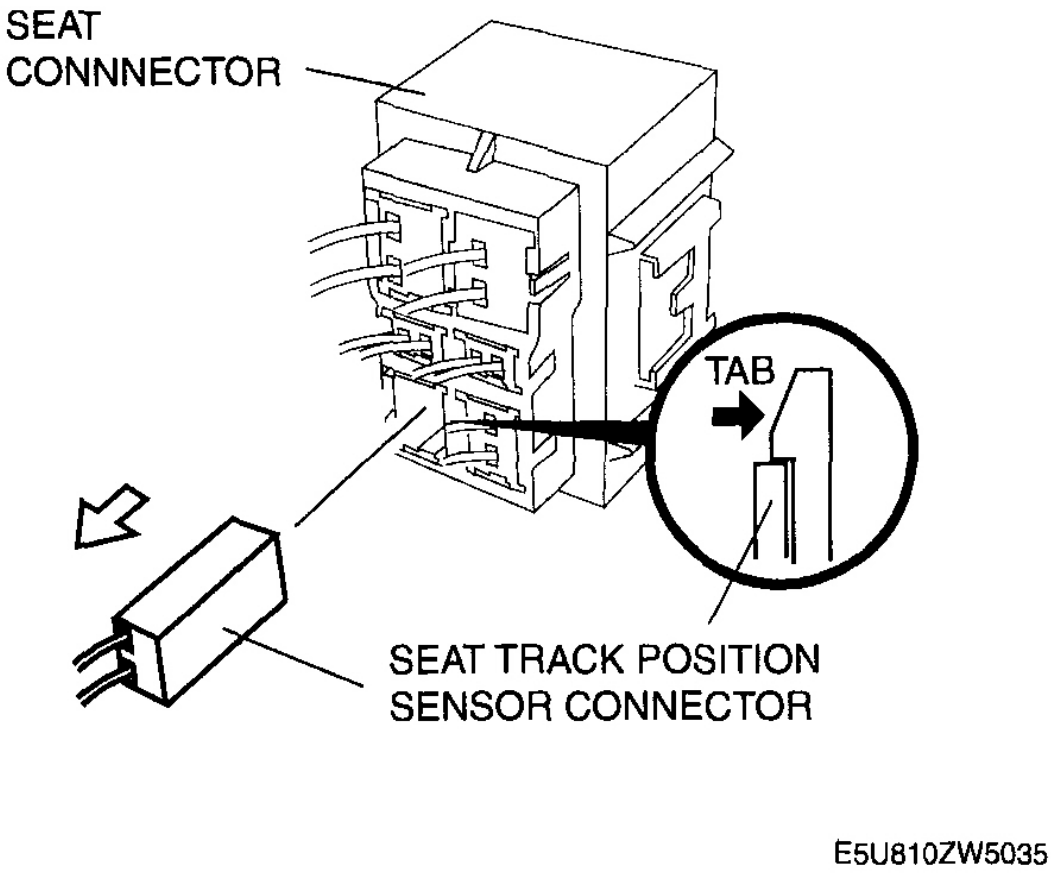
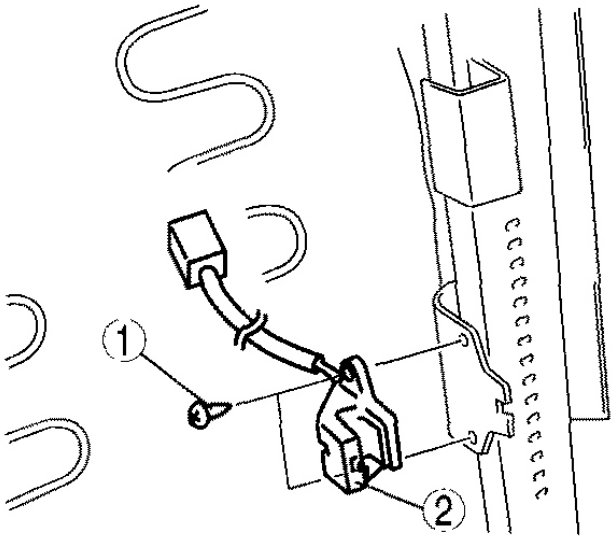


Fig. 20: Detaching Seat Connector Tab & Removing Connector From Seat Connector
Courtesy of MAZDA MOTORS CORP.

6. Remove in the order indicated in **Fig. 21** .



E5U810ZW5014

1	Screw
2	Seat track position sensor

Fig. 21: Removing Connector From Seat Connector
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.

SEAT TRACK POSITION SENSOR INSTALLATION NOTE

- Verify that the seat track position sensor is not contacting the metal plate.

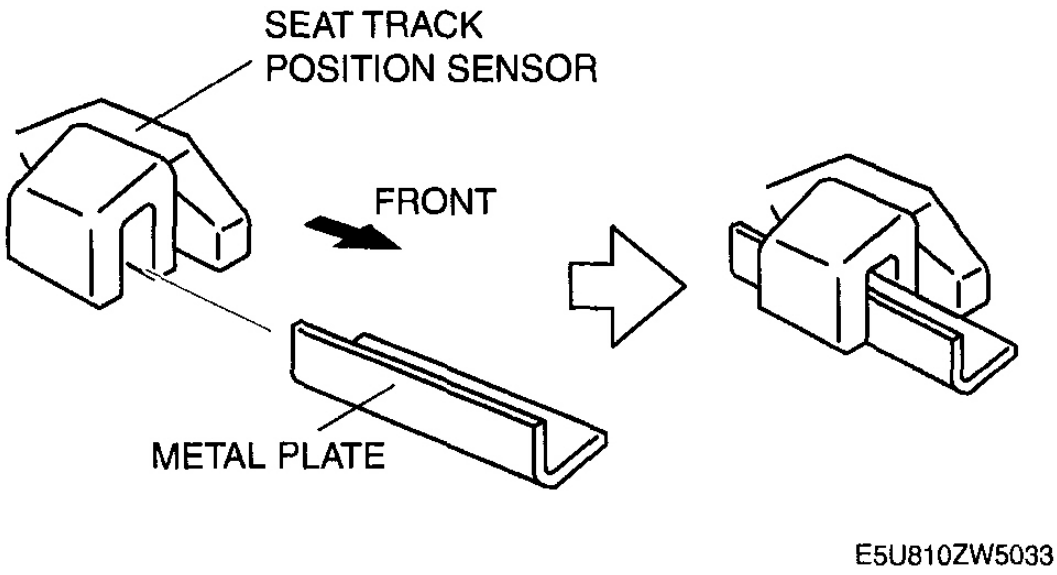
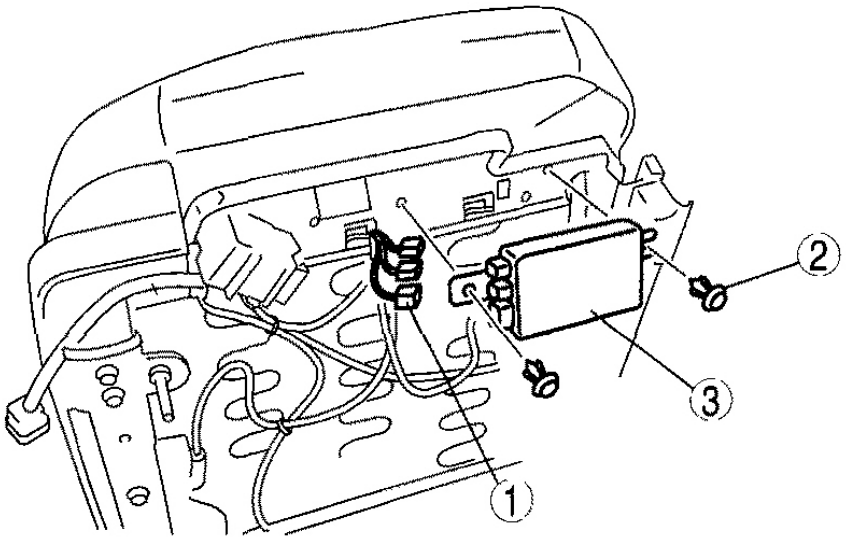


Fig. 22: Installing Seat Track Position Sensor
Courtesy of MAZDA MOTORS CORP.

SEAT WEIGHT SENSOR CONTROL MODULE REMOVAL/INSTALLATION

CAUTION:
- **When the seat weight sensor control module is replaced with a new one, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove in the order indicated in **Fig. 23** .



E5U810ZW5015

1	Connector
2	Fasner
3	Seat weight sensor control module

Fig. 23: Removing/Installing Seat Weight Sensor Control Module
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

SEAT WEIGHT SENSOR CALIBRATION

CAUTION:

- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent.**
  - **Replacement with a new seat weight sensor**
  - **Replacement with a new seat weight sensor control module**
  - **Replacement with new passenger-side seat parts**
  - **Disassembly of the passenger-side seat**
- **If any of the following work is performed, perform the seat weight sensor inspection using the WDS or equivalent. (See SEAT WEIGHT SENSOR INSPECTION .)**
  - **Removal of the passenger-side seat**
  - **Loosening and retightening of passenger's seat fixing bolts**

- **Or, the vehicle is involved in a collision**

1. Have two **20 kg {44 lb}** weights ready to use.
2. Connect the WDS or equivalent to the DLC-2 (16-pin).

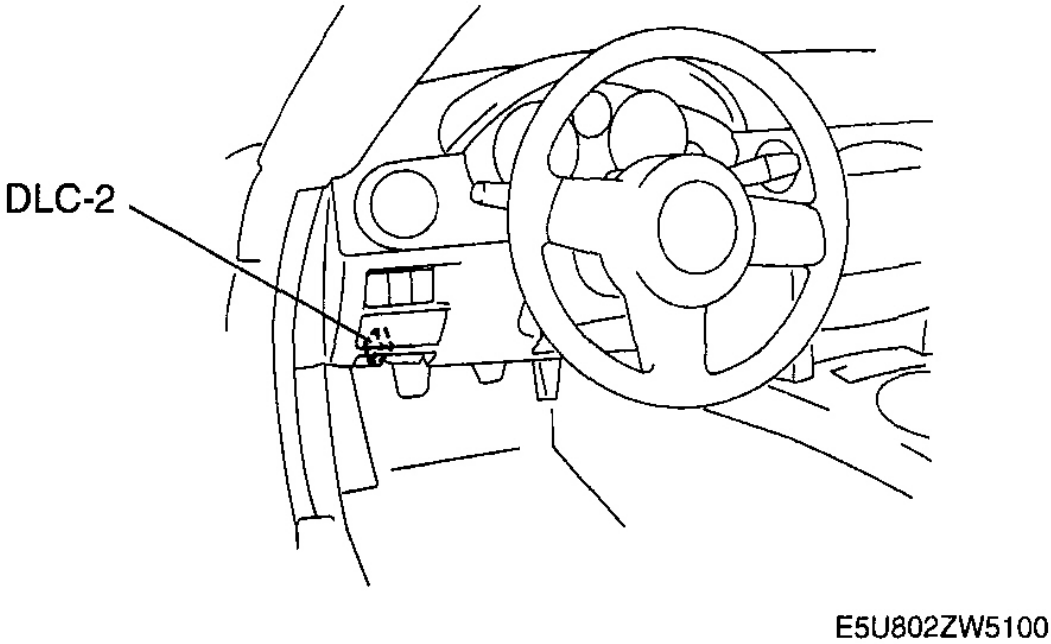


Fig. 24: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

3. Select "Body" from the menu.
4. Select "Restraints".
5. Select "Seat Weight Sensor ReZero Procedure".
6. Perform calibration following the procedures on the WDS or equivalent screen.

NOTE:

- **When "Lightly pat the passenger seat cushion" is displayed on the WDS or equivalent screen, lightly pat horizontally approx. five times on the headrest or upper side of the seat back trim of the passenger-side front seat.**

SEAT WEIGHT SENSOR INSPECTION

CAUTION:

- **If any of the following work is performed, perform the seat weight**

sensor inspection using the WDS or equivalent.

- **Removal of the passenger-side seat**
- **Loosening and retightening of passenger's seat fixing bolts**
- **Or, the vehicle is involved in a collision**

- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**
  - **Replacement with a new seat weight sensor**
  - **Replacement with a new seat weight sensor control module**
  - **Replacement with new passenger-side seat parts**
  - **Disassembly of the passenger-side seat**

1. Connect the WDS or equivalent to the DLC-2 (16-pin).

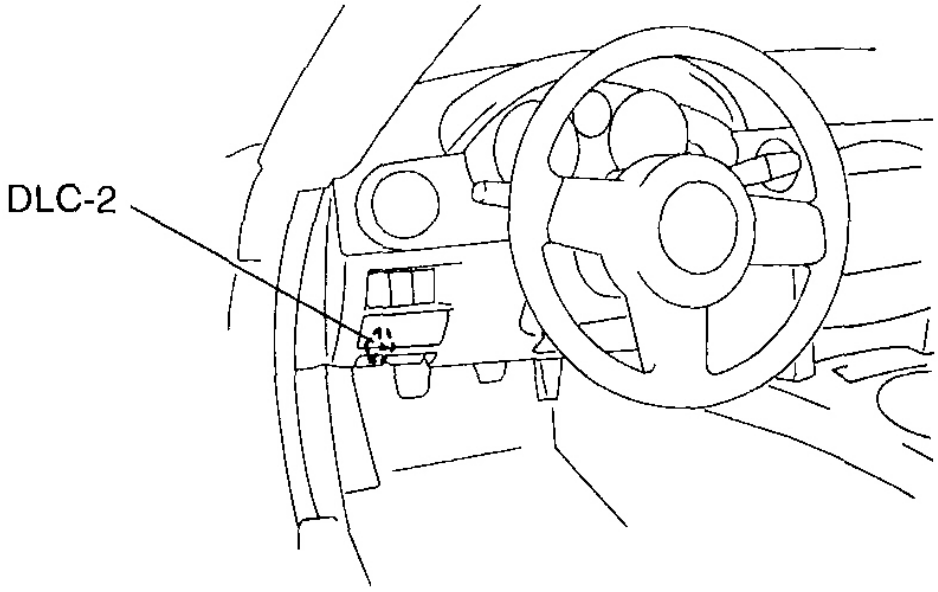


Fig. 25: Identifying DLC-2 Location
Courtesy of MAZDA MOTORS CORP.

2. Select "Body" from the menu.
3. Select "Restraints".
4. Select "Seat Weight Sensor ReZero Procedure".
5. Perform inspection following the procedures on the WDS or equivalent screen.

PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
4. Disconnect the connector.
5. Remove the PAD switch.

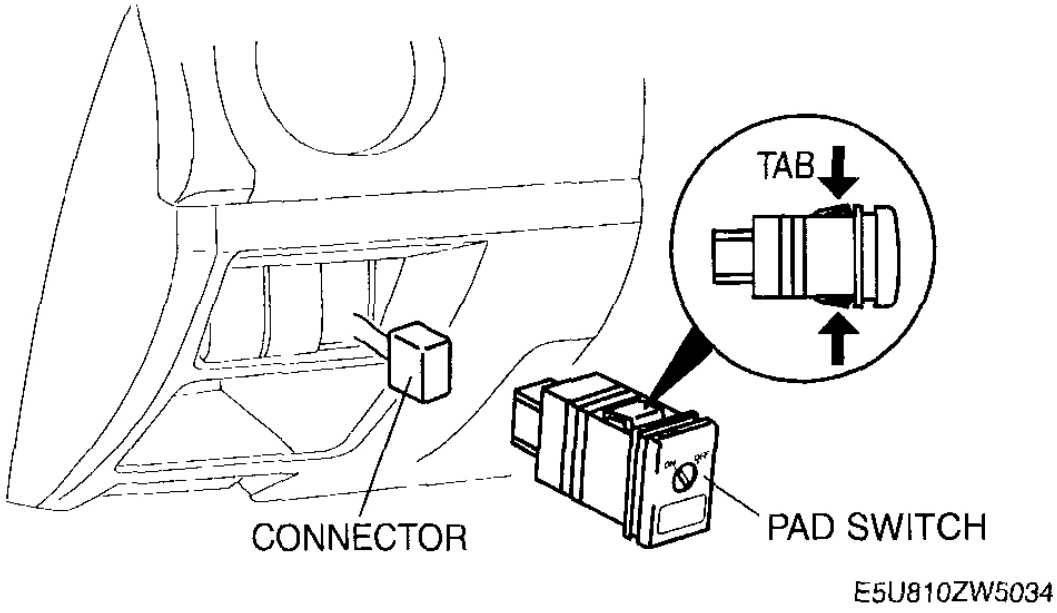


Fig. 26: Removing/Installing Passenger Air Bag Deactivation (PAD) Switch
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.
7. Turn the ignition switch to the ON position.
8. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH INSPECTION

1. Remove the PAD switch. (See **PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH REMOVAL/INSTALLATION** .)

2. Verify that the continuity between the PAD switch terminals is as indicated in **Fig. 27** .
   - If not as indicated in **Fig. 27** , replace the PAD switch.

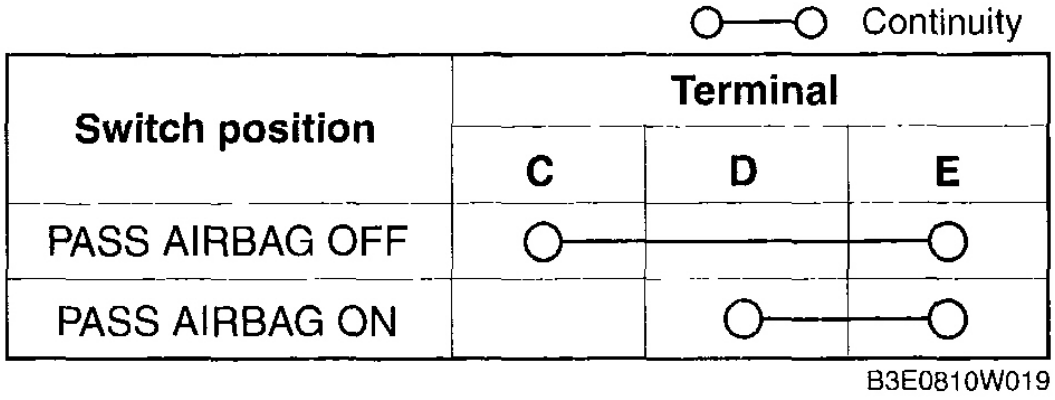


Fig. 27: PAD Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

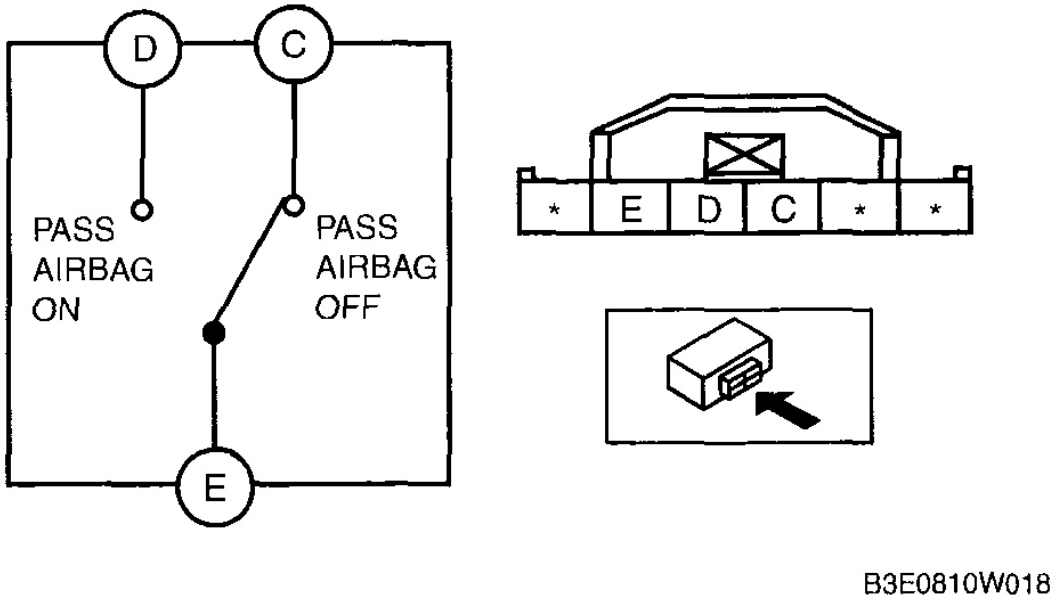


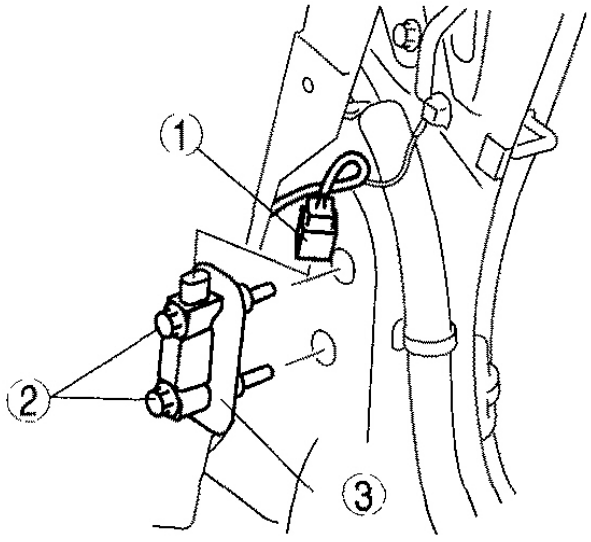
Fig. 28: Inspecting Passenger Air Bag Deactivation (PAD) Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

SIDE AIR BAG SENSOR REMOVAL/INSTALLATION

WARNING:

- **Handling the side air bag sensor improperly can accidentally operate (deploy) the air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the side air bag sensor. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
5. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
6. Remove the tire house trim. (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
7. Remove in the order indicated in **Fig. 29** .



E5U810ZW5016

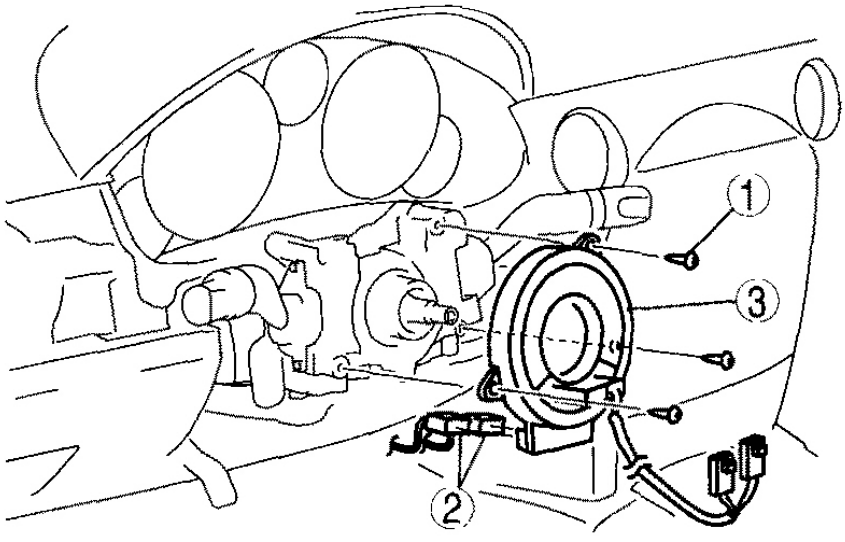
1	Connector
2	Bolt
3	Side air bag sensor

Fig. 29: Removing/Installing Side Air Bag Sensor
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Turn the ignition switch to the ON position and hold for **5 s or more** .
10. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
    - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CLOCK SPRING REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
    2. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
    3. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 30** .



E5U810ZW5017

1	Screw
2	Connector
3	Clock spring

Fig. 30: Clock Spring Removing/Installing Steps

Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. Turn the ignition switch to the ON position.
7. Verify that the air bag system warning light illuminates for **approx. 6 s** and goes out.
   - If the air bag system warning light does not operate normally, refer to **RESTRAINTS -- ON-BOARD DIAGNOSTIC** system (air bag system) and perform inspection of the system.

CLOCK SPRING INSTALLATION NOTE

CAUTION:
- **If the clock spring is not adjusted, the spring wire in the clock spring could over-wind and break when the steering wheel is turned. Always adjust the clock spring after installing it.**

1. Adjust the clock spring after installing it. (See **CLOCK SPRING ADJUSTMENT** .)

CLOCK SPRING ADJUSTMENT

NOTE:
- **The adjustment procedure is also specified on the caution label of the clock spring.**

1. Set the front tires straight-ahead.

CAUTION:
- **The clock spring will break if over-wound. Do not forcibly turn the clock spring.**

2. Turn the clock spring clockwise until it stops.

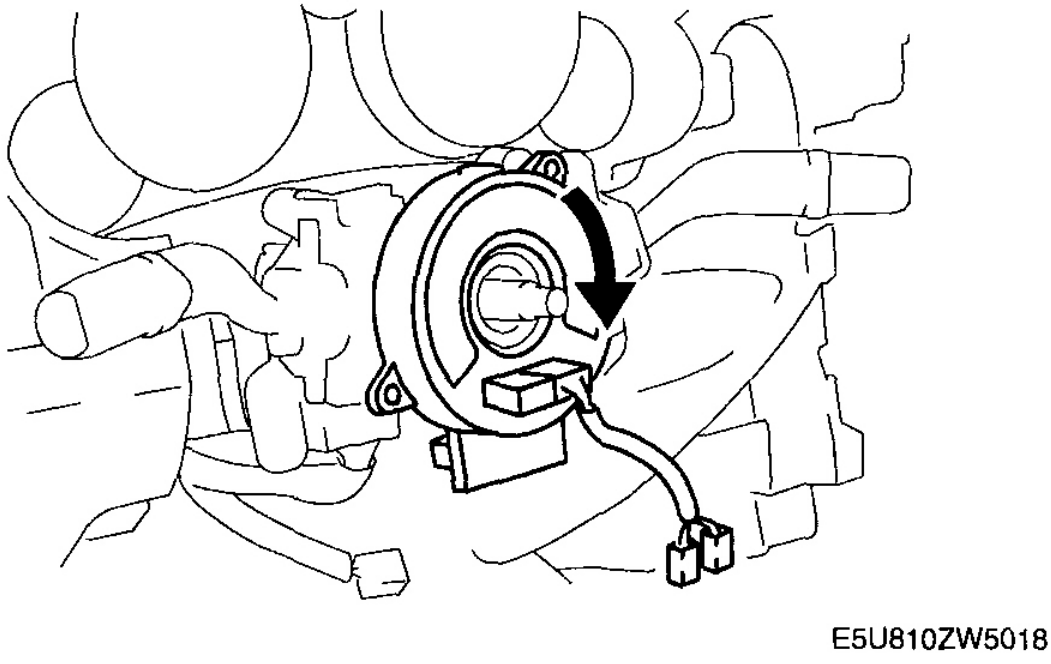


Fig. 31: Turning Clock Spring Clockwise
Courtesy of MAZDA MOTORS CORP.

3. From the stopped position, turn the clock spring counterclockwise **2 3/4 turns** .

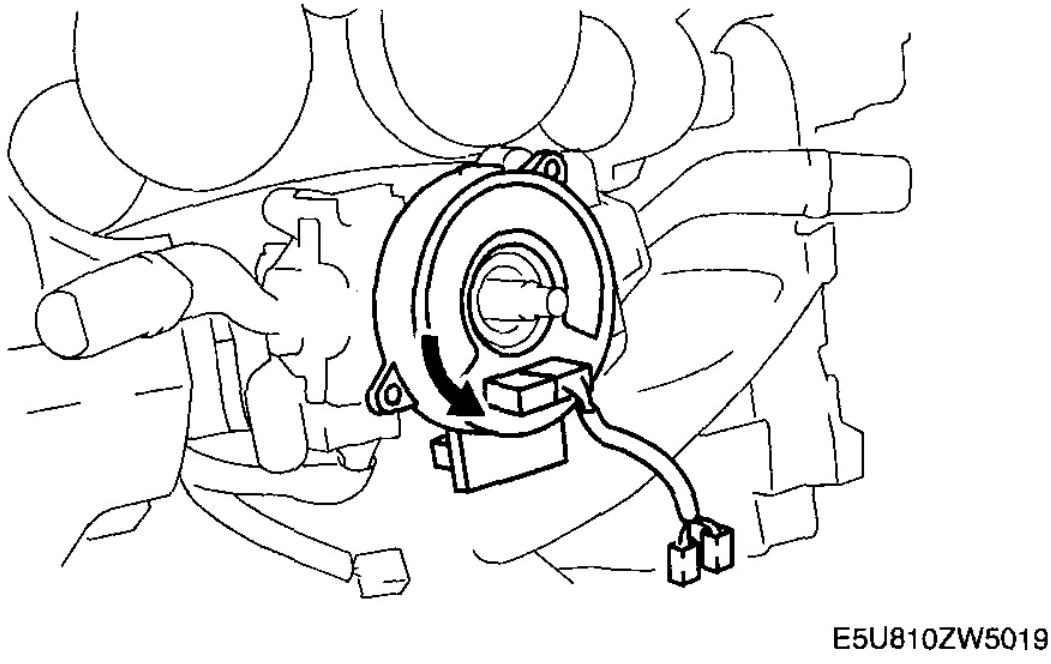


Fig. 32: Turning Clock Spring Counterclockwise 2 3/4 Turns
Courtesy of MAZDA MOTORS CORP.

4. Align the mark on the clock spring with the mark on the outer housing.

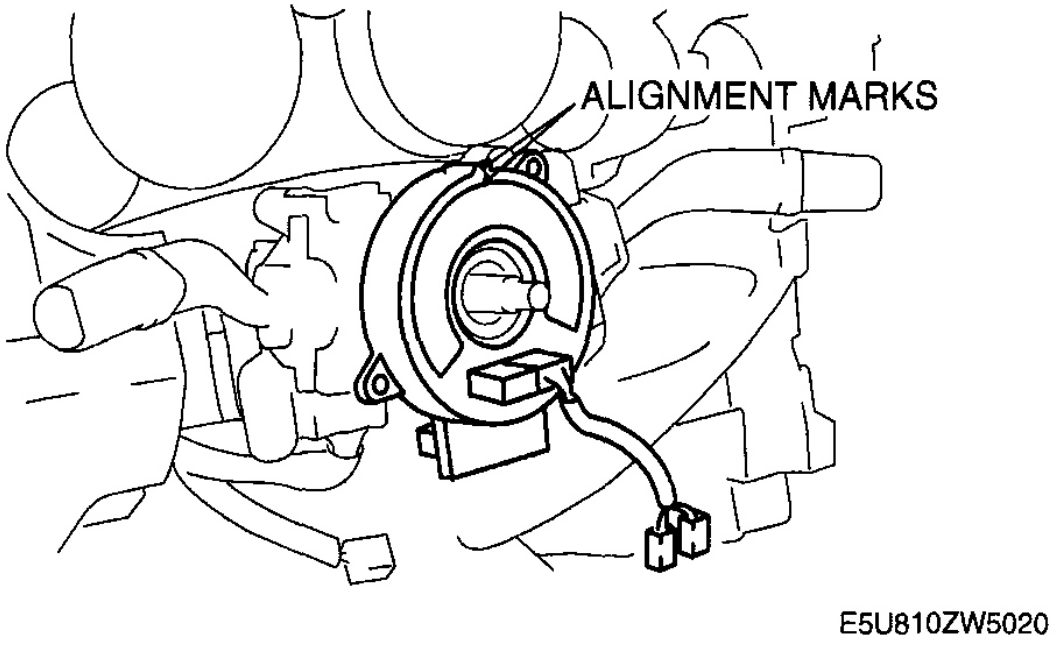


Fig. 33: Aligning Mark On Clock Spring With Mark On Outer Housing
Courtesy of MAZDA MOTORS CORP.

CLOCK SPRING INSPECTION

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Remove the steering wheel. (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
3. Remove the clock spring. (See **CLOCK SPRING REMOVAL/INSTALLATION** .)
4. Verify that the continuity is as indicated in **Fig. 34** .
   - If not as indicated in **Fig. 34** , replace the clock spring.

NOTE:

- **When the vehicle-side connector for the clock spring is disconnected, terminals 1A, 1B, 1C and 1D are shorted to prevent unexpected operation (deployment) of the air bag module.**

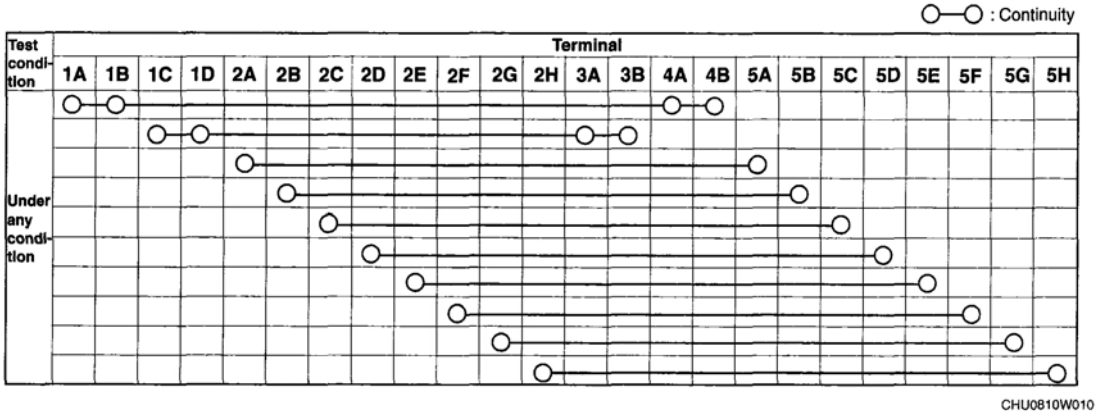


Fig. 34: Clock Spring Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

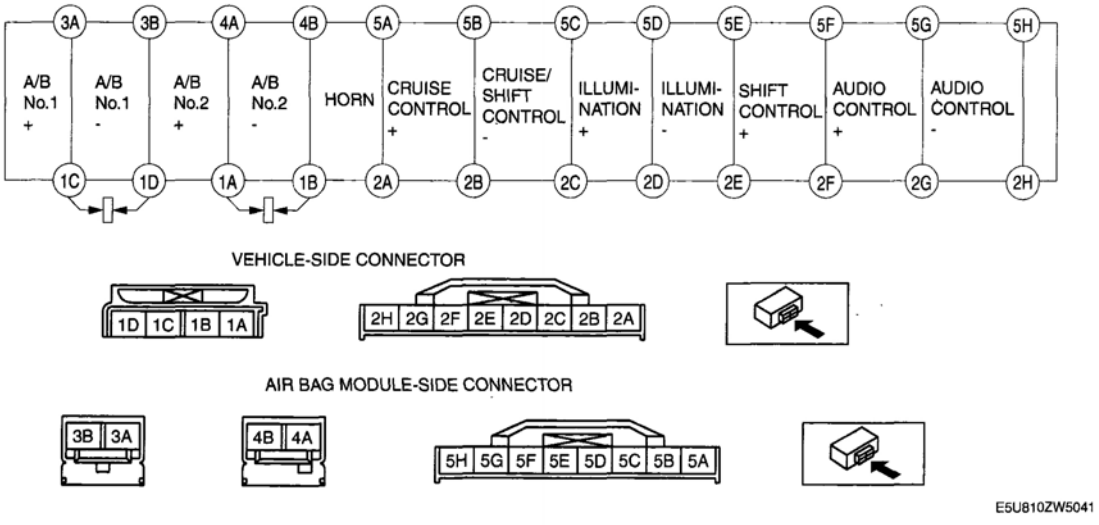


Fig. 35: Identifying Clock Spring Connector Terminals
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DEPLOYMENT PROCEDURES

WARNING:

- **A live (undeployed) air bag module or pre-tensioner seat belt may accidentally operate (deploy) when it is disposed of and cause serious injury. Do not dispose of a live (undeployed) air bag module and pre-tensioner seat belt. If the SSTs (Deployment tool and Adapter harness) are not available, consult the nearest Mazda representative for assistance.**

CAUTION:

- **Deploying the air bag modules and pre-tensioner seat belts inside the vehicle may cause damage to the vehicle interior. When the vehicle is not to be scrapped, always deploy the air bag modules and pre-tensioner seat belts outside the vehicle.**

- If the vehicle is to be scrapped, or when disposing of any air bag modules or pre-tensioner seat belts, operate (deploy) them inside the vehicle by following the deployment procedure below and using the **SST** (Deployment tool).
- When disposing of an operated (deployed) air bag module and pre-tensioner seat belt, refer to **AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DISPOSAL PROCEDURES** .

DEPLOYMENT PROCEDURE FOR INSIDE OF VEHICLE

1. Inspect the **SST** (Deployment tool). (See **INSPECTION OF SST (DEPLOYMENT TOOL)** .)
2. Move the vehicle to an open space, away from strong winds, and close all of the vehicle doors and windows.
3. Turn the ignition switch to the LOCK position.
4. Remove the battery cover.
5. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
6. Follow the procedure below for operating (deploying) the applicable air bag module or pre-tensioner seat belt.

DRIVER-SIDE AIR BAG MODULE

WARNING:

- **The driver-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both driver-side air bag module inflators simultaneously, following the procedure below.**

NOTE:

- **The SSTs , two types of adapter harnesses (for inflators No.1 and No.2) and two deployment tools are to be used to operate (deploy) the driver-side air bag module.**

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the driver-side air bag module as shown in **Fig. 36** .
3. Install the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)

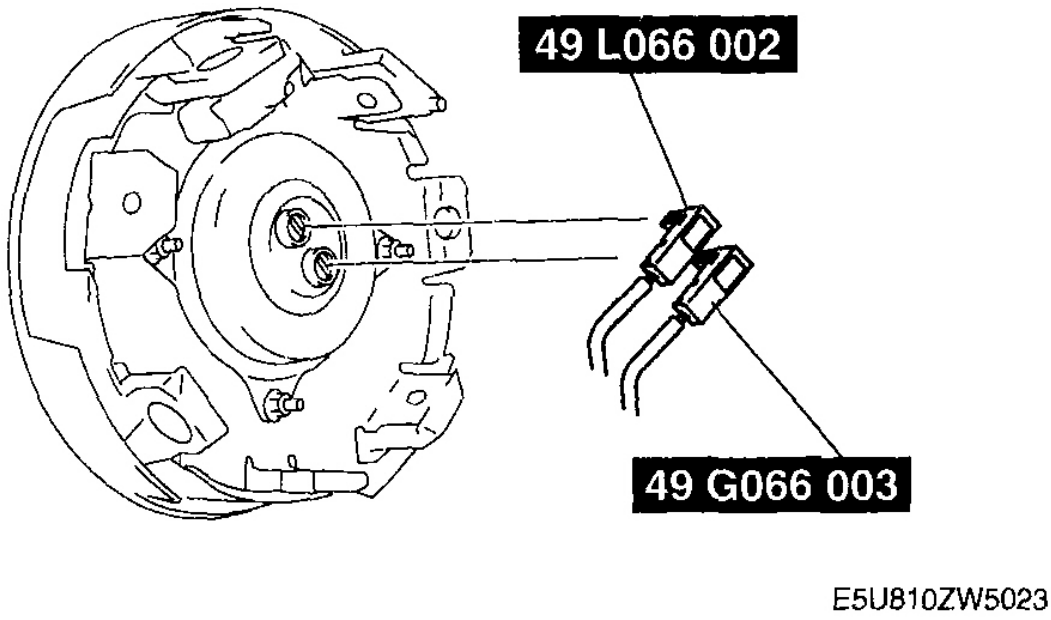


Fig. 36: Connecting SSTs (Adapter Harness) To Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

4. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).

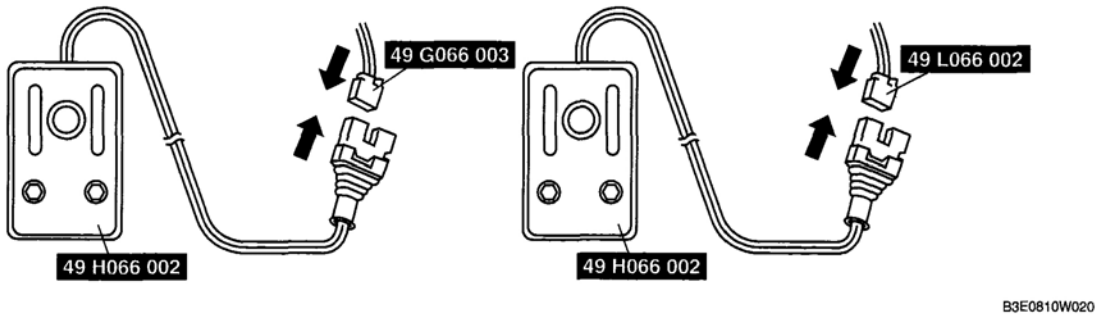


Fig. 37: Connecting SSTs (Deployment tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

5. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.
8. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow

connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

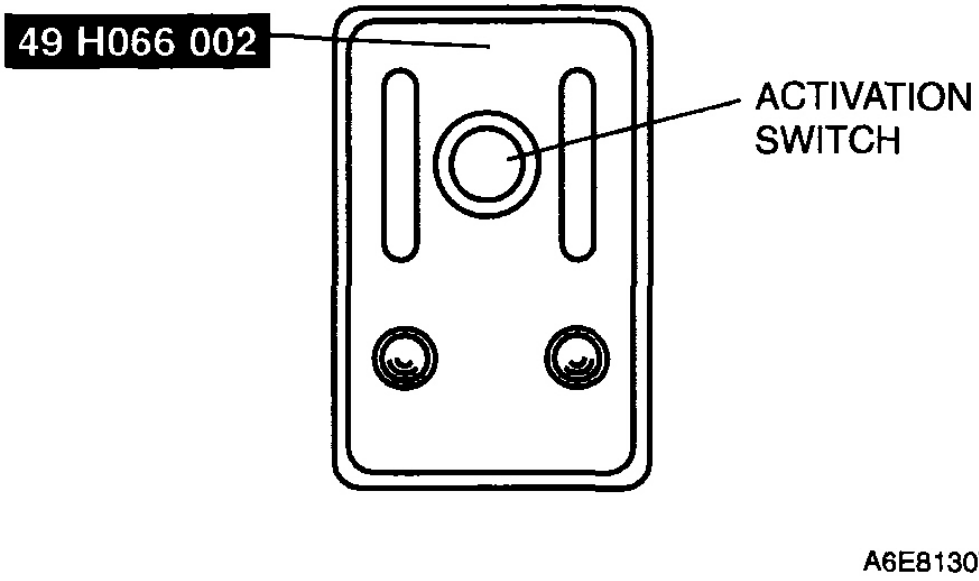


Fig. 38: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can get burned. Do not touch the air bag module for at least 15 min after deployment.**

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

PASSENGER-SIDE AIR BAG MODULE

WARNING:

- **The passenger-side air bag module is a dual inflator type. If one**

inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both passenger-side air bag module inflators simultaneously, following the procedure below.

NOTE:

- **The SSTs , two types of adapter harnesses (for inflators No.1 and No.2) and two deployment tools are to be used to operate (deploy) the passenger-side air bag module.**

1. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
2. Disconnect the passenger-side air bag module connector.
3. Connect the **SSTs** (Adapter harness) to the passenger-side air bag module as shown in **Fig. 39** .
4. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).

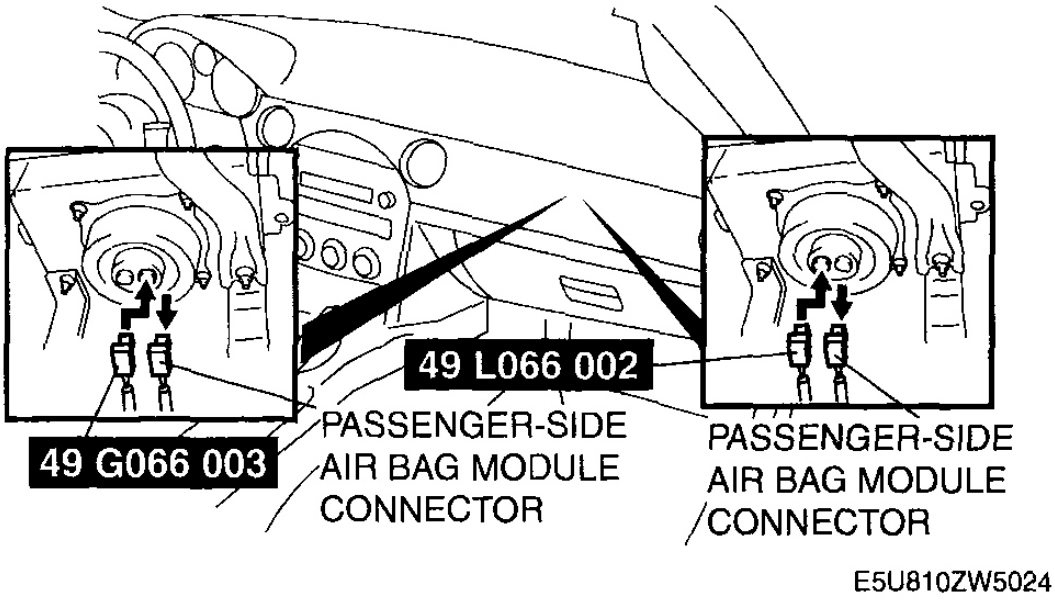


Fig. 39: Connecting SSTs (Adapter Harness) To Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

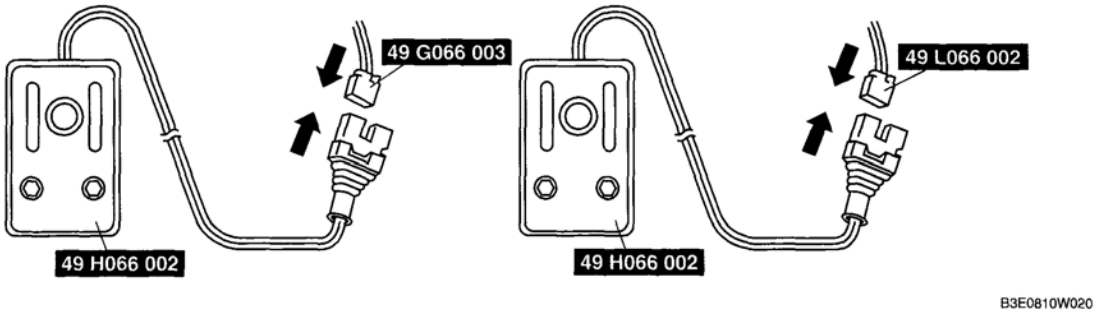


Fig. 40: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

5. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.
8. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

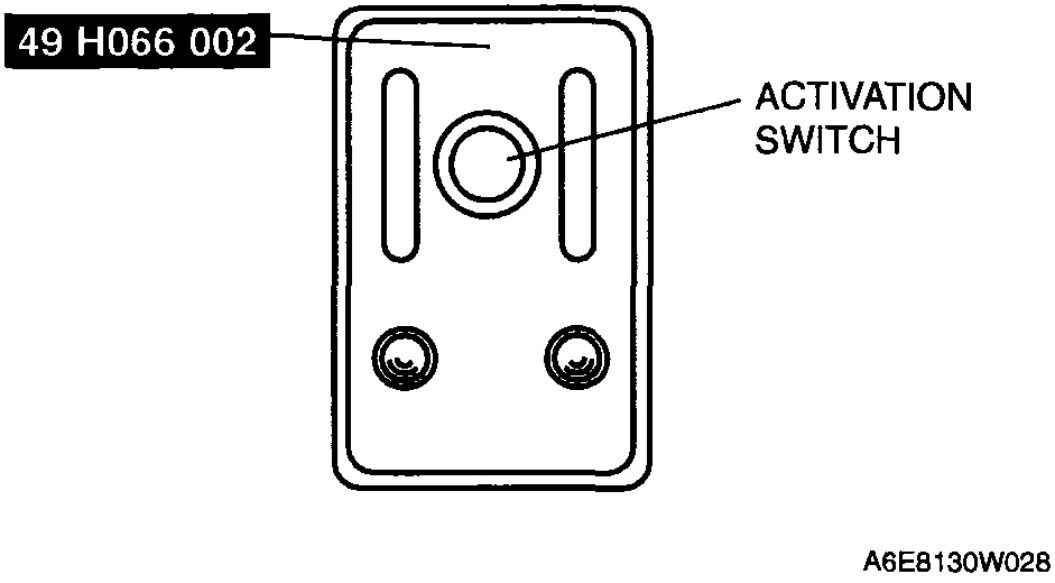


Fig. 41: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

SIDE AIR BAG MODULE

1. Disconnect the seat connector.
2. Connect the **SST** (Adapter harness) to the side air bag module as shown in **Fig. 42** .

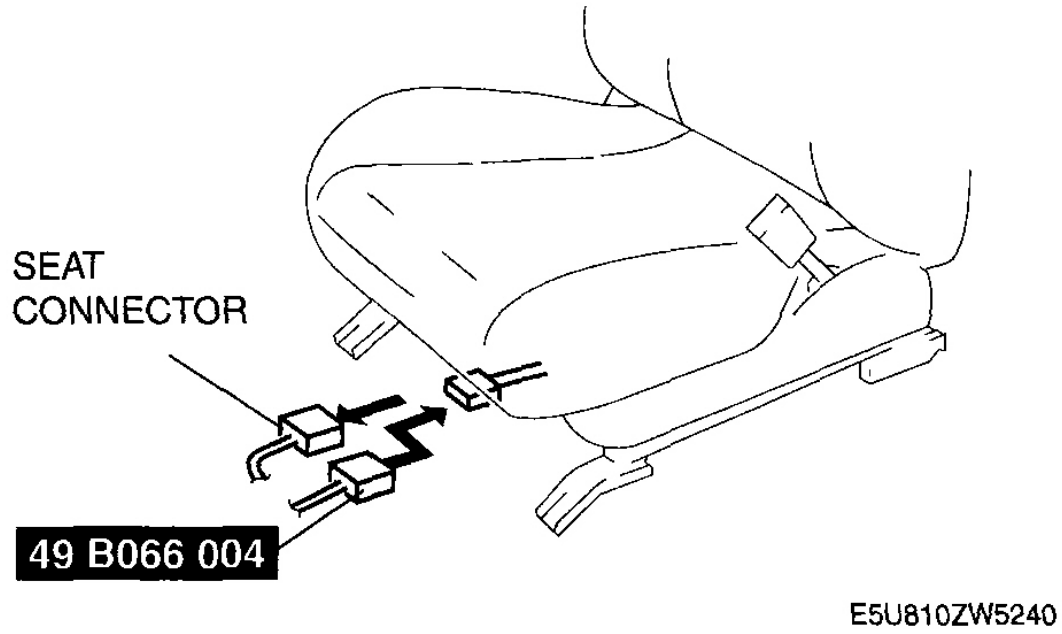


Fig. 42: Connecting SST (Adapter Harness) To Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
4. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
5. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
6. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

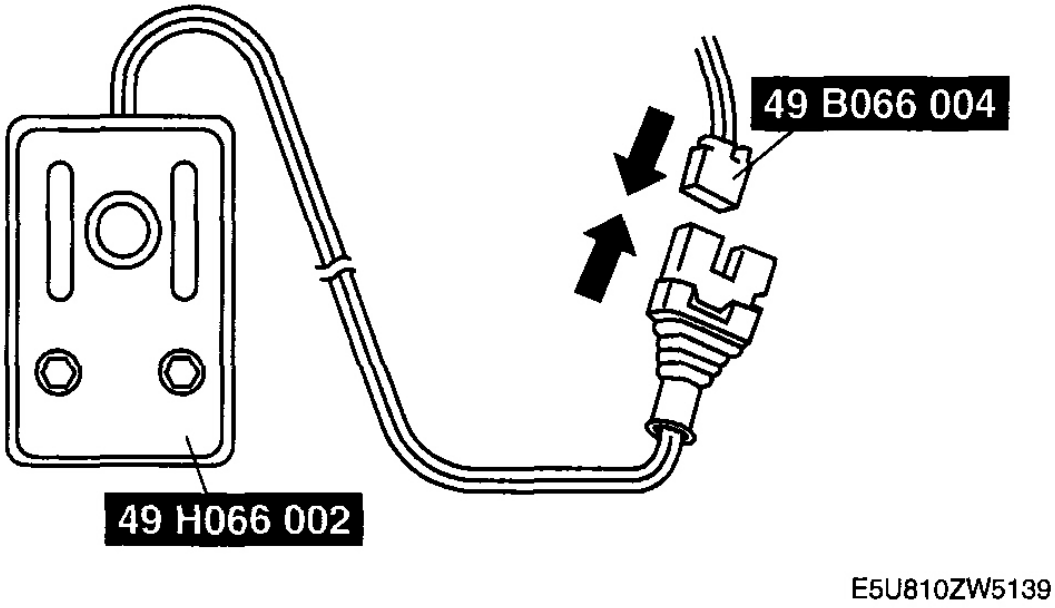


Fig. 43: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

7. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the side air bag module.
8. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

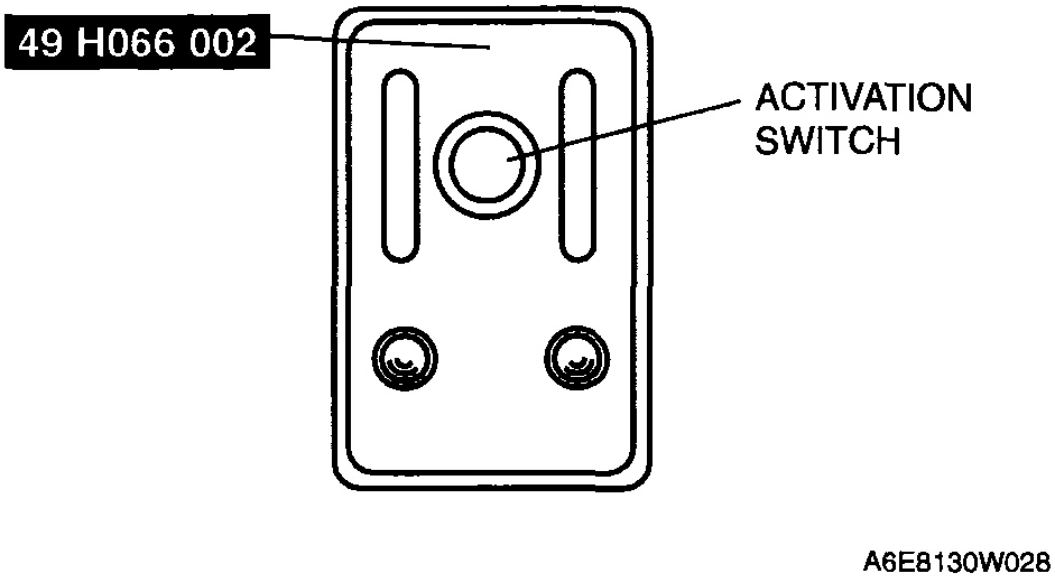


Fig. 44: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

PRE-TENSIONER SEAT BELT

1. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
2. Remove the pre-tensioner seat belt and connect the **SST** (Adapter harness) as shown in **Fig. 45** . (See **SEAT BELT REMOVAL/INSTALLATION** .)

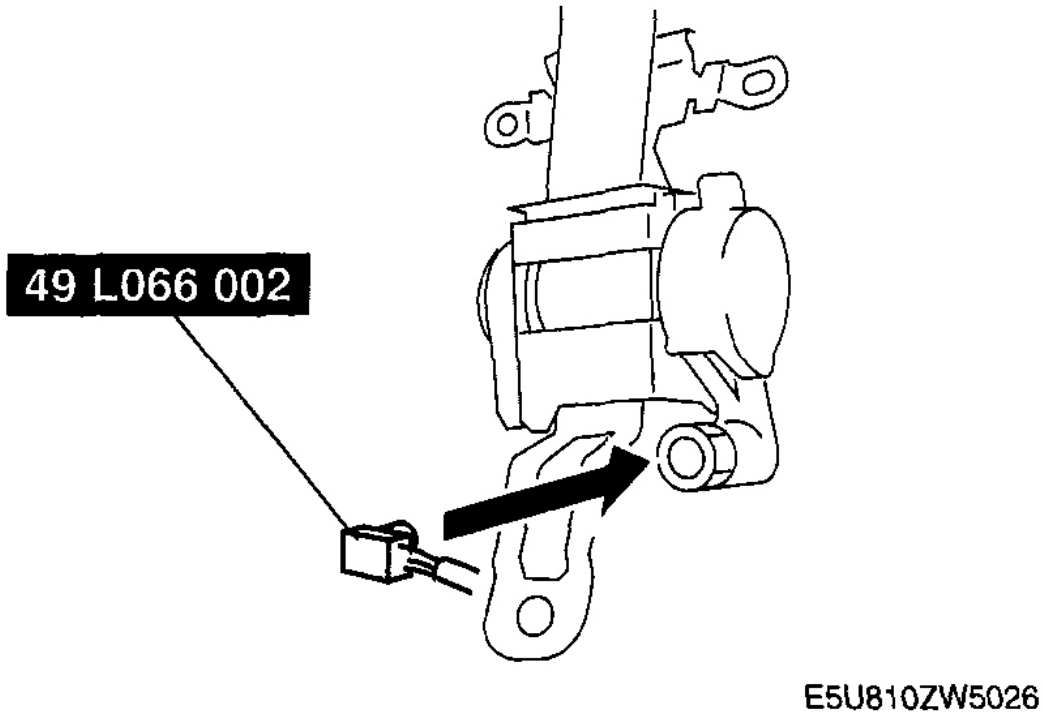


Fig. 45: Removing Pre-Tensioner Seat Belt & Connect SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

3. Install the pre-tensioner seat belt.
4. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
5. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
6. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
7. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

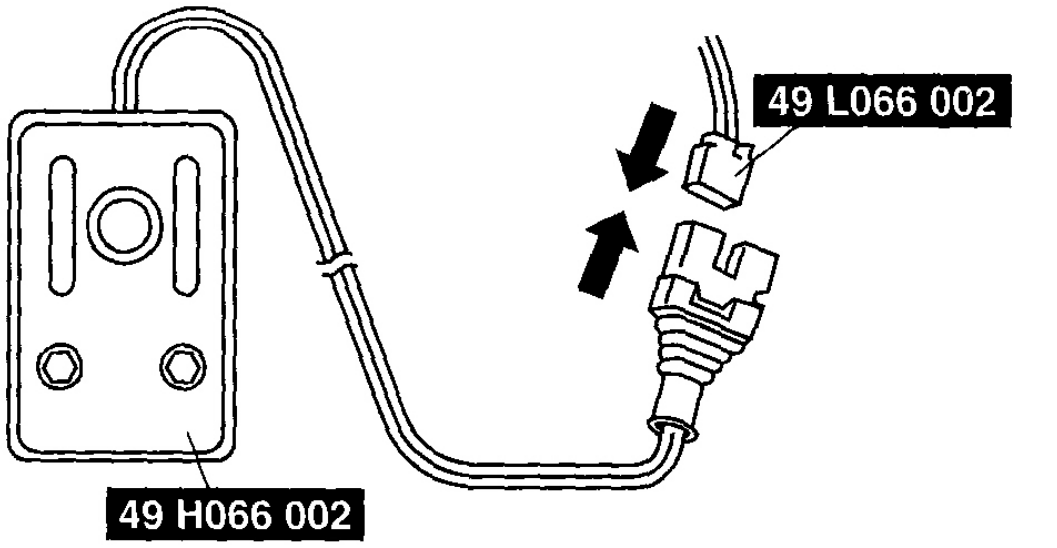


Fig. 46: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

8. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the pre-tensioner seat belt.

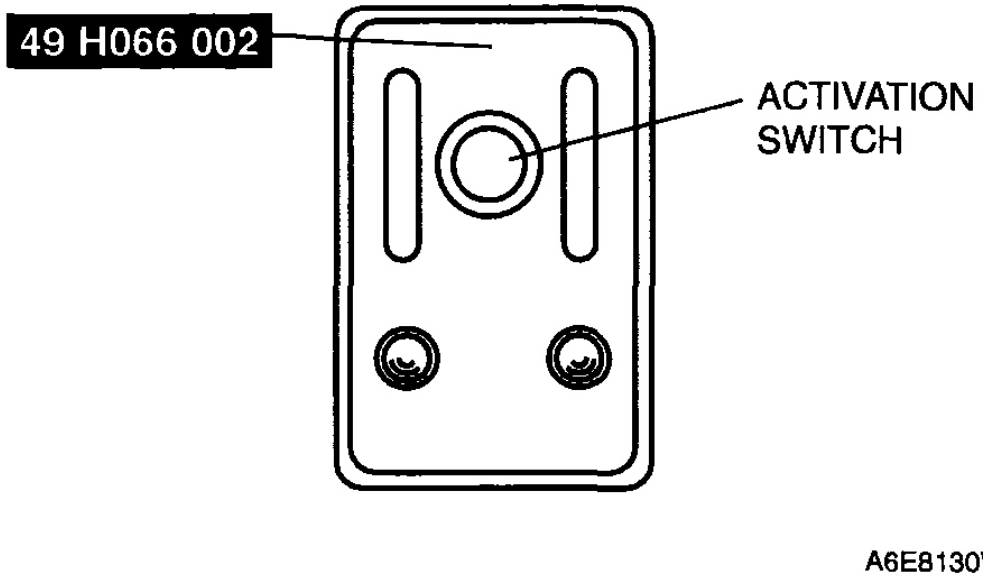


Fig. 47: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

9. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

DEPLOYMENT PROCEDURE FOR OUTSIDE OF VEHICLE

1. Inspect the **SST** (Deployment tool). (See **INSPECTION OF SST (DEPLOYMENT TOOL)** .)
2. Turn the ignition switch to the LOCK position.
3. Remove the battery cover.
4. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Follow the procedure below for operating (deploying) the applicable air bag module or pre-tensioner seat belt.

DRIVER-SIDE AIR BAG MODULE

WARNING:

- **The driver-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both driver-side air bag module inflators simultaneously, following the procedure below.**

1. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the driver-side air bag module as shown in **Fig. 48** .

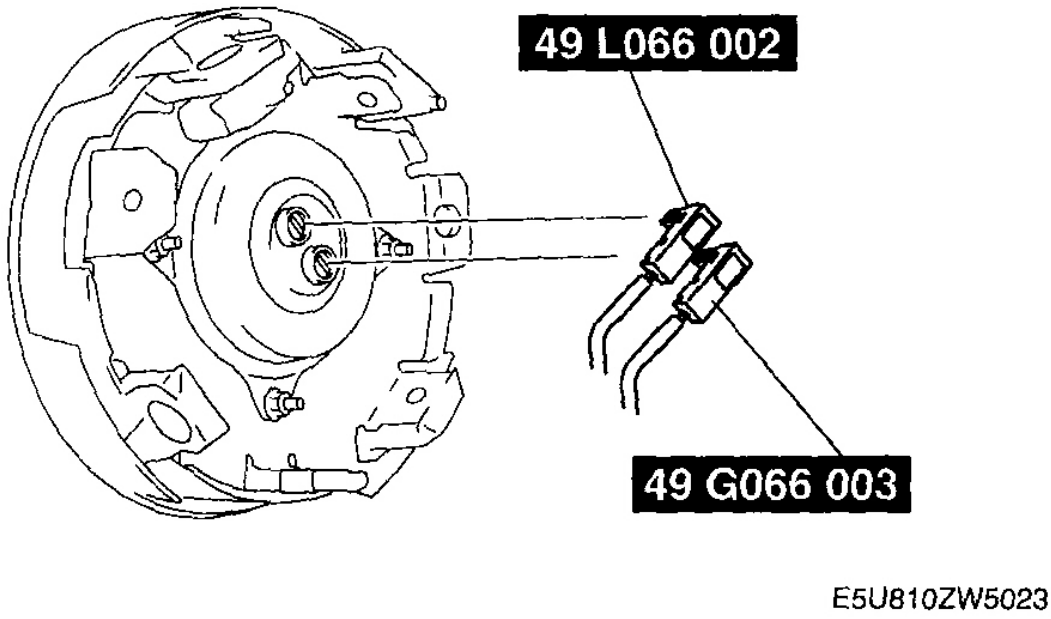


Fig. 48: Connecting SSTs (Adapter Harness) To Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Place the driver-side air bag module on the center of the tire wheel with the padded surface facing up. To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the wheel and the bolt installation holes of the air bag module **at least 4 times** .

WARNING:

- **If the air bag module is not properly installed to the tire wheel, serious injury may occur when the module is operated (deployed). When installing the air bag module to the tire wheel, make sure the padded surface is facing up.**

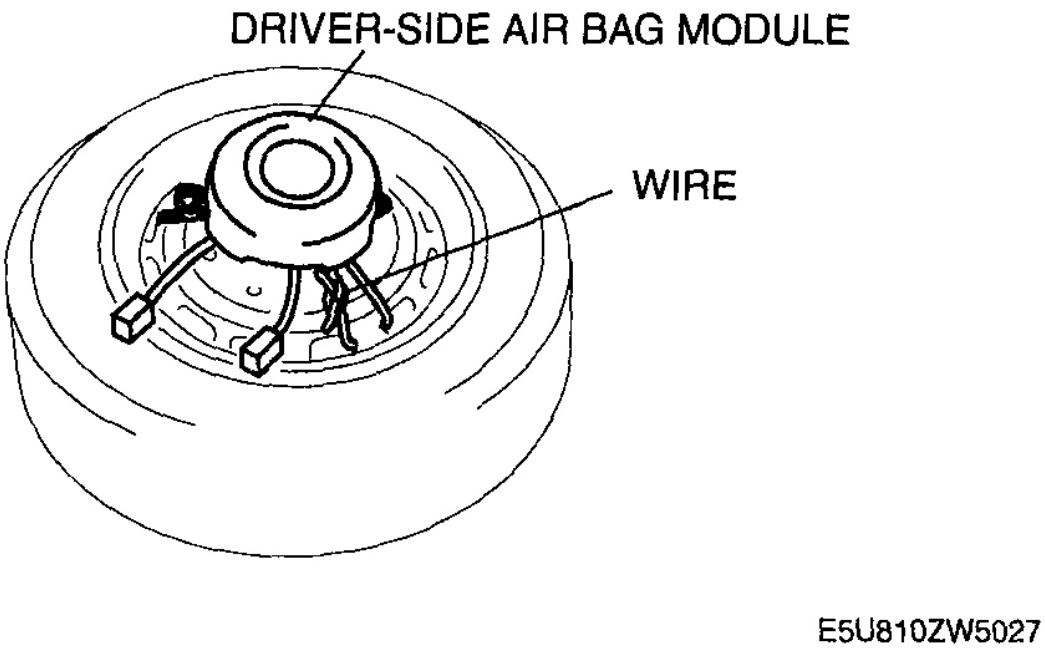


Fig. 49: Placing Driver-Side Air Bag Module On Center Of Tire Wheel
Courtesy of MAZDA MOTORS CORP.

4. Stack three tires without wheels on top of the tire with the driver-side air bag module, and then stack another tire with a wheel on the very top.

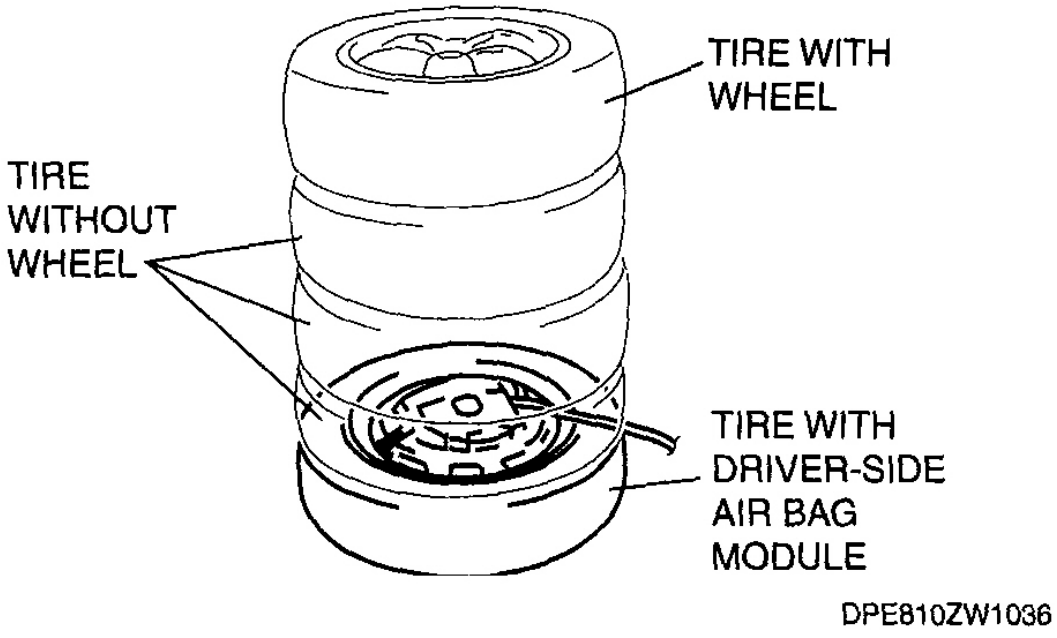


Fig. 50: Stacking Tires Without Wheels On Top Of Tire With Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

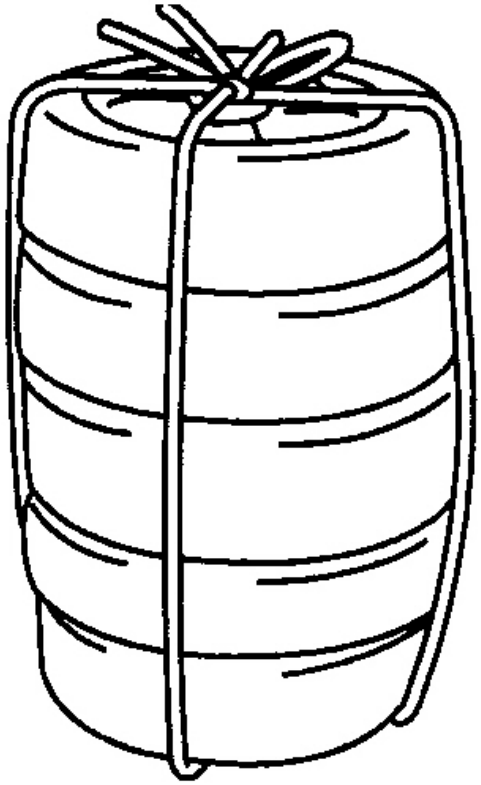


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Fig. 51: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).
7. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

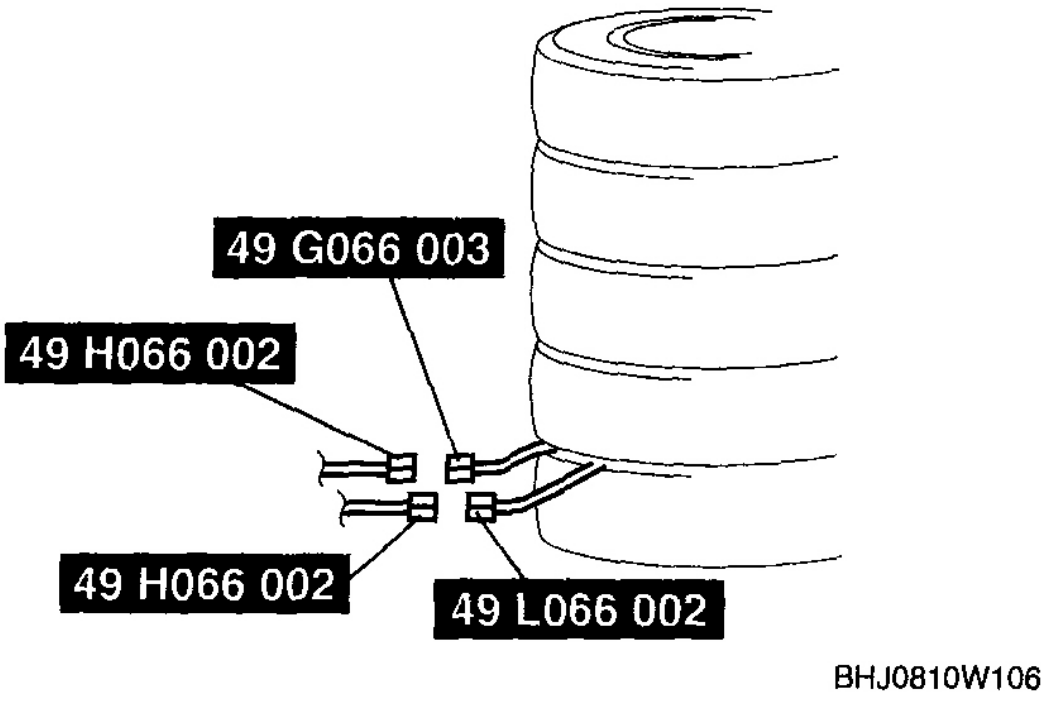

Fig. 52: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

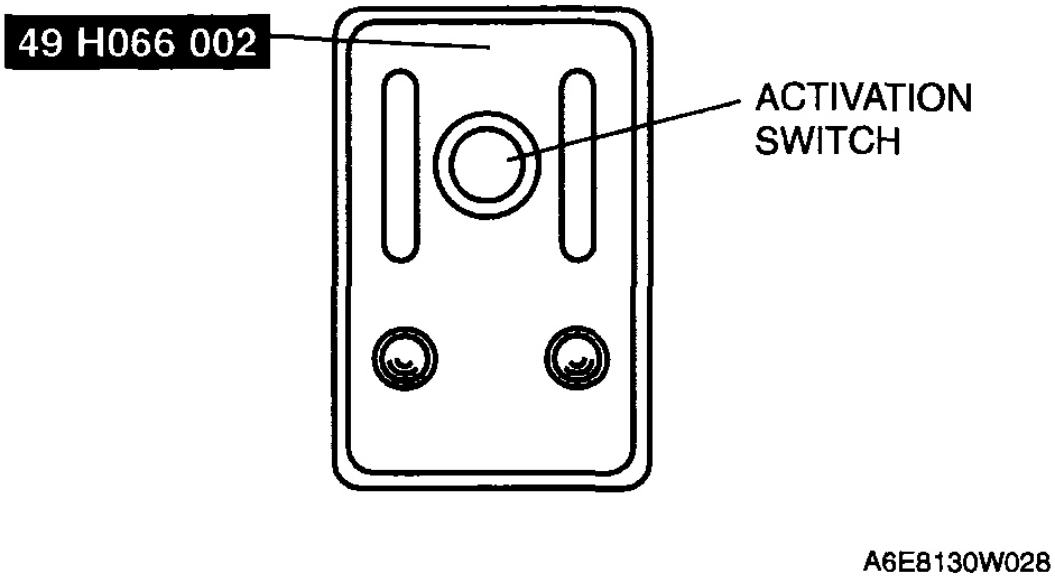

Fig. 53: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

PASSENGER-SIDE AIR BAG MODULE

WARNING:

- **The passenger-side air bag module is a dual inflator type. If one inflator is forced to operate (deploy), the other may operate (deploy) accidentally. To prevent injury while disposing of the air bag module, make sure to operate (deploy) both passenger-side air bag module inflators simultaneously, following the procedure below.**

1. Remove the passenger-side air bag module. (See **PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Connect the **SSTs** (Adapter harness) to the passenger-side air bag module as shown in **Fig. 54** .

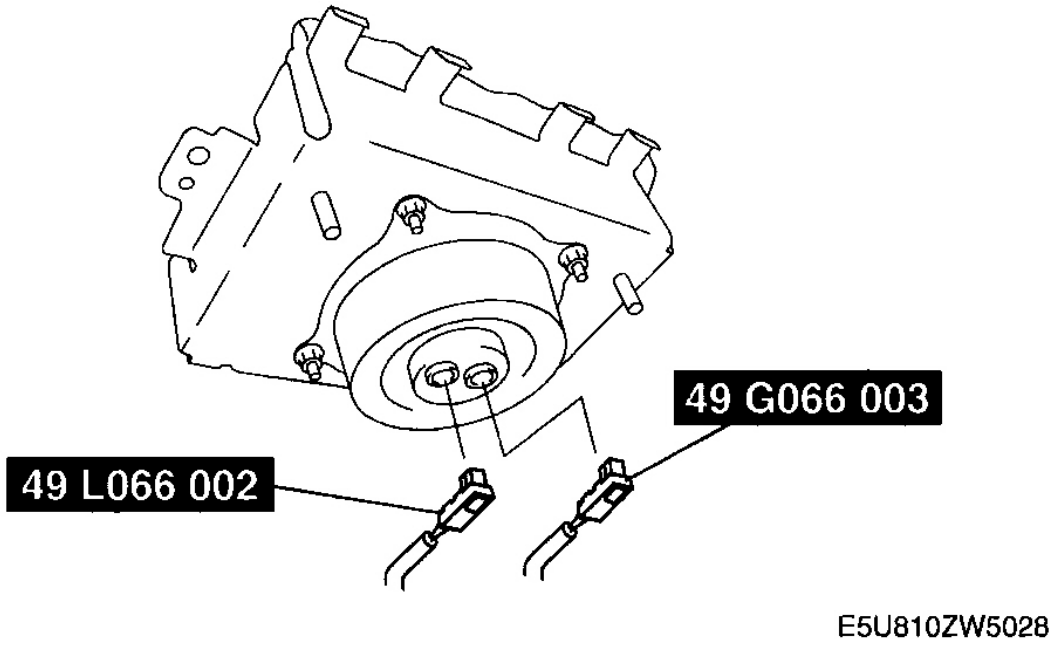

Fig. 54: Connecting SSTs (Adapter Harness) To Passenger-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

3. Place the padded surface of the passenger-side air bag module facing the center of the tire as shown in **Fig. 55** . To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the tire and the brackets **at least 4 times** as shown in **Fig. 55** .

WARNING:

- **If the air bag module is not properly secured to the tire, the tires may fall over by the impact of operation (deployment) and cause serious injury. To prevent this, secure the air bag module properly with the padded surface facing the center of the tire.**

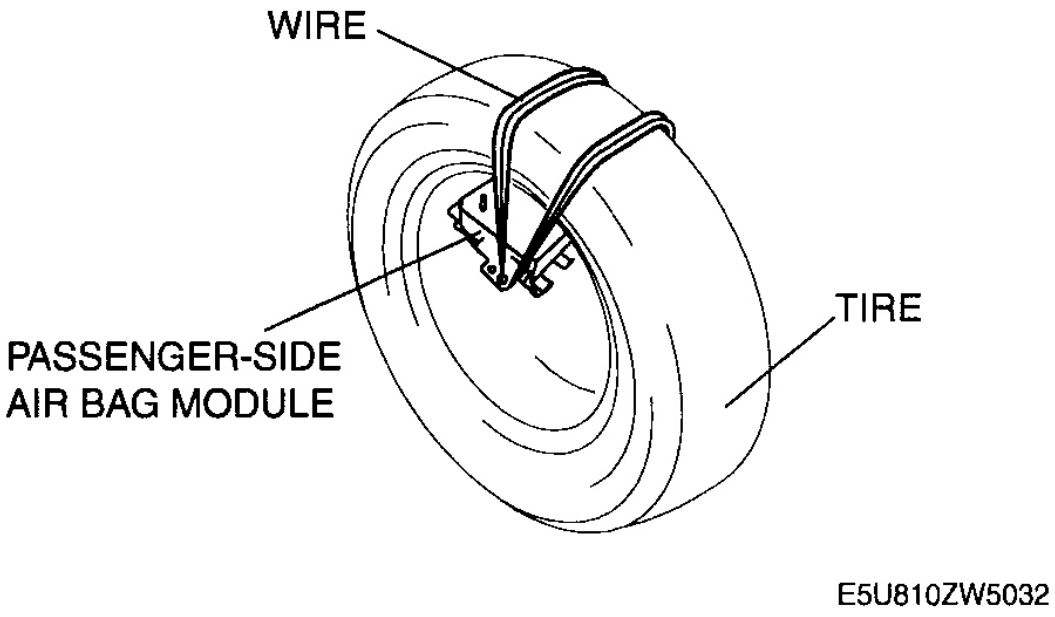

Fig. 55: Wrapping Wire Through Tire & Brackets
Courtesy of MAZDA MOTORS CORP.

4. Stack the tire with the passenger-side air bag module on top of two tires without wheels. Stack a tire without a wheel on top of the tire with the passenger-side air bag module, and then stack another tire with a wheel on the very top.

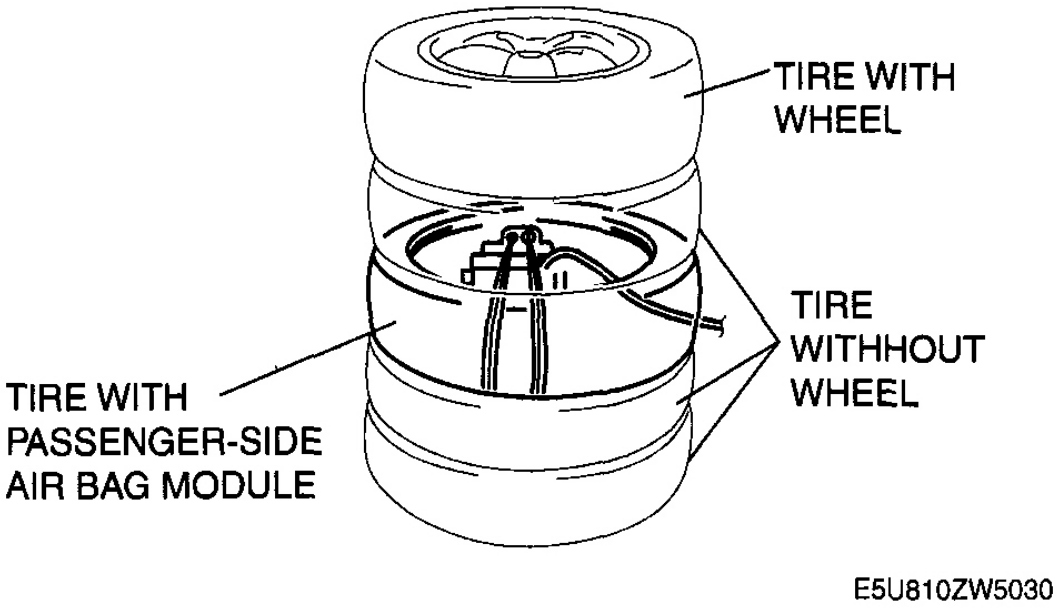

Fig. 56: Stacking Tire With Passenger-Side Air Bag Module On Top Of Two Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

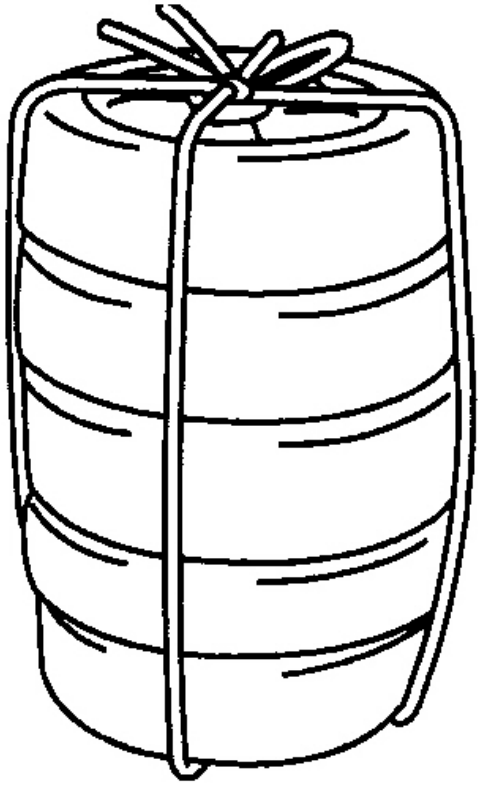

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Fig. 57: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SSTs** (Deployment tool) to the **SSTs** (Adapter harness).
7. Connect both **SSTs** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on both **SSTs** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

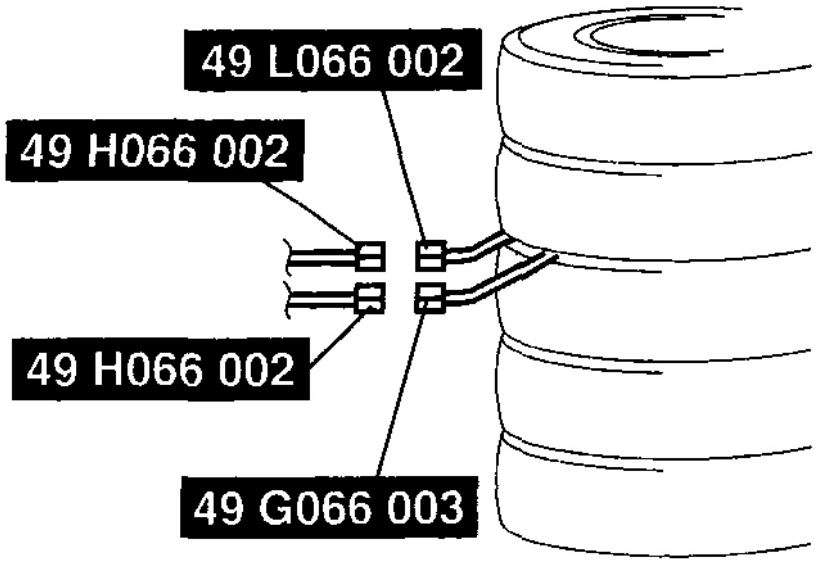

Fig. 58: Connecting SSTs (Deployment Tool) To SSTs (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) connected with 49 L066 002 (a yellow connector) of the **SST** (Adapter harness), and **after 3 s** , press the activation switch on the other **SST** (Deployment tool) to operate (deploy) the air bag module (both inflators).

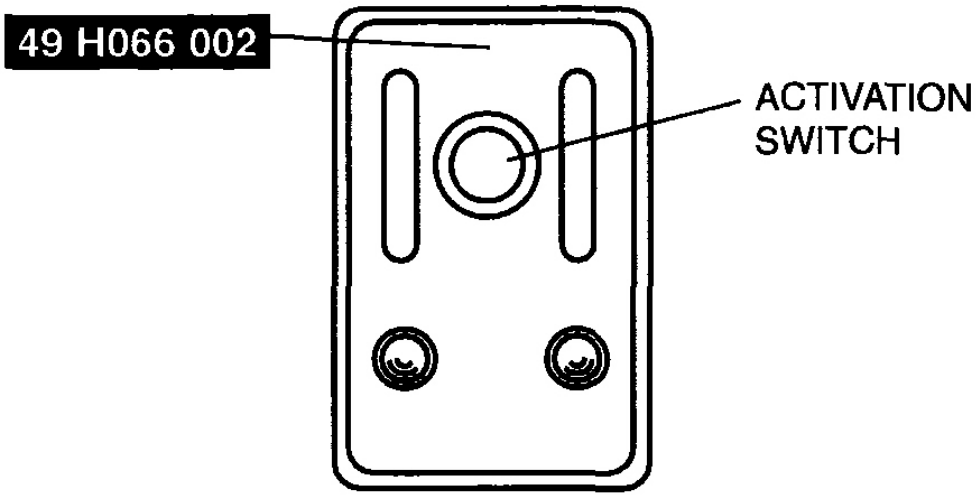

Fig. 59: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **Verify that air bag module operation (explosive) sound occurs twice. If no operation (explosive) sound was heard or a single operation (explosive) sound was heard, both inflators would not have operated (deployed) properly. This may cause serious injury if the air bag module operates (deploy) unexpectedly. If the two operation (explosive) sounds are not heard, perform Step 8 again. If a total of two operation (explosive) sounds cannot be verified even though Step 8 is performed again, leave the air bag module alone for 30 min or more before approaching it again.**
- **The air bag module is very hot immediately after it is operated (deployed). You can be burned. Do not touch the air bag module for at least 15 min after deployment.**

11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

SIDE AIR BAG MODULE

1. Remove the side air bag module. (See **SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
2. Install the nuts to the side air bag module as shown in **Fig. 60** , and connect the **SST** (Adapter harness).

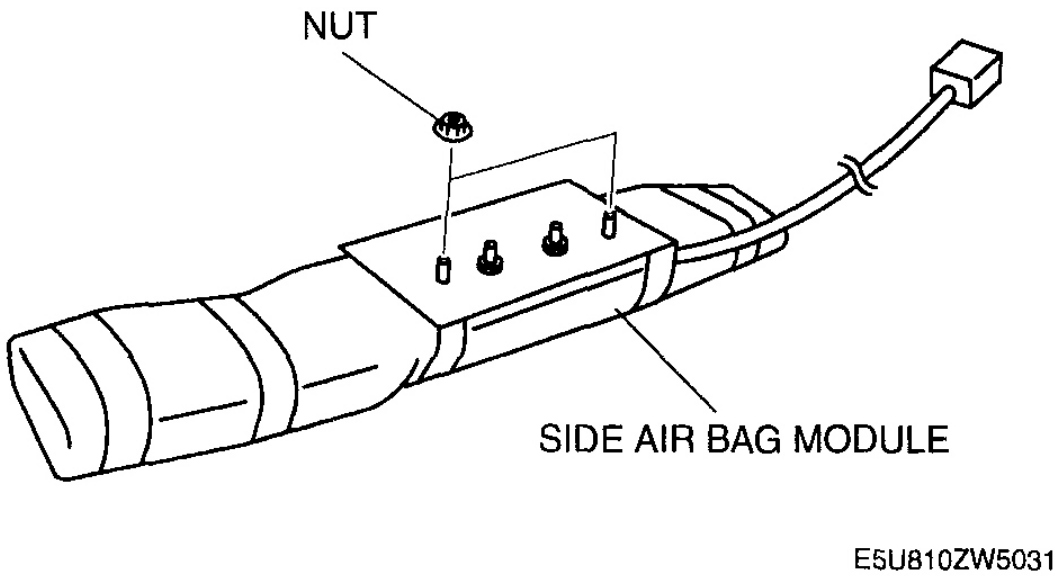

Fig. 60: Installing Nuts To Side Air Bag Module & Connect SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

3. Place the padded surface of the side air bag module facing the center of the tire as shown in **Fig. 61** . To secure the air bag module to the tire wheel, wrap a wire (cross section **1.25 mm^2 {0.002 in^2 } or more**) through the tire and around the bolts **at least 4 times** .

WARNING:

- **If the air bag module is not properly secured to the tire, the tires may fall over by the impact of operation (deployment) and cause serious injury. To prevent this, secure the air bag module properly with the padded surface facing the center of the tire.**

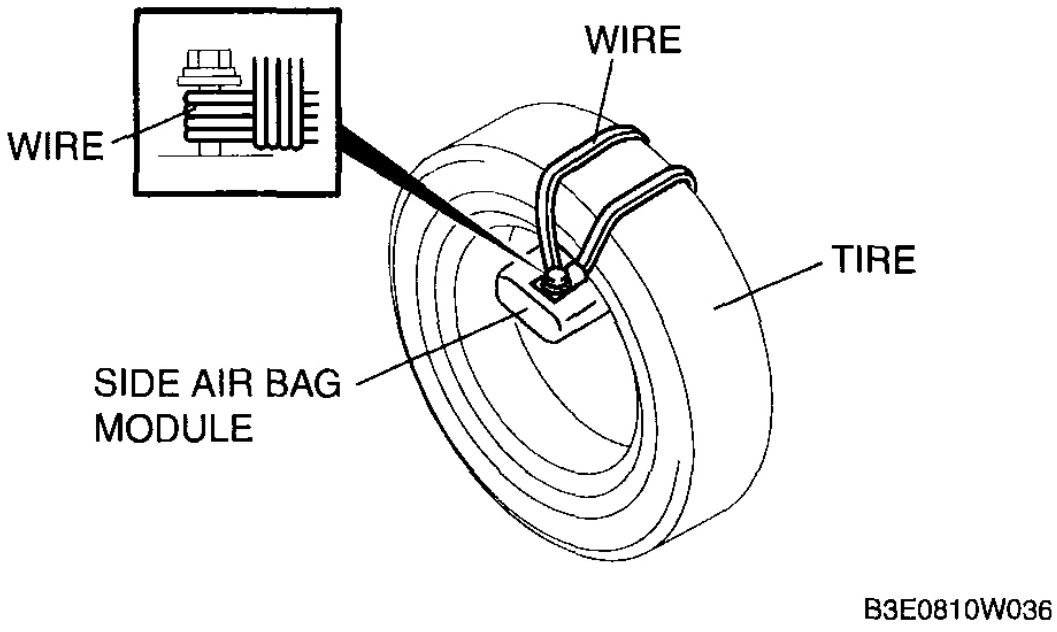

Fig. 61: Placing Padded Surface Of Side Air Bag Module Facing Center Of Tire
Courtesy of MAZDA MOTORS CORP.

4. Connect the **SST** (Adapter harness) to the side air bag module as shown in **Fig. 62** .

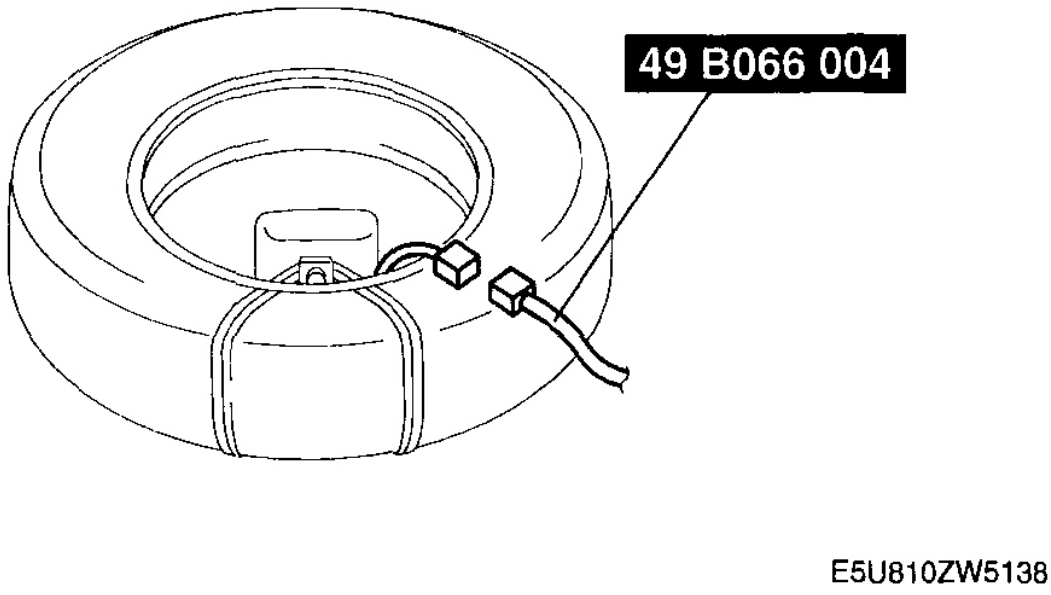

Fig. 62: Connecting SST (Adapter Harness) To Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

5. Stack the tire with the side air bag module on top of two tires without wheels. Stack a tire without a wheel on top of the tire with the side air bag module, and then stack another tire with a wheel on the very top.

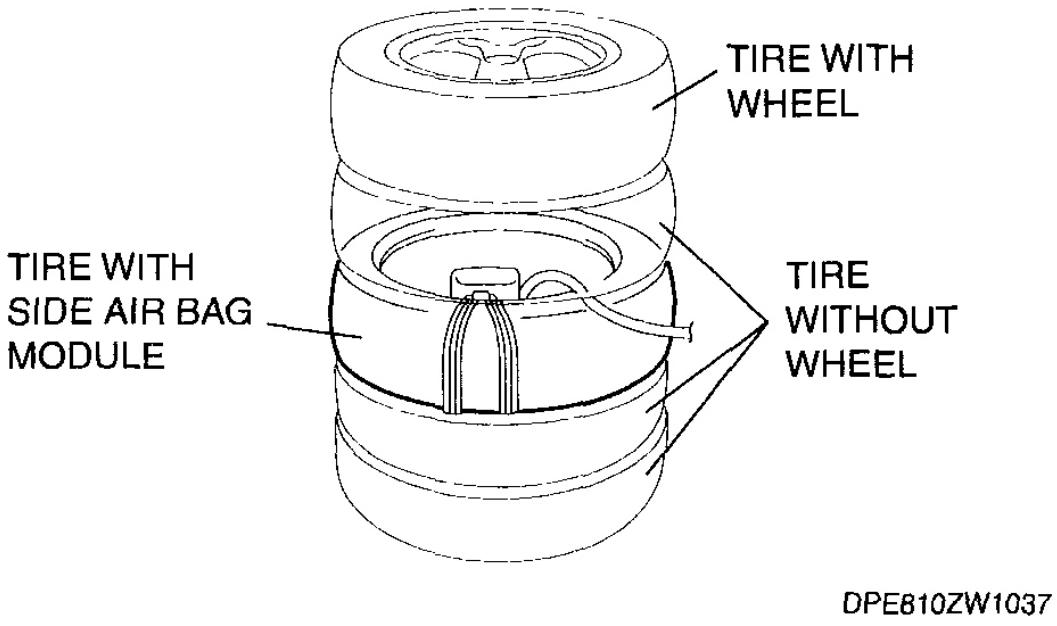

Fig. 63: Stacking Tire With Side Air Bag Module On Top Of Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

6. Secure the tires with wire.

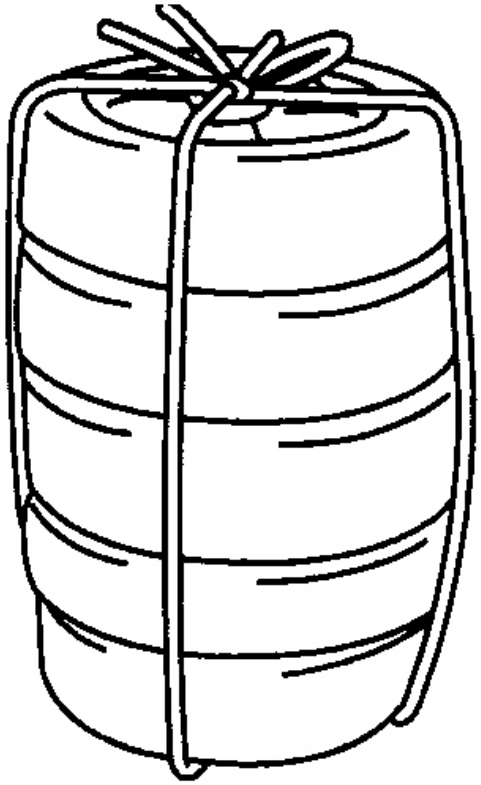

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Fig. 64: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

7. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
8. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
9. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
10. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

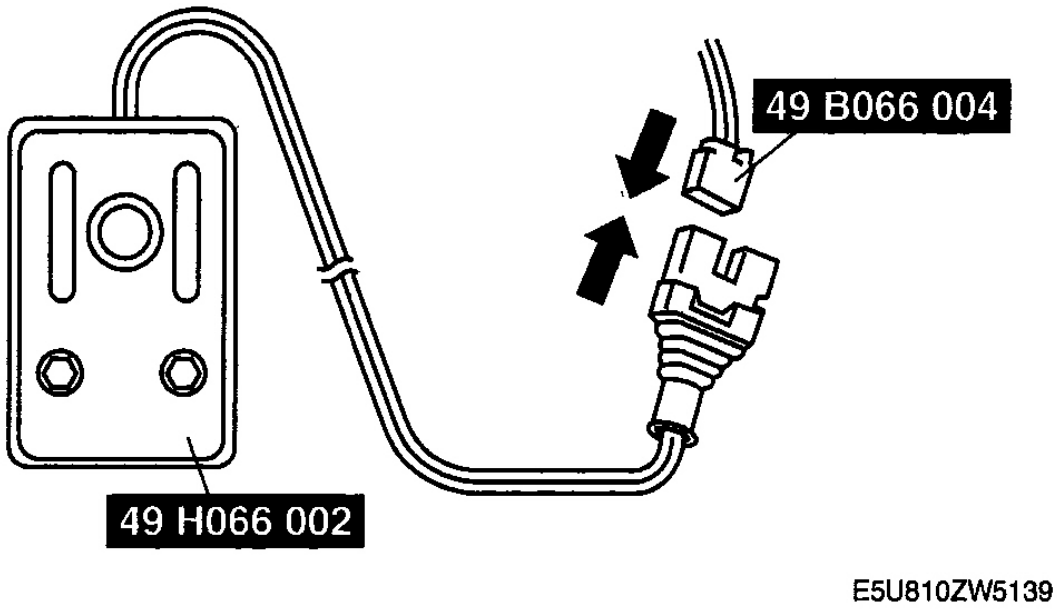

Fig. 65: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

11. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the side air bag module.
12. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

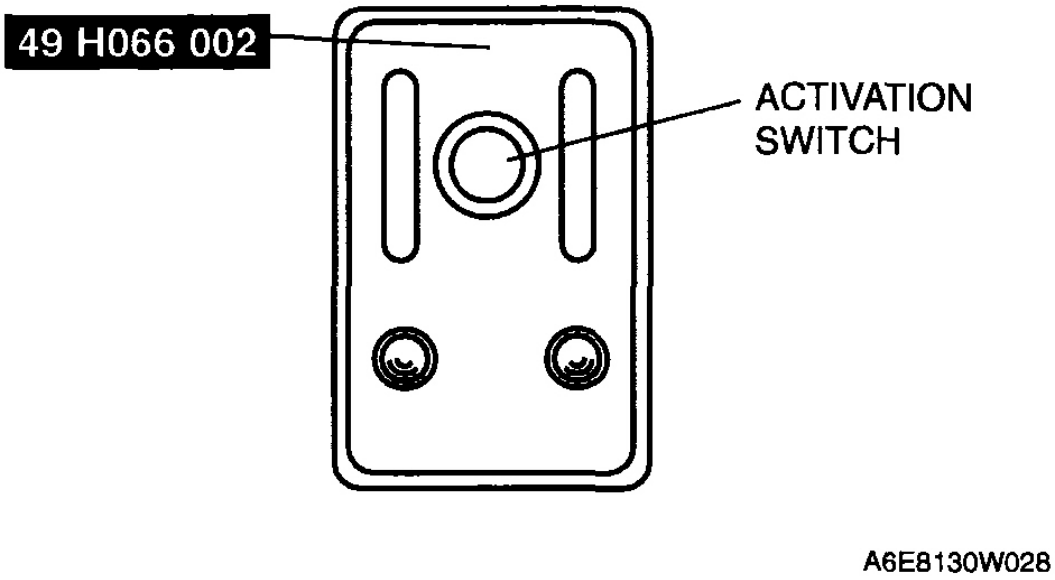

Fig. 66: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

PRE-TENSIONER SEAT BELT

1. Remove the pre-tensioner seat belt. (See **SEAT BELT REMOVAL/INSTALLATION** .)
2. Connect the **SST** (Adapter harness) to the pre-tensioner seat belt as shown in **Fig. 67** .

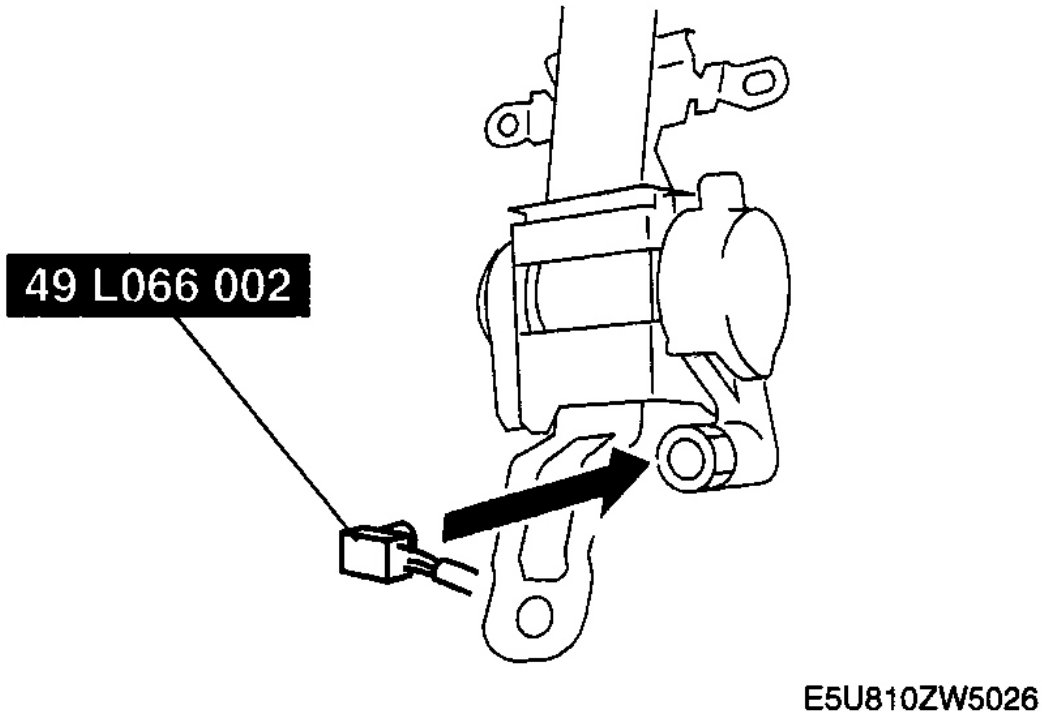

Fig. 67: Connecting SST (Adapter Harness) To Pre-Tensioner Seat Belt
Courtesy of MAZDA MOTORS CORP.

3. Put the pre-tensioner seat belt inside the tire and secure it to the tire by wrapping a wire (cross section of **1.25 mm^2 {0.002 in^2 } or more**) through the tire and the bolt installation holes **at least 4 times** .

WARNING:

- **If the pre-tensioner seat belt is not properly installed to the tire, serious injury may occur when the pre-tensioner part is operated (deployed). When installing the pre-tensioner seat belt to the tire, make sure the pre-tensioner part is inside the tire.**

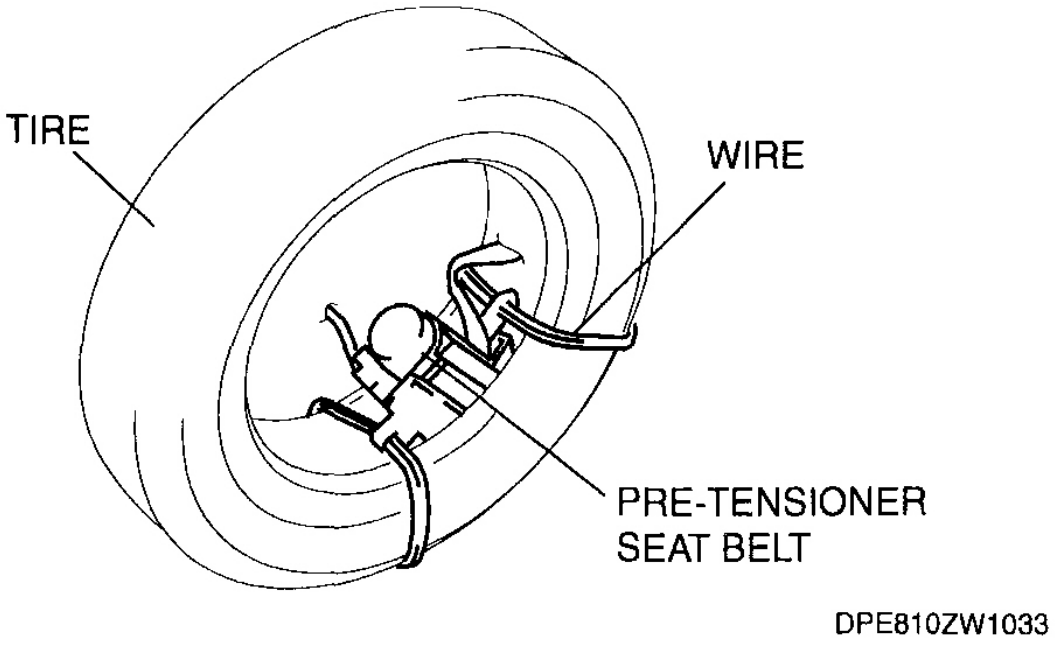

Fig. 68: Putting Pre-Tensioner Seat Belt Inside Tire & Secure To Tire By Wrapping Wire
Courtesy of MAZDA MOTORS CORP.

4. Stack the tire with the pre-tensioner seat belt on two of tires without wheels. Stack a tire without a wheel on top of the tire with the pre-tensioner seat belt, and then stack another tire with a wheel on the very top.

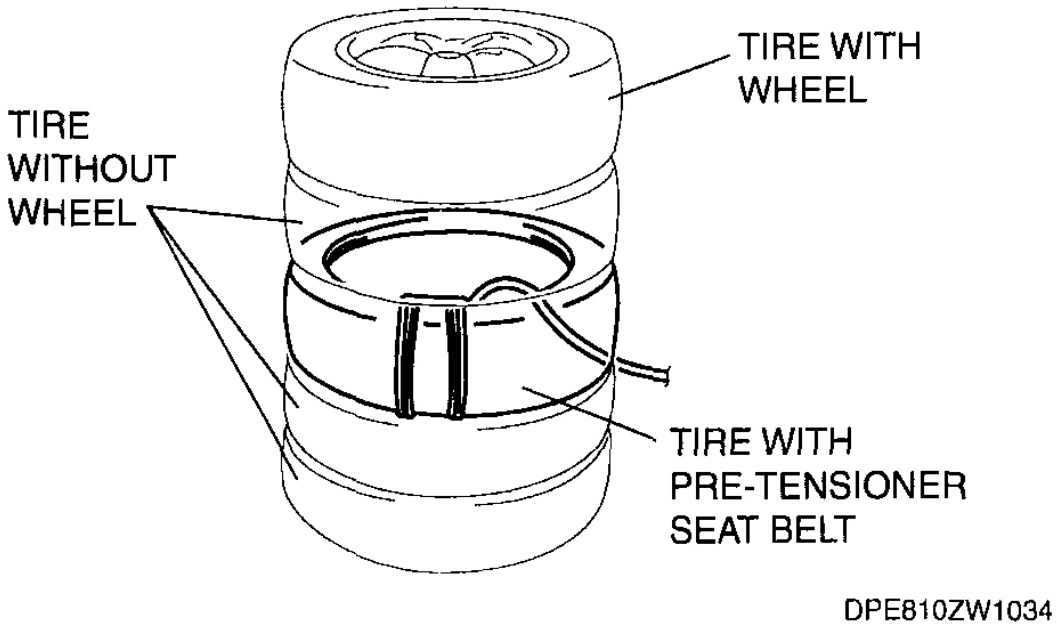

Fig. 69: Stacking Tire With Pre-Tensioner Seat Belt On Two Of Tires Without Wheels
Courtesy of MAZDA MOTORS CORP.

5. Secure the tires with wire.

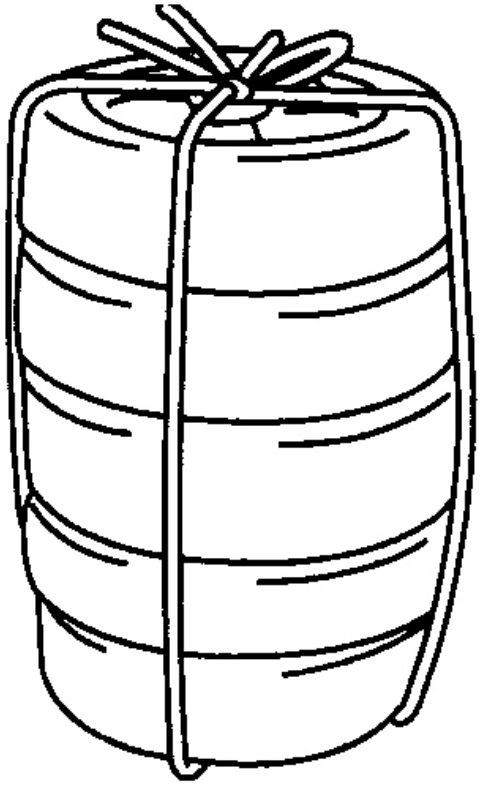

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Fig. 70: Tying Tires Together With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the **SST** (Deployment tool) to the **SST** (Adapter harness).
7. Connect the **SST** (Deployment tool) to the battery. Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.
8. Verify that the red lamp on the **SST** (Deployment tool) is illuminated.
9. Verify that all persons are standing **at least 6 m {20 ft}** away from the vehicle.

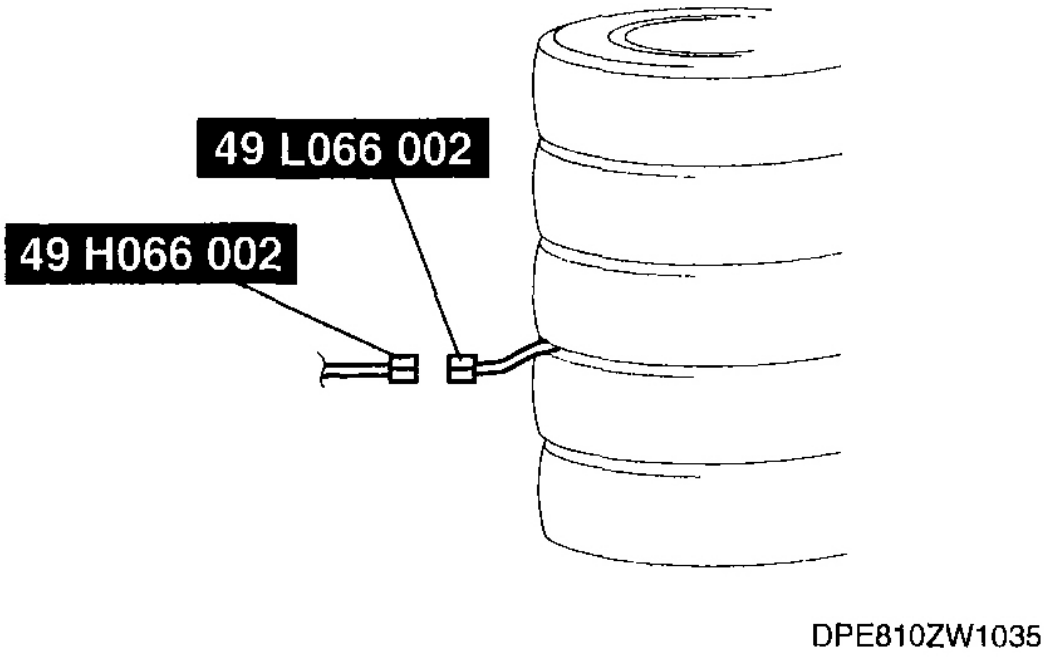


Fig. 71: Connecting SST (Deployment Tool) To SST (Adapter Harness)
Courtesy of MAZDA MOTORS CORP.

10. Press the activation switch on the **SST** (Deployment tool) to operate (deploy) the pre-tensioner seat belt.
11. Disconnect the **SSTs** (Deployment tool) from the **SSTs** (Adapter harness).

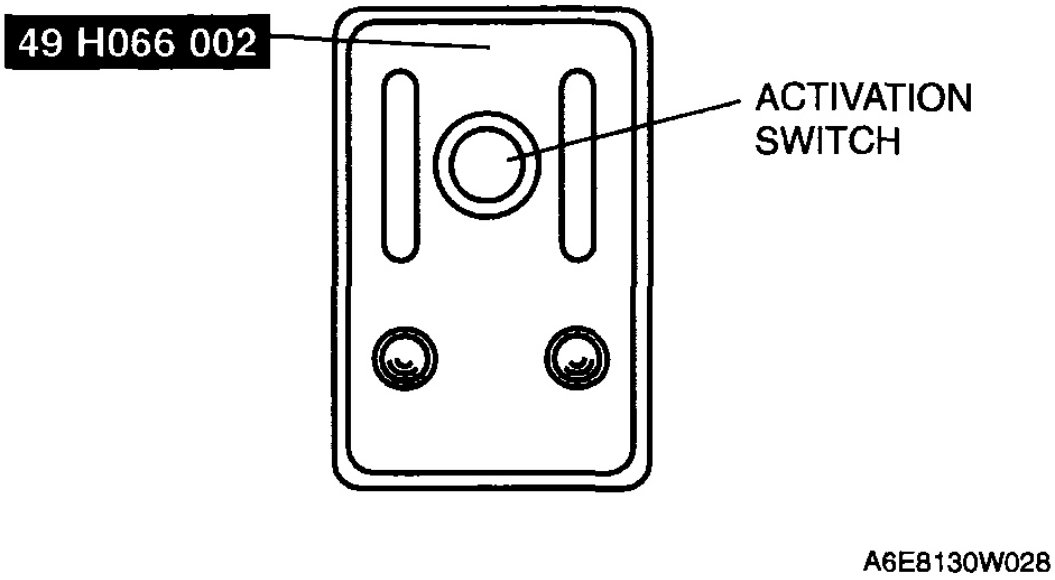


Fig. 72: Identifying Activation Switch
Courtesy of MAZDA MOTORS CORP.

AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DISPOSAL PROCEDURES

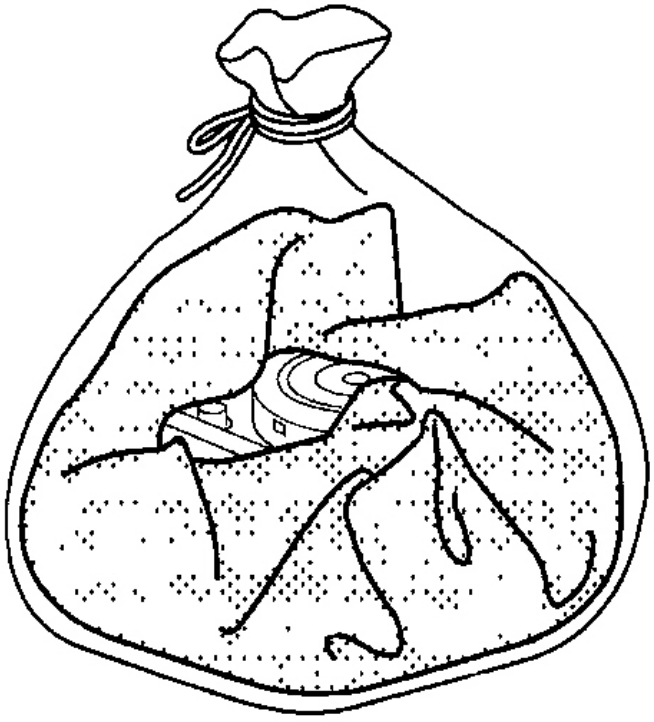
WARNING:

- **A live (undeployed) air bag module or pre-tensioner seat belt may accidentally operate (deploy) when it is disposed of and cause serious injury. Always refer to the AIR BAG MODULE AND PRE-TENSIONER SEAT BELT DEPLOYMENT PROCEDURES and dispose of air bag modules and pre-tensioner seat belts in a deployed condition.**
- **The air bag modules and the pre-tensioner seat belts are very hot immediately after they are deployed. You can be burned. Do not touch an air bag module and pre-tensioner seat belt for at least 15 min after deployment.**
- **Pouring water on the deployed air bag module and pre-tensioner seat belt is dangerous. The water will mix with the residual gases to form a gas that can make breathing difficult. Do not pour water on the deployed air bag module and pre-tensioner seat belt.**
- **The deployed air bag module or pre-tensioner seat belt may contain deposits of sodium hydroxide, a caustic byproduct of the gas-generated combustion. If this substance gets into your eyes or on your hands, it can cause irritation and itching. When handling the**

deployed air bag module and pre-tensioner seat belt, wear gloves and safety glasses.

- **Due to the adoption of 2-step deployment control in both the driver and passenger-side air bag modules, depending on the impact force, it is possible that inflator No. 2 might not operate (deploy). Before disposing of the air bag module, always follow the inflator deployment procedures and verify the complete operation (deployment) of inflators No. 1 and 2.**

1. Remove the deployed air bag module or pre-tensioner seat belt.
2. Put the air bag module or pre-tensioner seat belt in a plastic bag, seal the bag, and then dispose of it.



BHJ0810W023

Fig. 73: Putting Air Bag Module Or Pre-Tensioner Seat Belt In Plastic Bag
Courtesy of MAZDA MOTORS CORP.

INSPECTION OF SST (DEPLOYMENT TOOL)

1. Before using the **SST** (49 H066 002), inspect its operation.

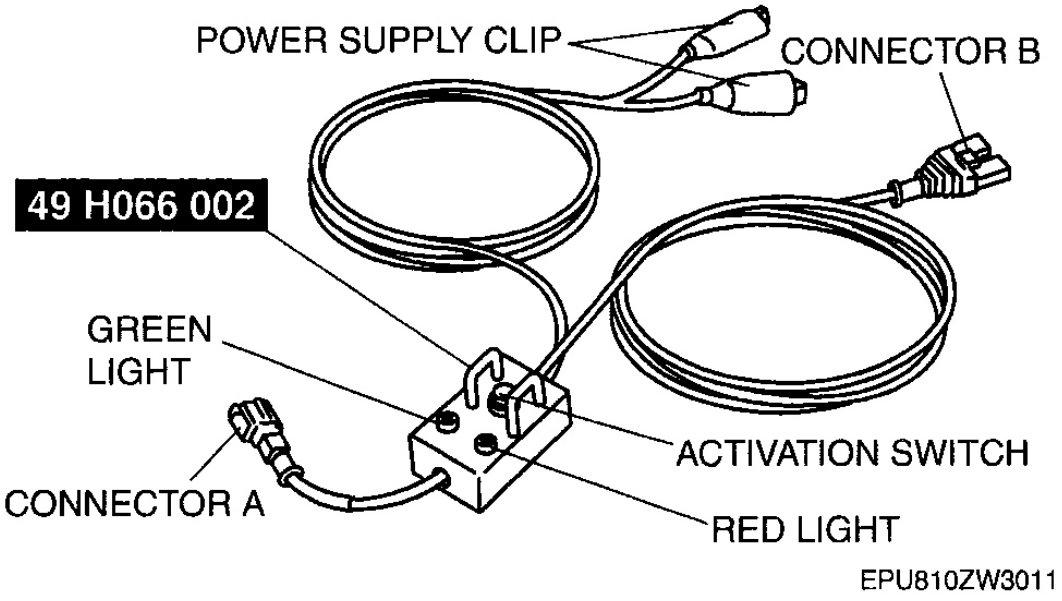


Fig. 74: Inspecting SST (Deployment Tool)
Courtesy of MAZDA MOTORS CORP.

INSPECTION PROCEDURE

1. Follow the steps below to inspect the **SST** (49 H066 002).
   - If not as indicated in **SST INSPECTION REFERENCE TABLE** , replace the **SST** (49 H066 002) because it has a malfunction.

WARNING:
- **Do not use a malfunctioning SST (49 H066 002), otherwise it could cause the air bag module or pre-tensioner seat belt to accidentally operate (deploy).**

CAUTION:
- **Because the permissible voltage for the SST (49 H066 002) is 12 V, do not connect a 24 V power source because it will damage the SST. Always connect only a 12 V power source.**

SST INSPECTION REFERENCE TABLE

Step	Inspection procedure	Light condition	
		Green	Red
1	Connect the power supply red clip to the positive battery terminal, and the black clip to the negative battery terminal.	On	Off
2	Connect connectors A and B.	Off	On

3	Press the activation switch.	On	Off

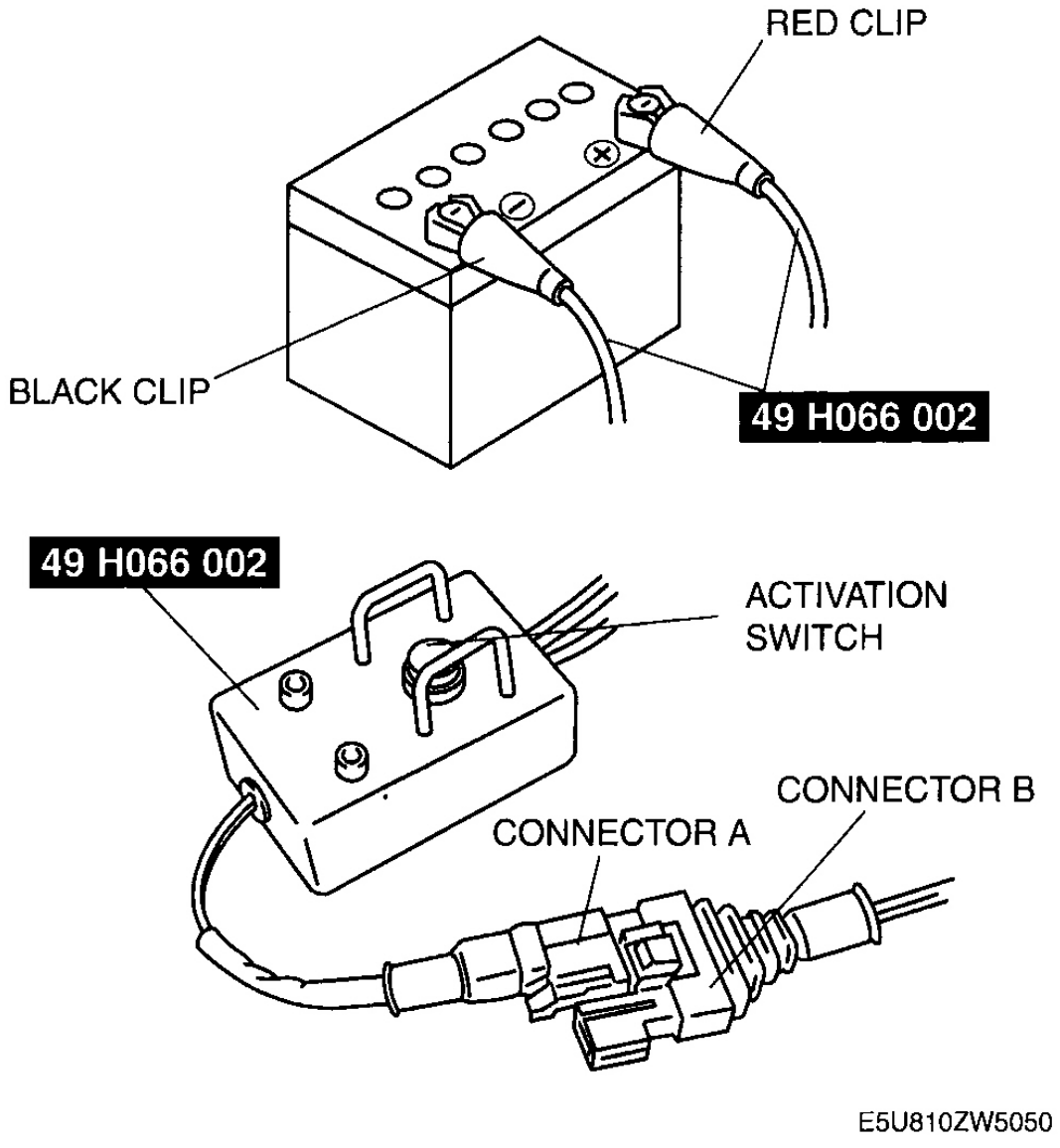
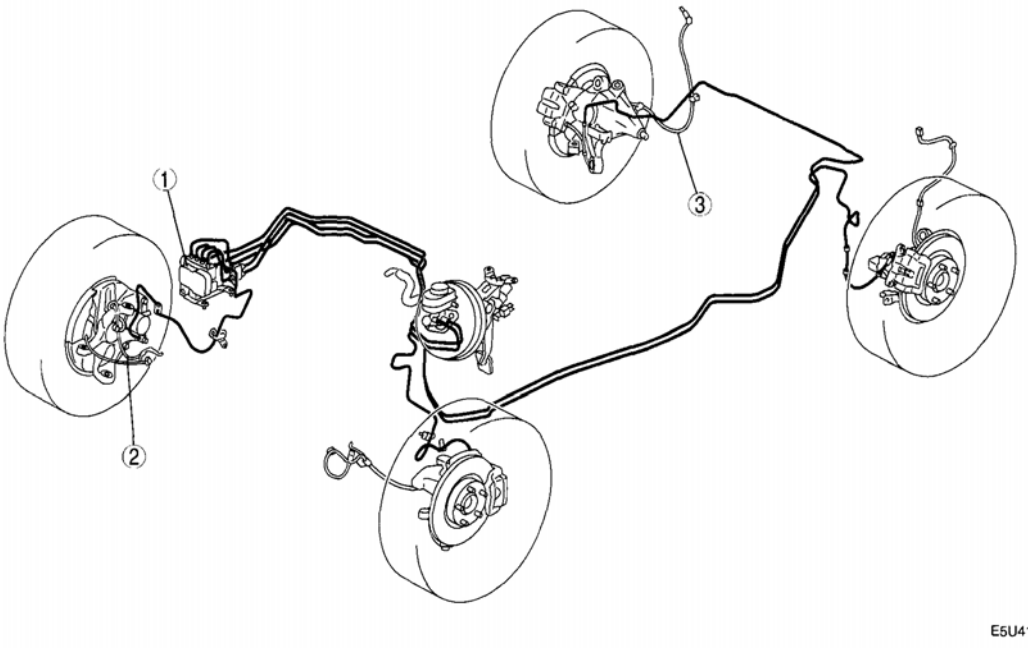


Fig. 75: Inspecting Activation Switch
Courtesy of MAZDA MOTORS CORP.

2007 BRAKES

Antilock Brake System - MX-5 Miata

ABS LOCATION INDEX



1	ABS HU/CM
2	Front ABS wheel-speed sensor
3	Rear ABS wheel-speed sensor

Fig. 1: Identifying Location Of ABS Components
Courtesy of MAZDA MOTORS CORP.

ABS SYSTEM WIRING DIAGRAM

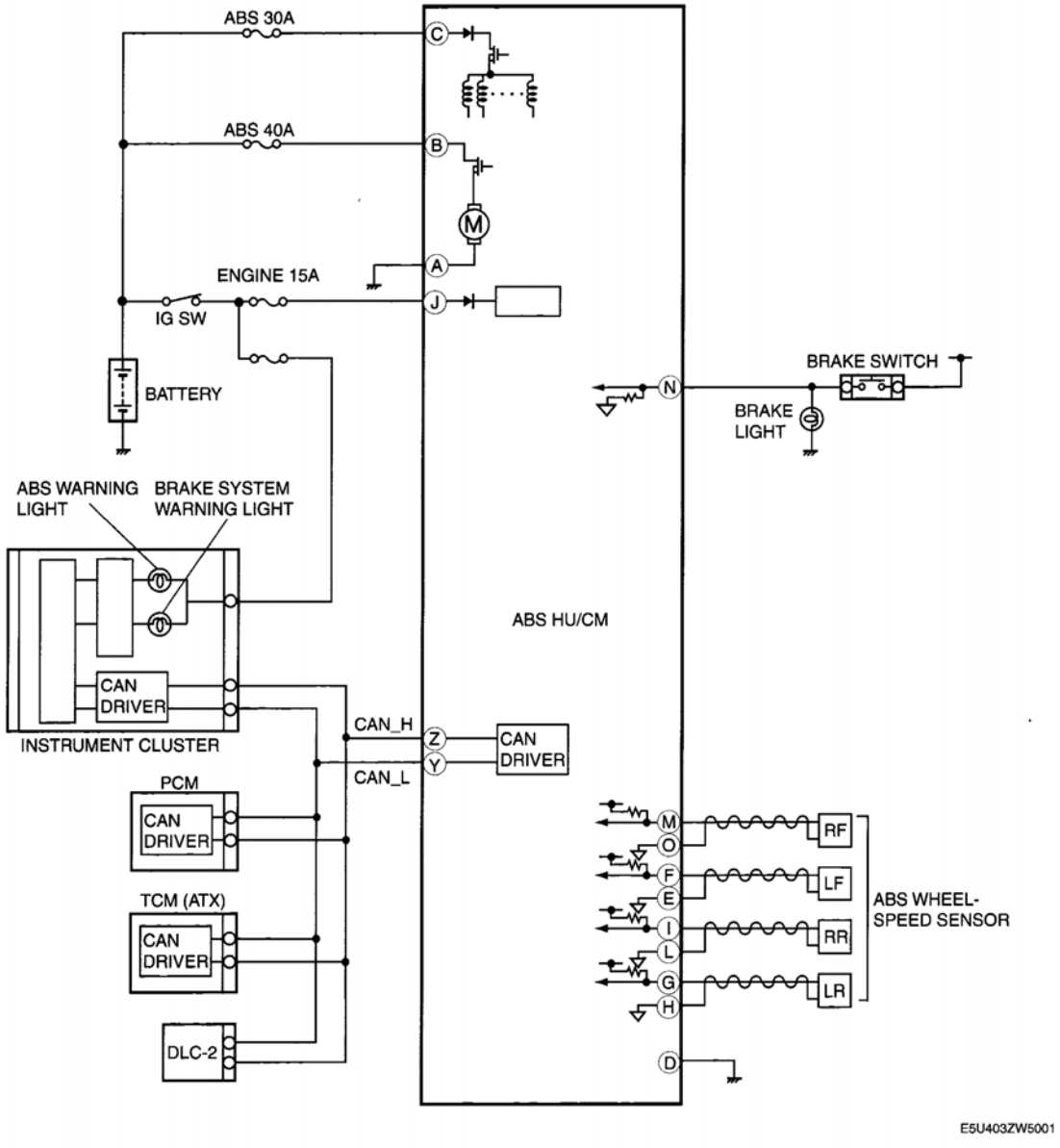


Fig. 2: ABS System Wiring Diagram
Courtesy of MAZDA MOTORS CORP.

ABS SYSTEM INSPECTION

ABS HYDRAULIC UNIT ON-VEHICLE INSPECTION

Preparation

1. Verify that battery is fully charged.
2. Turn the ignition switch to the ON position and verify that the ABS warning light goes out after **approx.**

3s .

3. Turn the ignition switch off.
4. Jack up the vehicle and support it evenly on safety stands.
5. Shift to neutral.
6. Release the parking brake.
7. Verify that all four wheels rotate.
8. Rotate the wheels by hand, and verify there is no brake drag.
    - If there is any brake drag, perform regular brake inspection.
    - If there is no brake drag, perform ABS HU/CM operation inspection.

Operation Inspection

1. Perform "Preparation".
2. Connect the M-MDS or equivalent to the DLC-2.
3. Set up an active command mode inspection according to the combination of commands below.

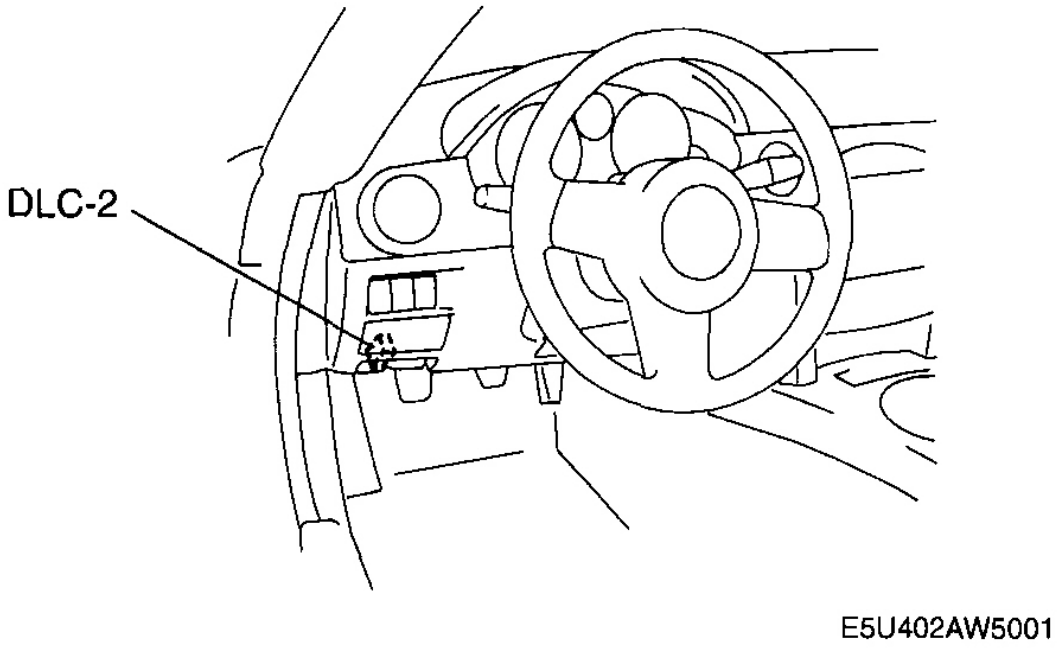


Fig. 3: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

ACTIVE COMMAND MODE INSPECTION REFERENCE TABLE

Operation	Command name			Command

condition	PMP_MOTOR	RF_OUTLET	RF_INLET	transmission type
Brake pressure retention	OFF	OFF	ON	Manual
Brake pressure reduction	ON	ON	ON	

The **ACTIVE COMMAND MODE INSPECTION REFERENCE TABLE** above shows an example of a right front wheel inspection.

CAUTION:
- **To protect the ABS HU/CM, the solenoid valve and the pump motor used during active command mode stay on for only 10 s or less each time they are switched on.**

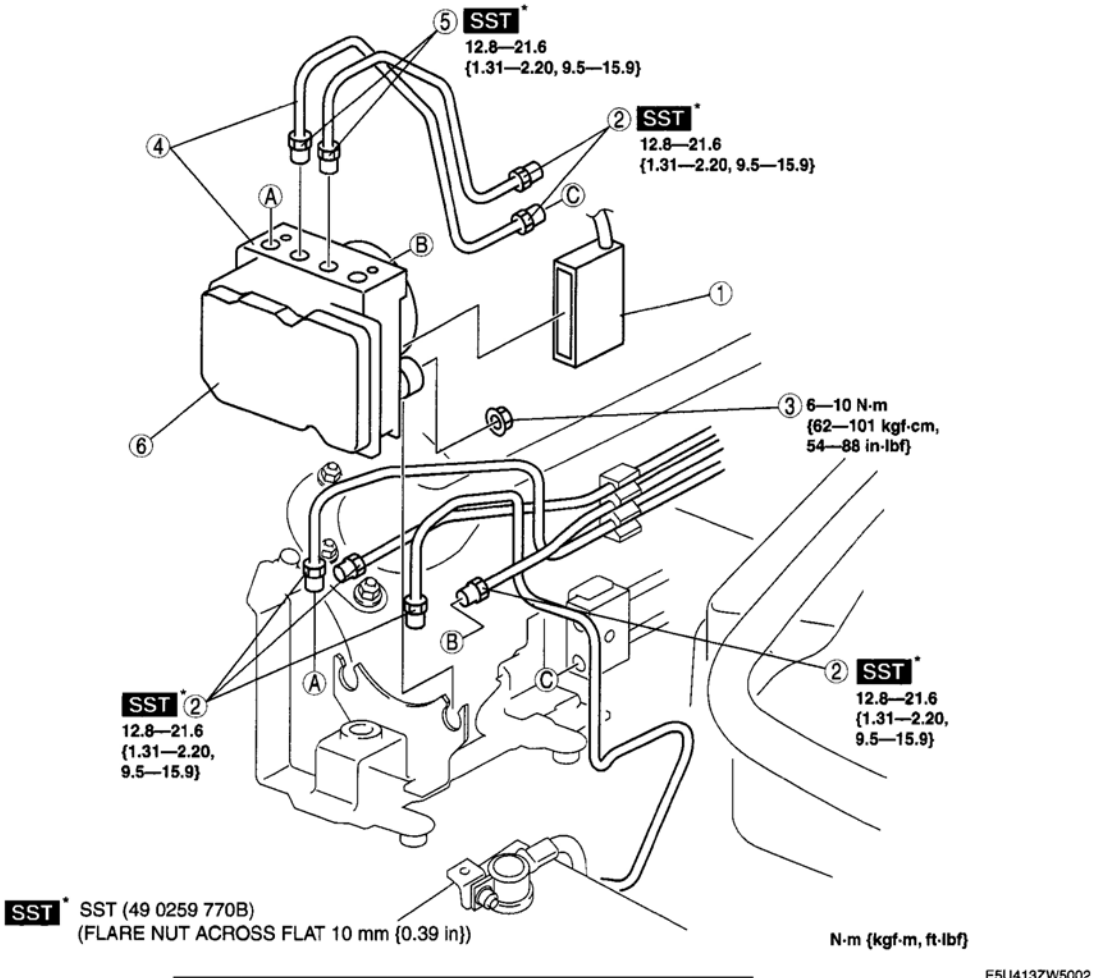
NOTE:
- **When working with two people, one should press on the brake pedal, and the other should attempt to rotate the wheel being inspected.**

4. Send the command while depressing the brake pedal and attempting to rotate the wheel being inspected.
5. Performing the inspection above determines the following:
   - The ABS HU/CM brake lines are normal.
   - The ABS HU/CM hydraulic system is not significantly abnormal (including inside ABS HU/CM).
   - The ABS HU/CM internal electrical parts (solenoid, motor and other parts) are normal.
   - The ABS HU/CM output system wiring harnesses (solenoid valve, relay system) are normal.
     - However, the following items cannot be verified.
     - Malfunction of ABS HU/CM input system wiring harnesses and parts
     - Extremely small leaks in the ABS HU/CM internal hydraulic system
     - Malfunction with intermittent occurrence of the above items

ABS HU/CM REMOVAL/INSTALLATION

CAUTION:
- **When replacing the DSC HU/CM with a new one, configuration procedure must be performed before removing the DSC HU/CM. If configuration is not completed before removing the DSC HU/CM, DTC B2477 will be detected.**
- **The internal parts of the ABS HU/CM could be damaged if dropped. Be careful not to drop the ABS HU/CM. Replace the ABS HU/CM if it is subjected to an impact.**

1. Perform ABS configuration. (See **ABS CONFIGURATION** .)
2. Remove in the order indicated in **Fig. 4** .
3. Install in the reverse order of removal.



1	ABS HU/CM connector
2	Brake pipe
3	Nut
4	ABS HU/CM, brake pipe
5	Brake pipe (ABS HU/CM—brake pipe joint)
6	ABS HU/CM

Fig. 4: Identifying ABS HU/CM Steps (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

ABS HU/CM CONNECTOR REMOVAL NOTE

1. Pull the lock lever up in the direction of the arrow.
2. Pull the connector toward the vehicle rear and remove it.

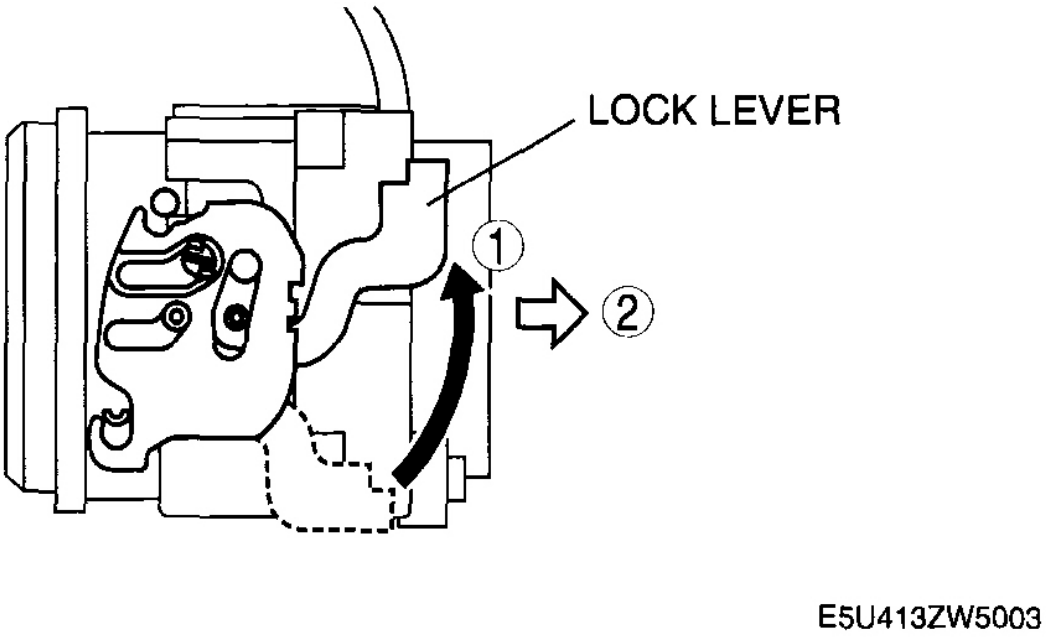


Fig. 5: Identifying Lock Lever Position
Courtesy of MAZDA MOTORS CORP.

BRAKE PIPE REMOVAL NOTE

1. Place an alignment mark on the brake pipe and ABS HU/CM.

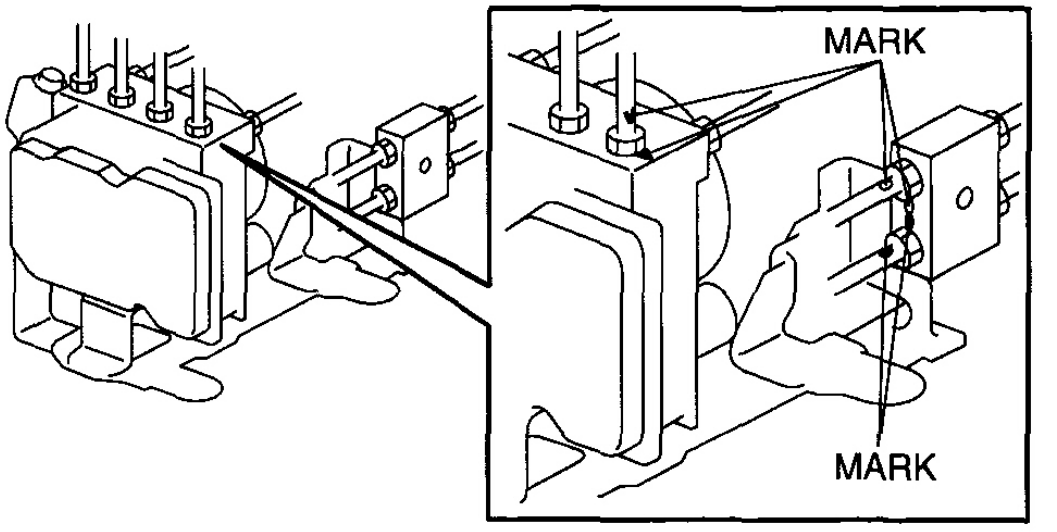


Fig. 6: Placing Alignment Mark On Brake Pipe & ABS HU/CM
Courtesy of MAZDA MOTORS CORP.

2. Apply protective tape to the connector to prevent brake fluid from entering.
3. Remove the brake pipe.

BRAKE PIPE (ABS HU/CM-BRAKE PIPE JOINT) INSTALLATION NOTE

1. Align with the mark made before removing the brake pipe and temporarily install the brake pipe to the ABS HU/CM.

CAUTION:
- **If the brake pipe is tightened to the specified torque, it may be difficult to install it to the vehicle. Therefore, only temporarily tighten the brake pipe so that it can still be moved.**

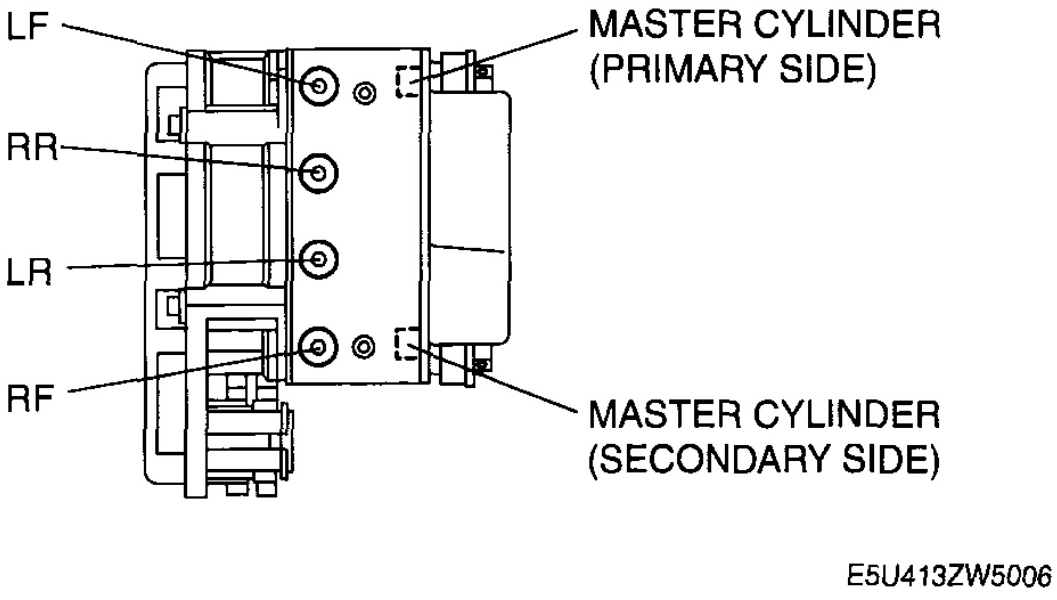


Fig. 7: Identifying Aligning Marks
Courtesy of MAZDA MOTORS CORP.

BRAKE PIPE INSTALLATION NOTE

1. Align the marks made before removal and install the brake pipe to the ABS HU/CM and brake pipe joint referring to **Fig. 7** .
2. Tighten the brake pipe to the specified torque using the **SST** (49 0259 770B).

ABS HU/CM CONNECTOR INSTALLATION NOTE

1. After connecting the connector, verify that the lock lever Is completely pushed in.

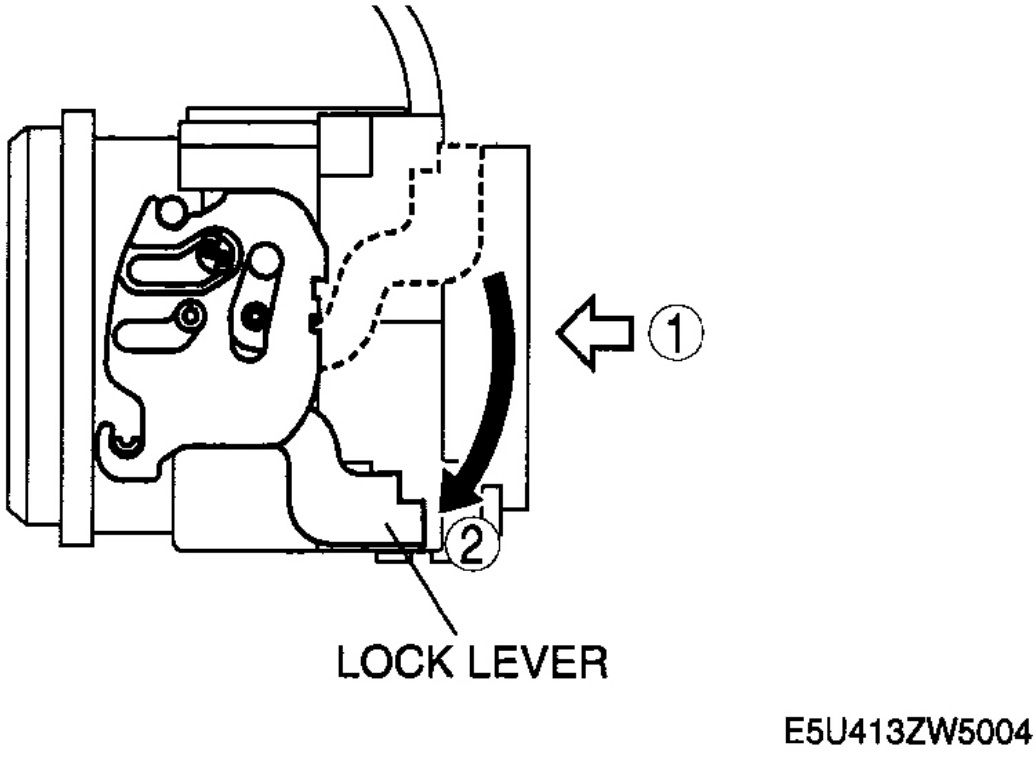


Fig. 8: Verifying Lock Lever Is Completely Pushed In
Courtesy of MAZDA MOTORS CORP.

ABS CONFIGURATION

1. Connect the M-MDS or equivalent to the DLC-2.

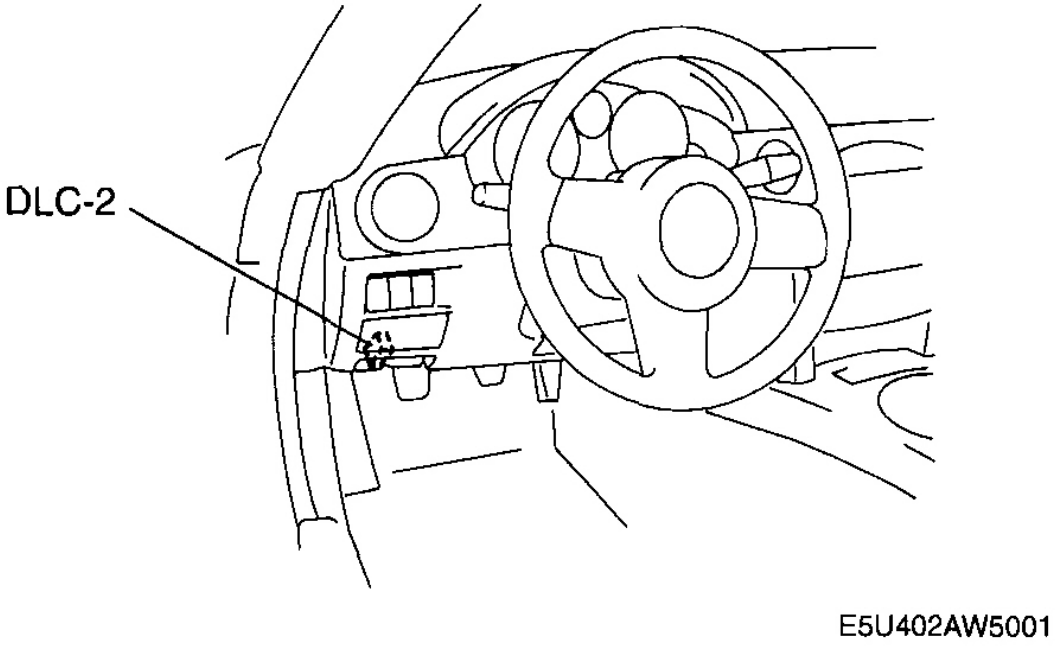


Fig. 9: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. After the Vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        1. Select the "Module Programming".
    - When using the PDS (Pocket PC)
        1. Select "Programming".
        2. Select "Module Programming".
3. Then, select the "Programmable Module Installation" and "ABS" from the screen menu.
4. Perform the configuration according to the directions on the screen.
5. Retrieve DTCs using the M-MDS, then verify if DTCs are present.
    - If a DTC is present, perform the applicable DTC inspection. (See **ON-BOARD DIAGNOSTIC (ABS) -- MX-5 MIATA**)

ABS HU/CM INSPECTION

1. Disconnect the ABS HU/CM connector.
2. Connect the negative battery cable.
3. Attach the tester lead to the ABS HU/CM harness side connector, then inspect voltage, continuity or resistance according to the standard (reference value) on **STANDARD (REFERENCE VALUE)**

TABLE .

STANDARD (REFERENCE VALUE)

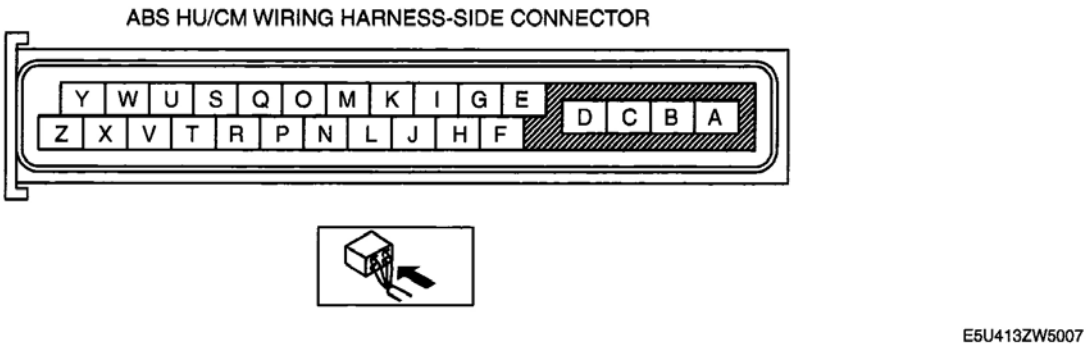


Fig. 10: Identifying ABS HU/CM Connector Terminals
Courtesy of MAZDA MOTORS CORP.

STANDARD (REFERENCE VALUE) TABLE

Terminal	Signal name	Connected to	Measured item	Measured terminal (measured condition)	Standard	Inspection Item(s)
A	Ground (ABS motor)	Ground point	Continuity	A-ground point	Continuity detected	• Wiring harness (A-ground point)
B	Power supply (ABS motor operation)	Battery	Voltage	Under any condition	B+	• Wiring harness (B-battery)
C	Power supply (solenoid)	Battery	Voltage	Under any condition	B+	• Wiring harness (C-battery)
D	Ground (ABS system)	Ground point	Continuity	D-ground point	Continuity detected	• Wiring harness (D-ground point)
						• Wiring harness

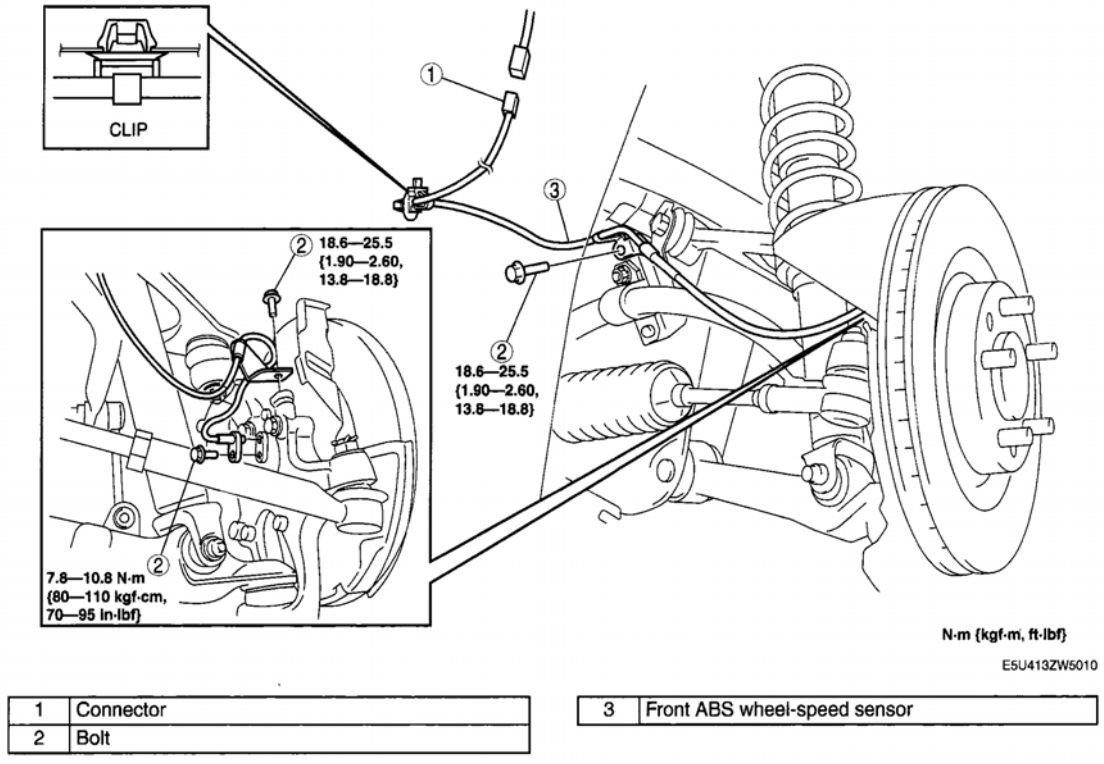
E	LF wheel-speed sensor (ground)	LF ABS wheel-speed sensor	Continuity	E-LF ABS wheel-speed sensor connector terminal B	Continuity detected	(E-LF ABS wheel-speed sensor connector terminal B)
F	LF wheel-speed sensor (single)	LF ABS wheel-speed sensor	Continuity	F-LF ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (F-LF ABS wheel-speed sensor connector terminal A)
G	LR wheel-speed sensor (signal)	LR ABS wheel-speed sensor	Continuity	G-LR ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (G-LR ABS wheel-speed sensor connector terminal A)
H	LR wheel-speed sensor (ground)	LR ABS wheel-speed sensor	Continuity	H-LR ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (H-LR ABS wheel-speed sensor connector terminal B)
I	RR wheel-speed sensor (signal)	RR ABS wheel-speed sensor	Continuity	I-RR ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (I-RR ABS wheel-speed sensor connector

						terminal A)
J	Power supply (system)	Ignition switch	Voltage	Ignition switch at ON	B+	• Wiring harness (J-ignition switch)
				Ignition switch is off.	1 V or less	-
K	-	-	-	-	-	-
L	RR wheel-speed sensor (ground)	RR ABS wheel-speed sensor	Continuity	L-RR ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (L-RR ABS wheel-speed sensor connector terminal B)
M	RF wheel-speed sensor (signal)	RF ABS wheel-speed sensor	Continuity	M-RF ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (M-RF ABS wheel-speed sensor connector terminal A)
N	Brake switch	Brake switch	Voltage	N-brake switch (Brake pedal depressed)	B+	• Wiring harness (N-brake switch) • Brake switch
				Y-brake switch (Brake pedal not depressed)	1 V or less	
O	RF wheel-speed sensor (ground)	RF ABS wheel-speed sensor	Continuity	O-RF ABS wheel-speed sensor connector	Continuity detected	• Wiring harness (O-RF ABS wheel-speed sensor

				terminal B		connector terminal B)
P	-	-	-	-	-	-
Q	-	-	-	-	-	-
R	-	-	-	-	-	-
S	-	-	-	-	-	-
T	-	-	-	-	-	-
U	-	-	-	-	-	-
V	-	-	-	-	-	-
W	-	-	-	-	-	-
X	-	-	-	-	-	-
Y	CAN_L	DLC-2 (CAN_L)	Continuity	Y-DLC-2 terminal CAN_L.	Continuity detected	• Wiring harness (Y-DLC-2 terminal CAN_L)
Z	CAN_H	DLC-2 (CAN_H)	Continuity	Z-DLC-2 terminal CAN_H	Continuity detected	• Wiring harness (Z-DLC-2 terminal CAN_H)

FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

1. Remove the mudguard.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Connector
2	Bolt
3	Front ABS wheel-speed sensor

Fig. 11: Identifying Front ABS Wheel-Speed Sensor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

FRONT ABS WHEEL-SPEED SENSOR INSPECTION

INSTALLATION VISUAL INSPECTION

1. Inspect the following items:
   - If there is any malfunction, replace the applicable part.
   1. Excessive play of the ABS wheel-speed sensor
   2. Deformation of the ABS wheel-speed sensor

CLEARANCE INSPECTION

1. Remove the front ABS wheel-speed sensor.
2. Measure the distance between the front ABS wheel-speed sensor installation surface and the ABS sensor rotor. This is dimension A.
3. Measure the distance between the front ABS wheel-speed sensor installation surface and the tip of ABS wheel-speed sensor. This is dimension B.
4. Calculate the clearance between the front ABS wheel-speed sensor and the ABS sensor rotor using the following formula:

Clearance (mm {in}) = A - B

5. Verify that the clearance between the ABS sensor rotor and the front ABS wheel-speed sensor is as indicated below.
   - If there is any malfunction, replace it.

Clearance

0.3-1.0 mm {0.012-0.057 in}

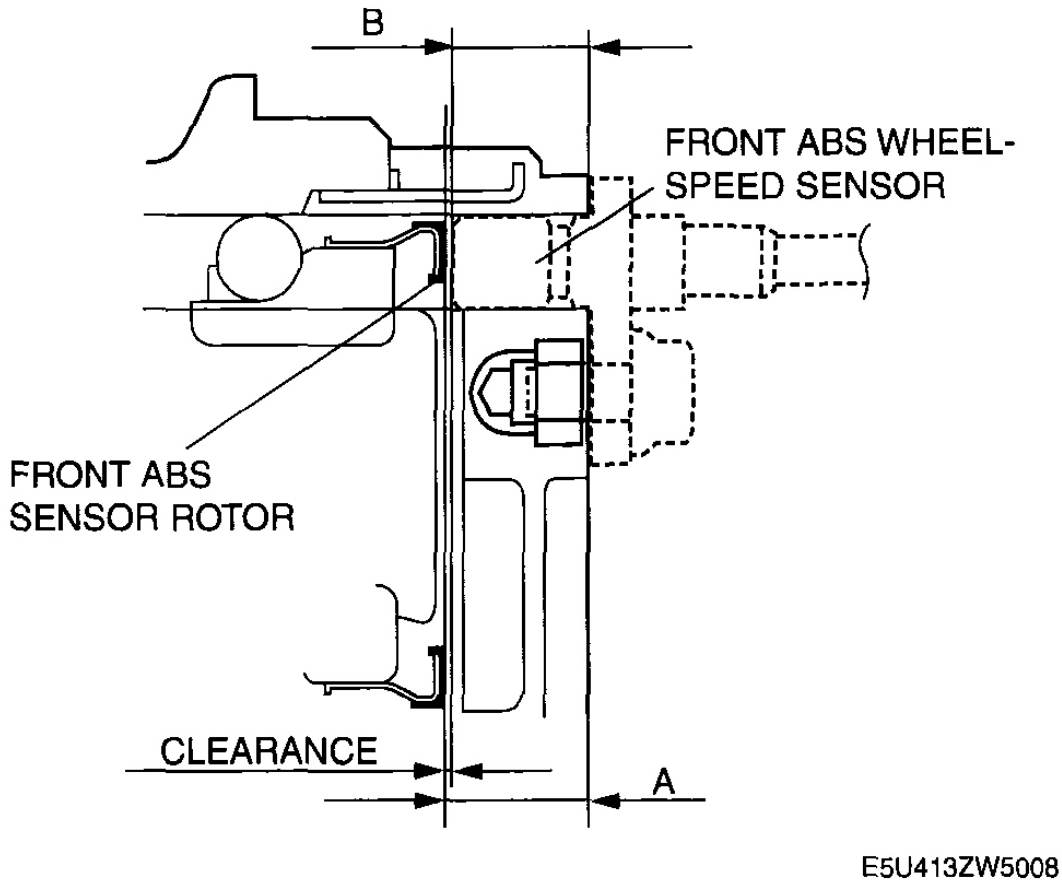


Fig. 12: Measuring Distance Between Front ABS Wheel-Speed Sensor Installation Surface & ABS Wheel-Speed Sensor Tip
Courtesy of MAZDA MOTORS CORP.

SENSOR OUTPUT VALUE INSPECTION

CAUTION:
- **Resistance inspection using other testers may cause damage to the**

ABS wheel-speed sensor internal circuit. Be sure to use the M-MDS or equivalent to inspect the ABS wheel-speed sensor.

1. Turn the ignition switch off.
2. Connect the M-MDS or equivalent to the DLC-2.

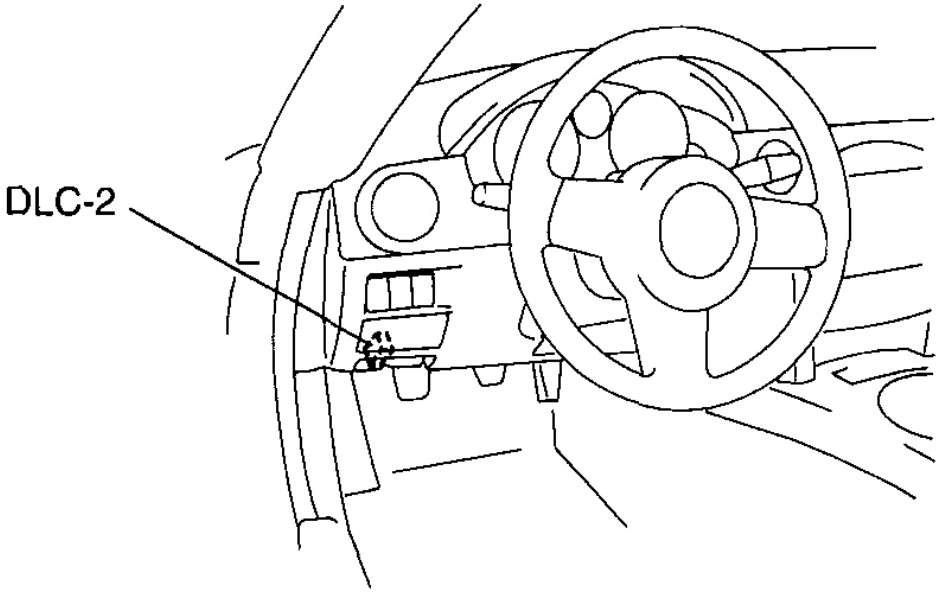


Fig. 13: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Select the following PIDs using the M-MDS or equivalent:
   - LF_WSPD

     (LF wheel-speed sensor)

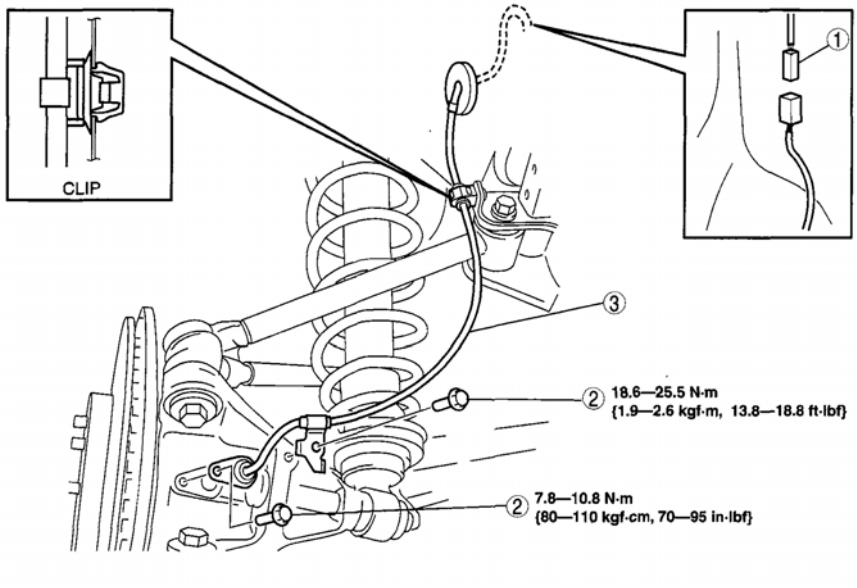
   - RF_WSPD

     (RF wheel-speed sensor)

4. Start the engine and drive the vehicle.
5. Verify that the display of the M-MDS or equivalent shows the same value as the speedometer.
   - If there is any malfunction, replace the front ABS wheel-speed sensor.

REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

1. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
2. Remove the partition board. (See **PARTITION BOARD REMOVAL/INSTALLATION** .)
3. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
4. Remove the fuel-filler pipe protector. (See **FUEL TANK REMOVAL/INSTALLATION [LF]** .)
5. Remove in the order indicated in **Fig. 14** .
6. Install in the reverse order of removal.



1	Connector	3	Rear ABS wheel-speed sensor
2	Bolt		

Fig. 14: Identifying Rear ABS Wheel-Speed Sensor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR ABS WHEEL-SPEED SENSOR INSPECTION

INSTALLATION VISUAL INSPECTION

1. Inspect the following items:
   - If there is any malfunction, replace the applicable part.
   1. Excessive looseness or play of the ABS wheel-speed sensor
   2. Deformation of the ABS wheel-speed sensor
   3. Deformation or damage of the ABS sensor rotor

CLEARANCE INSPECTION

1. Verify the clearance between the ABS sensor rotor and the ABS wheel-speed sensor.
   - If there is any malfunction, check for improper installation, and replace if necessary.

   Clearance

   0.8-1.6 mm {0.032-0.062 in}

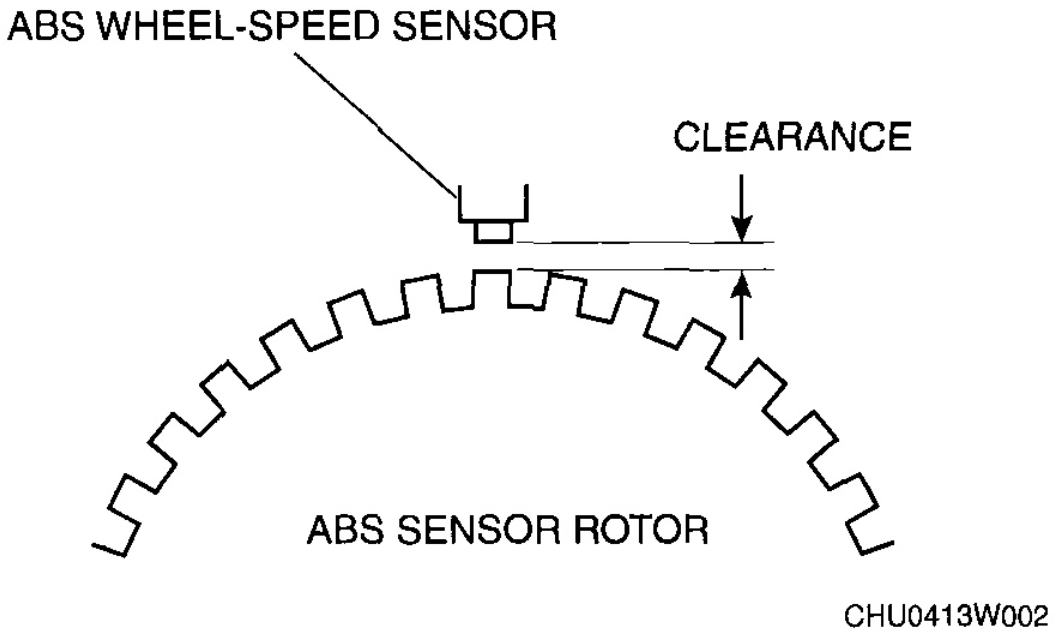


Fig. 15: Inspecting ABS Sensor-To-Rotor Clearance
Courtesy of MAZDA MOTORS CORP.

SENSOR OUTPUT VALUE INSPECTION

1. Turn the ignition switch off.
2. Connect the M-MDS or equivalent to the DLC-2.

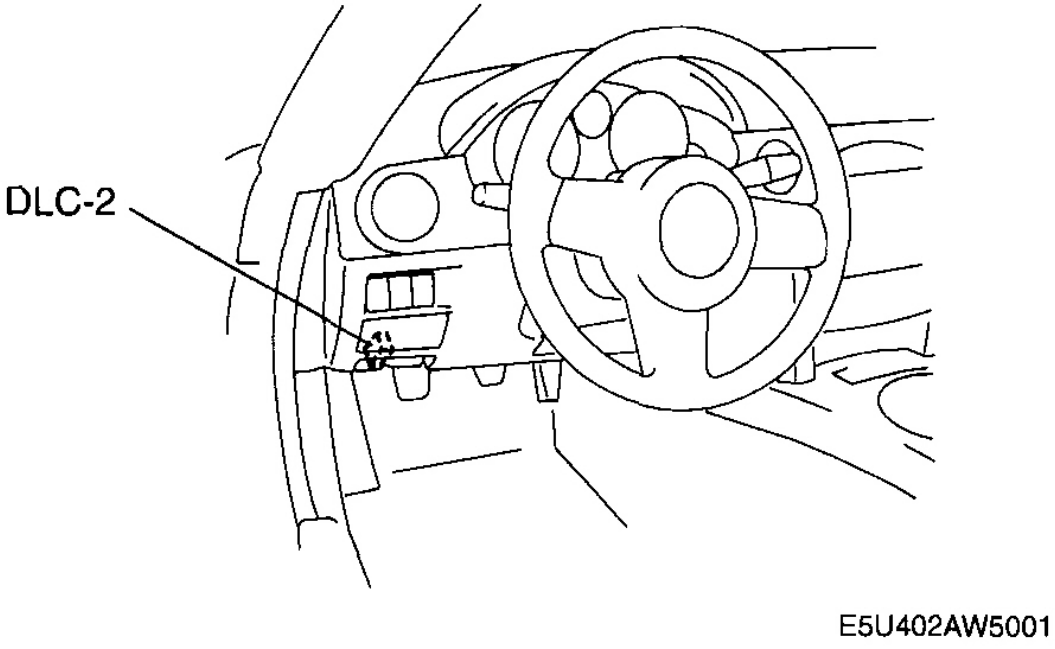


Fig. 16: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Select the following PIDs using the M-MDS or equivalent:
   - LR_WSPD

     (LR wheel-speed sensor)

   - RR_WSPD

     (RR wheel-speed sensor)

4. Start the engine and drive the vehicle.
5. Verify that the display of the M-MDS or equivalent shows the same value as the speedometer.
   - If there is any malfunction, replace the rear ABS wheel-speed sensor.

2006-08 TRANSMISSION

Automatic Transmission Overhaul - MX-5 Miata & RX-8

05-13 AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION DISASSEMBLY

Precaution

The following are precautions that must be followed performing removal/installation.

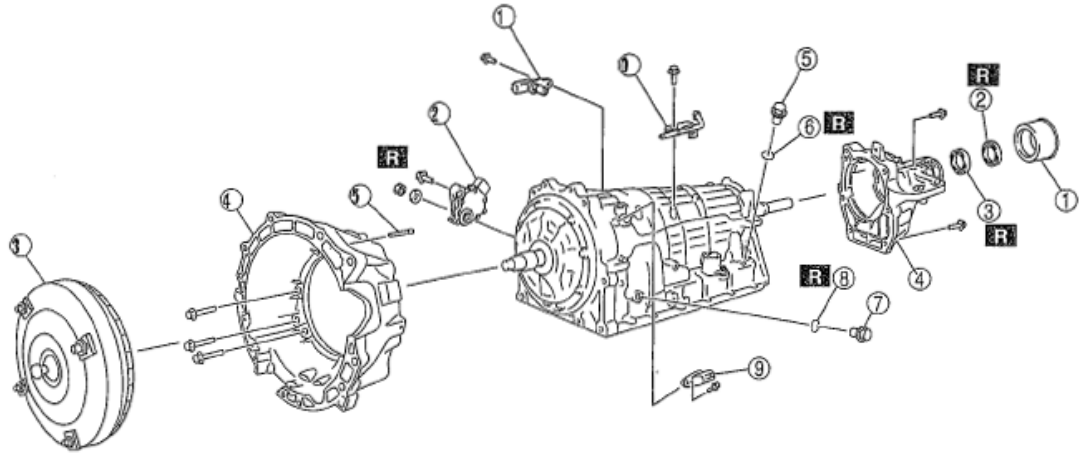
1. Handle electronic parts with care
   - Do not pull the wiring harness forcibly when disconnecting the connector. Unlock the first and pull the connector.
   - When connecting the connector, verify that it is inserted until it is properly locked. (Verify that a click sound is heard.)
   - Do not apply shock to electronic parts. Replace with new parts if they have been dropped or subjected to shock.
2. Prevent foreign matter from penetrating
   - Be sure to remove foreign matter such as dust and sand from the automatic transaxle before removing parts.
   - Protect removed parts from dust with an object such as a vinyl sheet.
   - Do not use cotton work gloves or shop rags as frayed strings might get caught in the unit. Work with bare hands or use vinyl gloves.
3. Prevent scratching
   - Do not pry with a screwdriver forcibly. Slightly tap the case with a plastic hammer when separating component cases at seams.
   - Do not pull the valve forcibly.
   - Be careful not to get the wiring harness caught between parts during installation.
4. Prevent incorrect or insufficient, installation or missing parts
   - Be careful not to install parts incorrectly or lose parts since there are similar types of O-rings, snap rings, bearings and races. Be careful to for straighten parts and check their installation direction.
   - Be careful not to drop small parts such as check balls or lose them during installation.
5. Wash parts and apply oil
   - Wash each part before installing and dry using compressed air, and then apply the specified ATF type JWS3309.
   - Soak discs in ATF type JWS3309 before installing. In particular, soak a new disc for **2 h or more** so that the oil seeps into the lining.
   - If the thrust bearing or race falls during installation, use a small amount of yellow petrolatum grease.
   - Apply ATF type JWS3309 to contact and rotating surfaces.

- Do not apply oil or drive the vehicle immediately after installing a part applied with sealant. Leave it for **one hour or more.**
- Do not wash aluminum parts or rubber parts with alkaline chemicals.
- Do not wash rubber parts with isopropyl alcohol (IPA).

6. ATF care
   - If ATF is spilled on the floor, wipe it off immediately, as it is quite slippery and dangerous.
   - Be sure to use JWS3309 type ATF.

Disassembly

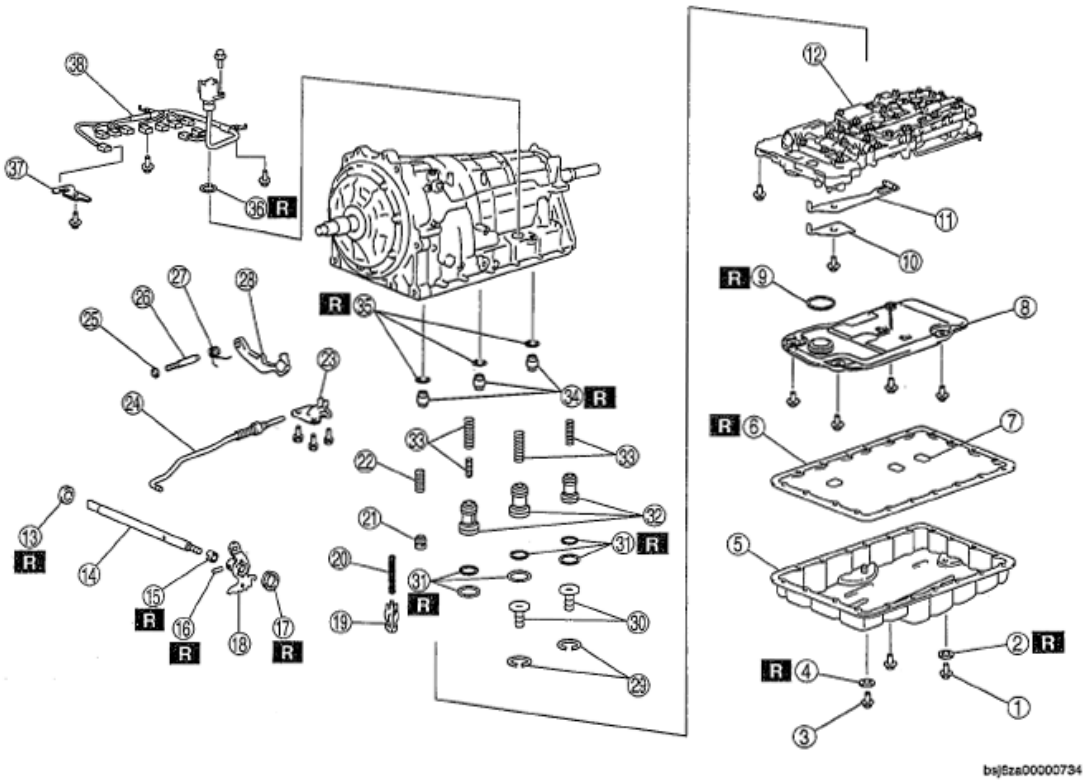
Components



1	Extension dust deflector
2	Extension housing shroud
3	Oil seal
4	Extension housing
5	Filler plug
6	O-ring
7	Drain plug
8	O-ring

9	VSS
10	Breather tube
11	Turbine sensor
12	TR switch
13	Torque converter
14	Converter housing
15	Breather pipe

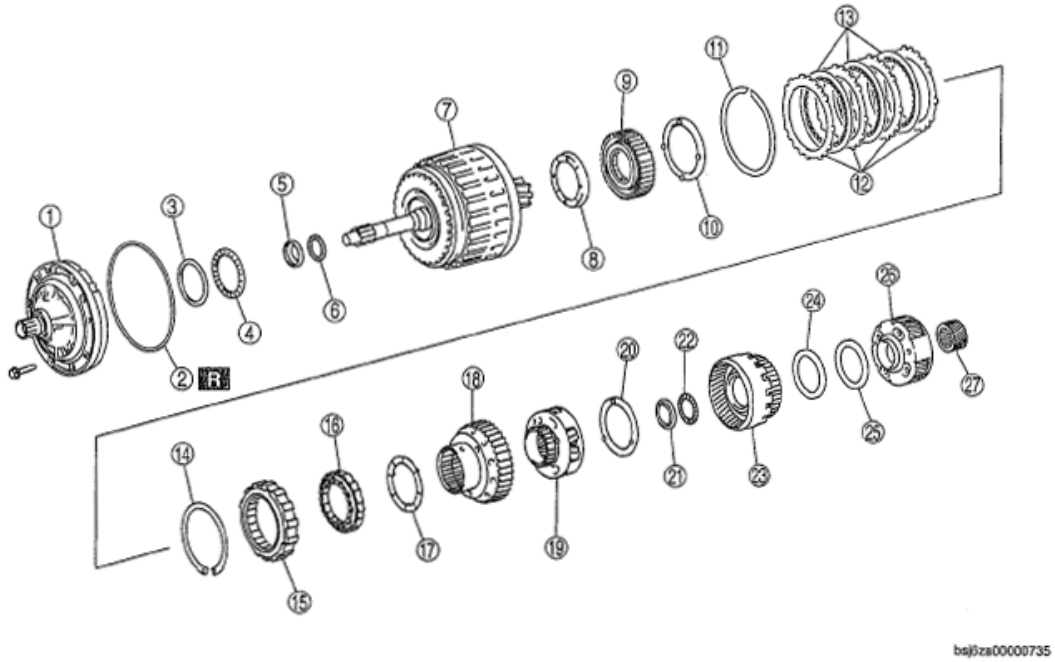
Fig. 1: Disassembled View Of Automatic Transmission Components (1 Of 5)



1	Drain plug
2	Gasket
3	Overflow plug
4	Gasket
5	Oil pan
6	Oil pan gasket
7	Magnet
8	Oil strainer
9	O-ring
10	Detent spring cover
11	Detent spring
12	Control valve body
13	Oil seal
14	Manual shaft
15	Manual shaft washer
16	Pin
17	Oil seal
18	Manual valve
19	Check valve
20	Spring

21	Accumulator piston
22	Spring
23	Bracket
24	Parking rod
25	Driven plate
26	Shaft parking pawl
27	Spring
28	Parking pawl
29	Snap ring
30	Spring
31	O-ring
32	Accumulator piston
33	Accumulator spring
34	Gasket
35	Gasket
36	O-ring
37	Clip
38	Coupler component

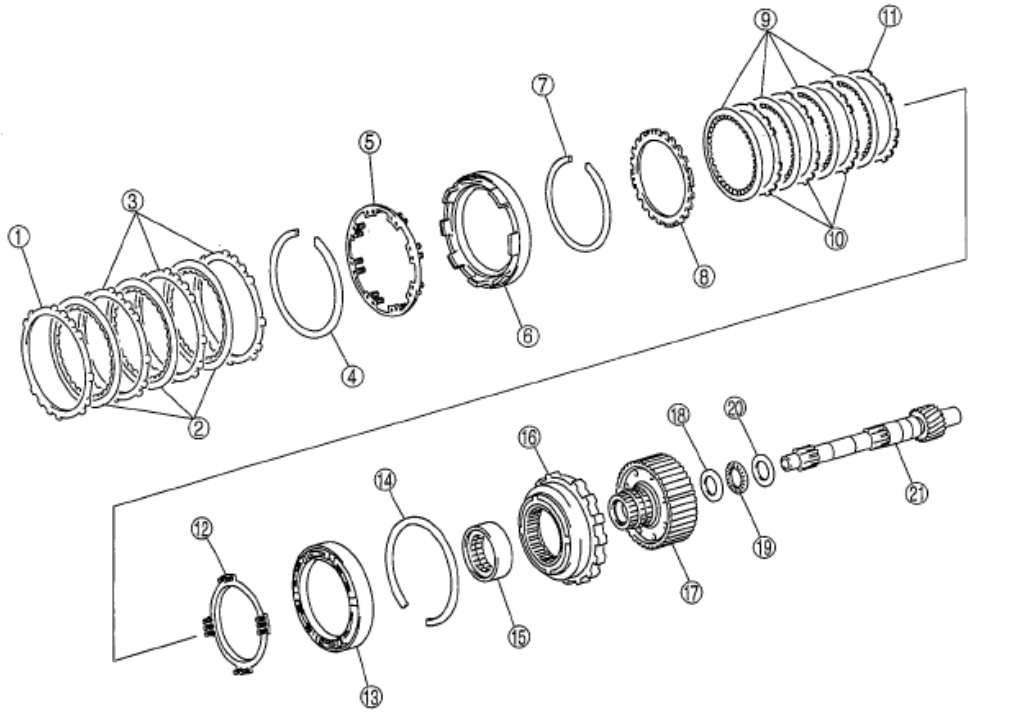
Fig. 2: Disassembled View Of Automatic Transmission Components (2 Of 5)



1	Oil pump
2	O-ring
3	Bearing race
4	Thrust needle bearing
5	Bearing race
6	Thrust needle bearing
7	Clutch drum component
8	Thrust washer
9	F2 one-way clutch
10	Thrust washer
11	Snap ring
12	Driven plate
13	Drive plate
14	Snap ring

15	B3 brake piston component
16	F1 one-way clutch
17	Thrust washer
18	Bearing race
19	Front planetary gear component
20	Thrust washer
21	Bearing race
22	Thrust needle bearing
23	Front and middle ring gear component
24	Thrust needle bearing
25	Bearing race
26	Front planetary gear component
27	Sun gear

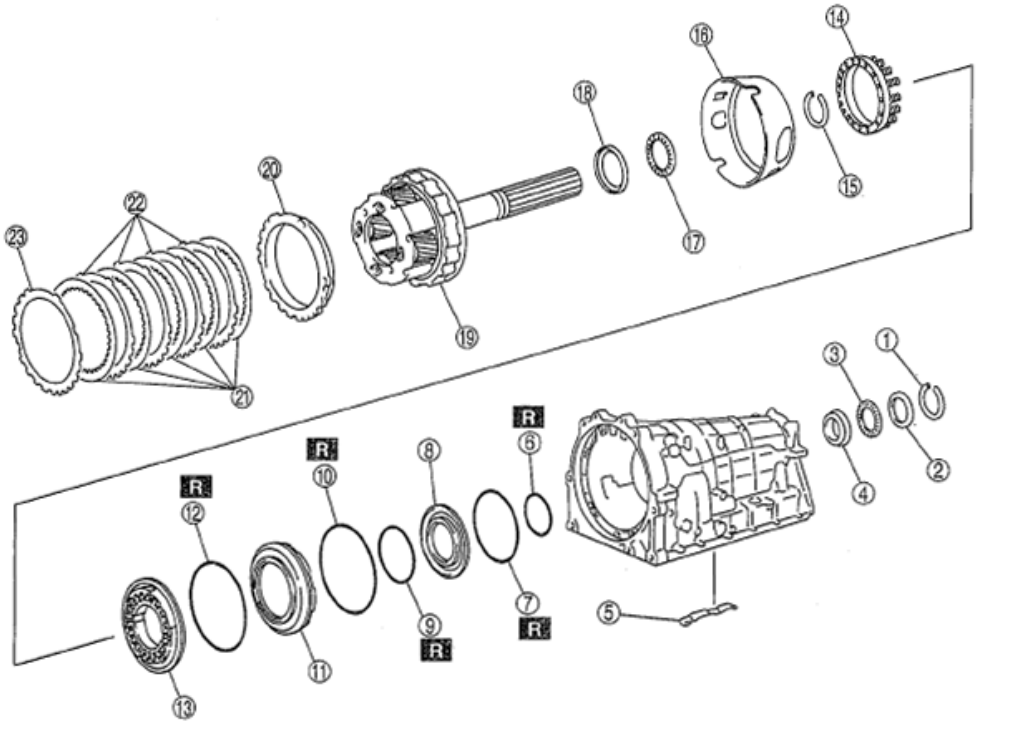
Fig. 3: Disassembled View Of Automatic Transmission Components (3 Of 5)



1	Retaining plate
2	Driven plate component
3	Driven plate
4	Snap ring
5	Pinion return spring
6	B1 brake piston component
7	Snap ring
8	Retaining plate
9	Drive plate
10	Driven plate
11	Driven plate

12	Pinion return spring
13	B2 brake piston component
14	Snap ring
15	Inner race
16	F3 one-way clutch
17	Rear ring gear component
18	Bearing race
19	Needle bearing
20	Bearing race
21	Intermediate shaft

Fig. 4: Disassembled View Of Automatic Transmission Components (4 Of 5)



1	Snap ring
2	Bearing race
3	Thrust needle bearing
4	Bearing race
5	Stopper spring
6	O-ring
7	O-ring
8	Inner brake piston
9	O-ring
10	O-ring
11	Sleeve
12	O-ring

13	B4 brake piston
14	Piston return spring
15	Snap ring
16	Brake tube
17	Thrust needle bearing
18	Bearing race
19	Rear planetary gear component
20	O-ring
21	Inner brake piston
22	O-ring
23	O-ring

Fig. 5: Disassembled View Of Automatic Transmission Components (5 Of 5)

Disassembly procedure

1. Remove the drain plug and gasket.

CAUTION:
- **Do not damage the oil seal.**
- **Do not drop the torque converter.**

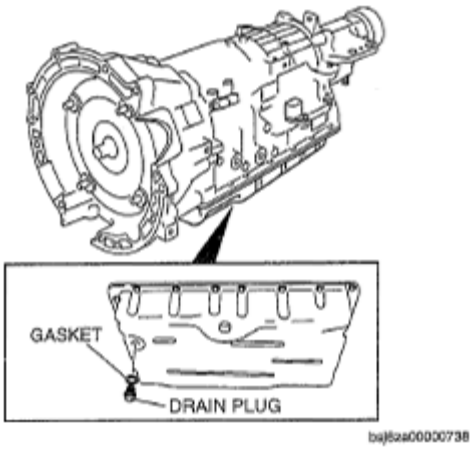


Fig. 6: Identifying Drain Plug And Gasket

2. Remove the torque converter.

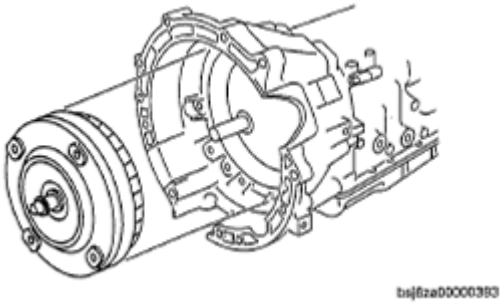


Fig. 7: Identifying Torque Converter

3. Remove the breather hose and breather pipe.

CAUTION:
- **Do not damage the turbine sensor.**

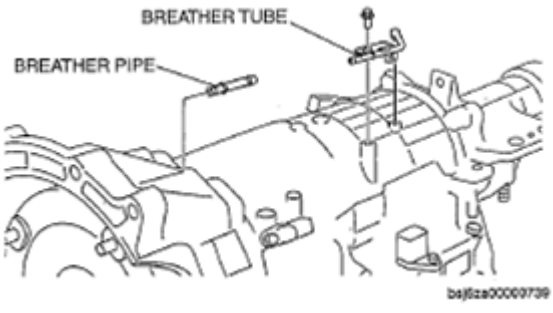


Fig. 8: Identifying Breather Tube And Pipe

4. Remove the turbine sensor.

CAUTION:

- **Do not damage the VSS.**

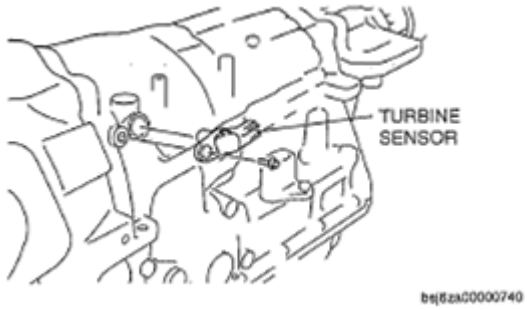


Fig. 9: Identifying Turbine Sensor

5. Remove the VSS.

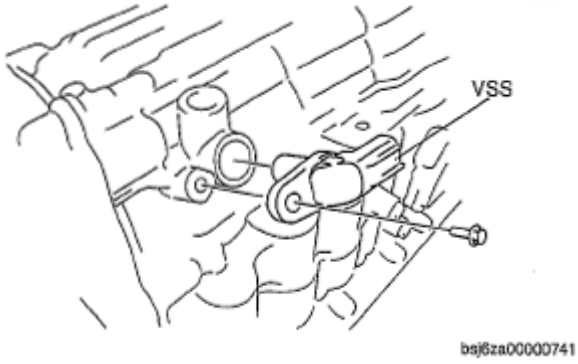


Fig. 10: Identifying VSS

6. Lift up the lock washer using a flathead screwdriver.

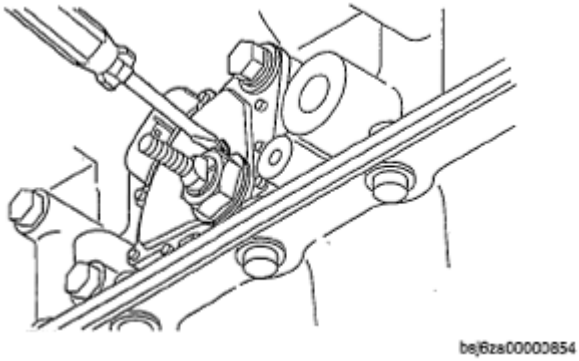


Fig. 11: Lifting Up Lock Washer Using Flathead Screwdriver

7. Remove the nut and lock washer.

CAUTION:
- **Do not damage the TR switch.**

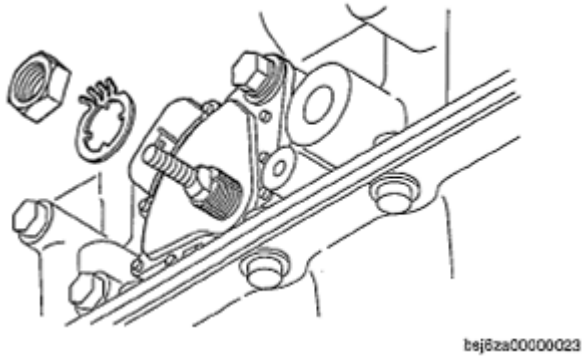


Fig. 12: Identifying Nut And Lock Washer

8. Remove the TR switch.

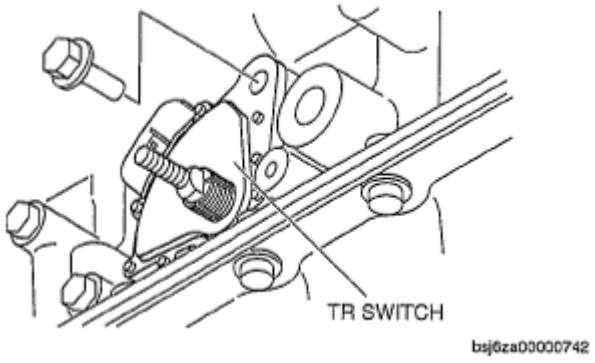


Fig. 13: Identifying TR Switch

9. Remove the bolts as shown in the figure.

CAUTION:
- **Do not damage the fitting surface of the transmission case and the converter housing.**

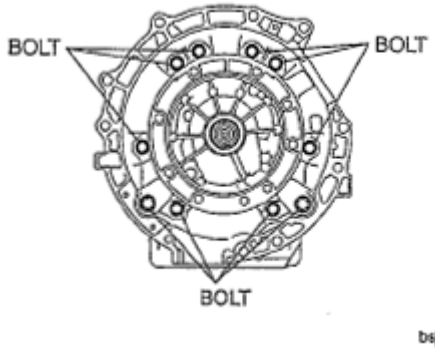


Fig. 14: Identifying Bolts

10. Using a plastic hammer, tap the converter housing to remove it.

CAUTION:
- **Do not damage the fitting surface of the extension housing and the extension dust deflector.**

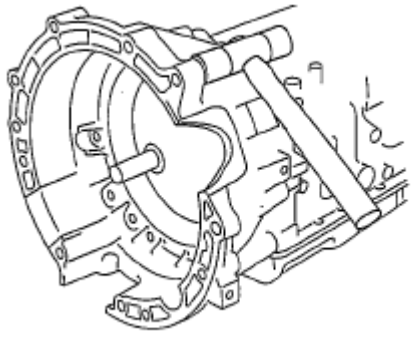


Fig. 15: Tapping Converter Housing Using Plastic Hammer

11. Using a plastic hammer and slab of wood, tap the extension dust deflector to remove it.

CAUTION:
- **Do not damage the extension housing.**

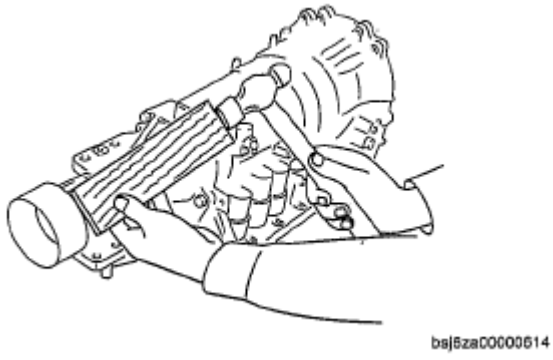


Fig. 16: Tapping Extension Dust Deflector Using Plastic Hammer

12. Using a flathead screwdriver, remove the extension housing shroud.

CAUTION:
- **Do not damage the extension housing.**

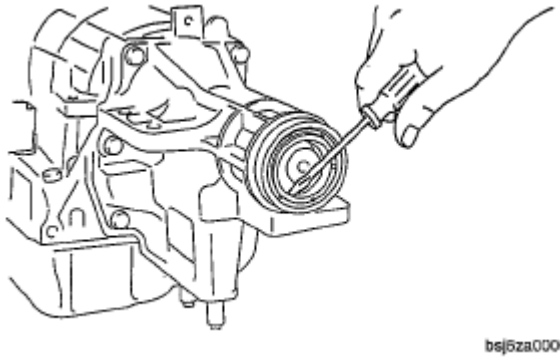


Fig. 17: Removing Extension Housing Shroud Using Flathead Screwdriver

13. Using a flathead screwdriver, remove the oil seal.

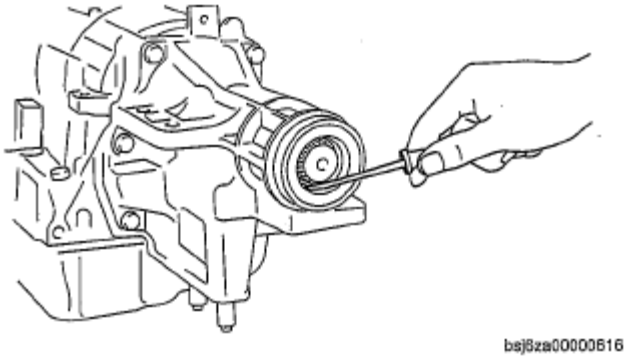


Fig. 18: Removing Oil Seal Using Flathead Screwdriver

14. Remove the bolts as shown in the figure.

CAUTION:

- **Do not damage the fitting surface of the transmission case and the extension housing.**

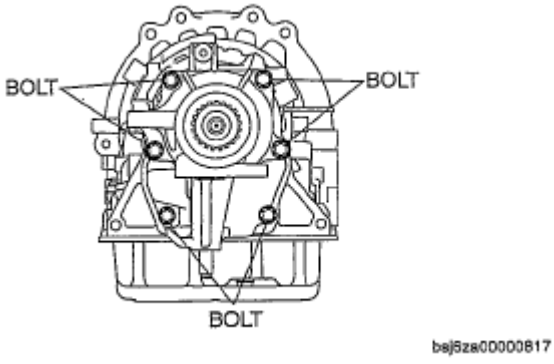


Fig. 19: Identifying Bolts

15. Using a plastic hammer, tap the extension housing to remove it.

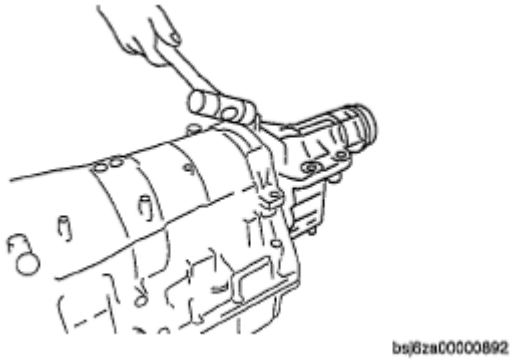


Fig. 20: Tapping Extension Housing Using Plastic Hammer

16. Remove the snap ring using snap ring pliers.

CAUTION:

- **Do not damage the fitting surface of the transmission case and the oil pan.**
- **Do not deform the oil pan.**

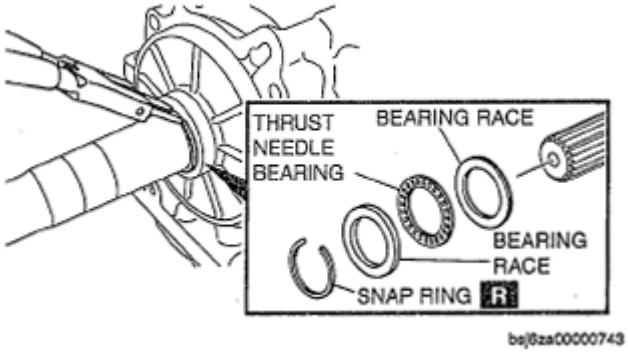


Fig. 21: Removing Snap Ring Using Snap Ring Pliers

17. Remove the bolt as shown in the figure and remove the oil pan and gasket.
18. Remove the magnet from the oil pan.

NOTE:

- **Inspect the oil pan for foreign material and determine the worn areas of the transmission. For ferrous metal related areas, check for wear of the bearings, gears, and plates. For brass related metal (non-magnetized), check for bushing wear.**

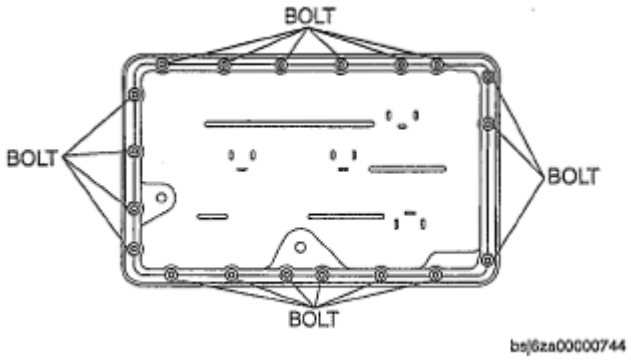


Fig. 22: Identifying Bolts

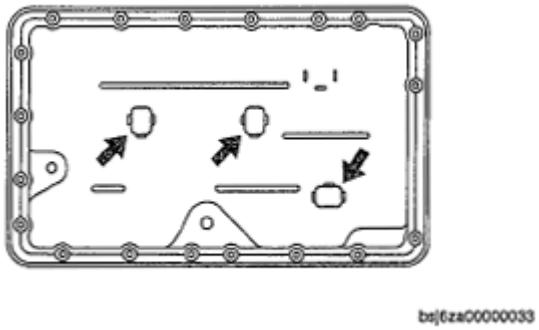


Fig. 23: Locating Magnet In Oil Pan

19. Remove the oil strainer from the control valve body component.
20. Remove the O-ring from the oil strainer.

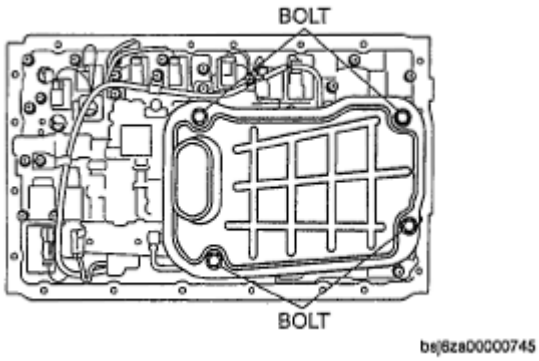


Fig. 24: Identifying Oil Strainer Bolts

21. Disconnect the solenoid connectors from the solenoids.
22. Disconnect the coupler component from the clamps.

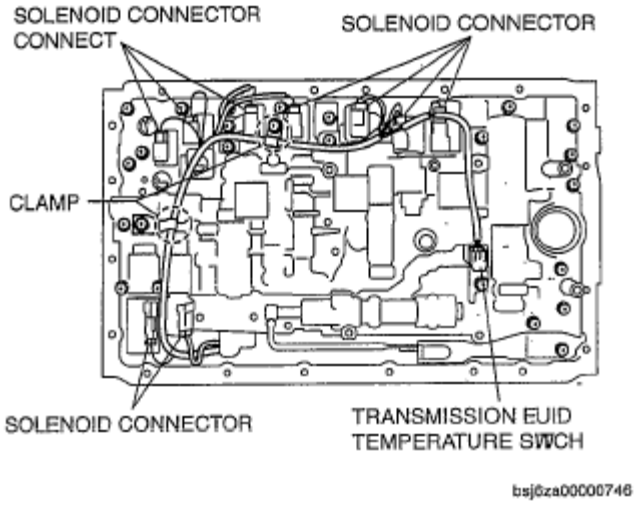


Fig. 25: Identifying Solenoid Connectors

23. Remove the lock plate from the control valve body component.

CAUTION:
- **When installing the control valve body, make sure that it does not interfere with the coupler component.**

24. Disconnect the transmission fluid temperature switch from the control valve body component.

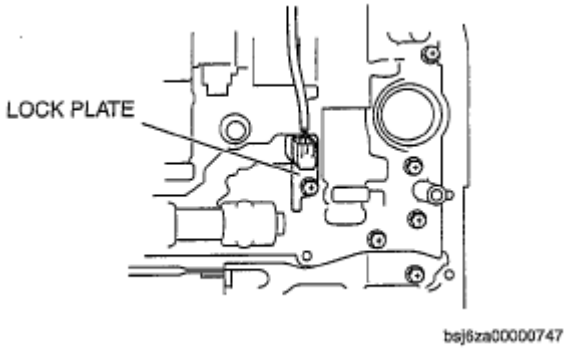


Fig. 26: Identifying Lock Plate

25. Fix the coupler component with tape to the transmission case as shown in the figure.

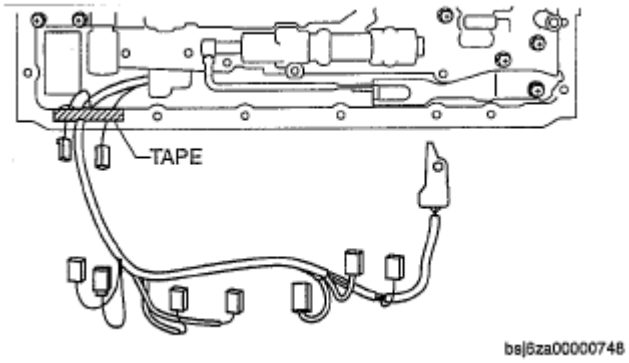


Fig. 27: Identifying Tape

26. Disconnect the detent spring cover and detent spring from the control valve body component.

CAUTION:
- **Do not drop the control valve body component.**

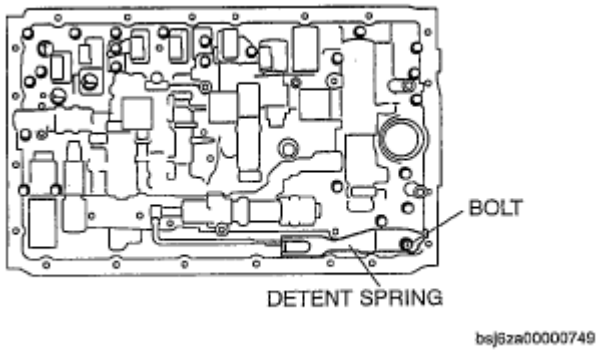


Fig. 28: Identifying Detent Spring And Bolt

27. Remove the bolts from transmission case.

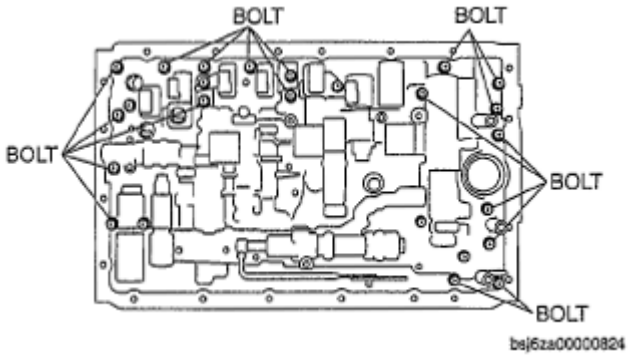


Fig. 29: Identifying Bolts

28. Disconnect the manual valve link and remove the control valve body component.

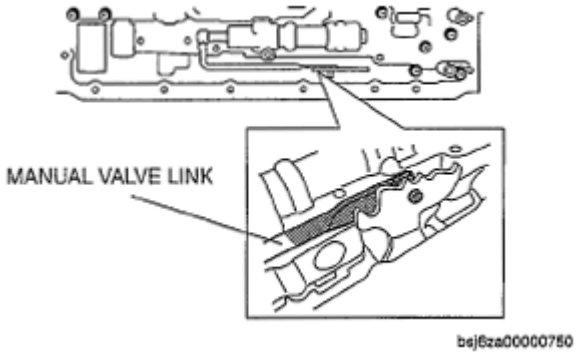


Fig. 30: Identifying Manual Valve Link

29. Remove the check valve subcomponent and compression spring from transmission case.

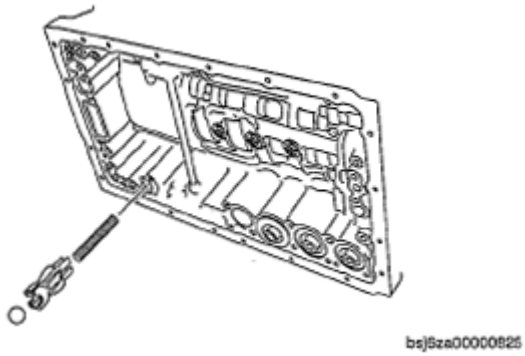


Fig. 31: Identifying Check Valve Subcomponent And Compression Spring

30. Remove the transmission case gasket and brake drum gasket from transmission case.

CAUTION:
- **Be careful of the accumulator pistons A and B as they pop out.**

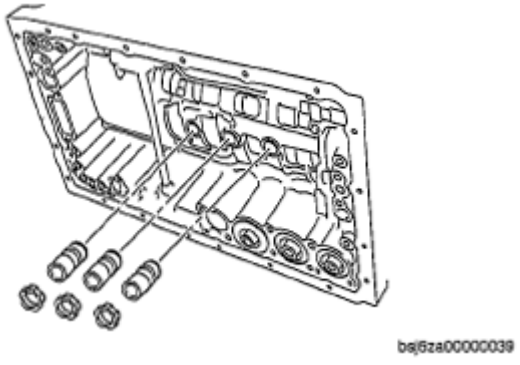


Fig. 32: Identifying Transmission Case And Brake Drum Gasket

31. Blow compressed air from the oil passage shown in the figure and remove accumulator pistons A and B

and the compression spring from the transmission case.

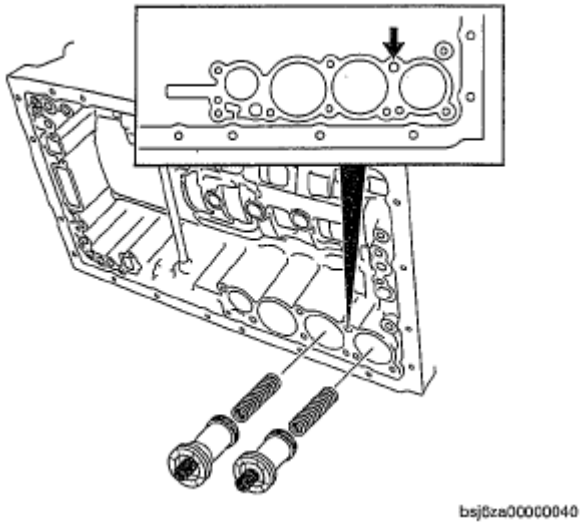


Fig. 33: Locating Oil Passage

32. Using a flathead screwdriver, remove the snap ring from accumulator pistons A and B.
33. Remove the compression spring from accumulator piston A and B.

CAUTION:
- **Do not damage the accumulator pistons.**

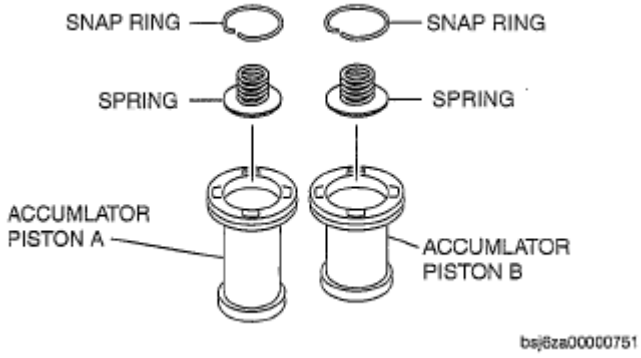


Fig. 34: Identifying Snap Ring On Accumulator Pistons A And B

34. Using a flathead screwdriver, remove the O-ring from accumulator piston A and B.

CAUTION:
- **Be careful of the accumulator pistons C as they pop out.**

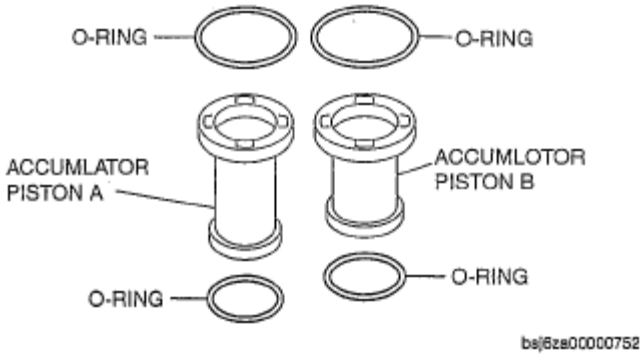


Fig. 35: Identifying O-Ring On Accumulator Piston A And B

35. Blow compressed air from the oil passage shown in the figure and remove accumulator pistons C and the compression springs from the transmission case.
36. Using a flathead screwdriver, remove the O-ring from accumulator pistons C.
37. Remove the accumulator valve and compression springs from the transmission case.

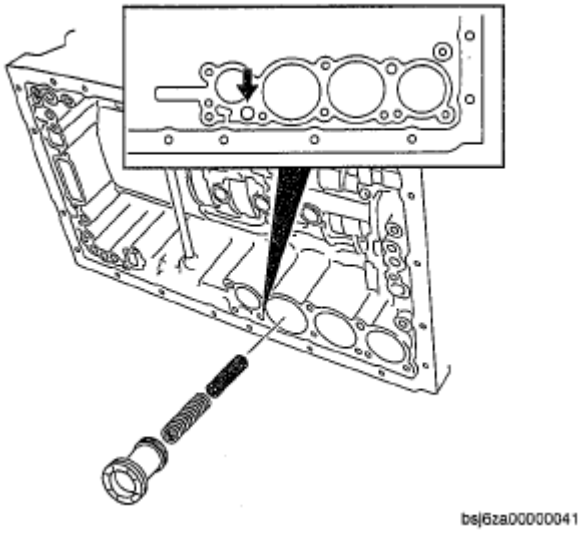


Fig. 36: Locating Oil Passage

38. Remove the bracket.

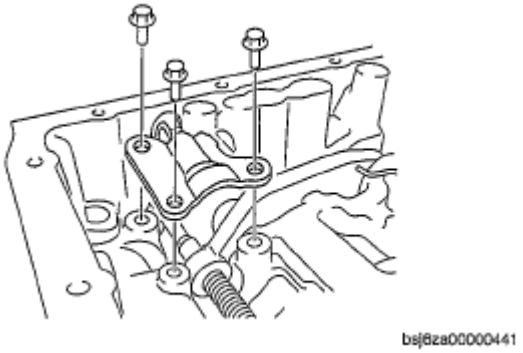


Fig. 37: Identifying Bracket Bolts

39. Remove the parking rod from the manual valve lever.

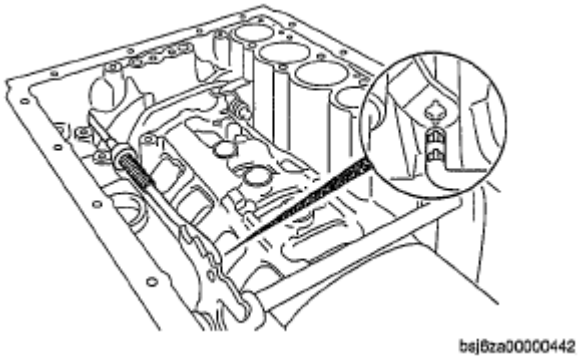


Fig. 38: Identifying Parking Rod On Manual Valve Lever

40. Pull out the shaft parking pawl and spring.

CAUTION:
- **Be careful not to apply too much force to the torsion spring.**

41. Using a flathead screwdriver, remove the driven plate from shaft parking pawl.
42. Remove the parking pawl.

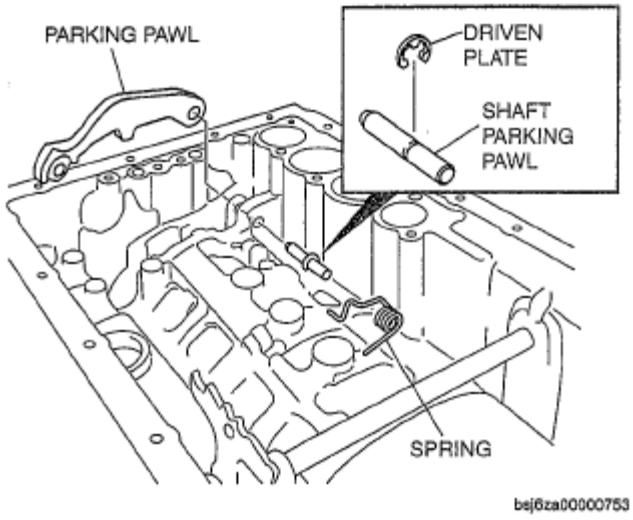


Fig. 39: Identifying Shaft Parking Pawl And Spring

43. Using a flathead screwdriver and hammer, remove the manual shaft washer.

CAUTION:
- **Do not damage the manual valve component.**

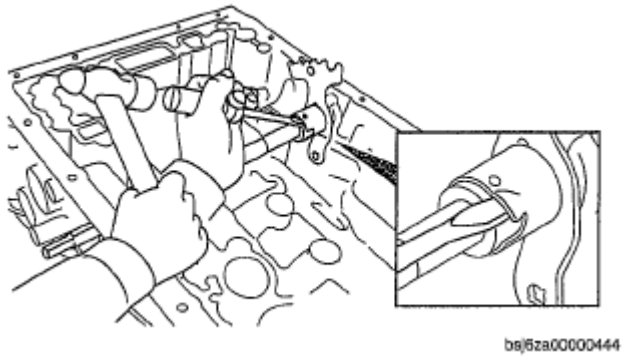


Fig. 40: Removing Manual Shaft Washer Using Flathead Screwdriver And Hammer

44. Using a hammer and pin punch, remove the pin.

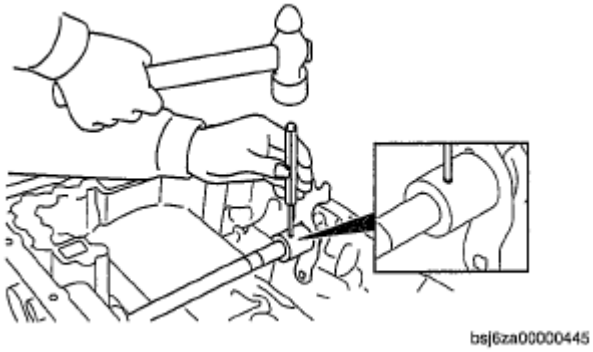


Fig. 41: Removing Pin Using Hammer And Pin Punch

45. Pull out the manual shaft and remove the manual valve component.

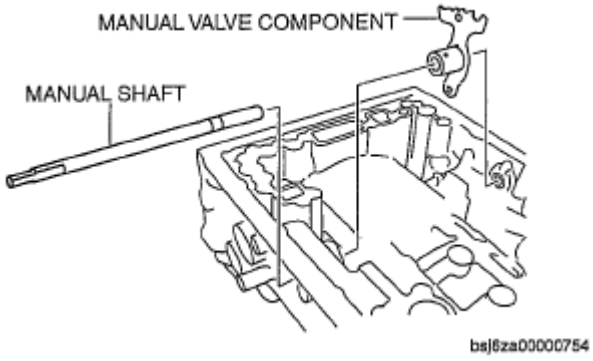


Fig. 42: Identifying Manual Shaft And Manual Valve Component

46. Using a flathead screwdriver, remove the oil seal.

CAUTION:
- **Do not damage the transmission case component.**

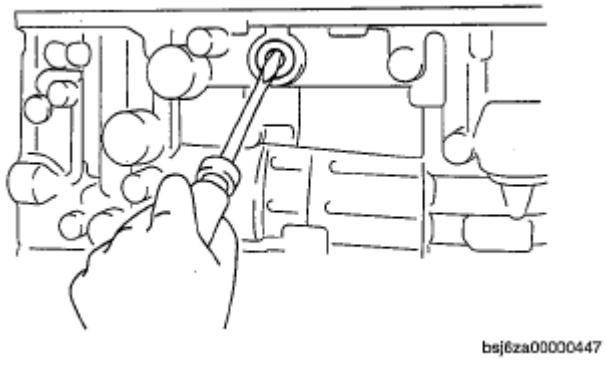


Fig. 43: Removing Oil Seal Using Flathead Screwdriver

47. Remove the bolts from the oil pump as shown in the figure.

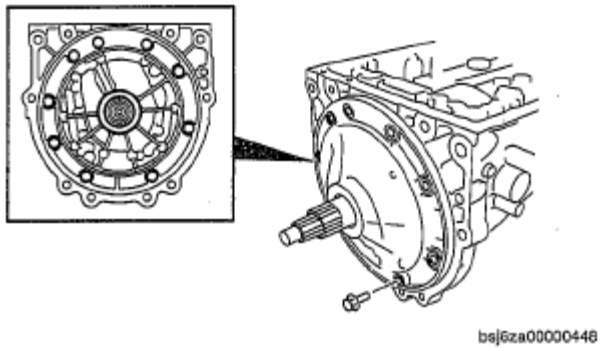


Fig. 44: Identifying Bolts On Oil Pump

48. Using a flathead screwdriver, remove the oil pump.

CAUTION:
- **Do not damage the oil pump.**

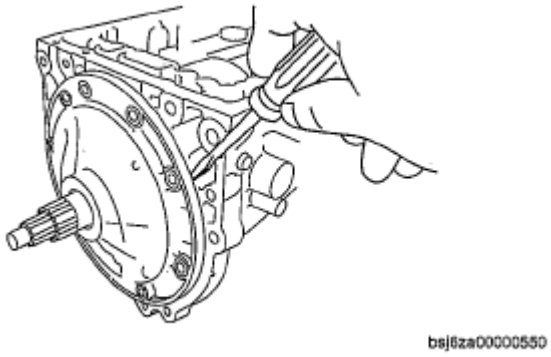


Fig. 45: Removing Oil Pump Using Flathead Screwdriver

49. Remove the O-ring from the oil pump.
50. Remove the thrust needle bearing and bearing race from oil pump.

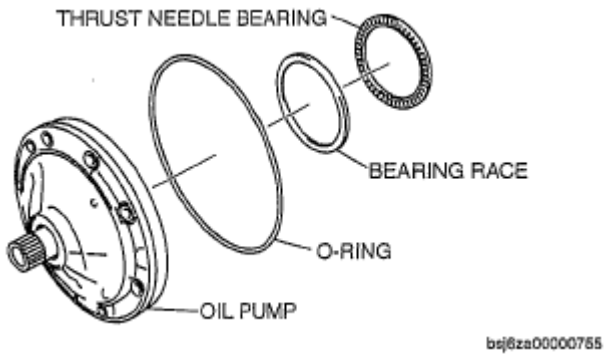


Fig. 46: Identifying O-Ring, Thrust Needle Bearing And Bearing Race On Oil Pump

51. Remove the clutch drum component.

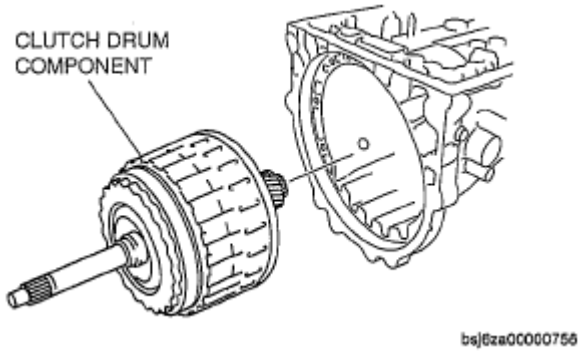


Fig. 47: Identifying Clutch Drum Component

52. Remove the thrust needle bearing and bearing race from the clutch drum component.

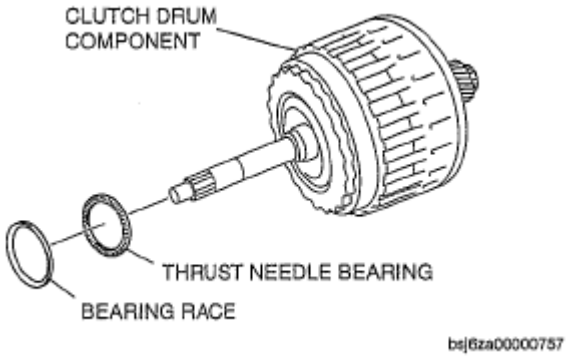


Fig. 48: Identifying Thrust Needle Bearing And Bearing Race

53. Remove the thrust washer and F2 one-way clutch component from the clutch drum component.

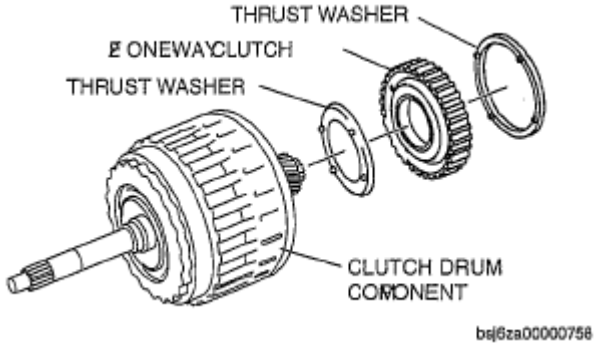


Fig. 49: Identifying Thrust Washer And F2 One-Way Clutch Component On Clutch Drum Component

54. Using a flathead screwdriver, remove the snap ring from the transmission case component.

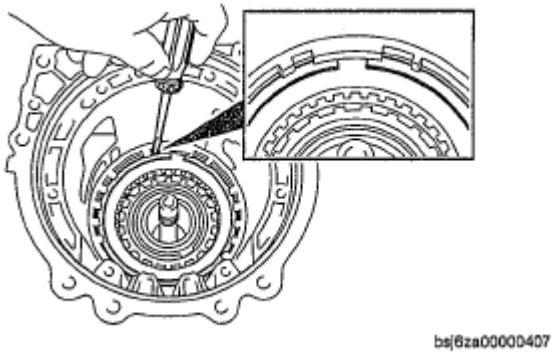


Fig. 50: Removing Snap Ring From Transmission Case Using Flathead Screwdriver

55. Remove the retaining plates, drive and driven plates.

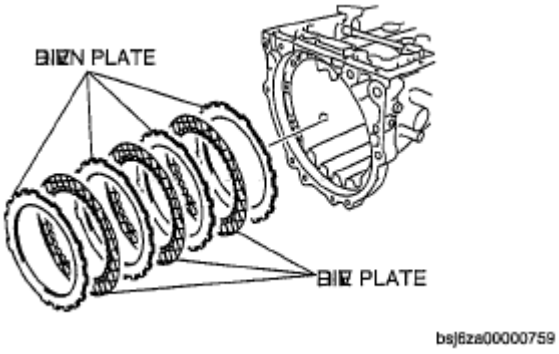


Fig. 51: Identifying Drive And Driven Plates

56. Inspect the lining of all drive plates.
    - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace with a new drive plate. When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate. If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

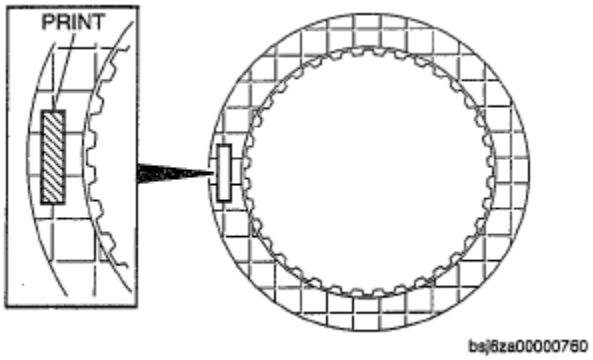


Fig. 52: Identifying Print Mark Location

57. Remove the snap ring from transmission case using snap ring pliers.

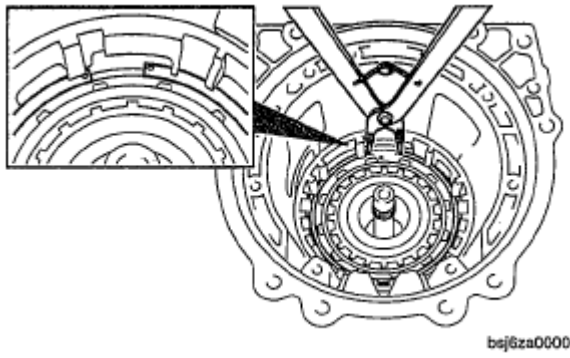


Fig. 53: Removing Snap Ring From Transmission Case Using Snap Ring Pliers

58. Remove the B2 brake piston component and F1 one-way clutch.

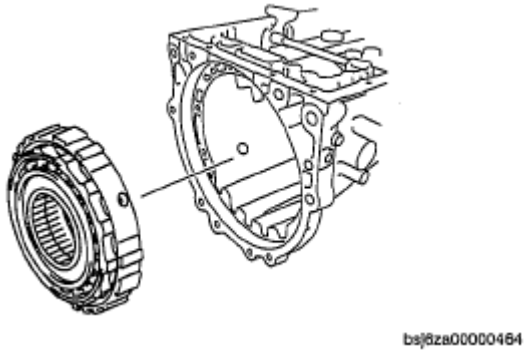


Fig. 54: Identifying B2 Brake Piston Component

59. Remove the bearing race and thrust washer from the F1 one-way clutch component.
60. Remove the F1 one-way clutch component from the B3 brake piston component.

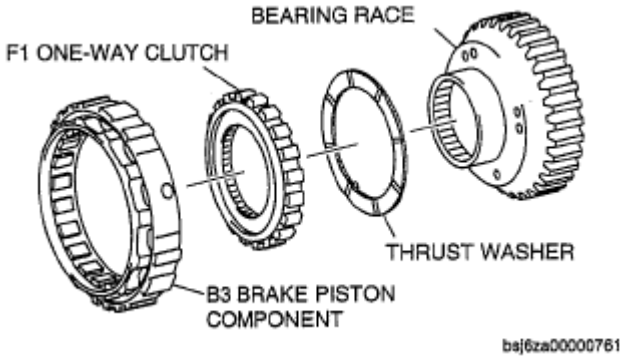


Fig. 55: Identifying F1 One-Way Clutch, B3 Brake Piston Component, Bearing Race And Thrust Washer

61. Remove the front planetary gear component and thrust washer.

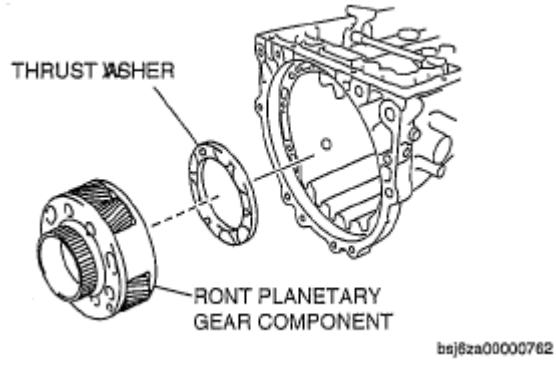


Fig. 56: Identifying Planetary Gear Component And Thrust Washer

62. Remove the front and middle ring gear component.
63. Remove the bearing race and thrust needle bearing from front and middle ring gear component.

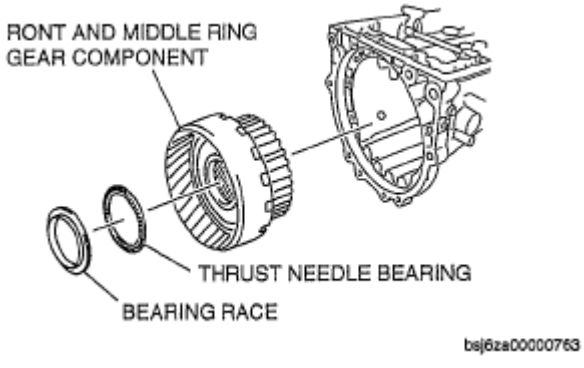


Fig. 57: Identifying Front And Middle Ring Gear Component, Thrust Needle Bearing And Bearing Race

64. Remove the retaining plates, drive and driven plates.

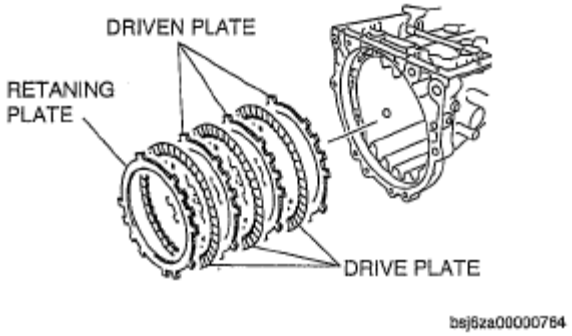


Fig. 58: Identifying Retaining Plates, Drive And Driven Plates

65. Inspect the lining of all drive plates.
    - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace with a new drive plate. When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate. If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

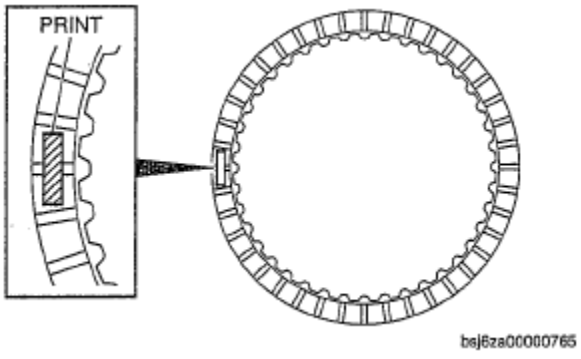


Fig. 59: Identifying Print Mark Location

66. Remove the middle planetary gear component and sun gear.
67. Remove the bearing race and thrust needle bearing from middle planetary gear component.

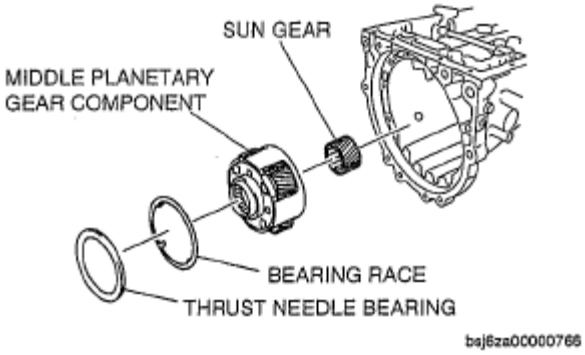


Fig. 60: Identifying Middle Planetary Gear Component And Sun Gear

68. Using a flathead screwdriver, remove the snap ring from transmission case component.

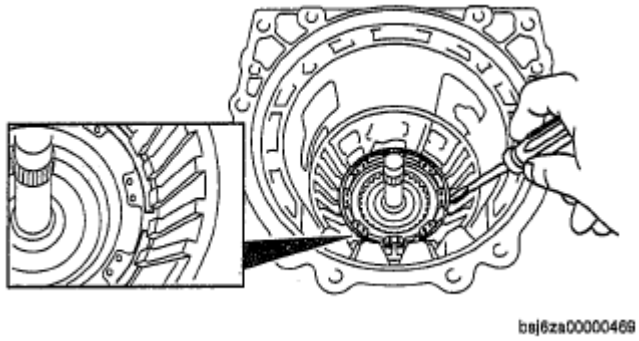


Fig. 61: Removing Snap Ring Using Flathead Screwdriver

69. Remove the piston return spring and B1 brake piston component.

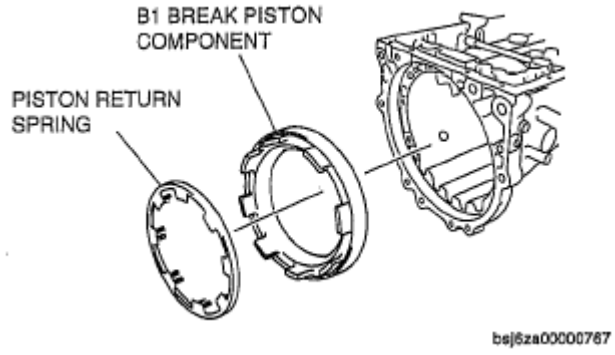


Fig. 62: Identifying Piston Return Spring And B1 Brake Piston Component

70. Using a flathead screwdriver, remove the snap ring from transmission case.

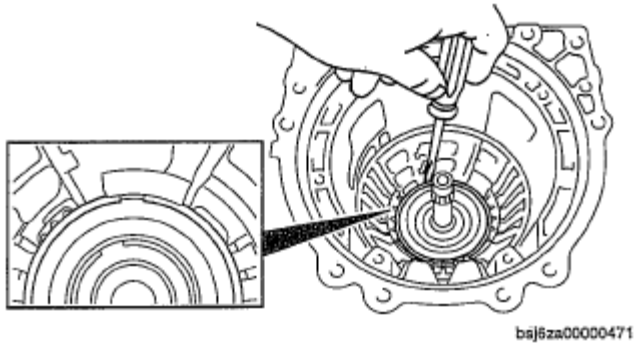


Fig. 63: Removing Snap Ring Using Flathead Screwdriver

71. Remove the driven plate.

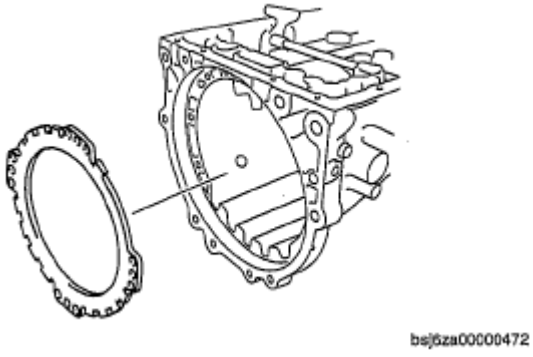


Fig. 64: Identifying Driven Plate

72. Remove the retaining plates, drive and driven plates.

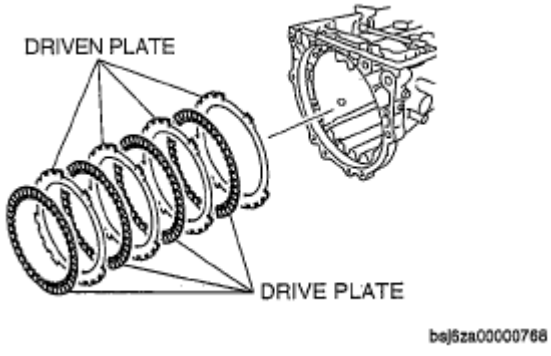


Fig. 65: Identifying Drive And Driven Plates

73. Remove the piston return spring.

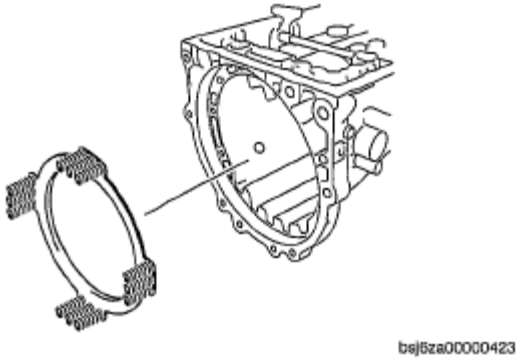


Fig. 66: Identifying Piston Return Spring

74. Inspect the lining of all drive plates
    - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace with a new drive plate. When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate. If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

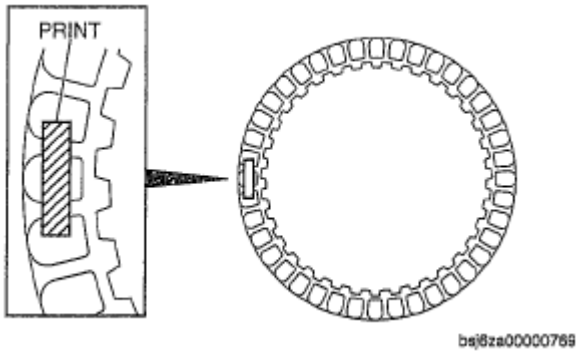


Fig. 67: Identifying Print Mark Location

75. Blow compressed air into the oil passage as shown in the figure while pressing the B2 brake piston component by hand and remove the B2 brake piston component from the transmission case.

Air pressure

392 kPa {4 kgf/cm^2 , 57 psi}

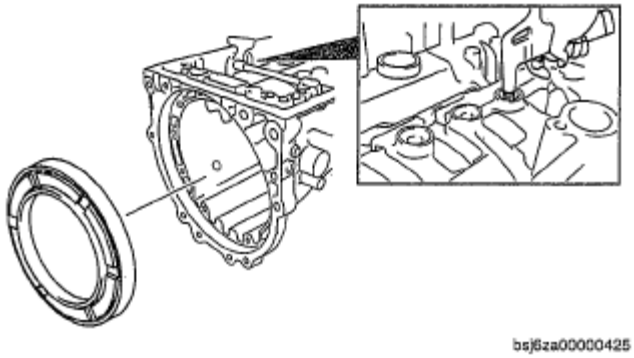


Fig. 68: Identifying Oil Passage Location

76. Remove the stopper spring from the transmission case.

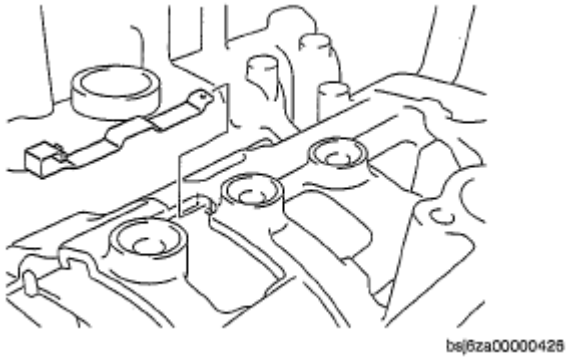


Fig. 69: Identifying Stopper Spring On Transmission Case

77. Remove the snap ring from the transmission case using snap ring pliers.

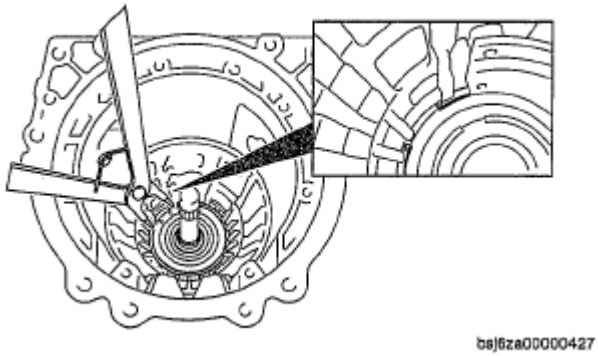


Fig. 70: Removing Snap Ring From Transmission Case Using Snap Ring Pliers

78. Remove the following parts from the transmission case and disassemble in the order indicated below.
    1. Inner race
    2. F3 one-way clutch

3. Rear ring gear component
4. Bearing race
5. Needle bearing
6. Bearing race
7. Intermediate shaft

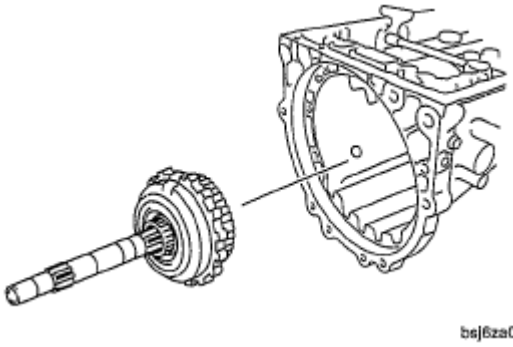


Fig. 71: Identifying Intermediate Shaft Components

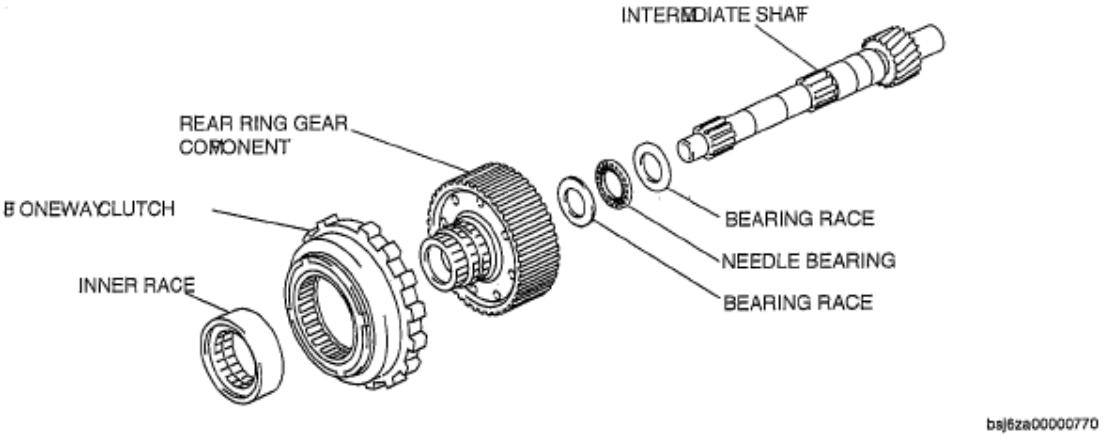


Fig. 72: Disassembled View Of Transmission Case Components

79. Remove the retaining plates, drive and driven plates.

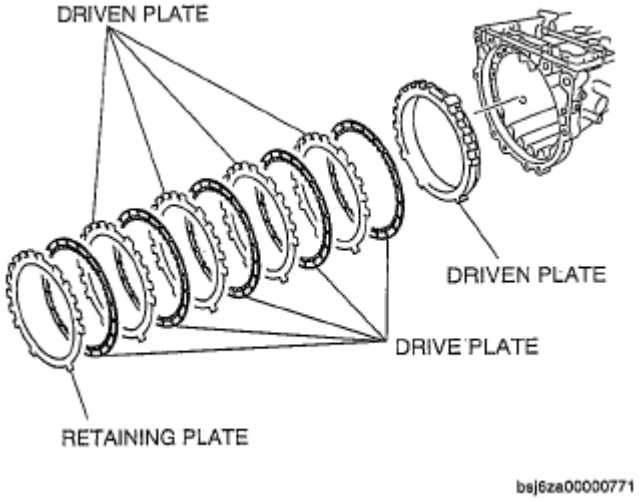


Fig. 73: Identifying Retaining Plates, Drive And Driven Plates

80. Inspect the lining of all drive plates.
    - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate. When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate. If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

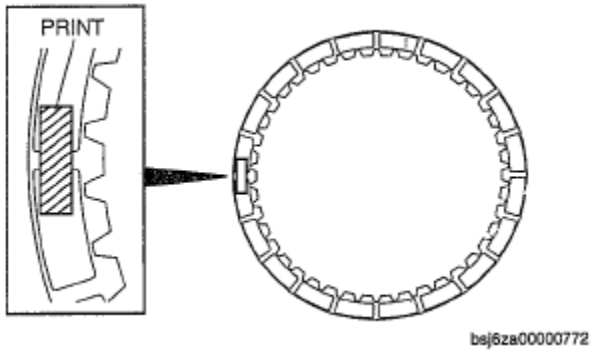


Fig. 74: Identifying Print Mark Location

81. Remove the rear planetary gear component and bearing race and thrust needle bearing.

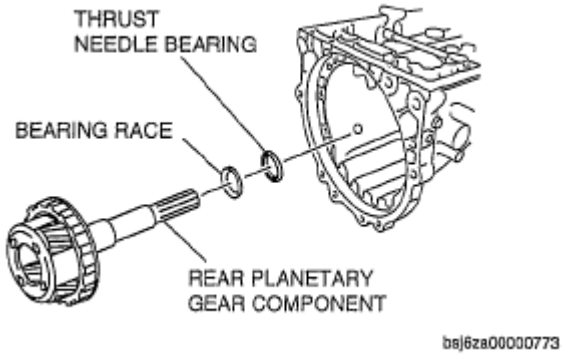


Fig. 75: Identifying Rear Planetary Gear Component, Bearing Race And Thrust Needle Bearing

82. Remove the brake tube.

CAUTION:
- **Make sure that the snap ring is not expanded excessively.**

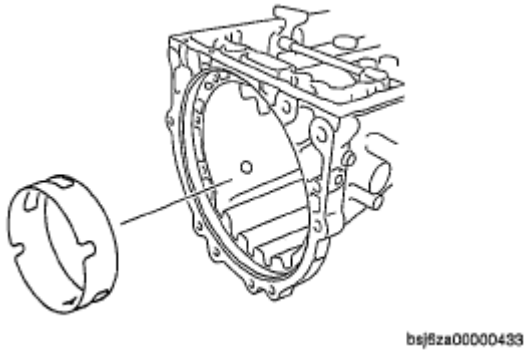


Fig. 76: Identifying Brake Tube

83. Compress the piston return spring using the **SSTs** and remove the snap ring.

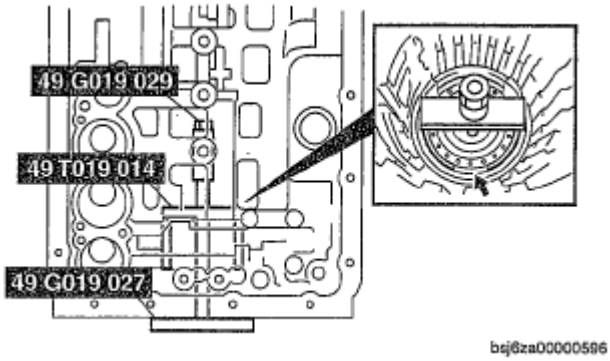


Fig. 77: Identifying SSTs For Compressing Piston Return Spring

84. Remove the piston return spring.

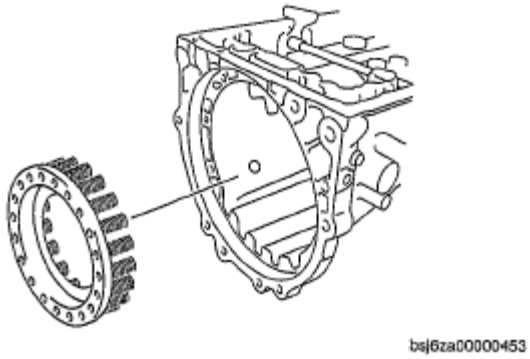


Fig. 78: Identifying Piston Return Spring

85. Blow compressed air into the oil passage as shown in the figure while pressing the B4 brake piston component by hand and remove the B4 brake piston component from the transmission case.

Air pressure

392 kPa {4 kgf/cm^2 , 57 psi}

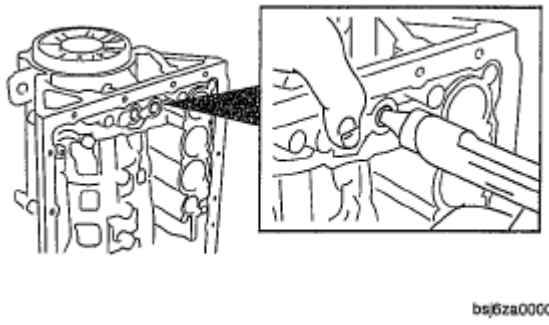


Fig. 79: Blowing Compressed Air Into Oil Passage

86. Remove the inner brake piston and sleeve and B4 brake piston.

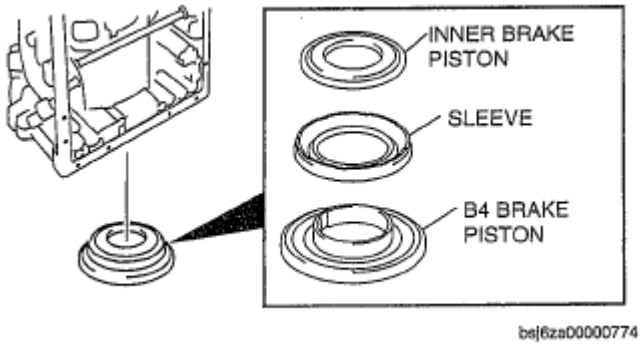


Fig. 80: Identifying Inner Brake Piston And Sleeve And B4 Brake Piston

87. Remove the O-ring from the inner brake piston.

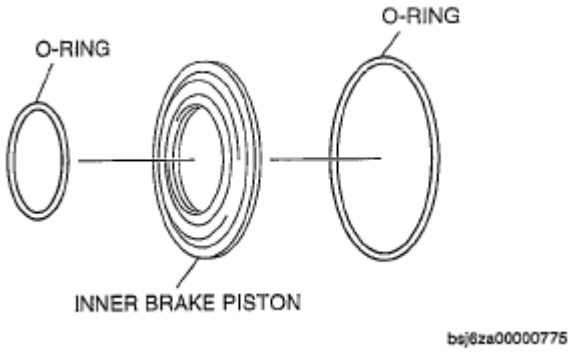


Fig. 81: Identifying O-Ring On Inner Brake Piston

88. Remove the O-ring from sleeve.

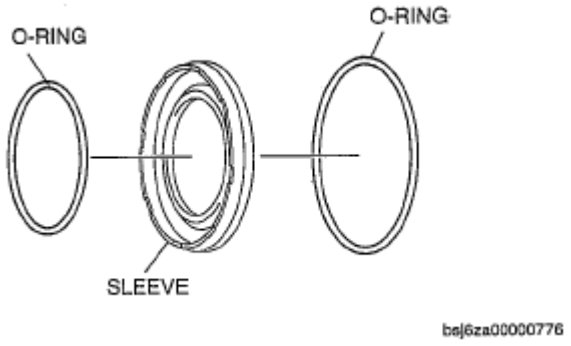


Fig. 82: Identifying O-Ring On Sleeve

89. Remove the O-ring from B4 brake piston.

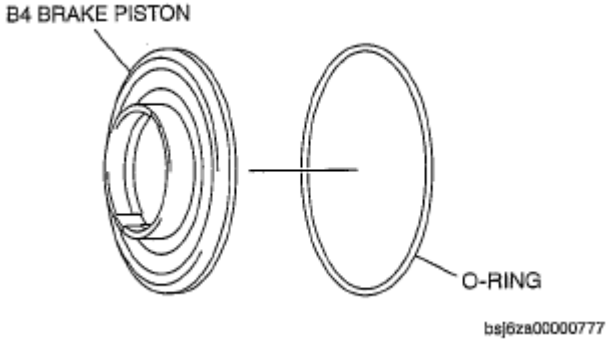
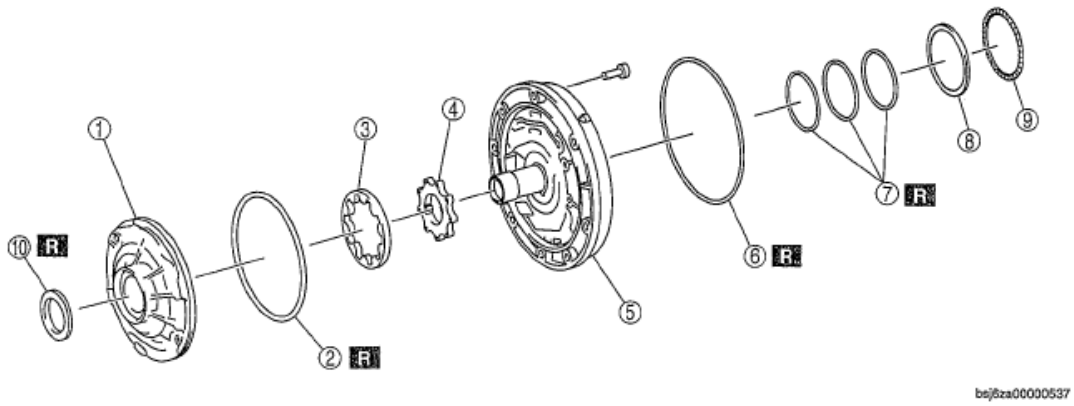


Fig. 83: Identifying O-Ring On B4 Brake Piston

OIL PUMP DISASSEMBLY

Components



1	Pump housing
2	O-ring
3	Outer oil pump gear
4	Inner oil pump gear
5	Oil pump shaft

6	O-ring
7	Seal ring
8	Bearing race
9	Thrust needle bearing
10	Oil seal

Fig. 84: Disassembled View Of Oil Pump Components

Disassembly

1. Remove the O-ring from the oil pump component.

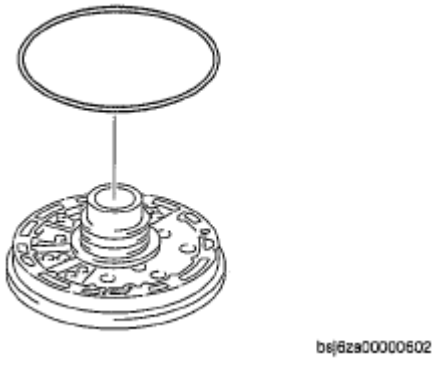


Fig. 85: Identifying O-Ring On Oil Pump

2. Remove the seal ring from the oil pump shaft.

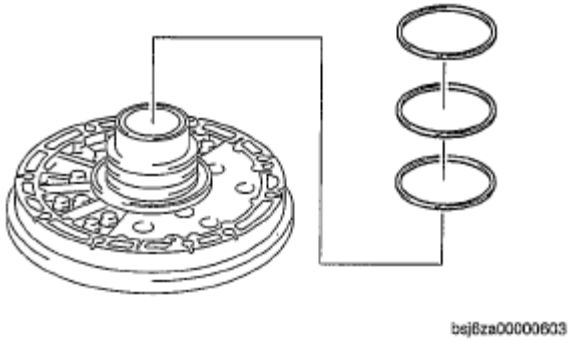


Fig. 86: Identifying Seal Ring

3. Put an installation mark on the pump housing and oil pump shaft.

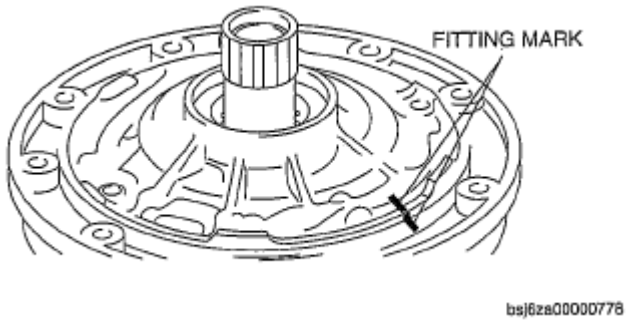


Fig. 87: Identifying Fitting Mark On Pump Housing

4. Remove the screw from the oil pump.

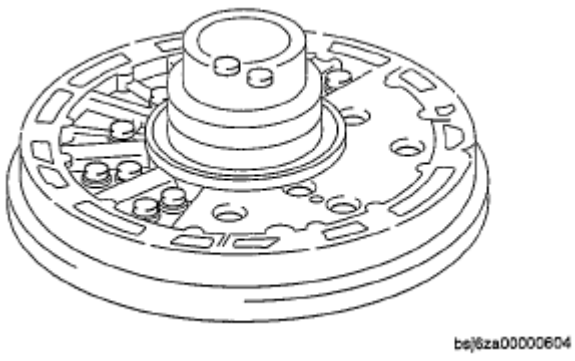


Fig. 88: Identifying Screw On Oil Pump

5. Remove the oil pump shaft from the pump housing.

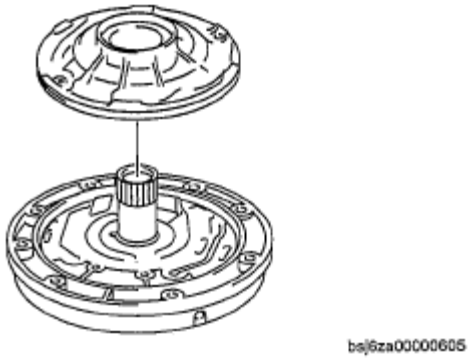


Fig. 89: Identifying Oil Pump Shaft

6. Remove the O-ring from the pump housing.

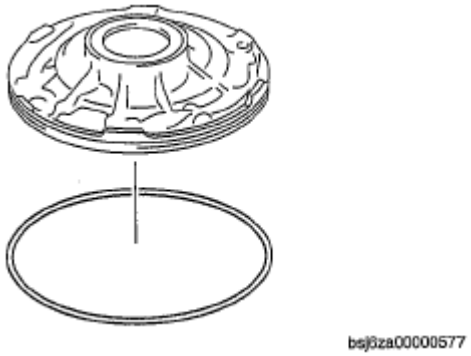


Fig. 90: Identifying O-Ring On Pump Housing

7. Remove the inner oil pump gear and outer oil pump gear from the pump housing.

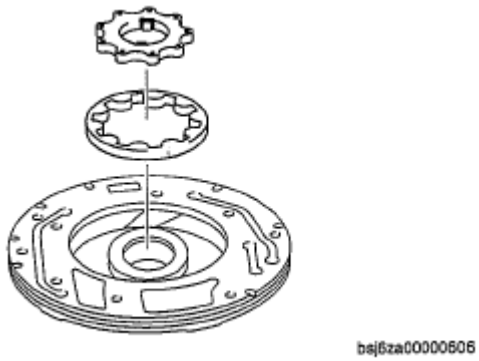


Fig. 91: Identifying Inner And Outer Oil Pump Gear

8. Using a flathead screwdriver, remove the oil seal from the pump housing.

CAUTION:
- **Do not damage the bushing on the pump housing.**

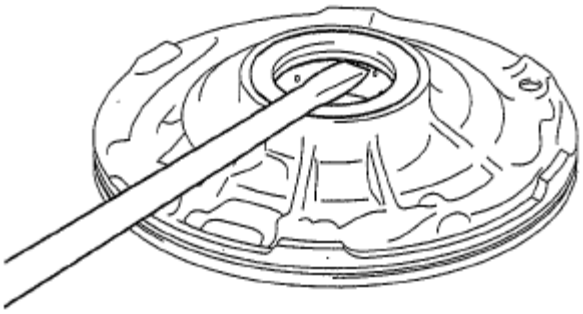


Fig. 92: Removing Oil Seal From Pump Housing Using Flathead Screwdriver

OIL PUMP INSPECTION

1. Using a dial gauge, measure the inner diameter of the pump housing component bushings.

   Pump housing bushing inner diameter

   38.113-38.138 mm {1.50051-1.50150 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the pump housing component with a new one.**
- **When the pump housing component is replaced, inspect the contact surface opposed to the torque converter.**
- **If the surface of it is scratched or has changed color, replace the torque converter with a new one.**

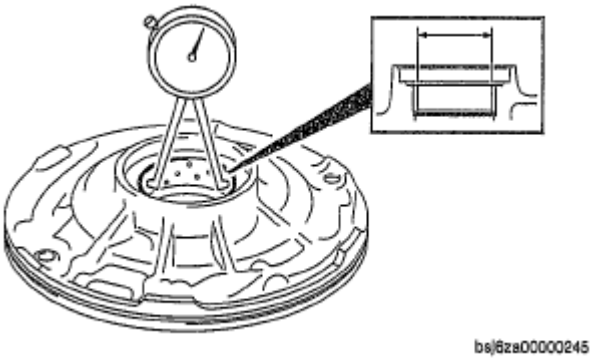


Fig. 93: Measuring Inner Diameter Of Pump Housing Component Bushings Using Dial Gauge

2. Using a dial gauge, measure the inner diameter of the oil pump shaft bushings.

Oil pump shaft bushing inner diameter

21.501-21.527 mm {0.846496-0.847520 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the oil pump shaft with a new one.**
- **When the oil pump shaft is replaced, inspect the contact surface opposed to the input shaft.**
- **If the surface of it is scratched or has changed color, replace the input shaft with a new one.**

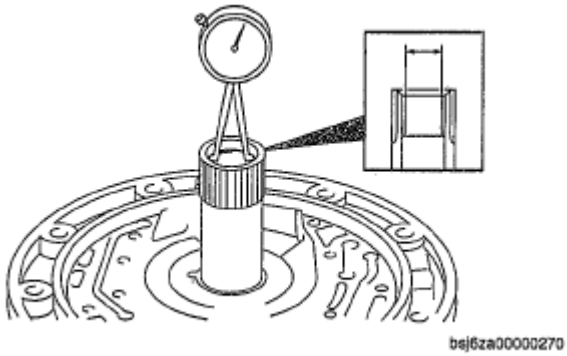


Fig. 94: Measuring Inner Diameter Of Oil Pump Shaft Bushings Using Dial Gauge

3. Press the gear oil pump towards the outer side of one side of the pump housing. Measure the clearance using a feeler gauge.

Oil pump gear outer standard clearance

0.10-0.17 mm {0.004-0.006 in}

CAUTION:
- **If it exceeds the specification, replace the pump housing with a new one.**

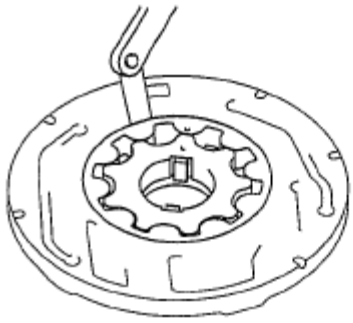


Fig. 95: Measuring Oil Pump Gear Outer Clearance Using Feeler Gauge

4. Measure the clearance between the inner and outer oil pump gears using a feeler gauge.

   Oil pump gear inner standard clearance 0.07-0.15 mm {0.0028-0.0059 in}

   CAUTION:
   - **If it exceeds the specification, replace the pump housing with a new one.**

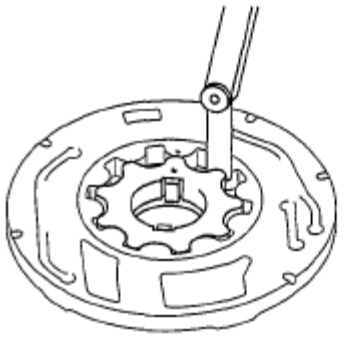


Fig. 96: Measuring Oil Pump Gear Inner Clearance

5. Measure the side clearance of both gears using a steel straight edge and feeler gauge.

   Oil pump gear side standard clearance 0.02-0.04 mm {0.0008-0.0015 in}

   Oil pump gear size (mm {in})

OIL PUMP GEAR SIZE REFERENCE

Identification mark	Thickness
0	9.946-9.952
1	9.953-9.959
2	9.960-9.966

3	9.967-9.973
4	9.974-9.980
5	9.981-9.987
6	9.988-9.994

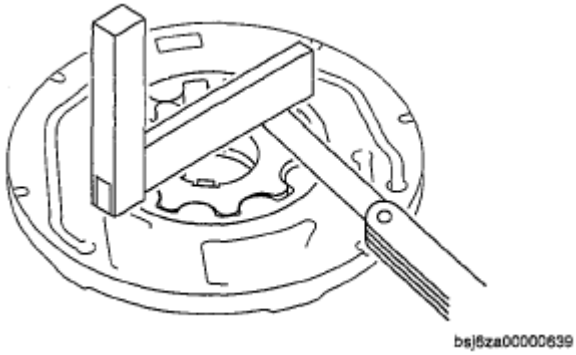


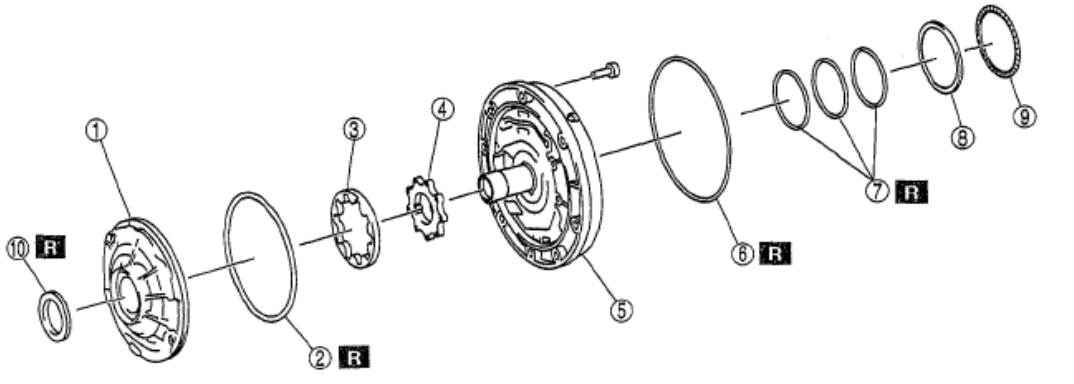
Fig. 97: Measuring Side Clearance Of Both Gears Using Steel Straight Edge And Feeler Gauge

CAUTION:

- **If the measurement exceeds the maximum specification, replace the inner oil pump gear and outer oil pump gear with a new one so that the side clearance is within the maximum specification. If the side clearance still exceeds the maximum specification, replace the oil pump with a new one.**

OIL PUMP ASSEMBLY

Components



1	Pump housing
2	O-ring
3	Outer oil pump gear
4	Inner oil pump gear
5	Oil pump shaft

6	O-ring
7	Seal ring
8	Bearing race
9	Thrust needle bearing
10	Oil seal

Fig. 98: Exploded View Of Oil Pump Assembly

Assembly Procedure

1. Apply ATF to the inner oil pump gear, outer oil pump gear and sliding surface of the pump housing.
2. Install the inner oil pump gear and outer oil pump gear to the pump housing as shown in the figure.
3. Apply ATF to the new O-ring.

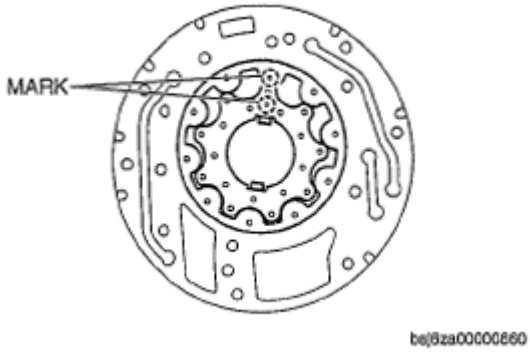


Fig. 99: Identifying Alignment Marks On Oil Pump Gear

4. Install the O-ring to the pump housing.

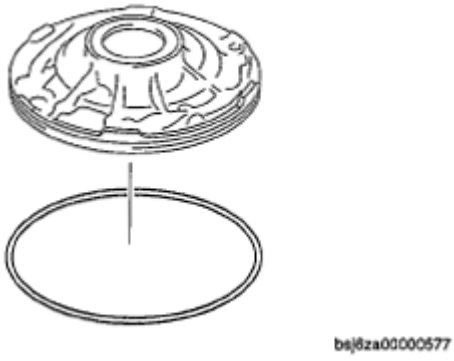


Fig. 100: Identifying O-Ring On Pump Housing

5. Align the oil pump shaft with the mark on the pump housing, and install it.

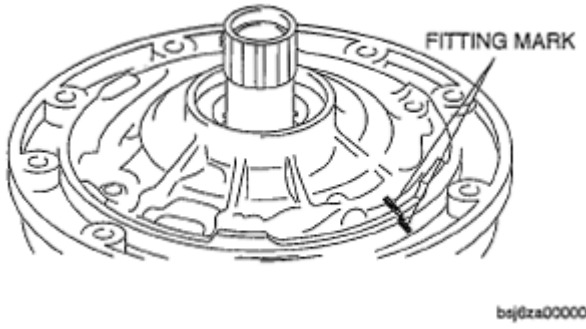


Fig. 101: Identifying Fitting Mark On Pump Housing

6. Align the oil pump shaft with bolt hole on the pump housing, and temporarily tighten.
7. Tighten the bolts.

Tightening torque

9.8-11.8 N.m {100.0-120.3 kgf.cm, 86.8-104.4 in.lbf}

8. Apply ATF to the sliding surface of the new seal ring and oil pump.

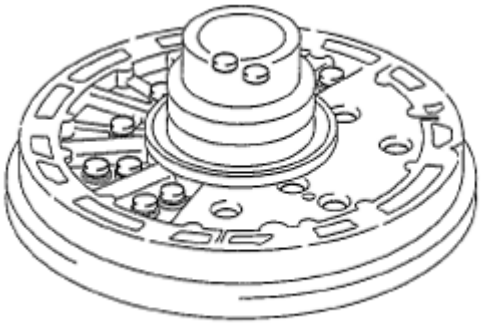


Fig. 102: Identifying Bolts

CAUTION:
- **Do not expand the seal ring too much.**
- **Be careful not to shorten the seal rings too much, when installing the seal rings.**

9. Compress the seal rings as shown in the figure, then install the seal rings to the oil pump shaft.

NOTE:
- **Verify that oil seal rings rotate smoothly after installing them.**

10. Apply ATF to the new O-rings.

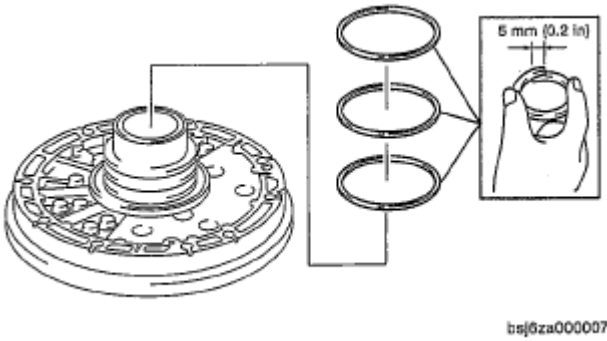


Fig. 103: Identifying Seal Rings

11. Install the O-rings to the oil pump component.

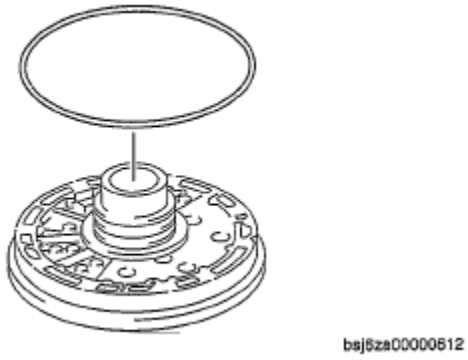


Fig. 104: Identifying O-Rings

12. Turn the drive gear with flathead screwdrivers and verify it rotates smoothly.

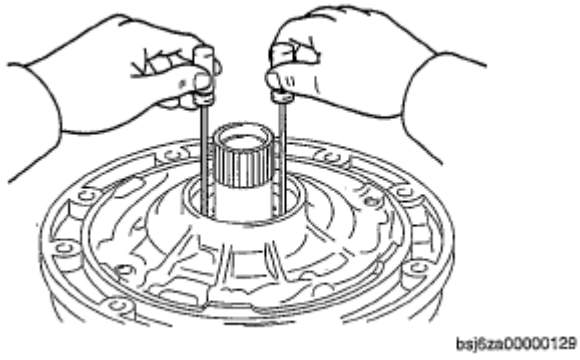


Fig. 105: Turning Drive Gear Using Flathead Screwdrivers

13. Using a hammer, install the new oil seal to the pump housing.

CAUTION:
- **Do not damage the oil seal.**

14. Apply grease to the oil seal lip.

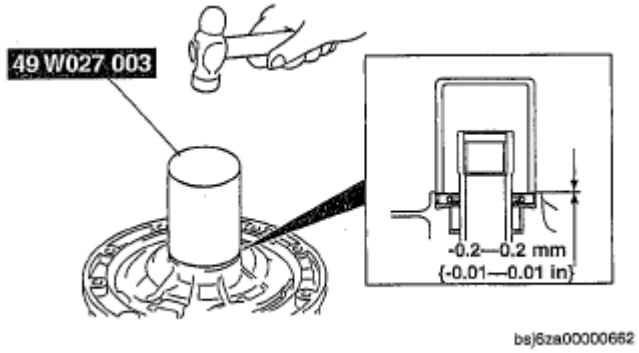
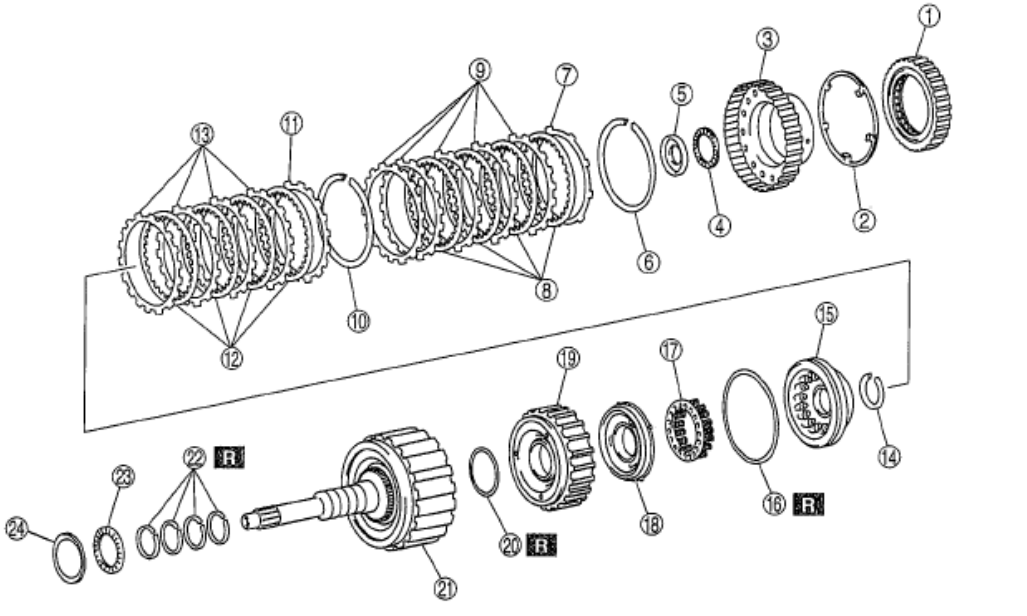


Fig. 106: Installing Oil Seal To Pump Housing Using Hammer

CLUTCH DRUM COMPONENT AND F4 ONE-WAY CLUTCH COMPONENT DISASSEMBLY

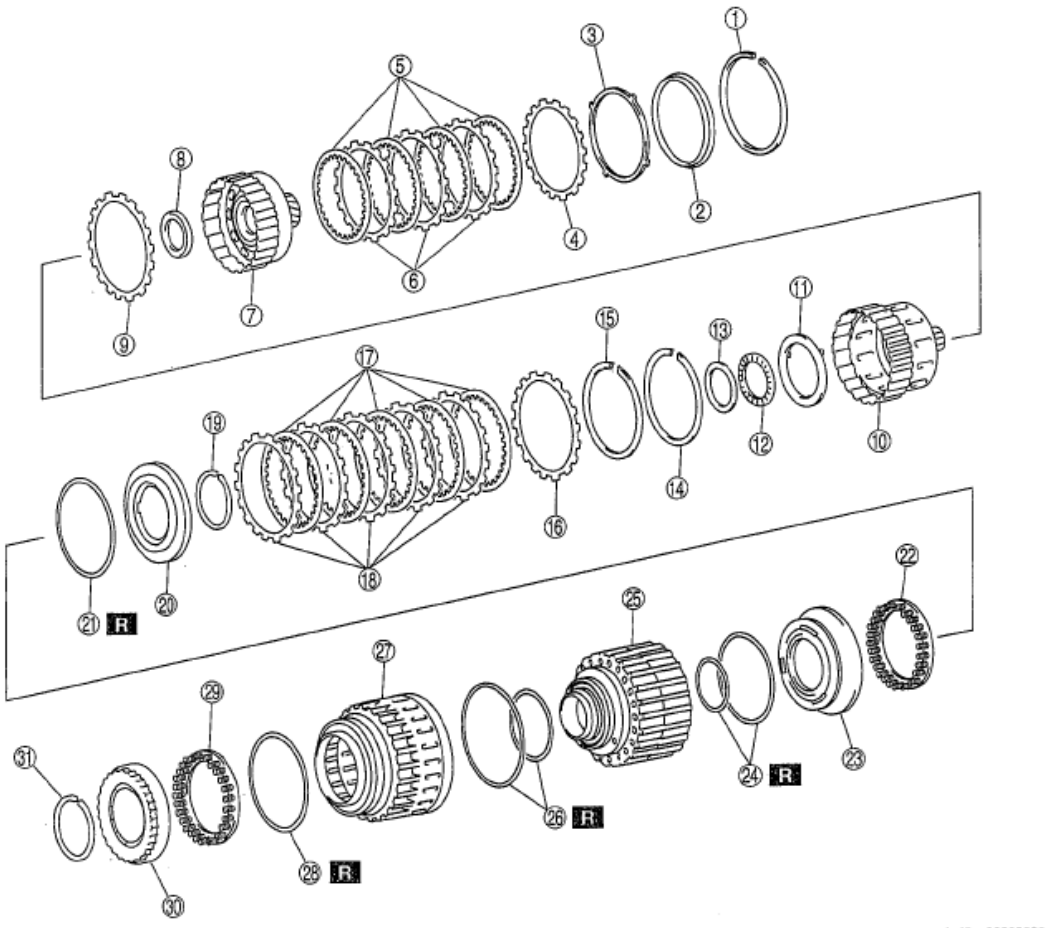
Components



1	F4 one-way clutch
2	Thrust washer
3	Clutch hub
5	Bearing race
6	Snap ring
7	Retaining plate
8	Drive plate
9	Driven plate
10	Snap ring
11	Retaining plate
12	Drive plates component
13	Driven plate

14	Snap ring
15	C1 clutch seal plate
16	D-ring
17	Piston return spring
18	C4 clutch piston
19	C1 clutch piston
20	O-ring
21	Input shaft component
22	Seal ring
23	Bearing race
24	Snap ring

Fig. 107: Clutch Drum Component And F4 One-Way Clutch Component Disassembled View (1 Of 2)



1	Snap ring
2	Sleeve
3	Driven plate
4	Retaining plate
5	Drive plate
6	Driven plate
7	Clutch hub component
8	Thrust needle bearing
9	Retaining plate
10	Clutch hub
11	Thrust washer
12	Thrust bearing
13	Bearing race
14	Snap ring
15	Snap ring
16	Retaining plate

17	Drive plate
18	Driven plate
19	Snap ring
20	C2 clutch seal plate
21	O-ring
22	C2 clutch piston return spring
23	C2 clutch piston
24	O-ring
25	C2, C3 clutch drum
26	O-ring
27	C3 clutch piston component
28	O-ring
29	Piston return spring
30	C3 clutch seal plate
31	Snap ring

Fig. 108: Clutch Drum Component And F4 One-Way Clutch Component Disassembled View (2 Of 2)

Disassembly Procedure

1. Using a flathead screwdriver, remove the snap ring from the C3 clutch piston component.
2. Remove the clutch hub component from the C3 clutch piston component.

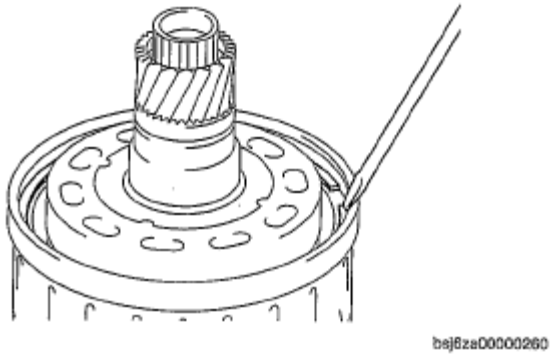


Fig. 109: Removing Snap Ring From C3 Clutch Piston Component Using Screwdriver

3. Remove the retaining plate and the drive plate and the driven plate from the clutch hub component.

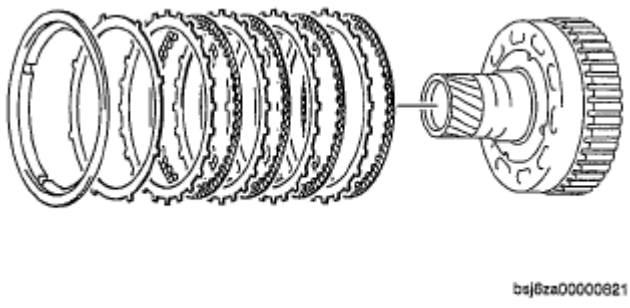


Fig. 110: Identifying Retaining Plate, Drive Plate And Driven Plate

4. Remove the retaining plate from the C3 clutch piston component.

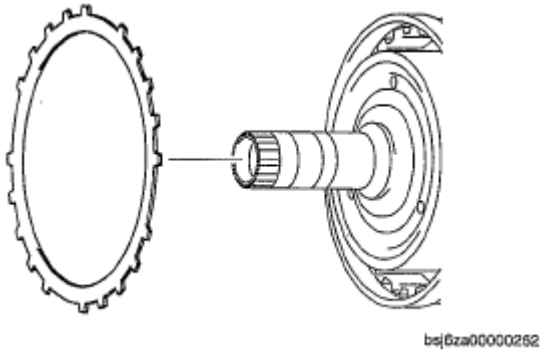


Fig. 111: Identifying Retaining Plate On C3 Clutch Piston Component

5. Remove the thrust needle bearing from the clutch hub.

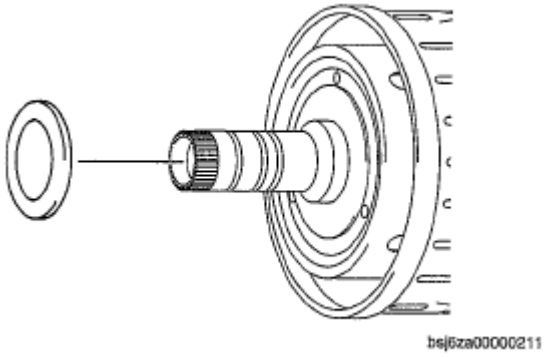


Fig. 112: Identifying Thrust Needle Bearing On Clutch Hub

6. Remove the clutch hub from the C3 clutch piston component.

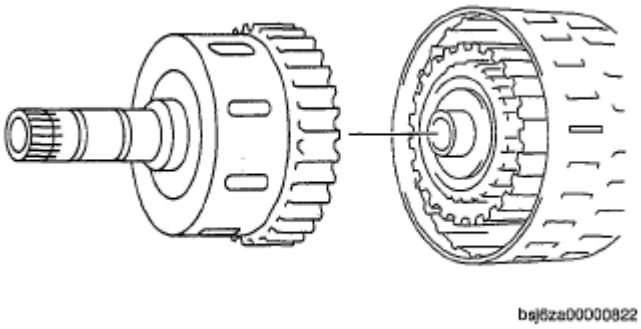


Fig. 113: Identifying Clutch Hub

7. Remove the thrust bearing, the bearing race and the thrust washer from clutch hub.

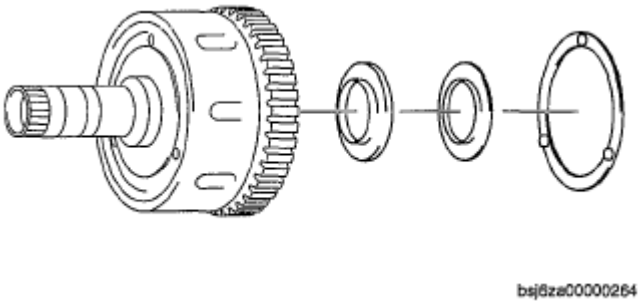


Fig. 114: Identifying Thrust Bearing, Bearing Race And Thrust Washer

8. Remove the C1, C4 clutch component from the C2, C3 clutch drum.

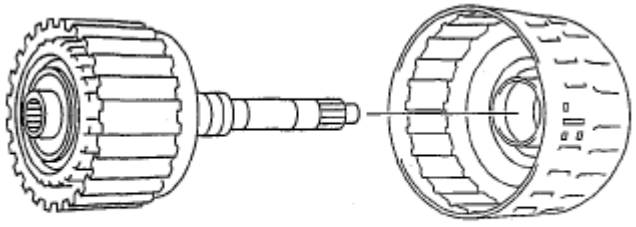


Fig. 115: Identifying Clutch Component

9. Remove the bearing race from the C3 clutch piston component.

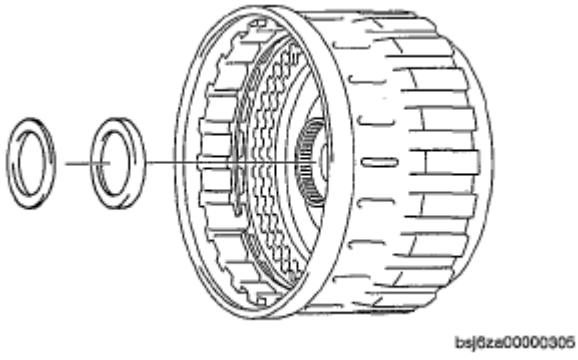


Fig. 116: Identifying Bearing Race

10. Remove the clutch hub and F4 one-way clutch from the C1, C4 clutch component.

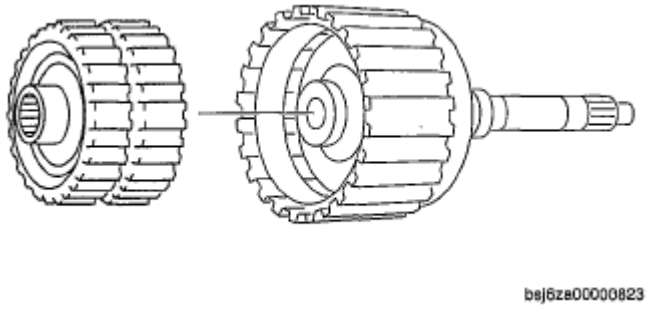


Fig. 117: Identifying Clutch Hub And F4 One-Way Clutch

11. Remove the bearing race from the C1, C4 clutch component.

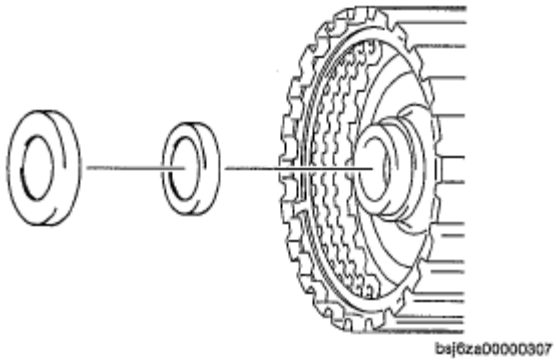


Fig. 118: Identifying Bearing Race

12. Remove the F4 one-way clutch from the clutch hub.

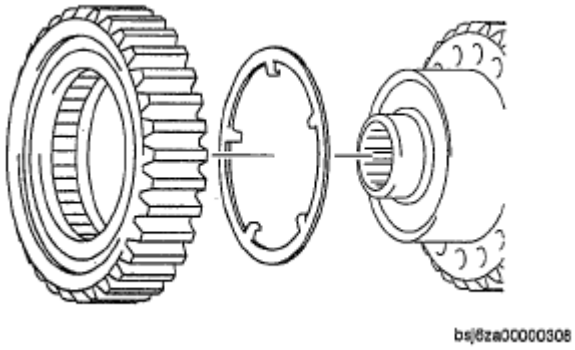


Fig. 119: Identifying F4 One-Way Clutch

13. Using a flathead screwdriver, remove the snap ring from the input shaft component.

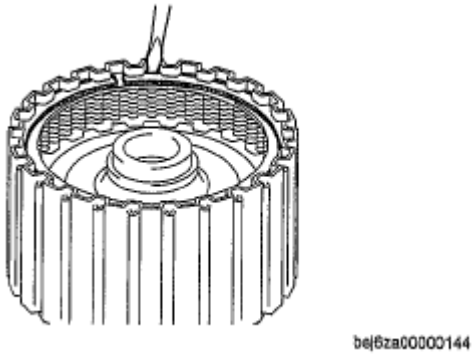


Fig. 120: Removing Snap Ring From Input Shaft Component Using Flathead Screwdriver

14. Remove the retaining plate (C1) and the drive plate (C1) and the driven plate (C1) from the input shaft component.

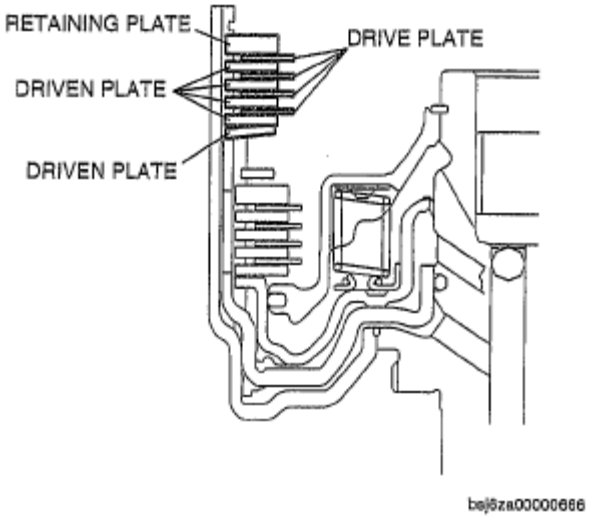


Fig. 121: Identifying Retaining Plate, Drive And Driven Plate

15. Using a flathead screwdriver, remove the snap ring from the input shaft component.

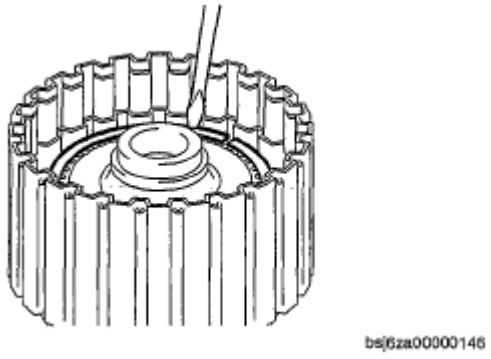


Fig. 122: Removing Snap Ring From Input Shaft Component Using Flathead Screwdriver

16. Remove the retaining plate (C4) and the drive plate (C4) and the driven plate (C4) from the input shaft component.

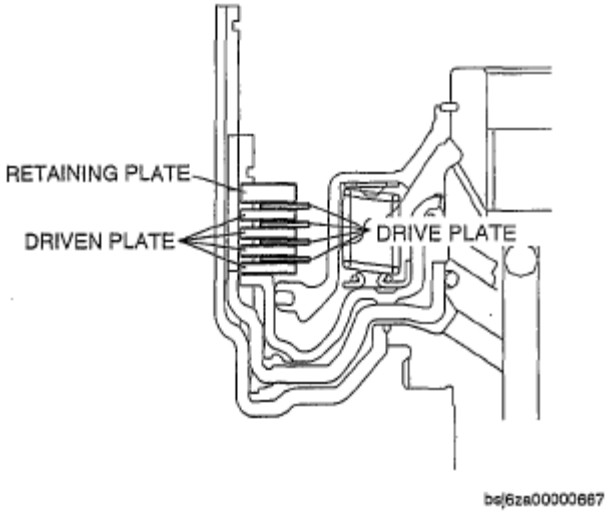


Fig. 123: Identifying Retaining Plate, Drive And Driven Plate

17. Place the **SST** on the seal plate and compress the piston return spring with a press.

CAUTION:
- **Be careful not to expand the snap ring too much.**

18. Remove the snap ring using snap ring pliers.

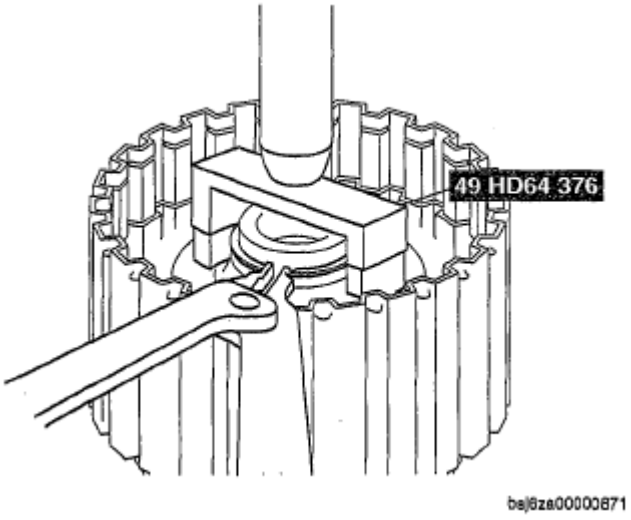


Fig. 124: Removing/Installing Snap Ring Using Snap Ring Pliers

19. Remove the C4 clutch seal plate and the piston return spring from the input shaft component.

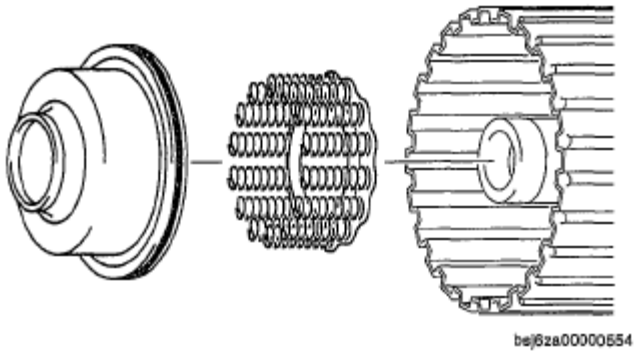


Fig. 125: Identifying C4 Clutch Seal Plate And Piston Return Spring

20. Apply compressed air into the oil passage as shown in the figure and remove the C4 clutch piston and C1 clutch piston from the input shaft component.

    Air pressure

    392 kPa (4.02 kgf/cm^2 , 57 psi)

21. When applying compressed air, shut the oil passages of the input shaft component.

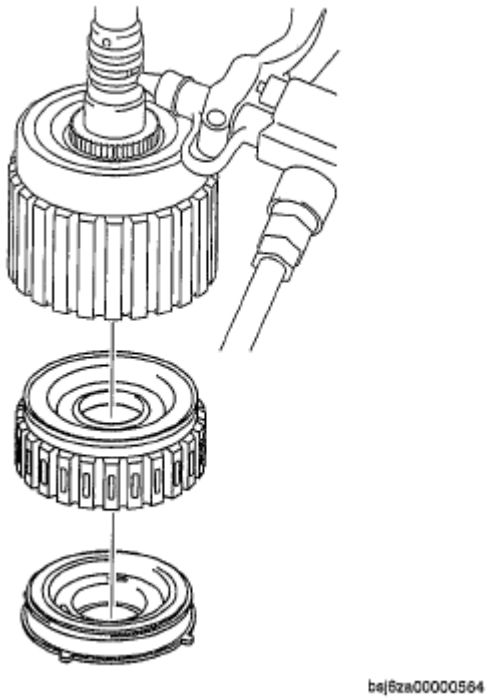


Fig. 126: Applying Compressed Air Into Oil Passage

22. Remove the O-ring from the input shaft component.

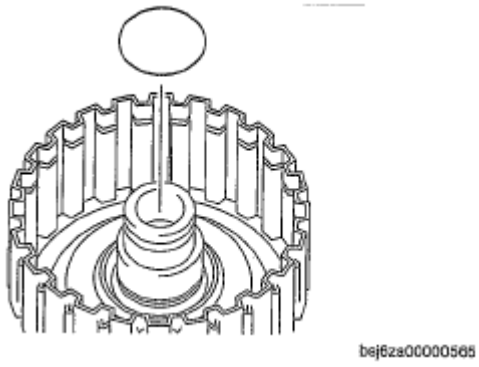


Fig. 127: Identifying O-Ring On Input Shaft Component

23. Remove the D-ring from the C1 clutch seal plate.

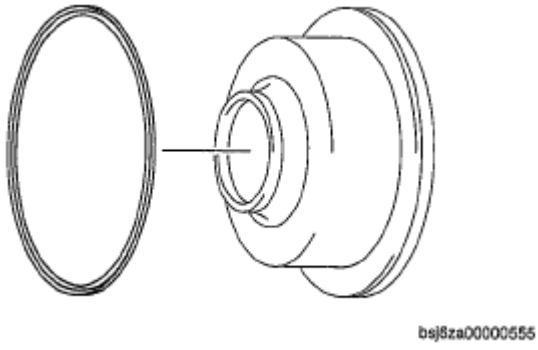


Fig. 128: Identifying D-Ring On C1 Clutch Seal Plate

24. Remove the seal ring from the input shaft component.

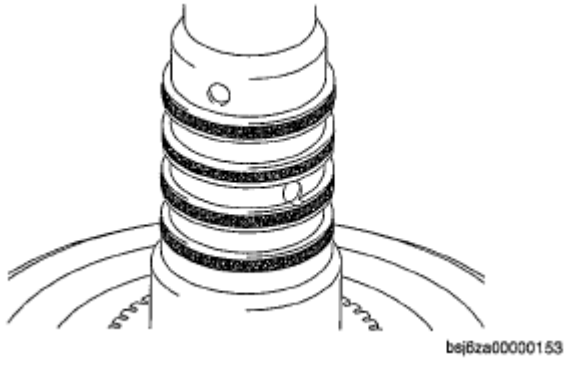


Fig. 129: Identifying Seal Ring On Input Shaft Component

25. Using a flathead screwdriver, remove the snap ring (C3) from the C2, C3 clutch drum.

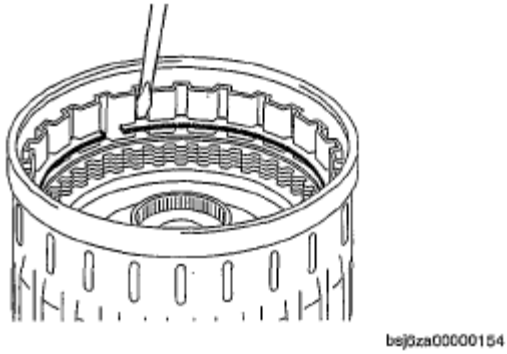


Fig. 130: Removing Snap Ring (C3) From C2, C3 Clutch Drum

26. Using a flathead screwdriver, remove the snap ring (C2) from the C2, C3 clutch drum.

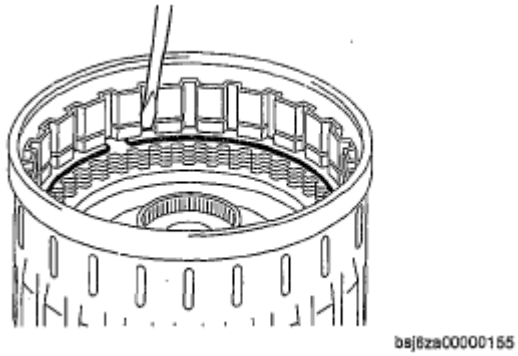


Fig. 131: Removing Snap Ring (C2) From C2, C3 Clutch Drum

27. Remove the retaining plate (C2) and the drive plate (C2) and the driven plate (C2) from the input shaft component.

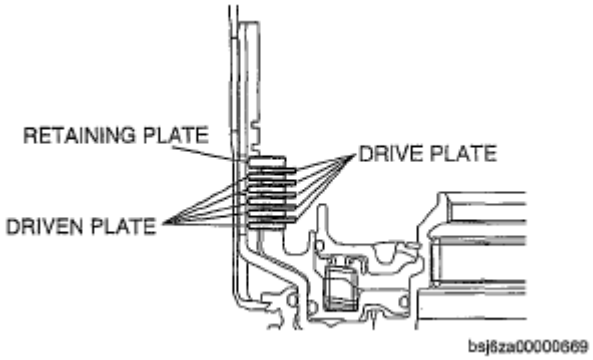


Fig. 132: Identifying Retaining Plate, Drive And Driven Plate

28. Install the **SST** as shown in the figure, and compress the C2 clutch piston return spring.

CAUTION:
- **Be careful not to expand the snap ring too much.**

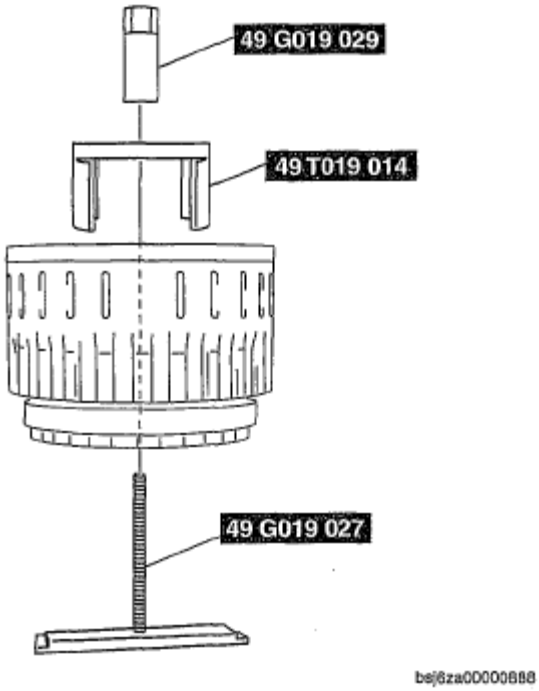


Fig. 133: Identifying SST

29. Remove the snap ring using snap ring pliers.

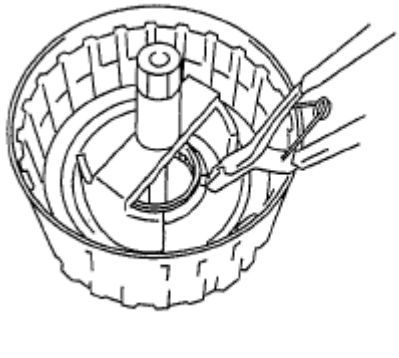


Fig. 134: Removing/Installing Snap Ring Using Snap Ring Pliers

30. Remove the seal plate and the C2 clutch piston return spring from the C3 clutch drum.

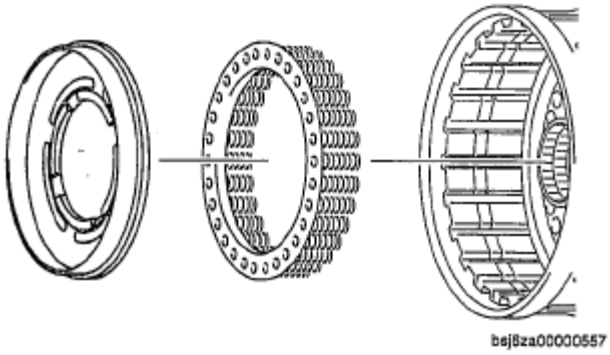


Fig. 135: Identifying Seal Plate And C2 Clutch Piston Return Spring

31. Apply compressed air into the oil passage as shown in the figure and remove the C2 clutch piston and C3 clutch piston from the input shaft component.

    Air pressure

    392 kPa (4.02 kgf/cm^2 , 57 psi)

32. When applying compressed air, shut the oil passage of the input shaft component.

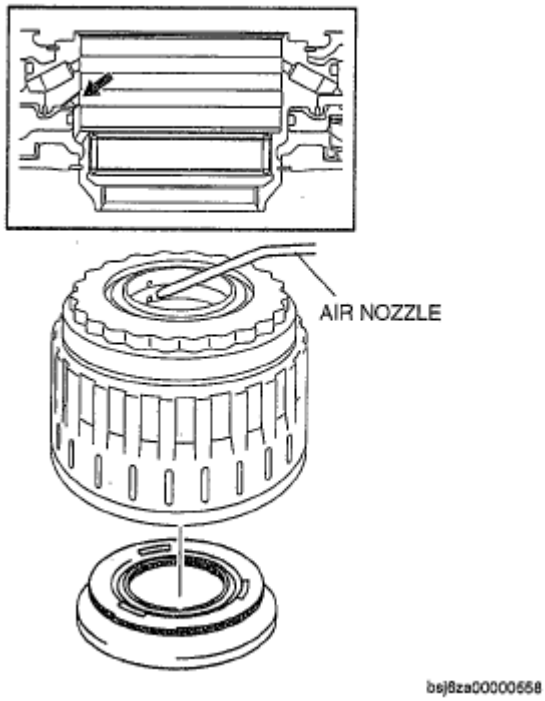


Fig. 136: Identifying Oil Passage For Applying Compressed Air

33. Remove the O-ring from the C2 clutch seal plate.

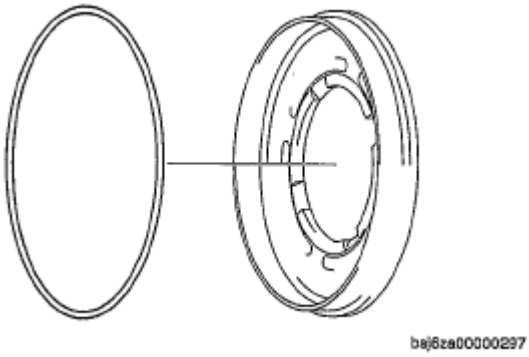


Fig. 137: Identifying O-Ring On C2 Clutch Seal Plate

34. Remove the O-ring from the C2 clutch piston.

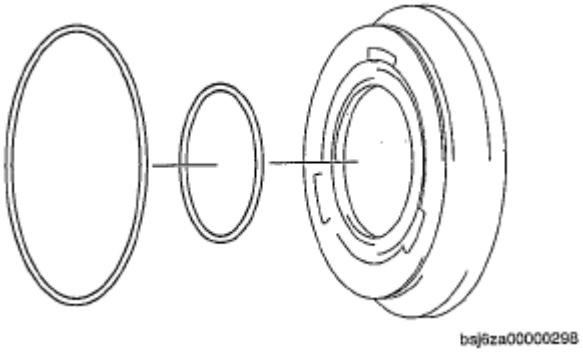


Fig. 138: Identifying O-Ring On C2 Clutch Piston

35. Install the **SST** using a **M10-1.25** bolt with a length of **100 mm** as shown in the figure to compress the piston return spring.

CAUTION:
- **Be careful not to expand the snap ring too much.**

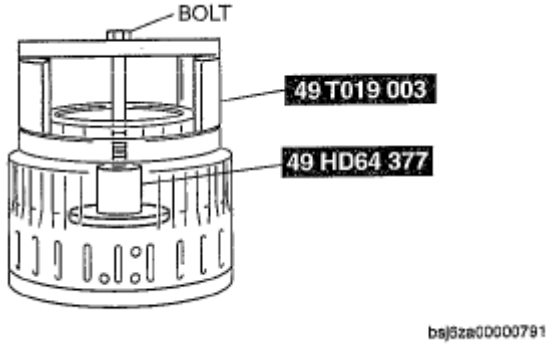


Fig. 139: Identifying SST

36. Remove the snap ring using snap ring pliers.

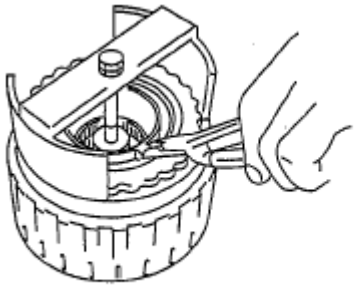


Fig. 140: Removing Snap Ring Using Snap Ring Pliers

37. Remove the seal plate piston return spring from the C3 clutch piston component.

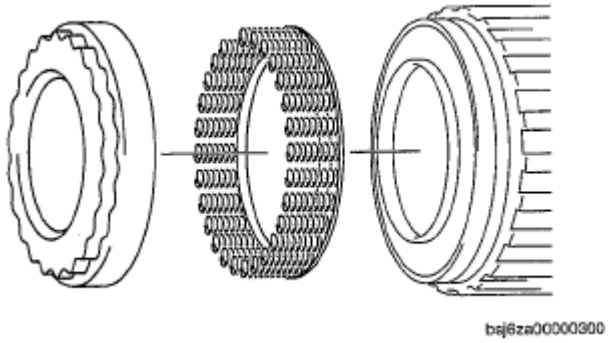


Fig. 141: Identifying Seal Plate Piston Return Spring On C3 Clutch Piston Component

38. Remove the C2, C3 clutch drum C3 clutch piston component.

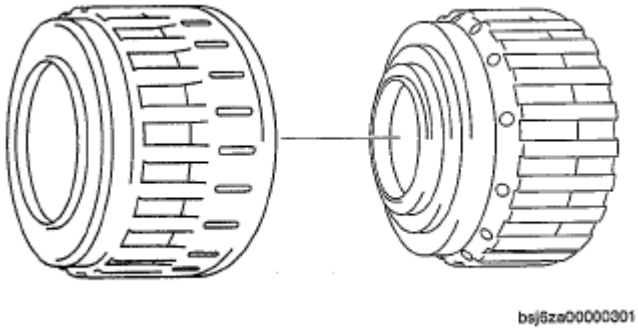


Fig. 142: Identifying C2, C3 Clutch Drum And C3 Clutch Piston Component

39. Remove the O-ring from the C3 clutch piston component.

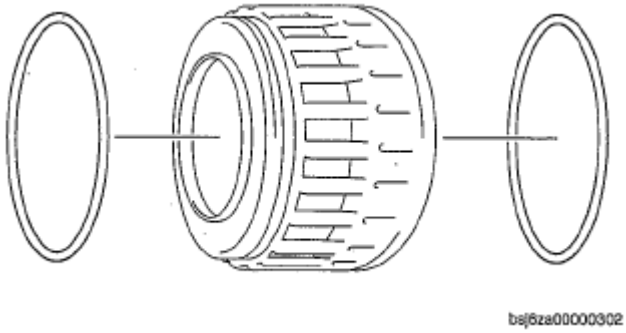


Fig. 143: Identifying O-Ring On C3 Clutch Piston Component

40. Remove the O-ring from the C2, C3 clutch drum.

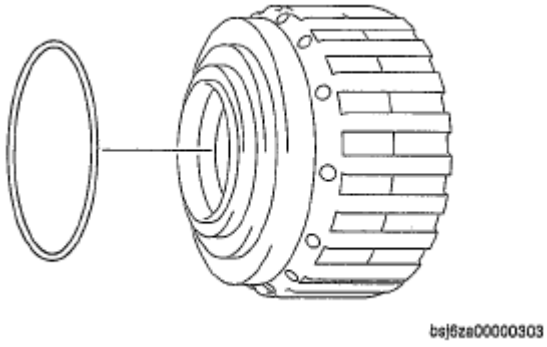


Fig. 144: Identifying O-Ring On C2, C3 Clutch Drum

CLUTCH DRUM COMPONENT AND F4 ONE-WAY CLUTCH INSPECTION

1. Inspect the lining of all drive plates. (C1)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

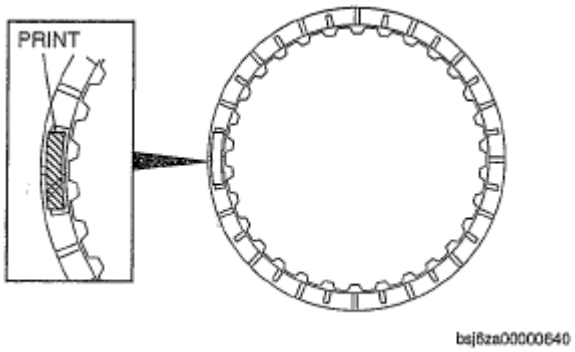


Fig. 145: Identifying Print Mark On Drive Plates (C1)

2. Inspect the lining of all drive plates. (C4)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

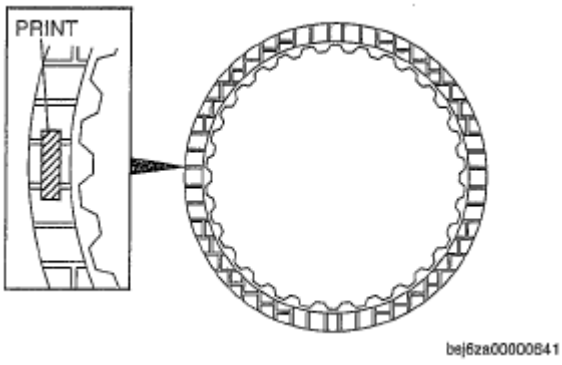


Fig. 146: Identifying Print Mark On Drive Plates (C4)

3. Using vernier calipers, measure the free length of the piston return spring.

   C1, C4 clutch return spring free length

   Standard: 26.29 mm {1.04 in}

   - If it less than the specification, replace the piston return spring with a new one.

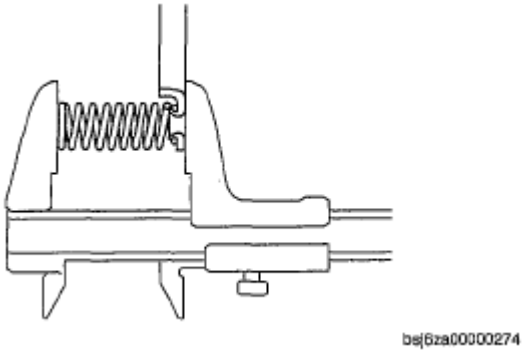


Fig. 147: Measuring Free Length Of Piston Return Spring

4. Inspect the lining of all drive plates. (C2)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

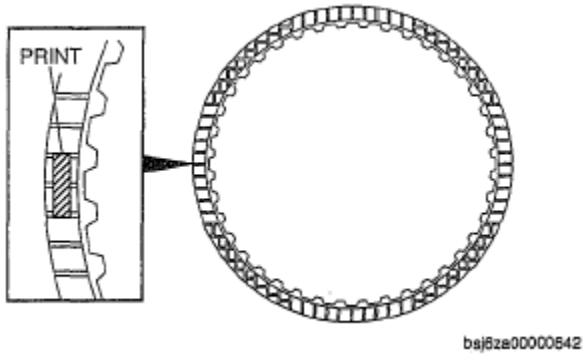


Fig. 148: Identifying Print Mark On Drive Plates (C2)

5. Inspect the lining of all drive plates. (C3)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

NOTE:

- **Before replacing with new drive plates, soak them at least 2 h in**

ATF.

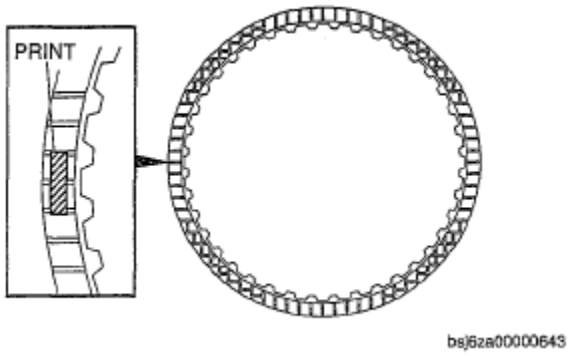


Fig. 149: Identifying Print Mark On Drive Plates (C3)

6. Using vernier calipers, measure the free length of the piston return spring.

   C2 clutch return spring free length

   Standard: 20.02 mm {0.79 in}

   - If it less than the specification, replace the piston return spring with a new one.

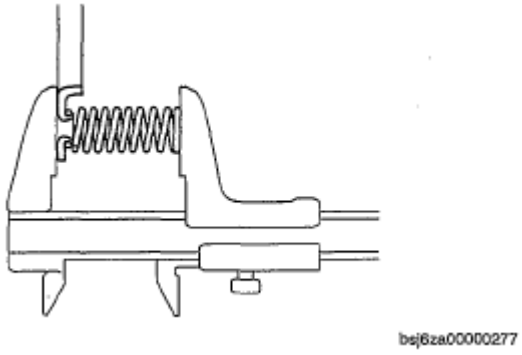


Fig. 150: Measuring Free Length Of Piston Return Spring

7. Using vernier calipers, measure the free length of the piston return spring.

   C3 clutch return spring free length

   Standard: 21.03 mm {0.83 in}

   - If it less than the specification, replace the piston return spring with a new one.

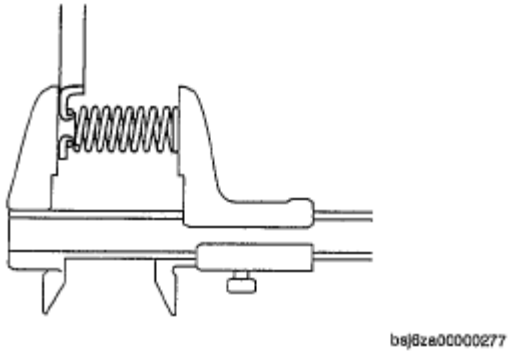


Fig. 151: Measuring Free Length Of Piston Return Spring

8. Using a dial gauge, measure the inner diameter of the input shaft component bushings.

Input shaft component bushing inner diameter

18.000-18.025 mm {0.7087-0.7096 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the input shaft component with a new one.**
- **When the input shaft component is replaced, inspect the contact surface opposed to the intermediate shaft.**
- **If the surface of it is scratched or has changed color, replace the intermediate shaft with a new one.**

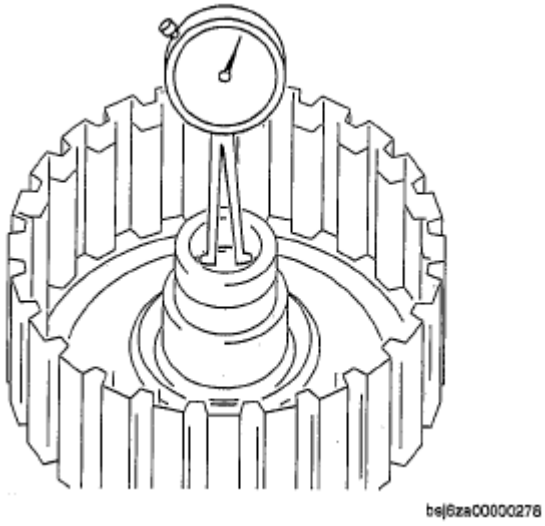


Fig. 152: Measuring Inner Diameter Of Input Shaft Component Bushings Using Dial Gauge

9. Using a dial gauge, measure the inner diameter of the clutch hub bushings.

Clutch hub bushing inner diameter

Front side: 23.037-23.062 mm {0.90697-0.90795 in}

Rear side: 23.037-23.062 mm {0.90697-0.90795 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the clutch hub with a new one.**
- **When the clutch hub is replaced, Inspect the contact surface opposed to the input shaft component.**
- **If the surface of it is scratched or has changed color, replace the input shaft component with a new one.**

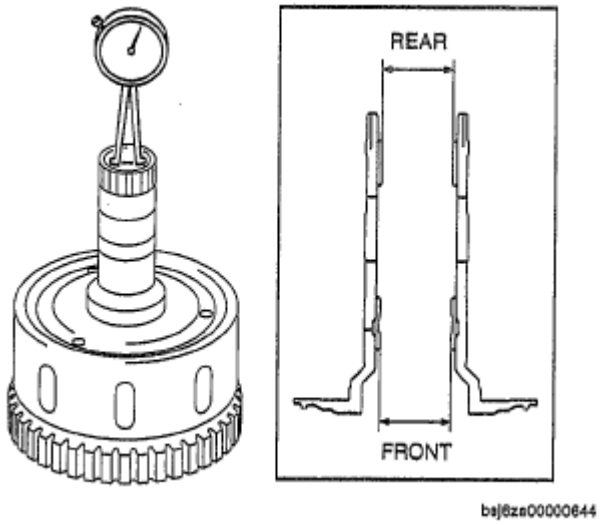


Fig. 153: Measuring Inner Diameter Of Clutch Hub Bushings Using Dial Gauge

10. Using a dial gauge, measure the inner diameter of the clutch hub component bushings.

Clutch hub component bushing inner diameter

Front side: 33.312-33.337 mm {1.31150-1.31248 in}

Rear side: 33.312-33.337 mm {1.31150-1.31248 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the clutch hub component with a new one.**

- **When the clutch hub component is replaced, inspect the contact surface opposed to the clutch hub.**
- **If the surface of it is scratched or has changed color, replace the clutch hub with a new one.**

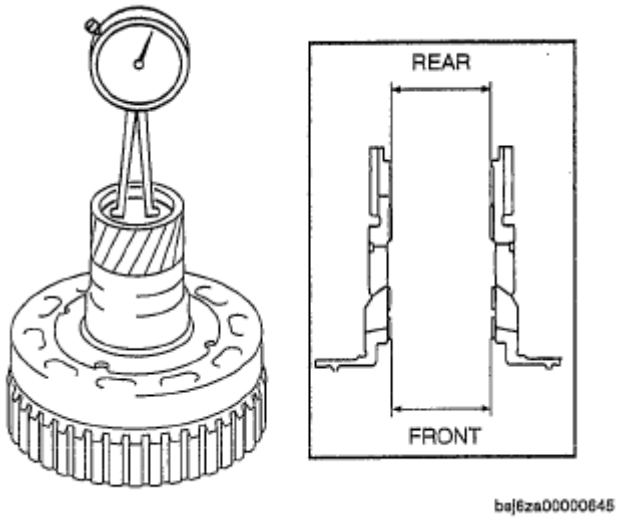


Fig. 154: Measuring Inner Diameter Of Clutch Hub Component Bushings Using Dial Gauge

11. Verify that the F4 one-way clutch rotates when the clutch hub is secured and rotated clockwise, and that it does not rotate when the clutch hub is rotated counterclockwise.

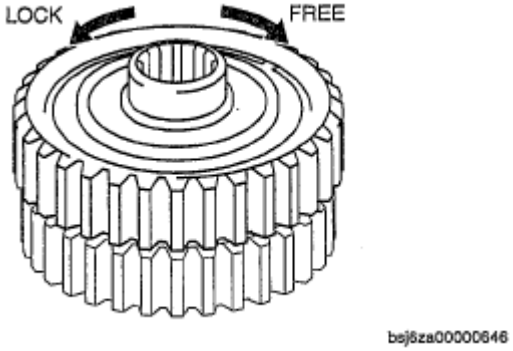
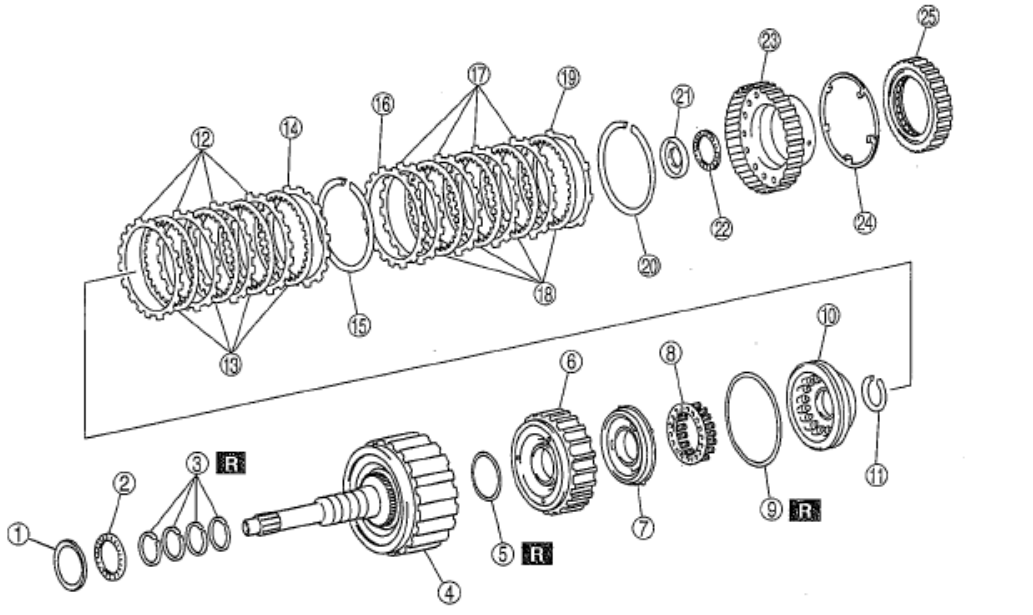


Fig. 155: Identifying F4 One-Way Clutch Rotation Positions

CLUTCH DRUM COMPONENT AND F4 ONE-WAY CLUTCH COMPONENT ASSEMBLY

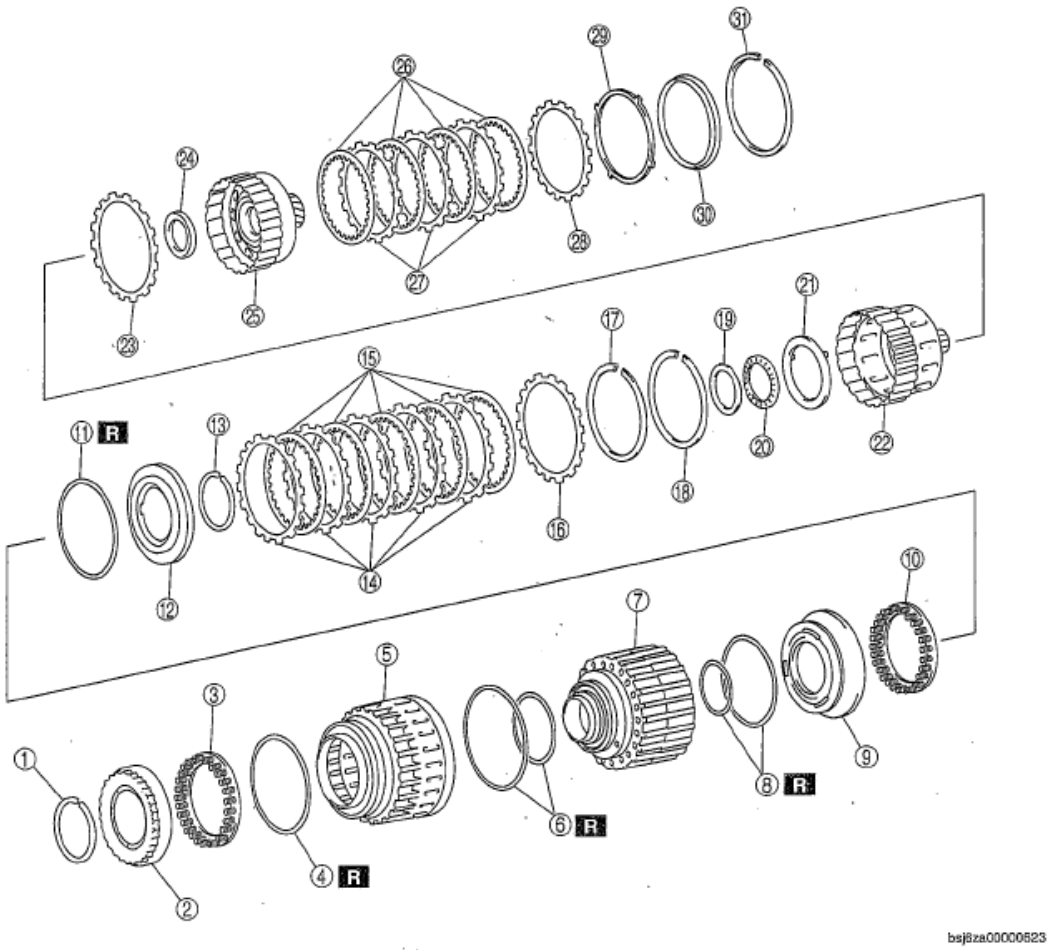
Components



1	Bearing race
2	Thrust needle spring
3	Seal ring
4	Input shaft component
5	O-ring
6	C1 clutch position
7	C4 clutch position
8	Piston return spring
9	O-ring
10	C1 clutch seal plate
11	Snap ring
12	Driven plate
13	Drive plate

14	Retaining plate
15	Snap ring
16	Driven plate
17	Driven plate
18	Drive plate
19	Retaining plate
20	Snap ring
21	Bearing race
22	Thrust needle bearing
23	Clutch hub
24	Thrust washer
25	F4 one-way clutch

Fig. 156: Exploded View Of Clutch Drum Component And F4 One-Way Clutch Component (1 Of 2)



1	Snap ring
2	C3 clutch seal plate
3	Piston return spring
4	O-ring
5	C3 clutch piston component
6	O-ring
7	C2, C3 clutch drum
8	O-ring
9	C2 clutch piston
10	C2 clutch piston return spring
11	O-ring
12	C2 clutch seal plate
13	Snap ring
14	Driven plate
15	Drive plate
16	Retaining plate

17	Snap ring
18	Snap ring
19	Bearing race
20	Thrust bearing
21	Thrust washer
22	Clutch hub
23	Retaining plate
24	Thrust needle bearing
25	Clutch hub component
26	Drive plate
27	Driven plate
28	Retaining plate
29	Driven plate
30	Sleeve
31	Snap ring

Fig. 157: Exploded View Of Clutch Drum Component And F4 One-Way Clutch Component (2 Of 2)

Assembly Procedure

1. Apply ATF to the new O-ring
2. Install the O-rings to the C2, C3 clutch drum.

3. Apply ATF to the new O-rings.

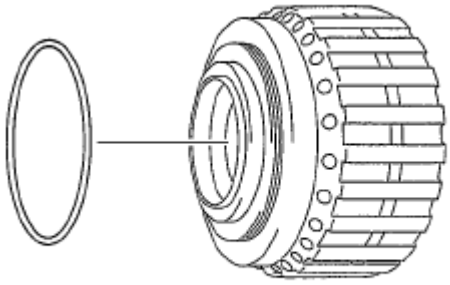


Fig. 158: Identifying O-Ring On C2, C3 Clutch Drum

4. Install the O-rings to the C3 clutch piston component.
5. Apply ATF to the C2, C3 clutch drum and the C3 clutch piston component.

CAUTION:
- **Do not damage the O-ring.**

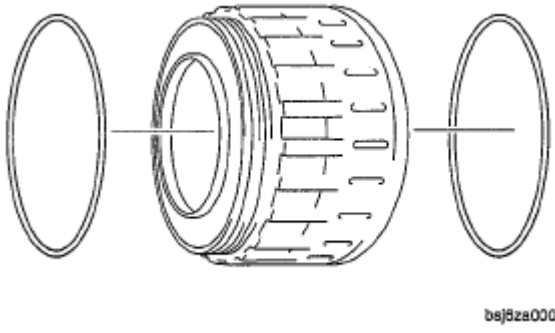


Fig. 159: Identifying O-Rings On C3 Clutch Piston Component

6. Install the C2, C3 clutch drum to the C3 clutch piston component.
7. Apply ATF to the seal plate and the piston return spring.

CAUTION:
- **Do not damage the O-ring.**

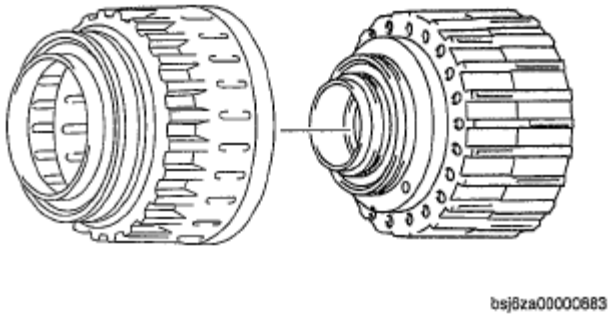


Fig. 160: Identifying C2, C3 Clutch Drum

8. Install the seal plate and the piston return spring to the C3 clutch hub component.

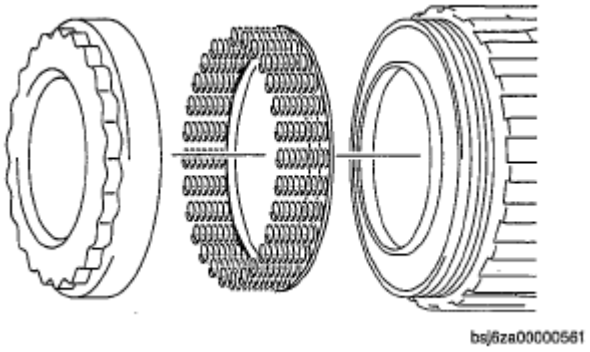


Fig. 161: Identifying Seal Plate And Piston Return Spring

9. Install the **SST** using a **M10-1.25** bolt with a length of **100 mm** as shown in the figure to compress the piston return spring.

CAUTION:
- **Do not expand the snap ring too much.**

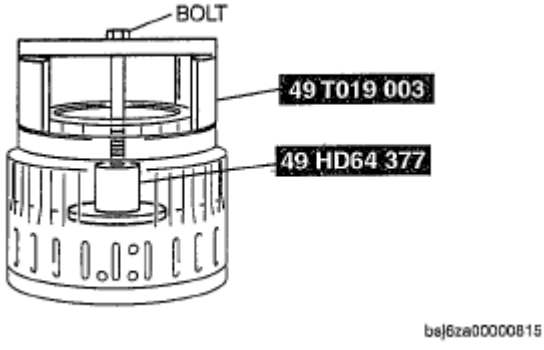


Fig. 162: Identifying SST

10. Remove the snap ring using snap ring pliers.

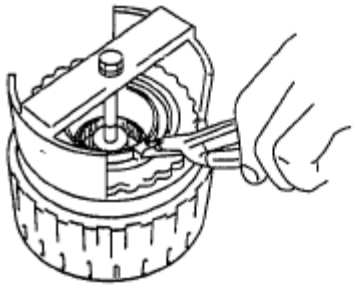


Fig. 163: Removing Snap Ring Using Snap Ring Pliers

11. Apply ATF to the new O-rings.
12. Install the O-rings to the C2 clutch piston.
13. Apply ATF to the new O-rings.

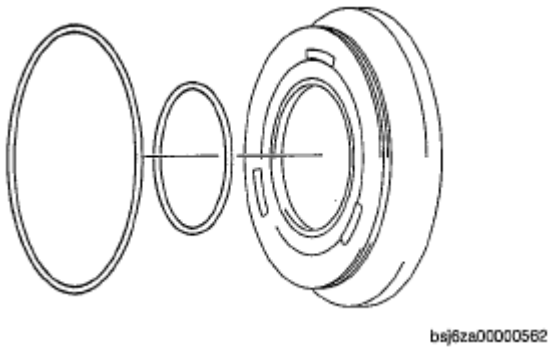


Fig. 164: Identifying O-Rings On C2 Clutch Piston

14. Install the O-rings to the C2 clutch seal plate.
15. Apply ATF to the C2 clutch piston and the C2, C3 clutch drum.

CAUTION:
- **Do not damage the O-ring.**

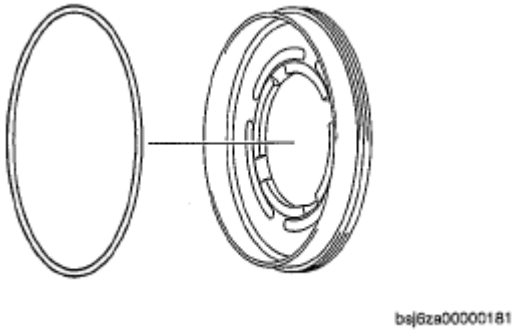


Fig. 165: Identifying O-Rings On C2 Clutch Seal Plate

16. Install the C2 clutch piston and the C2, C3 clutch drum.
17. Apply ATF to the C2 clutch seal plate and the C2, C3 clutch drum.

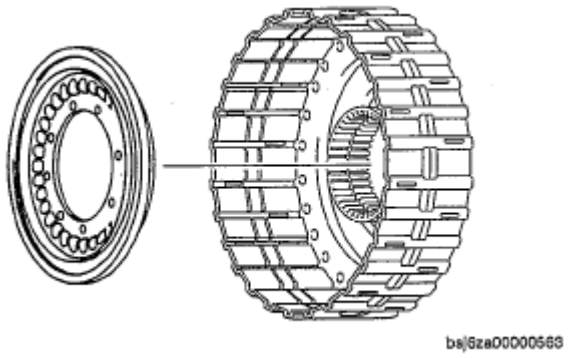


Fig. 166: Identifying C2 Clutch Seal Plate

18. Install the C2 clutch seal plate and the C2 clutch piston return spring to the C2, C3 clutch drum.

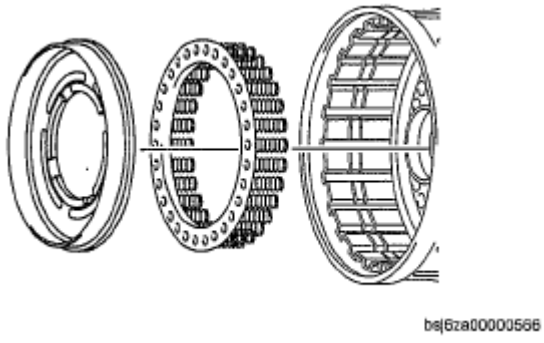


Fig. 167: Identifying C2 Clutch Seal Plate And C2 Clutch Piston Return Spring

19. Install the **SST** as shown in the figure, and compress the C2 clutch piston return spring.

CAUTION:
- **Do not expand the snap ring too much.**

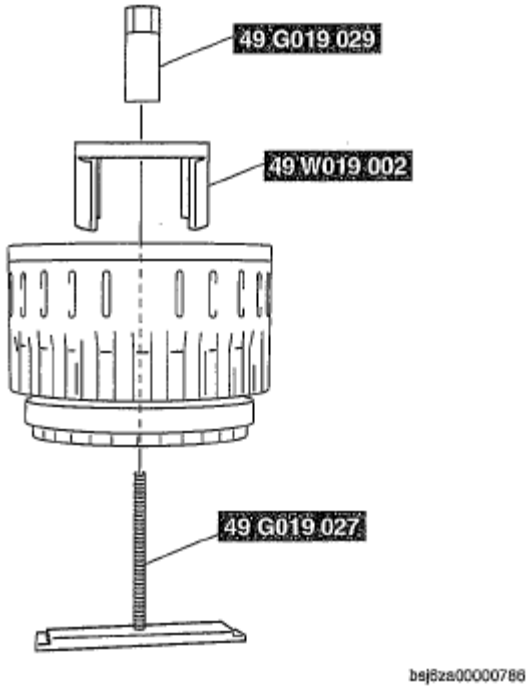


Fig. 168: Identifying SST

20. Install the snap ring using snap ring pliers.
21. Apply ATF to the driven plate (C2) and the drive plate (C2) and the retaining plate (C2).

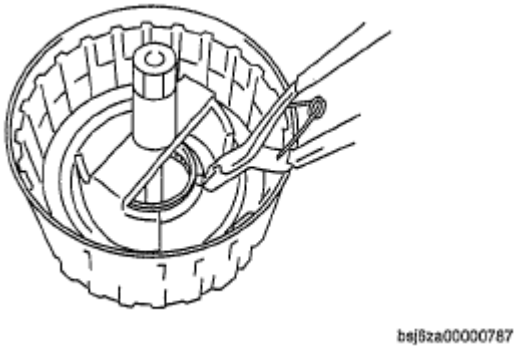


Fig. 169: Removing/Installing Snap Ring Using Snap Ring Pliers

22. Install the driven plate (C2), the drive plate (C2), the retaining plate (C2) to the C2, C3 clutch drum.

CAUTION:
- **Inspect the number of drive and driven plates.**

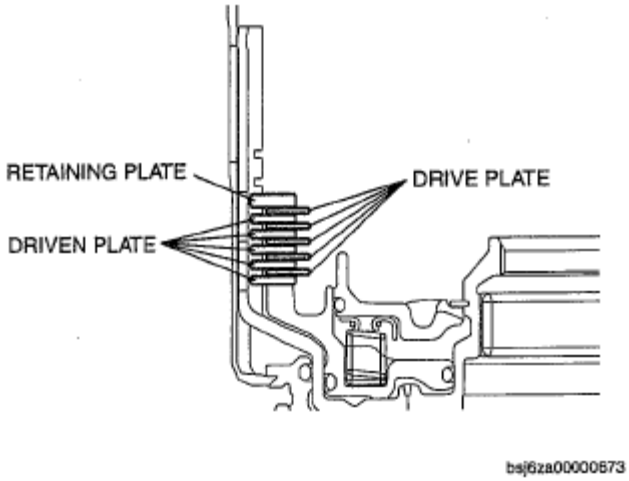


Fig. 170: Identifying Driven, Drive Plate And Retaining Plate

23. Using a flathead screwdriver, install the snap ring (C2) to the C2, C3 clutch drum.

CAUTION:
- **When installing the snap ring, set the end gap of the snap ring as shown in the figure.**

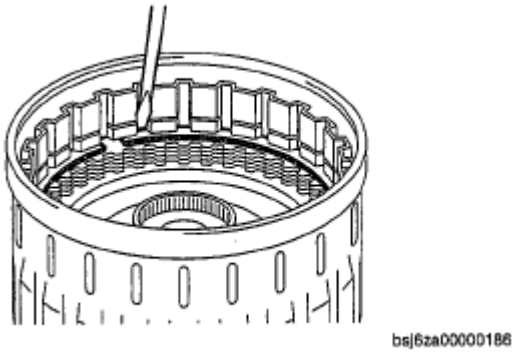


Fig. 171: Installing Snap Ring Using Flathead Screwdriver

24. Measure the retaining plate travel distance at both ends across the diameter using a dial gauge while blowing compressed air into the oil passage as shown in the figure, and calculate the average value. Verify that the piston moves smoothly.

Air pressure

200 kPa (2 kgf/cm^2 , 28 psi)

THICKNESS REFERENCE

Identification mark	Thickness (mm {in})
0	2.95-3.05{0.016-0.120}

1	3.05-3.15{0.120-0.124}
2	3.15-3.25{0.124-0.128}
3	3.25-3.35{0.128-0.132}
4	3.35-3.45{0.132-0.136}
5	3.45-3.55{0.136-0.140}
6	3.55-3.65{0.140-0.144}
7	3.65-3.75{0.144-0.148}
8	3.75-3.85{0.148-0.152}

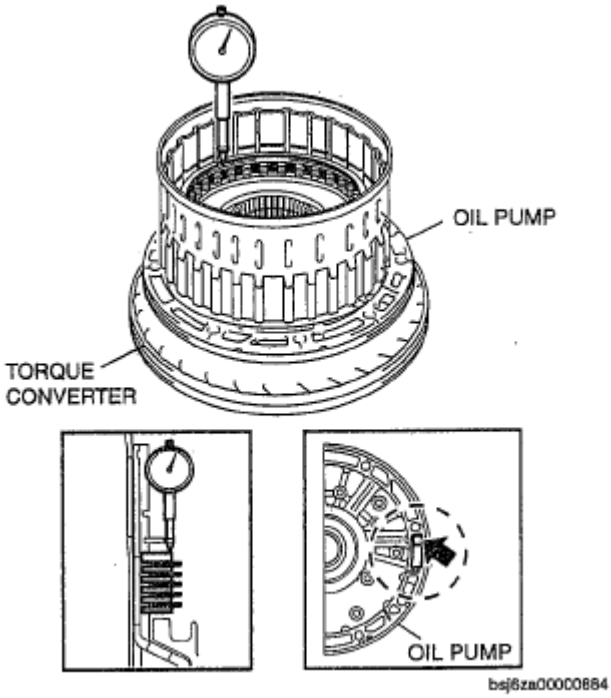


Fig. 172: Measuring Retaining Plate Travel Distance At Both Ends Across Diameter Using Dial Gauge

CAUTION:
- **If the C2 clutch pack clearance exceeds the maximum specification, select another retaining plate.**

25. Using a flathead screwdriver, install the snap ring (C3) to the C2, C3 clutch drum.

CAUTION:
- **When installing the snap ring, set the end gap of the snap ring as shown in the figure.**

26. Apply ATF to the retaining plate (C3), the driven plate (C3), the drive plate (C3).

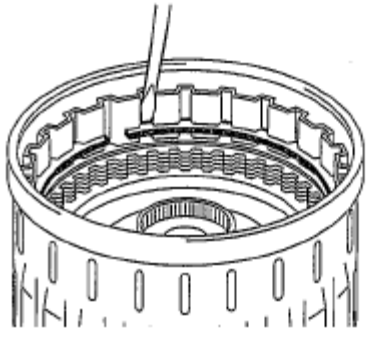


Fig. 173: Installing Snap Ring Using Flathead Screwdriver

CAUTION:
- **Inspect the number of drive and driven plates.**

27. Install the retaining plate (C3) and the driven plate (C3) and the drive plate (C3) and the sleeve to the C2, C3 clutch drum.

CAUTION:
- **When installing the snap ring, set the end gap of the snap ring as shown in the figure.**

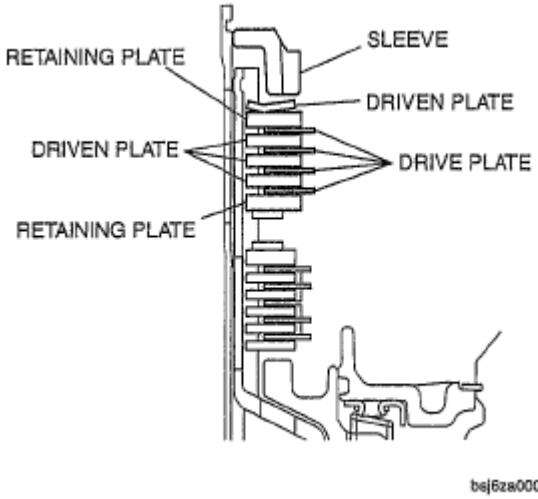


Fig. 174: Identifying Retaining Plate, Driven Plate, Drive Plate And Sleeve

28. Using a flathead screwdriver, install the snap ring (C3) to the C2, C3 clutch drum.

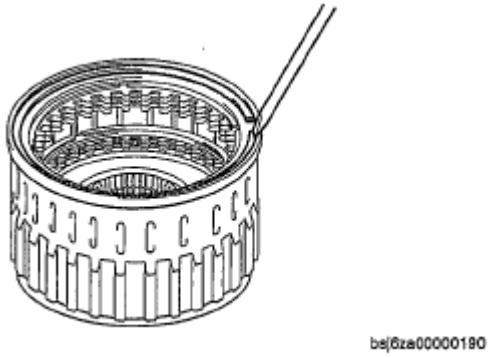


Fig. 175: Installing Snap Ring Using Flathead Screwdriver

29. Measure the driven plate travel distance of the reverse piston travel distance and driven plate at the both ends across the diameter using a dial gauge while blowing compressed air into the oil passage as shown in the figure, and calculate the average value. Verify that the piston moves smoothly.

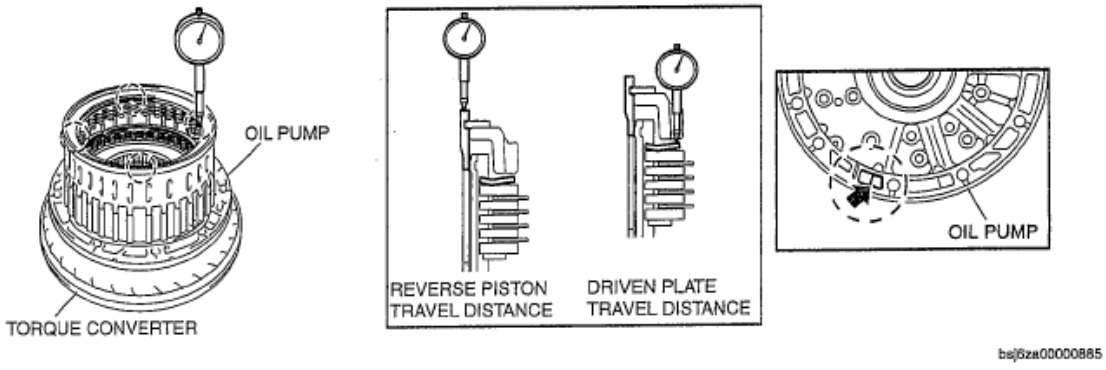


Fig. 176: Measuring Driven Plate Travel Distance Using Dial Gauge

Air pressure

200 kPa (2 kgf/cm^2 , 28 psi)

Standard travel distance A

1.62-2.68 mm {0.06-0.10 in}

Standard travel distance B

1.22-1.67 mm {0.05-0.06 in}

Standard gap

0.40-0.70 mm {0.01-0.03 in}

THICKNESS REFERENCE

Identification mark	Thickness (mm {in})
0	2.35-2.45 {0.093-0.096}
1	2.45-2.55 {0.096-0.100}
2	2.55-2.65 {0.100-0.104}
3	2.65-2.75 {0.104-0.108}
4	2.75-2.85 {0.108-0.112}
5	2.85-2.95 {0.112-0.116}
6	2.95-3.05 {0.116-0.120}
7	3.05-3.15 {0.120-0.124}
8	3.15-3.25 {0.124-0.128}
9	3.25-3.35 {0.128-0.132}
A	3.35-3.45 {0.132-0.136}
B	3.45-3.55 {0.136-0.140}

CAUTION:
- **If the C3 clutch pack clearance exceeds the maximum specification, select another retaining plate.**

30. Apply ATF to the sliding surface of the new seal ring input shaft.

CAUTION:
- **Do not expand the seal ring too much.**
- **Be careful not to shorten the seal rings too much, when installing them.**

31. Compress the seal rings as shown in the figure and install them to the input shaft component.

NOTE:
- **Verify that oil seal rings rotate smoothly after installing them.**

32. Apply ATF to the new D-ring.

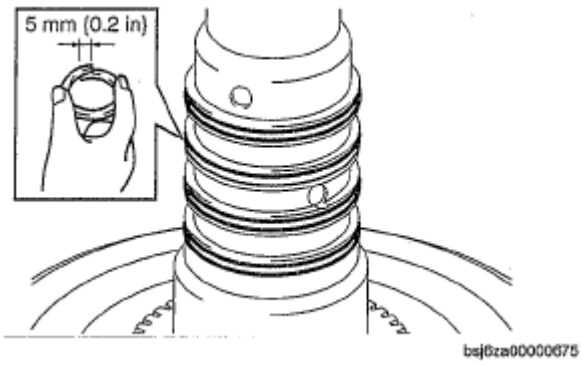


Fig. 177: Compressing Seal Rings

33. Install the D-ring to the C4 clutch seal plate.
34. Apply ATF to the new O-ring.

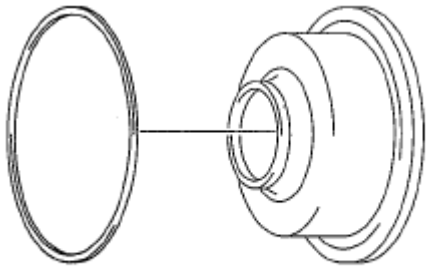


Fig. 178: Identifying D-Ring On C4 Clutch Seal Plate

35. Install the O-ring to the input shaft component.
36. Apply ATF to the C1 clutch piston and the C4 clutch piston to the input shaft component.

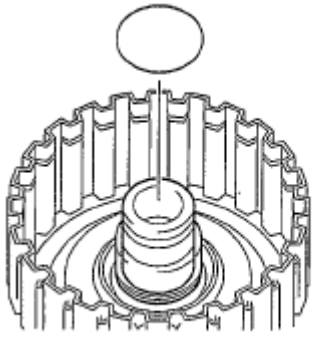


Fig. 179: Identifying O-Ring On Input Shaft Component

37. Install the C1 clutch piston and the C4 clutch piston to the input shaft component.
38. Apply ATF to the C1 clutch seal plate and the input shaft component.

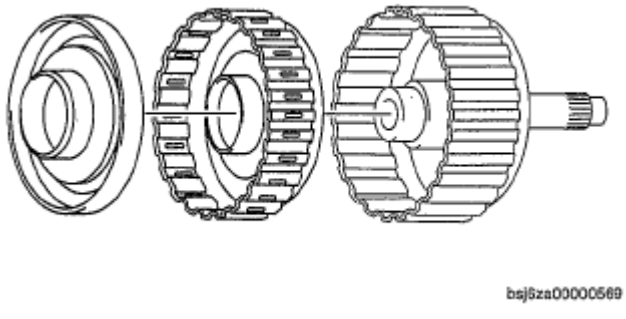


Fig. 180: Identifying C1 Clutch Piston And C4 Clutch Piston

39. Install the C1 clutch seal plate and the piston return spring to the input shaft component.

CAUTION:
- **Do not damage the D-ring.**

40. Place the **SST** on the C1 clutch seal plate and compress the piston return spring with a press.

CAUTION:
- **Do not expand the snap ring too much.**

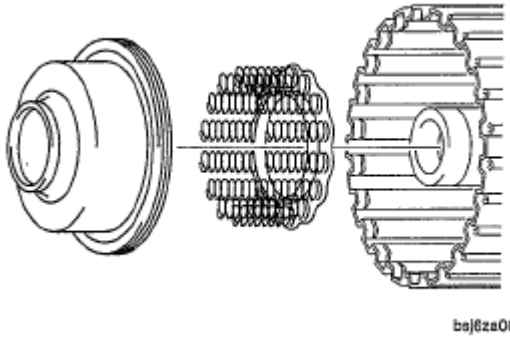


Fig. 181: Identifying C1 Clutch Seal Plate And Piston Return Spring

41. Install the snap ring using snap ring pliers.

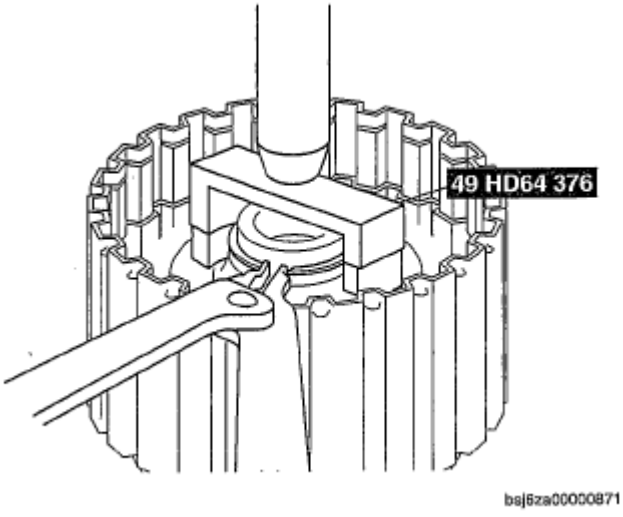


Fig. 182: Removing/Installing Snap Ring Using Snap Ring Pliers

42. Apply ATF to the retaining plate (C4), the driven plate (C4), the drive plate (C4).

CAUTION:
- **Inspect the number of drive and driven plates.**

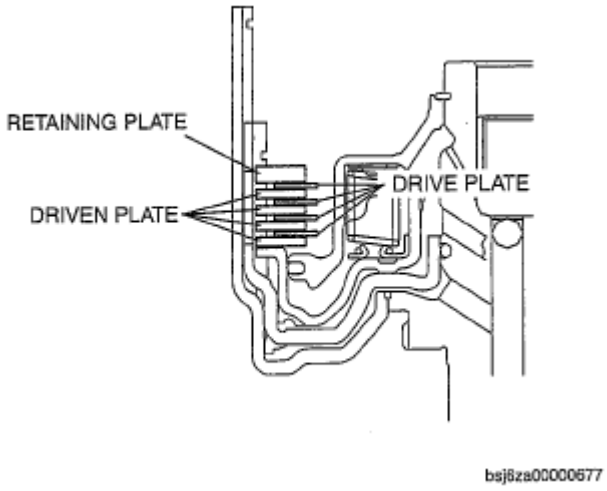


Fig. 183: Identifying Retaining Plate, Driven And Drive Plate

43. Install the retaining plate (C4), the driven plate (C4), the drive plate (C4) to the input shaft component.
44. Using a flathead screwdriver, install the snap ring to the input shaft component.

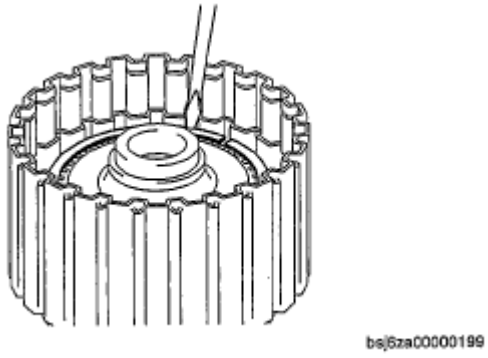


Fig. 184: Installing Snap Ring To Input Shaft Component Using Flathead Screwdriver

45. Measure the retaining plate travel distance at both ends across the diameter using a dial gauge while blowing compressed air into the oil passage as shown in the figure, and calculate the average value. Verify that the piston moves smoothly.

    Air pressure

    200 kPa (2 kgf/cm^2 , 28 psi)

    Standard travel distance

    0.02-1.01 mm {0.0008-0.0397 in}

Standard gap

0.4-0.7 mm {0.0158-0.0275 in}

THICKNESS REFERENCE

Identification mark	Thickness (mm {in})
0	2.95-3.05{0.116-0.120}
1	3.05-3.15{0.120-0.124}
2	3.15-3.25{0.124-0.128}
3	3.25-3.35{0.128-0.132}
4	3.35-3.45{0.132-0.136}
5	3.45-3.55{0.136-0.140}
6	3.55-3.65{0.140-0.144}
7	3.65-3.75{0.144-0.148}
8	3.75-3.85{0.148-0.152}
9	3.85-3.95{0.152-0.156}

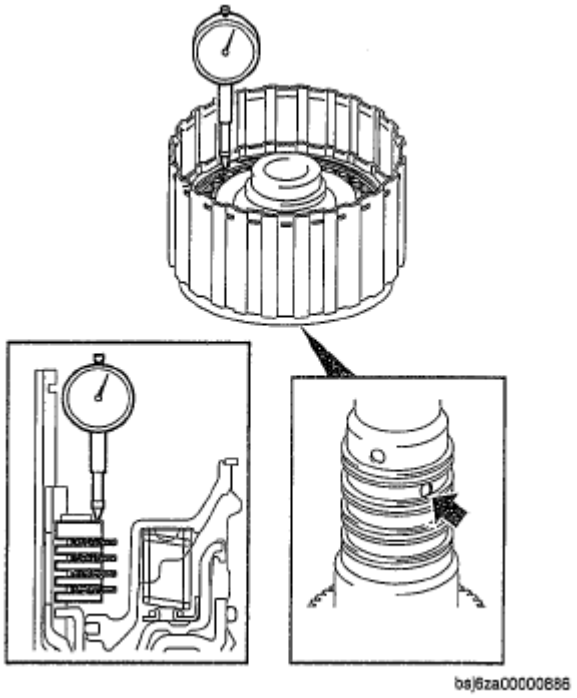


Fig. 185: Measuring Retaining Plate Travel Distance At Both Ends Across Diameter Using Dial Gauge

CAUTION:
- **If the C4 clutch pack clearance exceed the maximum specification, select another retaining plate.**

46. Apply ATF to the retaining plate (C1), the driven plate (C1), the drive plate (C1).

CAUTION:
- **Inspect the number of drive and driven plates.**

47. Install the retaining plate (C1), the driven plate (C1), the drive plate (C1) to the input shaft component.

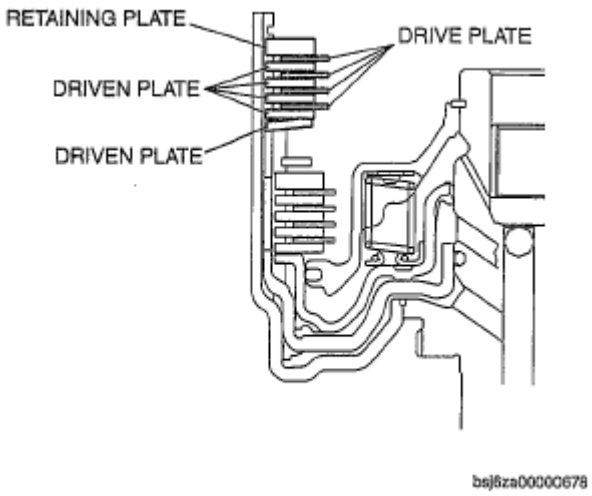


Fig. 186: Identifying Retaining Plate, Driven Plate And Drive Plate

48. Using a flathead screwdriver, install the snap ring to the input shaft component.

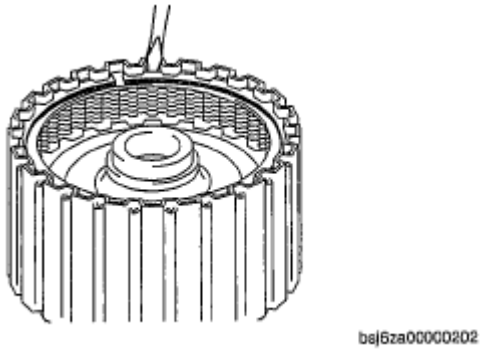


Fig. 187: Installing Snap Ring Using Flathead Screwdriver

49. Measure the retaining plate travel distance at both ends across the diameter using a dial gauge while blowing compressed air into the oil passage as shown in the figure, and calculate the average value. Verify that the piston moves smoothly.

Air pressure

200 kPa (2 kgf/cm^2 , 28 psi)

Standard travel distance

0.14-0.17 mm {0.0056-0.0066 in}

Standard gap

0.56-0.86 mm {0.0221-0.0338 in}

CAUTION:
- **If the C1 clutch pack clearance exceed the maximum specification, select another retaining plate.**

50. Apply ATF to the F4 one-way clutch and the thrust washer.

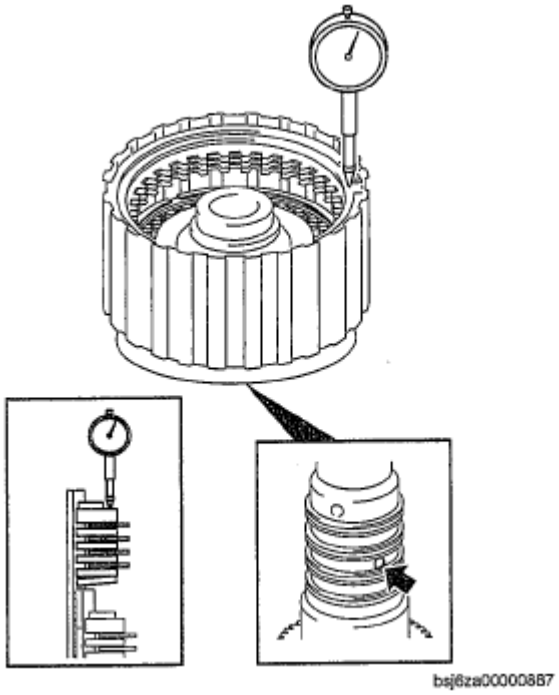


Fig. 188: Measuring Retaining Plate Travel Distance At Both Ends Across Diameter Using Dial Gauge

51. Install the F4 one-way clutch to the clutch hub.
52. Apply ATF to the bearing race.

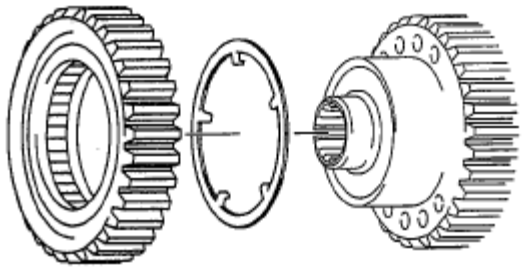


Fig. 189: Identifying F4 One-Way Clutch And Thrust Washer

53. Install the bearing race to the C1, C4 clutch component.

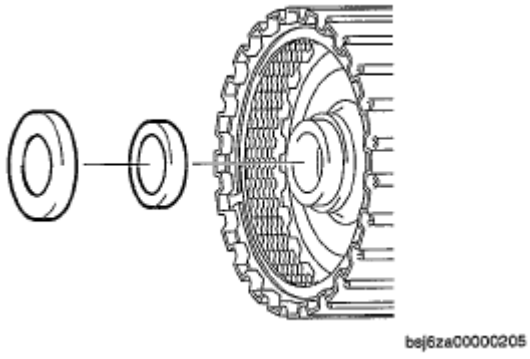


Fig. 190: Identifying Bearing Races

54. Install the clutch hub to the C1, C4 clutch component.
55. Apply ATF to the bearing race.

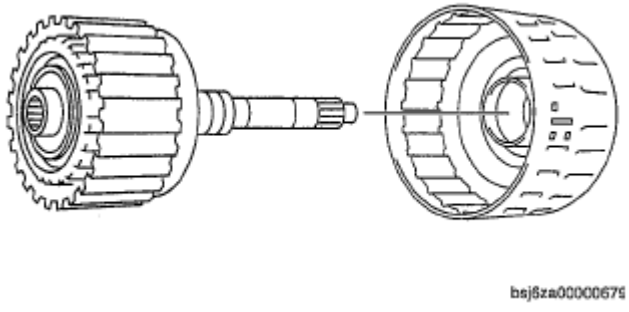


Fig. 191: Identifying Clutch Hub

56. Install the bearing race to the C3 clutch piston component.

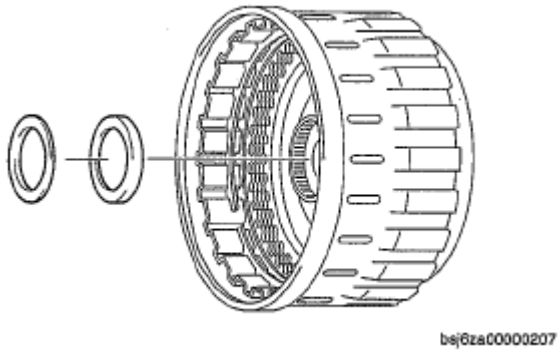


Fig. 192: Identifying Bearing Race On C3 Clutch Piston Component

57. Install the C1, C4 clutch component to the C2, C3 clutch drum.
58. Apply ATF to the thrust bearing, the bearing race and the thrust washer.

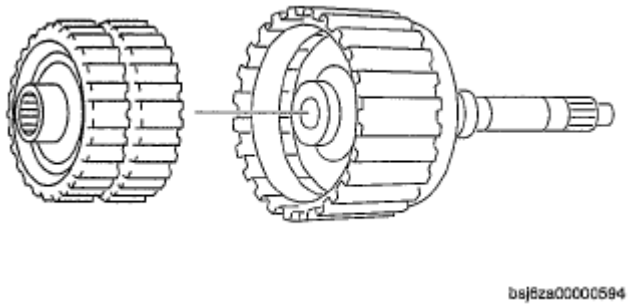


Fig. 193: Identifying C1, C4 Clutch Component

59. Install the thrust bearing, bearing race and thrust washer.

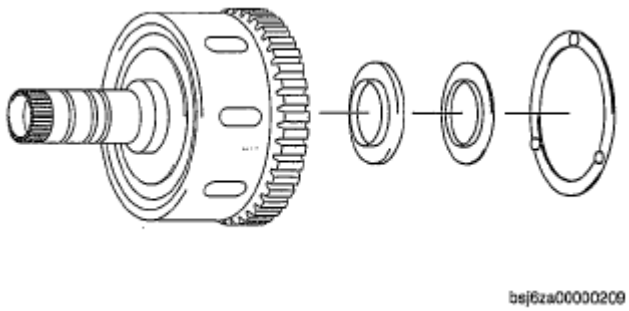


Fig. 194: Identifying Thrust Bearing, Bearing Race And Thrust Washer

60. Install the clutch hub to the C3 clutch piston component.
61. Apply ATF to the thrust needle spring.

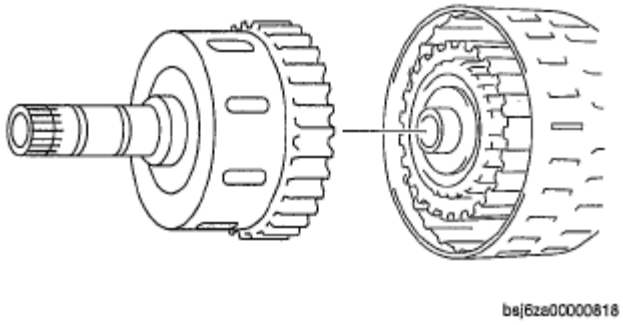


Fig. 195: Identifying Clutch Hub On C3 Clutch Piston Component

62. Install the thrust needle spring to the clutch hub.
63. Apply ATF to the retaining plate.

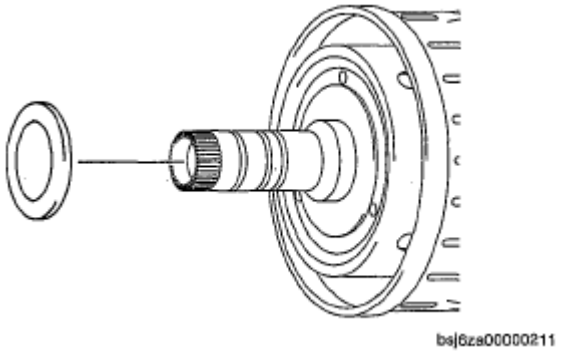


Fig. 196: Identifying Thrust Needle Bearing On Clutch Hub

64. Install the retaining plate to the C3 clutch piston component.

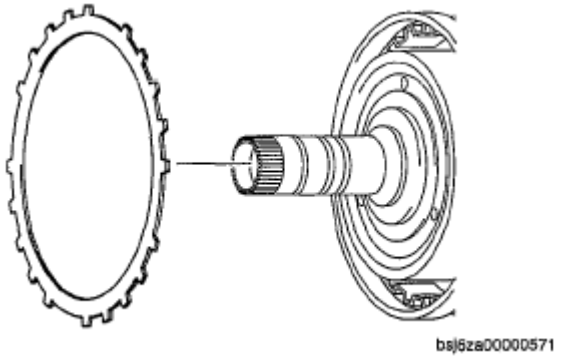


Fig. 197: Identifying Retaining Plate On C3 Clutch Piston Component

65. Install the clutch hub component to the C3 clutch piston component.
66. Apply ATF to the retaining plate, the drive plate, the driven plate.

CAUTION:

- **Inspect the number of drive and driven plates.**

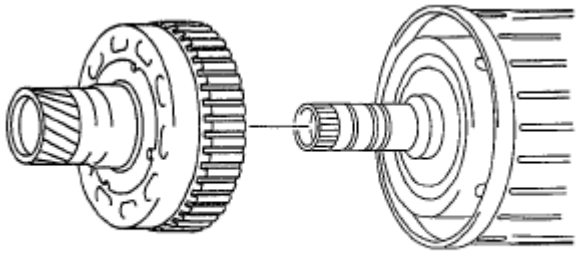


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Fig. 198: Identifying Clutch Hub Component

67. Install the retaining plate (C3), the drive plate (C3), and the driven plate (C3) to the clutch hub component.

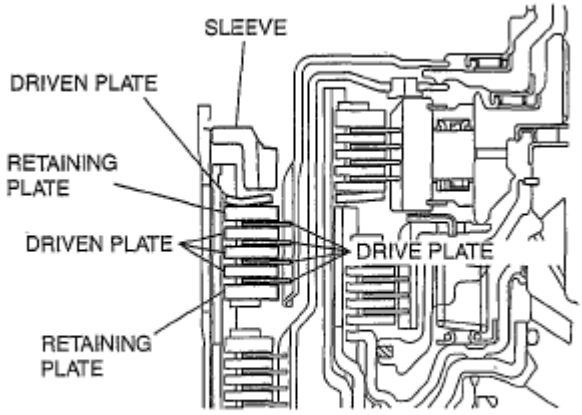

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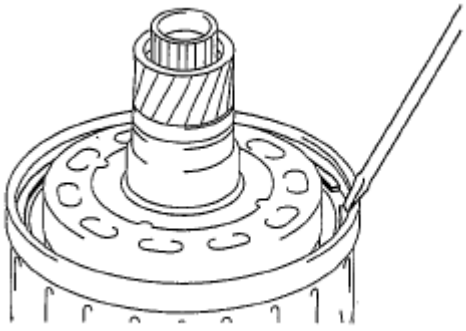
Fig. 199: Identifying Retaining Plate, Drive Plate And Driven Plate

68. Using a flathead screwdriver, install the snap ring to the C3 clutch piston component.

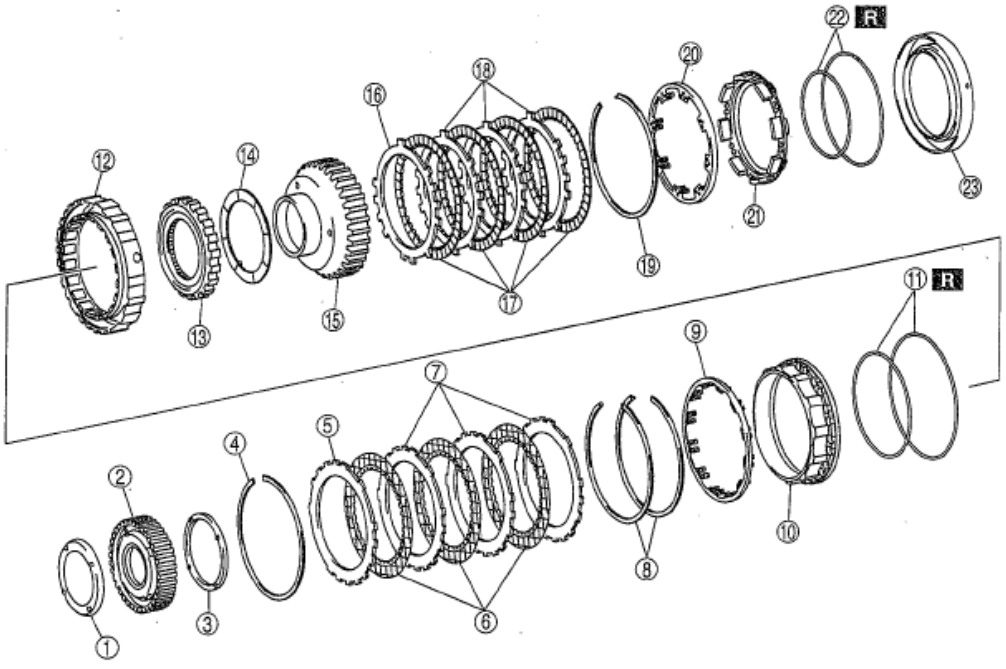


bsj6za00000820

Fig. 200: Installing Snap Ring To C3 Clutch Piston Component Using Flathead Screwdriver

B1, B3 BRAKE AND F1, F2 ONE-WAY CLUTCH COMPONENT DISASSEMBLY

Components



1	Thrust washer
2	F2 one-way clutch
3	Thrust washer
4	Snap ring
5	Driven plate
6	Drive plate
7	Driven plate
8	Snap ring
9	Piston return spring
10	B3 brake piston
11	O-ring
12	B3 brake cylinder

13	F1 one-way clutch
14	Thrust washer
15	Bearing race
16	Retaining plate
17	Drive plate
18	Driven plate
19	Snap ring
20	Spring return
21	B1 brake piston
22	O-ring
23	B1 brake cylinder

Fig. 201: B1, B3 Brake And F1, F2 One-Way Clutch Component Disassembled View

Disassembly Procedure

1. Remove the B3 brake cylinder from the F1 one-way clutch.

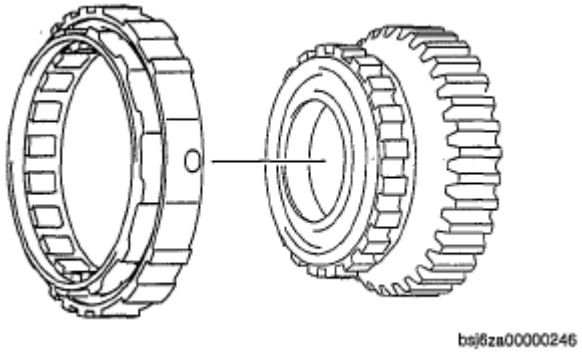


Fig. 202: Identifying B3 Brake Cylinder

2. Remove the F1 one-way clutch and the thrust washer from the bearing race.

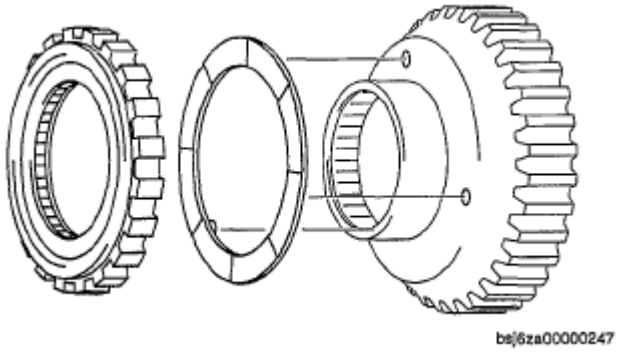


Fig. 203: Identifying F1 One-Way Clutch And Thrust Washer

3. Using a flathead screwdriver, remove the snap ring from the B3 brake cylinder.

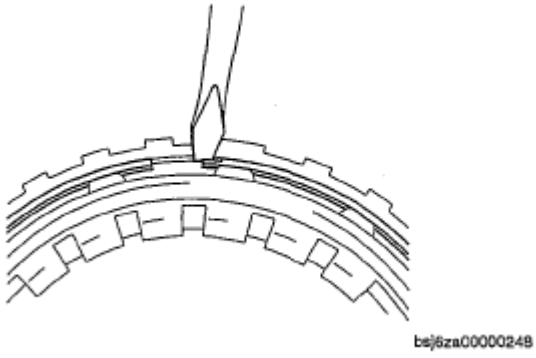


Fig. 204: Removing Snap Ring From B3 Brake Cylinder Using Flathead Screwdriver

4. Remove the piston return spring from the B3 brake piston.

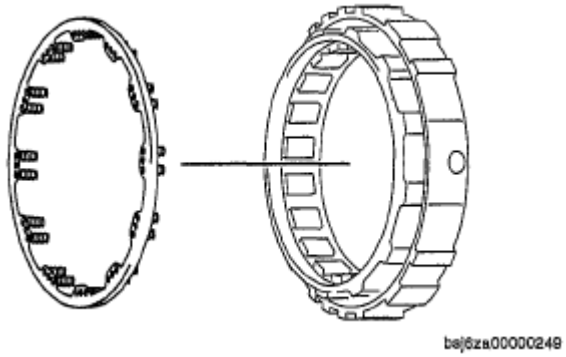


Fig. 205: Identifying Piston Return Spring

5. While pushing the B3 brake piston, apply compressed air into the oil passage as shown in the figure and remove the B3 brake piston from the B3 brake cylinder.

   Air pressure

   392 kPa (4.0 kgf/cm^2 , 57 psi)

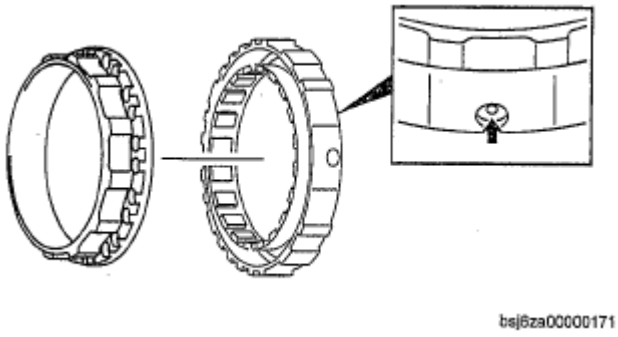


Fig. 206: Locating Oil Passage

6. Remove the O-ring from the B3 brake piston.

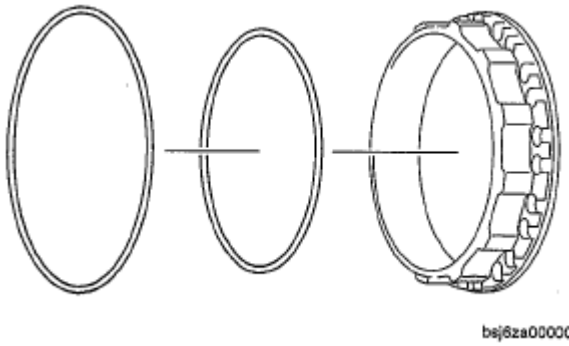


Fig. 207: Identifying O-Ring On B3 Brake Piston

7. While pushing the B1 brake piston, apply compressed airinto the oil passage as shown in the figure and remove the B1 brake piston from the B1 brake cylinder.

   Air pressure

   392 kPa (4.0 kgf/cm^2 , 57 psi)

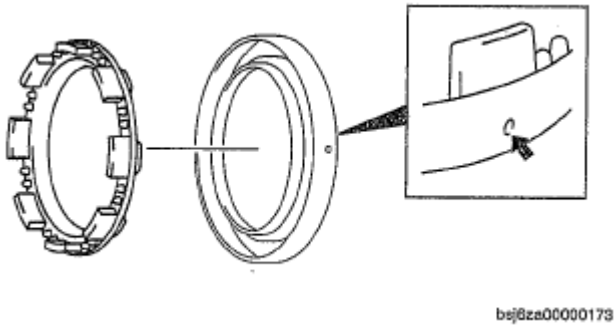


Fig. 208: Locating Oil Passage

8. Remove the O-ring from the B1 brake piston.

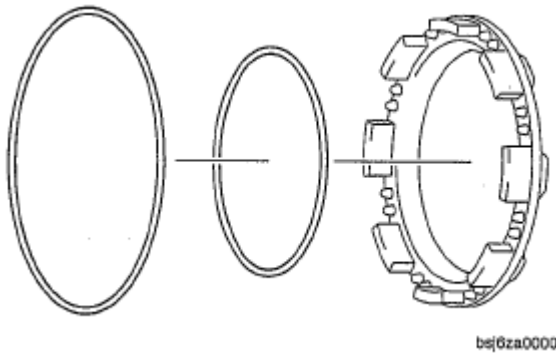


Fig. 209: Identifying O-Ring On B1 Brake Piston

B1, B3 BRAKE AND F1, F2 ONE-WAY CLUTCH INSPECTION

1. Using vernier calipers, measure the free length of the piston return spring.

   B3 brake return spring free length

   Standard: 15.72 mm {0.62 in}

   - If it less than the specification, replace the piston return spring with a new one.

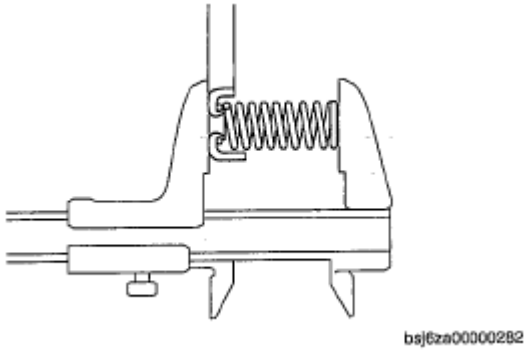


Fig. 210: Measuring Free Length Of Piston Return Spring Using Vernier Caliper

2. Inspect the lining of all drive plates. (B3)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

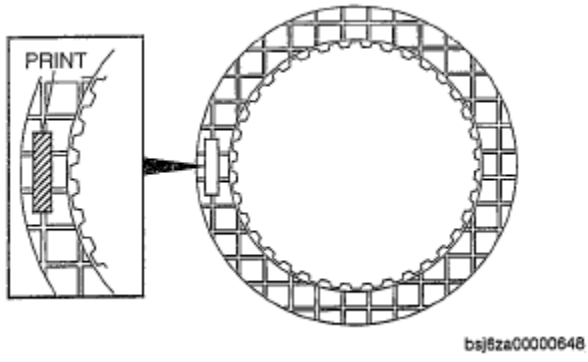


Fig. 211: Identifying Print Mark Location

NOTE:
- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

3. Using vernier calipers, measure the free length of the piston return spring.

   B1 brake return spring free length

   Standard: 17.05 mm {0.67 in}

   - If it less than the specification, replace the piston return spring with a new one.

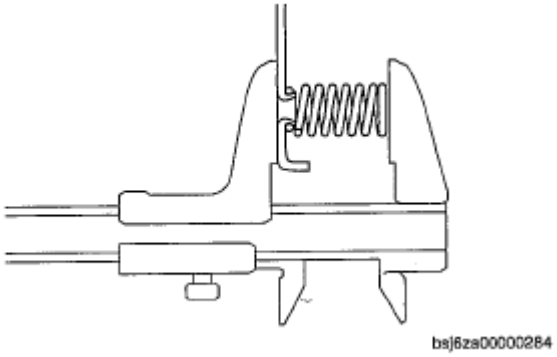


Fig. 212: Measuring Free Length Of Piston Return Spring

4. Inspect the lining of all drive plates. (B1)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

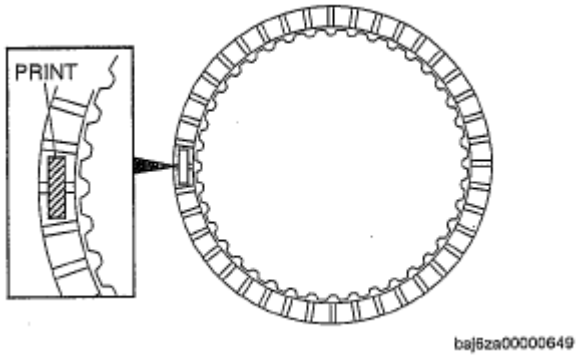


Fig. 213: Identifying Print Mark Location

NOTE:
- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

5. Verify that the F1 one-way clutch rotates when the bearing race is secured and rotated clockwise, and that it does not rotate when the bearing race is rotated counterclockwise.

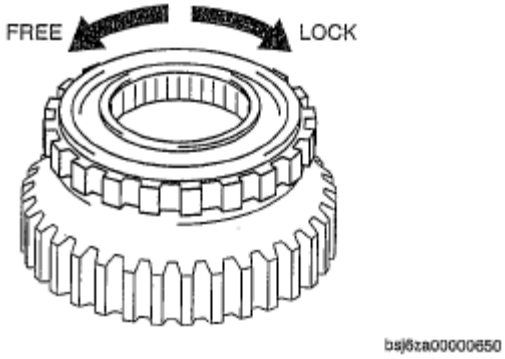


Fig. 214: Identifying F1 One-Way Clutch Rotation Positions

6. Verify that the F2 one-way clutch rotates when the clutch hub is secured and rotated clockwise, and that it does not rotate when the clutch hub is rotated counterclockwise.

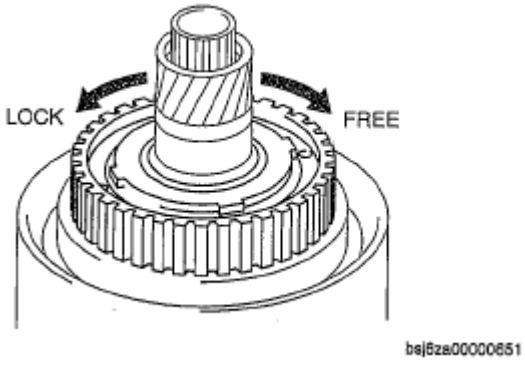
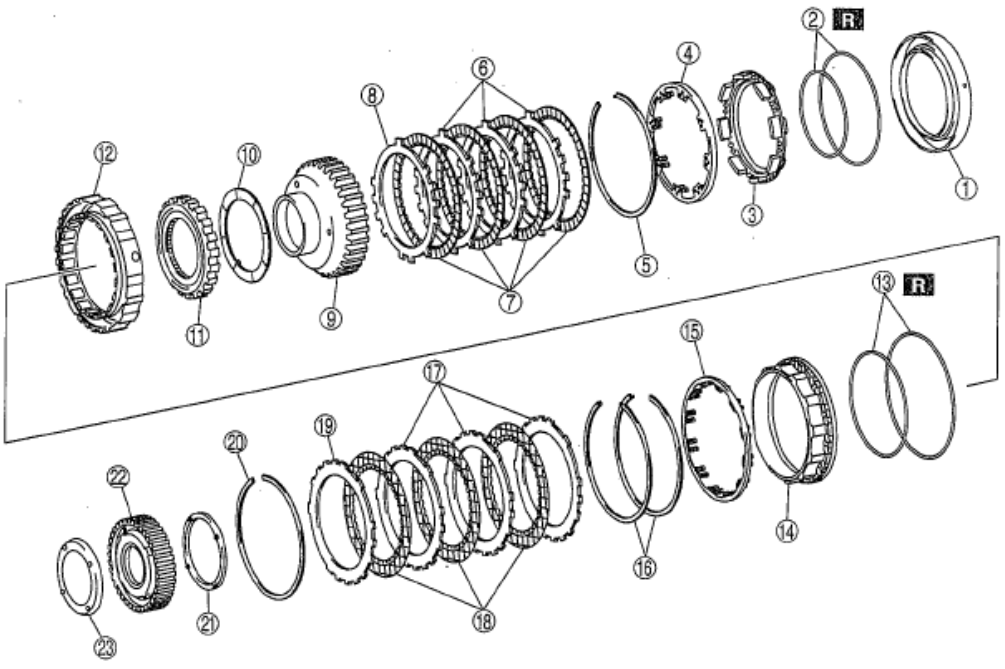


Fig. 215: Identifying F2 One-Way Clutch Rotation Positions

B1, B3 BRAKE AND F1, F2 ONE-WAY CLUTCH COMPONENT ASSEMBLY

Components



1	B1 brake cylinder
2	O-ring
3	B1 brake piston
4	Spring return
5	Snap ring
6	Driven plate
7	Drive plate
8	Retaining plate
9	Bearing race
10	Thrust washer

11	F1 one-way clutch
12	B3 brake cylinder
13	O-ring
14	B3 brake cylinder
15	Piston return spring
16	Snap ring
17	Driven plate
18	Drive plate
19	Driven plate
20	Snap ring
21	Thrust washer
22	F2 one-way clutch
23	Thrust washer

Fig. 216: Exploded View Of B1, B3 Brake And F1, F2 One-Way Clutch Component

Assembly Procedure

1. Apply ATF to the new O-ring.
2. Install the O-rings to the B1 brake piston.
3. Apply ATF to the B1 brake piston and the B1 brake cylinder.

CAUTION:
- **Do not damage the O-ring.**

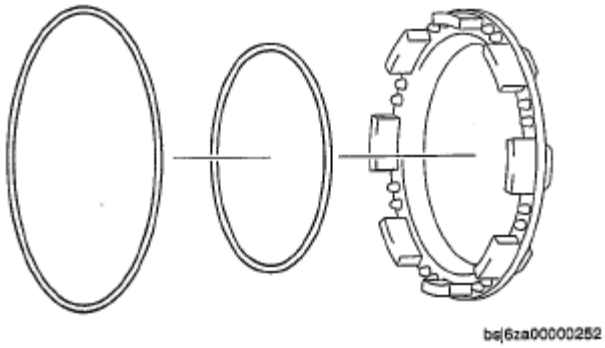


Fig. 217: Identifying O-Rings On B1 Brake Piston

4. Install the B1 brake piston to the B1 brake cylinder.
5. Apply ATF to the new O-rings.

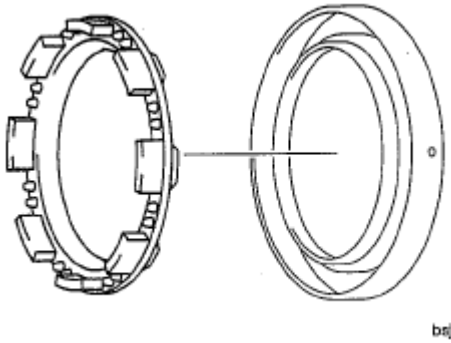


Fig. 218: Identifying B1 Brake Piston On B1 Brake Cylinder

6. Install the O-rings to the B3 brake piston.
7. Apply ATF to the B3 brake cylinder to the B3 brake piston.

CAUTION:
- **Do not damage the O-ring.**

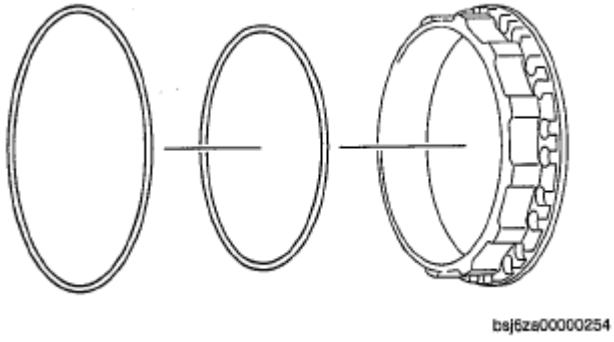


Fig. 219: Identifying O-Rings On B3 Brake Piston

8. Install the B3 brake piston to the B3 brake cylinder.

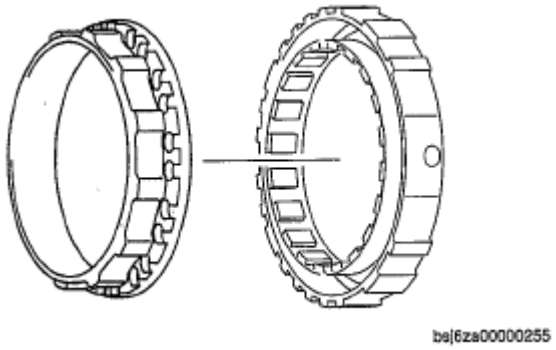


Fig. 220: Identifying B3 Brake Piston On B3 Brake Cylinder

9. Install the piston return spring to the B3 brake piston.

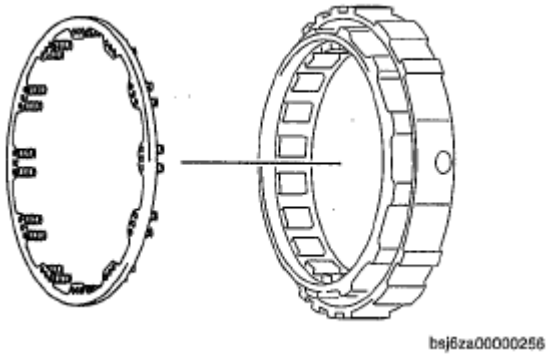


Fig. 221: Identifying Piston Return Spring

10. While holding the snap ring with a finger, install it to the brake cylinder using a flathead screwdriver.
11. Apply ATF to the thrust washer.
12. Install the bearing race to the thrust washer.

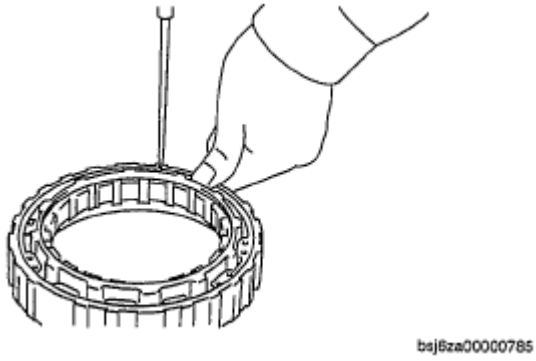


Fig. 222: Installing Brake Cylinder Using Flathead Screwdriver

13. Install the F1 one-way clutch to the bearing race.

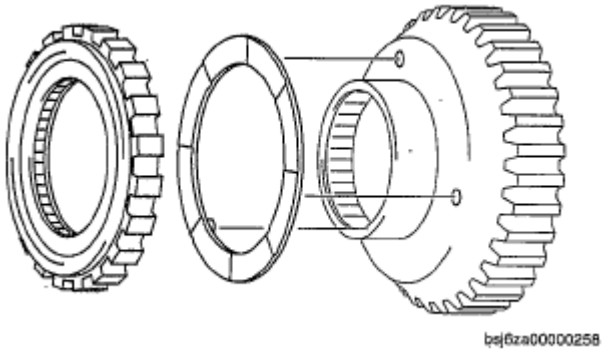


Fig. 223: Identifying F1 One-Way Clutch

14. Install the B3 brake cylinder to the F1 one-way clutch.

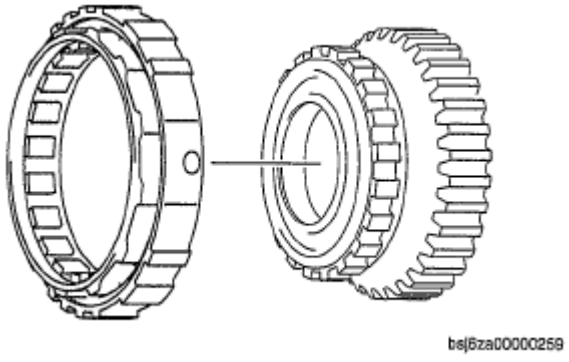
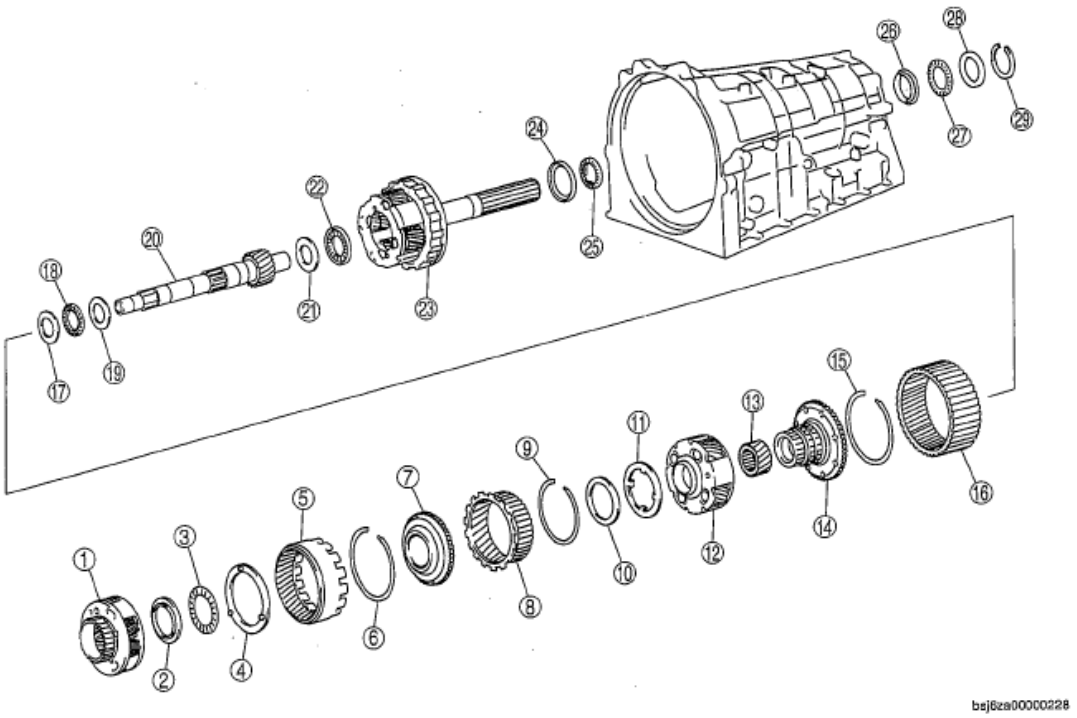


Fig. 224: Identifying B3 Brake Cylinder

PLANETARY GEAR COMPONENT DISASSEMBLY

Components



1	Front planetary gear component
2	Bearing race
3	Thrust needle bearing
4	Thrust washer
5	Front planetary ring gear
6	Snap ring
7	Front planetary ring gear flange
8	Middle planetary ring gear
9	Snap ring
10	Thrust needle bearing
11	Bearing race
12	Middle planetary gear component
13	Sun gear
14	Middle planetary ring gear flange
15	Snap ring

16	Rear planetary ring gear
17	Bearing race
18	Needle bearing
19	Bearing race
20	Intermediate shaft
21	Bearing race
22	Thrust needle bearing
23	Rear planetary ring gear
24	Bearing race
25	Thrust needle bearing
26	Bearing race
27	Thrust needle bearing
28	Bearing race
29	Snap ring

Fig. 225: Planetary Gear Component Disassembled View

Disassembly Procedure

1. Using a flathead screwdriver, remove the snap ring from the middle planetary ring gear.

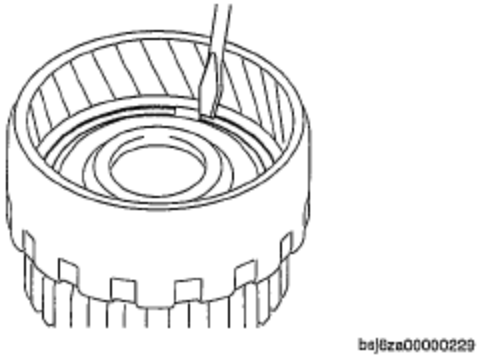


Fig. 226: Removing Snap Ring From Middle Planetary Ring Gear Using Flathead Screwdriver

2. Remove the front planetary ring gear flange from the middle planetary ring gear.

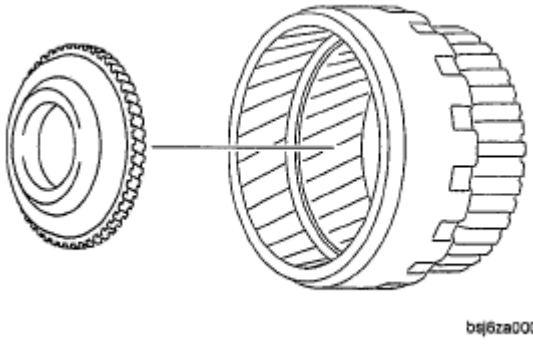


Fig. 227: Identifying Front Planetary Ring Gear Flange

3. Using a flathead screwdriver, remove the snap ring from the middle planetary ring gear.

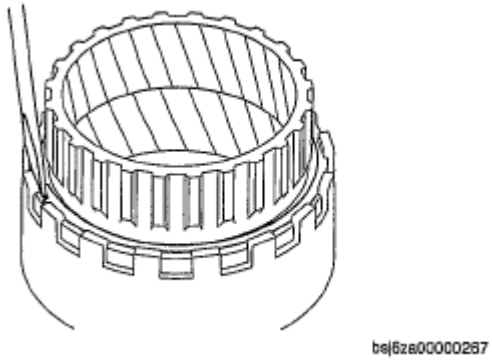


Fig. 228: Removing Snap Ring From Middle Planetary Ring Gear

4. Remove the front planetary ring gear from the middle planetary ring gear.

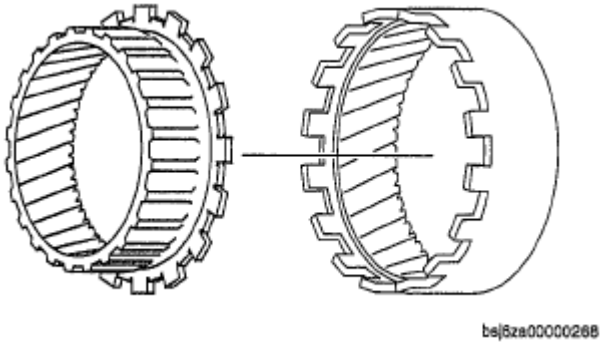


Fig. 229: Identifying Front Planetary Ring Gear

5. Using a flathead screwdriver, remove the snap ring from the rear planetary ring gear.

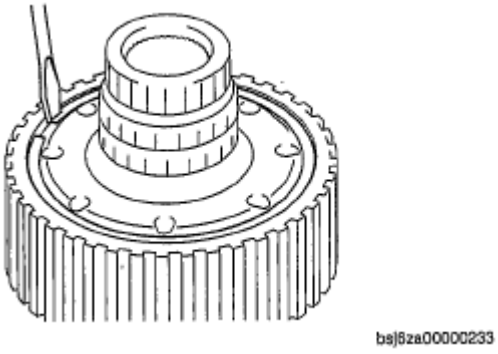


Fig. 230: Removing Snap Ring From Rear Planetary Ring Gear Using Flathead Screwdriver

6. Remove the rear planetary ring gear flange from the rear planetary ring gear.

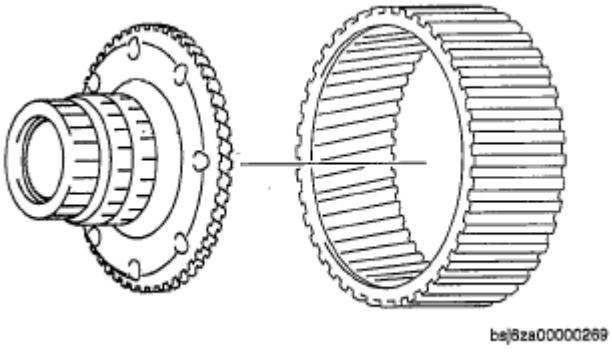


Fig. 231: Identifying Rear Planetary Ring Gear Flange

PLANETARY GEAR COMPONENT INSPECTION

1. Using a dial gauge, measure the inner diameter of the front planetary ring gear flange bushings.

Front planetary ring gear bushing inner diameter

46.038-46.063 mm {1.81252-1.81350 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the front planetary ring gear flange with a new one.**
- **When the front planetary ring gear flange is replaced, inspect the contact surface opposed to the middle planetary gear component.**
- **If the surface of it is scratched or has changed color, replace the middle planetary gear component with a new one.**

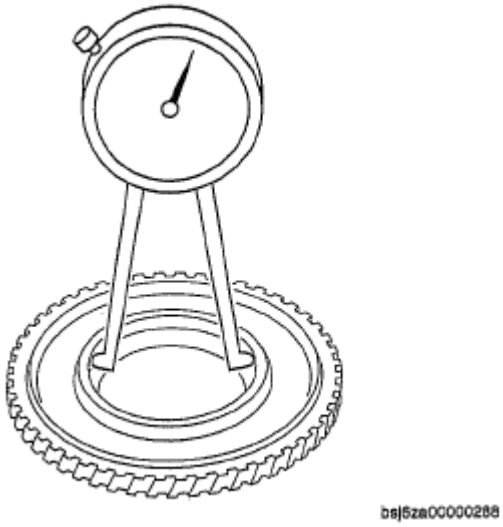


Fig. 232: Measuring Inner Diameter Of Front Planetary Ring Gear Flange Bushings

2. Using a dial gauge, measure the inner diameter of the front planetary gear component bushings.

Front planetary gear component bushing inner diameter

48.755-48.780 mm {1.91949-1.92047 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the front planetary gear component with a new one.**
- **When the front planetary gear component is replaced, inspect the contact surface opposed to the clutch hub.**
- **If the surface of it is scratched or has changed color, replace the clutch hub with a new one.**

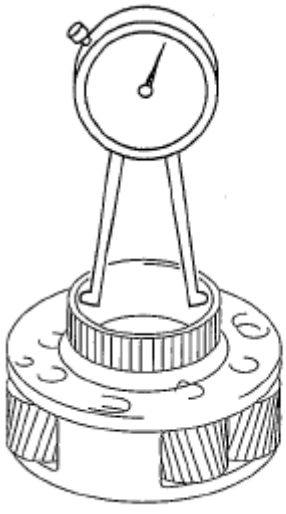


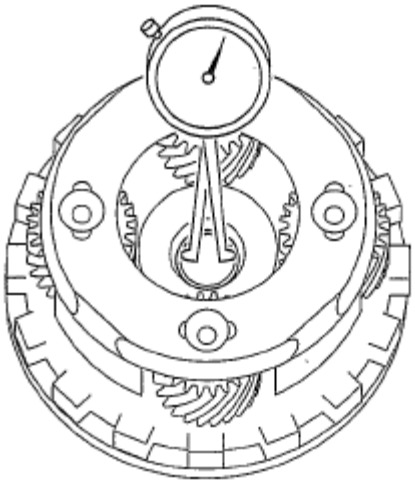
Fig. 233: Measuring Inner Diameter Of Front Planetary Gear Component Bushings

3. Using a dial gauge, measure the inner diameter of the rear planetary gear component bushings.

Rear planetary gear component bushing inner diameter

18.000-18.025 mm {0.7087-0.7096 in}

CAUTION:
- **Measure at different places and take an average. If it exceeds the specification, replace the Rear planetary gear component with a new one.**
- **When the front planetary gear component is replaced, inspect the contact surface opposed to the intermediate shaft.**
- **If the surface of it is scratched or has changed color, replace the intermediate shaft with a new one.**

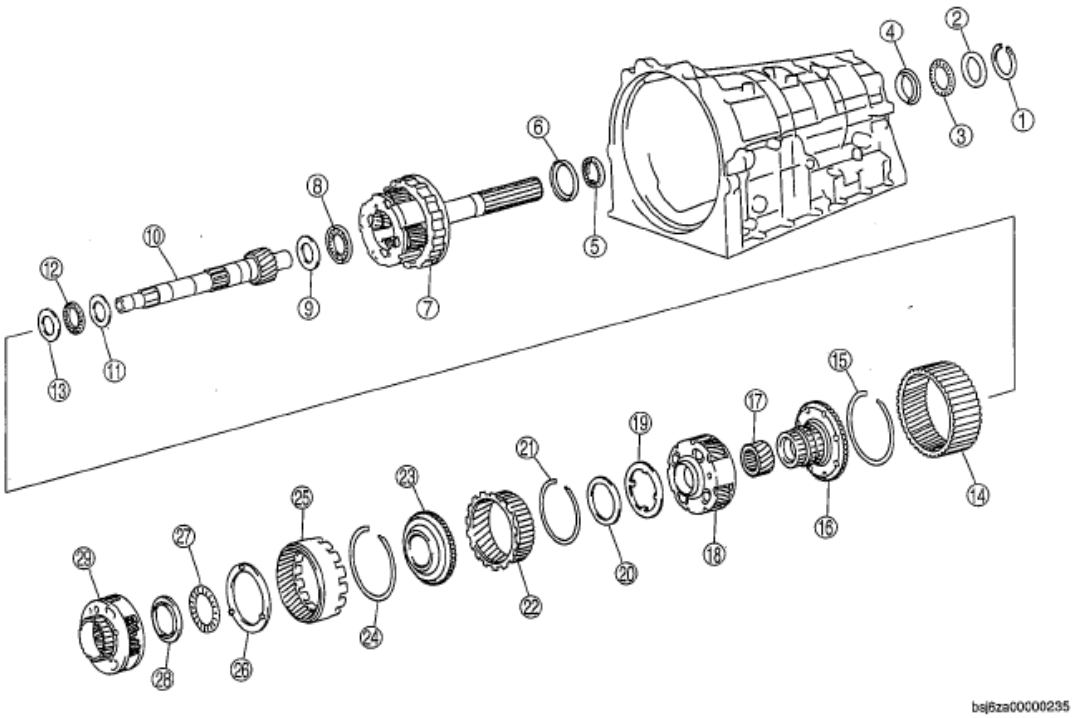


bsj8za00000849

Fig. 234: Measuring Inner Diameter Of Rear Planetary Gear Component Bushings

PLANETARY GEAR COMPONENT ASSEMBLY

Components



1	Snap ring
2	Bearing race
3	Thrust needle bearing
4	Bearing race
5	Thrust needle bearing
6	Bearing race
7	Rear planetary gear component
8	Thrust needle bearing
9	Bearing race
10	Intermediate shaft
11	Bearing race
12	Needle bearing
13	Bearing race
14	Rear planetary ring gear flange
15	Snap ring

16	Middle planetary ring gear flange
17	Sun gear
18	Middle planetary gear component
19	Bearing race
20	Thrust needle bearing
21	Snap ring
22	Middle planetary ring gear
23	Middle planetary ring gear flange
24	Snap ring
25	Front planetary gear component
26	Thrust washer
27	Thrust needle bearing
28	Bearing race
29	Front planetary gear component

Fig. 235: Exploded View Of Planetary Gear Components

Assembly Procedure

1. Install the rear planetary gear flange to the rear planetary ring gear.

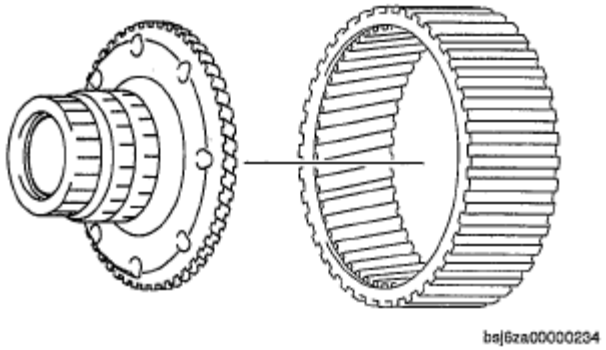


Fig. 236: Identifying Rear Planetary Gear Flange

2. Using a flathead screwdriver, install the snap ring to the rear planetary ring gear.

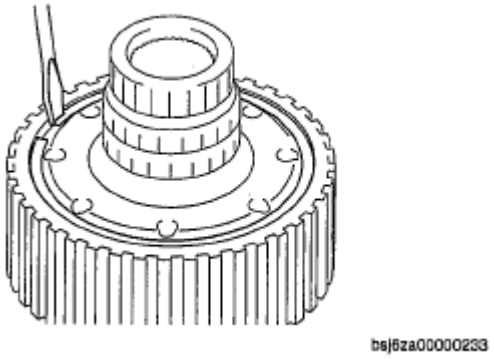


Fig. 237: Installing Snap Ring To Rear Planetary Ring Gear

3. Install the front planetary ring gear to the middle planetary ring gear.

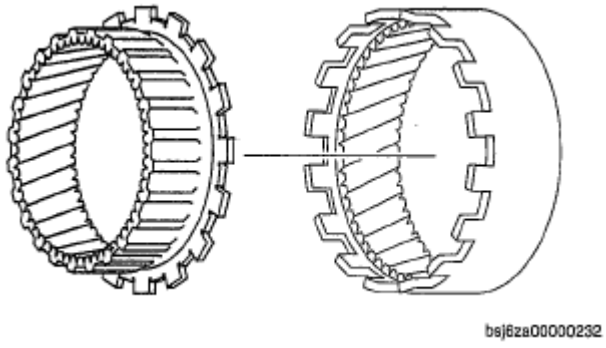


Fig. 238: Identifying Front Planetary Ring Gear

4. Using a flathead screwdriver, install the snap ring to the middle planetary ring gear.

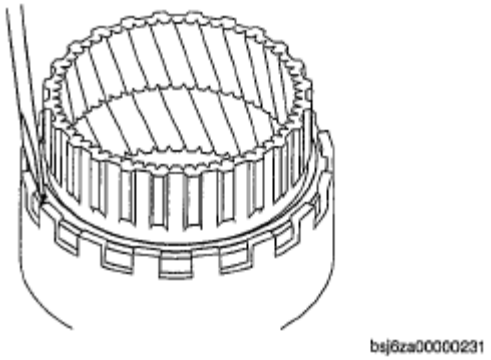


Fig. 239: Installing Snap Ring To Middle Planetary Ring Gear

5. Install the middle planetary ring gear flange to the middle planetary ring gear.

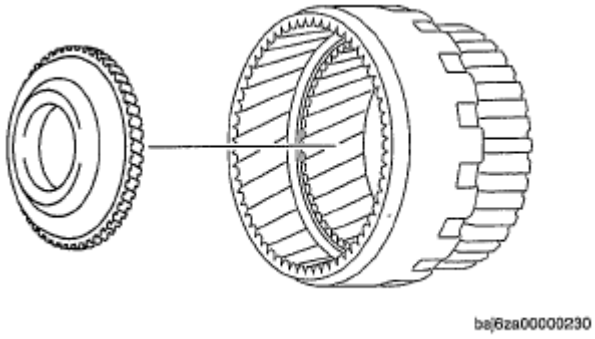


Fig. 240: Identifying Middle Planetary Ring Gear Flange

6. Using a flathead screwdriver, install the snap ring to the middle planetary ring gear.

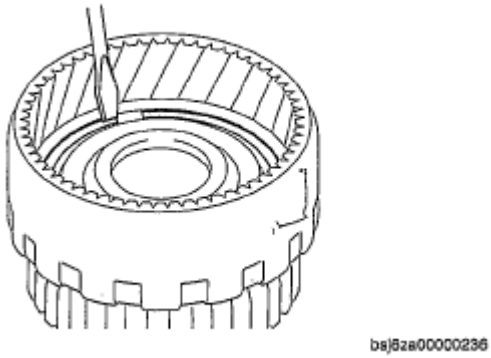
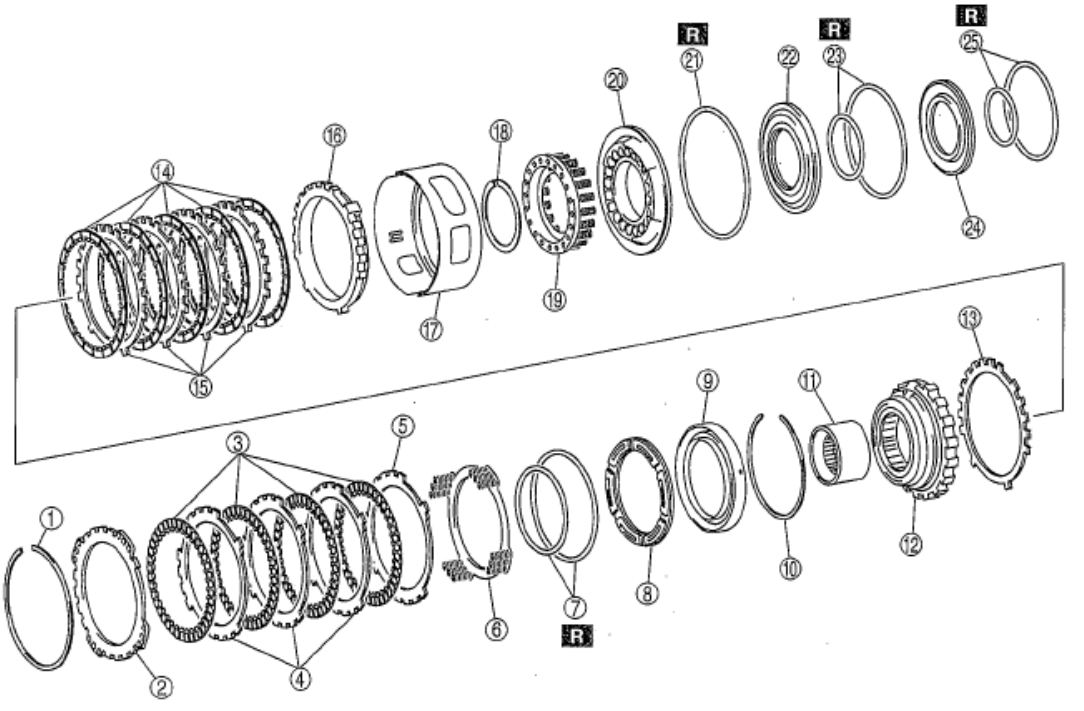


Fig. 241: Installing Snap Ring To Middle Planetary Ring Gear

B2, B4 BRAKE AND F3 ONE-WAY CLUTCH COMPONENT DISASSEMBLY

Components



1	Snap ring
2	Retaining plate
3	Drive plate
4	Driven plate
5	Driven plate
6	Piston return spring
7	O-ring
8	B2 brake piston
9	B2 brake cylinder
10	Snap ring
11	Inner race
12	F3 one-way clutch
13	Retaining plate

14	Drive plate
15	Driven plate
16	Driven plate
17	Brake tube
18	Snap ring
19	Piston return spring
20	B4 brake piston
21	O-ring
22	Sleeve
23	O-ring
24	B4 brake piston
25	O-ring

Fig. 242: B2, B4 Brake And F3 One-Way Clutch Component Disassembled View

Disassembly Procedure

1. Blow compressed air into the oil passage as shown in the figure while pressing the B2 brake piston and brake cylinder by hand and remove the B2 brake piston.

   Air pressure

   392 kPa (4.0 kgf/cm^2 , 57 psi)

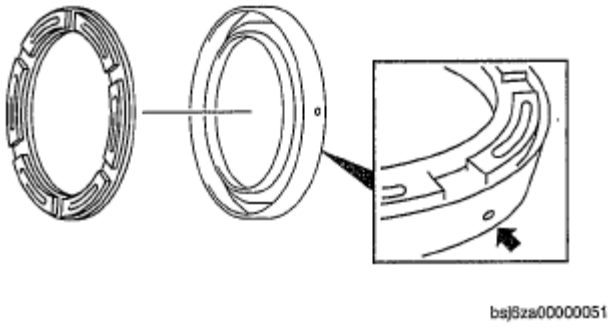


Fig. 243: Locating Oil Passage

2. Remove the O-ring from the B2 brake piston.

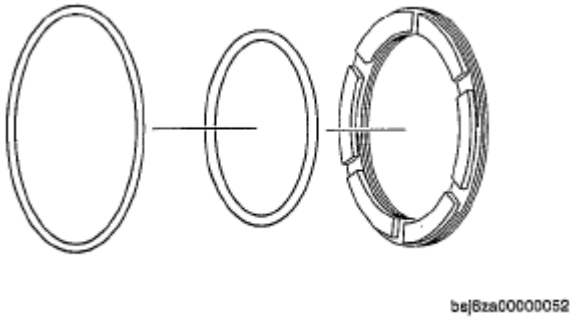


Fig. 244: Identifying O-Ring On B2 Brake Piston

3. Remove the inner race from the F3 one-way clutch component.

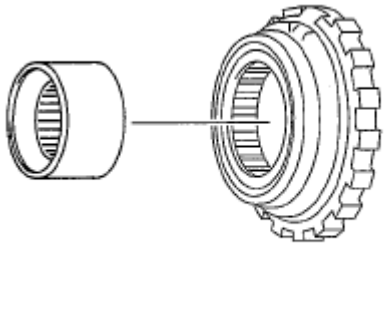


Fig. 245: Identifying Inner Race On F3 One-Way Clutch Component

4. Remove the O-ring from the B4 brake piston.

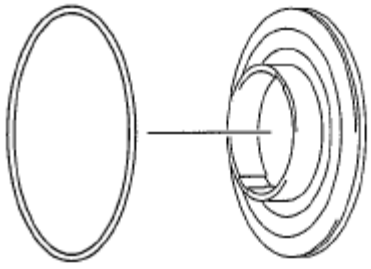


Fig. 246: Identifying O-Ring On B4 Brake Piston

5. Remove the O-ring from the sleeve.

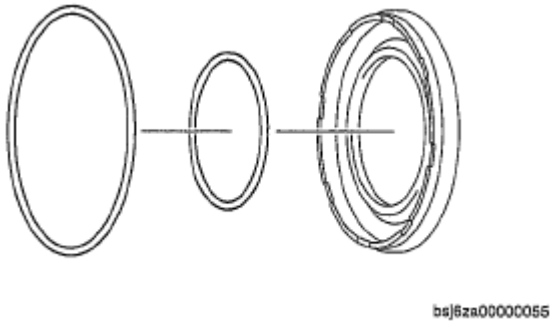


Fig. 247: Identifying O-Ring On Sleeve

6. Remove the O-ring from the inner brake piston.

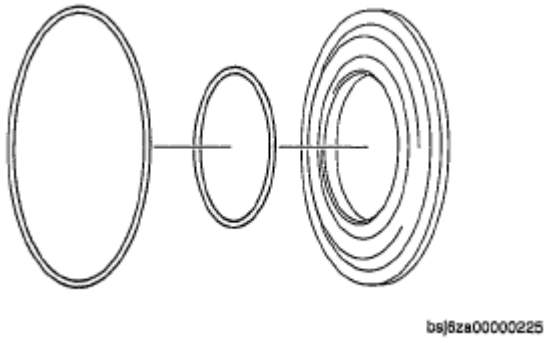


Fig. 248: Identifying O-Ring On Inner Brake Piston

B2, B4 BRAKE AND F3 ONE-WAY CLUTCH INSPECTION

1. Using vernier calipers, measure the free length of the piston return spring.

B2 brake return spring free length

Standard: 22.66 mm {0.89 in}

- If it less than the specification, replace the piston return spring with a new one.

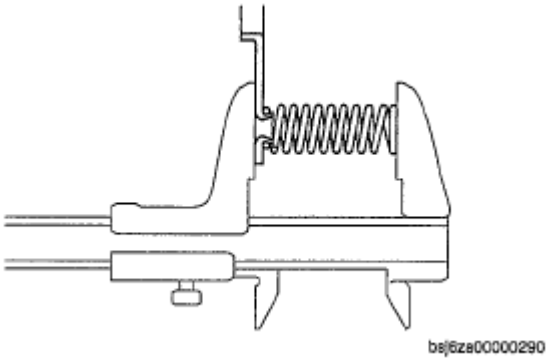


Fig. 249: Measuring Free Length Of Piston Return Spring

2. Inspect the lining of all drive plates. (B2)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

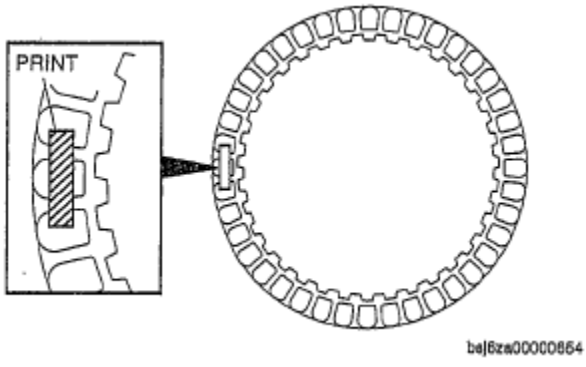


Fig. 250: Identifying Print Mark Location

NOTE:
- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

3. Using vernier callpers, measure the free length of the piston return spring.

B4 brake return spring free length

Standard: 13.84 mm {0.54 in}

- If it less than the specification, replace the piston return spring with a new one.

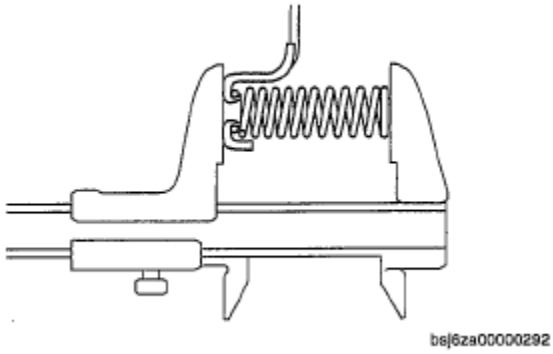


Fig. 251: Measuring Free Length Of Piston Return Spring

4. Inspect the lining of all drive plates. (B2)
   - If the lining is flaking or has changed color, or if it is worn or the print mark is wearing away, replace it with a new drive plate.
   - When replacing, inspect the contact surfaces between the retaining plate, driven plate and drive plate.
   - If they are scratched or have changed color, replace with new parts.

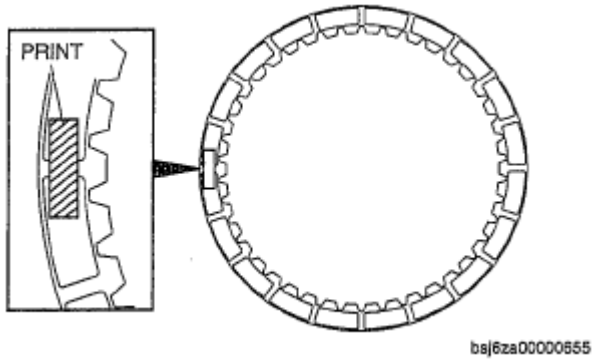


Fig. 252: Identifying Print Mark Location

NOTE:
- **Before replacing with new drive plates, soak them at least 2 h in ATF.**

5. Verify that the inner race rotates when the F3 one-way clutch is secured and rotated clockwise, and that it does not rotate when the F3 one-way clutch is rotated counterclockwise.

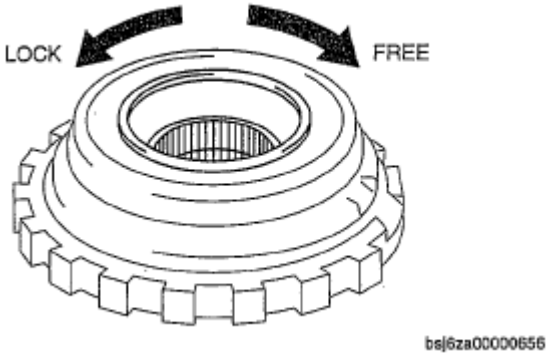
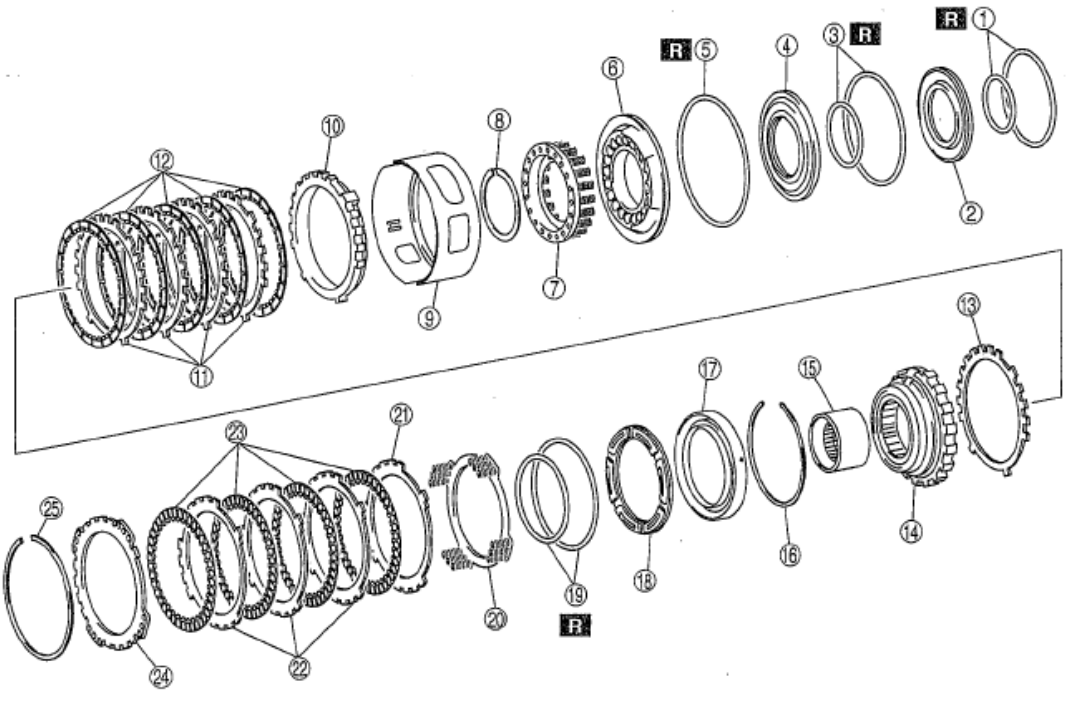


Fig. 253: F3 One-Way Clutch Rotation Position

B2, B4 BRAKE AND F3 ONE-WAY CLUTCH COMPONENT ASSEMBLY

Components



1	O-ring
2	Inner brake piston
3	O-ring
4	Sleeve
5	O-ring
6	B4 brake piston
7	Piston return spring
8	Snap ring
9	Brake tube
10	Driven plate
11	Drive plate
12	Driven plate
13	Retaining plate

14	F3 one-way clutch
15	Inner race
16	Snap ring
17	B2 brake cylinder
18	B2 brake piston
19	O-ring
20	Piston return spring
21	Driven plate
22	Drive plate
23	Driven plate
24	Retaining plate
25	Snap ring

Fig. 254: Exploded View Of B2, B4 Brake And F3 One-Way Clutch Components

Assembly Procedure

1. Apply ATF to the new O-rings.
2. Install the O-rings to the B4 brake piston.
3. Apply ATF to the new O-rings.

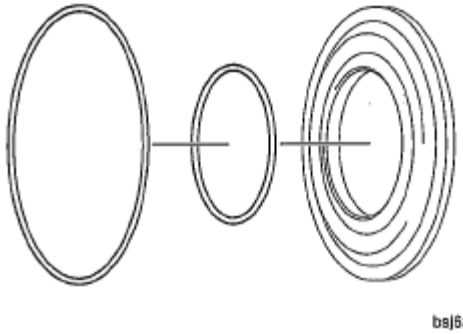


Fig. 255: Identifying O-Rings On B4 Brake Piston

4. Install the O-rings to the sleeve.
5. Apply ATF to the new O-ring.

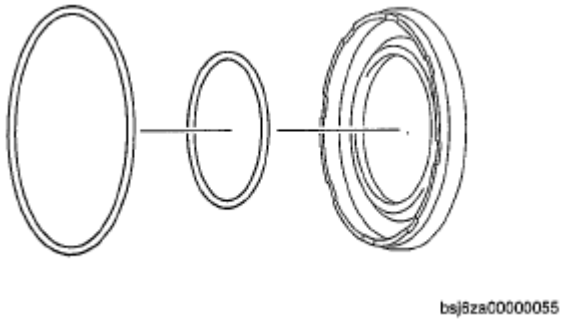


Fig. 256: Identifying O-Ring On Sleeve

6. Install the O-rings to the B4 brake piston.
7. Apply ATF to the inner race and the F3 one-way clutch component.

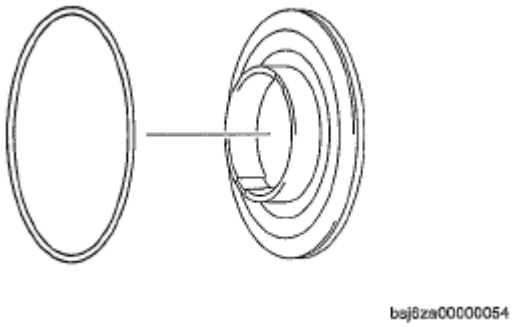


Fig. 257: Identifying O-Ring On B4 Brake Piston

8. Install the inner race to the F3 one-way clutch component.
9. Apply ATF to the new O-ring.

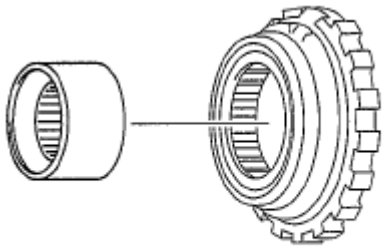


Fig. 258: Identifying Inner Race On F3 One-Way Clutch Component

10. install the O-ring to the B2 brake piston.
11. Apply ATF to the brake cylinder and the B2 brake piston.

CAUTION:
- **Do not damage the O-ring.**

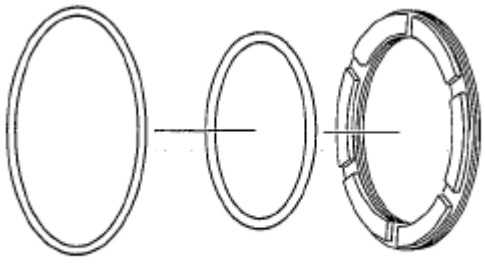


Fig. 259: Identifying O-Ring On B2 Brake Piston

12. Install the B2 brake piston to the brake cylinder.

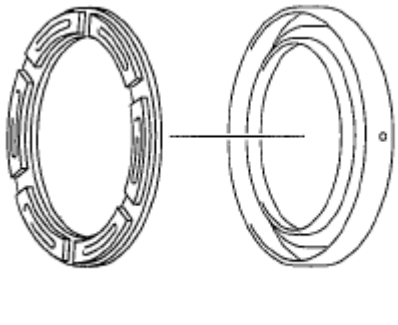
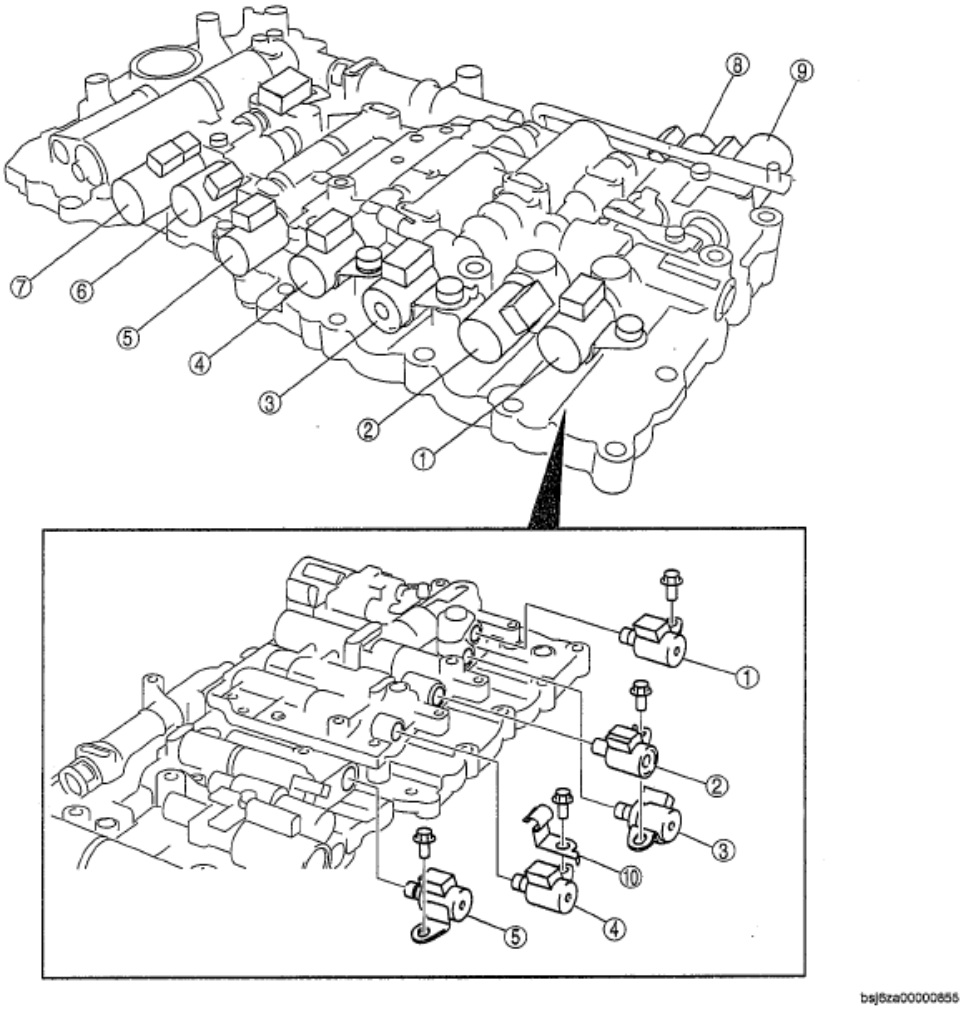


Fig. 260: Identifying B2 Brake Piston On Brake Cylinder

CONTROL VALVE BODY DISASSEMBLY/ASSEMBLY

Components



1	Shift solenoid C
2	Shift solenoid B
3	Shift solenoid D
4	Shift solenoid A
5	Shift solenoid E

6	Shift solenoid F
7	Pressure control solenoid
8	Shift solenoid G
9	TCC control solenoid
10	Harness clip

Fig. 261: Exploded View Of Control Valve Body

Disassembly Procedure

CAUTION:
- **Do not damage the solenoid.**

1. Remove the shift solenoid C from the control valve body.

CAUTION:
- **Do not damage the solenoid.**

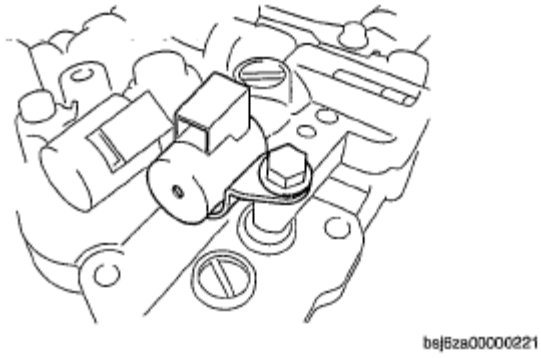


Fig. 262: Identifying Shift Solenoid C

2. Remove the shift solenoid B shift solenoid D from the control valve body.
3. Remove the bolt and the wiring harness clip.

CAUTION:
- **Do not damage the solenoid.**

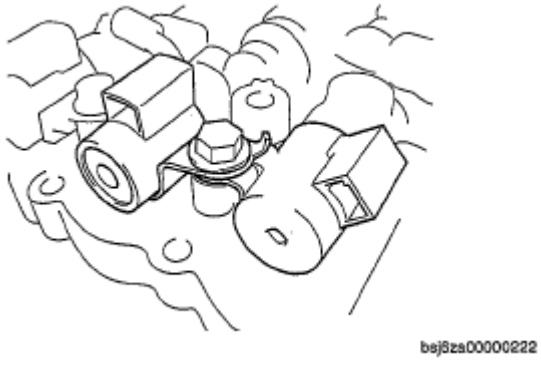


Fig. 263: Identifying Shift Solenoid B

4. Remove the shift solenoid A from the control valve body.

CAUTION:
- **Do not damage the solenoid.**

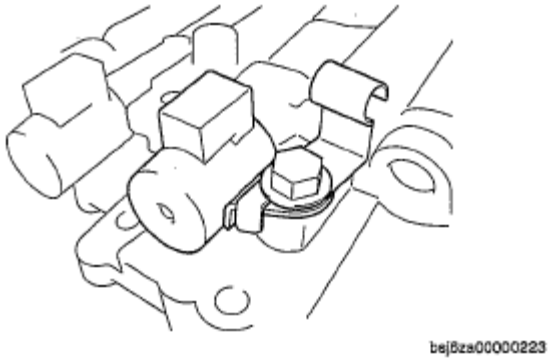


Fig. 264: Identifying Shift Solenoid A

5. Remove the shift solenoid E from the control valve body.

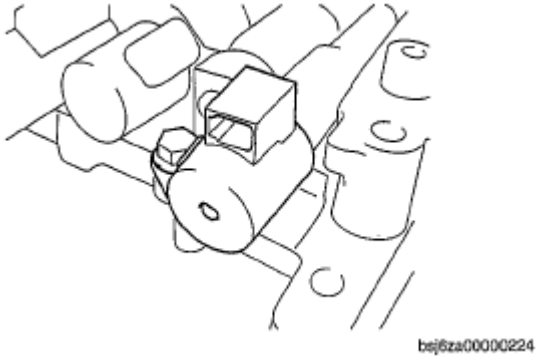


Fig. 265: Identifying Shift Solenoid E

Assembly Procedure

CAUTION:
- **Do not damage the solenoid.**

1. Install the shift solenoid E to the control valve body.

   Tightening torque

   8.0-12.0 N.m {81.6-122.3 kgf.cm, 70.9-106.1 in.lbf}

2. Install the bolt and the wiring harness clip.

CAUTION:
- **Do not damage the solenoid.**

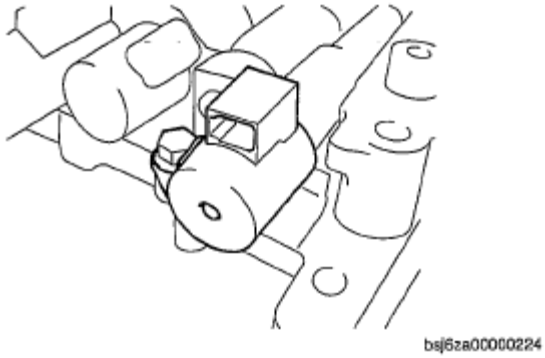


Fig. 266: Identifying Shift Solenoid E

3. Install the shift solenoid A to the control valve body.

   Tightening torque

   8.0-12.0 N.m {81.6-122.3 kgf.cm, 70.9-106.1 in.lbf}

   CAUTION:
   - **Do not damage the solenoid.**

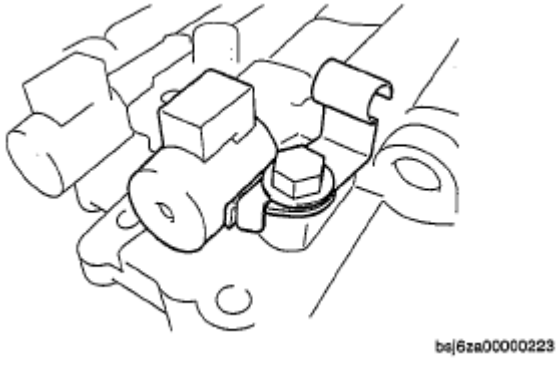


Fig. 267: Identifying Shift Solenoid A

4. Install the shift solenoid B and the shift solenoid D to the control valve body.

   Tightening torque

   8.0-12.0 N.m {81.6-122.3 kgf.cm, 70.9-106.1 in.lbf}

   CAUTION:
   - **Do not damage the solenoid.**

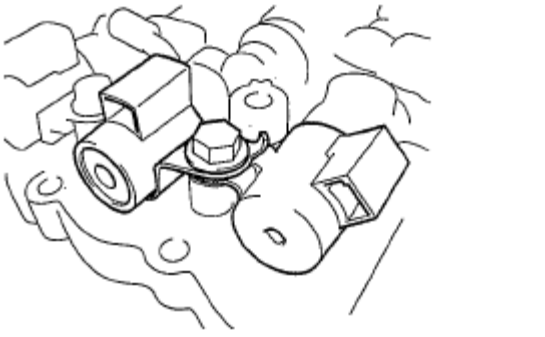


Fig. 268: Identifying Shift Solenoid B

5. Install the shift solenoid C to the control valve body.

   Tightening torque

   8.0-12.0 N.m {81.6-122.3 kgf.cm, 70.9-106.1 in.lbf}

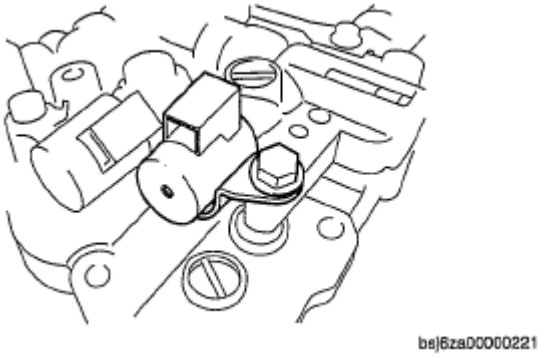
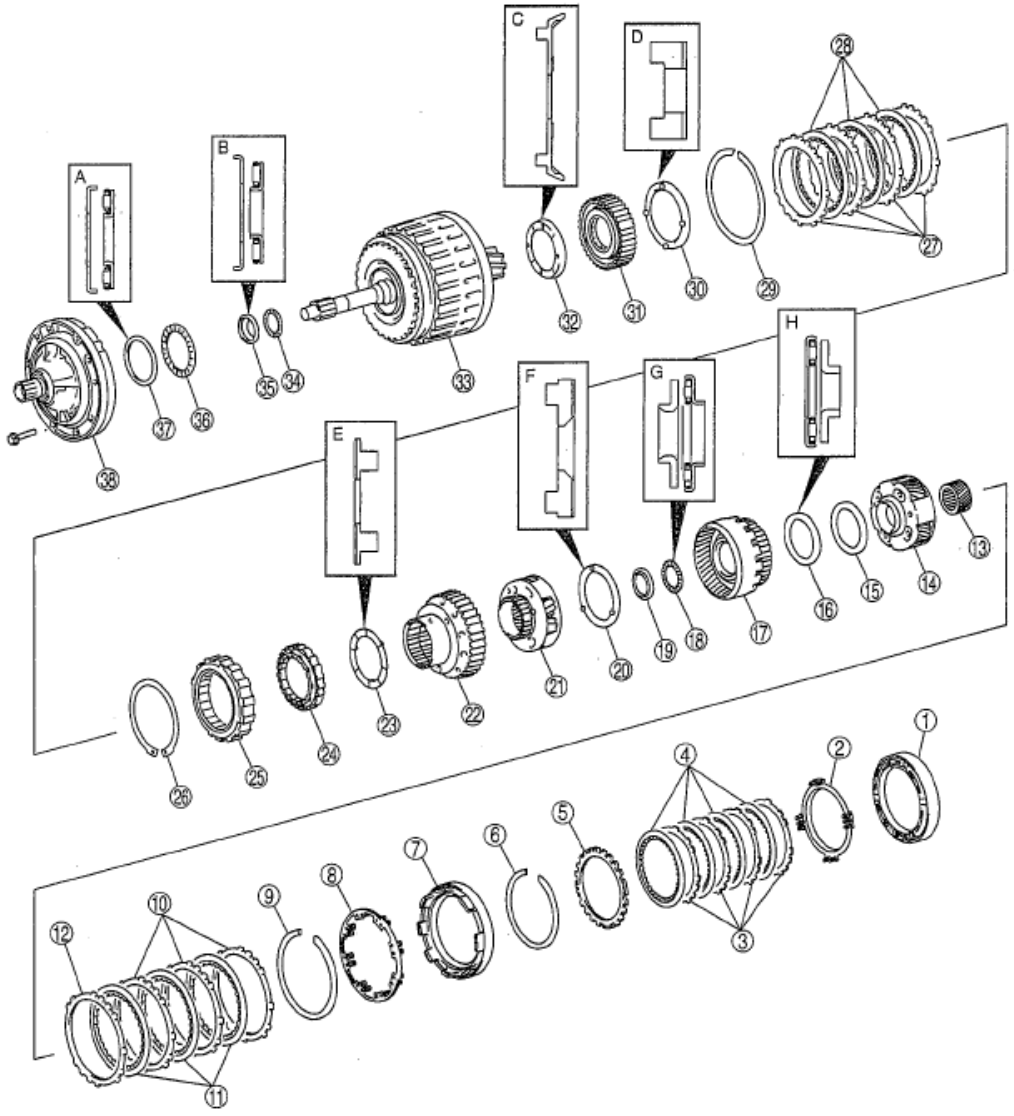


Fig. 269: Identifying Shift Solenoid C

AUTOMATIC TRANSMISSION ASSEMBLY

Assembly

Bearing and race locations

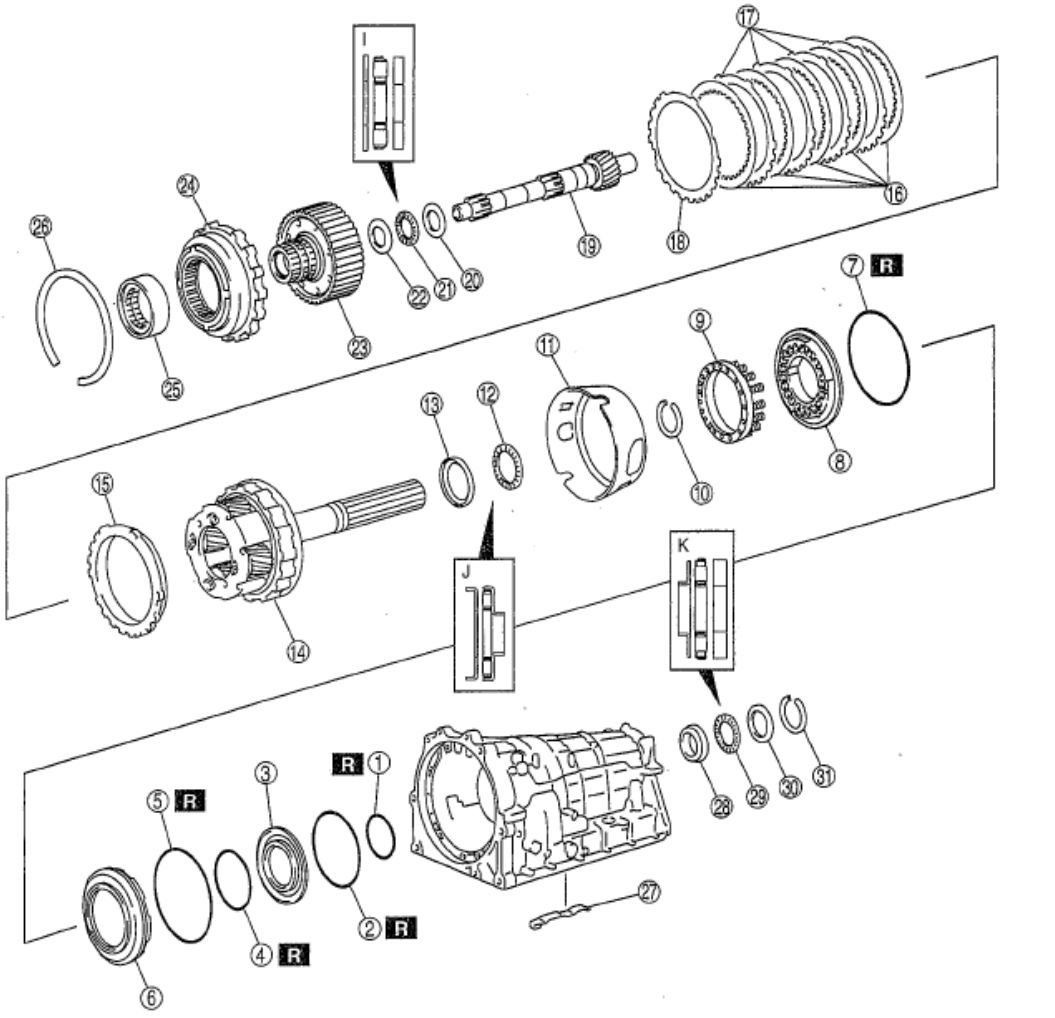


bsj6za00000856

1	B2 brake piston component
2	Piston return spring
3	Driven plate
4	Drive plate
5	Driven plate
6	Snap ring
7	B1 brake piston component
8	Piston return spring
9	Snap ring
10	Driven plate
11	Drive plate
12	Retaining plate
13	Sun gear
14	Middle planetary gear component
15	Bearing race
16	Thrust needle bearing
17	Front and middle ring gear component
18	Thrust needle bearing
19	Bearing race

20	Thrust washer
21	Front planetary gear component
22	Bearing race
23	Thrust washer
24	F1 one-way clutch
25	B3 brake piston component
26	Snap ring
27	Driven plate
28	Drive plate
29	Snap ring
30	Thrust washer
31	F2 one-way clutch
32	Thrust washer
33	Clutch drum component
34	Thrust needle bearing
35	Bearing race
36	Thrust needle bearing
37	Bearing race
38	Oil pump

Fig. 270: Exploded View Of Automatic Transmission Assembly With Bearing And Race Locations (1 Of 2)



1	O-ring
2	O-ring
3	Inner brake piston
4	O-ring
5	O-ring
6	Sleeve
7	O-ring
8	B4 brake piston
9	Piston return spring
10	Snap ring
11	Brake tube
12	Thrust needle bearing
13	Bearing race
14	Rear planetary gear component

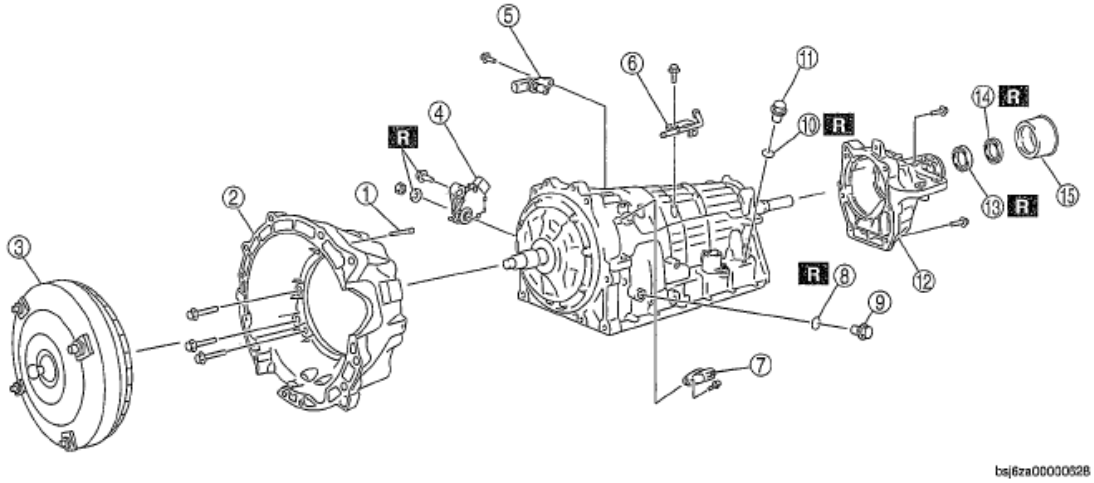
15	Driven plate
16	Drive plate
17	Driven plate
18	Retaining plate
19	Intermediate shaft
20	Bearing race
21	Needle bearing
22	Bearing race
23	Rear ring gear component
24	F3 one-way clutch
25	Inner race
26	Snap ring
27	Stopper spring
28	Bearing race
29	Thrust needle bearing
30	Bearing race
31	Snap ring

Fig. 271: Exploded View Of Automatic Transmission Assembly With Bearing And Race Locations (2 Of 2)

BEARING REFERENCE

		A	B	C	D	E	F	G	H	I	J	K
Bearing race (Front) (mm)	Outer diameter	87.74 {3.45}	35.6 {1.40}	92.6 {3.65}	102.7 {4.04}	96.7 {3.81}	83.6 {3.29}	50.8 {1.20}	-	44.9 {1.77}	56.7 {2.23}	51.2 {2.02}
	Inner diameter	74.2 {2.92}	20.00 {0.79}	63.8 {2.51}	89.3 {3.52}	76.3 {3.00}	60.0 {2.36}	34.9 {1.37}	-	29.6 {1.06}	43.3 {1.70}	37.0 {1.46}
Bearing (mm)	Outer diameter	85.6 {3.37}	41.0 {1.61}	-	-	-	-	53.1 {2.09}	73.5 {2.89}	43.85 {1.73}	58.0 {2.28}	52.5 {2.07}
	Inner diameter	71.9 {2.83}	20.0 {0.79}	-	-	-	-	38.6 {1.52}	58.5 {2.30}	27.8 {1.09}	40.6 {1.60}	36.1 {1.42}
Bearing race (Rear) (mm)	Outer diameter	-	-	-	-	-	-	-	71.2 {2.80}	43.7 {1.72}	-	51.0 {2.01}
	Inner diameter	-	-	-	-	-	-	-	54.8 {2.16}	27.8 {1.09}	-	36.1 {1.42}

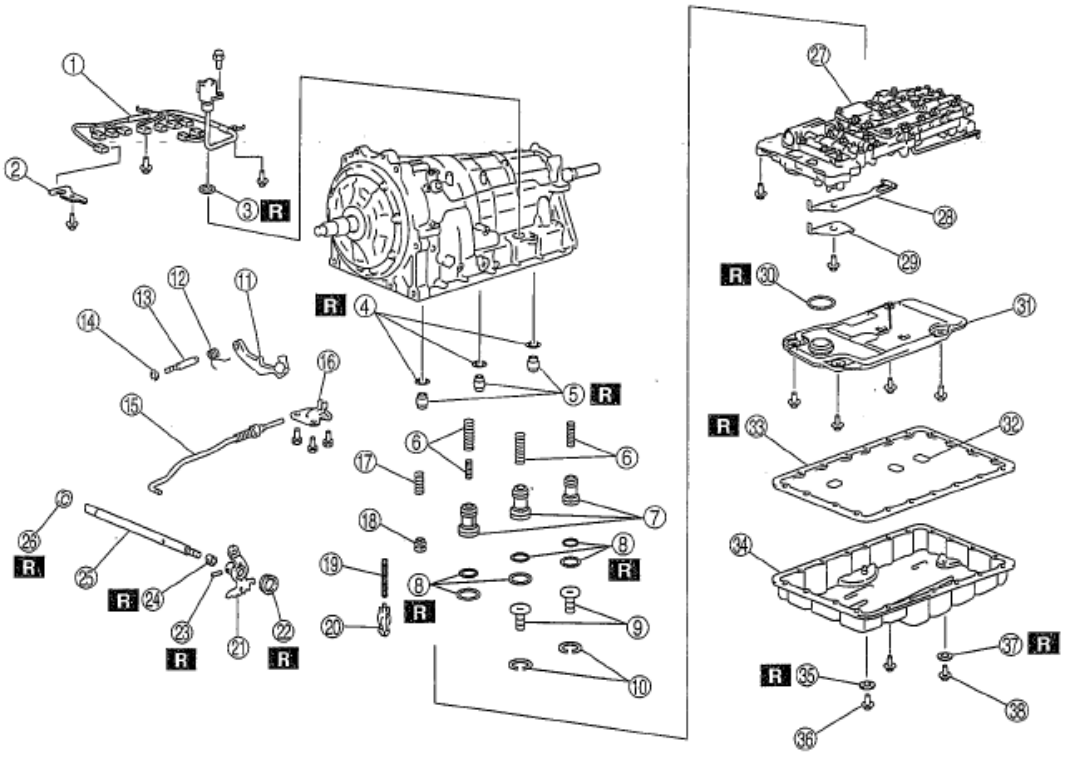
Components



1	Breather pipe
2	Converter housing
3	Torque converter
4	TR switch
5	Turbine sensor
6	Breather tube
7	VSS
8	O-ring

9	Check valve
10	O-ring
11	Filler plug
12	Extension housing
13	Oil seal
14	Extension housing shroud
15	Extension dust deflector

Fig. 272: Exploded View Of Automatic Transmission Components (1 Of 2)



1	Coupler component
2	Clip
3	O-ring
4	Gasket
5	Gasket
6	Accumulator spring
7	Accumulator piston
8	O-ring
9	Spring
10	Snap ring
11	Parking pawl
12	Spring
13	Parking pawl shaft
14	Driven plate
15	Parking rod
16	Bracket
17	Spring
18	Accumulator valve
19	Spring

20	Check valve
21	Manual valve
22	Oil seal
23	Pin
24	Manual shaft washer
25	Manual shaft
26	Oil seal
27	Control valve body
28	Detent spring
29	Detent spring cover
30	O-ring
31	Oil strainer
32	Magnet
33	Oil pan gasket
34	Oil pan
35	Gasket
36	Overflow plug
37	Gasket
38	Drain plug

Fig. 273: Exploded View Of Automatic Transmission Components (2 Of 2)

Disassembly Procedure

1. Apply ATF to the new O-ring.

CAUTION:
- **Do not damage the O-ring and B4 brake piston.**

2. Install the O-ring to the B4 brake piston.
3. Apply ATF to the new O-rings.

CAUTION:
- **Do not damage the O-ring and sleeve.**

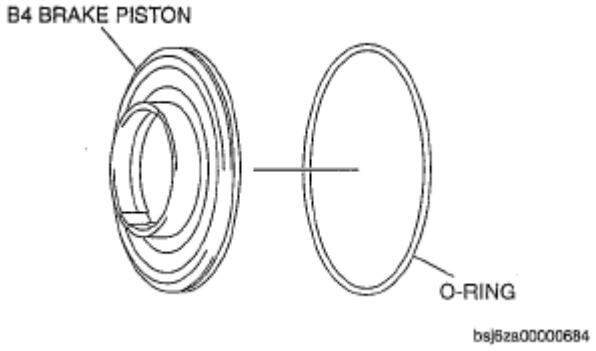


Fig. 274: Identifying O-Ring And B4 Brake Piston

4. Install the O-ring to the sleeve.
5. Apply ATF to the new O-rings

CAUTION:
- **Do not damage the O-ring and inner brake piston.**

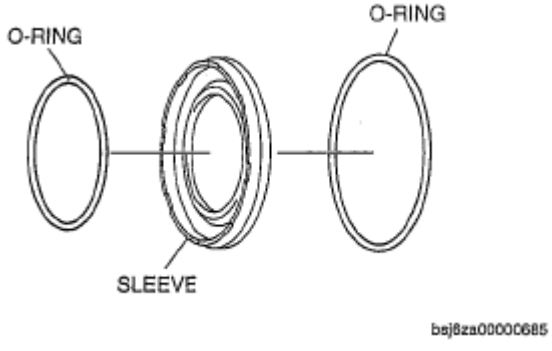


Fig. 275: Identifying O-Ring And Sleeve

6. Install the O-ring to the inner brake piston.
7. Apply ATF to the sliding surface of the transmission case.

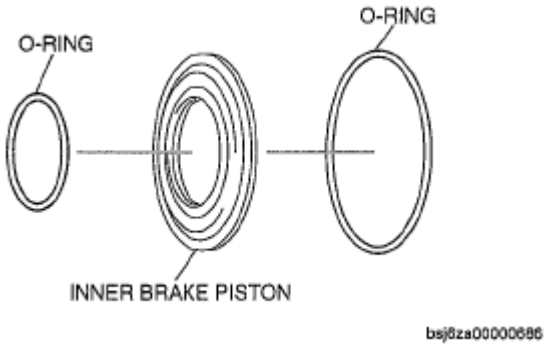


Fig. 276: Identifying O-Ring And Inner Brake Piston

8. Install the inner brake piston, sleeve and B4 brake piston to the transmission case.

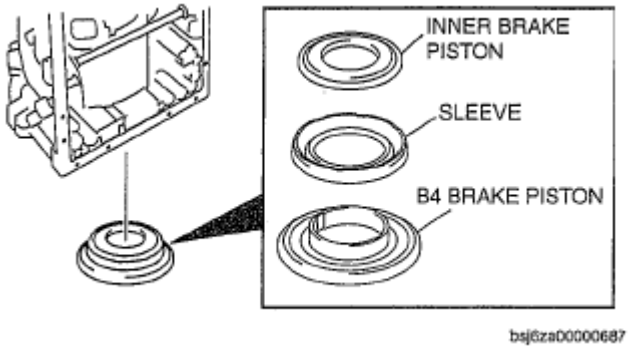


Fig. 277: Identifying Inner Brake Piston, Sleeve And B4 Brake Piston

9. Install the piston return spring.

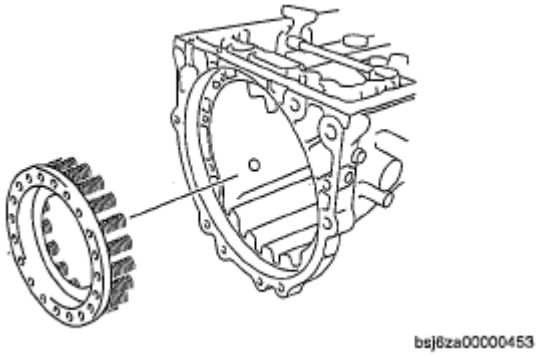


Fig. 278: Identifying Piston Return Spring

10. Using the SST, compress the piston return spring and install the snap ring into the groove.

CAUTION:
- **Do not expand the snap ring too much.**

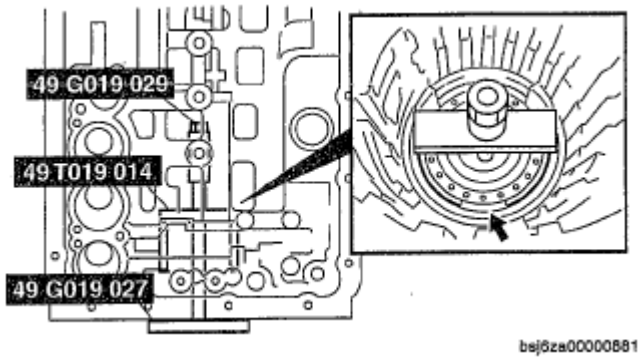


Fig. 279: Identifying SST For Compressing Piston Return Spring

11. Install the brake tube to the transmission case as shown in the figure.

CAUTION:
- **Align the tabs of the brake tube with the position shown in the figure.**

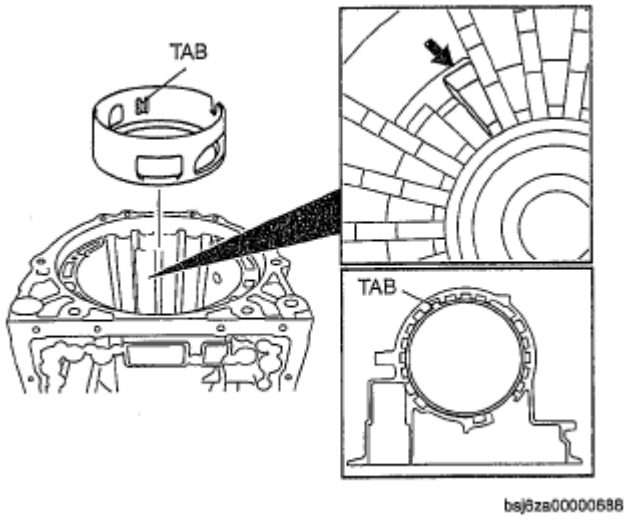


Fig. 280: Identifying Tabs Of Brake Tube

12. Verify that B4 brake piston moves smoothly when the compressed air atomization equipment lever is pulled/released while blowing compressed air into the transmission case.

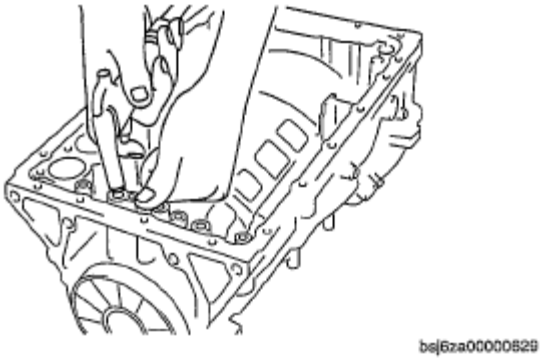


Fig. 281: Blowing Compressed Air Into Transmission Case

13. Measure the level difference (length A) between the brake tube upper surface and the retaining plate contact surface at the both ends across the B4 brake piston diameter using a vernier caliper, and calculate the average value.

NOTE:

- **Install the B4 brake piston to the transmission case securely.**

Dimension A

23.32-24.18 mm {0.92-0.95 in}

14. Measure the thickness of all the driven plates and drive plate components (5), and driven plates (4) at the both ends across the diameter using a vernier caliper, and calculate the average value.

Dimension B

21.92-22.72 mm {0.87-0.89 in}

15. Calculate the pack clearance using the following formula.

Dimension A-Dimension B-0.18 mm {0.007 in}-Thickness H

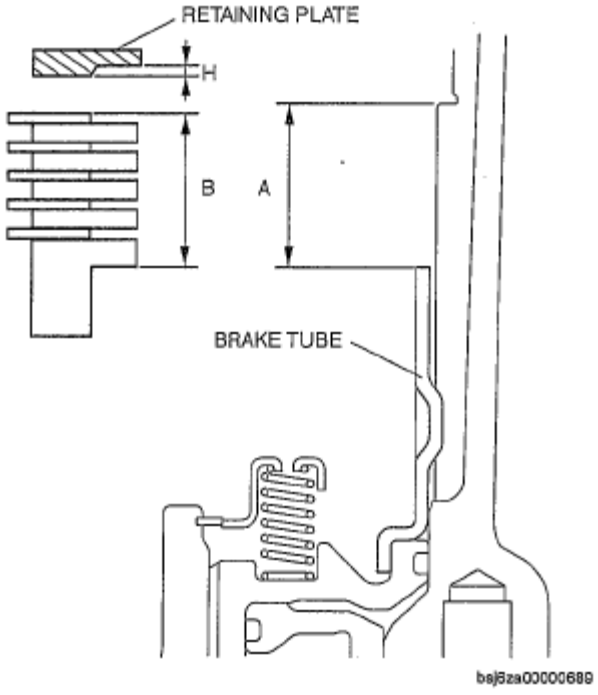


Fig. 282: Identifying Dimension A And B

16. If the pack clearance exceeds the maximum specification, select the retaining plate with a clearance that is the maximum specification and install it.

Pack clearance

0.5-0.8 mm {0.02-0.03 in}

NOTE:

- **There are 8 types of retaining plates for the pack clearance adjustment. Select the one with the most suitable thickness.**

Retaining plate thickness H (mm {in})

RETAINING PLATE THICKNESS

Identification mark	Thickness (mm {in}
0	0
2	0.15-0.25{0.006-0.010}
4	0.35-0.45 {0.014-0.0177}
6	0.55-0.65 {0.022-0.026}
8	0.75-0.85 {0.030-0.033}
10	0.95-1.05 {0.037-0.041}
12	1.15-1.25 {0.045-0.049}
14	1.35-1.45 {0.054-0.057}

17. Apply ATF to the bearing race, thrust needle bearing and install to the rear planetary gear component.

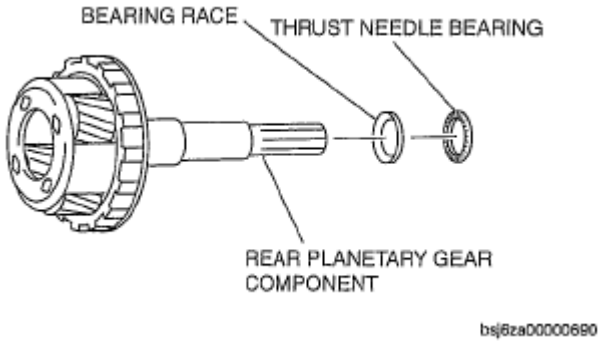


Fig. 283: Identifying Bearing Race, Thrust Needle Bearing And Rear Planetary Gear Component

18. Install the rear planetary gear component to the transmission case.

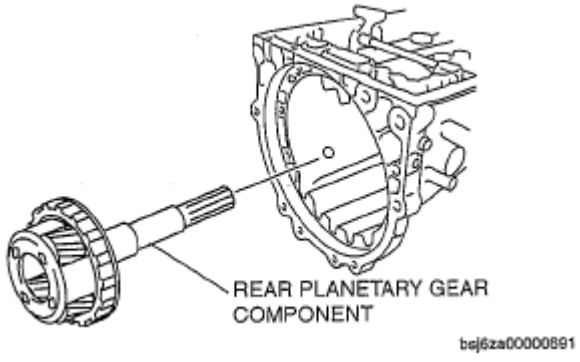


Fig. 284: Identifying Rear Planetary Gear Components

19. Install the retaining plates, drive plates and driven plates to the transmission case as shown in the figure.

CAUTION:
- **Inspect the number and order of the retaining plate, drive and driven plates.**

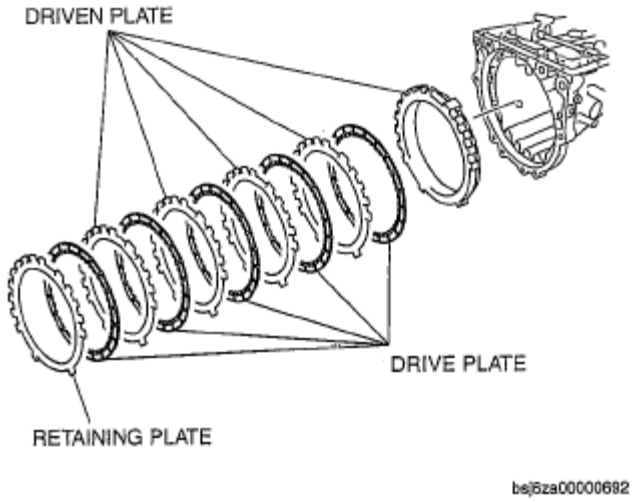


Fig. 285: Identifying Retaining Plates, Drive And Driven Plates

20. Install the retaining plate, drive plates and driven plates in the order indicated in the figure.

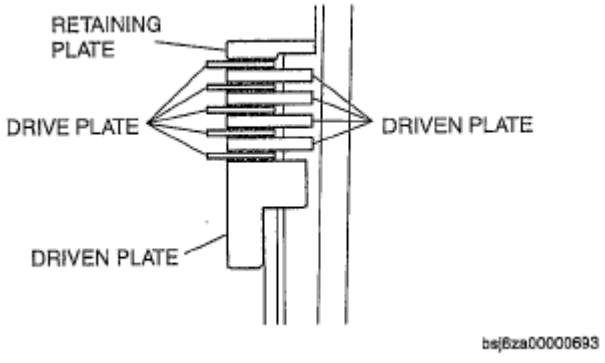


Fig. 286: Identifying Retaining Plate, Drive Plates And Driven Plates

21. Apply ATF to the bearing race, needle bearing race and install to the intermediate shaft.

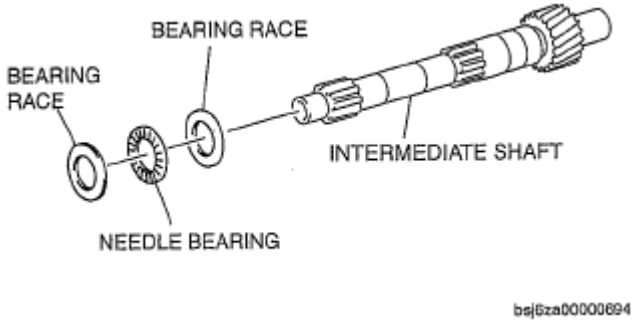


Fig. 287: Identifying Bearing Race And Needle Bearing Race

22. Install the rear ring gear component, F3 one-way clutch and inner race to the intermediate shaft.

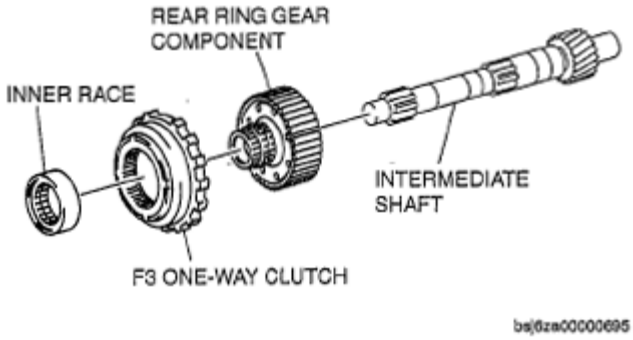


Fig. 288: Identifying Rear Ring Gear Component, F3 One-Way Clutch And Inner Race

23. Install the intermediate shaft component to the transmission case.

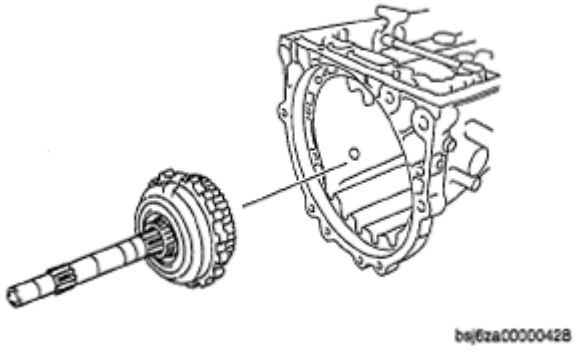


Fig. 289: Identifying Intermediate Shaft Component

24. Verify that the snap ring is correctly positioned.

CAUTION:
- **If the snap ring is not installed in the correct direction, the automatic transmission may not operate normally.**

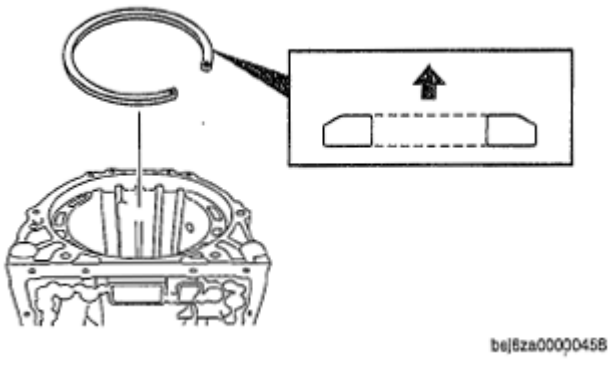


Fig. 290: Identifying Snap Ring Position

25. Install snap ring to the transmission case using snap ring pliers.

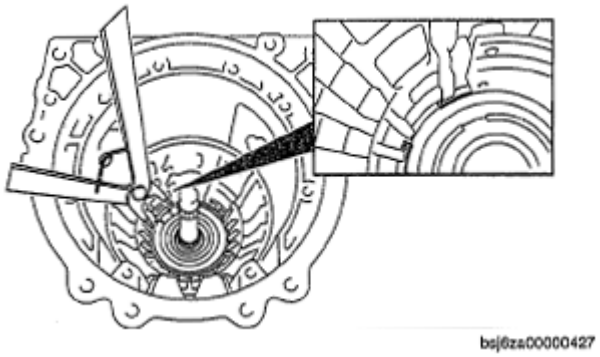


Fig. 291: Installing Snap Ring To Transmission Case Using Snap Ring Pliers

26. Install the stopper spring to the transmission case.

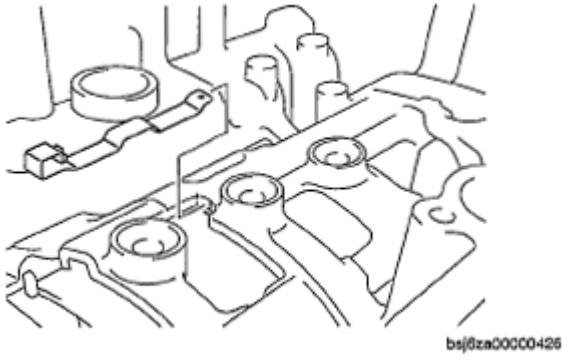


Fig. 292: Identifying Stopper Spring On Transmission Case

27. Install the brake piston and brake cylinder to the transmission case.

CAUTION:

- **Align the opening of the snap ring with the position shown in the figure.**

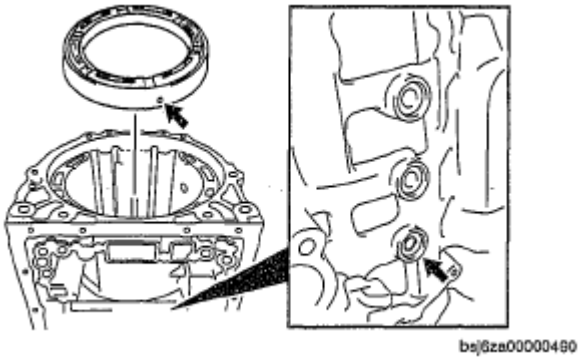


Fig. 293: Positions For Aligning Opening Of Snap Ring

28. Verify that B2 brake piston moves smoothly when the compressed air atomization equipment lever is pulled/released while blowing compressed air into the transmission case.

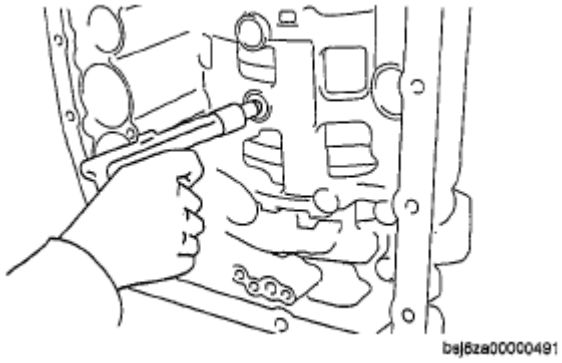


Fig. 294: Blowing Compressed Air Into Transmission Case

29. Measure the level difference (length A) between the brake piston upper surface and the snap ring contact surface at the both ends across the brake piston diameter using a vernier caliper, and calculate the average value.

NOTE:

- **Install the B2 brake piston to the transmission case securely.**

Dimension A

21.19-21.90 mm {0.84-0.86 in}

30. Measure the thickness of all the driven plates and drive plate components (4), and driven plates (3) at the both ends across the diameter using a vernier caliper, and calculate the average value.

Dimension B

16.52-17.15 mm {0.65-0.67 in}

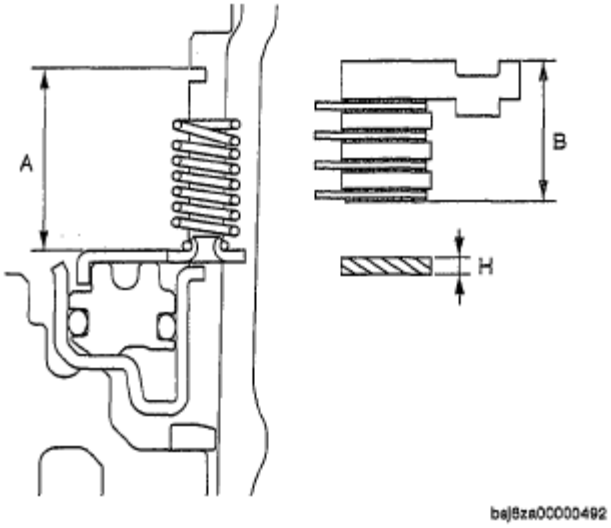


Fig. 295: Identifying Dimension A, B And H

31. Calculate the pack clearance using the following formula.

    Dimension A-Dimension B-1.6 mm {0.063 in}-Thickness H

32. If the pack clearance exceeds the maximum specification, select the retaining plate with a clearance that is the maximum specification and install it.

    Pack clearance

    0.6-0.9 mm {0.024-0.035 in}

    NOTE:

    - **There are 8 types of retaining plates for the pack clearance adjustment. Select the one with the most suitable thickness.**

    Retaining plate thickness H (mm {in})

    RETAINING PLATE THICKNESS

Identification mark	Thickness (mm {in})
0	1.95-2.05 {0.077-0.081}
1	2.05-2.15 {0.081-0.085}
2	2.15-2.25 {0.085-0.089}
3	2.25-2.35 {0.089-0.093}
4	2.35-2.45 {0.093-0.096}
5	2.45-2.55 {0.096-0.100}
6	2.55-2.65 {0.100-0.104}
7	2.65-2.75 {0.104-0.108}

33. Install the return spring to the transmission case.

CAUTION:

- **Inspect the number and order of the retaining plate, drive and driven plates.**

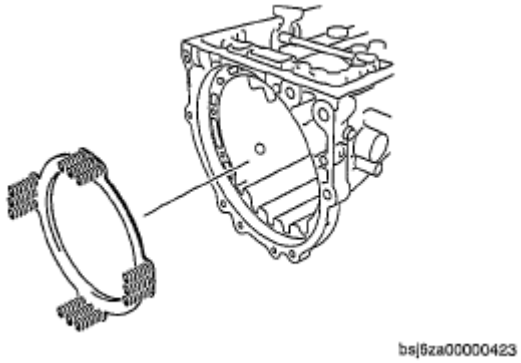


Fig. 296: Identifying Piston Return Spring

34. Install the retaining plate, drive plate and driven plates to the transmission case as shown in the figure.

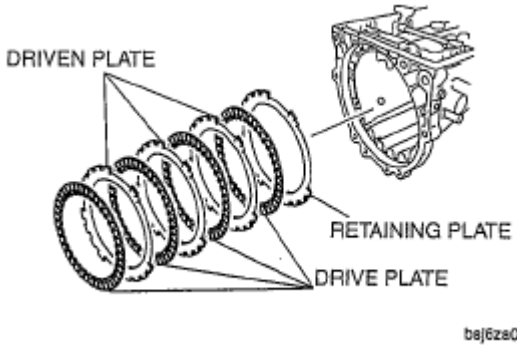


Fig. 297: Identifying Retaining Plate, Drive Plate And Driven Plates

35. Install the retaining plate, drive plate component, and driven plates in the order indicated in the figure.

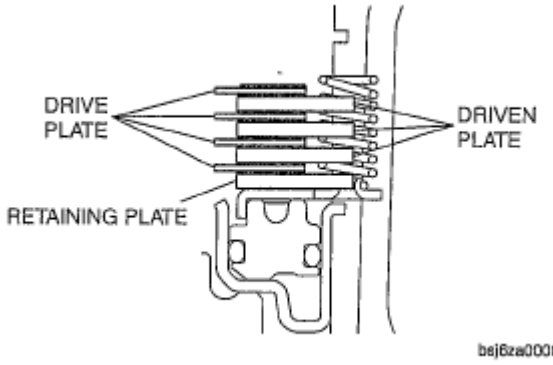


Fig. 298: Identifying Retaining Plate, Drive Plate Component And Driven Plates

36. Install the retaining plate to the transmission case.

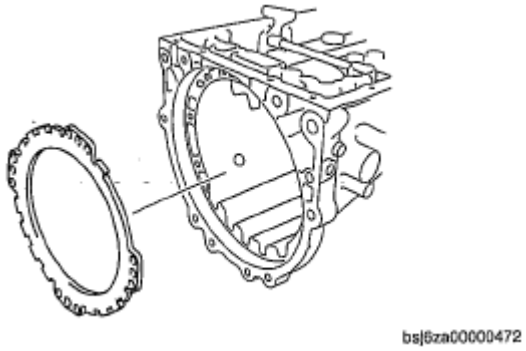


Fig. 299: Identifying Retaining Plate

37. Install the **SST** as shown in the figure, and compress the piston return spring.

CAUTION:
- **Align the opening of the snap ring with the position shown in the figure.**

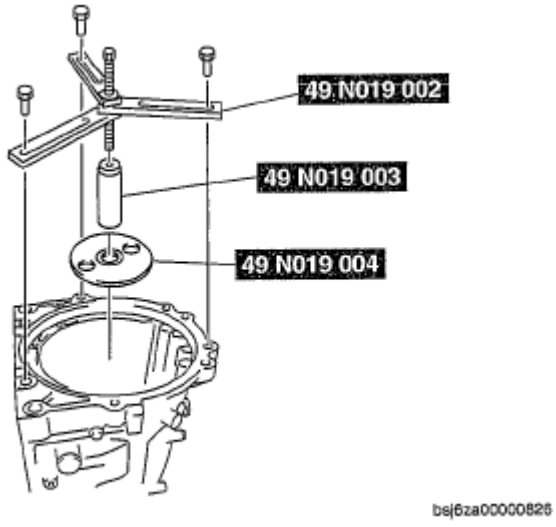


Fig. 300: Identifying SST

38. Using a flathead screwdriver, install the snap ring into the groove.

CAUTION:
- **Align the hole of the brake piston and brake cylinder with the position shown in the figure.**

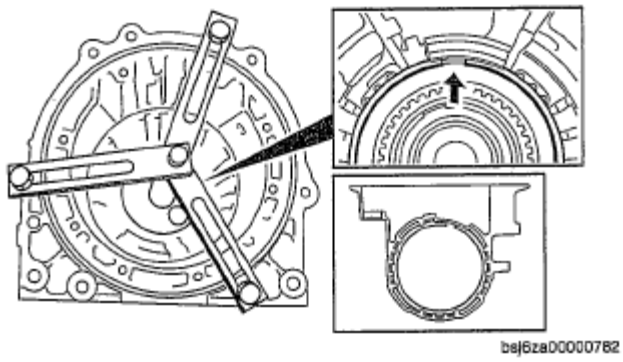


Fig. 301: Position For Installing Snap Ring

39. Install the B1 brake piston component and return spring to the transmission case as shown in the figure.

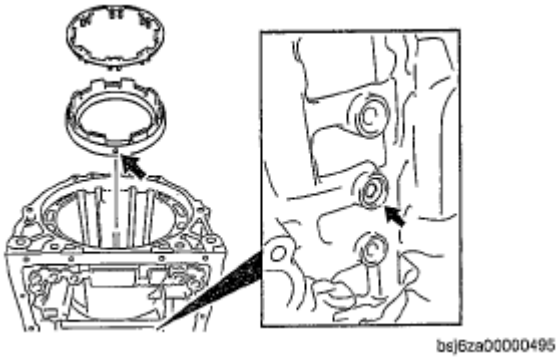


Fig. 302: Positions For Installing B1 Brake Piston Component And Return Spring

40. Install the **SST** as shown in the figure, and compress the piston return spring.

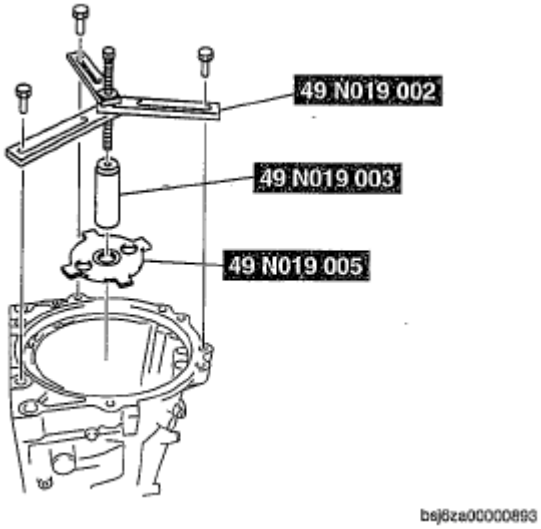


Fig. 303: Identifying SST

41. Using a flathead screwdriver, install the snap ring to the transmission case.

CAUTION:
- **Align the opening of the snap ring with the position shown in the figure.**

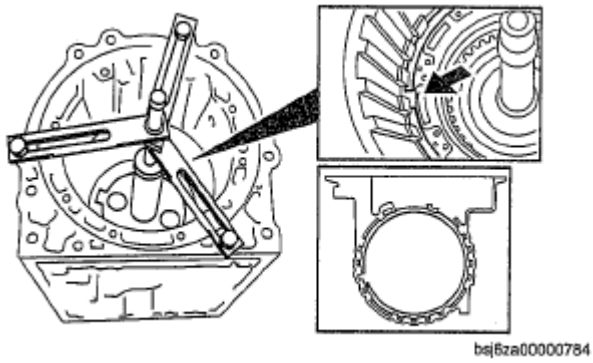


Fig. 304: Position For Installing Snap Ring

42. Verify that B1 brake piston moves smoothly when the compressed air atomization equipment lever is pulled/released while blowing compressed air into the transmission case.

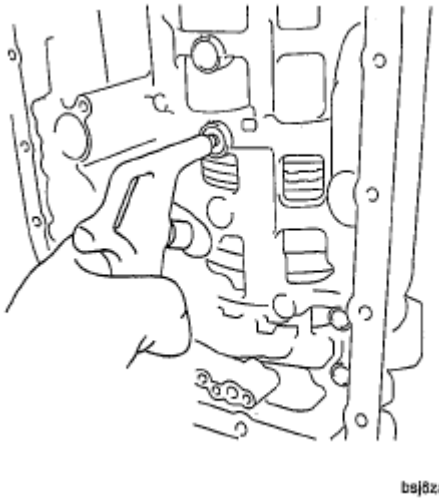


Fig. 305: Blowing Compressed Air Into Transmission Case

43. Measure the level difference (length A) between the B1 brake piston upper surface and retaining plate contact surface at the both ends across the B1 brake piston diameter using a vernier caliper, and calculate the average value.

NOTE:
- **Install the B1 brake piston component to the transmission case securely.**

Dimension A

15.27-15.92 mm {0.61-0.62 in}

44. Measure the thickness of all the driven plates and drive plate components (3), and driven plates (3) at the both ends across the diameter using a vernier caliper, and calculate the average value.

Dimension B

12.52-12.92 mm {0.493-0.508 in}

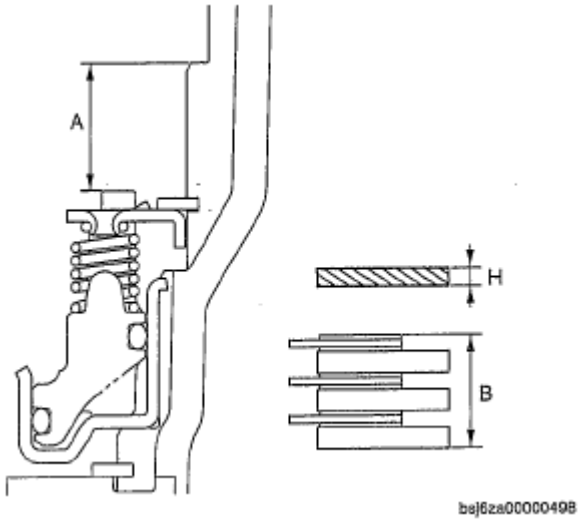


Fig. 306: Identifying Dimension A, B And H

45. Calculate the pack clearance using the following formula.

Dimension A-Dimension B-Thickness H

46. If the pack clearance exceeds the maximum specification, select the retaining plate with a clearance that is the maximum specification and install it.

Pack clearance

0.42-0.72 mm {0.017-0.028 in}

NOTE:

- **There are four types of retaining plates for the pack clearance adjustment. Select the one with the most suitable thickness.**

Retaining plate thickness H (mm {in})

RETAINING PLATE THICKNESS

Identification mark	Thickness (mm {in})
0	1.95-2.05 {0.077-0.081}
1	2.15-2.25 {0.085-0.089}
2	2.35-2.45 {0.093-0.096}
3	2.55-2.65 {0.100-0.104}

CAUTION:
- **Inspect the number and order of the retaining plate, drive and driven plates.**

47. Install the drive plate, driven plates and retaining plate to the transmission component as shown in the figure.

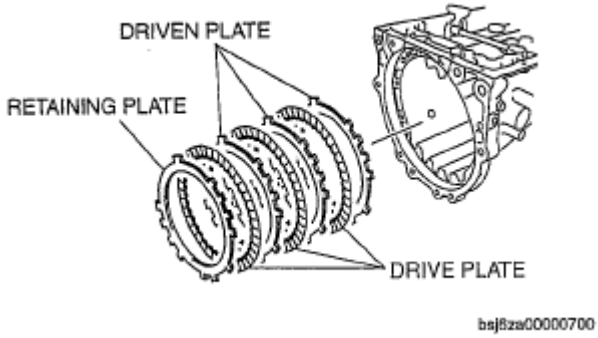


Fig. 307: Identifying Drive Plate, Driven Plates And Retaining Plate

48. Install the driven plates, drive plate, and the retaining plate in the order indicated in the figure.
49. Install the bearing race and thrust needle bearing to the middle planetary gear component.

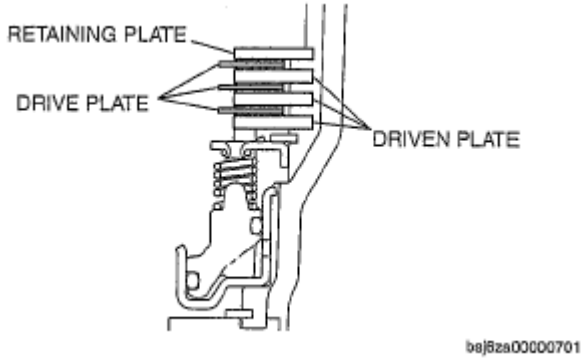


Fig. 308: Identifying Driven Plates, Drive Plate And Retaining Plate

50. Install the middle planetary gear component and sun gear.
51. Apply ATF to the bearing race and thrust needle bearing.
52. Install the bearing race and thrust needle bearing to the middle planetary gear component.

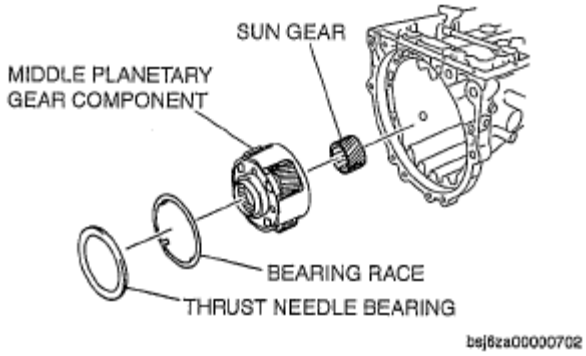


Fig. 309: Identifying Middle Planetary Gear Component And Sun Gear

53. Install the front and middle planetary gear ring component.
54. Apply ATF to the thrust washer.

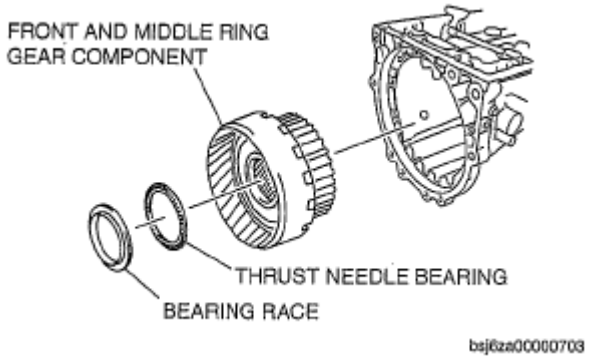


Fig. 310: Identifying Front And Middle Planetary Gear Ring Component And Thrust Needle Bearing

55. Install the thrust washer to the front planetary gear component.
56. Apply ATF to the thrust washer and install it to the bearing race.

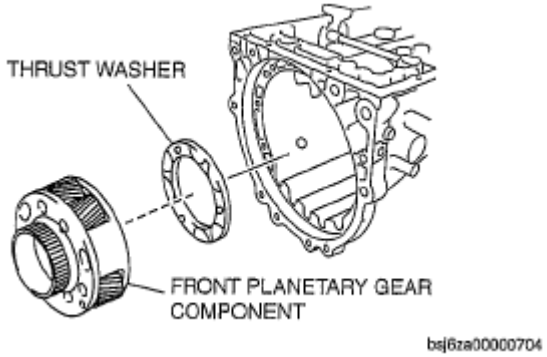


Fig. 311: Identifying Thrust Washer And Front Planetary Gear Component

57. Install the F1 one-way clutch component to the bearing race.

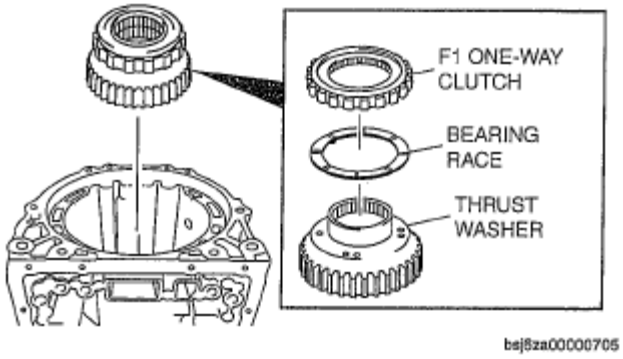


Fig. 312: Identifying F1 One-Way Clutch Component

58. Install the brake piston to the transmission case as shown in the figure.

CAUTION:
- **Align the hole of the brake piston with the position shown in the figure**

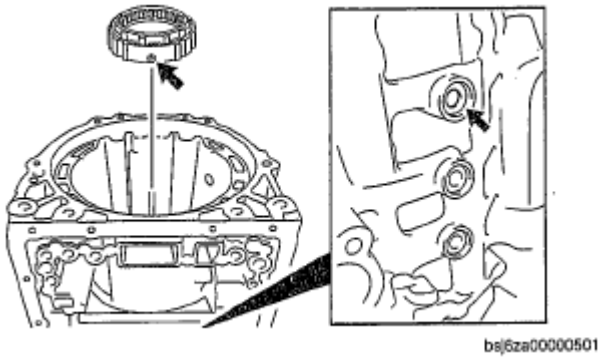


Fig. 313: Position For Aligning Hole Of Brake Piston

59. Verify that the snap ring is correctly positioned.

CAUTION:
- **If the snap ring is not installed in the correct direction, the automatic transmission may not operate normally.**

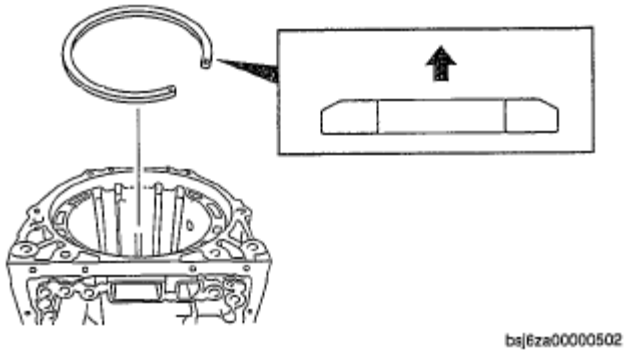


Fig. 314: Position For Installing Snap Ring

60. Using snap ring pliers, install snap ring into the groove.

NOTE:

- **Align the opening of the snap ring with the position shown in the figure.**

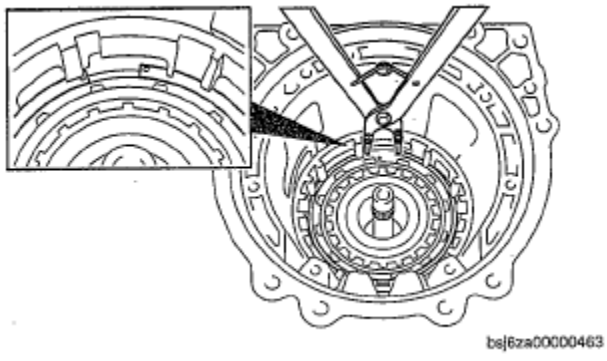


Fig. 315: Installing Snap Ring Using Snap Ring Pliers

61. Install the drive plate and driven plate as shown in the figure.

NOTE:

- **Inspect the number and order of the retaining plate, drive and driven plates.**

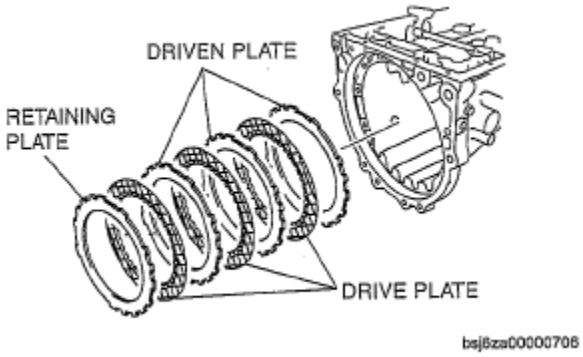


Fig. 316: Identifying Retaining Plate, Drive And Driven Plates

62. Install the driven plates, drive plate and the retaining plate in the order indicated in the figure.

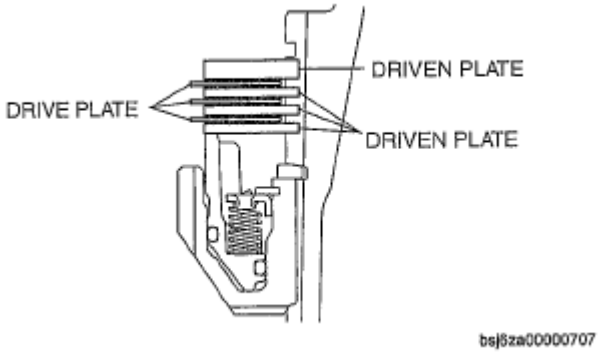


Fig. 317: Identifying Driven Plates, Drive Plate And Retaining Plate

63. Using a flathead screwdriver, install the snap ring into the groove.

CAUTION:
- **Align the opening of the snap ring with the position shown in the figure.**

64. Apply ATF to the thrust washer and install it to the F2 one-way clutch component.

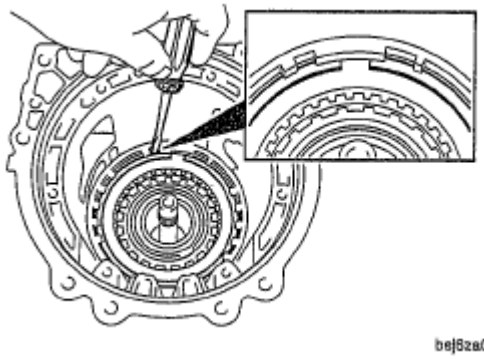


Fig. 318: Installing Snap Ring Using Flathead Screwdriver

65. Install the F2 one-way clutch component to the clutch drum component.
66. Apply ATF to the bearing race and thrust needle bearing.

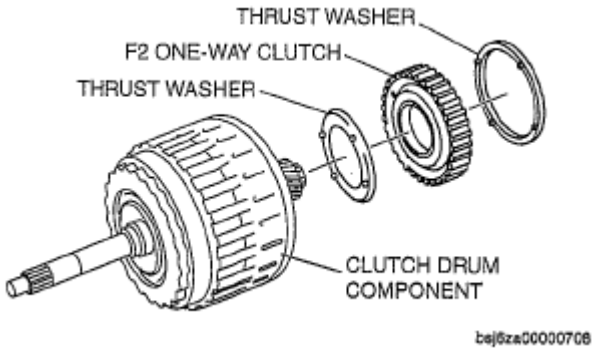


Fig. 319: Identifying F2 One-Way Clutch Component To Clutch Drum Component

67. Install the bearing race and thrust needle bearing to the clutch drum component and the F2 one-way clutch component.

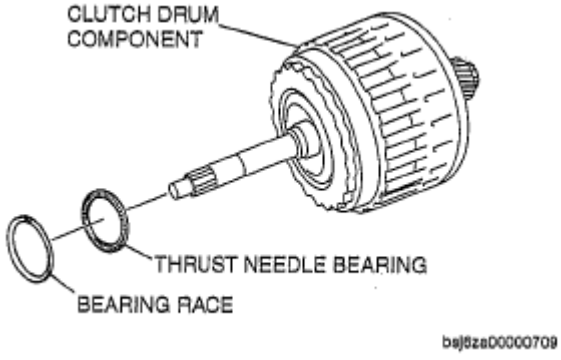


Fig. 320: Identifying Bearing Race, Thrust Needle Bearing And Clutch Drum Component

68. Install the clutch drum component and F2 one-way clutch component.

CAUTION:
- **Do not drop the clutch drum component and the F2 one-way clutch component.**

69. Apply ATF to the new O-ring.
70. Install the O-ring to the oil pump component.

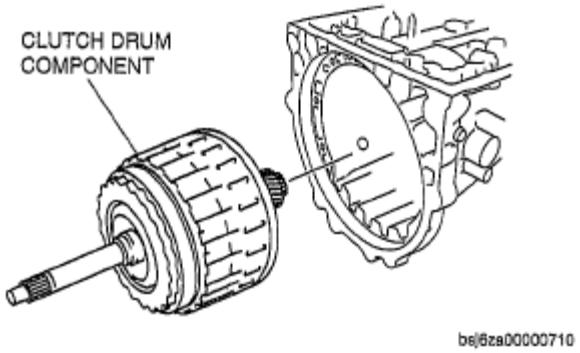


Fig. 321: Identifying Clutch Drum Component

71. Apply ATF to the thrust needle bearing, bearing race and install it to the oil pump component.

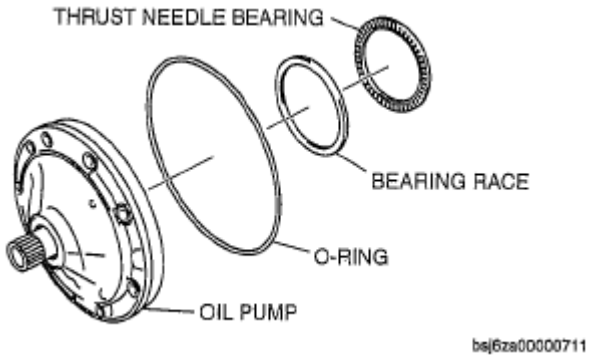


Fig. 322: Identifying Thrust Needle Bearing, Bearing Race And O-Ring

72. Install the oil pump as shown in the figure.

CAUTION:
- **Do not drop the oil pump.**

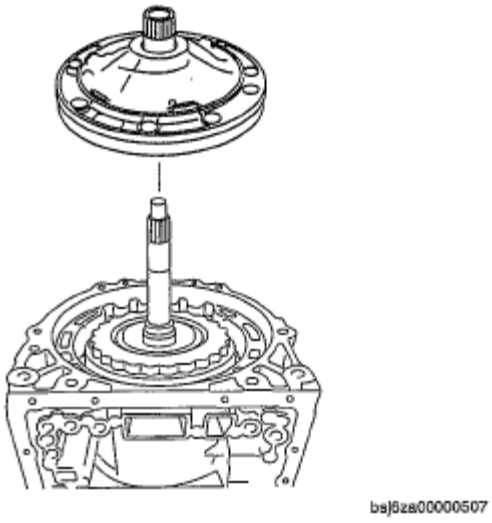


Fig. 323: Identifying Oil Pump

73. Install the bolt as shown in the figure.

    Tightening torque

    17.6-24.5 N.m {1.8-2.4 kgf.m, 13.0-18.0 ft.lb}

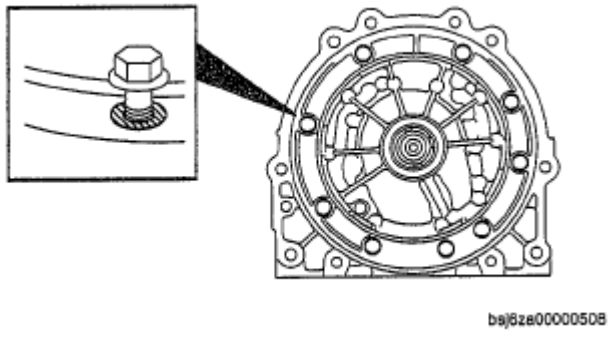


Fig. 324: Identifying Bolt

74. Apply ATF to the thrust needle bearing and the bearing race.
75. Install the thrust needle bearing and bearing race to the front planetary gear component.
76. Install snap ring using snap ring pliers.

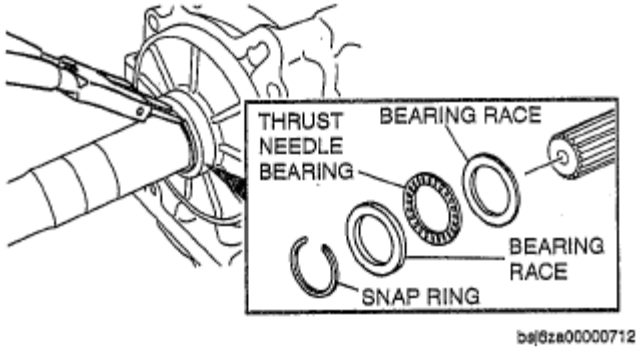


Fig. 325: Installing Thrust Needle Bearing And Bearing Race

77. Measure the clearance between snap ring and bearing race using a thickness gauge.

    Standard

    0.02-0.12 mm {0.0008-0.0047 in}

    - If not within the specification, select an appropriate bearing race.

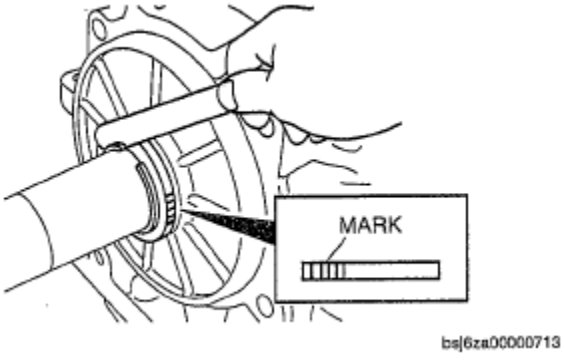


Fig. 326: Measuring Clearance Between Snap Ring And Bearing Race Using Thickness Gauge

Retaining plate size

Identification mark	Thickness (mm {in})
	3.80 {0.150}
	3.85 {0.152}
	3.90 {0.154}
	3.95 {0.156}
	4.00 {0.157}
	4.05 {0.159}
	4.10 {0.161}
	4.15 {0.163}
	4.20 {0.165}
	4.25 {0.167}
	4.30 {0.169}
	4.35 {0.171}

Fig. 327: Retaining Plate Size Reference Chart

78. Verify that the input shaft turns smoothly.
79. Using a dial indicator, measure the input shaft end play.

Input shaft end play

0.35-1.05 mm {0.014-0.041 in}

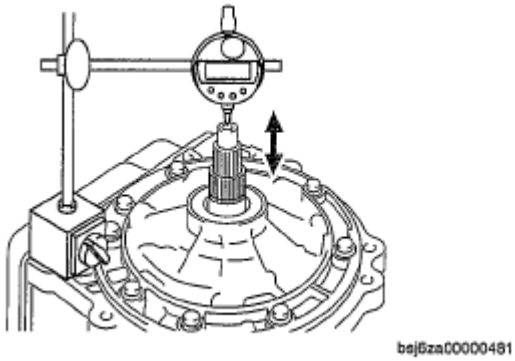


Fig. 328: Measuring Input Shaft End Play Using Dial Indicator

80. Using the **SST** and a hammer, install a new oil seal.

CAUTION:
- **Do not damage the transmission case.**

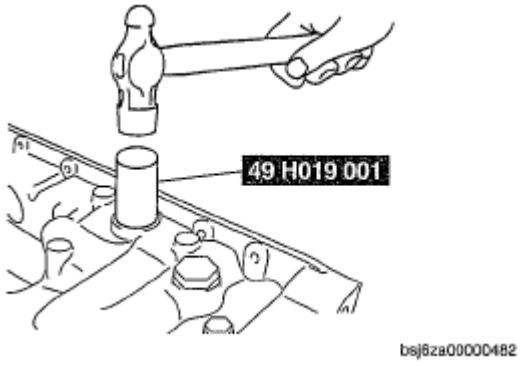


Fig. 329: Installing Oil Seal Using SST And Hammer

81. Install a new manual shaft washer to the manual valve.
82. Insert the manual shaft into the transmission case and assemble it to the manual valve.

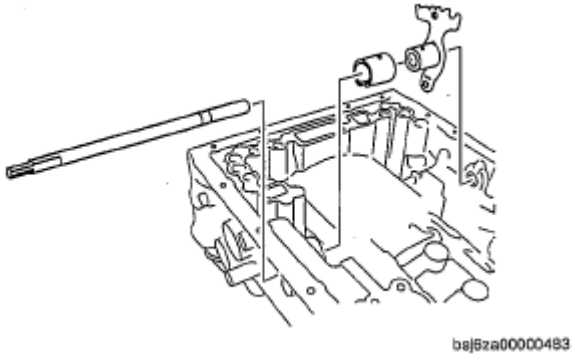


Fig. 330: Identifying Manual Shaft Washer And Manual Valve

83. Tap in a new pin using a hammer.

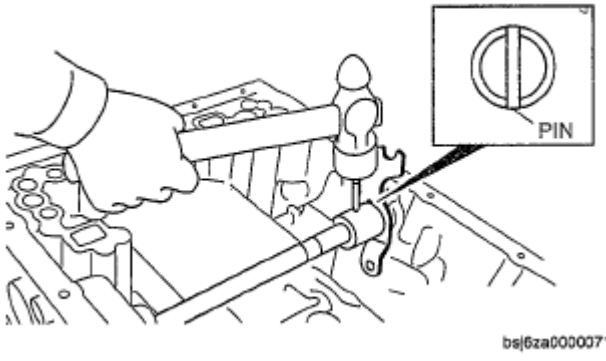


Fig. 331: Tapping Pin Using Hammer

84. Align the manual shaft groove with the spacer hole and crimp them using a punch.
85. Verify that the manual shaft turns smoothly.

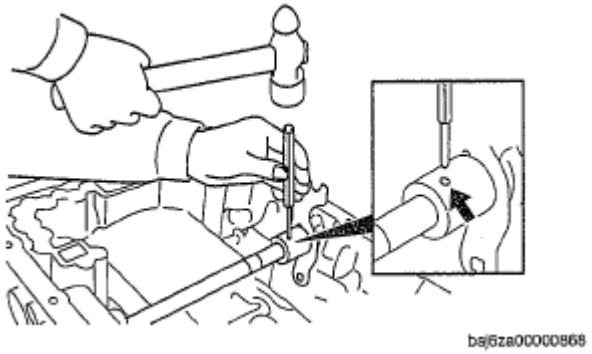


Fig. 332: Locating Spacer Hole

86. Install the parking pawl.
87. Install the driven plate to the parking pawl shaft.
88. Install the parking pawl shaft, spring.

CAUTION:
- **Be careful not to apply too much force to the spring.**

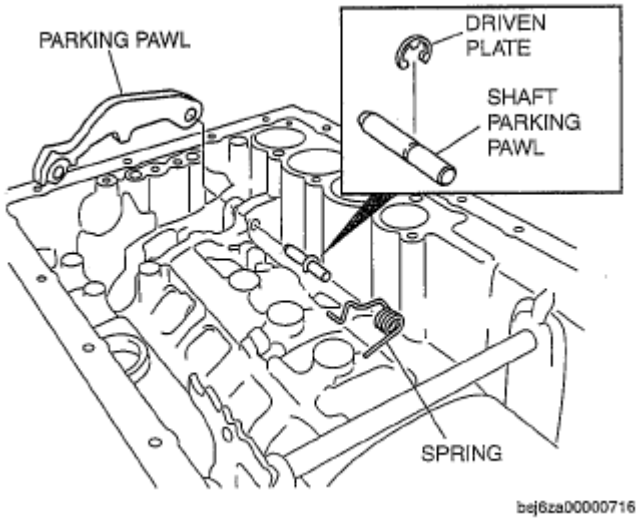


Fig. 333: Identifying Driven Plate, Parking Pawl Shaft And Parking Pawl

89. Connect the parking rod to the manual valve.

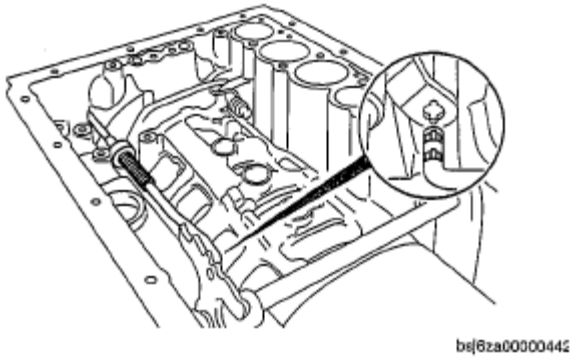


Fig. 334: Identifying Parking Rod On Manual Valve Lever

90. Install the bracket.

Tightening torque

5.9-8.8 N.m {60.2-89.7 kgf.cm, 52.3-77.8 in.lbf}

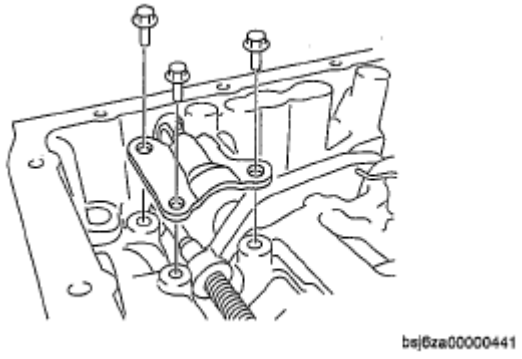


Fig. 335: Identifying Bracket Bolts

91. Set the manual valve to the P position and verify that the parking pawl shaft is properly engaged with the front planetary gear component.

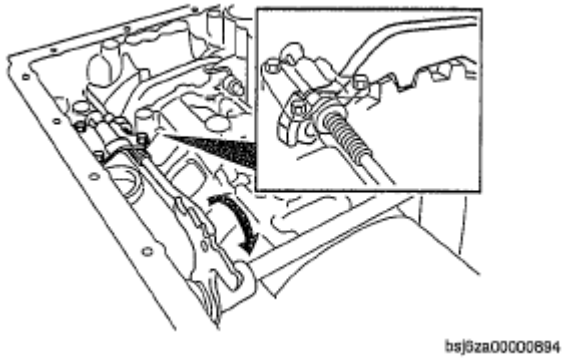


Fig. 336: Engaging Parking Pawl Shaft

92. Install the accumulator valve and compression spring to the transmission case.

CAUTION:
- **Do not damage the O-ring and accumulator piston.**

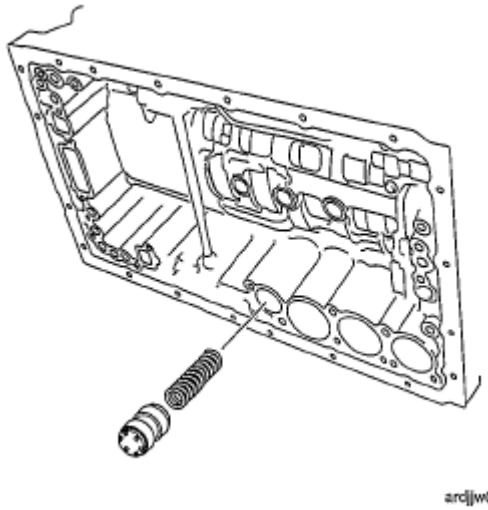


Fig. 337: Identifying Accumulator Valve And Compression Spring

93. Apply ATF to the new O-ring and install the accumulator pistons C.

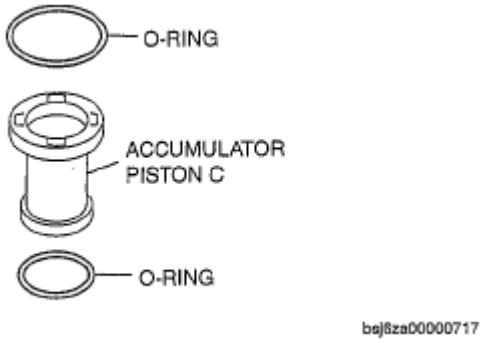


Fig. 338: Identifying O-Ring And Accumulator Pistons C

94. Install the accumulator piston C, compression spring to the transmission case.

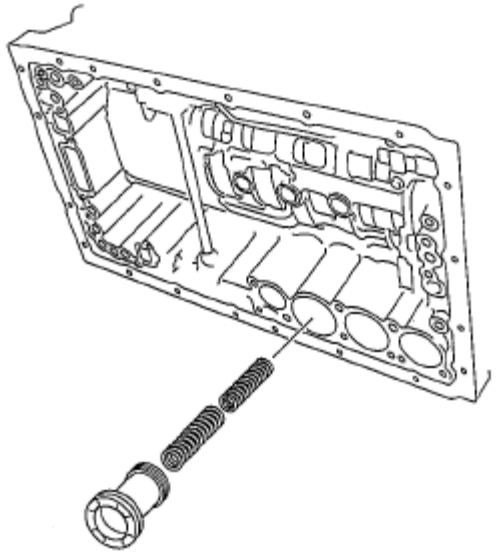


Fig. 339: Identifying Accumulator Piston C And Compression Spring

95. Apply ATF to the new O-ring and install the accumulator pistons A, B.

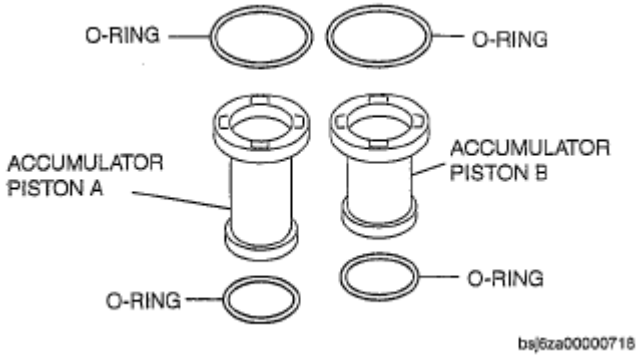


Fig. 340: Identifying O-Ring On Accumulator Pistons A, B

96. Using a flathead screwdriver, install the compression spring, snap ring to the accumulator pistons A, B.

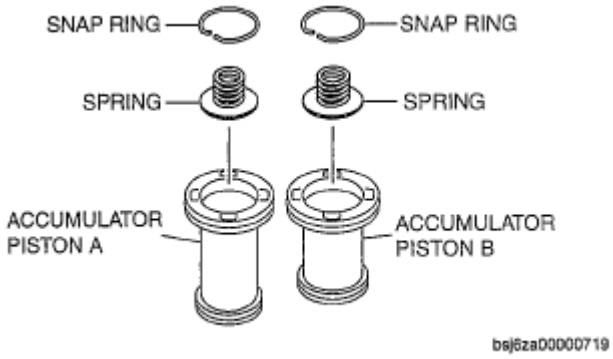


Fig. 341: Identifying Snap Ring On Accumulator Pistons A, B

97. Install the accumulator pistons A, B and the compression spring to the transmission case.

CAUTION:
- **Do not damage gasket.**

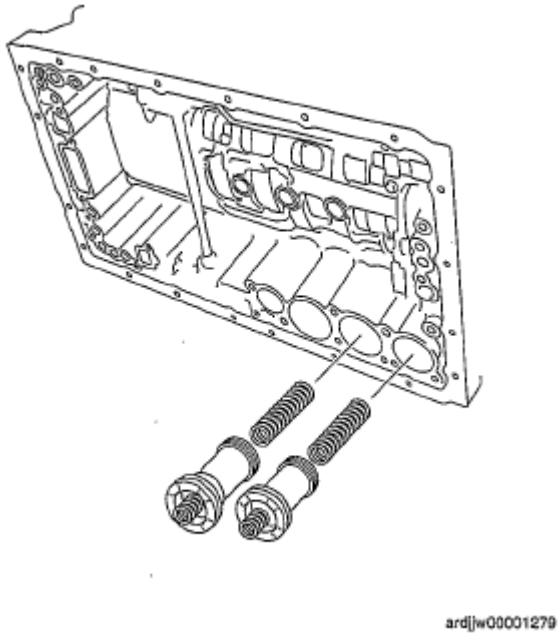


Fig. 342: Identifying Accumulator Pistons A, B And Compression Spring

98. Apply ATF to the new transmission case gasket, new brake drum gasket and install the transmission case.

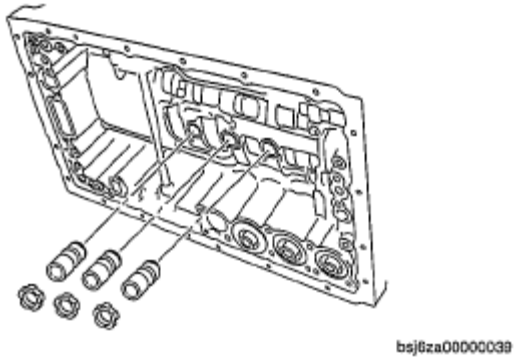


Fig. 343: Identifying Transmission Case And Brake Drum Gasket

99. Install the check valve subcomponent and compression spring to the transmission case.

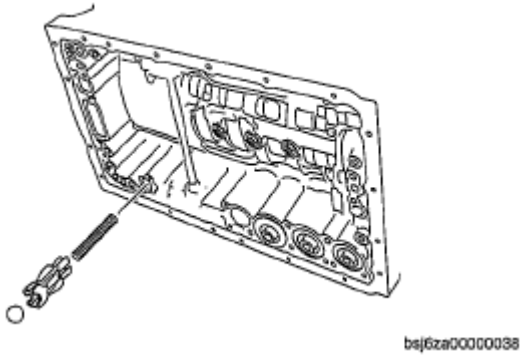


Fig. 344: Identifying Check Valve Subcomponent And Compression Spring

100. Connect the manual valve link, and install the control valve body component.

CAUTION:

- **When installing the control valve body component, route the wiring harness correctly to the separate plate depression inside the control valve body component shown in the figure.**

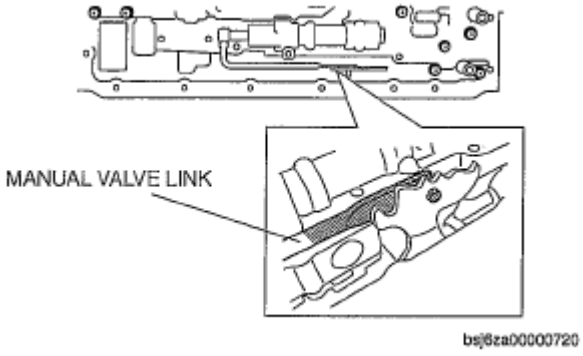


Fig. 345: Identifying Manual Valve Link

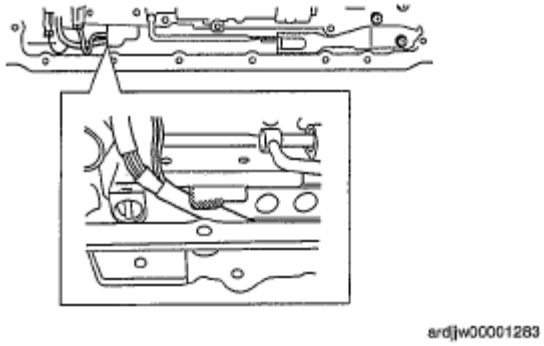


Fig. 346: Position For Installing Control Valve Body Component

101. Temporarily tighten the bolts to the transmission case as shown in the figure.

Bolt length (measured from below the head)

A. **25 mm {0.98 in}**
B. **36 mm {1.42 in}**
C. **45 mm {1.77 in}**
D. **50 mm {1.97 in}**

NOTE:

- **Aligning the bolt holes, temporarily tighten the bolts by hand.**

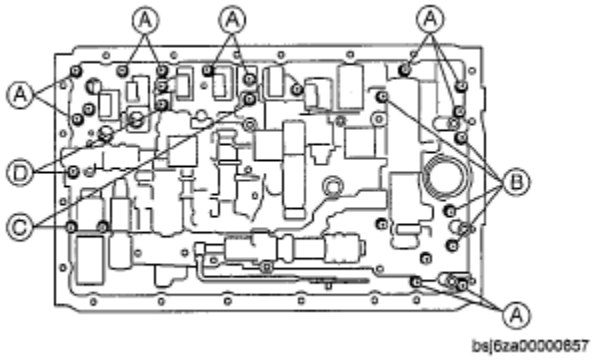


Fig. 347: Identifying Transmission Case Bolts

- **Tighten the bolts from the inner side.**

102. Tighten the bolts.

Tightening torque

10.0-12.0 N.m {102-122 kgf.cm, 89-105 in.lbf}

103. Install the detent spring cover and detent spring to the control valve body component.

Tightening torque

8.0-12.0 N.m {82-122 kgf.cm, 72-105 in.lbf}

104. Install the TFT sensor, lock plate to control valve body component.

Tightening torque

8.0-12.0 N.m {82-122 kgf.cm, 72-105 in.lbf}

105. Clamp the coupler component.
106. Connect the solenoid connector to the solenoid.
107. Apply ATF to the new O-ring and install the oil strainer.

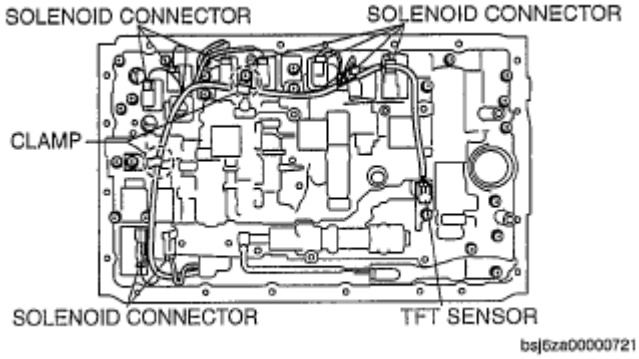


Fig. 348: Identifying Solenoid Connector

108. Install the oil strainer to the control valve body component.

Tightening torque

8.0-12.0 N.m {82-122 kgf.cm, 72-105 in.lbf}

CAUTION:
- **Make sure that lint or dirt does not penetrate the transmission.**

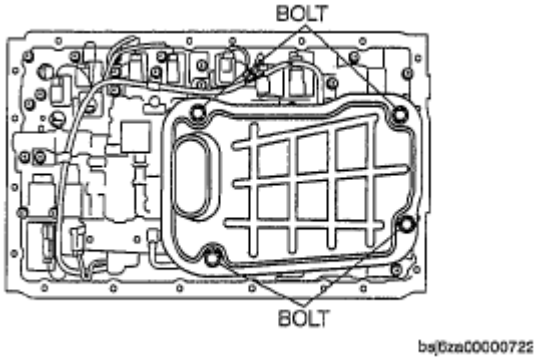


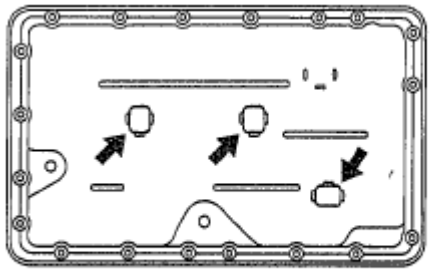
Fig. 349: Identifying Bolts On Control Valve Body

109. Clean the contact surface of the oil pan and transmission case.

NOTE:
- **Wash the magnets before installing them.**

110. Install the magnet to the oil pan.

CAUTION:
- **Do not damage the contact surface of the oil pan and transmission case.**
- **Do not deform the oil pan.**



be|8za00000033

Fig. 350: Locating Magnet On Oil Pan

111. Install the new oil pan gasket and oil pan to the transmission case.

CAUTION:
- **Because the oil pan gasket is made of cork, the oil pan gasket may be damaged if it is tightened with excessive force.**

112. Install the bolts to the transmission case.

Tightening torque

3.9-4.9 N.m {39.8-49.9 kgf.cm, 34.6-43.3 in.lbf}

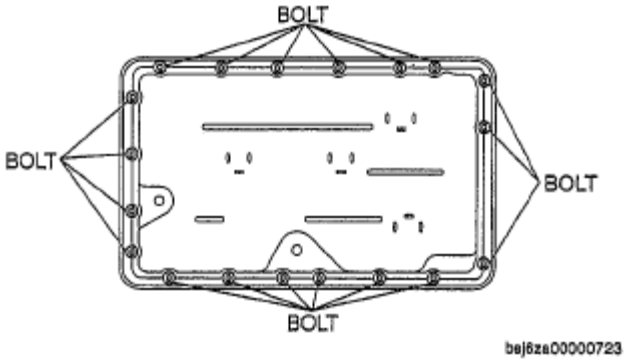


Fig. 351: Identifying Transmission Case Bolts

113. Remove the silicons sealant and be careful not to spill any oil on the contact surface of the transmission case and extension housing.
114. Clean the contact surface of the transmission case and the extension housing, and the bolt holes.

NOTE:
- **Completely remove sealant and oil with isoproply alcohol (IPA) or similar.**

115. Apply sealant to the extension housing as shown in the figure.

NOTE:
- **Spread sealant over the contact surface.**

116. Install the extension housing and transmission case.

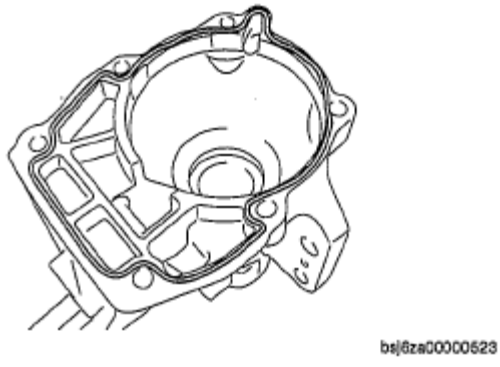
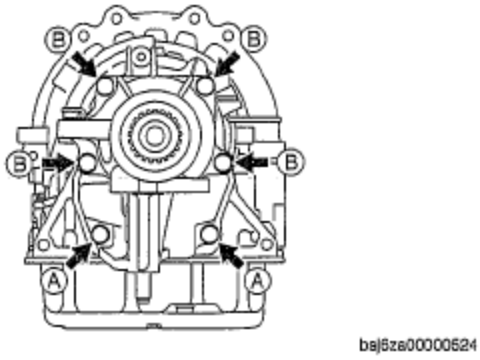


Fig. 352: Identifying Sealant Application Area On Extension Housing

117. Temporarily tighten the bolts by hand as shown in the figure.



baj6za00000624

Fig. 353: Locating Bolts On Transmission Case

TRANSMISSION CASE BOLTS REFERENCE

Bolt number	Bolt size	Length (measured from below the head) (mm {in})
A	M10-1.5	35 {1.38}
B	M 10-1.5	45 {1.77}

NOTE:

- **Do not apply sealant to the transmission case.**
- **The characters shown in the figure indicate the bolt type.**

118. Tighten the bolts.

Tightening torque

26.5-41.2 N.m {2.71-4.20 kgf.m, 19.6-30.3 ft.lbf}

119. .Assemble a new oil seal to the extension housing in the position shown in the figure using the **SST** and a hammer.

CAUTION:

- **Do not damage the oil seal.**
- **Do not damage the extension housing.**

120. Apply grease to the oil seal lip.

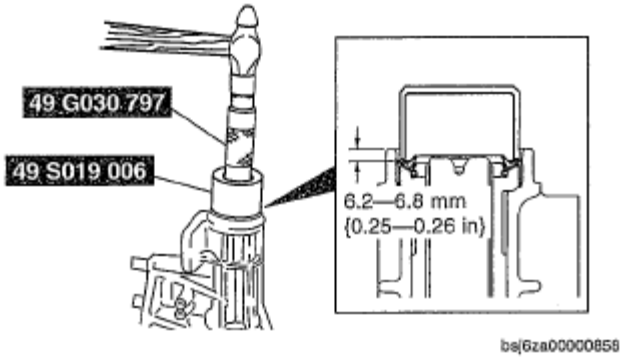


Fig. 354: Position For Installing Oil Seal To Extension Housing

121. Using the **SST** and a hammer, install the new extension housing shroud to the extension housing as shown in the figure.

CAUTION:
- **Do not damage the oil seal.**
- **Do not damage the extension housing.**
- **Do not damage the extension housing shroud.**

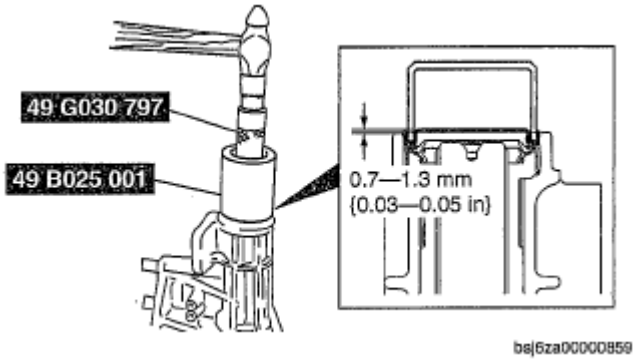


Fig. 355: Position For Installing Extension Housing Shroud To Extension Housing

122. Using a hammer and slab of wood, install the new extension dust deflector to the extension housing as shown in the figure.

CAUTION:
- **Do not damage extension housing.**
- **Do not damage extension dust deflector.**

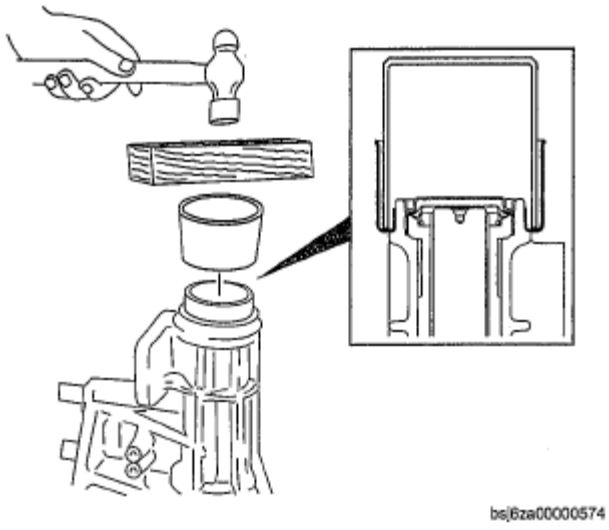


Fig. 356: Position For Installing Extension Dust Deflector

123. Temporarily tighten the bolts A and new bolts B, C by hand as shown in the figure.

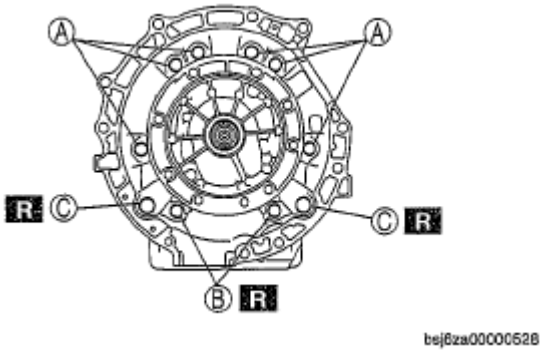


Fig. 357: Identifying Bolts

BOLTS REFERENCE CHART

Bolt number	Bolt size	Length (measured from below the head) (mm {in})
A	M10-1.5	35 {1.38}
B	M 10-1.5	35 {1.38}
C	M10-1.75	38 {1.50}

124. Tighten the bolts.

Tightening torque

A, B: 26.5-41.2 N.m {2.71-4.20 kgf.m, 19.6-30.3 ft.lbf}

C: 47.0-66.6 N.m {4.80-6.79 kgf.m, 34.7-49.1 ft.lbf}

125. Turn the manual shaft fully to the extension housing side and turn it back two steps so that the N position is selected.
126. Install the TR switch and temporarily tighten the new TR switch installation bolt.

CAUTION:

- **If the TR switch is not adjusted correctly, adjust it correctly, otherwise the AT may not operate normally.**

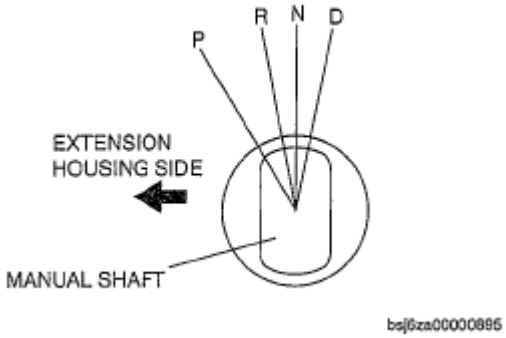


Fig. 358: Identifying TR Switch Positions

127. Verify that the scribed line on the TR switch and the manual shaft notch are aligned.

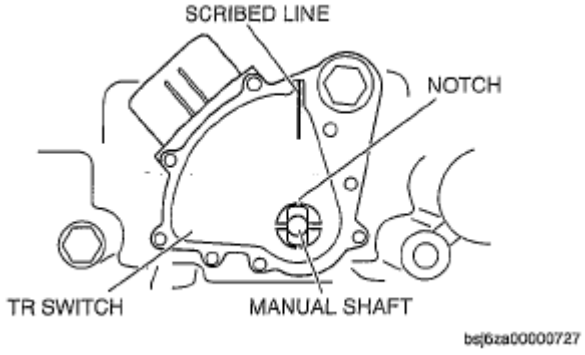


Fig. 359: Identifying TR Switch And Manual Shaft Notch Align Position

128. Install the washer, lock washer and nut.

Tightening torque

5.9-7.8 N.m {61-79 kgf.cm, 53-69 in.lbf}

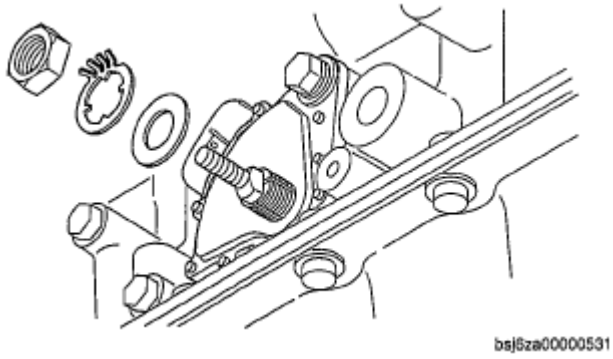


Fig. 360: Identifying Washer, Lock Washer And Nut

129. Using a flathead screwdriver, bend the tab of lock washer.
130. Tighten the TR switch installation bolt.

Tightening torque

9.8-15.7 N.m {1.0-1.6 kgf.m, 7.3-11.6 ft.lbf}

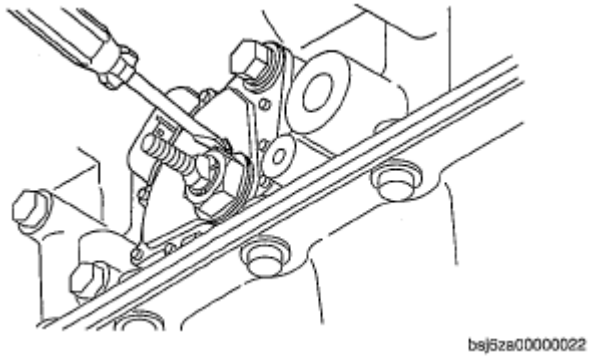


Fig. 361: Bending Tab Of Lock Washer Using Flathead Screwdriver

131. Install the VSS.

Tightening torque

3.9-6.9 N.m {40-70 kgf.cm, 35-61 in.lbf}

CAUTION:
- **Do not damage the VSS.**

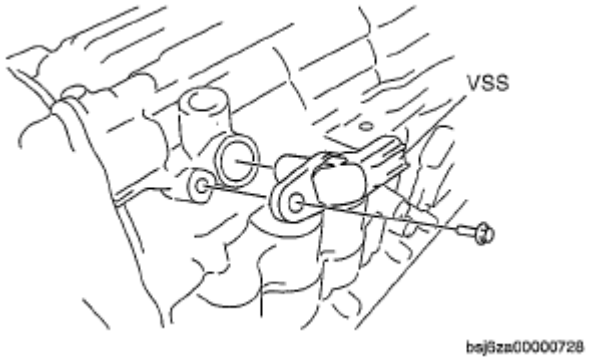


Fig. 362: Identifying VSS

132. Install the turbine sensor.

Tightening torque

3.9-6.9 N.m {40-70 kgf.cm, 35-61 in.lbf}

CAUTION:
- **Do not damage the turbine sensor.**

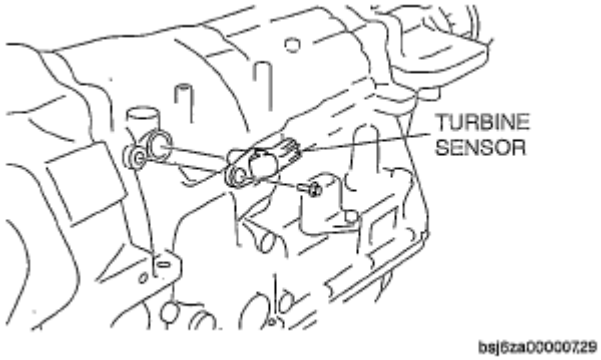


Fig. 363: Identifying Turbine Sensor

133. Install the breather tube.

Tightening torque

3.9-6.9 N.m {40-70 kgf.cm, 35-61 in.lbf}

CAUTION:
- **Do not damage the breather tube.**

134. Install the breather pipe.

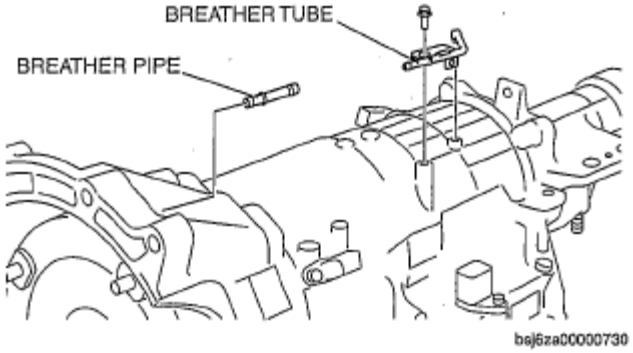


Fig. 364: Identifying Breather Tube And Pipe

135. Using a flathead screwdriver, position the drive gear on the oil pump component in the center. Then install the torque converter component to the transmission.

CAUTION:
- **Do not damage the oil seal.**
- **Do not drop the torque converter.**

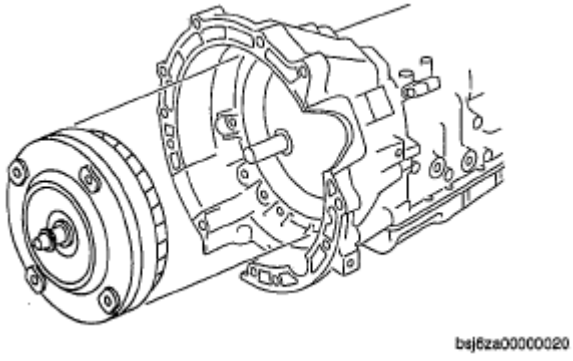


Fig. 365: Identifying Torque Converter

136. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

Distance A (between the end of the torque converter and the end of the converter housing)

26.2 mm {1.0 in}

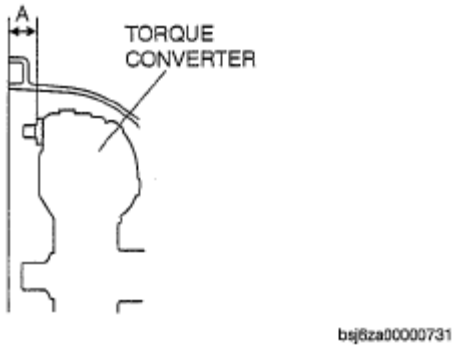


Fig. 366: Identifying Distance A

137. Clean the drain plug.

CAUTION:
- **Install the drain plug being careful of the drain plug gasket direction.**

138. Install the new drain plug gasket and drain plug to the oil pan.

Tightening torque

17.5-22.5 N.m {1.8-2.2 kgf.m, 13.0-16.5 ft.lbf}

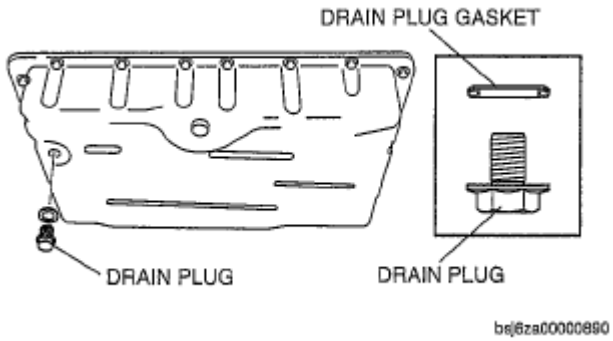


Fig. 367: Identifying Oil Pan Drain Plug Gasket And Drain Plug

05-50 TECHNICAL DATA

TRANSMISSION TECHNICAL DATA

TRANSMISSION TECHNICAL DATA

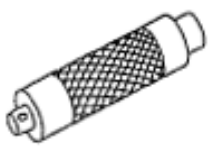
Item	Specification
Pump housing bushing inner diameter	38.113-38.138 mm {1.50051-1.50150 in}
Oil pump shaft bushing inner diameter	21.501-21.527 mm {0.846496-0.847520

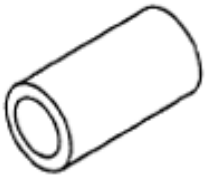
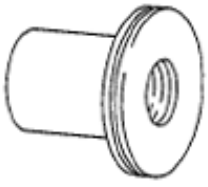
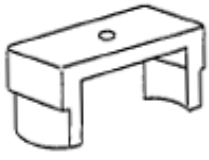
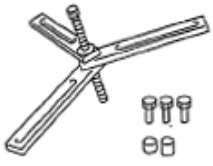
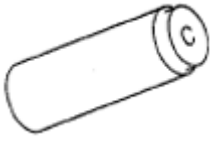
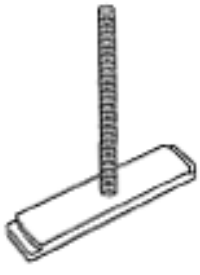
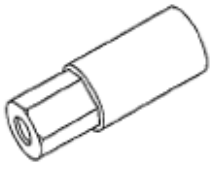
	in}
Oil pump gear outer standard clearance	0.10-0.17 mm {0.004-0.006 in}
Oil pump gear inner standard clearance	0.07-0.15 mm {0.0028-0.0059 in}
Oil pump gear side standard clearance	0.02-0.04 mm {0.0008-0.0015 in}
C1, C4 clutch return spring free length	Standard: 26.29 mm {1.04 in}
C2 clutch return spring free length	Standard: 20.02 mm {0.79 in}
C3 clutch return spring free length	Standard: 21.03 mm {0.83 in}
Input shaft component bushing inner diameter	18.000-18.025 mm {0.7087-0.7096 in}
Clutch hub bushing inner diameter	Front side: 23.037-23.062 mm {0.90697-0.90795 in} Rear side: 23.037-23.062 mm {0.90697-0.90795 in}
Clutch hub component bushing inner diameter	Front side: 33.312-33.337 mm {1.31150-1.31248 in} Rear side: 33.312-33.337 mm {1.31150-1.31248 in}
B3 brake return spring free length	Standard: 15.72 mm {0.62 in}
B1 brake return spring free length	Standard: 17.05 mm {0.67 in}
Front planetary ring gear bushing inner diameter	46.038-46.063 mm {1.81252-1.81350 in}
Front planetary gear component bushing inner diameter	48.755-48.780 mm {1.91949-1.92047 in}
Rear planetary gear component bushing inner diameter	18.000-18.025 mm {0.7087-0.7096 in}
B2 brake return spring free length	Standard: 22.66 mm {0.89 in}
B4 brake return spring free length	Standard: 13.84 mm {0.54 in}
Input shaft end play	0.35-1.05 mm {0.014-0.041 in}
Distance A (between the end of the torque converter and the end of the converter housing)	26.2 mm {1.0 in}

05-60 SERVICE TOOLS

TRANSMISSION SST

TRANSMISSION SST

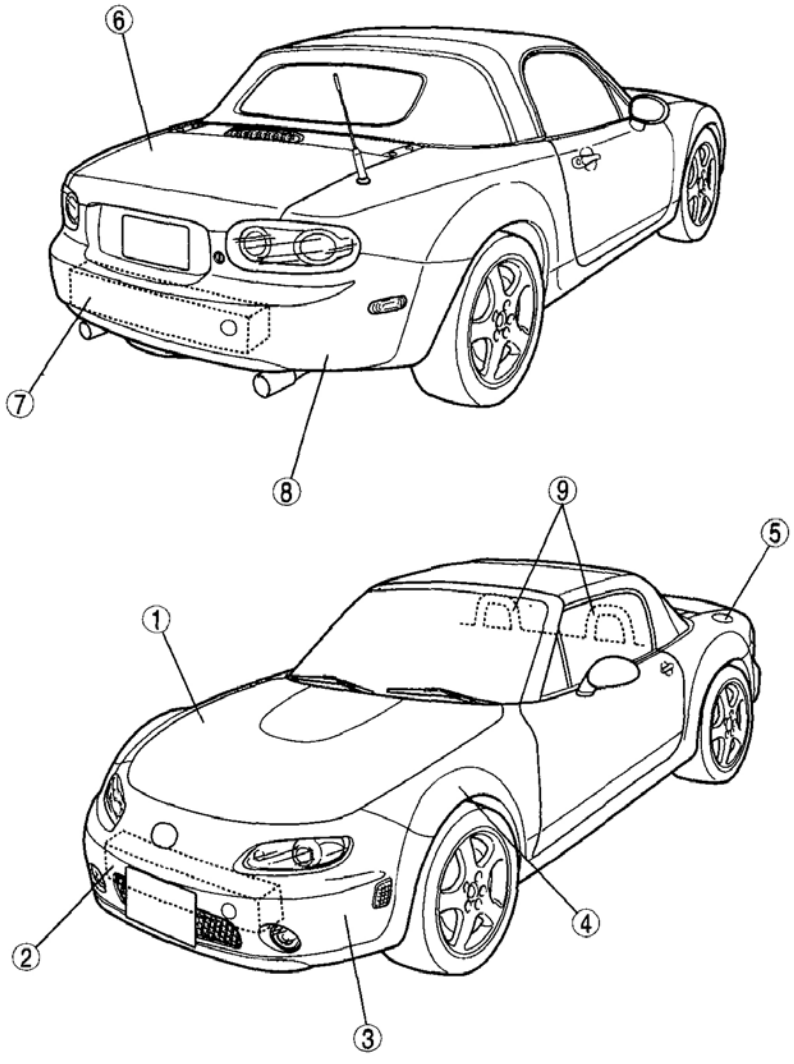
49 S019 006 Oil seal installer	49 G030 797 Handle 	49 B025 001 Body

49 W027 003 Support block	49 H019 001 Attachment 	49 T019 003 Body
49 HD64 377 Attachment 	49 HD64 376 Body 	49 G033 102 Handle
49 N019 002 Compressor 	49 N019 003 Extension 	49 N019 004 Attachment
49 N019 005 Attachment	49 T019 014 Body	49 G019 027 Attachment 
49 G019 029 Nut 	-	-

2007 ACCESSORIES & BODY, CAB

Body Panels - MX-5 Miata

BODY PANELS LOCATION INDEX



E5U910ZW1001

1	Hood
3	Front bumper
4	Front fender panel
5	Fuel-filler lid
6	Trunk lid
7	**Rear bumper reinforcement**
8	Rear bumper
9	Seat Back Crossmember Assembly

Fig. 1: Identifying Location Of Body Panel Components

Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER LID REMOVAL/INSTALLATION

1. Remove the bolts.
2. Remove the fuel-filler lid.
3. Install in the reverse order of removal.
4. Adjust the fuel-filler lid. (See **FUEL-FILLER LID ADJUSTMENT** .)

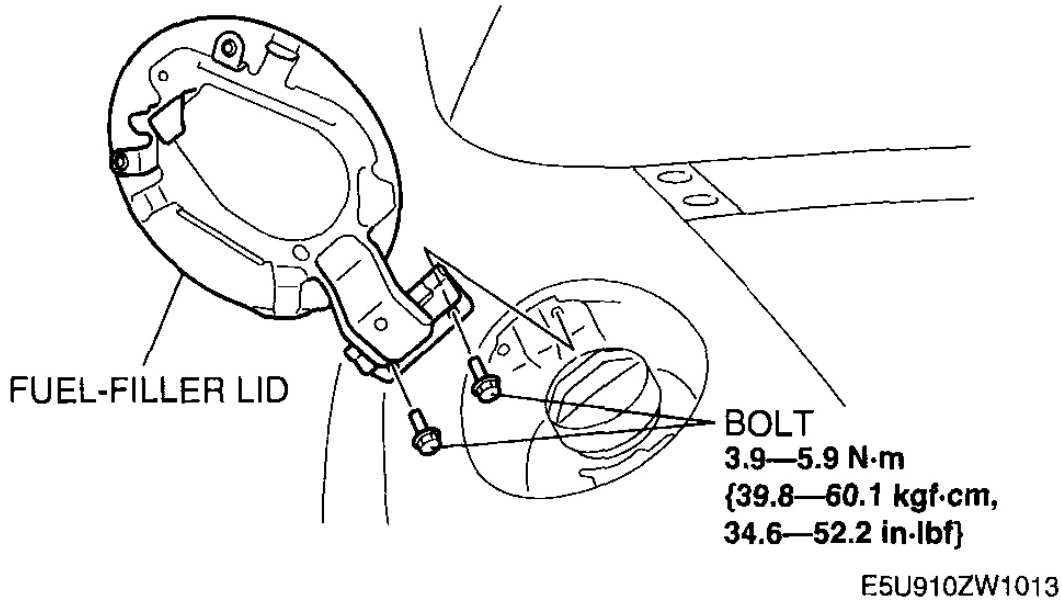


Fig. 2: Removing Fuel-Filler Lid (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER LID ADJUSTMENT

1. Measure the gap and height difference between the fuel-filler lid and the body.
2. Loosen the fuel-filler lid installation bolts, and adjust the fuel-filler lid.

Standard clearance

a. **1.7-3.7 mm {0.07-0.14 in}**
b. **-0.5 -1.5 mm {-0.02-0.05 in}**
c. **-1.0-1.0 mm {0.04-0.03 in}**
d. **-0.75-1.25 mm {-0.03-0.04 in}**

3. Tighten the bolts.

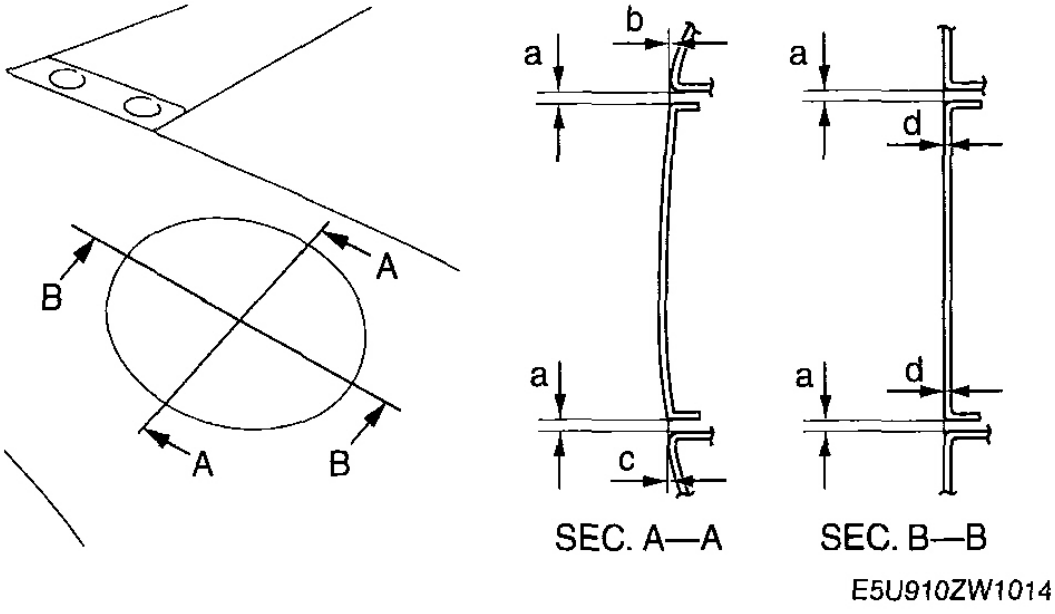
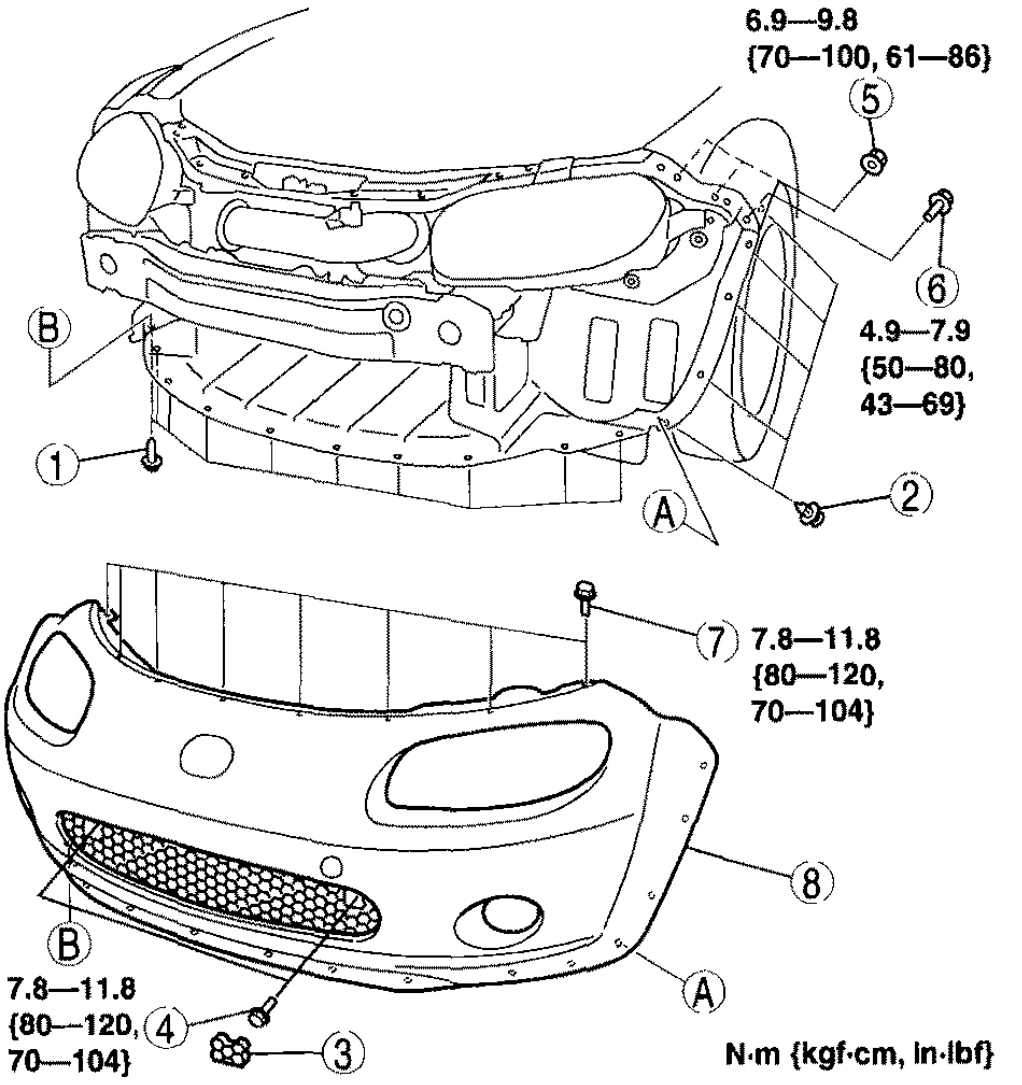


Fig. 3: Identifying Gap & Height Difference Between Fuel-Filler Lid & Body
Courtesy of MAZDA MOTORS CORP.

FRONT BUMPER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the front fog light connectors for vehicles with front fog lights.
3. Disconnect the side marker light connectors.
4. Remove in the order indicated in **Fig. 4** .



E5U910ZW1015

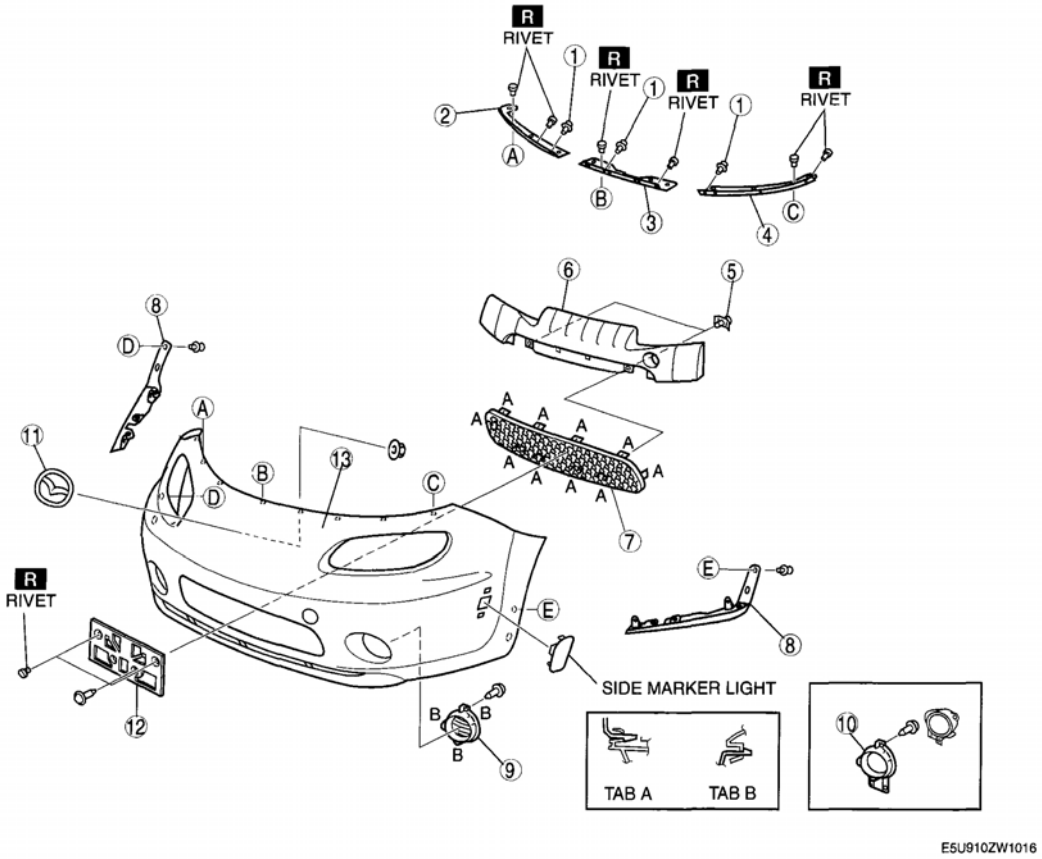
1	Screw A
2	Fastener A
3	Cover
4	Bolt A
5	Nut
6	Bolt B
7	Bolt C
8	Front bumper

Fig. 4: Removing/Installing Front Bumper (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. Adjust the front fog light aiming for vehicles with the front fog lights. (See **FRONT FOG LIGHT AIMING** .)

FRONT BUMPER DISASSEMBLY/ASSEMBLY

1. To disassemble the front bumper, remove the following parts:
    1. Front fog lights (Vehicles with the front fog lights) (See **FRONT FOG LIGHT REMOVAL/INSTALLATION** .)
    2. Front side marker light. (See **FRONT SIDE MARKER LIGHT REMOVAL/INSTALLATION** .)
2. Disassemble in the order indicated in **Fig. 5** .



1	Fastener
2	Set plate RH
3	Set plate CTR
4	Set plate LH
5	Clip
6	Energy absorbing form
7	Front bumper mesh

8	Air dam skirt
9	Lamp hole cover (Vehicles without the front fog lights)
10	Lamp hole cover (Vehicles with the front fog lights)
11	Ornament
12	License plate holder
13	Front bumper fascia

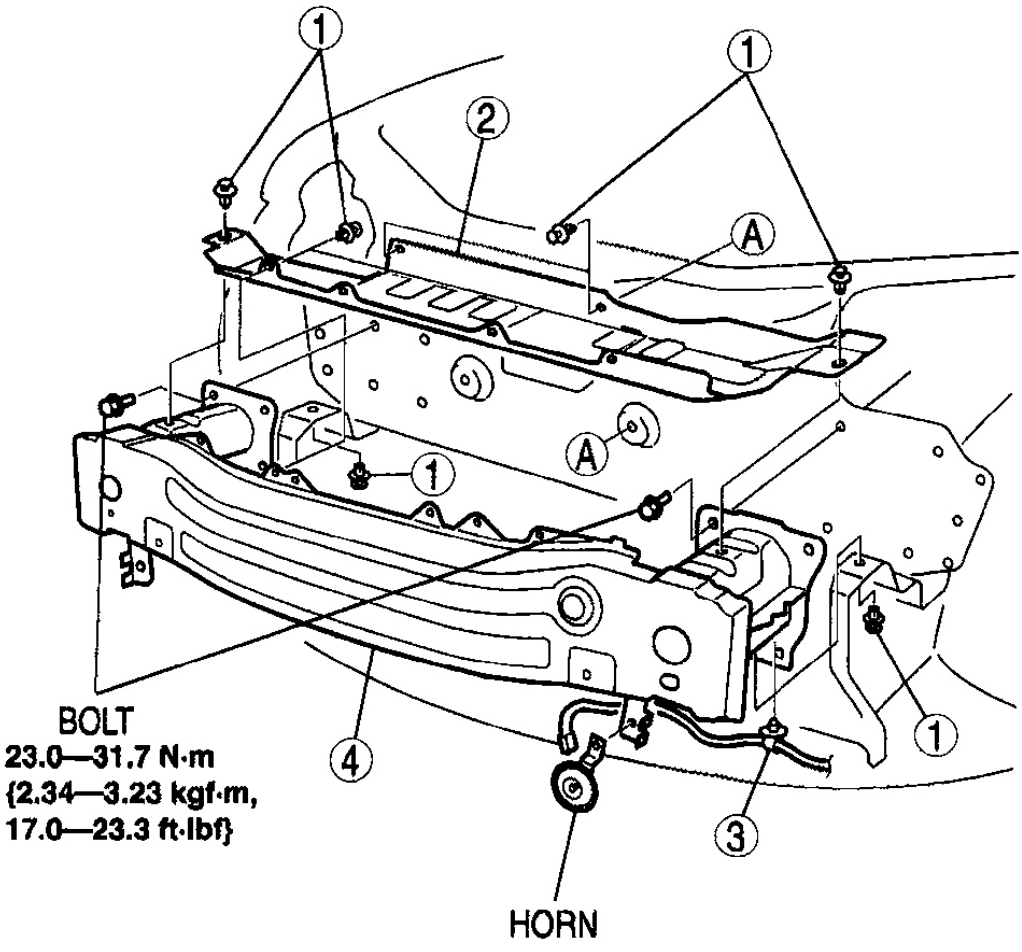
Fig. 5: Disassembling/Assembling Front Bumper
Courtesy of MAZDA MOTORS CORP.

3. Assemble in the reverse order of disassembly.

FRONT BUMPER REINFORCEMENT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
3. Remove the front combination light. (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
4. Remove the fresh air duct. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the horn. (See **HORN REMOVAL/INSTALLATION** .)

6. Remove in the order indicated in **Fig. 6**.



1	Clip
2	Shroud seal plate
3	Harness clip
4	Front bumper reinforcement

Fig. 6: Removing/Installing Front Bumper Reinforcement (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.

REAR BUMPER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
3. Remove the partition board. (See **PARTITION BOARD REMOVAL/INSTALLATION** .)
4. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
5. Remove the rear combination lights. (See **REAR COMBINATION LIGHT REMOVAL/INSTALLATION** .)
6. Remove the screws.
7. Splash shield, detach tabs A, and then remove the splash shield.

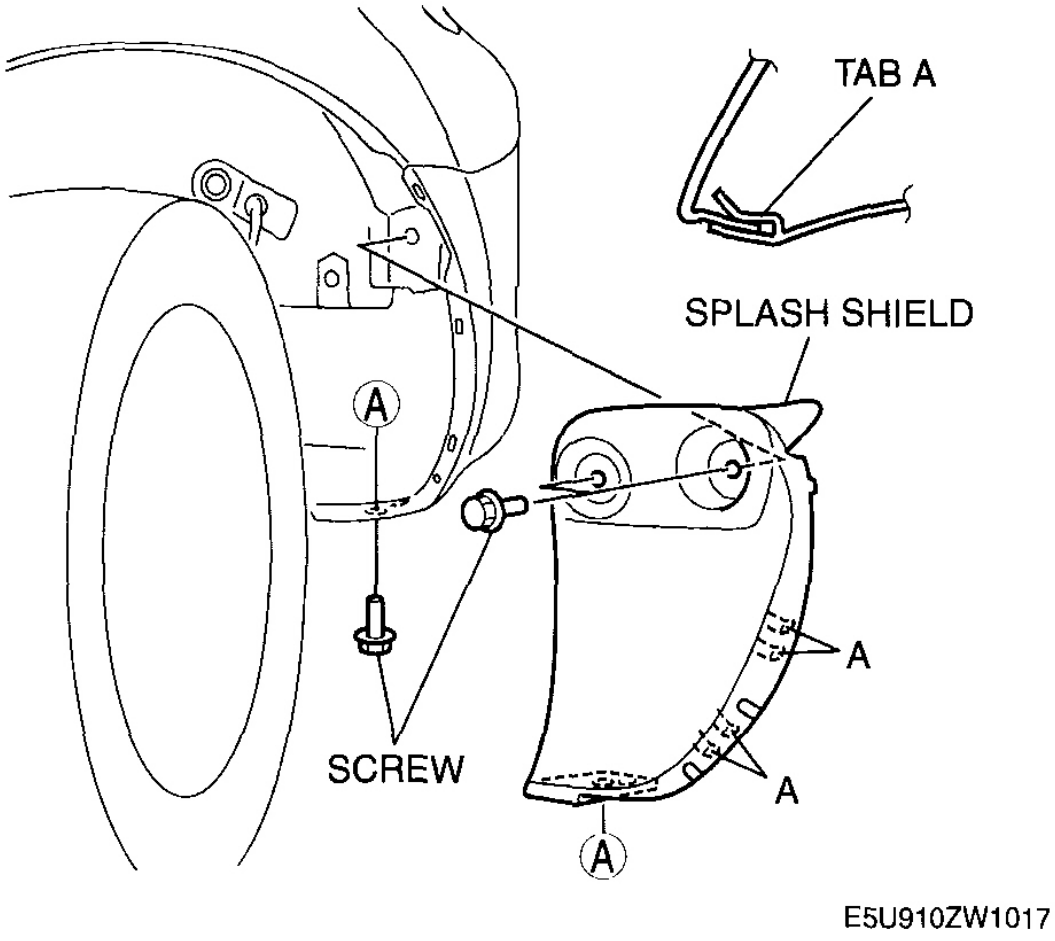
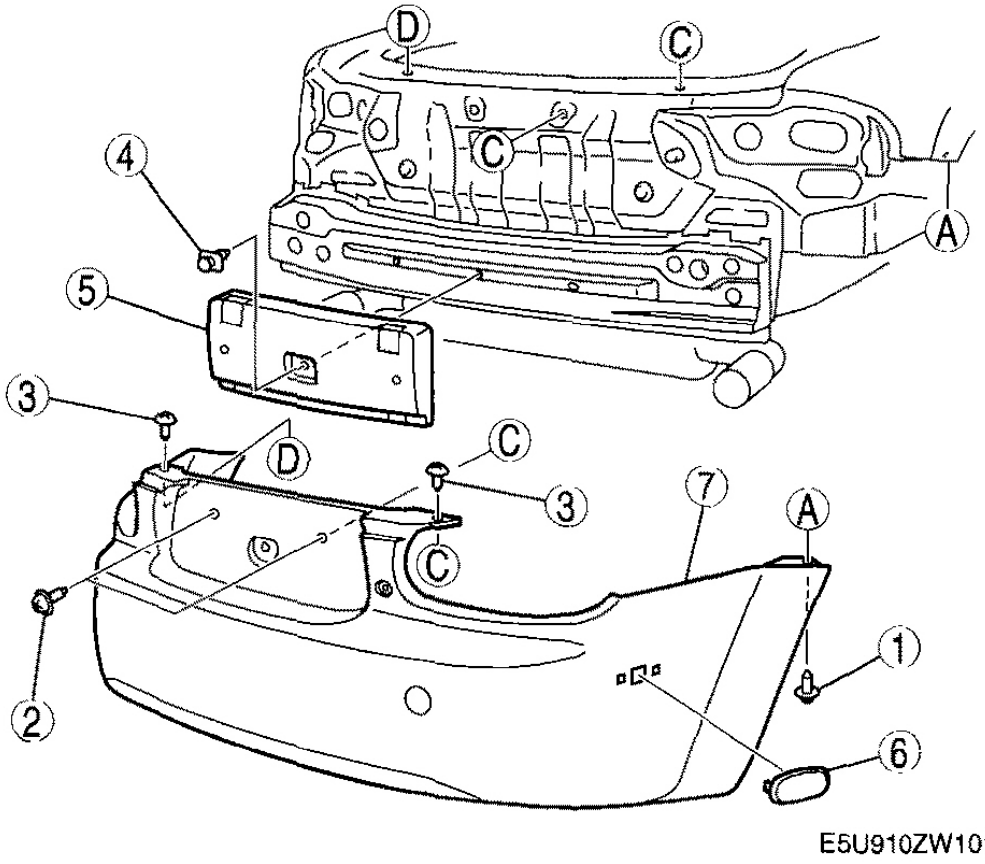


Fig. 7: Removing Splash Shield

Courtesy of MAZDA MOTORS CORP.

8. Remove in the order indicated in the table.



E5U910ZW1018

1	Screw A
2	Screw B
3	Screw C
4	Fastener A
5	Fastener B
6	Energy absorbing form
7	Reflector
8	Rear bumper

Fig. 8: Removing Rear Bumper
Courtesy of MAZDA MOTORS CORP.

9. Install in the reverse order of removal.

REAR BUMPER REMOVAL NOTE

1. Pull the rear bumper ends (wheel arch) outward to detach from the bumper slider.

CAUTION:
- **When detaching the rear bumper from the bumper slider, the rear bumper could fall and be damaged. Secure the rear bumper so that it does not fall.**

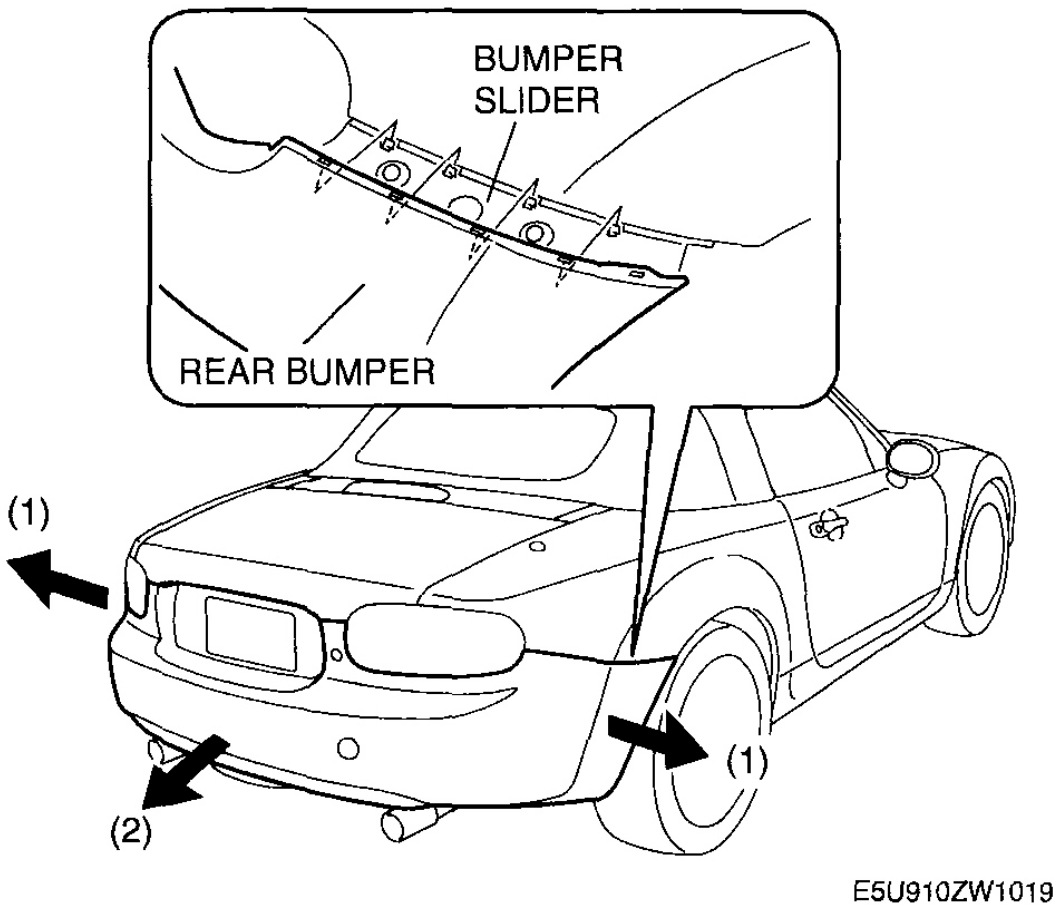


Fig. 9: Pulling Rear Bumper Ends (Wheel Arch) Outward From Bumper Slider
Courtesy of MAZDA MOTORS CORP.

REAR BUMPER INSTALLATION NOTE

1. Spread the rear bumper ends (wheel arches) apart.
2. Attach the rear bumper to the body.
3. Press the rear bumper connecting area into the body to engage with the bumper slider.

REFLECTOR REMOVAL NOTE

1. Lift the reflector up in the direction of the arrow, then unhook it from rear bumper.

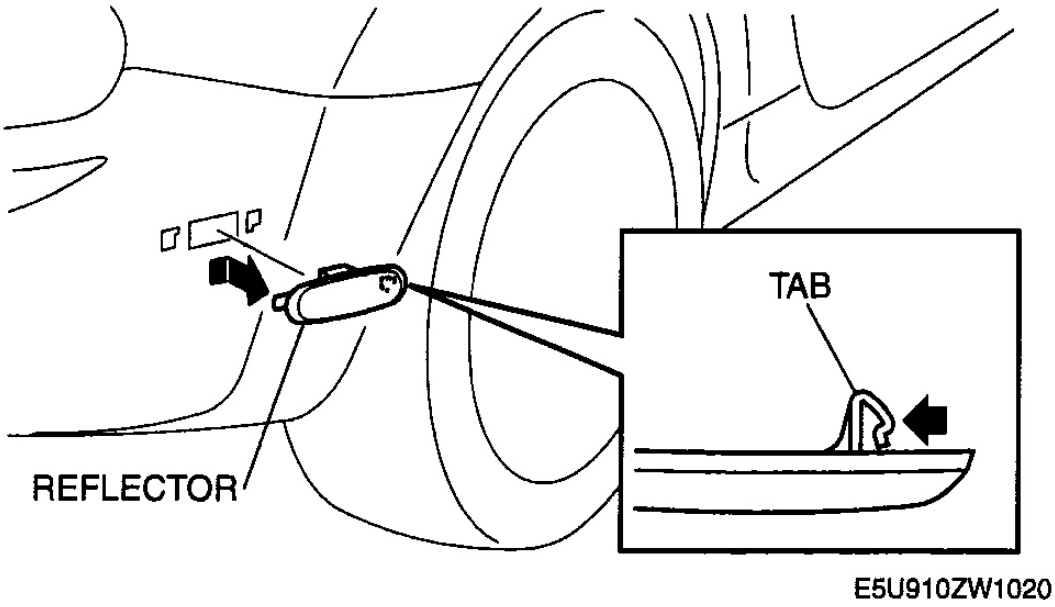


Fig. 10: Identifying Reflector
Courtesy of MAZDA MOTORS CORP.

REAR BUMPER REINFORCEMENT REMOVAL/INSTALLATION

1. Remove the following parts:
    1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
    2. Trunk end trim (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
    3. Partition board. (See **PARTITION BOARD REMOVAL/INSTALLATION** .)
    4. Trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
    5. Rear combination lights. (See **REAR COMBINATION LIGHT REMOVAL/INSTALLATION** .)
    6. Rear bumper (See **REAR BUMPER REMOVAL/INSTALLATION** .)

2. Remove the nuts, then remove the rear bumper reinforcement.
3. Install in the reverse order of removal.

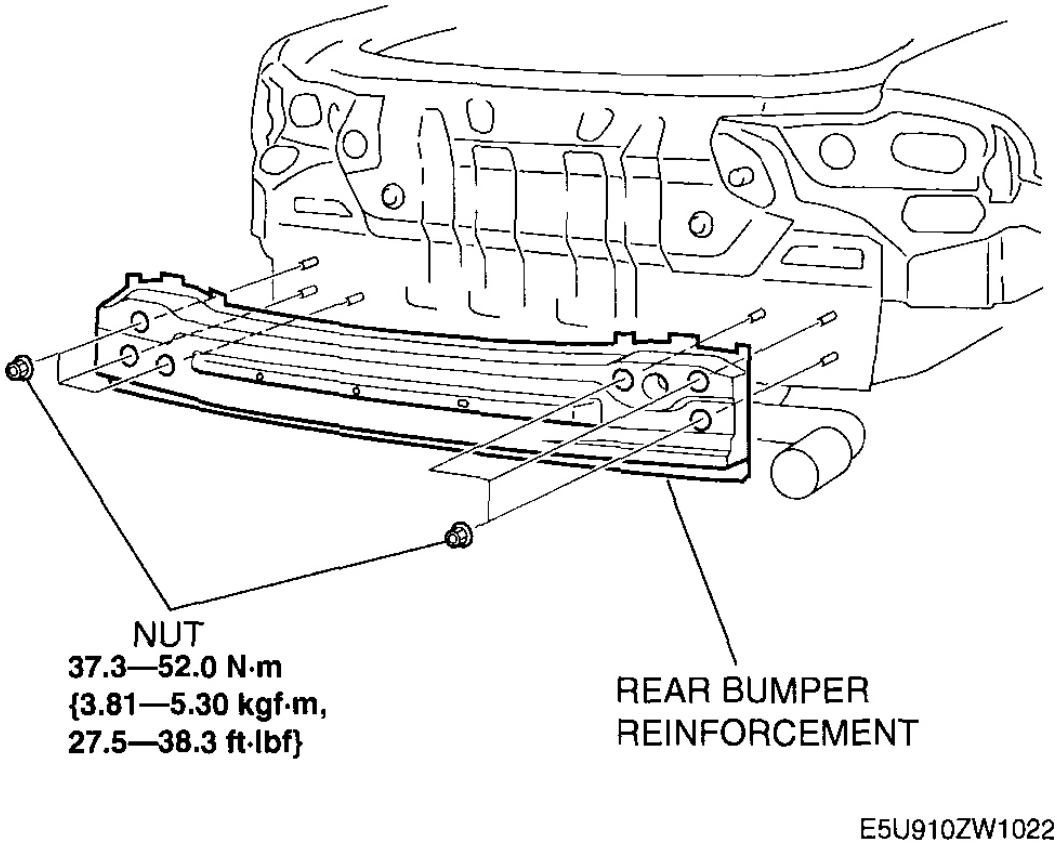
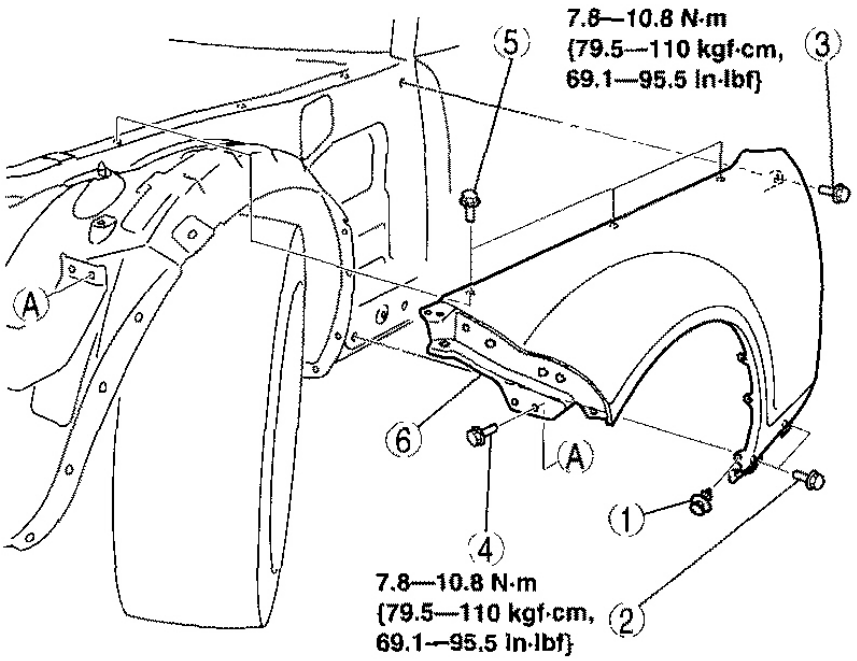


Fig. 11: Removing Rear Bumper Reinforcement (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

FRONT FENDER PANEL REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
3. Remove the front combination lights. (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
4. Remove the side step molding (See **SIDE STEP MOLDING REMOVAL** .) (See **SIDE STEP MOLDING INSTALLATION** .)
5. Remove in the order indicated in **Fig. 12** .



E5U910ZW1023

1	Fastener
2	Bolt A
3	Bolt B
4	Bolt C
5	Bolt D
6	Front fender panel

Fig. 12: Removing/Installing Front Fender Panel (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

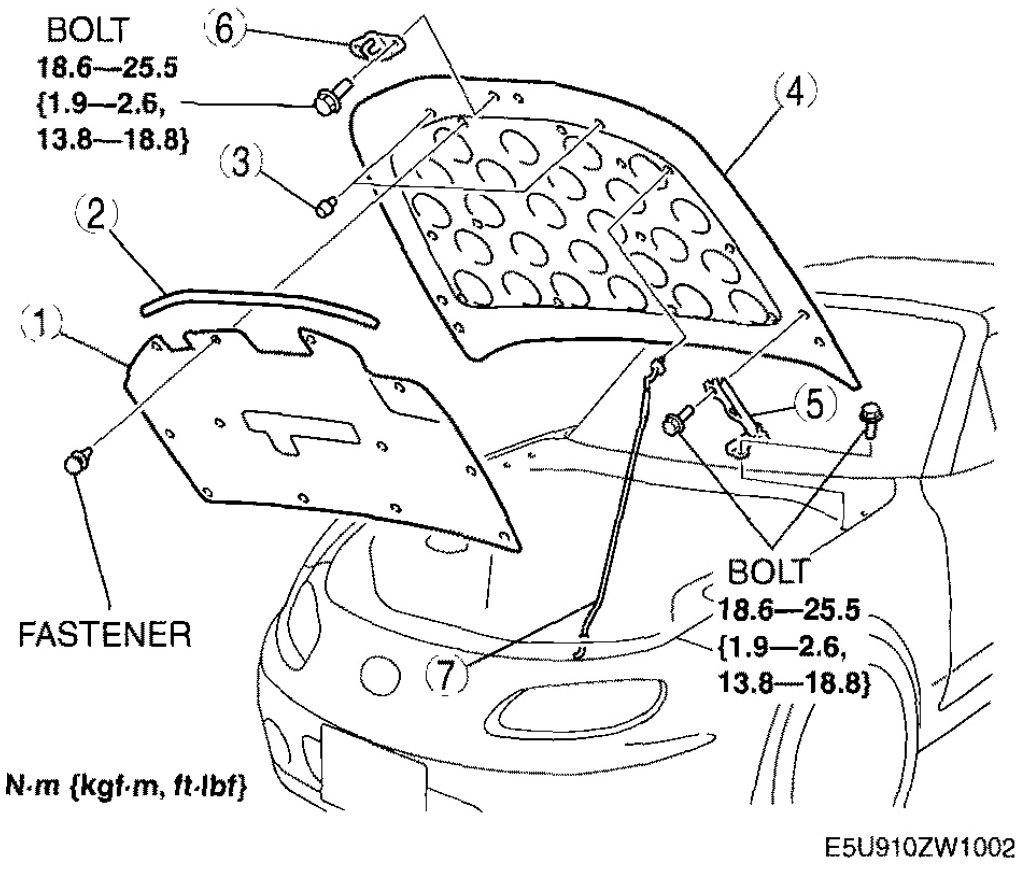
HOOD REMOVAL/INSTALLATION

WARNING:

- **Removing the hood without proper support can be dangerous. The**

hood may fall and injure you. Always perform the following procedure with at least another person.

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. To remove the hood hinge, remove the following parts:
    1. Front bumper (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
    2. Front combination lights (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
    3. Side step molding (See **SIDE STEP MOLDING REMOVAL** .) (See **SIDE STEP MOLDING INSTALLATION** .)
    4. Front fender panel (See **FRONT FENDER PANEL REMOVAL/INSTALLATION** .)
3. Remove in the order indicated in **Fig. 13** .



1	Hood insulator
2	Shroud seal weatherstrip
3	Cushion rubber
4	Hood
5	Hood hinge
6	Hood striker
7	Hood stay

Fig. 13: Removing/Installing Hood (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.
5. Adjust the hood. (See **HOOD ADJUSTMENT** .)

HOOD ADJUSTMENT

GAP ADJUSTMENT

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the following parts:
    1. Front bumper (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
    2. Front combination lights (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
    3. Side step molding (See **SIDE STEP MOLDING REMOVAL** .) (See **SIDE STEP MOLDING INSTALLATION** .)
    4. Front fender panel (See **FRONT FENDER PANEL REMOVAL/INSTALLATION** .)
3. Loosen the hood hinge installation bolts and adjust the hood.
4. Tighten the bolts.

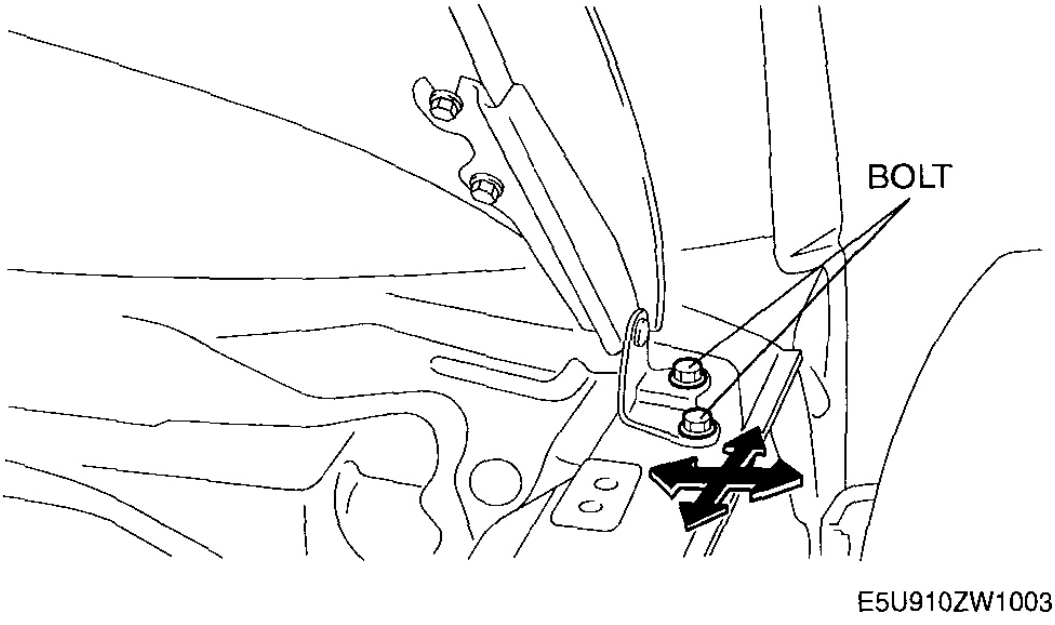


Fig. 14: Adjusting Hood Hinge
Courtesy of MAZDA MOTORS CORP.

5. Verify that the gap between the hood and the body is within the specification.

    Standard clearance

    a. **3.5-6.5 mm {0.14-0.25 in}**

b. **3.0-5.0 mm {0.12-0.19 in}**

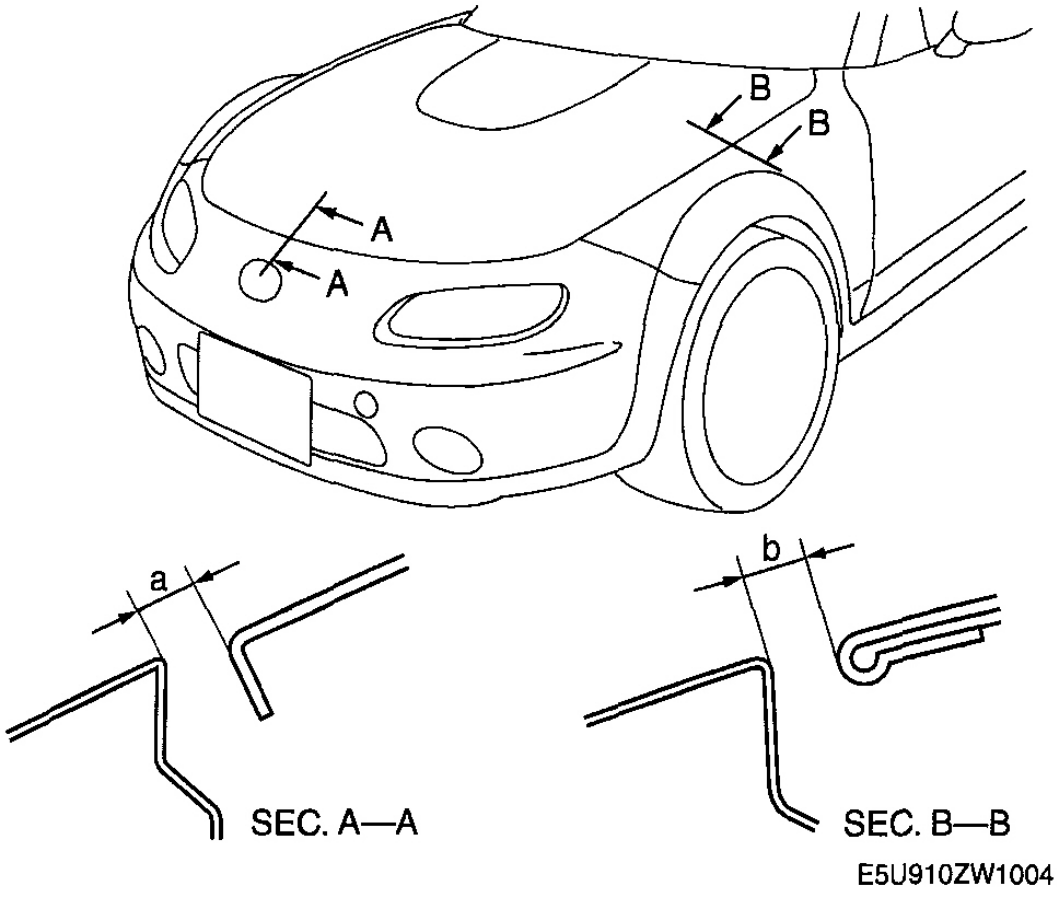


Fig. 15: Identifying Gap Between Hood & Body
Courtesy of MAZDA MOTORS CORP.

HEIGHT DIFFERENCE ADJUSTMENT

1. Turn the stop rubber to adjust the height of the hood.

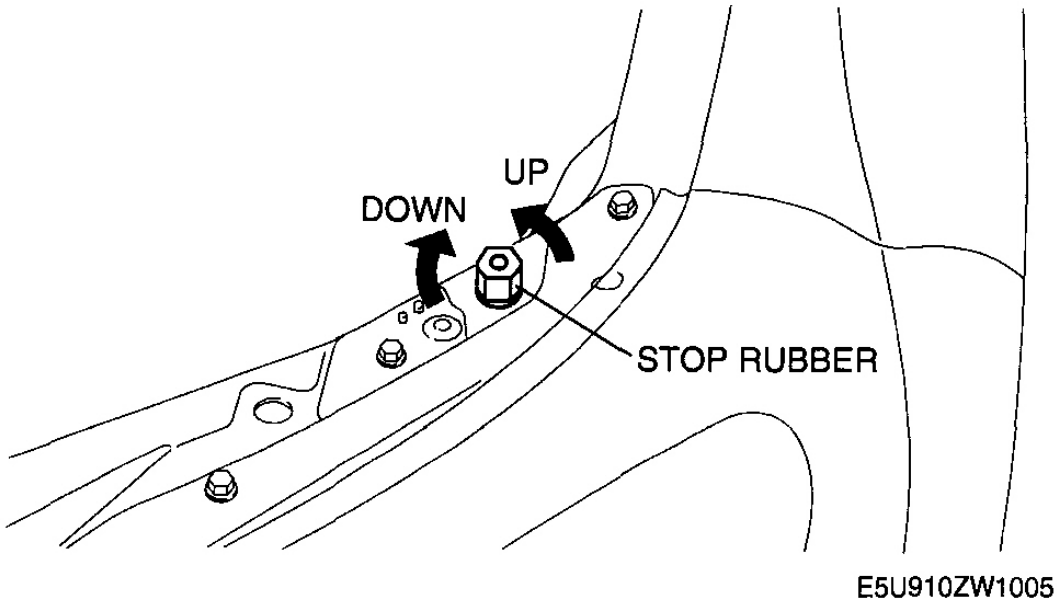


Fig. 16: Turning Stop Rubber To Adjust Height Of Hood
Courtesy of MAZDA MOTORS CORP.

2. Verify that the height difference between the hood and the body is within the specification.

   Standard clearance

   a. **-1.0-2.0 mm {-0.04-0.07 in}**
   b. **-1.5-1.5 mm {-0.06-0.05 in}**
   c. **-0.5-1.5 mm {-0.02-0.05 in}**

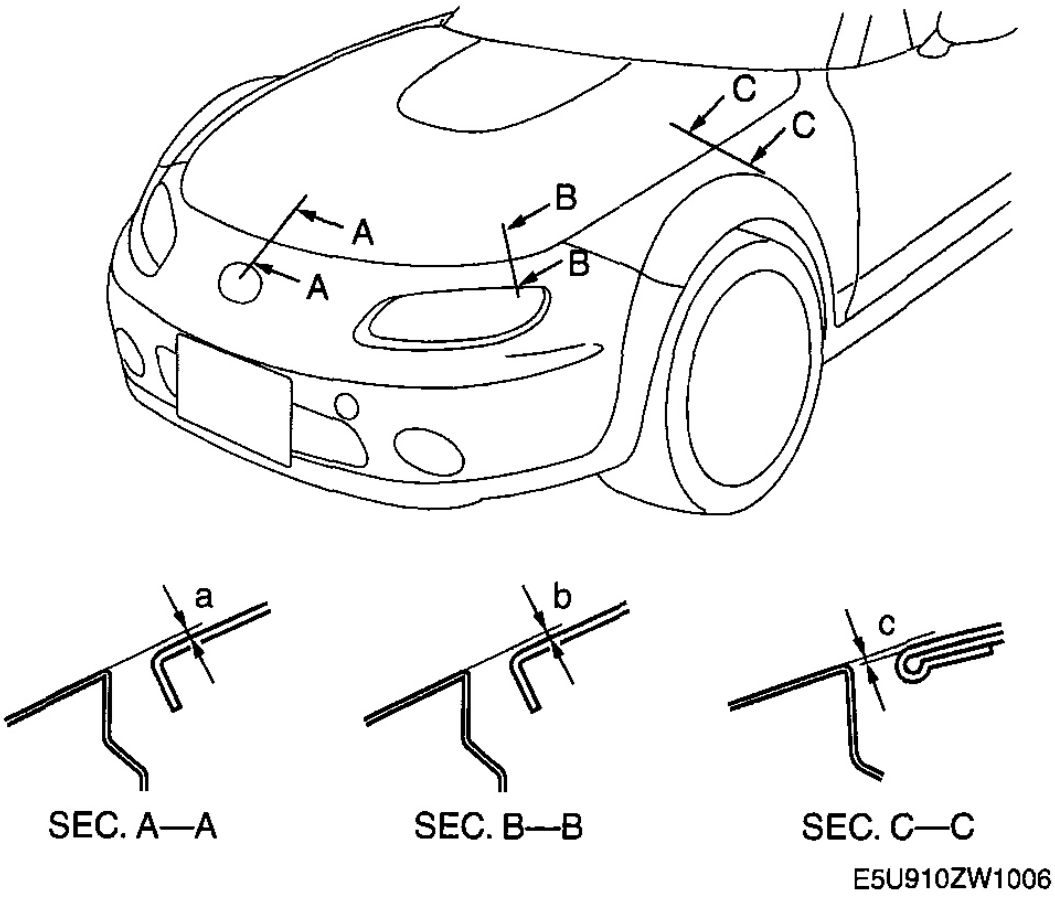


Fig. 17: Identifying Height Difference Between Hood & Body
Courtesy of MAZDA MOTORS CORP.

TRUNK LID REMOVAL/INSTALLATION

WARNING:

- **Removing the stay damper without supporting the trunk lid can be dangerous. The trunk lid may fall and injure you. Be sure to open the trunk lid completely and support it securely before removing the stay damper.**

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the trunk lid wiring harness connector, then take the trunk lid harness out from the vehicle.

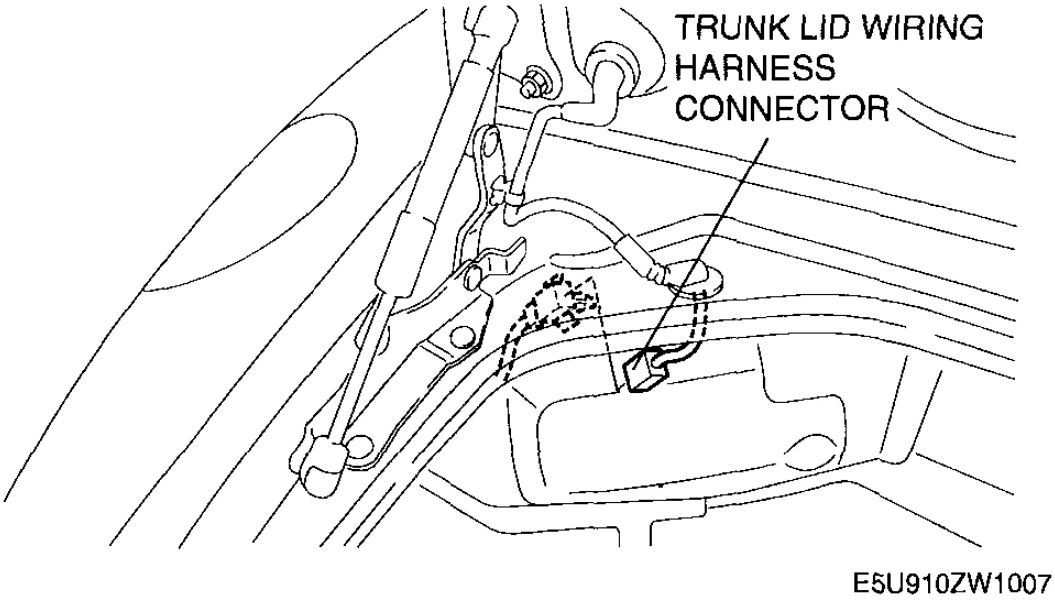


Fig. 18: Disconnecting Trunk Lid Wiring Harness Connector
Courtesy of MAZDA MOTORS CORP.

3. Remove the clips that secure the trunk lid wiring harness.

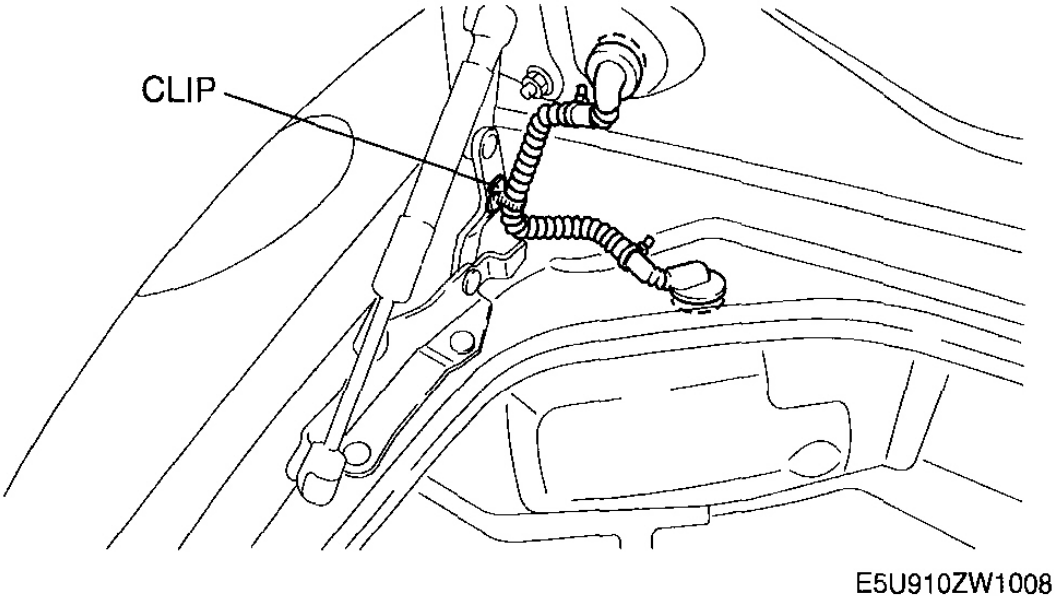


Fig. 19: Removing Trunk Lid Wiring Harness Clips
Courtesy of MAZDA MOTORS CORP.

4. Pry off the stay damper band using a flathead screwdriver.
5. Pry out the connecting part of the stay damper and the hinge with a flathead screwdriver to disconnect them, then remove the stay damper.

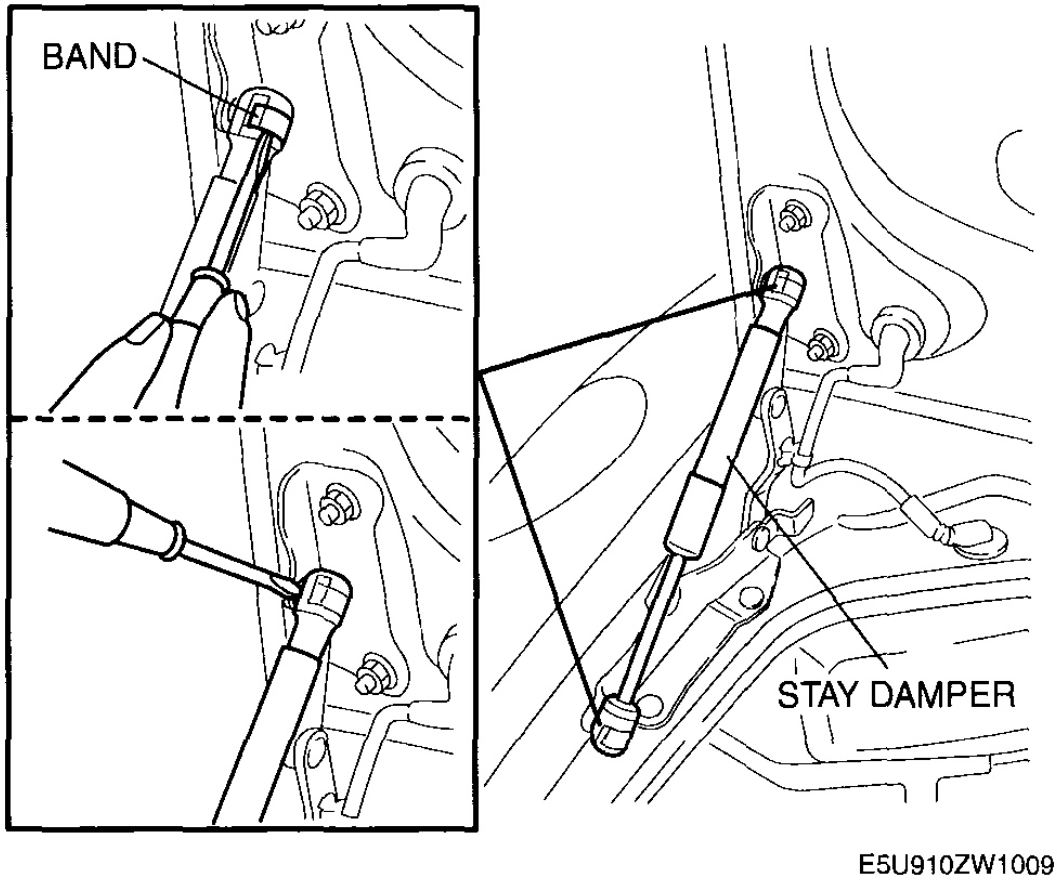


Fig. 20: Prying Out Connecting Part Of Stay Damper & Hinge With Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

6. Remove nuts A, then remove the trunk lid.
7. Remove nuts B, then remove the trunk lid hinge.
8. Install in the reverse order of removal.
9. Adjust the trunk lid. (See **TRUNK LID ADJUSTMENT**)

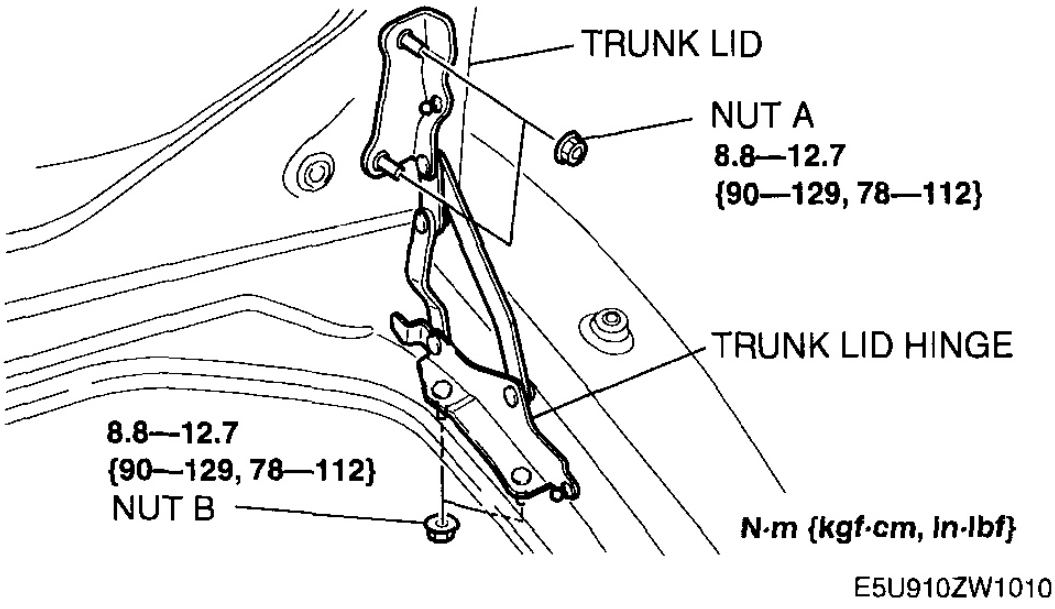


Fig. 21: Removing Trunk Lid Hinge (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

TRUNK LID ADJUSTMENT

1. Measure the gap and height difference between the trunk lid and the body.
2. Loosen the trunk lid hinge installation nuts or the trunk lid lock striker installation screws, and adjust the trunk lid.

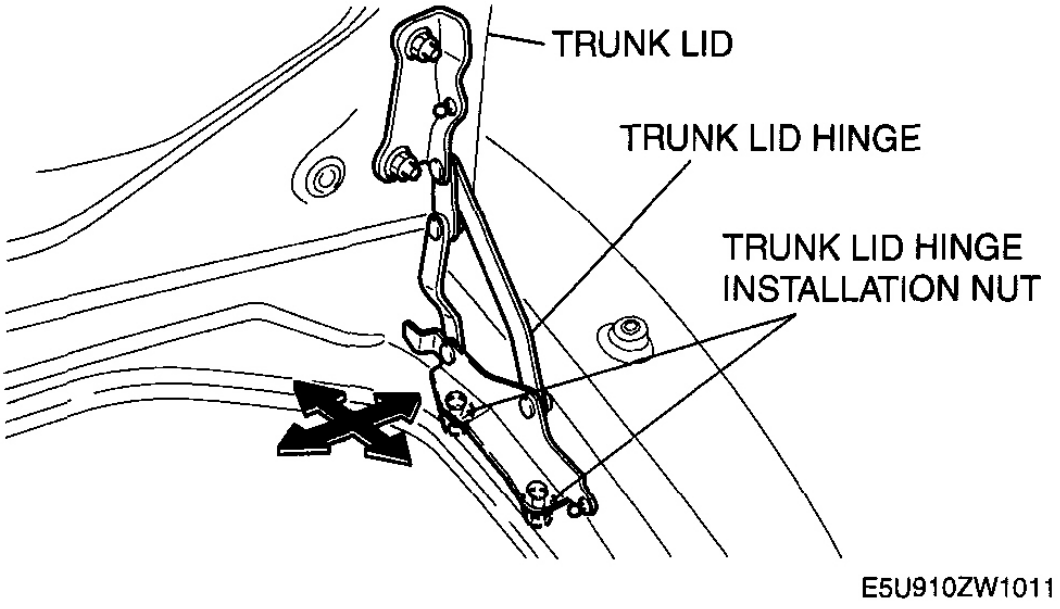


Fig. 22: Adjusting Trunk Lid
Courtesy of MAZDA MOTORS CORP.

Standard clearance

a. **4.5-7.5 mm {0.18-0.29 in} (Except Power Retractable Hardtop) 5.5-8.5 mm {0.22-0.33 in} (Power Retractable Hardtop)**
b. **5.0-9.0 mm {0.20-0.35 in}**
c. **3.0-6.0 mm {0.12-0.23 in} (Except Power Retractable Hardtop) 4.0-8.0 mm {0.16-0.31 in} (Power Retractable Hardtop)**
d. **3.0-5.0 mm {0.12-0.19 in}**

3. Tighten the nuts.

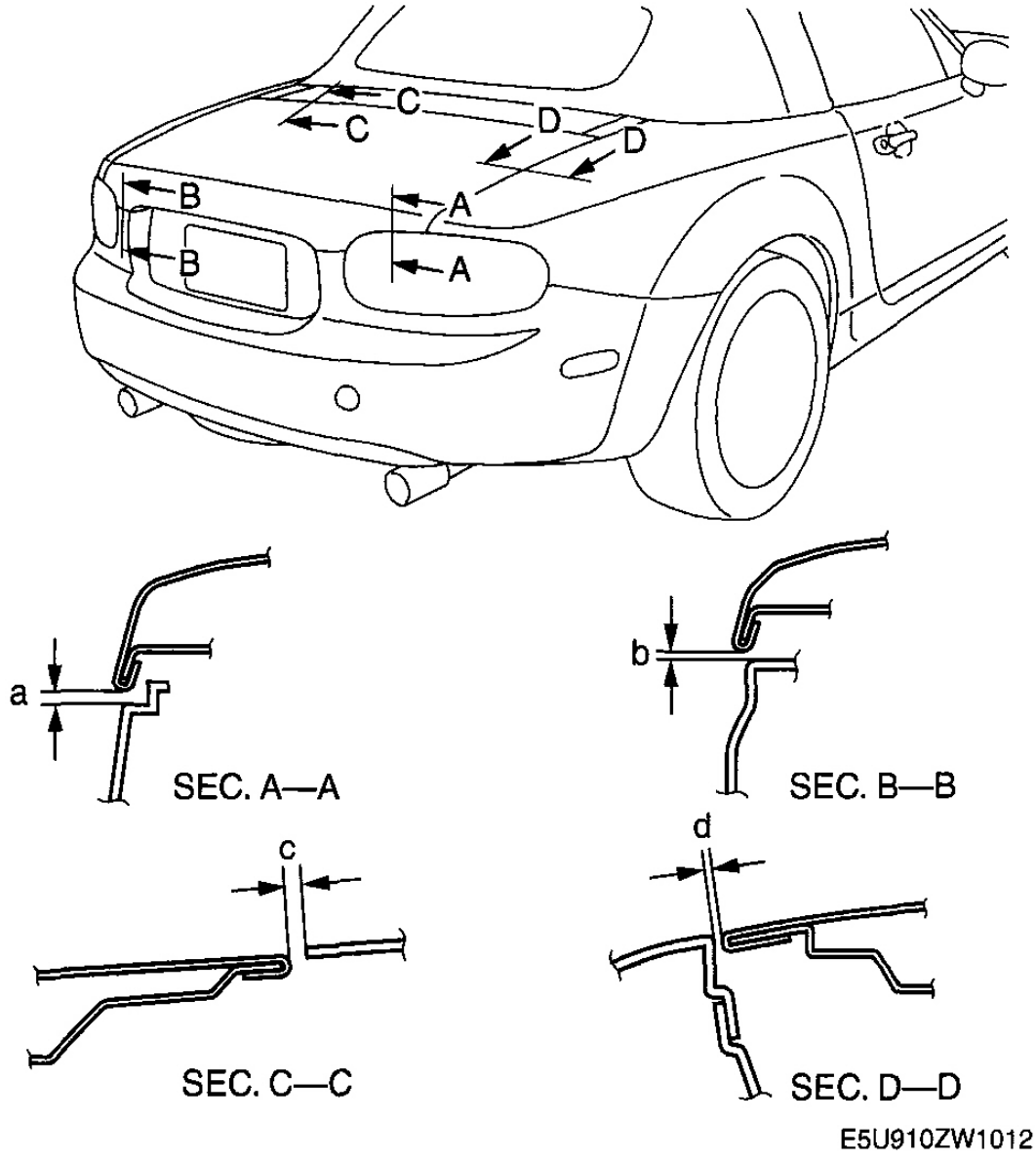


Fig. 23: Identifying Trunk Lid Standard Clearance
Courtesy of MAZDA MOTORS CORP.

STAY DAMPER DISPOSAL

NOTE:

- **The gas in the stay damper is colorless, odorless, and non-toxic.**

1. Wear protective eye wear.

2. Lay the stay damper flat.
3. Saw **2-3 mm {0.08-0.11 in}** into the stay damper using a hacksaw, and allow the gas to escape from the stay damper.
4. Verify that the gas has escaped from the stay damper.
5. Discard the stay damper.

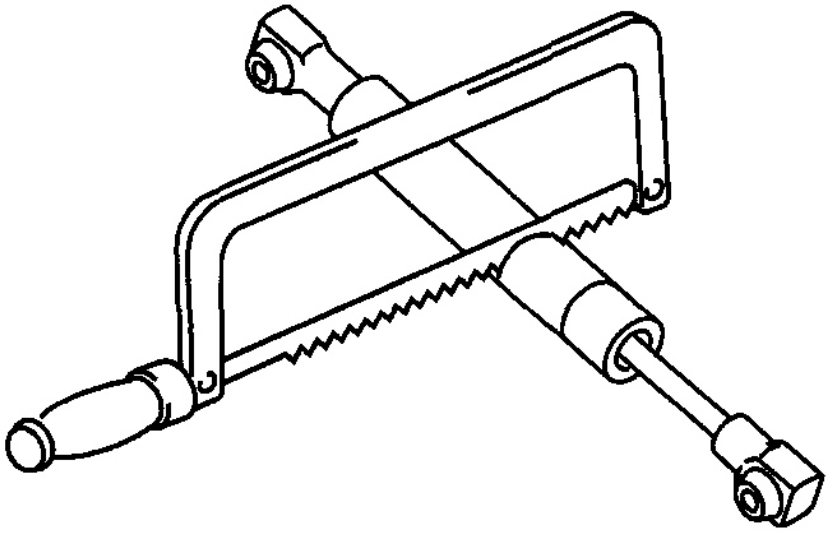
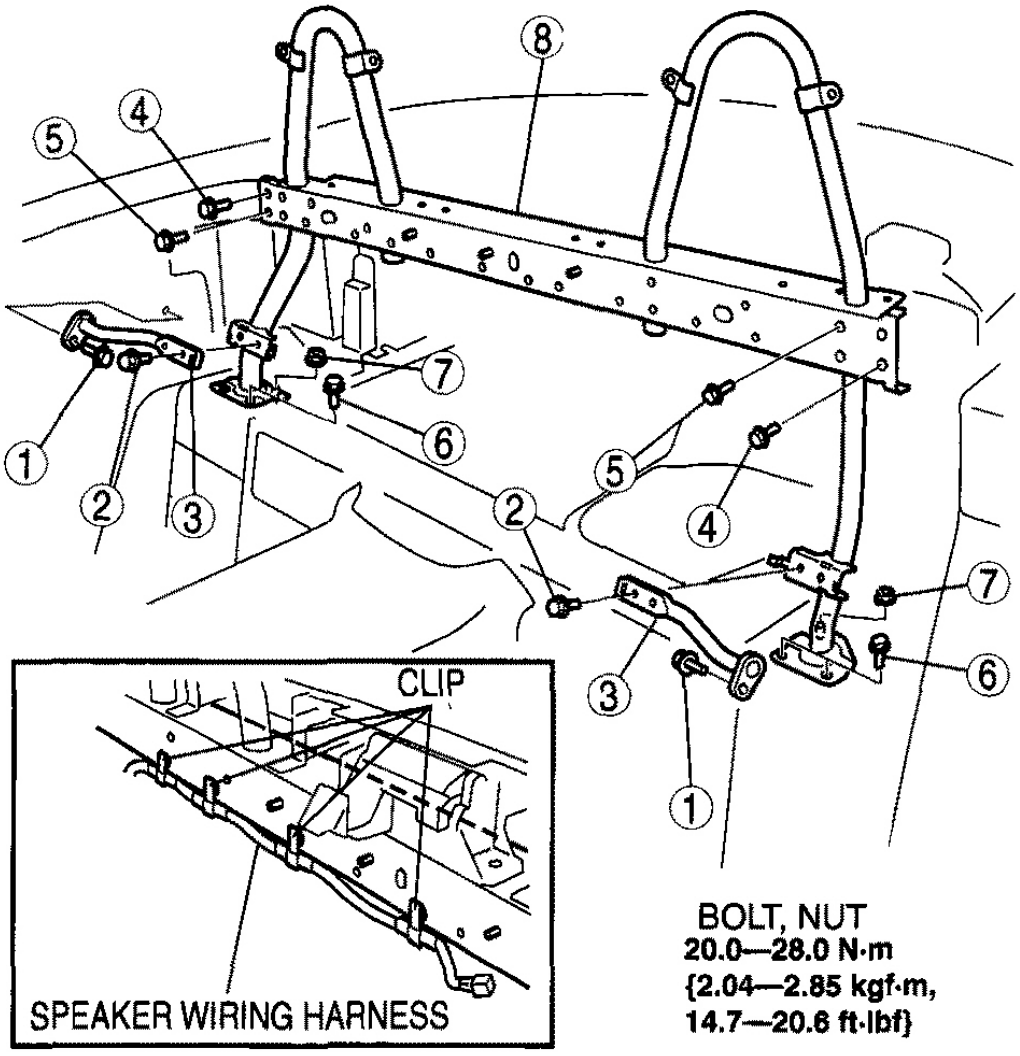


Fig. 24: Cutting Into Stay Damper Using Hacksaw
Courtesy of MAZDA MOTORS CORP.

SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
3. Remove the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
4. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
5. Remove the tire house trim. (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
6. Remove the aeroboard. (See **AEROBOARD REMOVAL/INSTALLATION** .)
7. Remove the seat back bar garnish. (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
8. Remove the open hook lever. (See **BACK TRIM REMOVAL/INSTALLATION** .)

9. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
10. Remove the open hook. (See **OPEN HOOK REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
11. Remove the rear speaker. (See **REAR SPEAKER REMOVAL/INSTALLATION** .)
12. Remove the seat belt set plate. (See **SEAT BELT REMOVAL/INSTALLATION** .)
13. Remove the clips, then remove the speaker wiring harness.
14. Remove in the order indicated in **Fig. 25** .



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1	Bolt A
2	Bolt B
3	Junction
4	Bolt C
5	Bolt D
6	Bolt E
7	Nut
8	Seat Back Crossmember Assembly

Fig. 25: Removing/Installing Seat Back Crossmember Assembly (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

15. Half open the power retractable hardtop

CAUTION: If the seat back crossmember component is removed with the power retractable hardtop fully opened, it may contact the middle roof and damage the roof. Half open the power retractable hardtop before removing the seat back crossmember component.

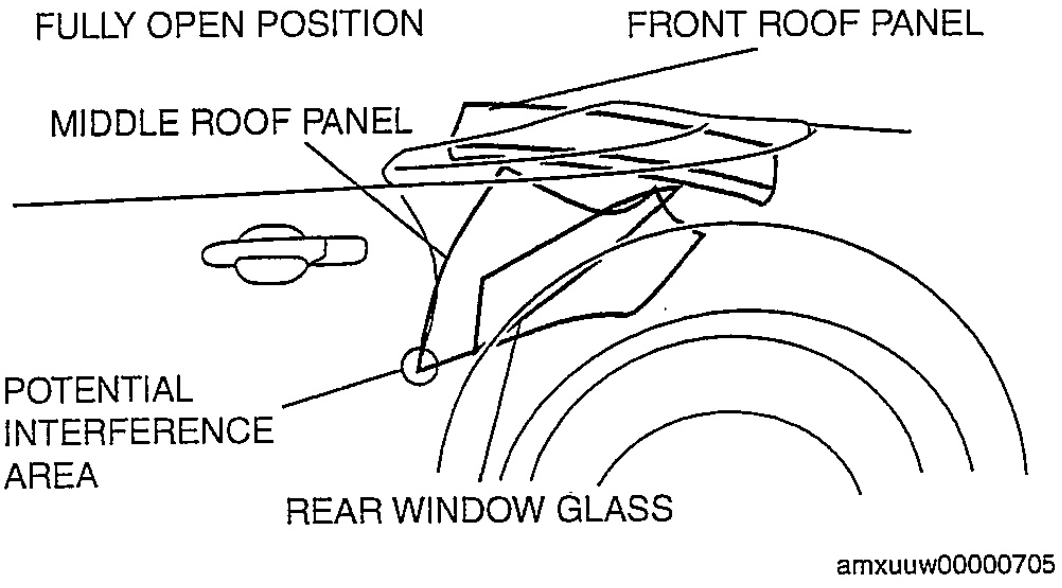


Fig. 26: Power Retractable Hardtop

16. Remove the clips, then remove the speaker wiring harness.
17. Remove in the order indicated in the table.
18. Install in the reverse order of removal.

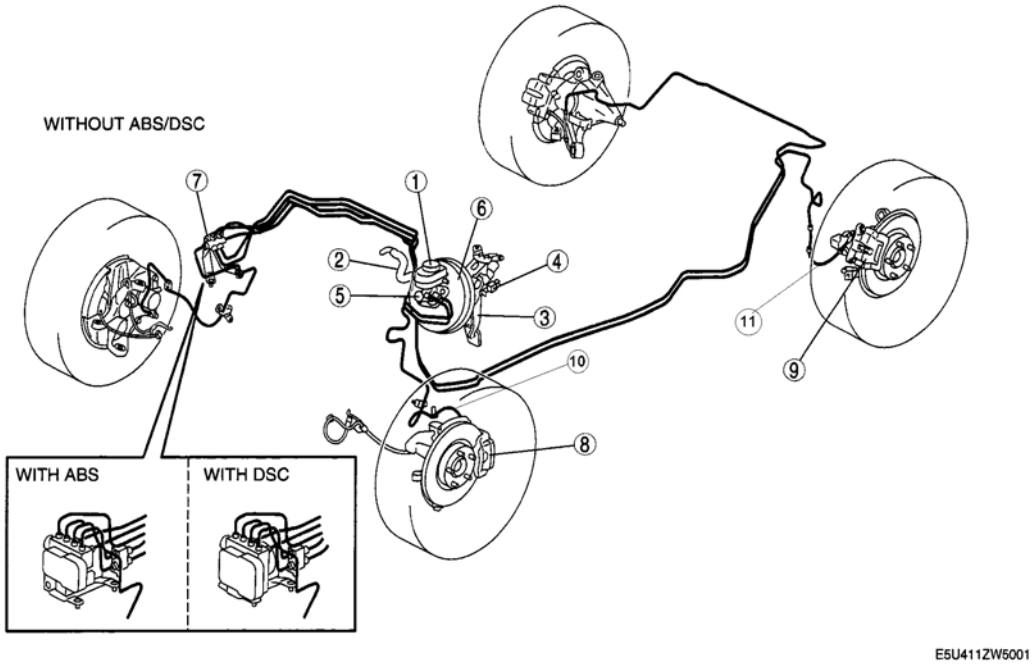
SEAT BACK CROSSMEMBER ASSEMBLY INSTALLATION NOTE

1. After temporarily tightening all of the bolts and nuts, tighten them to the specified torque. Tightening Torque: 20.0-28.0 N.m {2.04-2.85 kgf.m, 14.7-20.6 lb.ft}

2007 BRAKES

Conventional Brake System - MX-5 Miata

CONVENTIONAL BRAKE SYSTEM LOCATION INDEX



1	Brake fluid
2	Vacuum line
3	Brake pedal
4	Brake switch
5	Master cylinder
6	Power brake unit
7	Dual proportioning valve
8	Front brake (disc)
9	Rear brake (disc)
10	Brake hose (Front)
11	Brake hose (Rear)

Fig. 1: Identifying Location Of Conventional Brake System Components
Courtesy of MAZDA MOTORS CORP.

AIR BLEEDING

CAUTION:

- **Brake fluid will damage painted surfaces. Be careful not to spill any on painted surfaces. If it is spilled, wipe it off immediately.**

NOTE:

- **Keep the fluid level in the reserve tank at 3/4 full or more during the air bleeding.**
- **Begin air bleeding with the master cylinder and then continue with the brake caliper that is furthest away from the master cylinder. Finish by bleeding air from the master cylinder again.**

Brake fluid type

SAE J1703, FMVSS 116 DOT-3

1. Remove the bleeder cap from the brake caliper, and connect a vinyl tube to the bleeder screw.
2. Place the other end of the vinyl tube in a clear container, and fill the container with fluid during air bleeding.
3. Working with two people, one should depress the brake pedal a few times and then depress and hold the pedal down.
4. While the brake pedal is being held down, the other person should loosen the bleeder screw using the **SST** , and bleed any fluid containing air bubbles. Once completed, tighten the bleeder screw.

   Tightening torque

   Front: 6.9-9.8 N.m {71-99 Kgf.cm, 62-86 in.lbf}

   Rear: 6.0-8.0 N.m {62-81 Kgf.cm, 54-70 in.lbf}

5. Repeat Steps 3 and 4 until no air bubbles are seen.
6. Perform air bleeding as described in the above procedures for all brake calipers.
7. After air bleeding, inspect the following:
   - Brake operation
   - Fluid leakage
   - Fluid level

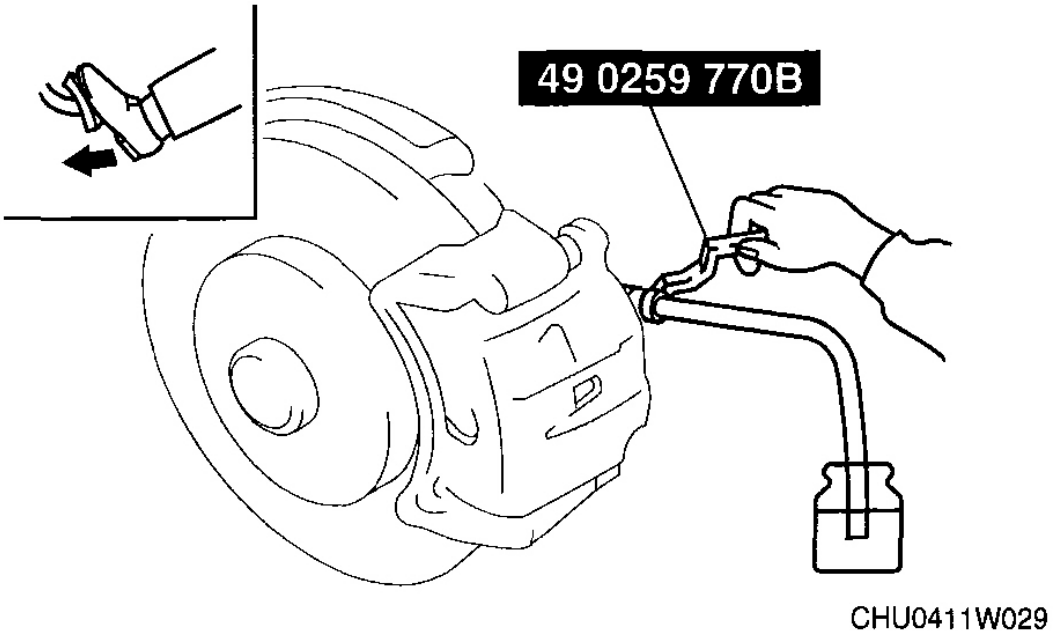


Fig. 2: Brake Bleeding Procedure
Courtesy of MAZDA MOTORS CORP.

VACUUM LINE INSPECTION

1. Remove the vacuum hose between the power brake unit and the intake manifold using pliers.
2. Verify that air can be blown from the power brake unit side of the vacuum hose towards the intake manifold side, and that air cannot be blown in the opposite direction.
    - If there is any malfunction of the inner check valve, replace it together with the vacuum hose as a single unit.

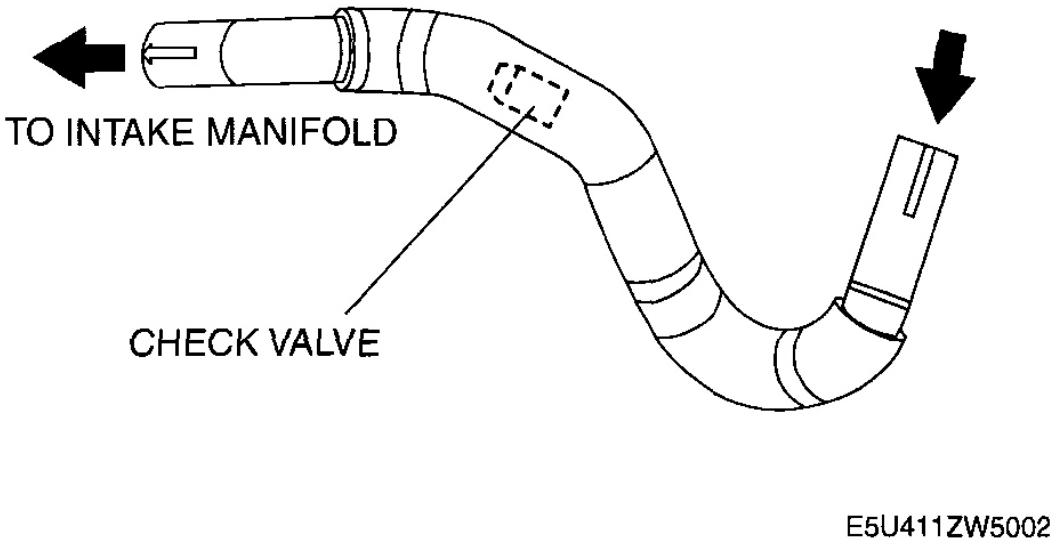


Fig. 3: Inspecting Vacuum Line Check Valve
Courtesy of MAZDA MOTORS CORP.

BRAKE PEDAL INSPECTION

BRAKE PEDAL HEIGHT INSPECTION

1. Measure the distance from the center of the upper surface of the pedal pad to the insulator and verify that it is as specified.
    - If not within the specification, adjust the pedal height.

Brake pedal height (reference value) 167 mm {6.57 in}

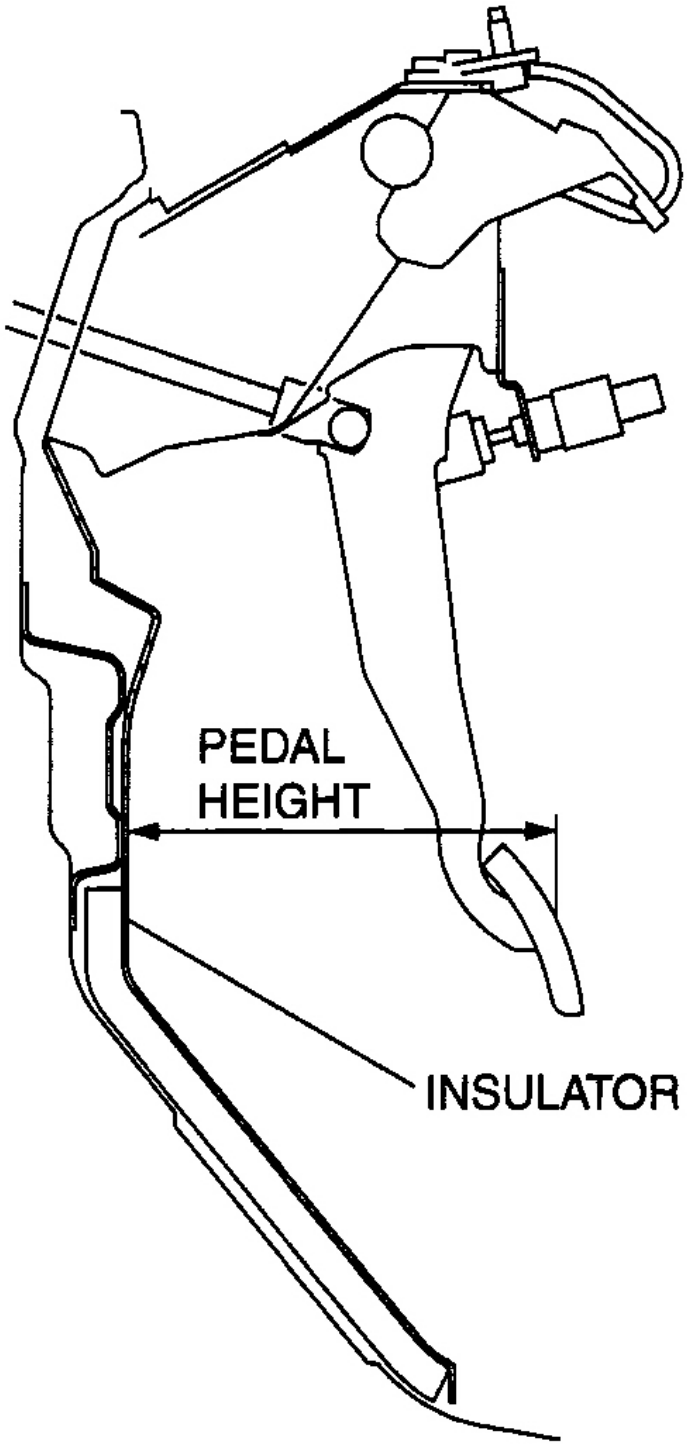


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Fig. 4: Inspecting Brake Pedal Height
Courtesy of MAZDA MOTORS CORP.

BRAKE PEDAL HEIGHT ADJUSTMENT

CAUTION:

- **The brake switch may not operate normally after adjusting the pedal height. Whenever adjusting the pedal height, replace the brake switch with a new one.**
- **The interlock cable may not operate normally after adjusting the pedal height. Whenever adjusting the pedal height, refer to the interlock cable installation note. (See INTERLOCK CABLE INSTALLATION NOTE .)**

1. Loosen the locknut and turn the push rod to adjust the pedal height.
2. Tighten the locknut.

   Tightening torque

   20.4-30.6 N.m {2.09-3.12 Kgf.m, 15.0-22.5 ft.lbf}

3. After adjustment, inspect the pedal play.

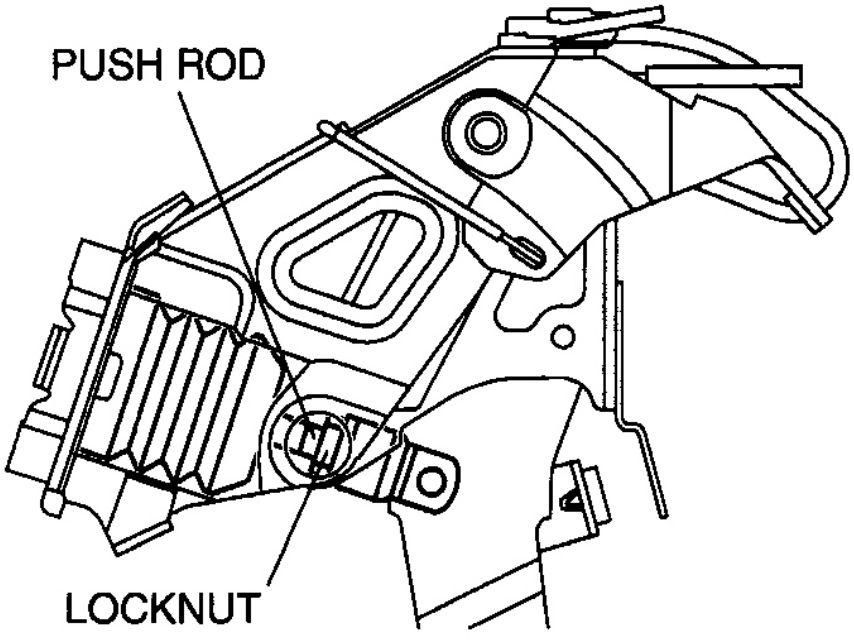

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Fig. 5: Adjusting Brake Pedal Height
Courtesy of MAZDA MOTORS CORP.

BRAKE PEDAL PLAY INSPECTION

1. Depress the pedal several times to release the vacuum in the power brake unit.
2. Gently depress the pedal by hand, and measure the pedal play.
   - If not within the specification, inspect the wear of the clevis pin and replace it if there is any malfunction.

Brake pedal play

2-5 mm {0.08-0.19 in}

NOTE:

- **If there is no malfunction in the clevis pin, there is a possibility that the power brake unit has some malfunction. Verify that there are no malfunctions, and replace it if necessary.**

PEDAL-TO-FLOOR CLEARANCE INSPECTION

1. Start the engine and depress the pedal with a pedal force of **147 N {15.0 kgf, 33.0 lbf}** .
2. Measure the distance between the pedal pad center and the insulator, and verify that it is as specified.
   - If the pedal-to-floor clearance is less than the specification, check for air in the brake system.

Brake pedal-to-floor clearance (Brake pedal when depressed at 147 N {15.0 kgf, 33.0 lbf}

106.9 mm {4.209 in} or more

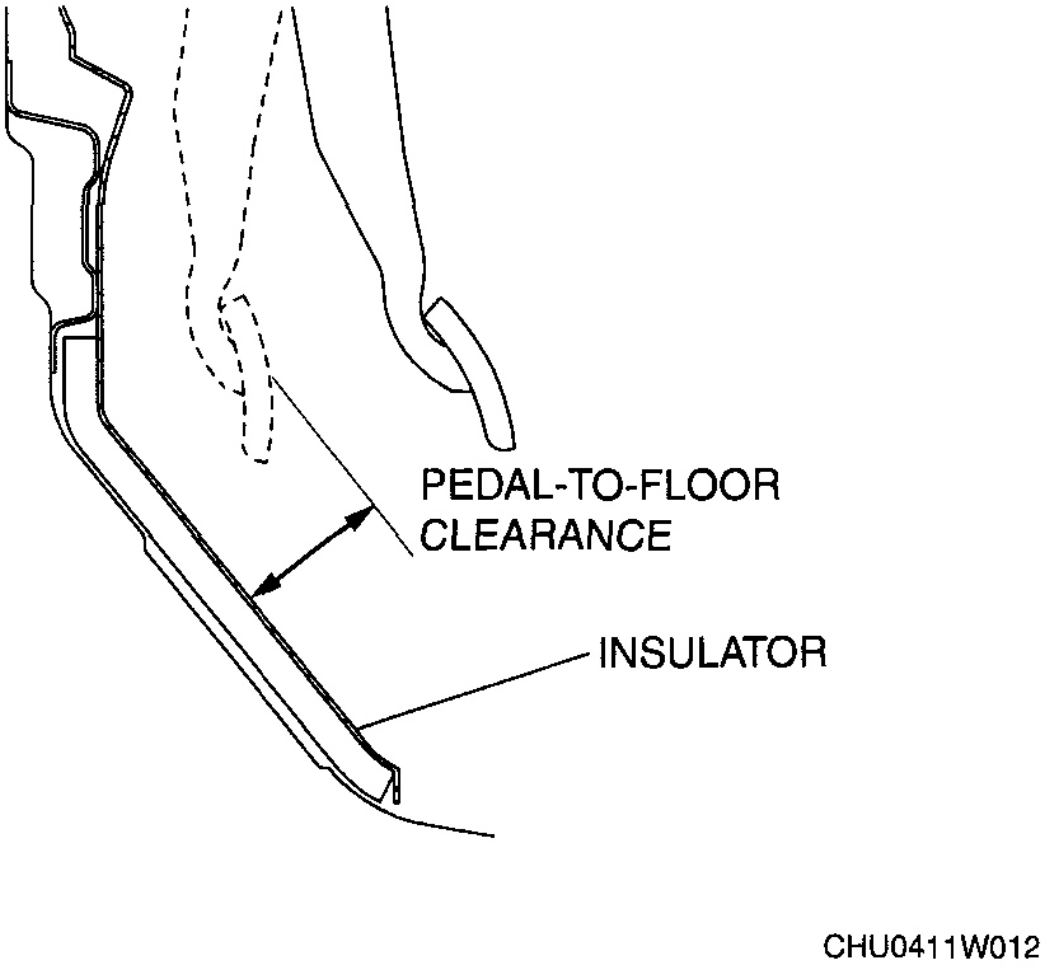


Fig. 6: Inspecting Pedal-To-Floor Clearance
Courtesy of MAZDA MOTORS CORP.

BRAKE PEDAL REMOVAL/INSTALLATION

CAUTION:

- **The clearance between the brake switch and the brake pedal is automatically adjusted to the correct amount when the brake switch connector is connected after the brake switch has been properly installed. If the brake switch is not properly installed or the connector is connected before installation, the clearance may be incorrect, causing a brake light malfunction. Therefore, always verify that the brake switch is properly installed before connecting the connector.**
- **Once the brake switch clearance has automatically been adjusted, it cannot be adjusted again. Therefore, replace the switch with a new**

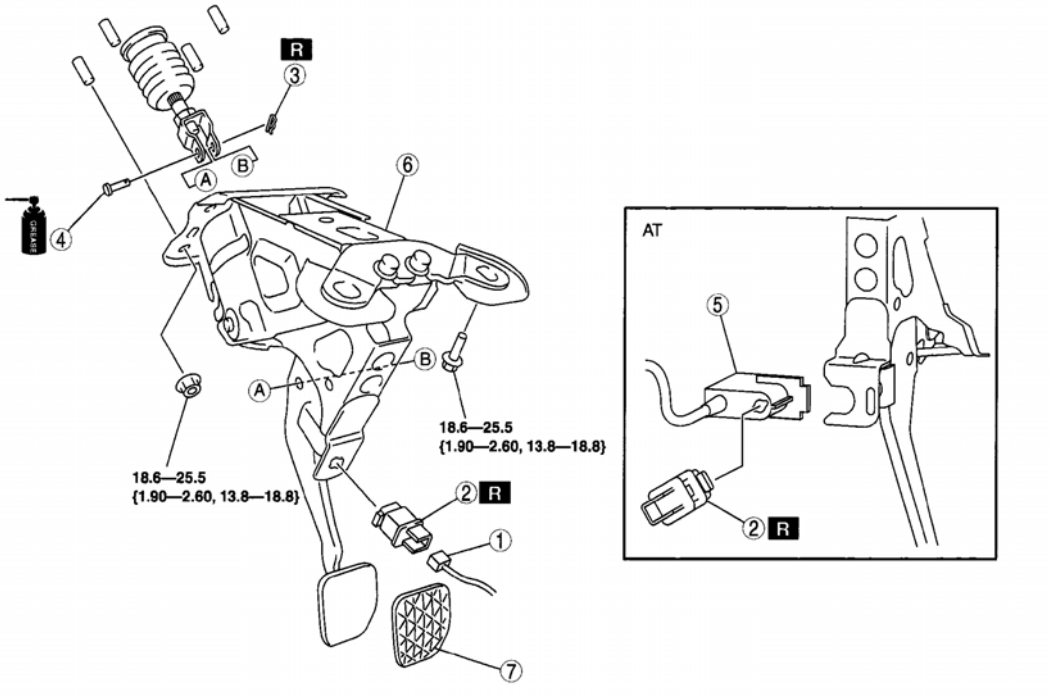
one when replacing the power brake unit or the pedal, or performing any procedure that changes the pedal stroke.

- **When replacing the brake pedal (AT), it is possible that the installation of the interlock cable could become defective. Always refer to the interlock cable installation note when replacing the brake pedal. (See INTERLOCK CABLE INSTALLATION NOTE .)**

NOTE:

- **When the brake switch connector is connected to the brake switch, the clearance between the pedal and the brake switch is adjusted automatically. However, this mechanism will only function one time.**

1. Remove in the order indicated in **Fig. 7**.
2. Install in the reverse order of removal.



1	Brake switch connector
2	Brake switch
3	Snap pin

4	Clevis pin
5	Interlock cable (AT)
6	Brake pedal
7	Pedal pad

Fig. 7: Identifying Brake Pedal Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

BRAKE PEDAL REMOVAL NOTE

1. Move the power brake unit to the vehicle front where the power brake unit fork does not interfere with the brake pedal arm.
2. Remove the brake pedal.

BRAKE SWITCH INSTALLATION NOTE

1. Install the new brake switch to the brake pedal (MT) or the interlock cable (AT), and secure it by turning it clockwise **45°** (AT) or counterclockwise **45°** (MT).

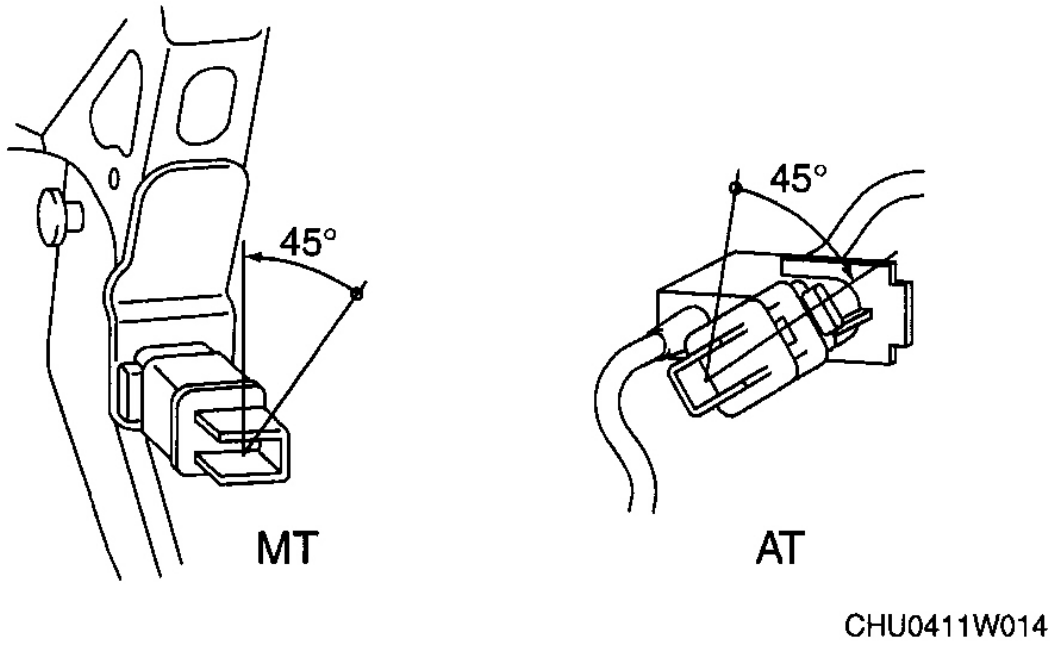


Fig. 8: Identifying Brake Switch Installing Angle
Courtesy of MAZDA MOTORS CORP.

BRAKE SWITCH CONNECTOR INSTALLATION NOTE

1. Inspect the brake pedal. (See **BRAKE PEDAL INSPECTION** .)
2. With the brake pedal in its original position, install the brake switch to the brake switch connector.

BRAKE SWITCH INSPECTION

CAUTION:

- **If the brake switch is removed from the brake pedal or the interlock unit, its proper functioning cannot be guaranteed when reinstalled. Therefore, inspect the brake switch with it still installed, or replace**

the brake switch if it is removed.

1. Verify continuity as indicated in **Fig. 9** .
   - If not as indicated in **Fig. 9** replace the brake switch.

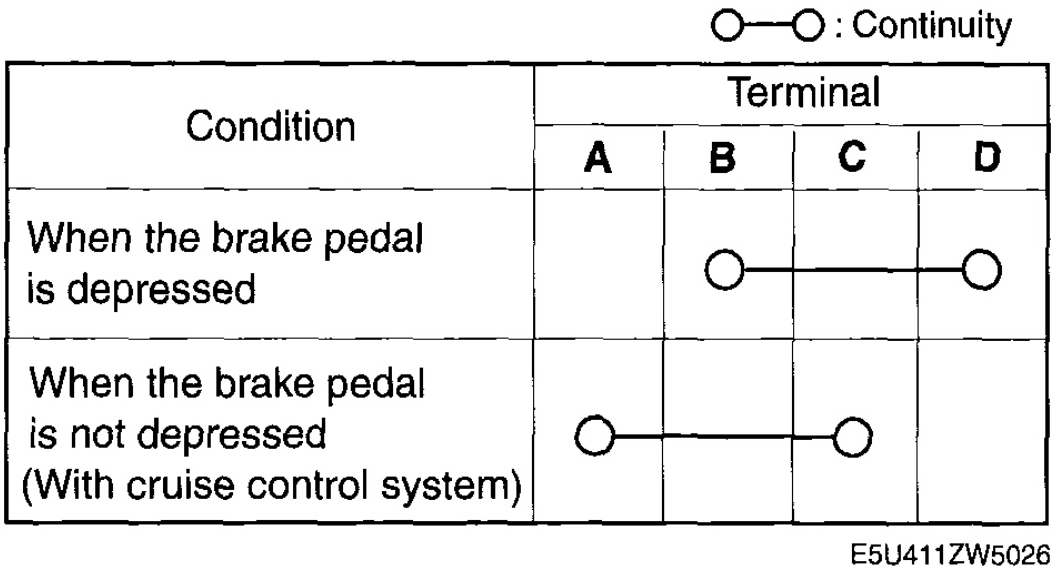


Fig. 9: Terminal Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

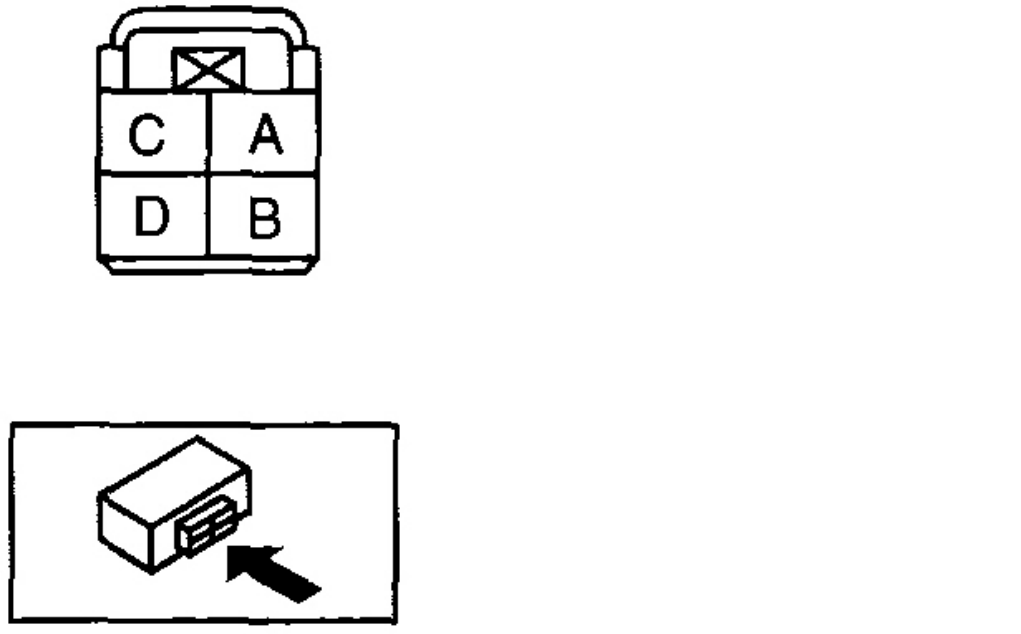
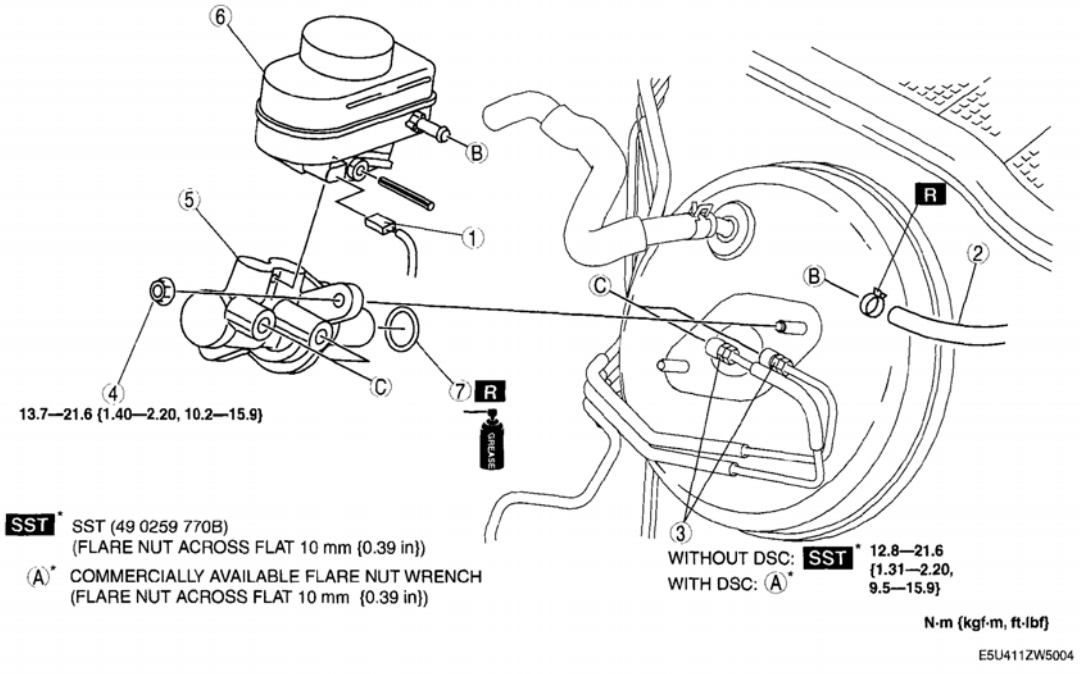


Fig. 10: Identifying Brake Switch Connector
Courtesy of MAZDA MOTORS CORP.

MASTER CYLINDER REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 11** .
2. Install in the reverse order of removal.



1	Brake fluid level sensor connector
2	Hose (MT)
3	Brake pipe
4	Nut

5	Master cylinder
6	Reserve tank
7	O-ring

Fig. 11: Identifying Master Cylinder Removing/Installing Steps (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

MASTER CYLINDER INSTALLATION NOTE

CAUTION:

- **If the master cylinder is installed at an angle, the master cylinder piston may push against the push rod retainer of the power brake unit causing poor air bleeding, brake drag, or other malfunctions. Be sure to install the master cylinder at a perpendicular angle to the power brake unit.**

1. Install the **SST** to the power brake unit and tighten to the specified torque.

   Tightening torque

   13.7-21.6 N.m {1.4-2.2 kgf.m, 10.2-15.9 ft.lbf}

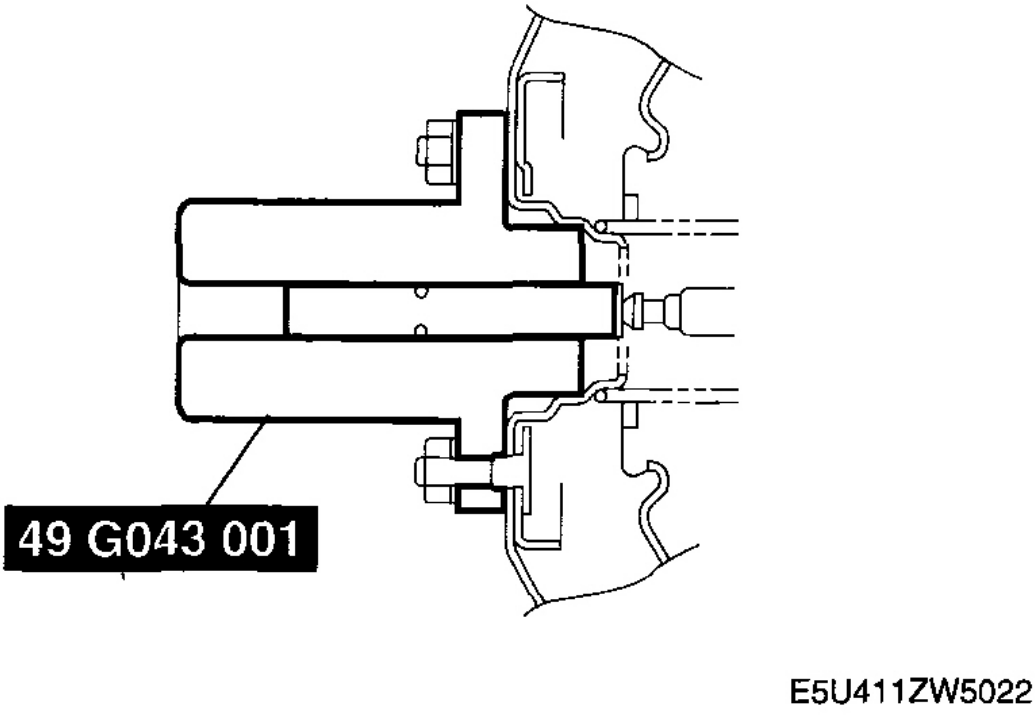


Fig. 12: Identifying Special Tool To Power Brake Unit
Courtesy of MAZDA MOTORS CORP.

2. Apply a vacuum of **66.7 kPa {500 mmHg, 19.7 inHg}** to the power brake unit using a vacuum gauge.

NOTE:

- **Use any commercially available vacuum gauge.**

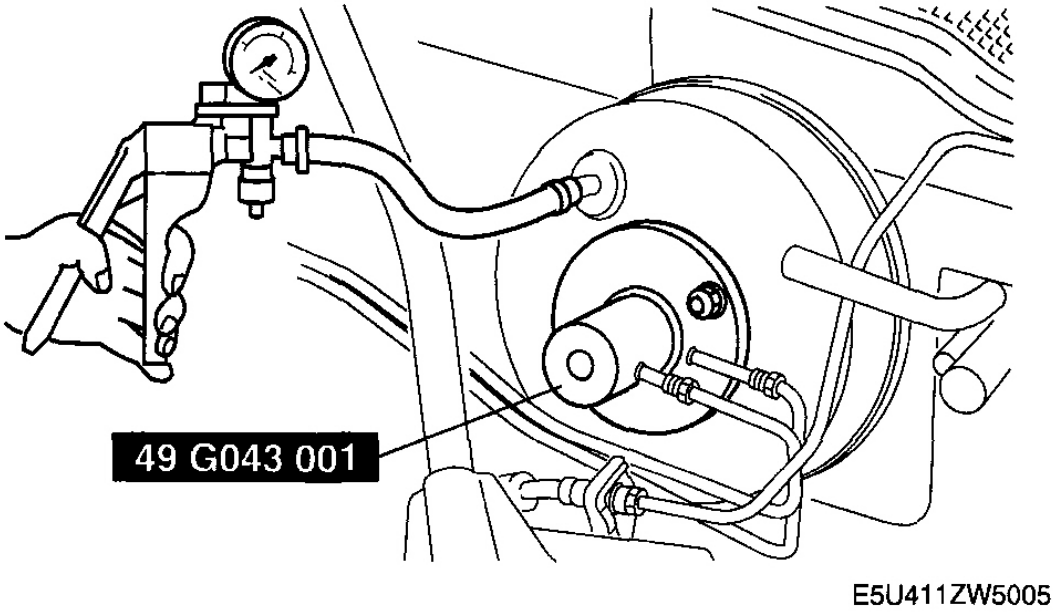


Fig. 13: Applying Vacuum To Power Brake Unit Using Vacuum Gauge
Courtesy of MAZDA MOTORS CORP.

3. Using calipers, measure dimension L as shown in **Fig. 14** .

   Standard L dimension

   30.4-30.6 mm {1.197-1.204 in}

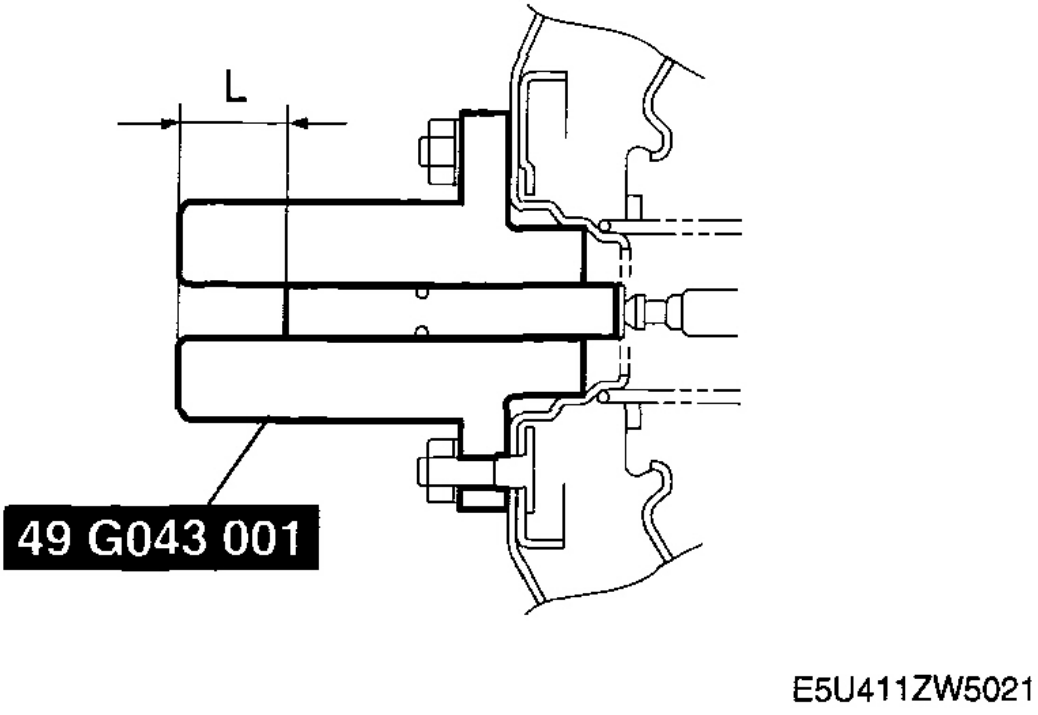


Fig. 14: Measuring Dimension L Using Calipers
Courtesy of MAZDA MOTORS CORP.

4. If dimension L is not within the standard, remove the **SST** (49 G043 001) and, while stopping the push rod rotation with the **SST** (49 E043 003A), adjust the push rod length with the **SST** (49 B043 004).
5. Switch the **SSTs** and remeasure dimension L.

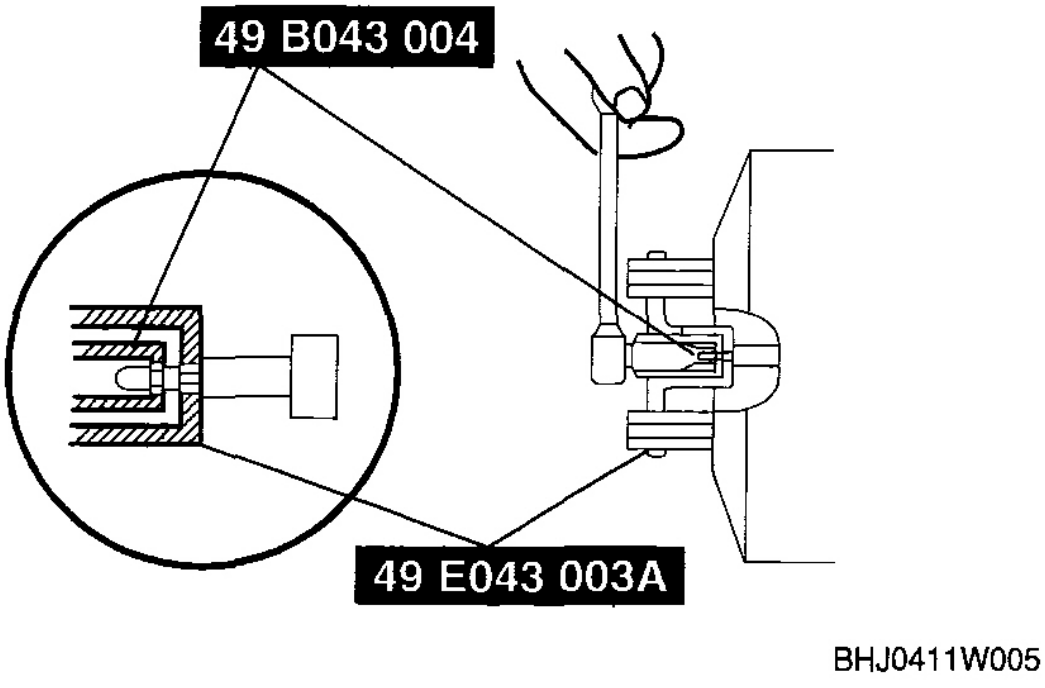


Fig. 15: Adjusting Pushrod Length
Courtesy of MAZDA MOTORS CORP.

6. Install the master cylinder to the power brake unit.

BRAKE FLUID LEVEL SENSOR INSPECTION

1. Disconnect the brake fluid level sensor connector from the master cylinder.
2. Inspect for continuity according to fluid level between the brake fluid level sensor terminals.
   - If not as indicated in **Fig. 16** , replace the reserve tank.

O—O: Continuity

Condition	Terminal	
	A	B
Above MIN		
Below MIN	O	O

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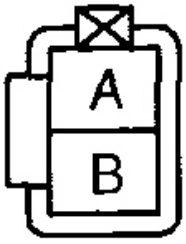
Fig. 16: Brake Fluid Sensor Terminal Continuity Table
Courtesy of MAZDA MOTORS CORP.



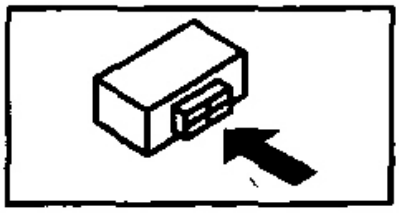


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Fig. 17: Identifying Brake Fluid Level Sensor Connector
Courtesy of MAZDA MOTORS CORP.

POWER BRAKE UNIT INSPECTION

NOTE:

- **The following inspection methods are simple inspection methods to judge the function of the power brake unit.**
- **If there is any malfunction in the power brake unit, replace the power brake unit as a single unit.**

WITHOUT USING SST

Operation Inspection

1. With the engine stopped, depress the pedal several times.
2. With the pedal depressed, start the engine.
3. If the pedal moves down slightly immediately after starting the engine, the unit is normal.

Vacuum Function Inspection

1. Start the engine.
2. After driving the vehicle for **1-2 min** , stop the engine.
3. Depress the pedal with normal force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is normal.
    - If a problem is found, inspect for damage to or improper installation of the check valve and vacuum hose. After repairing, inspect again.

Vacuum Loss Function Inspection

1. Start the engine.
2. Depress the pedal with normal force.
3. With the pedal depressed, stop the engine.
4. Maintain the pedal depressed for **approx. 30 s** .
5. If the pedal height does not change during this time, the unit is normal.

USING SST

Pre-inspection Preparation

1. Install the **SST** (49 N043 001) in the orientation shown in **Fig. 18** , (with DSC)

NOTE:

- **Install the SST (49 N043 001) to the master cylinder using a commercially available flare nut wrench.**

- **Flare nut across flat: 12 mm {0.47 in}**

2. Connect the **SSTs** , a vacuum gauge and a pedal force gauge to the master cylinder and bleed the air from the **SSTs** and the brake line. (Bleed the air from the **SSTs** through air bleeding valve A.)

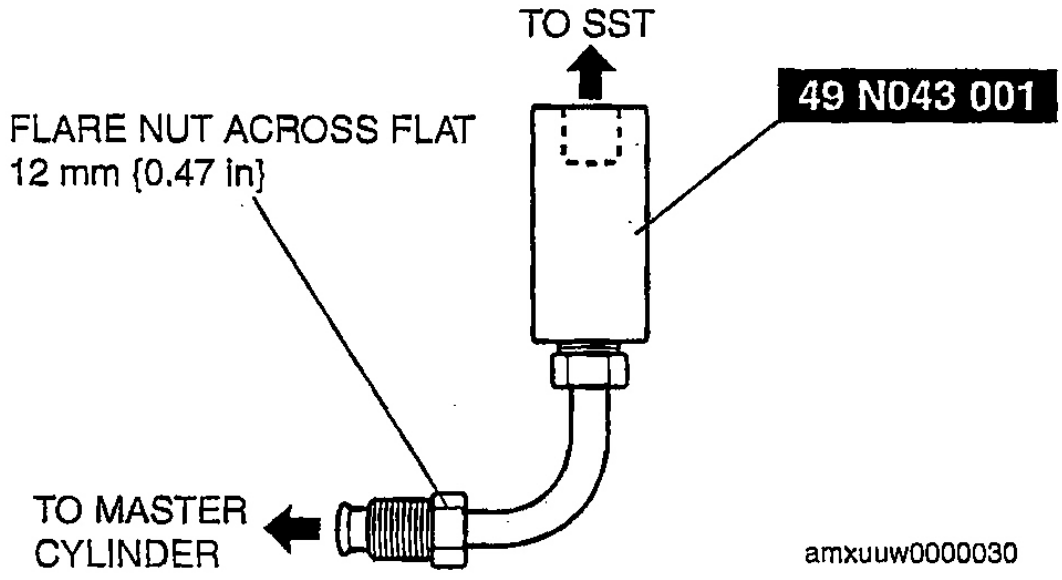


Fig. 18: Installing SST (49 N043 001)
Courtesy of MAZDA MOTORS CORP.

WITHOUT DSC

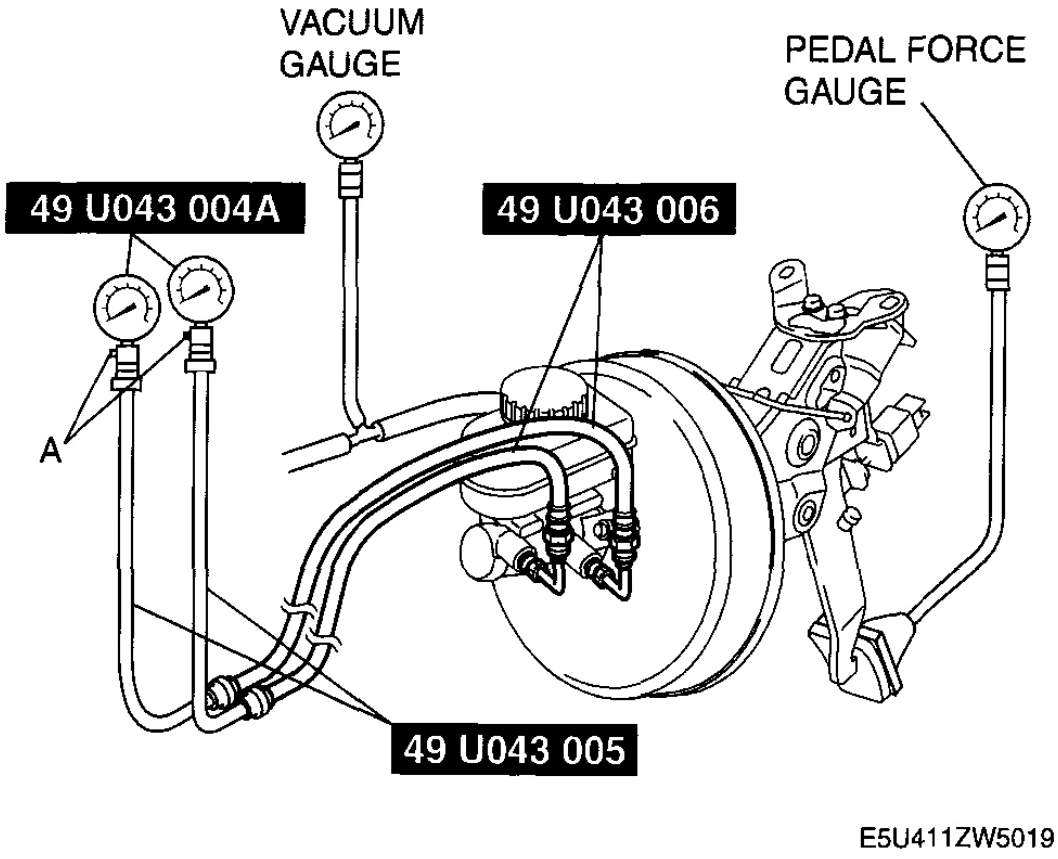


Fig. 19: Inspecting Vacuum Loss Function - Without DSC
Courtesy of MAZDA MOTORS CORP.

WITH DSC

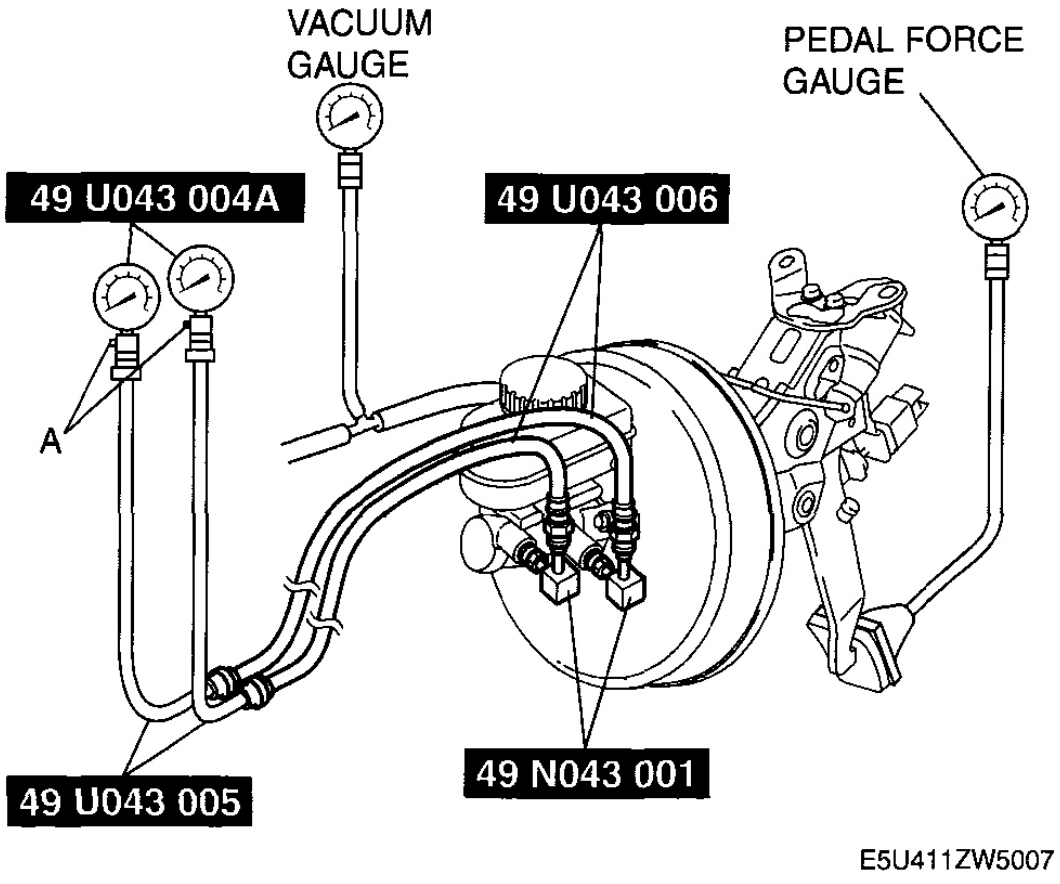


Fig. 20: Inspecting Vacuum Loss Function - With DSC
Courtesy of MAZDA MOTORS CORP.

Checking For Vacuum Loss (Loaded Condition)

1. Start the engine.
2. Depress the brake pedal with a force of **200 N {20.4 kgf, 44.9 lbf}** .
3. With the brake pedal depressed, turn off the engine when the vacuum gauge reaches **68 kPa {510 mmHg, 20.1 inHg}** .
4. Within **15 s** right after stopping the engine, measure the lowest amount of vacuum.
5. If the lowest amount is **3.3 kPa {25 mmHg, 1.0 inHg}** or less, the system is normal.

Lack of Hydraulic Pressure Inspection

1. With the engine stopped and the vacuum amount at **0 kPa {0 mmHg, 0 inHg}** if the pedal force and fluid pressure correlation is within the specification, the system is normal.

Power Brake Unit Fluid Pressure

POWER BRAKE UNIT FLUID PRESSURE SPECIFICATIONS

Vacuum amount at o kPa {0 mmHg, 0 inHg}	
Pedal force (N {kgf, lbf})	Fluid pressure (kPa {kgf/cm^2 , psi})
200 {20.4, 44.9}	620 {6.33, 90.0} or more

Hydraulic Pressure Inspection

1. Start the engine and when the vacuum amount reaches **66.7 kPa {500 mmHg, 19.7 inHg}** , depress the brake pedal.
2. At this time, apply the indicated pedal force and if the fluid pressure is within the specification, the unit is normal.

Power Brake Unit Fluid Pressure

POWER BRAKE UNIT FLUID PRESSURE SPECIFICATIONS

Vacuum amount at 66.7 kPa {500 mmHg, 19.7 inHg}	
Pedal force (N {kgf, lbf})	Fluid pressure (kPa {kgf/cm^2 , psi})
200 {20.4, 44.9}	6,340 {64.65, 919.6} or more

POWER BRAKE UNIT REMOVAL/INSTALLATION

1. Remove the master cylinder. (See **MASTER CYLINDER REMOVAL/INSTALLATION** .)
2. Remove the clutch pipe. (MT)

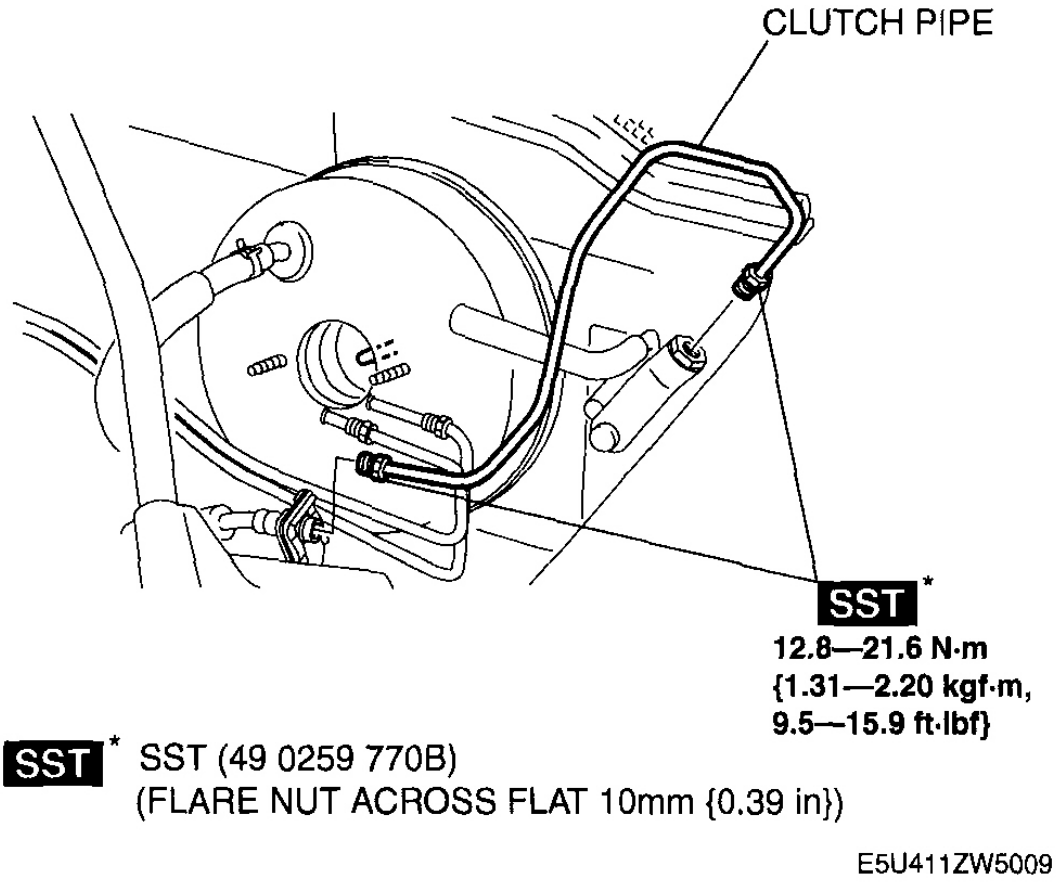


Fig. 21: Removing Clutch Pipe (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

3. Remove the nut shown in **Fig. 22** , then remove the cooler hose (LO) bracket from the vehicle.

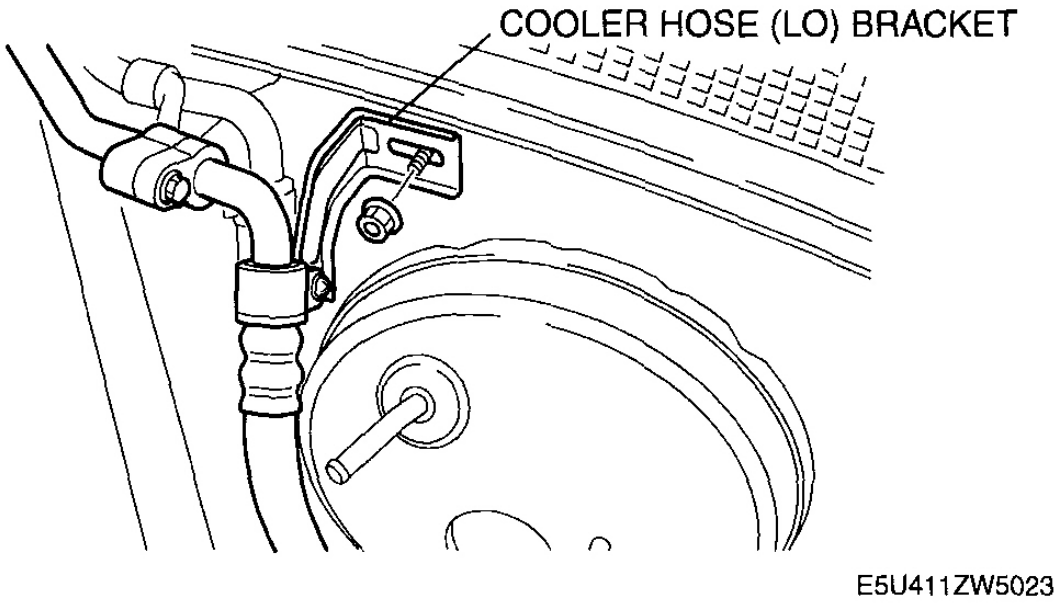
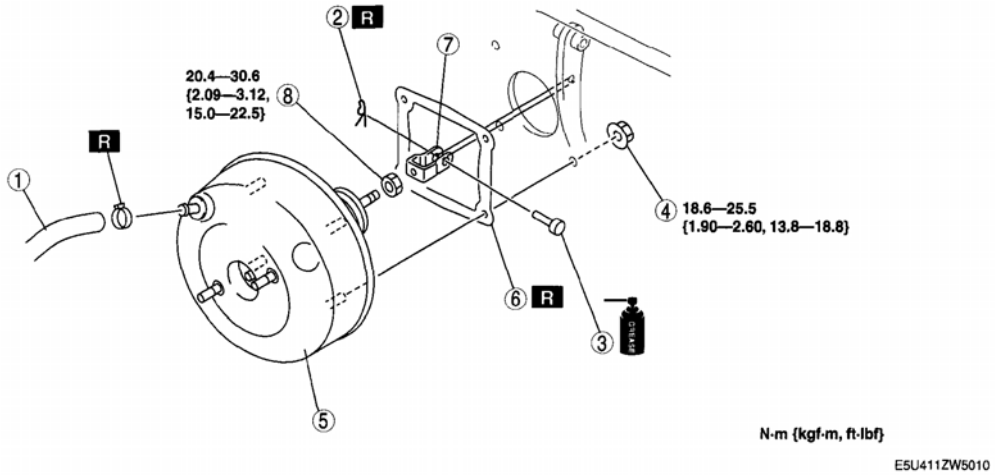


Fig. 22: Removing Cooler Hose (LO) Bracket From Vehicle
Courtesy of MAZDA MOTORS CORP.

4. Remove in the order indicated in **Fig. 23** .



1	Vacuum hose
2	Snap pin
3	Clevis pin
4	Nut

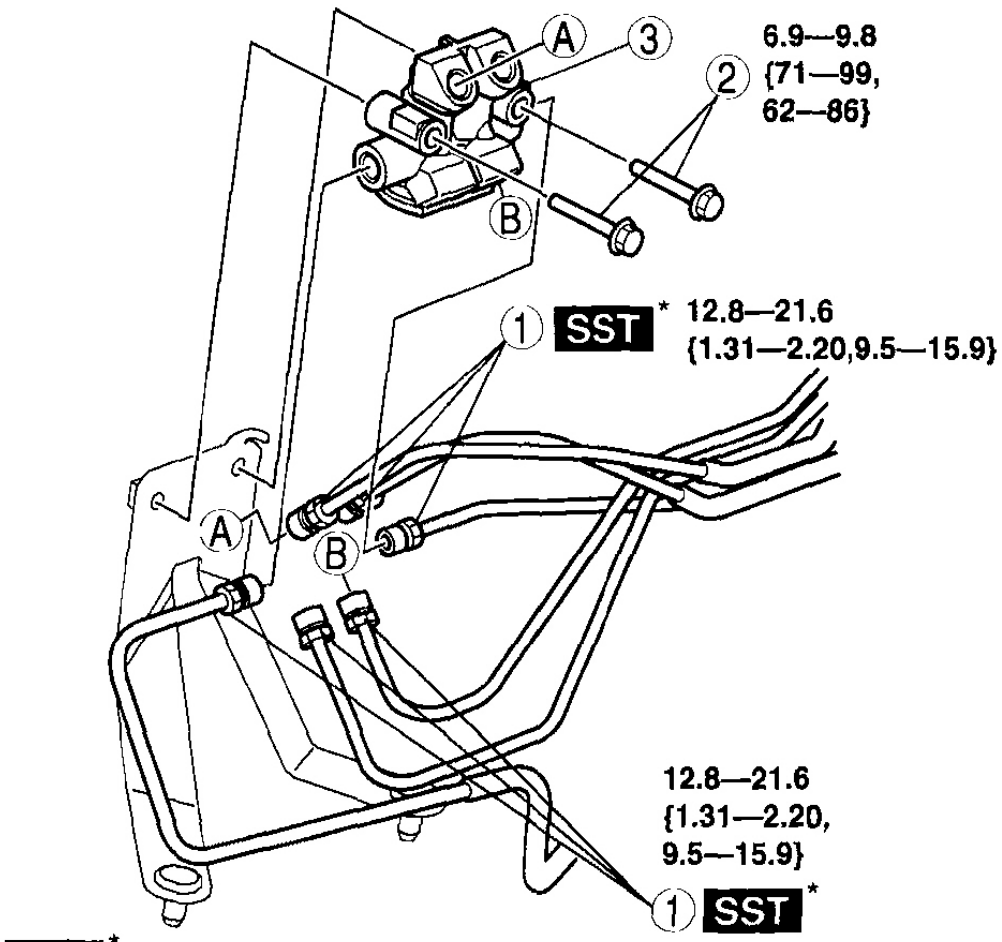
5	Power brake unit
6	Gasket
7	Fork
8	Locknut

Fig. 23: Identifying Power Brake Unit (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. After installation, perform brake pedal inspection. (See **BRAKE PEDAL INSPECTION** .)

DUAL PROPORTIONING VALVE REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 24** .



1	Brake pipe
2	Bolt
3	Dual proportioning valve

Fig. 24: Dual Proportioning Valve Removing/Installing Steps (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Install in the reverse order of removal.

BRAKE PIPE REMOVAL NOTE

1. Place an alignment mark on the brake pipe and dual proportioning valve.

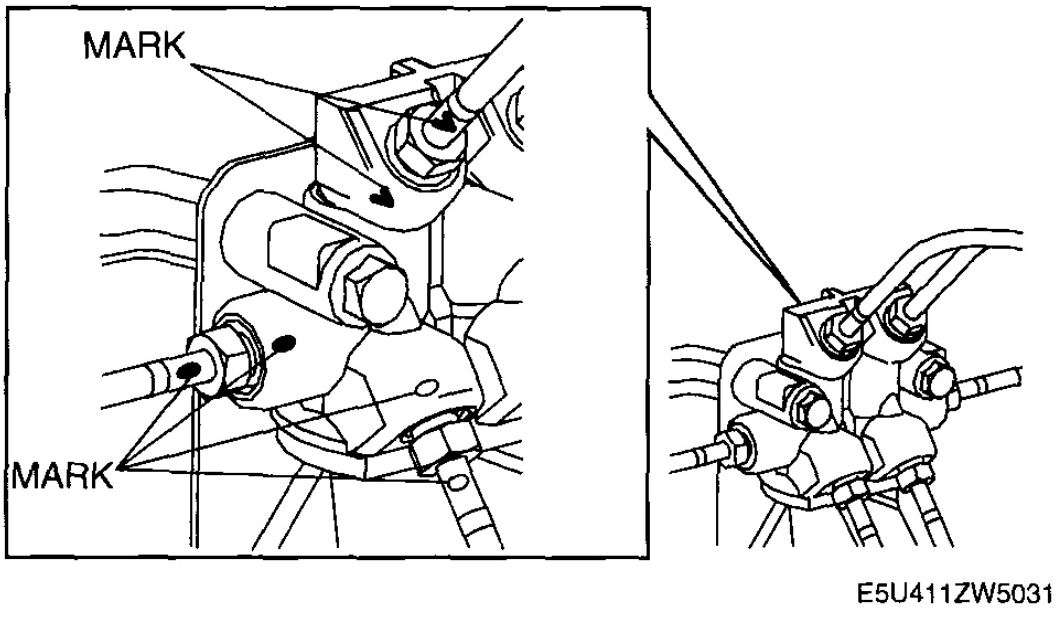


Fig. 25: Placing Alignment Mark On Brake Pipe & Dual Proportioning Valve
Courtesy of MAZDA MOTORS CORP.

DUAL PROPORTIONING VALVE INSTALLATION NOTE

1. Install the dual proportioning valve so that the R marks faces the upper side of the vehicle.

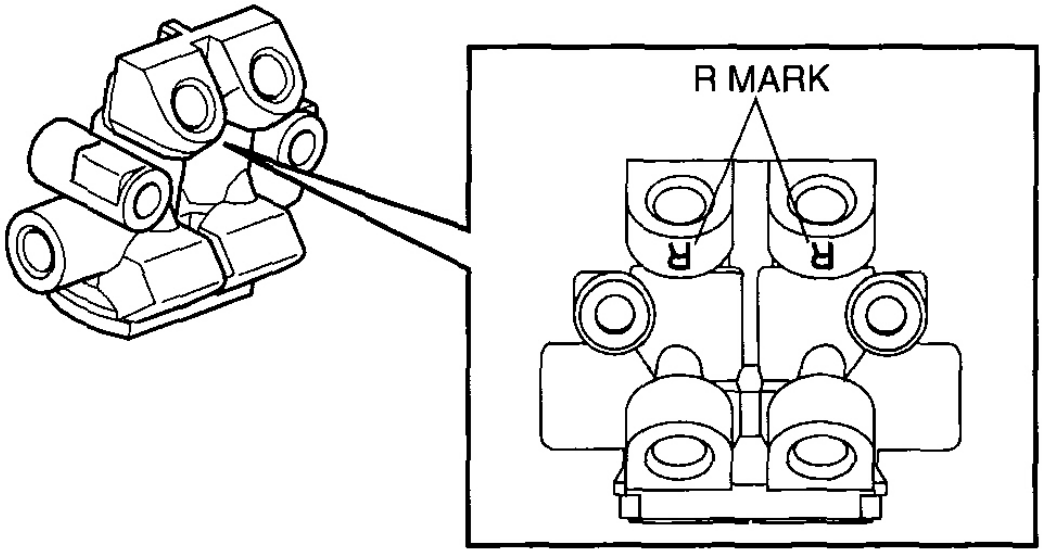


Fig. 26: Identifying Dual Proportioning Valve R Marks
Courtesy of MAZDA MOTORS CORP.

BRAKE PIPE INSTALLATION NOTE

1. Align the marks made before removal and install the brake pipe to the dual proportioning valve referring to **Fig. 27** .

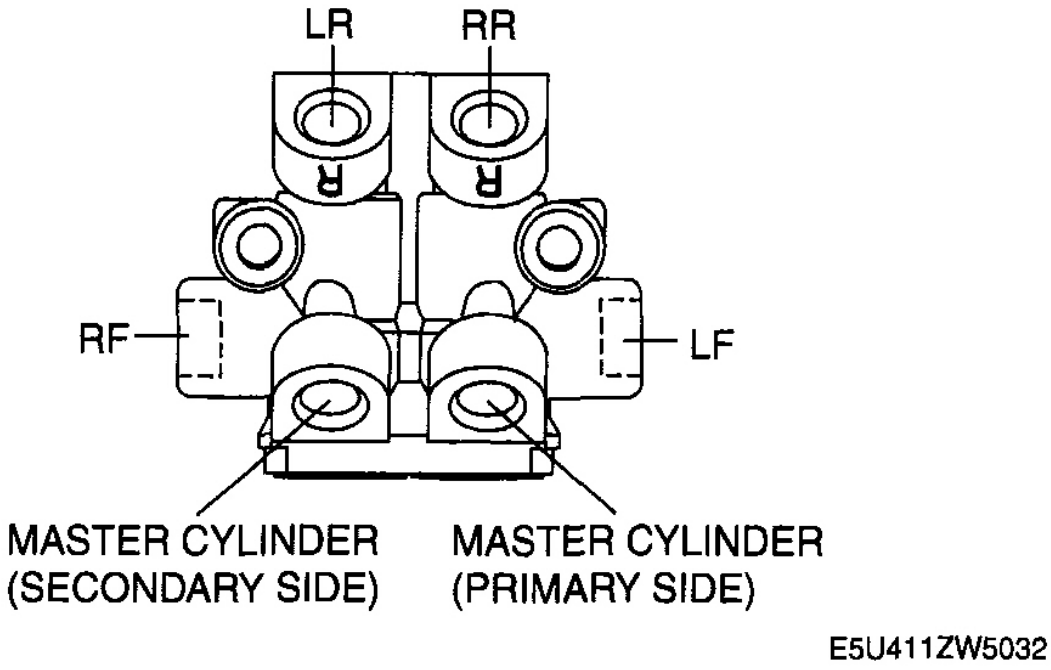


Fig. 27: Aligning Brake Pipe To Dual Proportioning Valve Marks
Courtesy of MAZDA MOTORS CORP.

DUAL PROPORTIONING VALVE INSPECTION

1. Connect the **SSTs** to the brake pipes as shown in **Fig. 28** .
2. Bleed the air from the brake system and the **SSTs** . (Bleed the air from the **SSTs** through air bleeding valve A.)

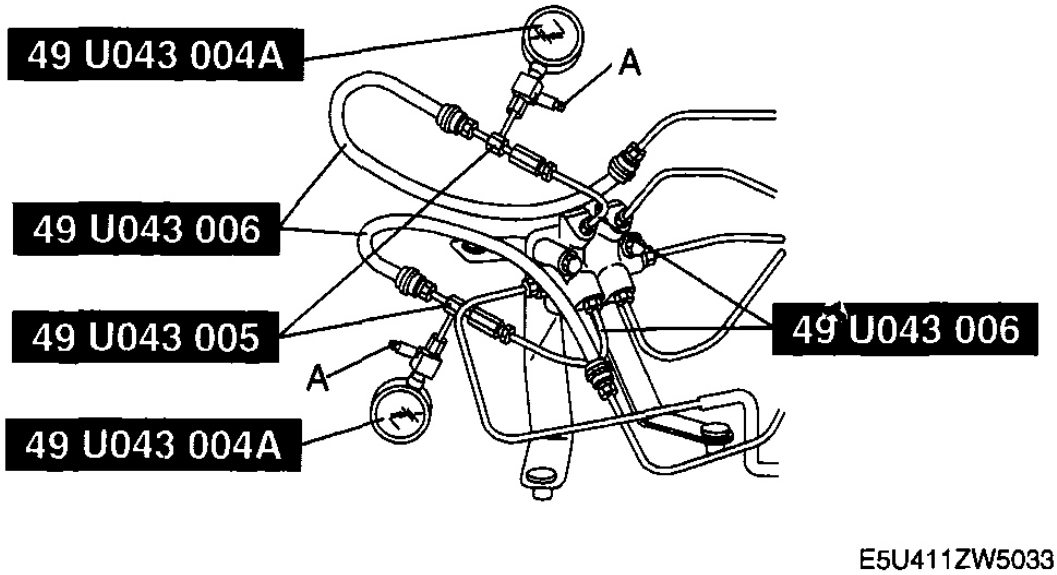


Fig. 28: Identifying Special Tools
Courtesy of MAZDA MOTORS CORP.

3. Measure the fluid pressure of the master cylinder and the rear brake.
    - If not within the specification, replace the dual proportioning valve.

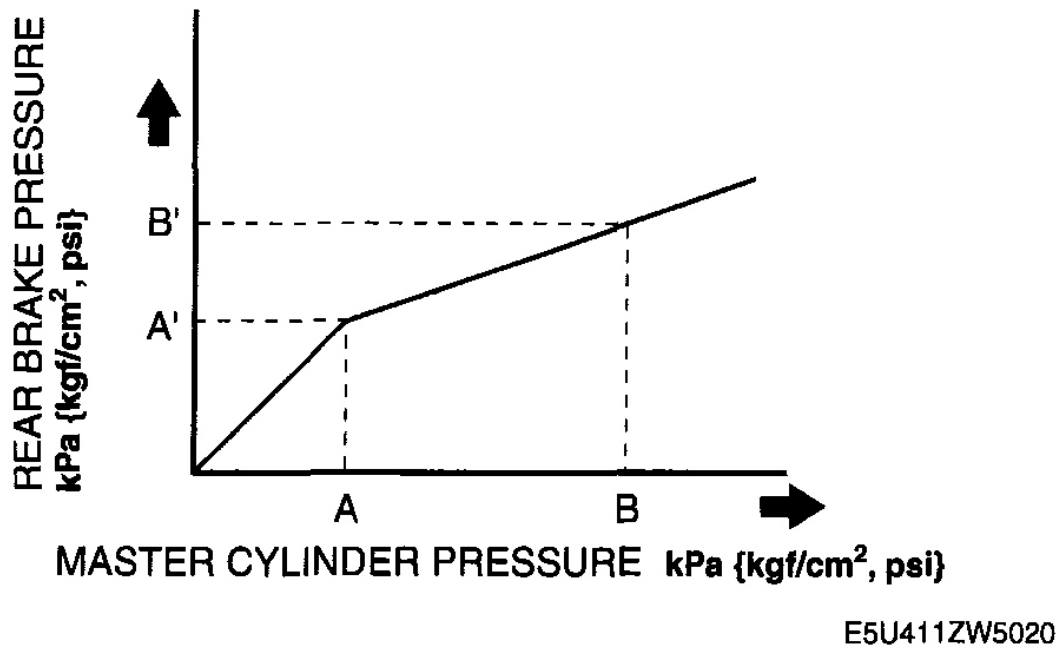


Fig. 29: Dual Proportioning Valve Fluid Pressure Graph
Courtesy of MAZDA MOTORS CORP.

DUAL PROPORTIONING VALVE FLUID PRESSURE SPECIFICATIONS

MASTER CYLINDER PRESSURE (kPa {kgf/cm^2 , psi})	REAR BRAKE PRESSURE (kPa {kgf/cm^2 , psi})
A: 3,430 {34.98, 497.5}	A': 3,130 {31.92, 453.9} - 3,730 {38.04, 540.9}
B: 5,880 {59.96, 852.8}	B': 4,010 {40.9, 581.7} - 4,810 {49.05, 697.6}

FRONT BRAKE (DISC) INSPECTION

BRAKE JUDDER REPAIR HINTS

Description

1. Brake judder concern has the following 3 characteristics:

Steering Wheel Vibration

1. Steering wheel vibrates in the rotation direction. This characteristic is most noticeable when applying brakes at a vehicle speed of **100-140 km/h {62.1-86.8 mph}** .

Floor Vibration

1. When applying the brakes, the vehicle body shakes back and forth. The seriousness of the shaking is not influenced by vehicle speed.

Brake Pedal Vibration

1. When applying brakes, a pulsating force tries to push the brake pad back. The pulsation is transmitted to the brake pedal.
2. The following are the main possible causes of brake judder:

Due To An Excessive Runout (Side-To-Side Wobble) Of The Disc Plate, The Thickness Of The Disc Plate Is Uneven

1. If the runout is **more than 0.05 mm {0.002 in}** at the position **10 mm {0.39 in}** from the disc plate edge, uneven wear occurs on the disc plate because the pad contacts the plate unevenly.
2. If the runout is **less than 0.05 mm {0.002 in}** , uneven wear does not occur.

The Disc Plate Is Deformed By Heat

1. Repeated panic braking may raise the temperature in some portions of disc plate by **approx. 1,000°C {1,832°F}** . This results in a deformed disc plate.

Due To Corrosion, The Thickness And Friction Coefficient Of Disc Plate Change

1. If a vehicle is parked in damp conditions for a long time, corrosion occurs on the friction surface of disc plate.
2. The thickness of corrosion is uneven and sometimes appears like a wave pattern, which changes the friction coefficient and causes a reaction force.

Inspection and Repair Procedure

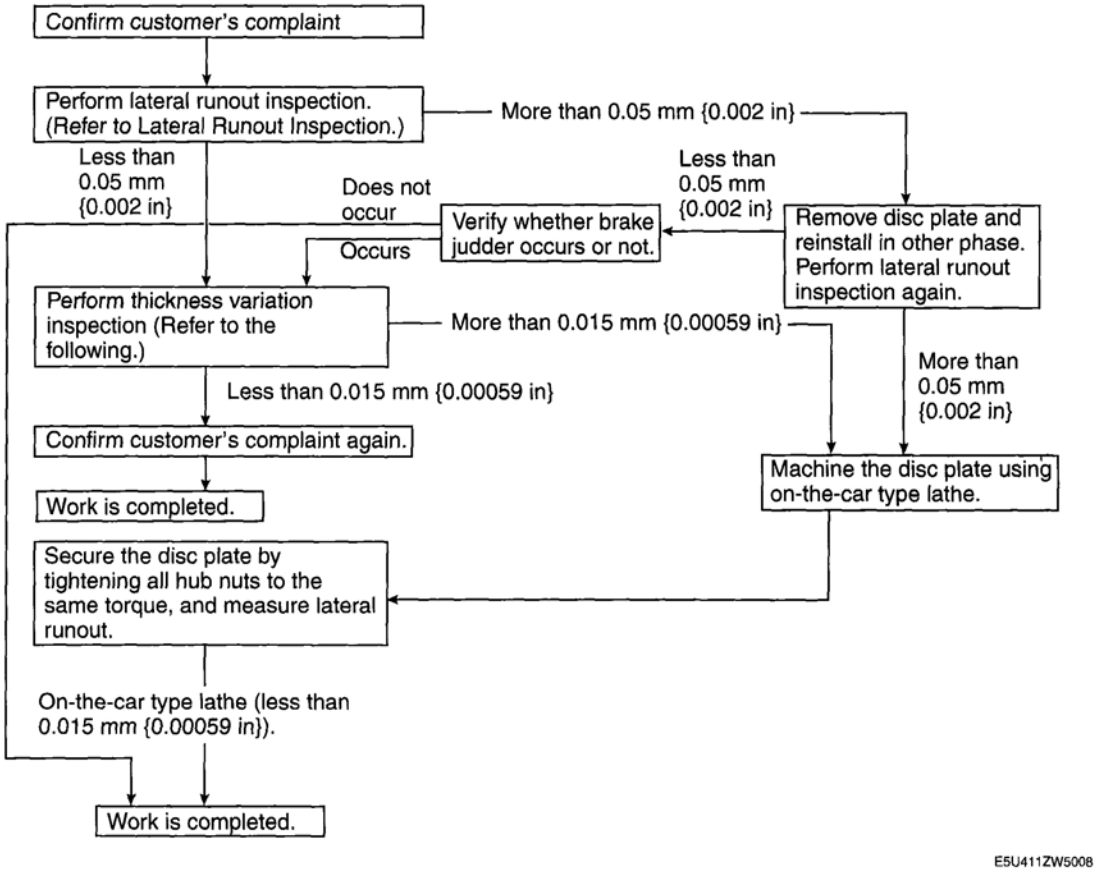


Fig. 30: Front Brake Inspection & Repair Flow Procedure
Courtesy of MAZDA MOTORS CORP.

Lateral Runout Inspection

1. To secure the disc plate and the hub, insert the washer (thickness **10 mm {0.39 in}** , inner diameter **more than 12 mm {0.47 in}**) between each hub bolt and the hub nut, then tighten all the hub nuts.

NOTE:

- **The component parts of the SST (49 B017 001 or 49 G019 003) can be used as a suitable washer.**

2. After tightening all the hub nuts to the same torque, put the dial gauge on the friction surface of disc plate **10 mm {0.12-0.28 in}** from the disc plate edge.
3. Rotate the disc plate one time and measure the runout.

Front disc plate runout limit

0.05 mm {0.002 in}

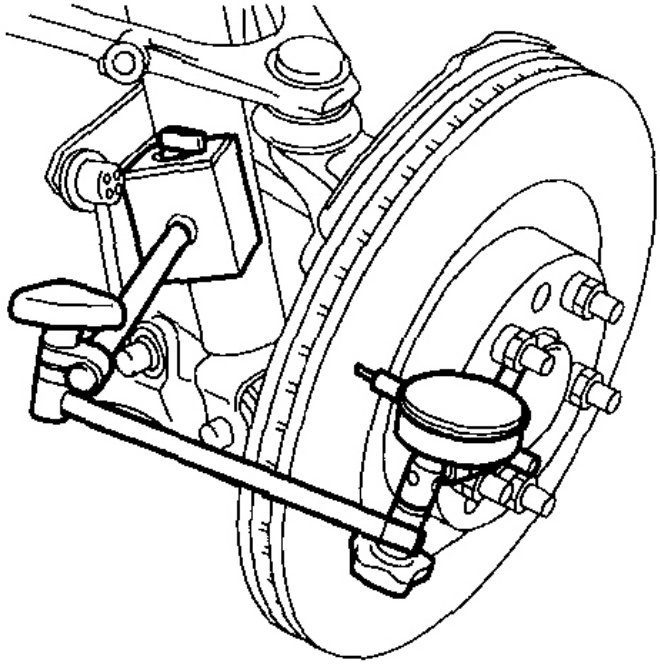


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Fig. 31: Measuring Front Disc Plate Runout
Courtesy of MAZDA MOTORS CORP.

Thickness Variation Inspection

1. Clean the disc plate-to-pad friction surface using a brake cleaner.
2. Measure the points indicated in **Fig. 32** using a caliper (micrometer).
3. Subtract the minimum value from the maximum, and if the result is not within specification, machine the disc plate using a lathe.

Thickness variation limit

0.015 mm {0.00059 in}

WARNING:

- **Do not exceed minimum disc plate thickness.**

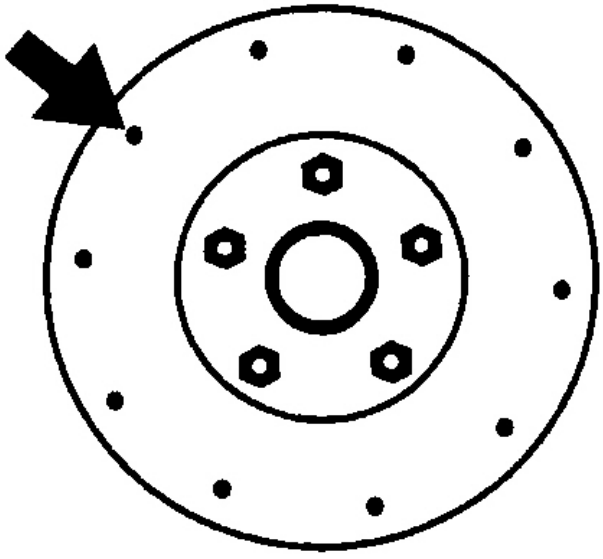

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Fig. 32: Inspecting Disc Plate-To-Pad Friction Surface
Courtesy of MAZDA MOTORS CORP.

Disc Plate Thickness Inspection

CAUTION:
- **Excessive runout may result if the disc plate is removed from the vehicle then machined. Machine the disc plate while installed on the vehicle.**

1. Measure the thickness of the disc plate.
   - If the thickness is not within the specification, replace the disc plate.

Minimum front disc plate thickness

20 mm {0.79 in}

Minimum front disc plate thickness after machining using a brake lathe on-vehicle

20.8 mm {0.82 in}

Disc Pad Thickness Inspection

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheel and tires.
3. Verify the remaining thickness of the pads.

   Minimum front disc pad thickness

   2.0 mm {0.079 in} min.

4. Replace the pads as a set (right and left wheels) if either one is at or less than the minimum thickness.

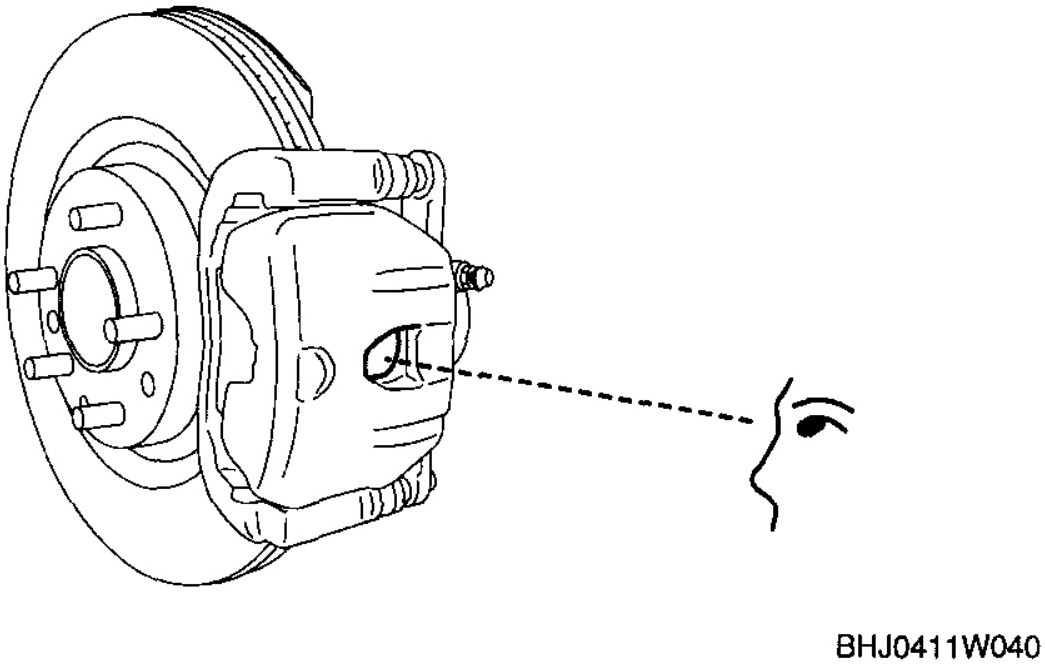
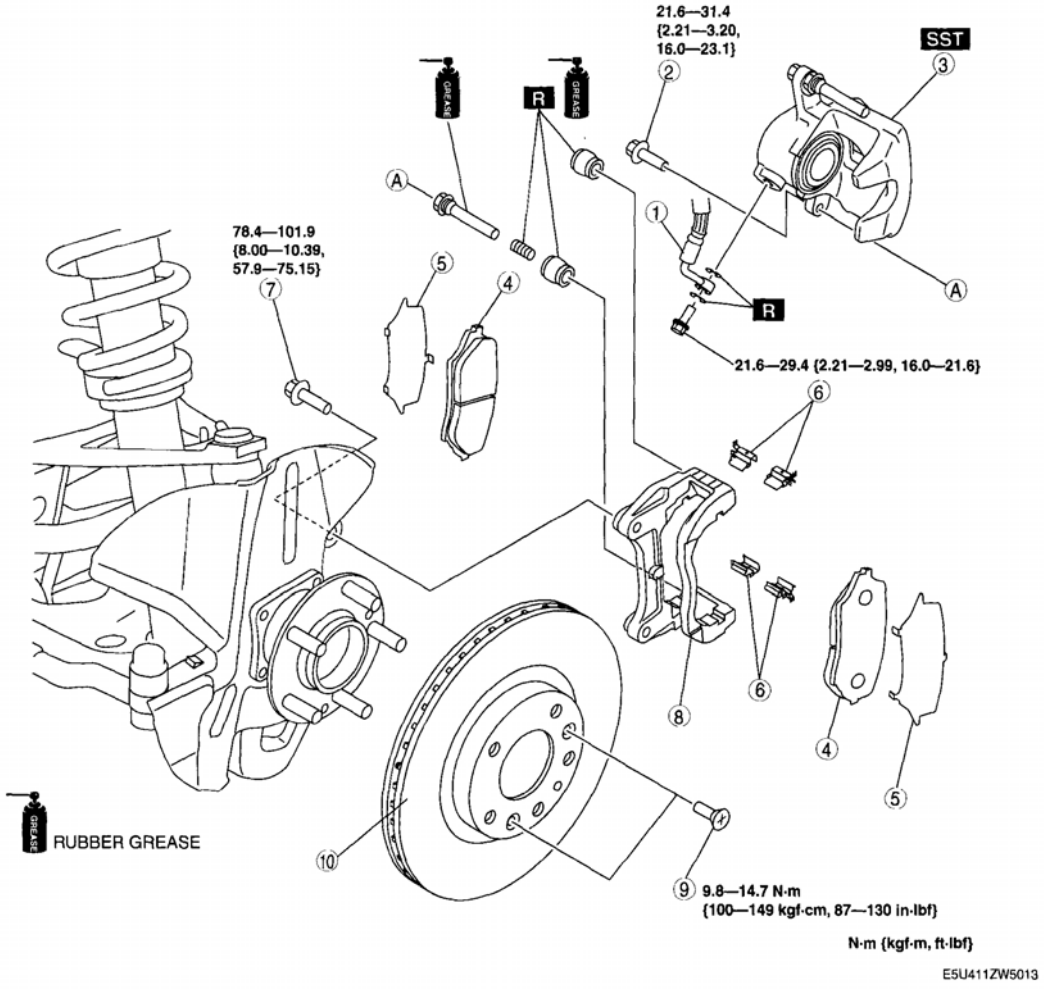


Fig. 33: Inspecting Disc Pad Thickness
Courtesy of MAZDA MOTORS CORP.

FRONT BRAKE (DISC) REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 34** .
2. Install in the reverse order of removal.
3. After installation, depress the brake pedal a few times, then verify that the brakes do not drag.



1	Brake hose
2	Bolt
3	Caliper
4	Disc pad
5	Shim

6	Guide plate
7	Bolt
8	Mounting support
9	Screw
10	Disc plate

Fig. 34: Identifying Front Brake (Disc) Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

CALIPER INSTALLATION NOTE

1. Clean the exposed area of the piston.
2. Install the piston using the **SST** .
3. Install the caliper.

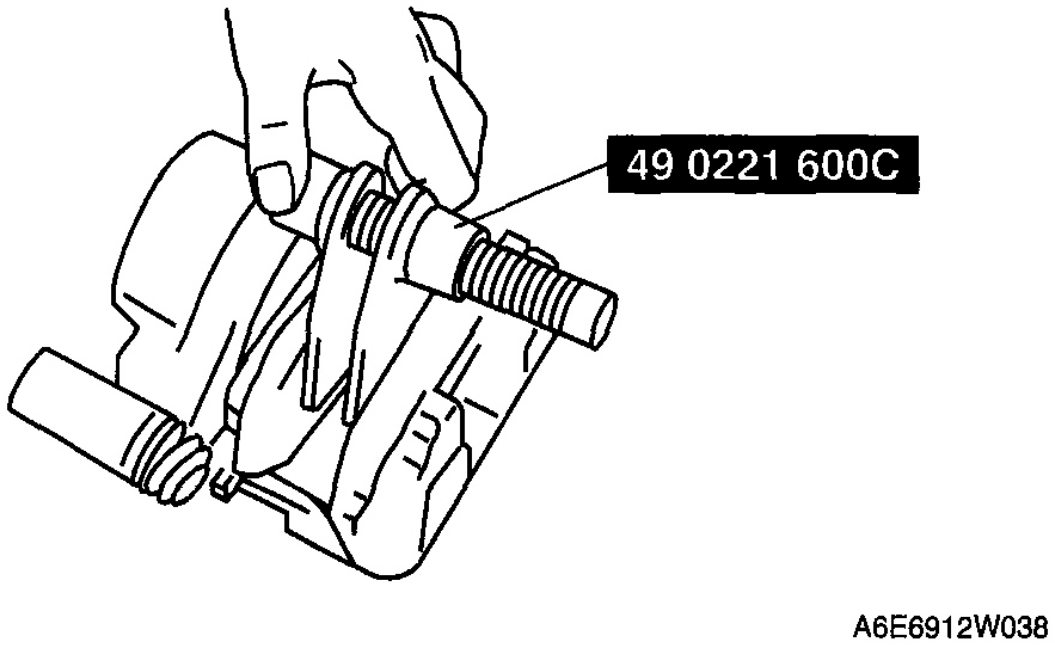
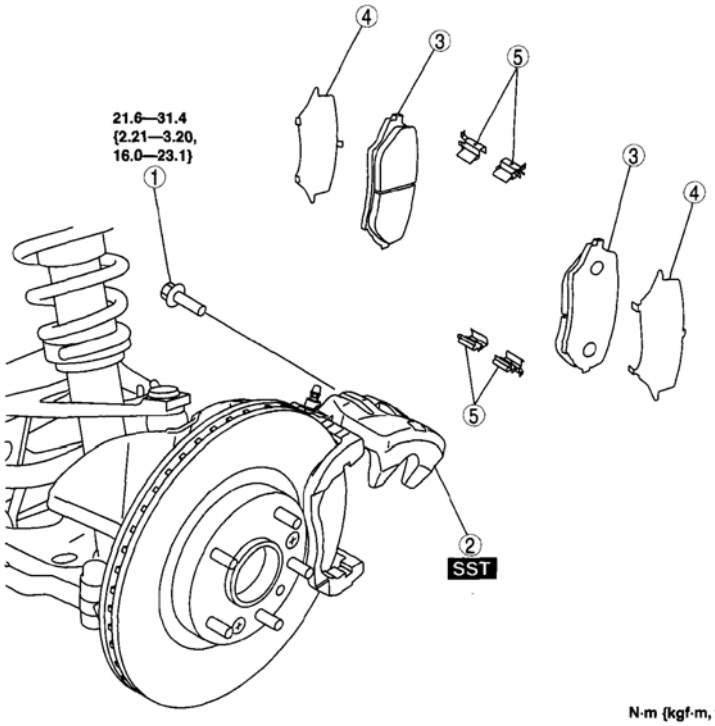


Fig. 35: Installing Piston Using Special Tool
Courtesy of MAZDA MOTORS CORP.

DISC PAD (FRONT) REPLACEMENT

1. Remove in the order indicated in **Fig. 36** .
2. Install in the reverse order of removal.
3. After installation, depress the brake pedal a few times, then verify that the brakes do not drag.



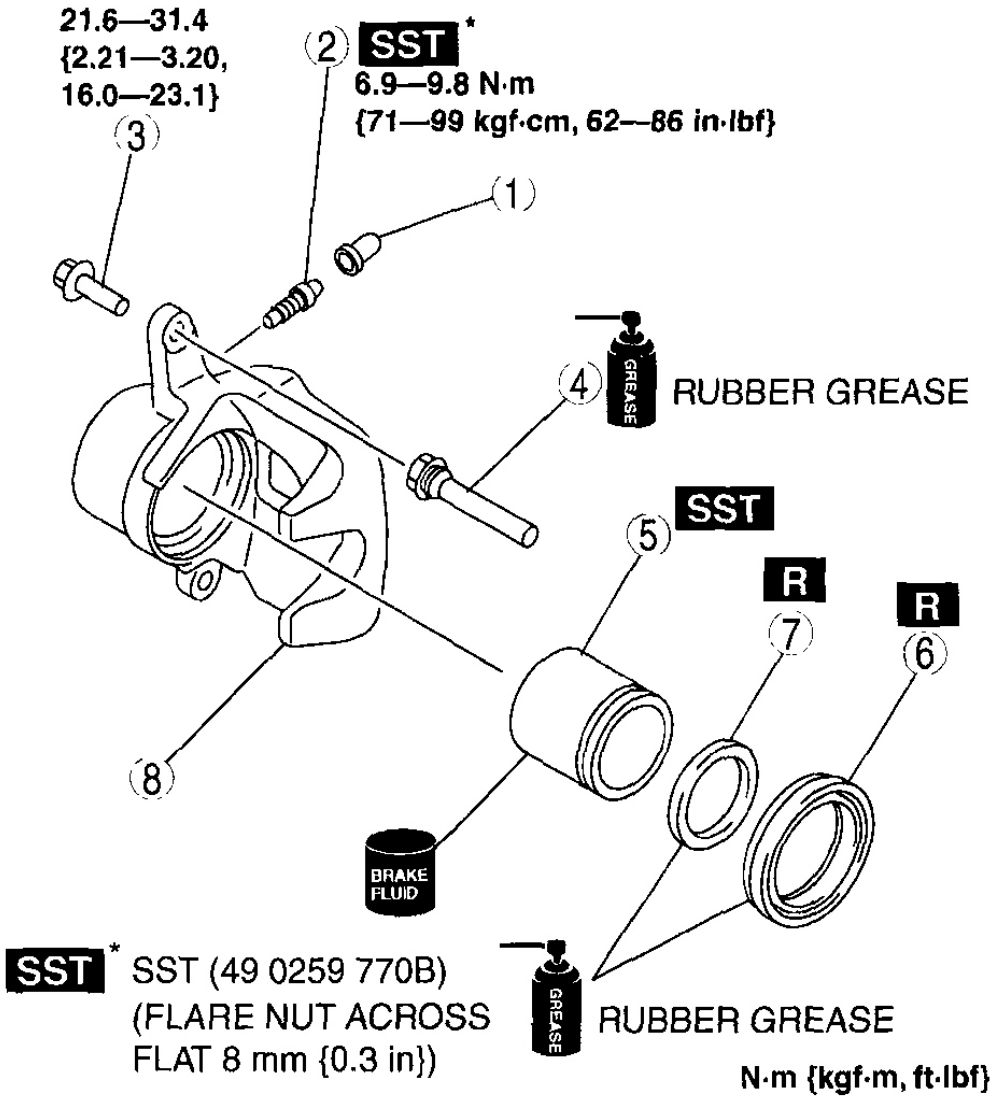
1	Bolt
2	Caliper
3	Disc pad

4	Shim
5	Guide plate

Fig. 36: Identifying Disc Pad Components (Front) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CALIPER (FRONT) DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 37** .



E5U411ZW5011

1	Bleeder cap
2	Bleeder screw
3	Bolt
4	Sleeve
5	Piston
6	Dust seal
7	Piston seal
8	Caliper body

Fig. 37: Exploded View Of Caliper (Front) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

PISTON DISASSEMBLY NOTE

CAUTION:
- **The piston could be damaged if blown out with great force. Blow the compressed air slowly to prevent the piston from suddenly popping out.**

1. Insert a piece of wood in the caliper as shown in **Fig. 38** , and then blow compressed air through the bleeder screw hole to remove the piston from the caliper body.

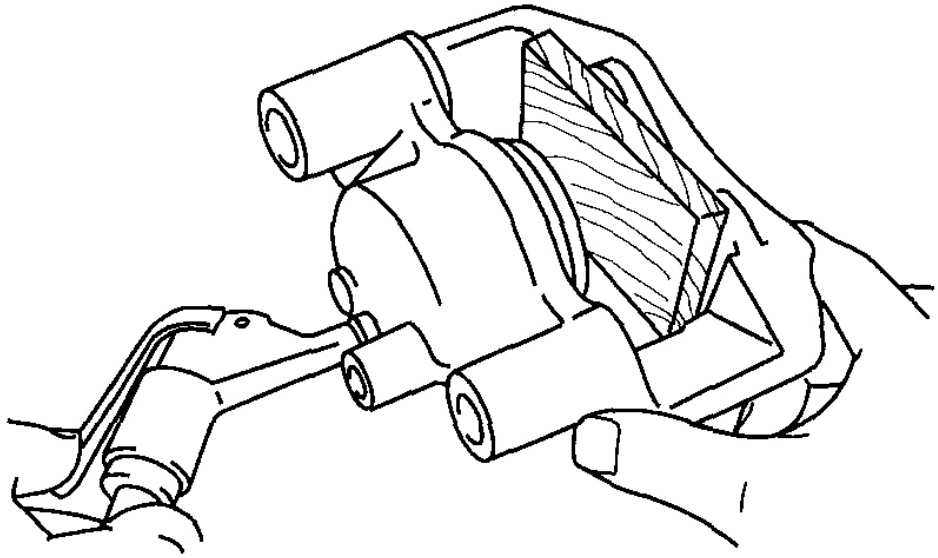


Fig. 38: Removing Piston From Caliper Body By Blowing Compressed Air Through Bleeder Screw Hole
Courtesy of MAZDA MOTORS CORP.

REAR BRAKE (DISC) INSPECTION

BRAKE JUDDER REPAIR HINTS

Description

1. Brake judder concern has the following 3 characteristics:

Steering Wheel Vibration

1. Steering wheel vibrates in the rotation direction. This characteristic is most noticeable when applying brakes at a vehicle speed of **100-140 km/h {62.1-86.8 mph}** .

Floor Vibration

1. When applying the brakes, the vehicle body shakes back and forth. The seriousness of the shaking is not influenced by vehicle speed.

Brake Pedal Vibration

1. When applying brakes, a pulsating force tries to push the brake pad back. The pulsation is transmitted to the brake pedal.
2. The following are the main possible causes of brake judder:

Due to an excessive runout (side-to-side wobble) of the disc plate, the thickness of the disc plate is uneven.

1. If the runout is **more than 0.05 mm {0.002 in}** at the position **10 mm {0.39 in}** from the disc plate edge, uneven wear occurs on the disc plate because the pad contacts the plate unevenly.
2. If the runout is **less than 0.05 mm {0.002 in}** , uneven wear does not occur.

The disc plate is deformed by heat.

1. Repeated panic braking may raise the temperature in some portions of disc plate by **approx. 1,000°C {1,832°F}** . This results in a deformed disc plate.

Due to corrosion, the thickness and friction coefficient of disc plate change.

1. If a vehicle is parked in damp conditions for a long time, corrosion occurs on the friction surface of disc plate.
2. The thickness of corrosion is uneven and sometimes appears like a wave pattern, which changes the friction coefficient and causes a reaction force.

Inspection and Repair Procedure

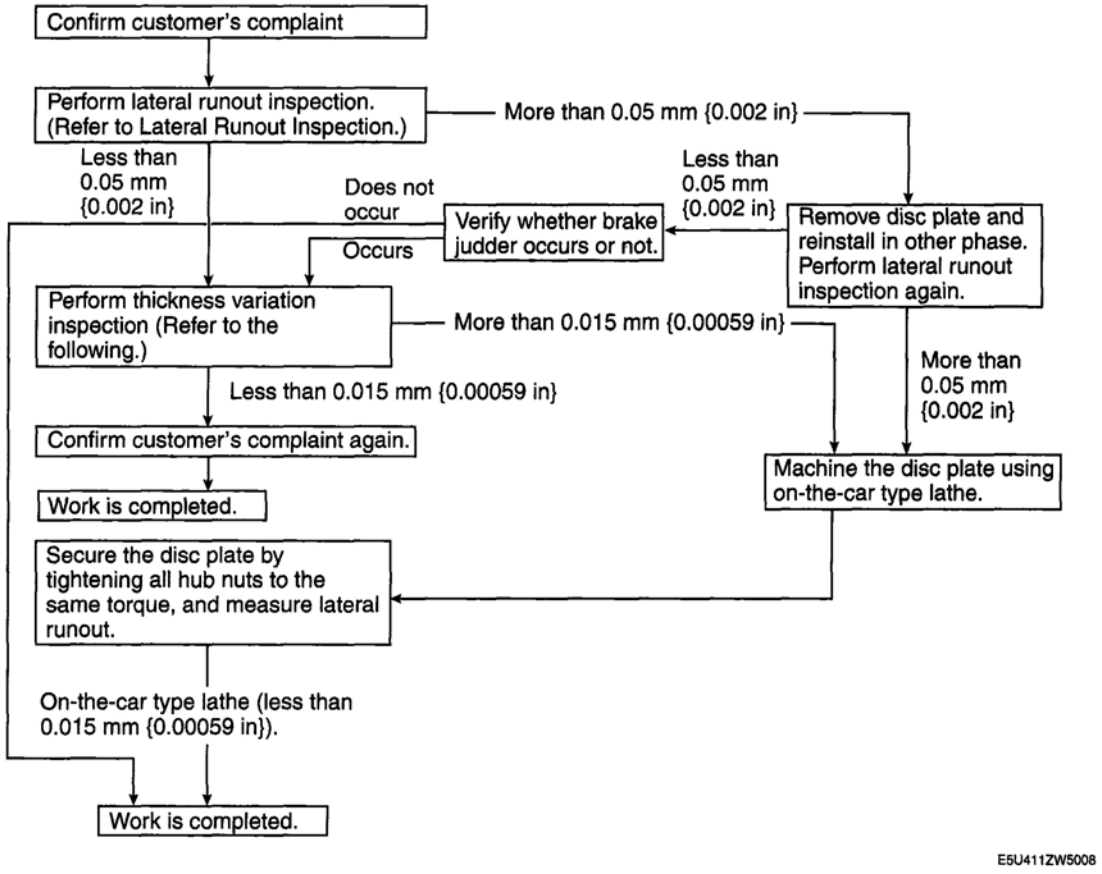


Fig. 39: Rear Brake Inspection & Repair Flow Procedure
Courtesy of MAZDA MOTORS CORP.

Lateral Runout Inspection

1. To secure the disc plate and the hub, insert the washer (thickness **10 mm {0.39 in}** , inner diameter **more than 12 mm {0.47 in}**) between each hub bolt and the hub nut, then tighten all the hub nuts.

NOTE:

- **The component parts of the SST (49 B017 001 or 49 G019 003) can be used as a suitable washer.**

2. After tightening all the hub nuts to the same torque, put the dial gauge on the friction surface of disc plate **10 mm {0.39 in}** from the disc plate edge.
3. Rotate the disc plate one time and measure the runout.

Rear disc plate runout limit

0.05 mm {0.002 in}

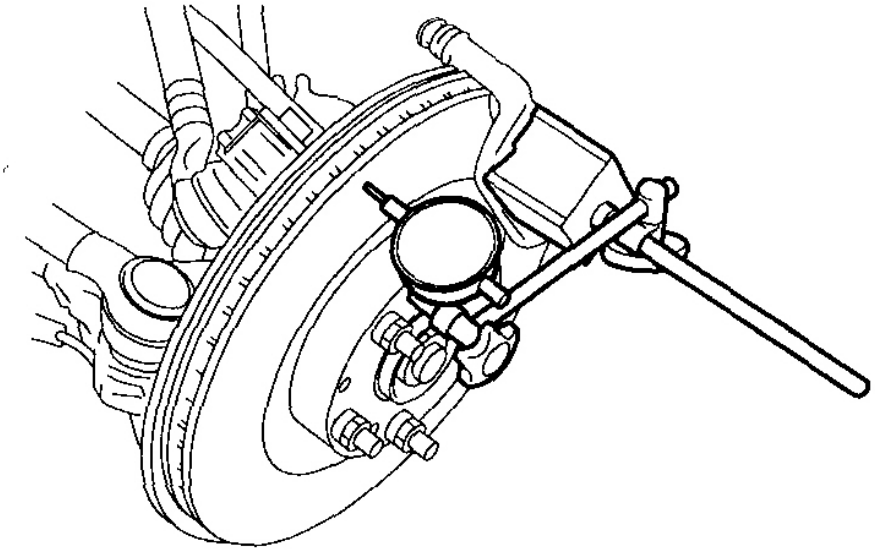


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Fig. 40: Measuring Rear Disc Plate Runout By Putting Dial Gauge On Friction Surface Of Disc Plate
Courtesy of MAZDA MOTORS CORP.

Thickness Variation Inspection

1. Clean the disc plate-to-pad friction surface using a brake cleaner.
2. Measure the points indicated in **Fig. 41** using a caliper (micrometer).
3. Subtract the minimum value from the maximum, and if the result is not within specification, machine the disc plate using a lathe.

Thickness variation limit

0.015 mm {0.00059 in}

WARNING:

- **Do not exceed minimum disc plate thickness.**

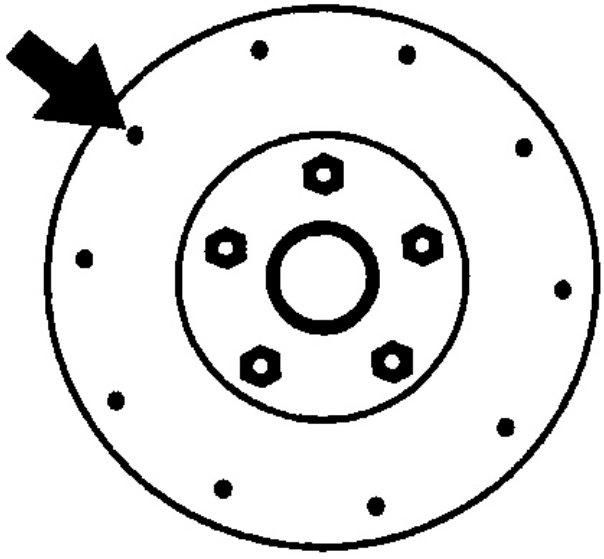


Fig. 41: Inspecting Disc Plate-To-Pad Friction Surface
Courtesy of MAZDA MOTORS CORP.

Disc Plate Thickness Inspection

CAUTION:
- **Excessive runout may result if the disc plate is removed from the vehicle then machined. Machine the disc plate while installed on the vehicle.**

1. Measure the thickness of the disc plate.
   - If the thickness is not within the specification, replace the disc plate.

Minimum rear disc plate thickness

8 mm {0.31 in}

Minimum rear disc plate thickness after machining using a brake lathe on-vehicle

8.8 mm {0.35 in}

Disc Pad Thickness Inspection

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheel and tires.
3. Verify the remaining thickness of the pads.

   Minimum rear disc pad thickness

   2.0 mm {0.079 in} min.

4. Replace the pads as a set (right and left wheels) if either one is at or less than the minimum thickness.

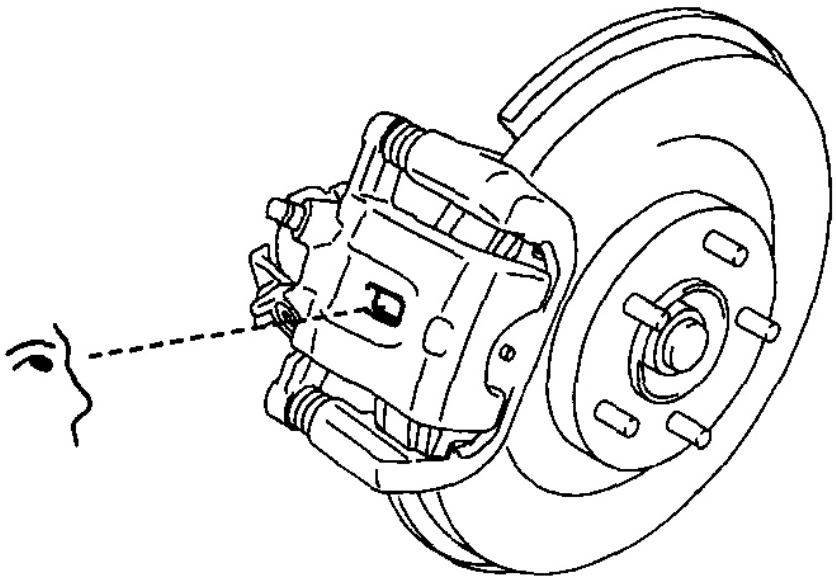
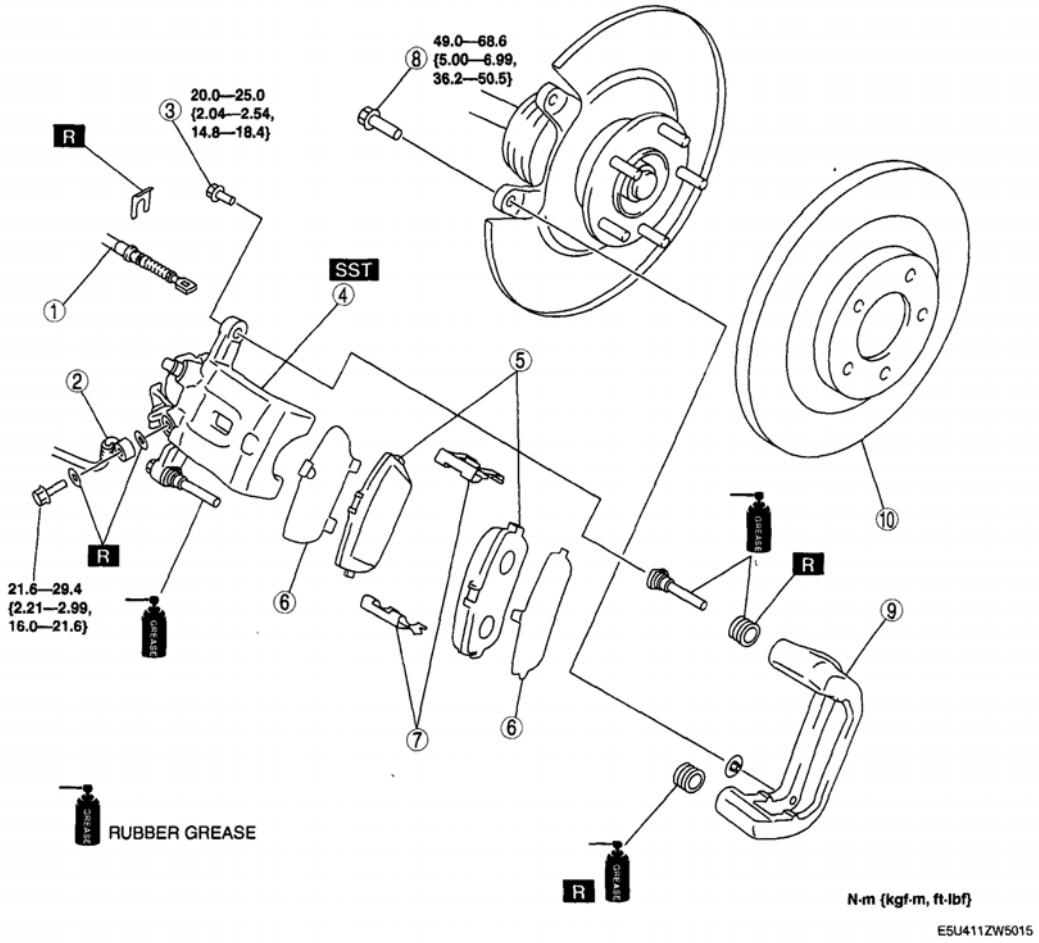


Fig. 42: Inspecting Disc Pad Thickness
Courtesy of MAZDA MOTORS CORP.

REAR BRAKE (DISC) REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 43** .
2. Install in the reverse order of removal.
3. After installation, depress the brake pedal a few times, and inspect the following.
   - The disc pad projection is securely installed to the piston groove
   - Parking brake lever stroke
   - Brake drag



1	Parking brake cable
2	Brake hose
3	Bolt
4	Caliper
5	Disc pad

6	Shim
7	Guide plate
8	Bolt
9	Mounting support
10	Disc plate

Fig. 43: Identifying Rear Brake (Disc) Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

DISC PLATE REMOVAL NOTE

1. Mark the wheel hub and disc plate.
2. Remove the disc plate.

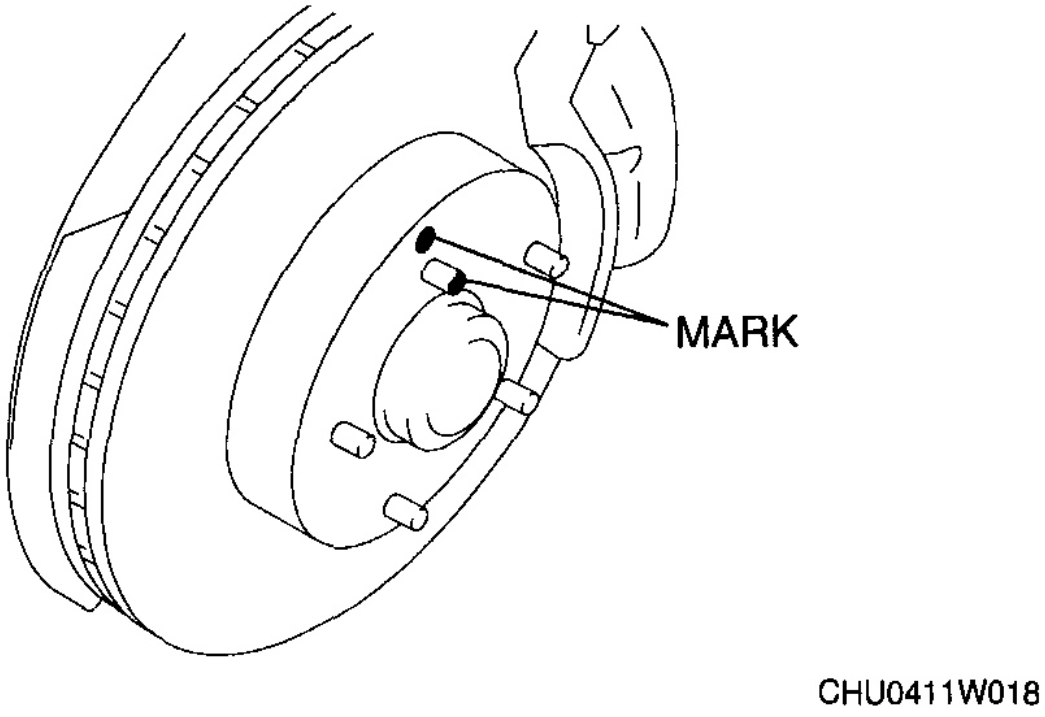


Fig. 44: Identifying Wheel Hub & Disc Plate Mark
Courtesy of MAZDA MOTORS CORP.

DISC PLATE INSTALLATION NOTE

1. Remove any rust or foreign material from the wheel hub and disc plate.
2. Align the marks made before removal and install the disc plate to the wheel hub.

CALIPER INSTALLATION NOTE

1. Clean the exposed area of the piston.
2. Rotate the piston clockwise slowly using the **SST** and push the piston completely until the piston grooves are in the position shown in **Fig. 45** .
3. Install the caliper.

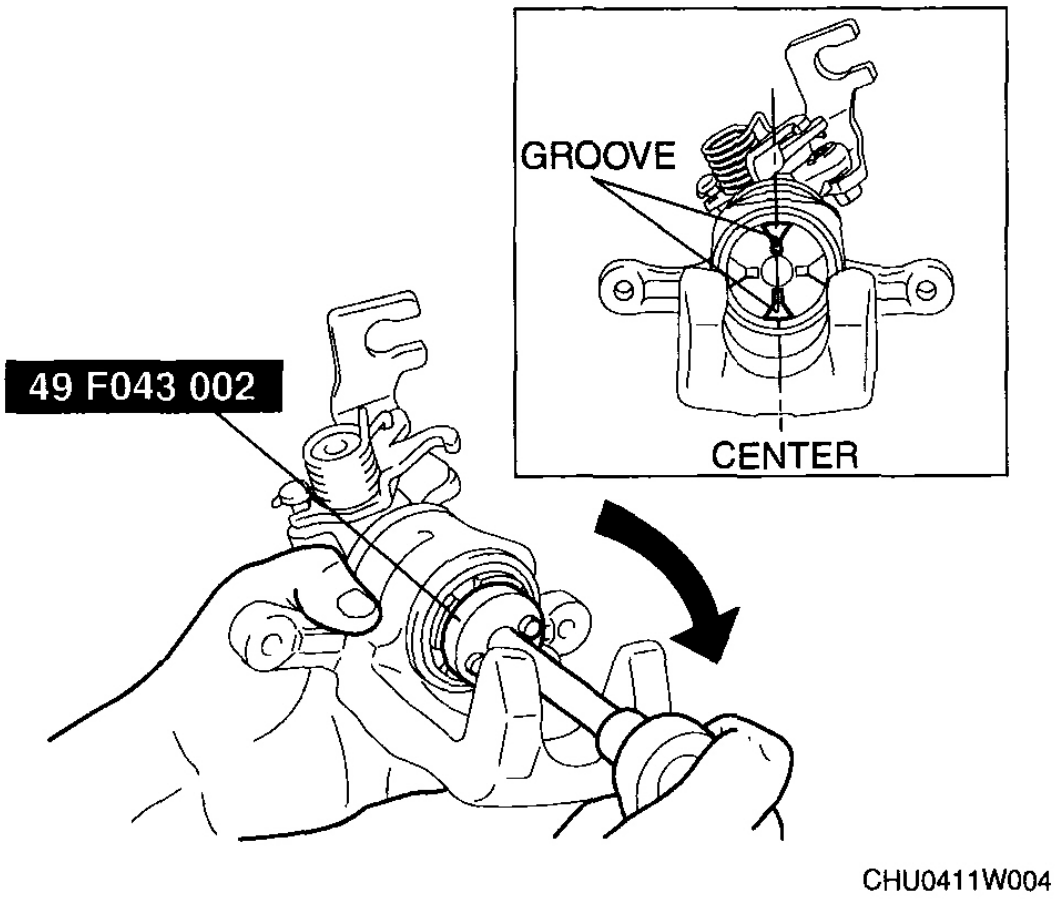


Fig. 45: Rotating Piston Clockwise Using SST
Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE CABLE INSTALLATION NOTE

1. After installing the parking brake cable, verify that the operating lever returns to the stopper nut with the parking brake lever released.

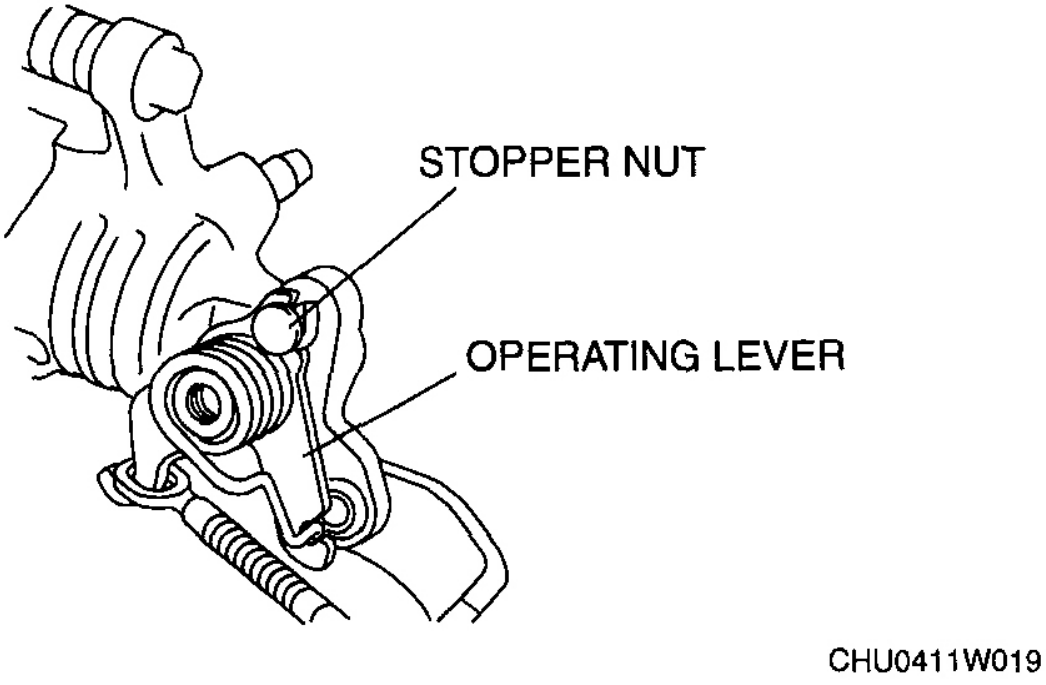
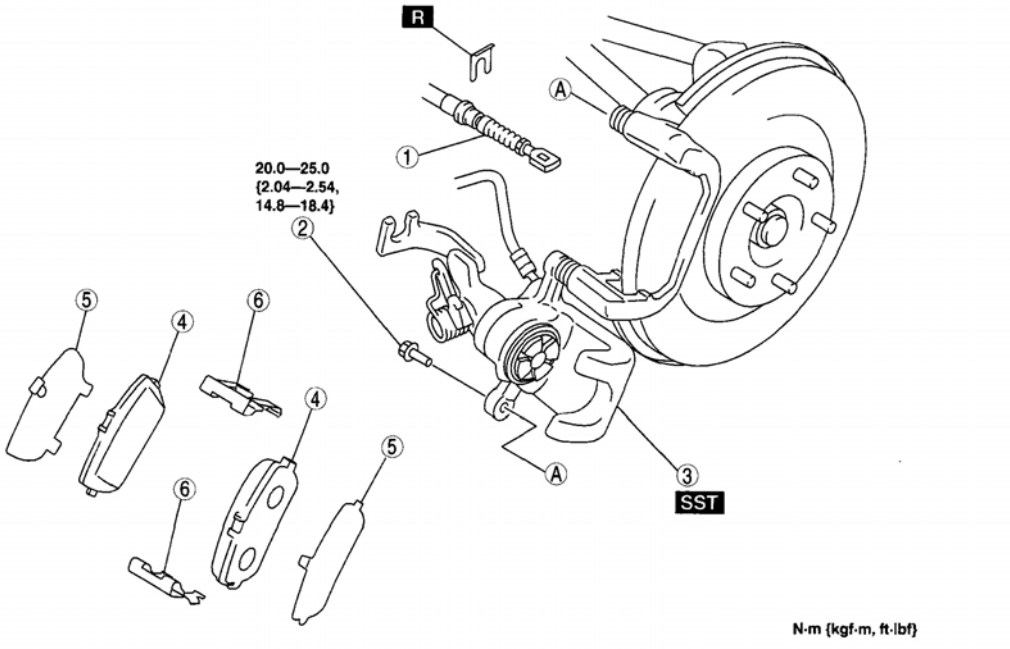


Fig. 46: Identifying Stopper Nut And Operating Lever
Courtesy of MAZDA MOTORS CORP.

DISC PAD (REAR) REPLACEMENT

1. Remove in the order indicated in **Fig. 47** .
2. Install in the reverse order of removal.
3. After installation, depress the brake pedal a few times, and inspect the following.
    - The disc pad projection is securely installed to the piston groove
    - Parking brake lever stroke
    - Brake drag



1	Parking brake cable
2	Bolt

3	Caliper
4	Disc pad
5	Shim
6	Guide plate

Fig. 47: Identifying Disc Pad (Rear) Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CALIPER INSTALLATION NOTE

1. Clean the exposed area of the piston.
2. Rotate the piston clockwise slowly using the **SST** and push in the piston completely until the piston grooves are in the position shown in **Fig. 48** .

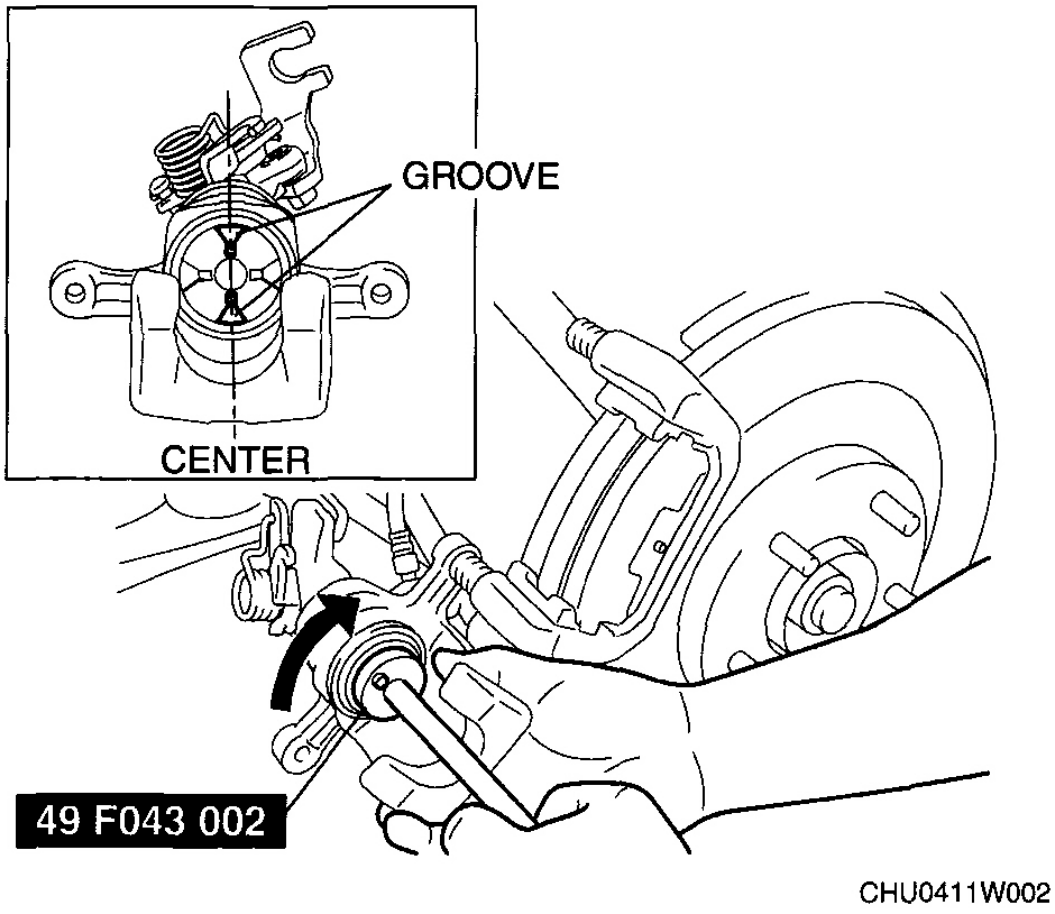
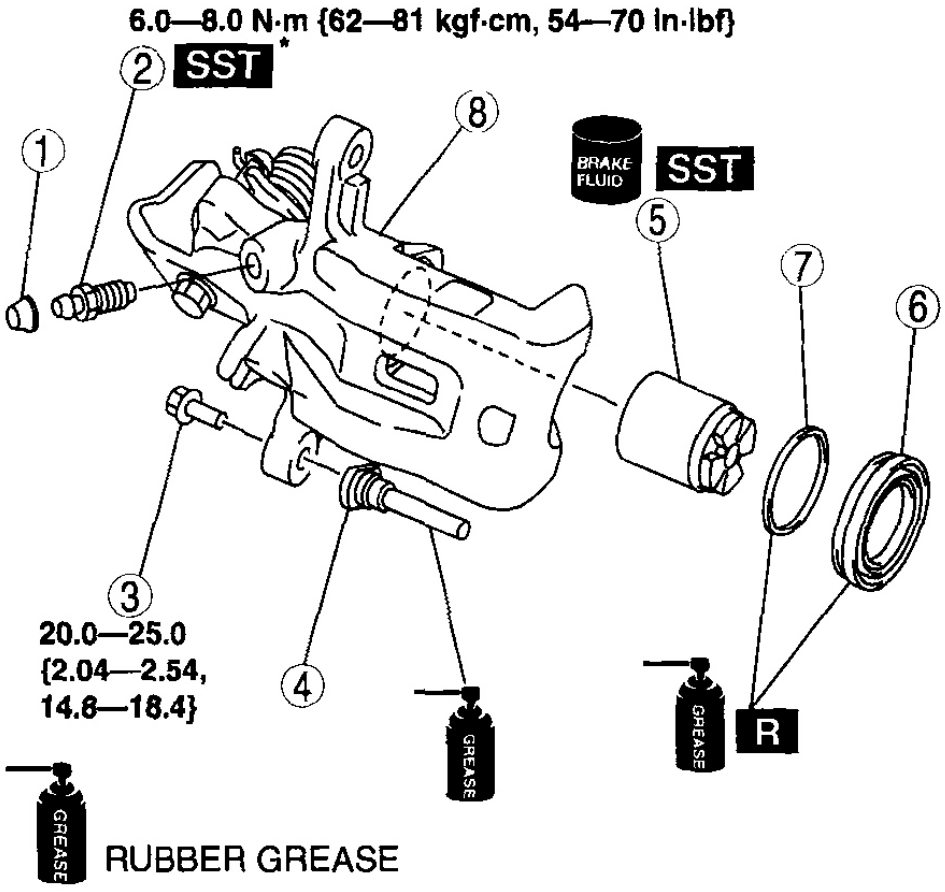


Fig. 48: Rotating Piston Clockwise Using SST
Courtesy of MAZDA MOTORS CORP.

3. Install the caliper.

CALIPER (REAR) DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 49** .



E5U411ZW5025

1	Bleeder cap
2	Bleeder screw
3	Bolt
4	Sleeve
5	Piston
6	Dust seal
7	Piston seal
8	Caliper body

Fig. 49: Exploded View Of Caliper (Rear) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

PISTON DISASSEMBLY NOTE

1. Rotate the piston counter-clockwise using the **SST** , remove the piston from the caliper body.

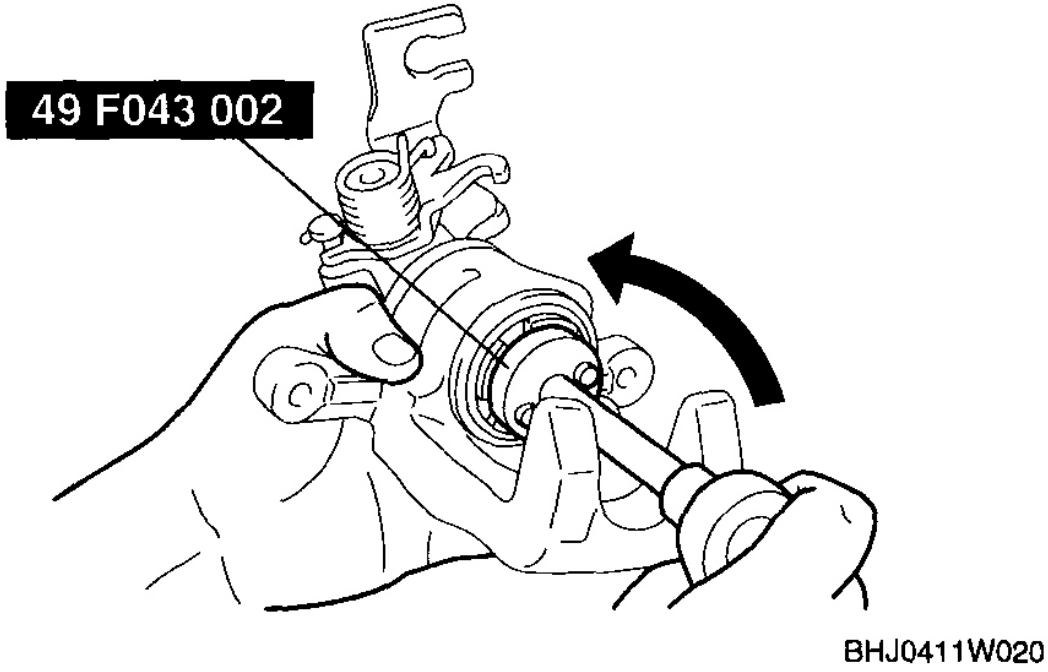


Fig. 50: Rotating Piston Counter-Clockwise Using SST
Courtesy of MAZDA MOTORS CORP.

DUST SEAL, PISTON ASSEMBLY NOTE

1. Assemble the dust seal to the piston.
2. Assemble the lip of the dust seal to the groove of the caliper body with the dust seal is assembled to the piston as shown in **Fig. 51** .

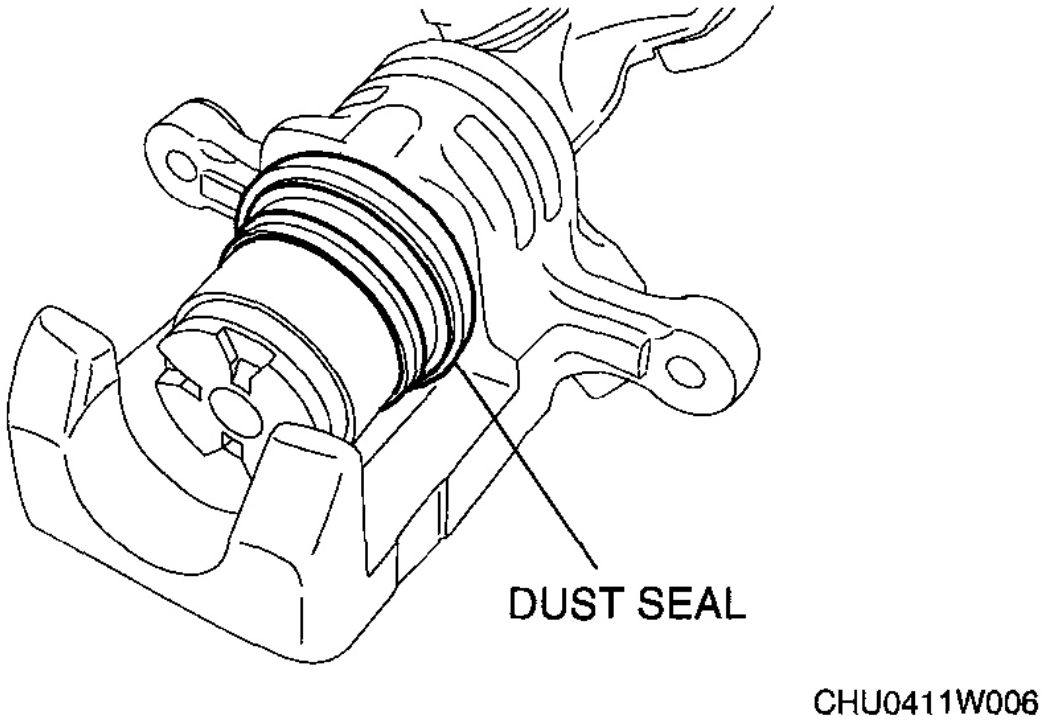


Fig. 51: Assembling Lip Of Dust Seal
Courtesy of MAZDA MOTORS CORP.

3. Rotate the piston clockwise using the **SST** slowly and push the piston inwards completely.
4. Verify that the dust seal is installed into the groove of the piston securely.

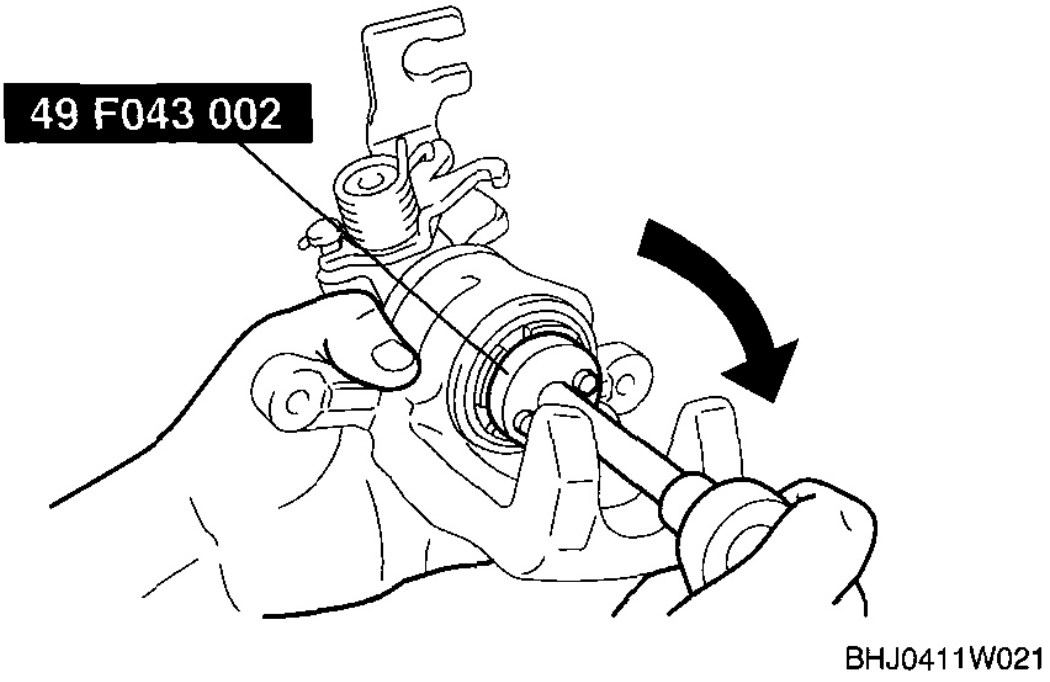
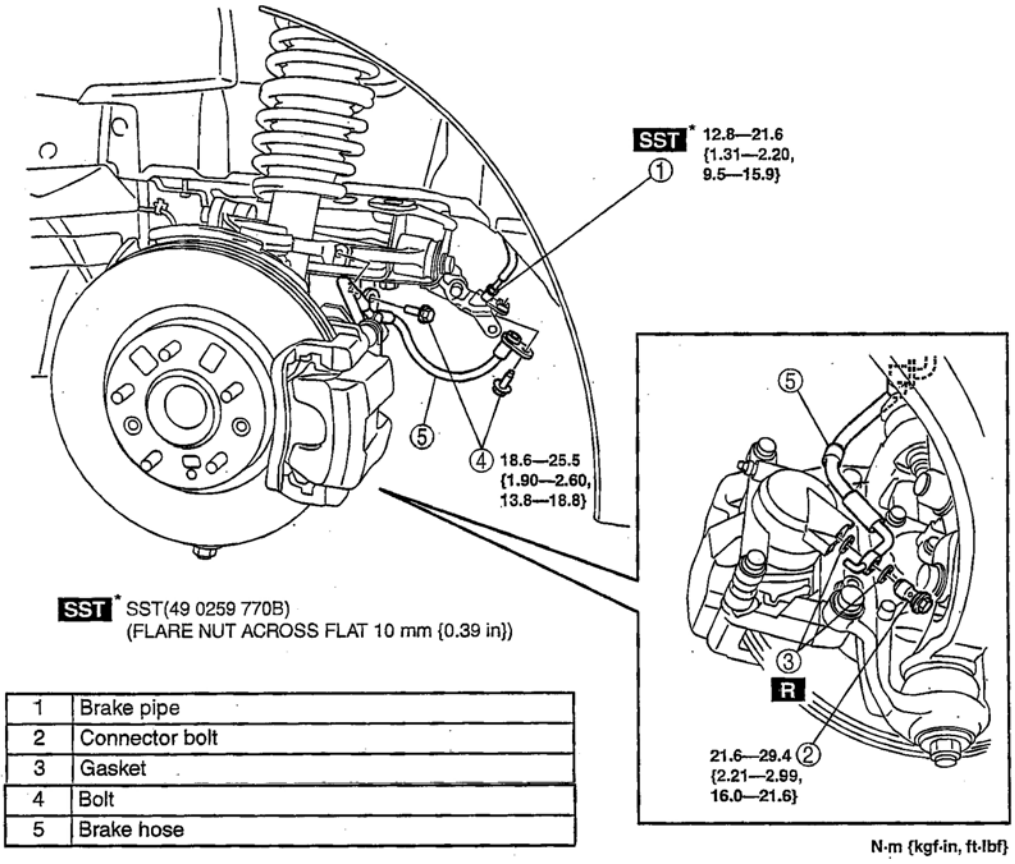


Fig. 52: Rotating Piston Clockwise Using SST
Courtesy of MAZDA MOTORS CORP.

BRAKE HOSE (FRONT) REMOVAL/INSTALLATION

1. Remove in the order indicated in FIG.....
2. Install in the reverse order of removal.
3. After installation, add brake fluid, bleed the air, and inspect for fluid leakage. (See **AIR BLEEDING**.)

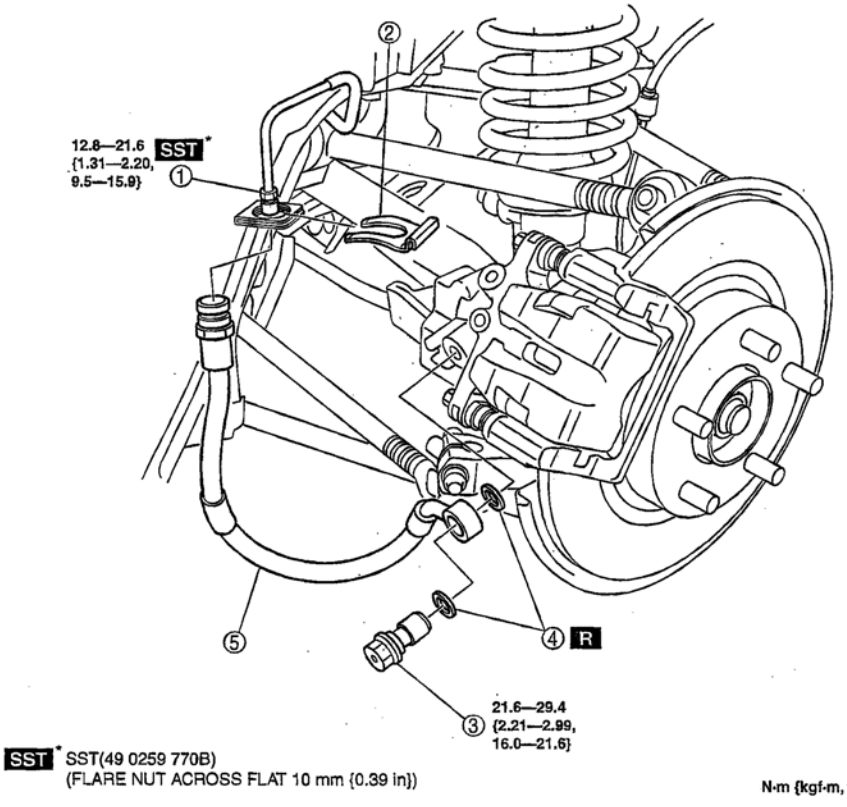


1	Brake pipe
2	Connector bolt
3	Gasket
4	Bolt
5	Brake hose

Fig. 53: Identifying Brake Hose (Front) Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

BRAKE HOSE (REAR) REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, add brake fluid, bleed the air, and inspect for fluid leakage. (See **AIR BLEEDING**.)



1	Brake pipe
2	Clip
3	Connector bolt

4	Gasket
5	Brake hose

Fig. 54: Identifying Brake Hose (Rear) Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2007 GENERAL INFORMATION

Brakes General Procedures - MX-5 Miata

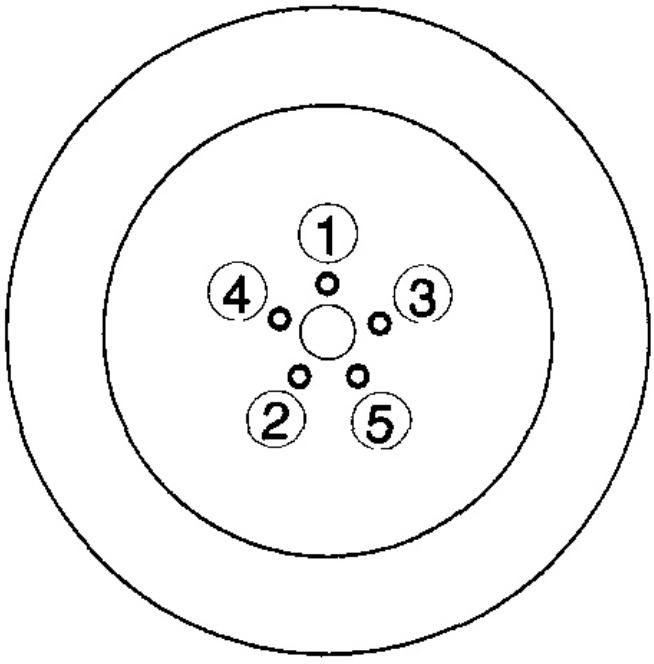
GENERAL PROCEDURES (BRAKE)

WHEEL AND TIRE INSTALLATION

1. When installing the wheels and tires, tighten the wheel nuts in a criss-cross pattern to the following tightening torque.

   Tightening torque

   88-118 N.m {9.0-12.0 Kgf.m, 65.0-87.0 ft.lbf}



E5U610ZW5001

Fig. 1: Wheel Lug Nut Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

BRAKE LINES DISCONNECTION

1. If any brake line has been disconnected anytime during the procedures, add brake fluid, bleed the brakes, and inspect for leakage after the procedure has been completed.

CAUTION:

- **Brake fluid will damage painted surfaces. Be careful not to spill any on painted surfaces. If it is spilled, wipe it off immediately.**

BRAKE PIPE FLARE NUT TIGHTENING

1. Tighten the brake pipe flare nut using the **SST** (49 0259 770B) or any commercially available flare nut wrench.

CONNECTOR DISCONNECTION

1. Disconnect the negative battery cable before performing any work that requires handling of connectors. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

ABS/DSC RELATED PARTS

1. Make sure that there are no DTCs in the ABS/DSC memory after working on ABS/DSC related parts. If there are any codes in the memory, clear them.

DSC RELATED PART SENSOR INITIALIZATION PROCEDURE

WARNING:

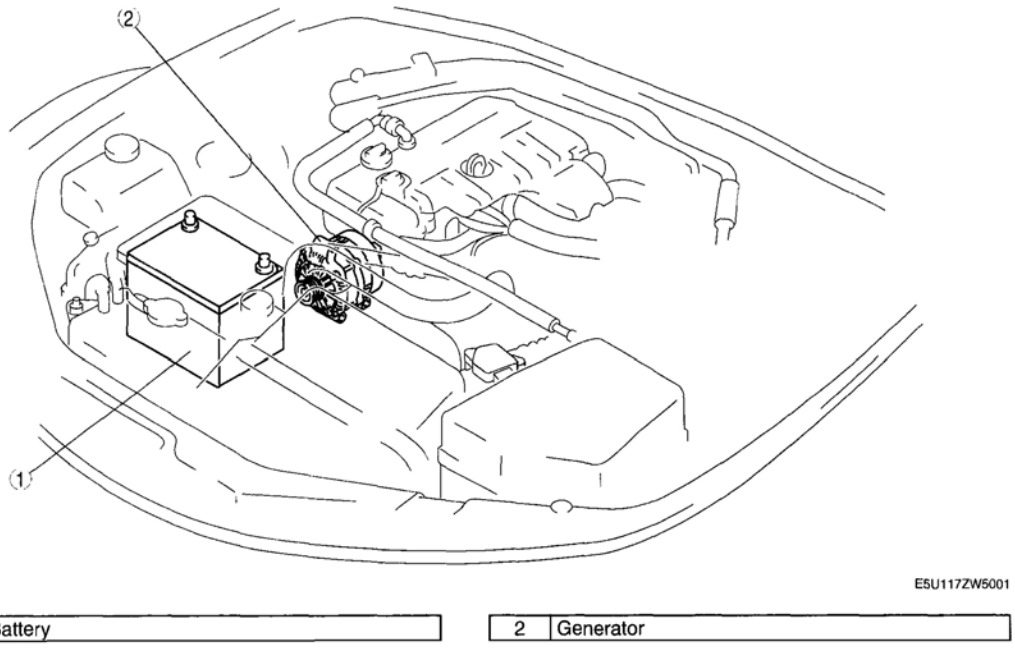
- **If the initialization procedure is not completed, the DSC will not operate properly and it might cause an unexpected accident. Therefore, when replacing or removing the following parts, make sure to perform the initialization procedure to insure proper DSC operation.**

1. When replacing or removing the following parts, perform the initialization procedure. (See **COMBINED SENSOR INITIALIZATION PROCEDURE** .) (See **STEERING ANGLE SENSOR INITIALIZATION PROCEDURE** .) (See **STEERING ANGLE SIGNAL INITIALIZATION PROCEDURE** .)
    - DSC HU/CM
    - Combined sensor
    - Steering angle sensor

2007 ELECTRICAL

Charging System - MX-5 Miata

CHARGING SYSTEM LOCATION INDEX [LF]



1	Battery	2	Generator

Fig. 1: Identifying Location Of Charging System Components
Courtesy of MAZDA MOTORS CORP.

BATTERY REMOVAL/INSTALLATION [LF]

WARNING:

- **For vehicles with DSC, if the negative battery cable is disconnected, the stored initial position of the steering angle sensor will be cleared and the DSC will not operate properly, making the vehicle unsafe to drive. Perform the steering angle sensor initialization procedure after connecting the negative battery cable.**

1. Remove in the order indicated in **Fig. 2** .
2. Install in the reverse order of removal.
3. Perform the steering angle sensor initialization procedure. (See **STEERING ANGLE SENSOR INITIALIZATION PROCEDURE** .)

1	Battery cover
2	Negative battery cable
3	Positive battery cable
4	Battery clamp
5	Battery
6	Battery box
7	Battery tray
8	Battery duct

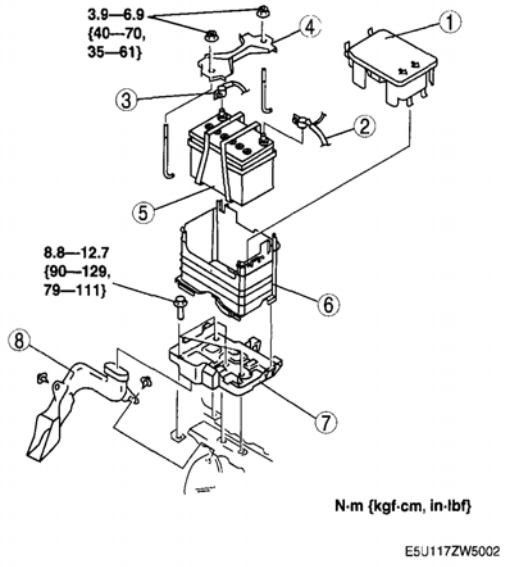


Fig. 2: Identifying Removal Order Of Battery (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

BATTERY DUCT REMOVAL NOTE

1. Remove the under cover.
2. Remove the battery duct.

NEGATIVE BATTERY CABLE INSTALLATION NOTE

1. When connecting the negative battery cable to the battery, connect the negative battery cable and the ground cable as shown in **Fig. 3** .

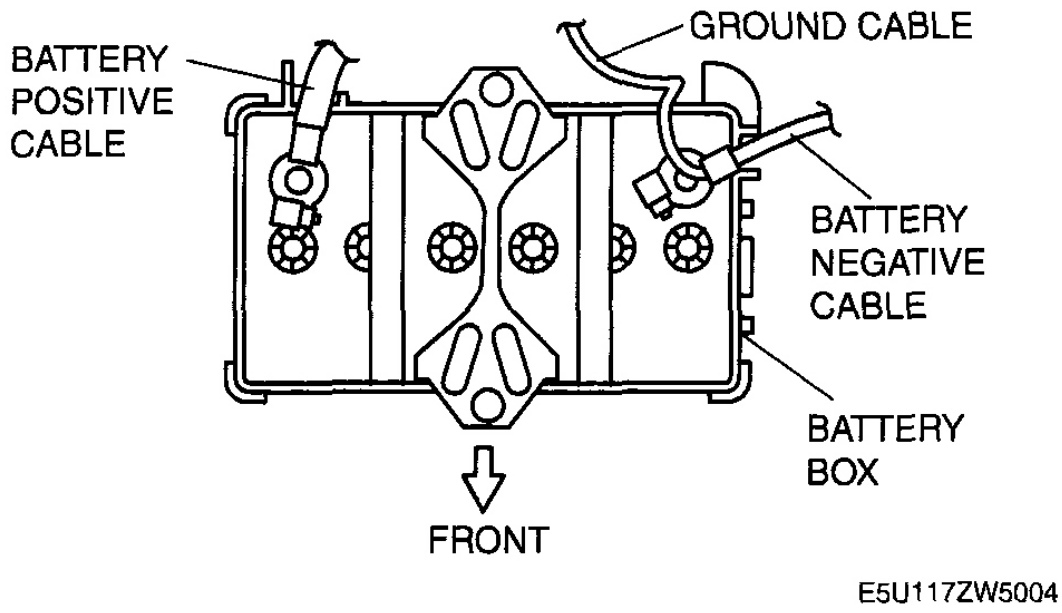


Fig. 3: Connecting Negative Battery Cable
Courtesy of MAZDA MOTORS CORP.

BATTERY INSPECTION [LF]

WARNING:

- **Since battery acid is toxic, be careful when handling the battery.**
- **Since battery acid is highly corrosive, be careful not to allow it to contact clothing or the vehicle.**
- **In case battery acid contacts skin, eyes, or clothing, flush it immediately with running water. Especially if the acid gets in the eyes, flush with water for more than 15 min. and get prompt medical attention.**

ELECTROLYTE SPECIFIC GRAVITY

1. Measure the electrolyte specific gravity using a hydrometer.
   - If it is less than the specification, recharge the battery. (See **BATTERY RECHARGING [LF]** .)

Battery electrolyte specific gravity [20°C {68°F}] 1.22-1.29

BATTERY VOLTAGE

1. Inspect the battery as follows:

BATTERY INSPECTION TABLE

Step	Inspection		Action
1	Measure the battery positive voltage.	12.4 V or more	Go to Step 3.
		Less than 12.4 V	Go to the next step.
2	Quick charge for **30 min.** and recheck voltage.	12.4 V or more	Go to the next step.
		Less than 12.4 V	Replace the battery.
3	Using the battery load tester, apply load current (see Battery load test current) and record battery voltage after **15 s.** Is voltage more than specification?	Yes	Normal
		No	Replace the battery.

Battery load test current

46B24L (36): 135 A

STANDARD SPECIFICATION

BATTERY STANDARD SPECIFICATION

Battery temp. (°C {°F})	Minimum voltage (V)
4 {39}	9.3
10 (50}	9.4
16 (61}	9.5
21 {70}	9.6

BACK-UP CURRENT

1. Verify that the ignition switch is off (key has been removed) and that all doors are closed.
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Connect the tester between the negative battery terminal and negative battery cable, leave the battery undisturbed for **30 min.** , and then measure the back-up current.
   - If not within the specification, measure the back-up current while removing the fuses one by one from the inside of the main fuse block and the inside of the fuse block.

NOTE:

- **If the battery is not left undisturbed for 30 min., the tester will indicate a high value (approx. 300 mA).**
- **If the key or any electrical accessory is operated within approx. 30 min. after the tester is connected, the battery must be left undisturbed for approx. 30 min. from that point.**

CAUTION:
- **Operating electrical loads while the back-up current is being measured can damage the tester.**

NOTE:
- **For vehicles with the immobilizer system, the system periodically shifts synchronization of the security light flashing. Therefore, 45 mA (0.1s) current is supplied when the security light is illuminated, and 25 mA (2s) current is supplied when the security light is not illuminated. In addition, the measuring instrument, which shows the average value, indicates around 30 mA.**

Battery back-up current

Vehicles with immobilizer system: 25-45 Ma

Vehicles without immobilizer system: 30 mA or less

5. Inspect and repair wiring harnesses and connectors of the fuse where the current has decreased.

BATTERY RECHARGING [LF]

WARNING:
- **Keep all flames away from the battery, otherwise evaporated gas from the battery fluid may catch fire, and cause serious injury.**
- **Remove the battery filler caps when recharging to prevent battery deformation or damage.**

CAUTION:
- **Do not quick charge for more than 30 min. It will damage the battery.**

1. Remove the battery and then place it in a pan of water.
2. Connect a battery charger to the battery and adjust the charging current as follows.

Battery slow charge current

46B24L (36): 3.5-4.5 A

Battery quick charge current [30 min.]

46B24L (36): 25 A

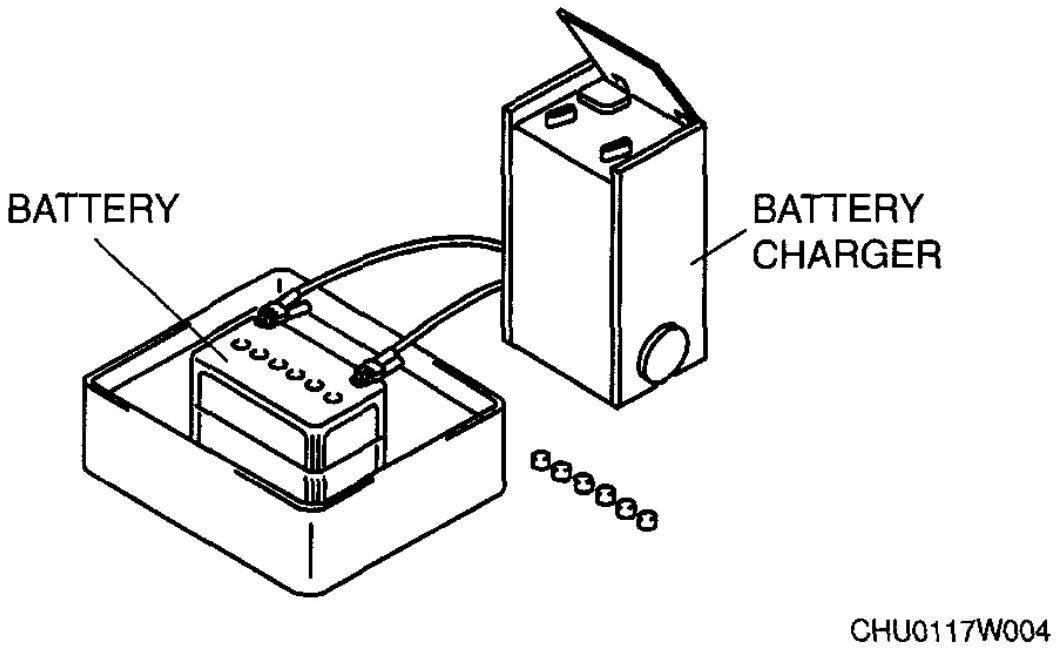


Fig. 4: Connecting Battery Charger To Battery
Courtesy of MAZDA MOTORS CORP.

3. After the battery is recharged, verify that the voltage is within the specification and remains at the same value for **1 h or more** after the recharging was completed.
   - If not within the specification, replace the battery.

Standard voltage

12.4 V or more

GENERATOR REMOVAL/INSTALLATION [LF]

WARNING:

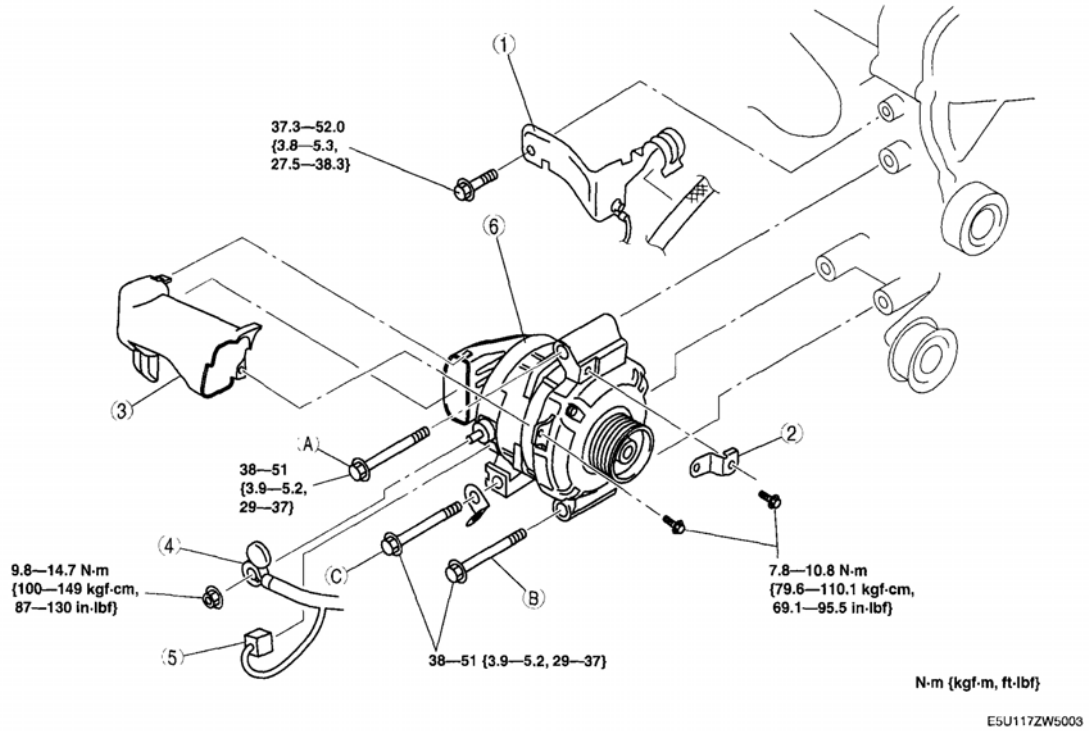
- **Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.**
- **When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery negative cable before performing the following operation.**

CAUTION:

- **The generator can be damaged by the heat from the exhaust**

manifold. Make sure the generator duct is installed securely.

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	P/S pressure hose bracket
2	Generator bracket
3	Generator duct
4	B terminal cable
5	Generator connector
6	Generator

Fig. 5: Identifying Removal Order Of Generator (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

GENERATOR INSTALLATION NOTE

1. Tighten bolt A temporarily.
2. Tighten bolt B, C to the specified tightening torque.
3. Tighten bolt A to the specified tightening torque.

GENERATOR INSPECTION [LF]

CAUTION:

- **Do not apply direct battery positive voltage to the generator terminal D, otherwise it could cause damage to the internal parts (power transistor) of the generator.**

GENERATOR WARNING LIGHT

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (See **DRIVE BELT INSPECTION [LF]** .)
3. With the ignition switch turned to the ON position, verify that the generator warning light illuminates.
   - If it does not illuminate, inspect the generator warning light and the wiring harness.
     - If the generator warning light and the wiring harness are normal, inspect the PCM.
4. Verify that the generator warning light goes out after the engine is started.
   - If it does not go out, inspect if any one of the following DTCs in the on-board diagnostic system are displayed: P0112, P0113, P2502, P2503, P2504. (See **DTC TABLE [LF]** .)

GENERATOR

Voltage

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (See **DRIVE BELT INSPECTION [LF]** .)
3. Turn off all electrical loads.
4. Start the engine.
5. Verify that the generator rotates smoothly without any noise while the engine is running.
   - If there is any noise, find the cause and repair or replace the generator.
6. Measure the voltage at each terminal using a tester.

   Generator standard voltage [IG-ON]

   Terminal B: B+

   Terminal P: Approx. 1 V or less

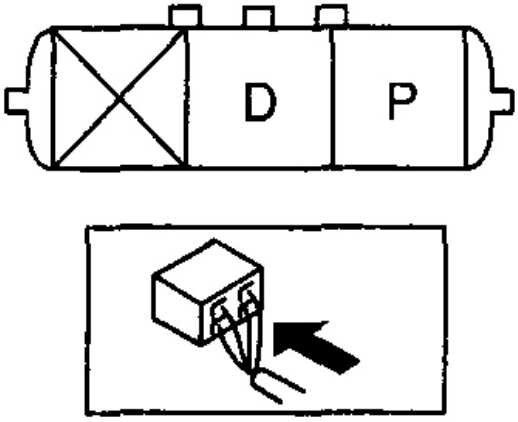
   Terminal D: Approx. 0 V

   Generator standard voltage [Idle, 20°C {68°F}]

   Terminal B: 13-15 V

   Terminal P: Approx. 3-8 V

   Terminal D: Turn the electrical loads (headlights, blower motor, rear window defroster) on and verify that the voltage reading increases.



CPJ117ZWB006

Fig. 6: Identifying Ignition Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Current

NOTE:

- **Since the charging current decreases rapidly after starting the engine, carry out the following procedure quickly, and read the maximum current value.**

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (See **DRIVE BELT INSPECTION [LF]** .)
3. Disconnect the negative battery cable.
4. Connect a tester, which can read **120 A or more** , between generator terminal B and the wiring harness.
5. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
6. Turn off all electrical loads.
7. Start the engine.
8. Increase engine speed to **2,500 rpm.**

NOTE:

- **When the electrical load of the vehicle is low, the specified current**

will not be verified although the generator is normal. In this case, increase the electrical load (by turning on the headlight and leave it for a while, then discharge the battery or by similar methods) and recheck.

- **When the generator itself or the ambient temperature are too high, the specified current cannot be verified. In this case, cool down the generator and recheck.**

9. Turn the following electrical loads on and verify that the current reading increases more than the minimum value indicated below.
    - If it is not as specified, go to the **PCM AND GENERATOR SHEARING INSPECTION**.
    - Headlights (high-beam)
    - Blower motor (HI)
    - Rear window defroster
    - Brake light

    Generator generated current minimum value

    70% of the nominal output current (nominal output current: 100 A)

    [ambient temp. 20°C {68°F}, voltage 13.0-15.0 V, both engine and generator are hot]

PCM AND GENERATOR SHEARING INSPECTION

1. Connect the M-MDS or equivalent to the DLC-2.

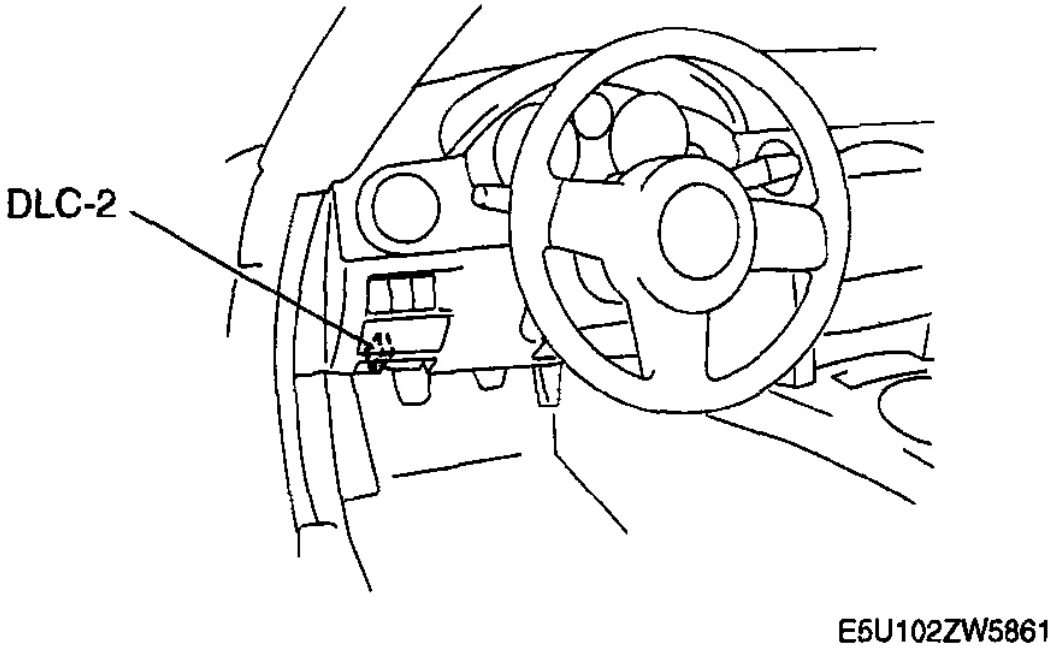
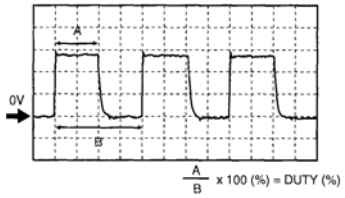
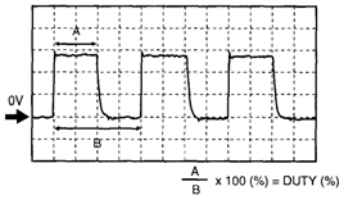


Fig. 7: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Inspect as follows:

PCM AND GENERATOR SHEARING INSPECTION TABLE

Step	Inspection		Action
1	Measure the generator terminal B voltage when the electrical loads (1) are on and off.	15 V or more	Go to Step 2.
		13-15 V	Normal (2)
		13 V or less	Go to Step 3.
2	Monitor the ALTT V PID using the M-MDS or equivalent, or measure the voltage of PCM terminal 2AJ using a tester. Is the voltage between 13 and 15 V?	Yes	Go to Step 4.
		No	PCM input error.
3	Monitor the ALTT V PID using the M-MDS or equivalent, or measure the voltage of PCM terminal 2AJ using a tester. Is the voltage between 13 and 15 V?	Yes	Go to Step 5.
		No	PCM input error.
	Monitor the ALTF PID using the M-MDS or equivalent, or calculate the duty value of the PCM terminal 2AI using an oscilloscope. Is the duty	Yes	PCM input error.

4	 value 100%?	No	PCM, generator, or both are not normal.
5	Monitor the ALTF PID using the M-MDS or equivalent, or calculate the duty value of the PCM terminal 2AI using an oscilloscope. Is the duty  value 0%?	Yes	PCM input error.
		No	PCM, generator, or both are not normal.

(1) Headlights, blower motor, rear window defroster, and brake light.

(2) If the generator field coil duty value does not change when electrical loads (such as headlights, blower motor, rear window defroster, brake light) are on or off, inspection with discharged battery is needed.

GENERATOR INNER PARTS

Rotor

1. Measure the resistance between the slip rings using a tester.
   - If not within the specification, replace the rotor.

   Generator rotor resistance (between slip rings) [20°C {68°F}]

   2.0-2.3 ohm

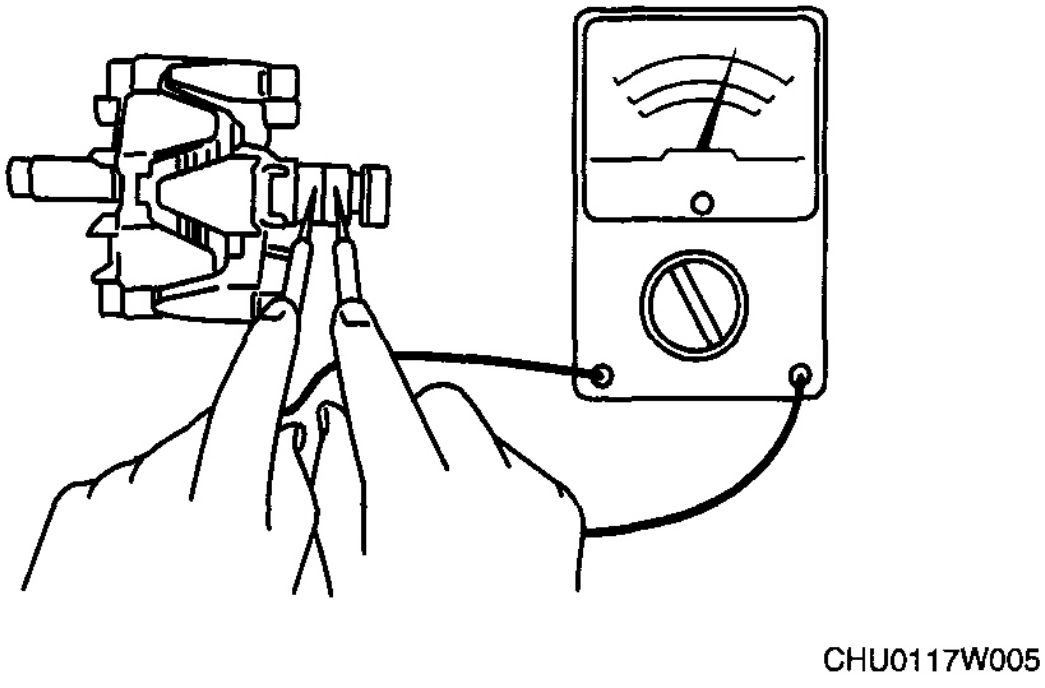


Fig. 8: Measuring Resistance Between Slip Rings Using Tester
Courtesy of MAZDA MOTORS CORP.

2. Verify that there is no continuity between the slip ring and core using a tester.
    - If there is continuity, replace the rotor.

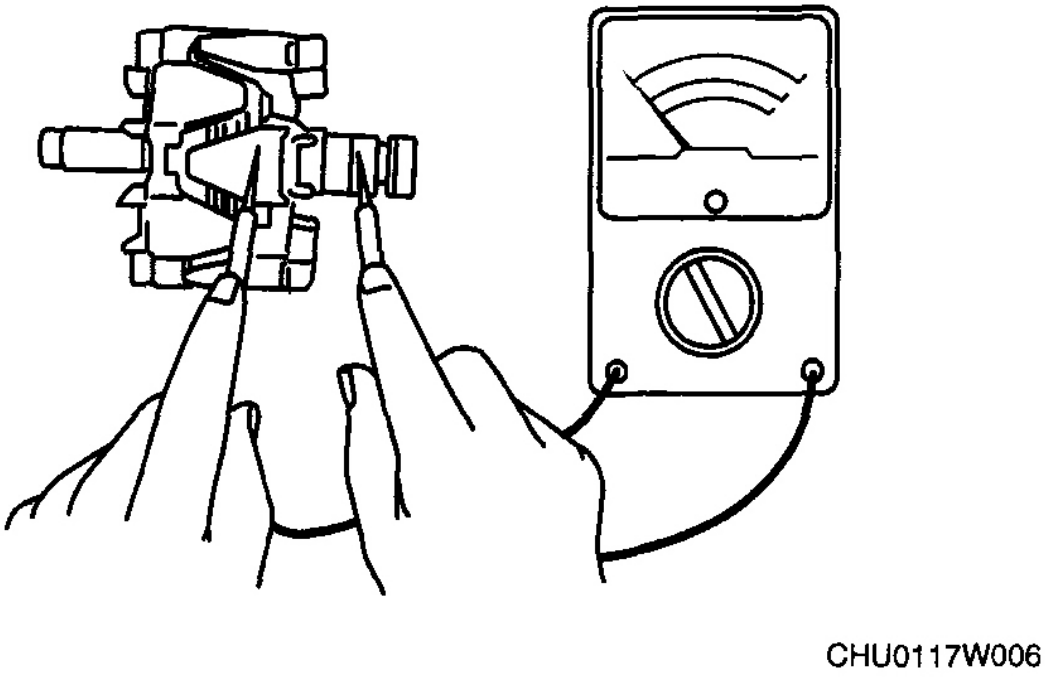


Fig. 9: Verifying There Is No Continuity Between Slip Ring & Core
Courtesy of MAZDA MOTORS CORP.

3. Inspect the slip ring surface condition.
    - If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.

Stator Coil

1. Verify that the continuity is as indicated in **Fig. 10** .

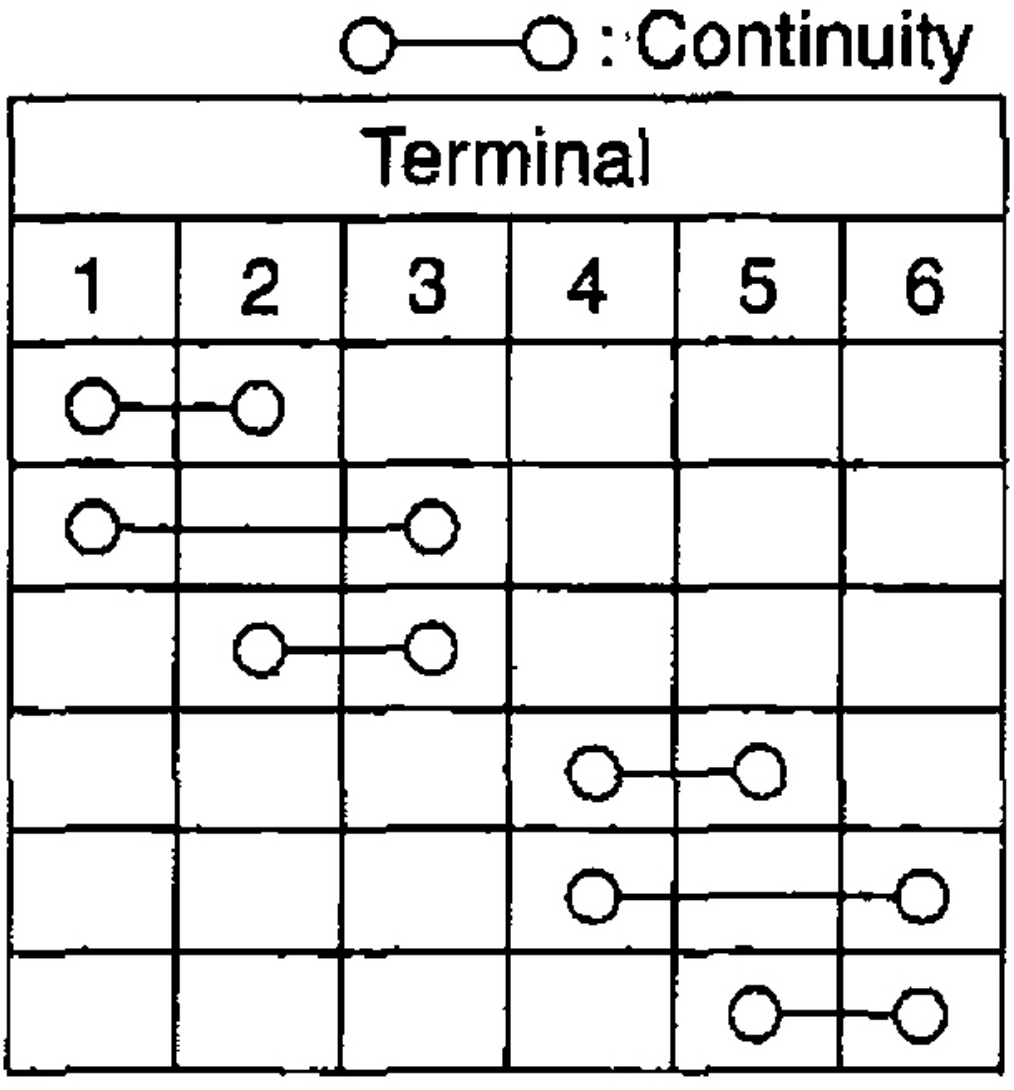


Fig. 10: Stator Coil Terminal Continuity Check Table
Courtesy of MAZDA MOTORS CORP.

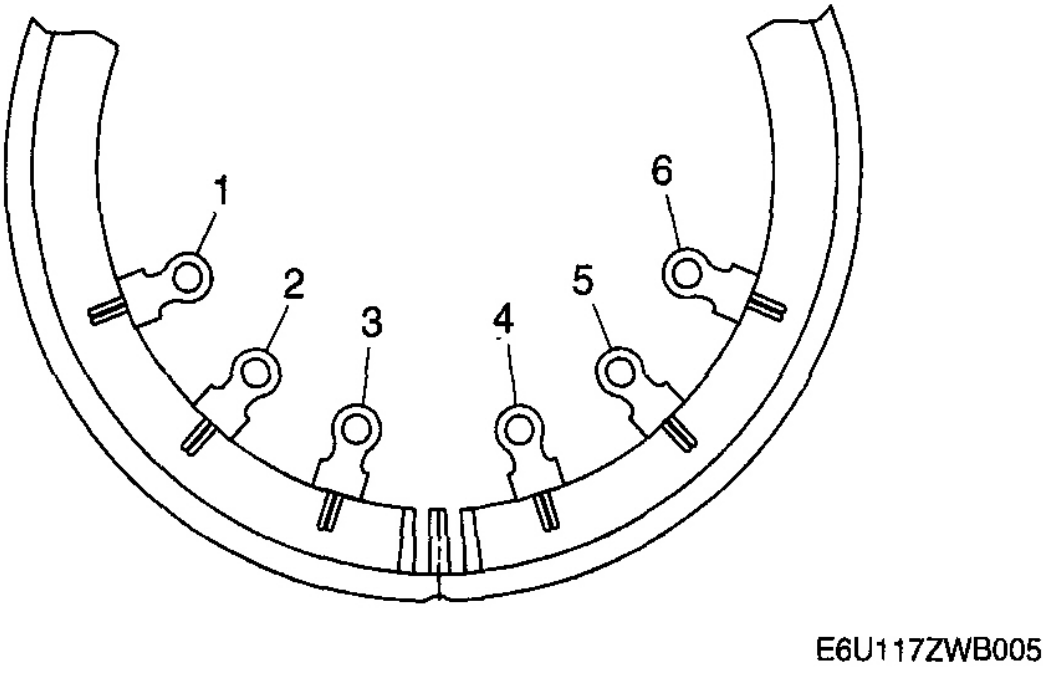


Fig. 11: Identifying Stator Coil Terminals
Courtesy of MAZDA MOTORS CORP.

- If there is any malfunction, replace the stator.

2. Verify that there is no continuity between the stator coil leads and core using a tester.
   - If there is continuity, replace the stator coil.

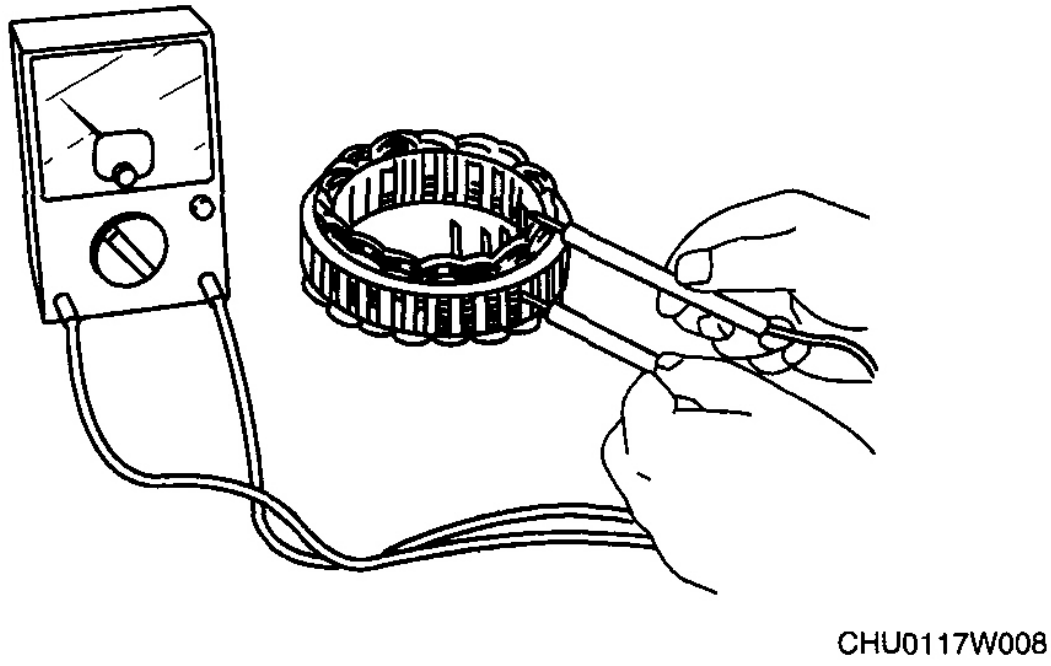


Fig. 12: Inspecting Continuity Between Stator Coil Leads And Core
Courtesy of MAZDA MOTORS CORP.

Brush

1. Inspect brushes for wear.
    - If any brush is worn almost to or beyond the limit, replace all of the brushes.

    Generator brush length

    Standard: 22.5 mm {0.89 in}

    Minimum: 5.0 mm {0.20 in}

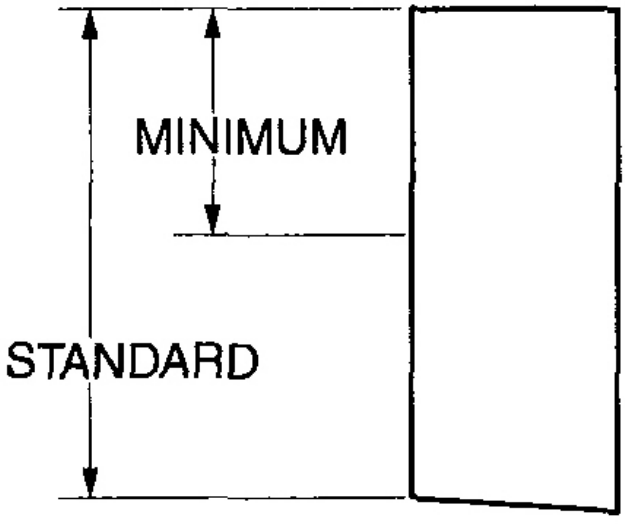


Fig. 13: Inspecting Brushes For Wear
Courtesy of MAZDA MOTORS CORP.

Brush Spring

1. Measure the force of the brush spring using a spring pressure gauge.

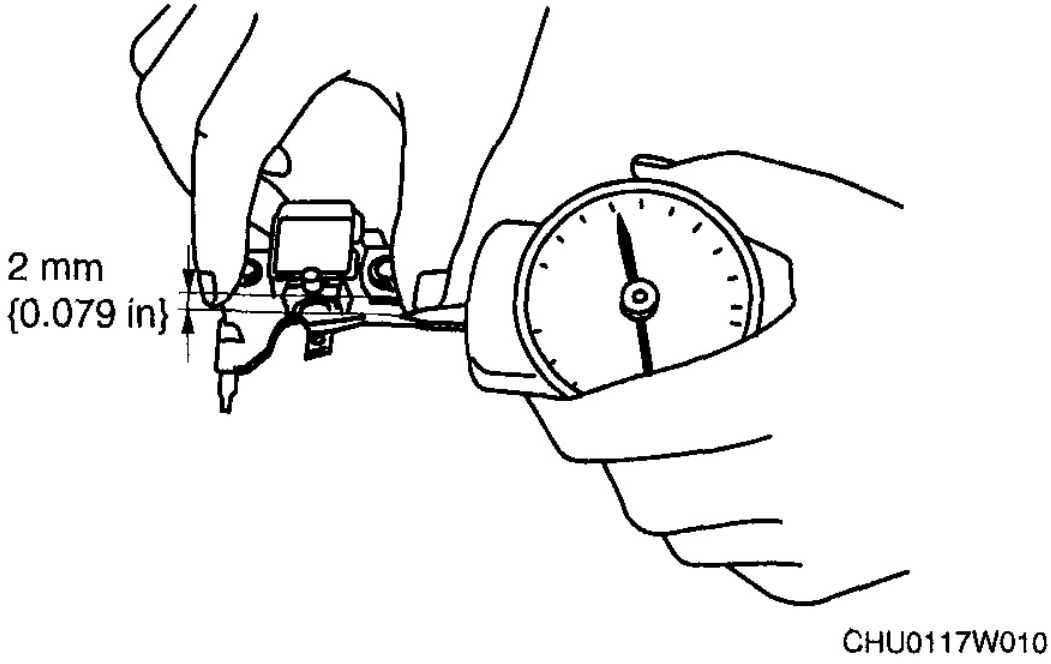


Fig. 14: Measuring Force Of Brush Spring Using Spring Pressure Gauge
Courtesy of MAZDA MOTORS CORP.

2. Read the spring pressure gauge at the brush tip projection of **2 mm {0.079 in}.**
   - Replace the brush spring if necessary.

Generator brush spring force

Standard: 4.1-5.3 N {0.42-0.54 kgf, 0.92-1.19 lbf}

Minimum: 1.7 N {0.17 kgf, 0.38 lbf}

Rectifier (Using an analog circuit tester)

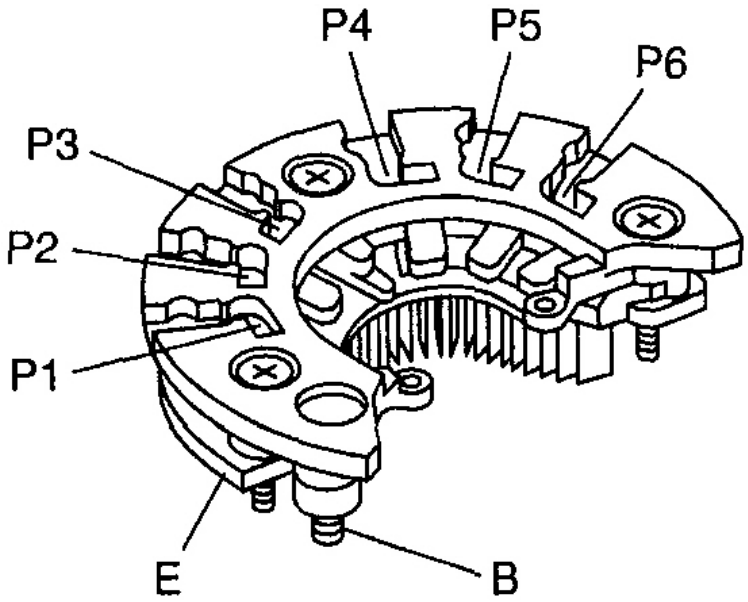
1. Inspect for continuity of the diodes using an analog circuit tester.
   - If not as specified, replace the rectifier.

Specification

RECTIFIER SPECIFICATION USING AN ANALOG CIRCUIT TESTER

Negative	Positive	Continuity
E	P1, P2, P3, P4, P5, P6	Yes

B	-	No
P1, P2, P3, P4, P5, P6	E	No
-	B	Yes



E6U117ZWB007

Fig. 15: Identifying Diodes
Courtesy of MAZDA MOTORS CORP.

Rectifier (Using a digital circuit tester)

1. Inspect for continuity of the diodes using a digital circuit tester.
    - If not as specified, replace the rectifier.

Specification

RECTIFIER SPECIFICATION USING AN DIGITAL CIRCUIT TESTER

Negative	Positive	Continuity
E	P1, P2, P3, P4, P5, P6	No
B	-	Yes
P1, P2, P3, P4, P5, P6	E	Yes
-	B	No

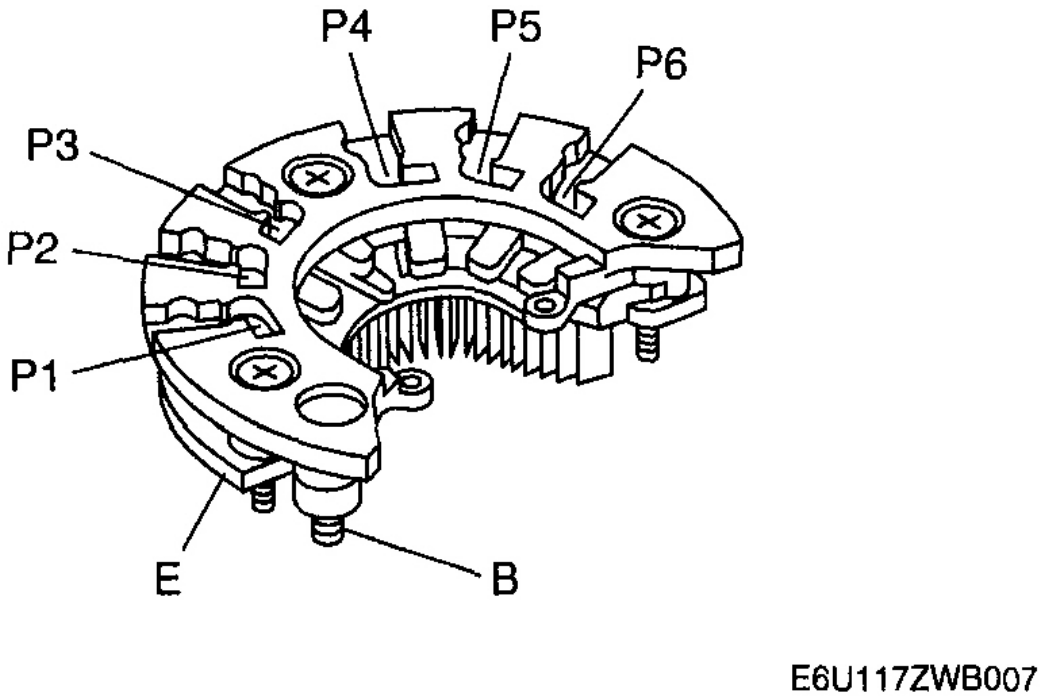
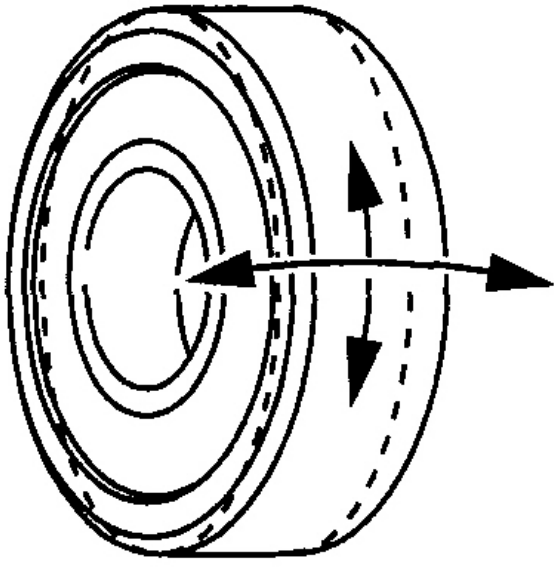


Fig. 16: Identifying Diodes
Courtesy of MAZDA MOTORS CORP.

Bearing

1. Inspect for abnormal noise, looseness, and sticking.
    - Replace the bearing if necessary.



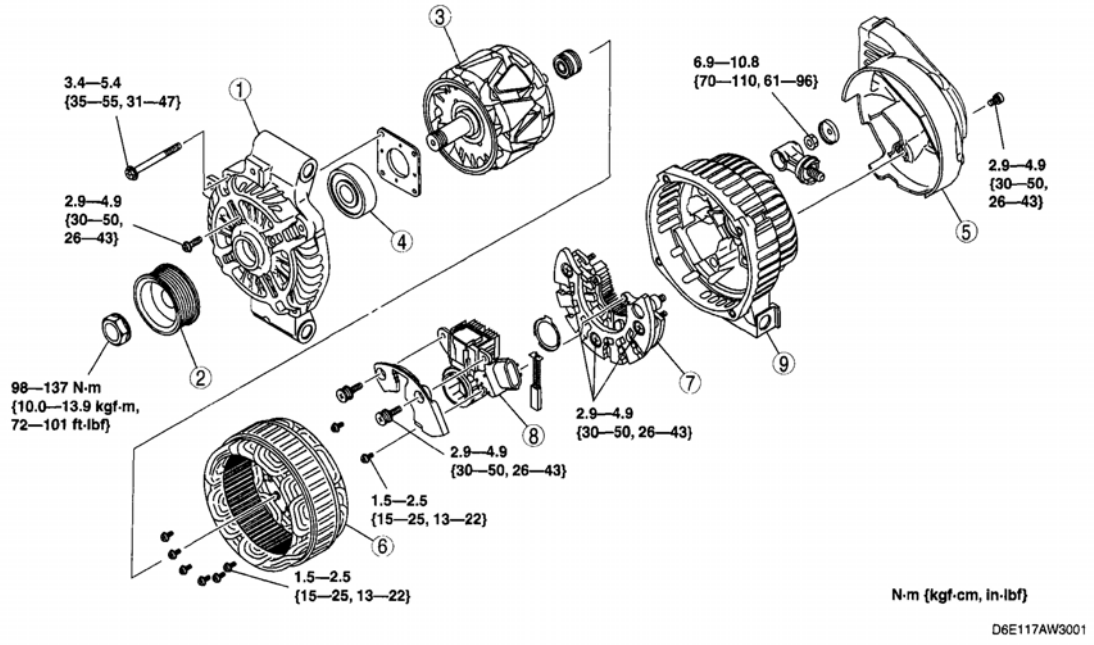
CHU0117W015

Fig. 17: Inspecting Bearing
Courtesy of MAZDA MOTORS CORP.

GENERATOR DISASSEMBLY/ASSEMBLY [LF]

CAUTION:
- **Melt the solder quickly, otherwise the diodes (rectifier) and regulator will be damaged by excessive heat.**

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Front cover
2	Pulley
3	Rotor
4	Bearing
5	Generator heat insulator

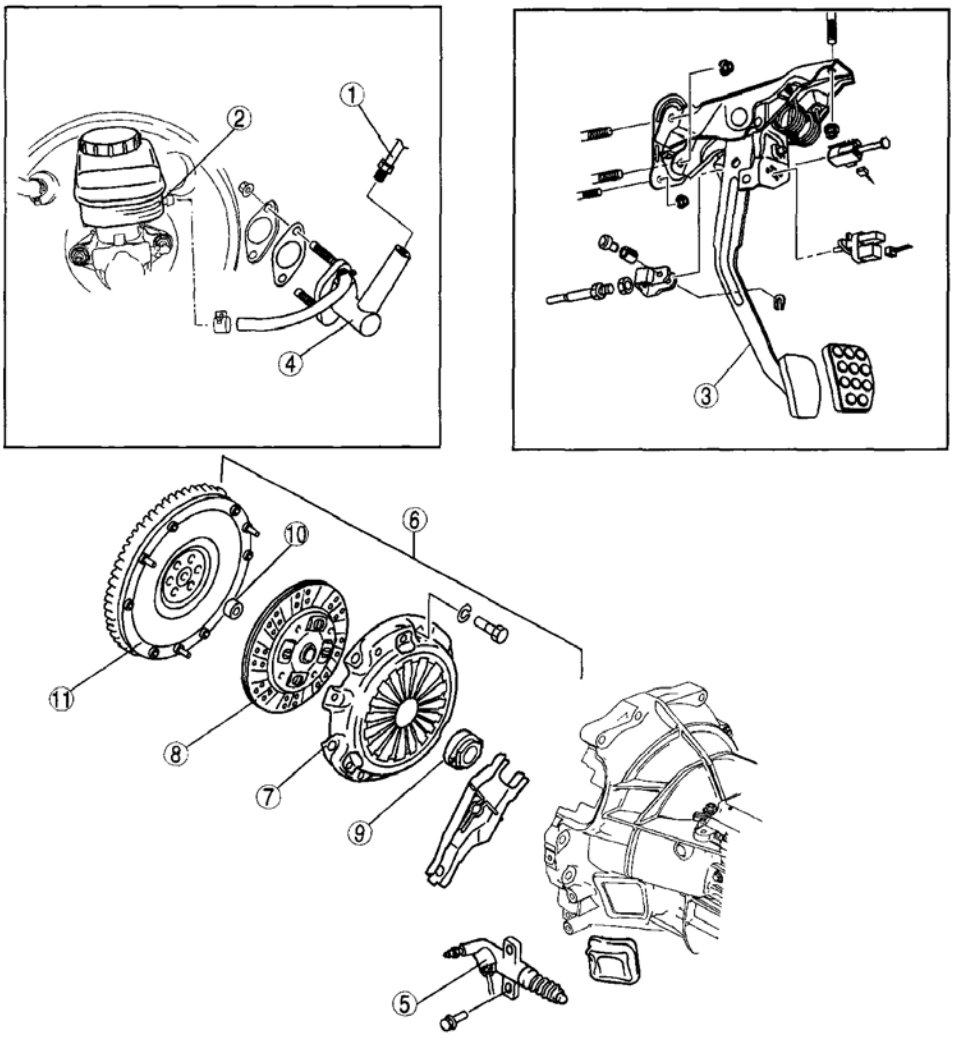
6	Stator coil
7	Rectifier
8	Brush holder
9	Rear bracket

Fig. 18: Identifying Disassemble Order Of Generator (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2007 TRANSMISSION

Clutch - MX-5 Miata

CLUTCH LOCATION INDEX



1	Clutch pipe
2	Brake fluid reservoir tank
3	Clutch pedal
4	Clutch master cylinder
5	Clutch release cylinder
6	Clutch unit
7	Clutch cover
8	Clutch disc
9	Clutch release collar
10	Pilot bearing
11	Flywheel

Fig. 1: Identifying Location Of Clutch Components
Courtesy of MAZDA MOTORS CORP.

GENERAL PROCEDURES (CLUTCH)

CAUTION:

- **Fluid will damage painted surfaces. Be careful not to spill any fluid on painted surfaces. If fluid does get on painted surfaces, wipe it off immediately.**

NOTE:

- **If any hydraulic related parts of the clutch system are removed during the procedure, add brake fluid, bleed the system and inspect for leakage after the procedure has been completed.**

1. Remove the clutch pipe using the **SST** (49 0259 770B).
2. Install the clutch pipe using a torque wrench and the **SST** (49 0259 770B).

CLUTCH FLUID INSPECTION

1. Inspect whether the fluid level in the brake fluid reservoir tank is between MIN and MAX.

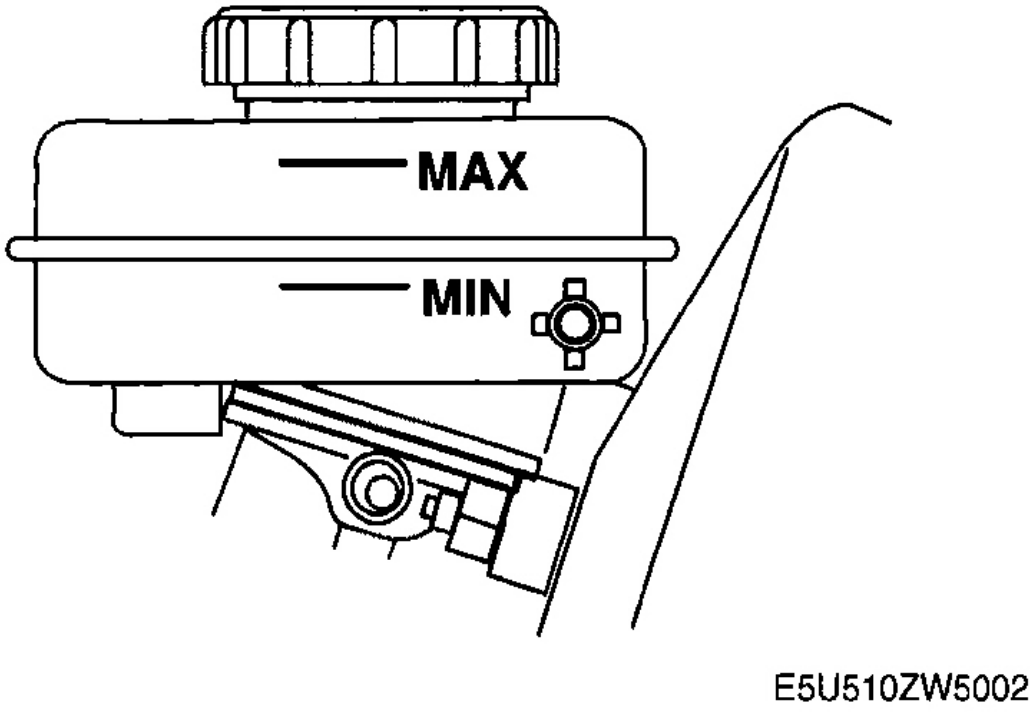


Fig. 2: Inspecting Clutch Fluid Level
Courtesy of MAZDA MOTORS CORP.

CLUTCH FLUID REPLACEMENT

CAUTION:

- **Fluid will damage painted surfaces. Be careful not to spill any fluid on painted surfaces. If fluid does get on painted surfaces, wipe it off immediately.**
- **Keep the fluid level in the reserve tank at 3/4 full or more during air bleeding.**

NOTE:

- **When replacing the fluid, drain the old fluid, fill the reserve tank with new fluid and then perform Steps 1 thru 6 below.**

Clutch fluid

SAE J1703, FMVSS 116 DOT-3

1. Remove the bleeder cap from the clutch release cylinder, and connect a vinyl hose to the bleeder plug.
2. Place the other end of the vinyl tube in a clear container, and fill fluid in the container during air bleeding.
3. Working with two people, one should depress the clutch pedal a few times and then depress and hold the pedal down.
4. While the clutch pedal is being held down, the other person should loosen the bleeder screw, and bleed any fluid containing air bubbles. Once completed, tighten the bleeder screw.
5. Continue to perform Steps 3 and 4 until no air comes from the vinyl hose.
6. Tighten the bleeder screw.

   Tightening torque

   5.9-8.8 N.m

   {61-89 kgf.cm, 53-77 in.lbf}

7. Fill the reserve tank to MAX with the recommended fluid.
8. Perform the following inspections:
   - Brake operation
   - Fluid leakage
   - Fluid level

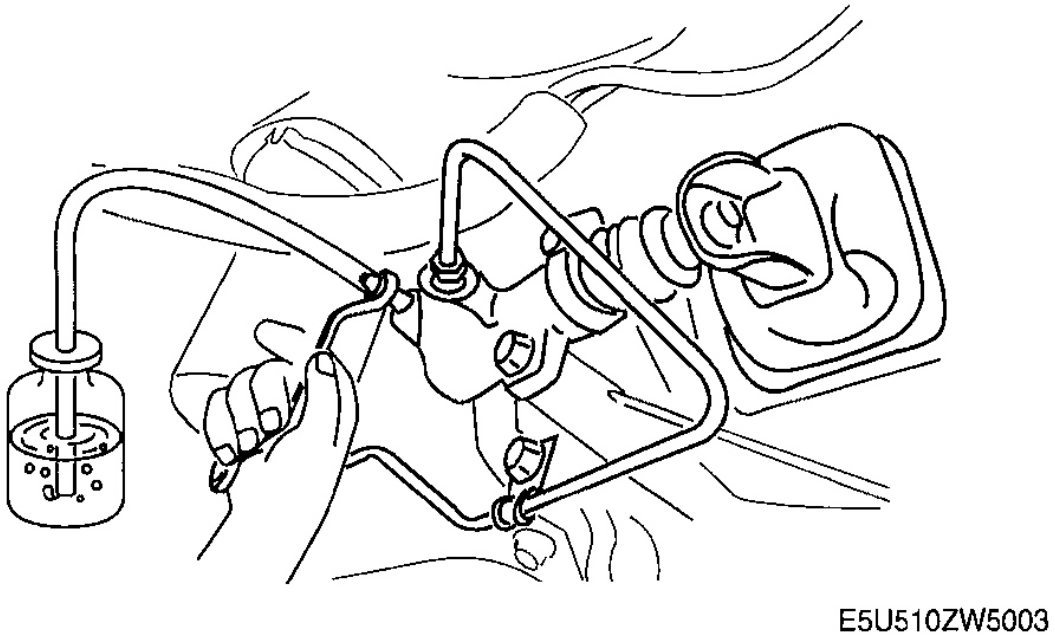


Fig. 3: Identifying Clutch Bleeding
Courtesy of MAZDA MOTORS CORP.

CLUTCH PEDAL ADJUSTMENT

CLUTCH PEDAL STROKE INSPECTION/ADJUSTMENT

1. Measure the clutch pedal stroke.
    - If there is any malfunction, loosen locknut A and adjust the pedal stroke by adjusting bolt B. Tighten locknut A after adjustment.

Clutch pedal stroke

130 mm {5.12 in}

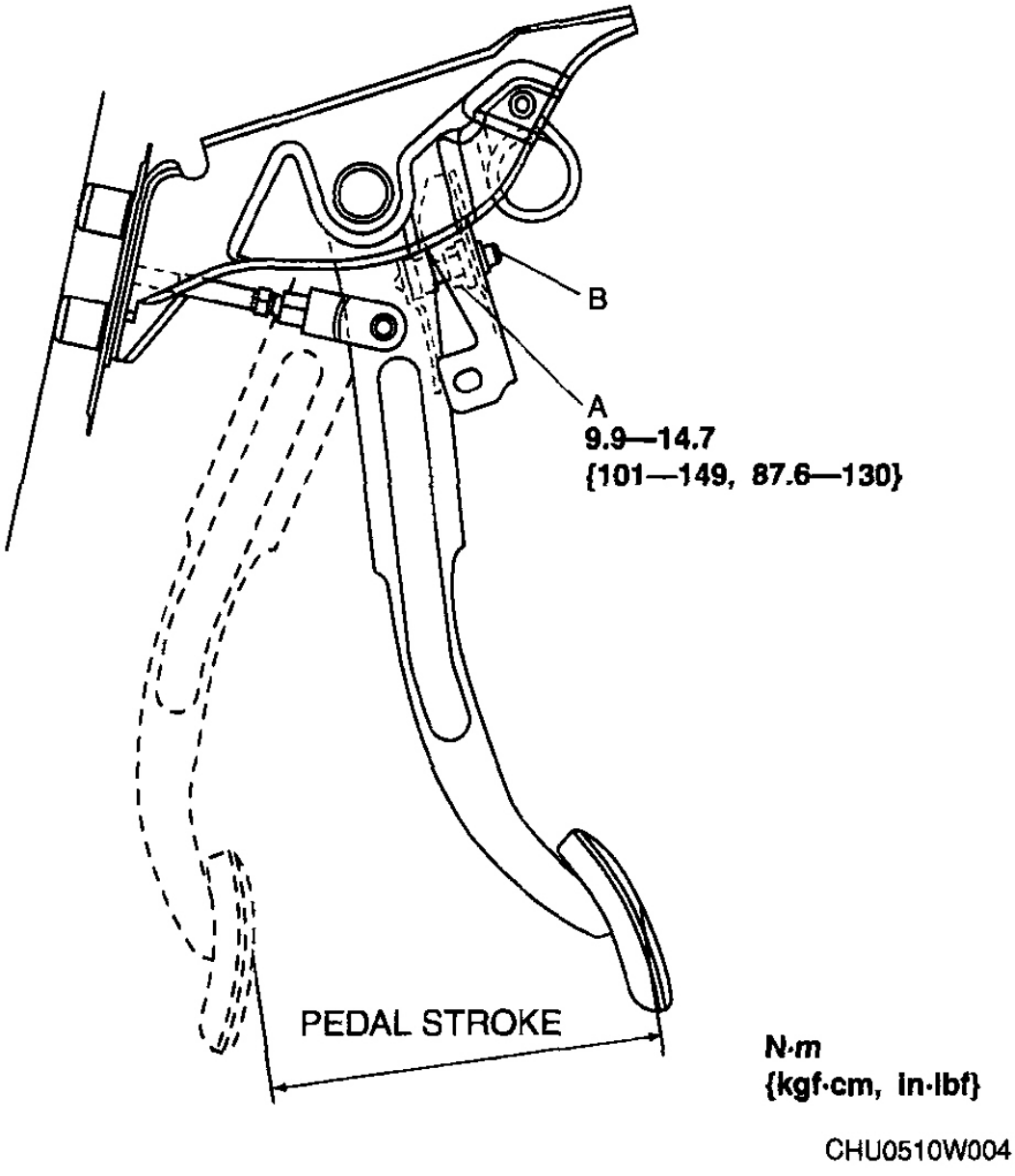


Fig. 4: Adjusting Clutch Pedal (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CLUTCH PEDAL PLAY INSPECTION/ADJUSTMENT

1. Lightly depress the clutch pedal by hand until clutch resistance is felt and then measure the pedal play.

Clutch pedal play

5-15 mm {0.20-0.59 in}

Clutch pedal push rod play

At push rod setting line: 0.1-0.5 mm {0.004-0.020 in} (Reference value)

At pedal pad: 0.5-2.7 mm {0.020-0.106 in}

2. If it is not within the specification, loosen locknut C and turn push rod D to adjust the pedal play.
3. Remeasure the pedal play and, if it is within the specification, tighten locknut C.

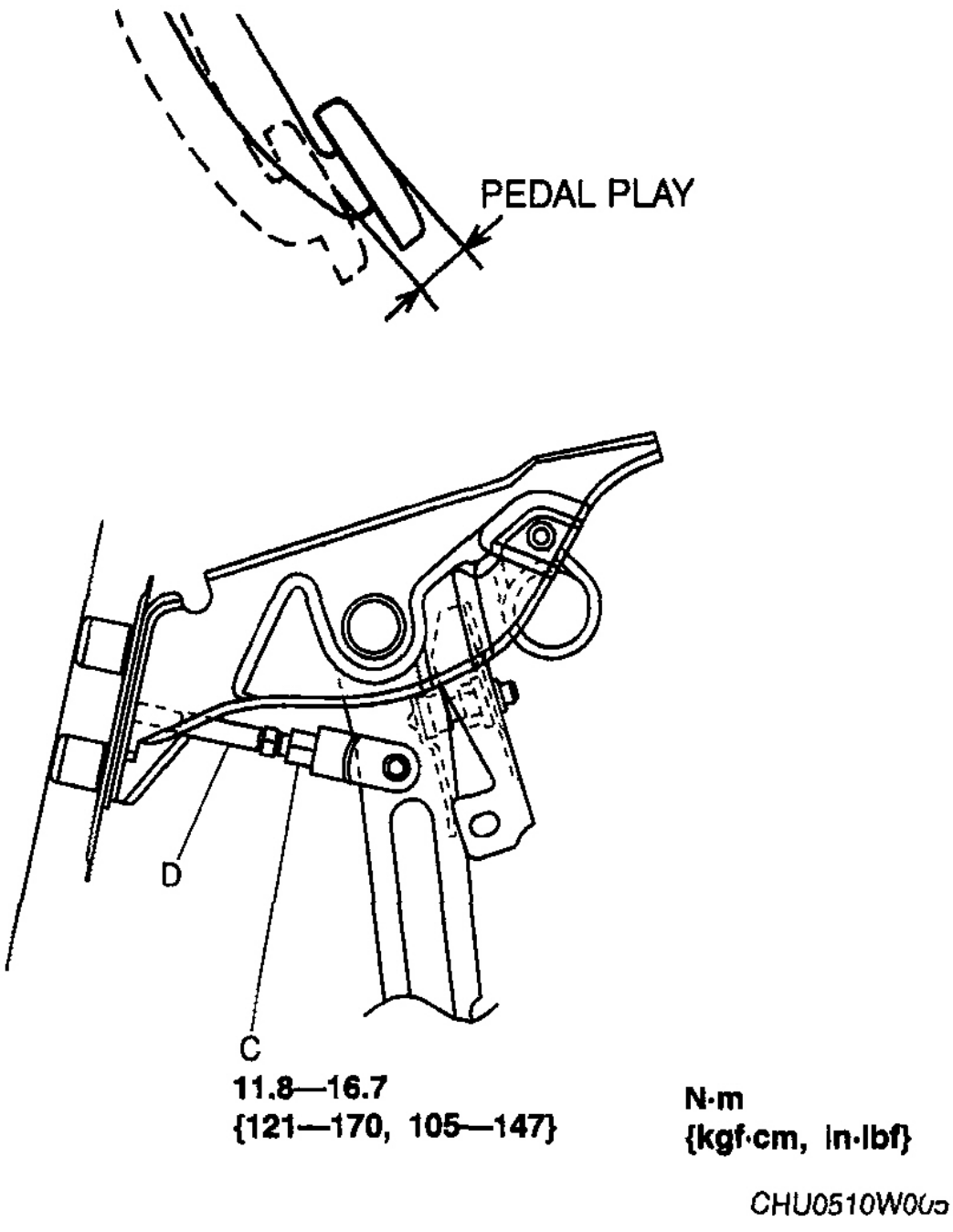


Fig. 5: Inspecting Clutch Pedal Play (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CLUTCH DISENGAGEMENT POINT INSPECTION

1. Start the engine.
2. Without depressing the clutch pedal, move the shift lever slowly to the reverse position until gear noise is heard and hold the lever in that position.
3. Slowly depress the clutch pedal and hold at the point where the gear noise stops (clutch disengagement point).
4. Measure distance A (from pedal not depressed to clutch disengagement point) and verify that it is within the specification.

Clutch disengagement stroke (Reference value)

A: 80-110 mm {3.15-4.33 in}

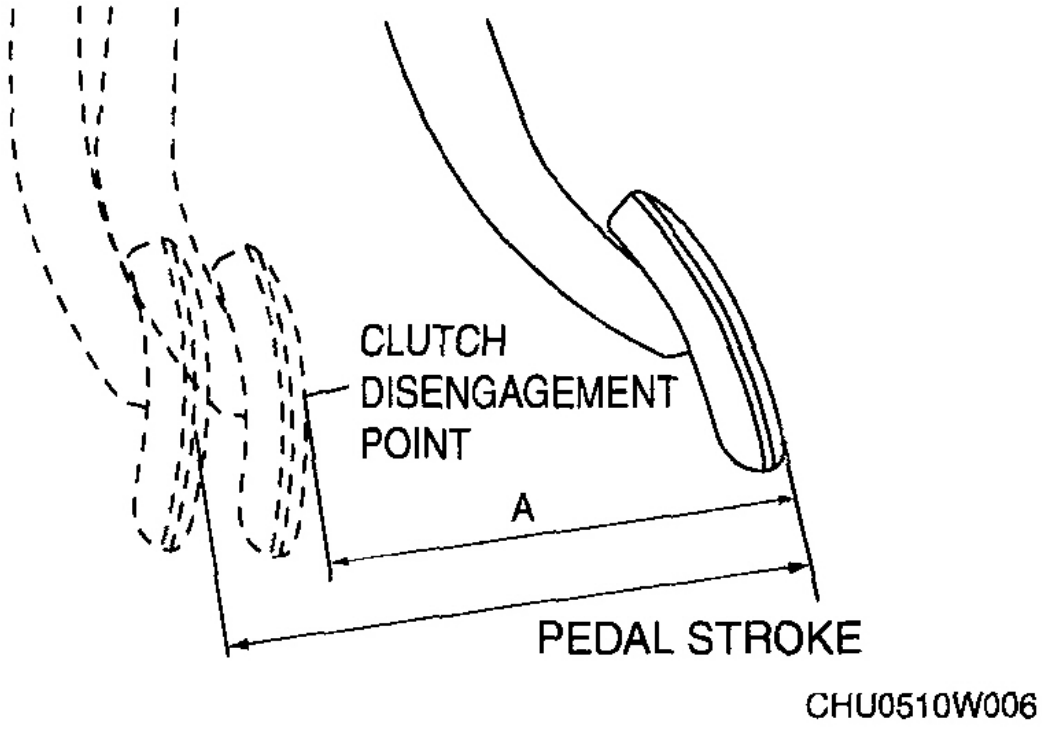


Fig. 6: Inspecting Clutch Disengagement Point
Courtesy of MAZDA MOTORS CORP.

CLUTCH SWITCH INSPECTION

1. Remove the engine cover.
2. Remove the battery cover.

3. Disconnect the negative battery cable.
4. Disconnect the clutch switch connector.
5. Verify continuity as indicated in **Fig. 7** .

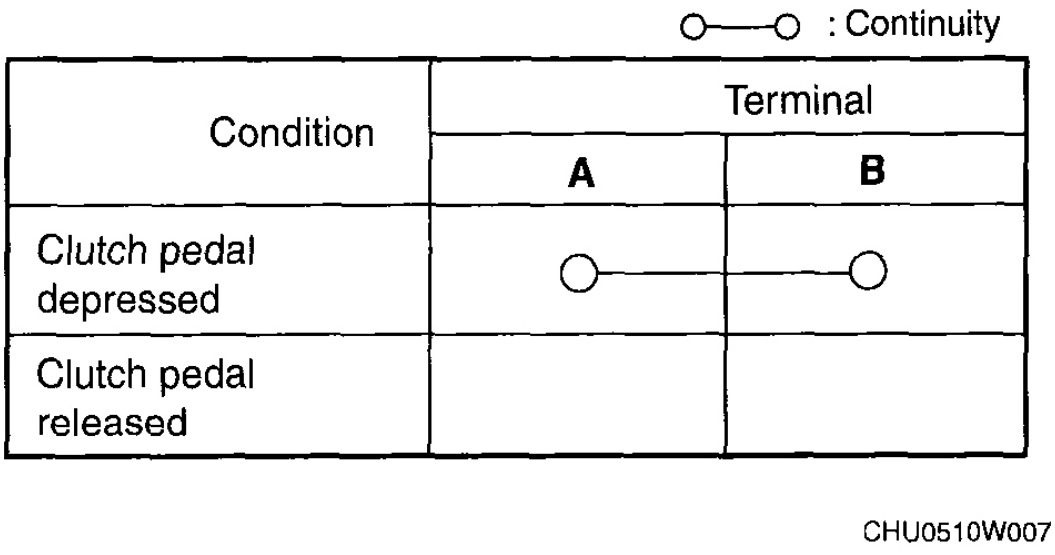


Fig. 7: Clutch Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

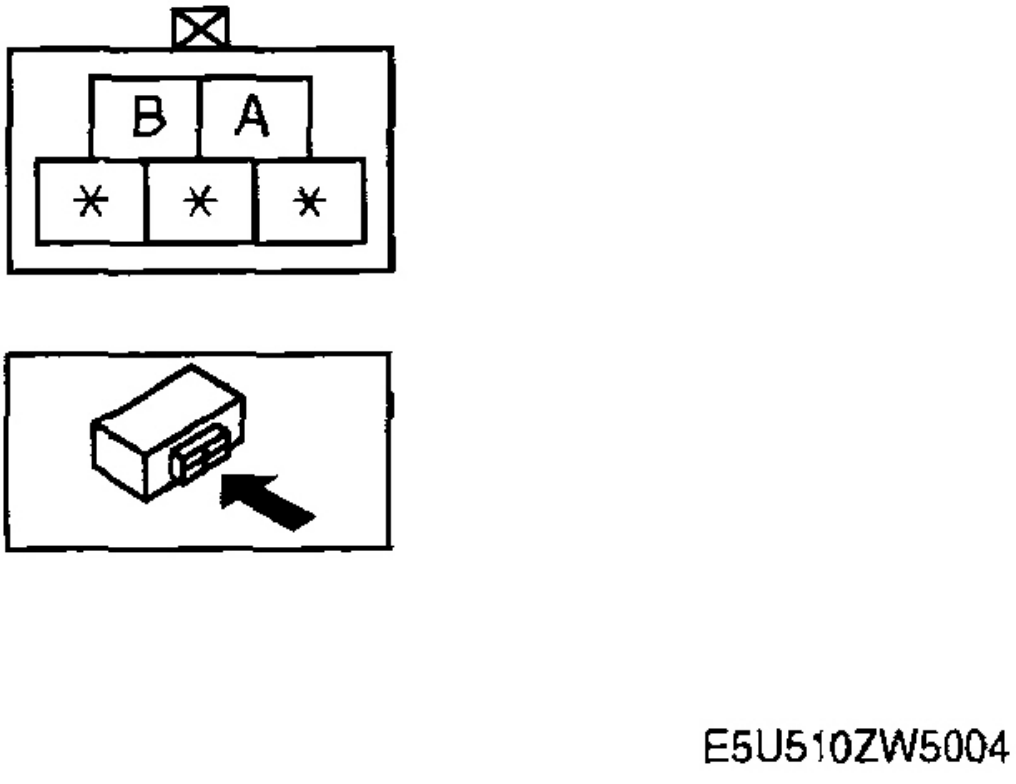
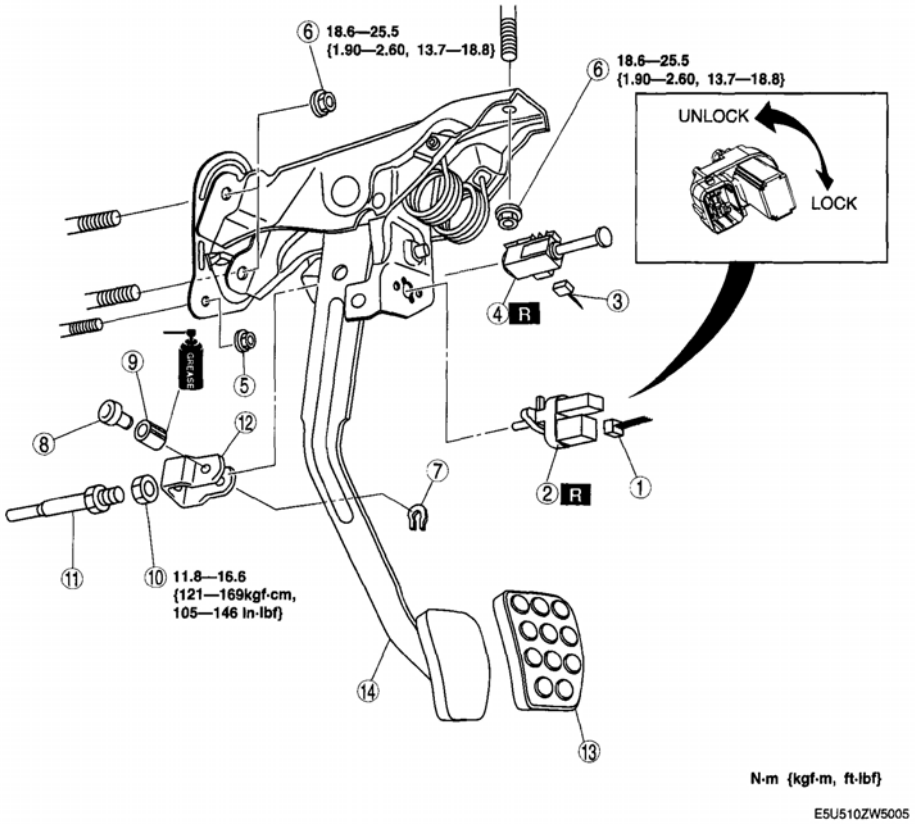


Fig. 8: Identifying Clutch Switch Connector
Courtesy of MAZDA MOTORS CORP.

- If there is any malfunction, replace the clutch switch.

CLUTCH PEDAL REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 9** .
2. Install in the reverse order of removal.
3. Inspect and adjust the clutch pedal. (See **CLUTCH PEDAL ADJUSTMENT** .)



1	Clutch switch connector
2	Clutch switch
3	Starter interlock switch connector
4	Starter interlock switch
5	Nut cap
6	Nut

7	Retaining ring
8	Joint pin
9	Bush
10	Nut
11	Push rod
12	Fork
13	Pedal pad
14	Clutch pedal component

Fig. 9: Identifying Clutch Pedal Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

STARTER INTERLOCK SWITCH INSTALLATION NOTE

CAUTION:

- **If the rod Is pushed in, it may not operate properly. Be careful not to push the rod in when installing the starter interlock switch.**

1. Insert a new starter interlock switch into the pedal bracket hole in direction A.
2. While pushing the starter interlock switch in direction A, slide it in direction B until it locks securely.
3. Move the clutch to a fully open stroke in direction C and securely fit the terminal of the starter interlock switch.

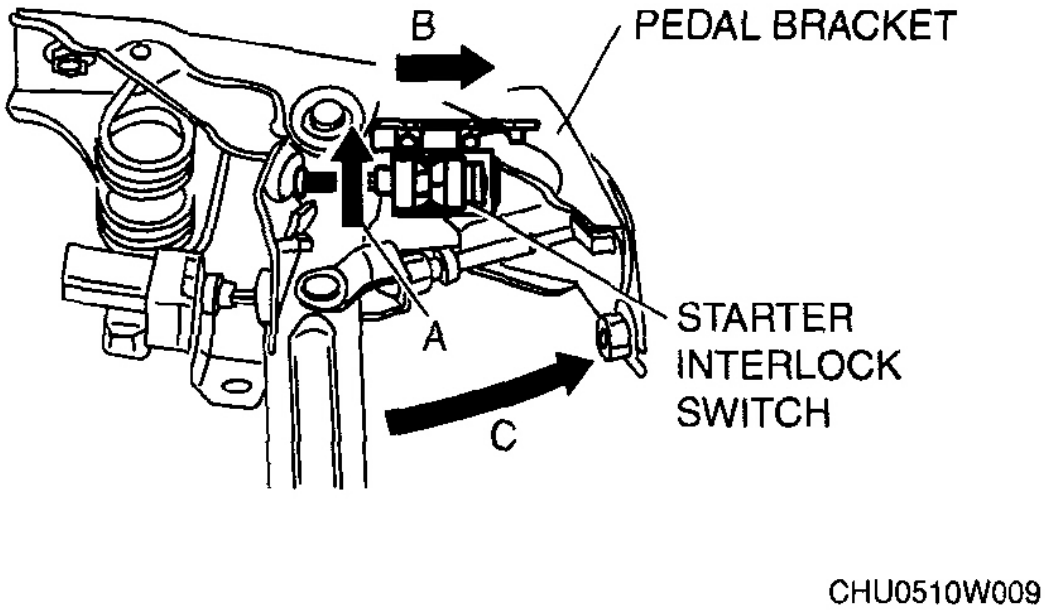


Fig. 10: Identifying Starter Interlock Switch And Pedal Bracket
Courtesy of MAZDA MOTORS CORP.

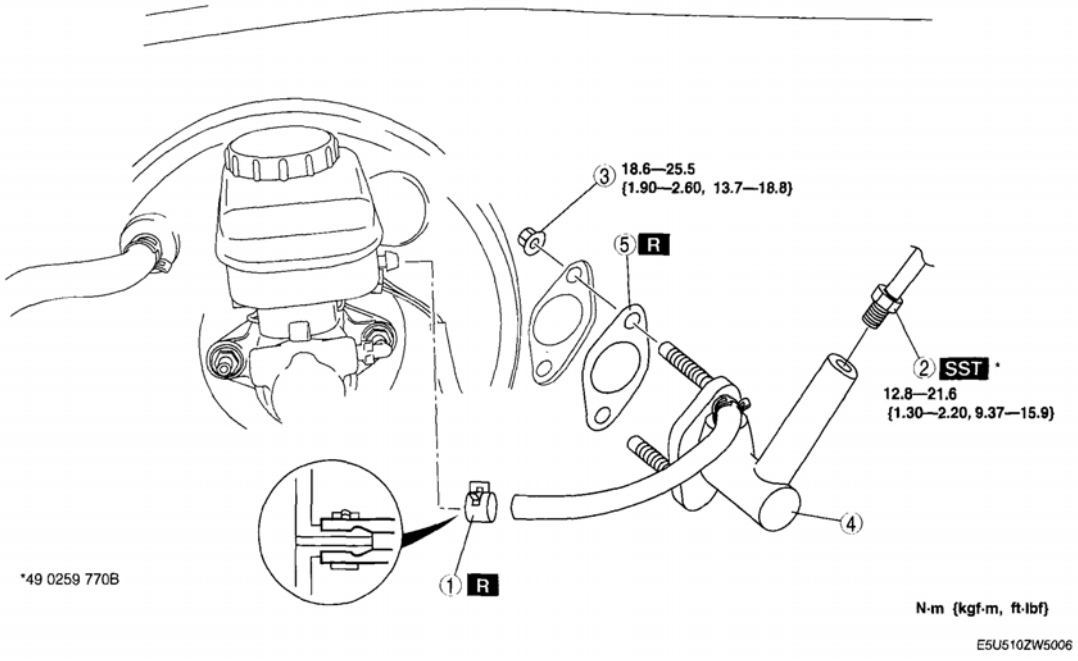
CLUTCH MASTER CYLINDER REMOVAL/INSTALLATION

CAUTION:
- **Fluid will damage painted surfaces. Be careful not to spill any fluid on painted surfaces. If it is spilled, wipe it off immediately.**

1. Remove in the order indicated in **Fig. 11** .
2. Install in the reverse order of removal.
3. Bleed the air from the system.

   (See **CLUTCH FLUID REPLACEMENT** .)

4. Inspect and adjust the clutch pedal. (See **CLUTCH PEDAL ADJUSTMENT** .)



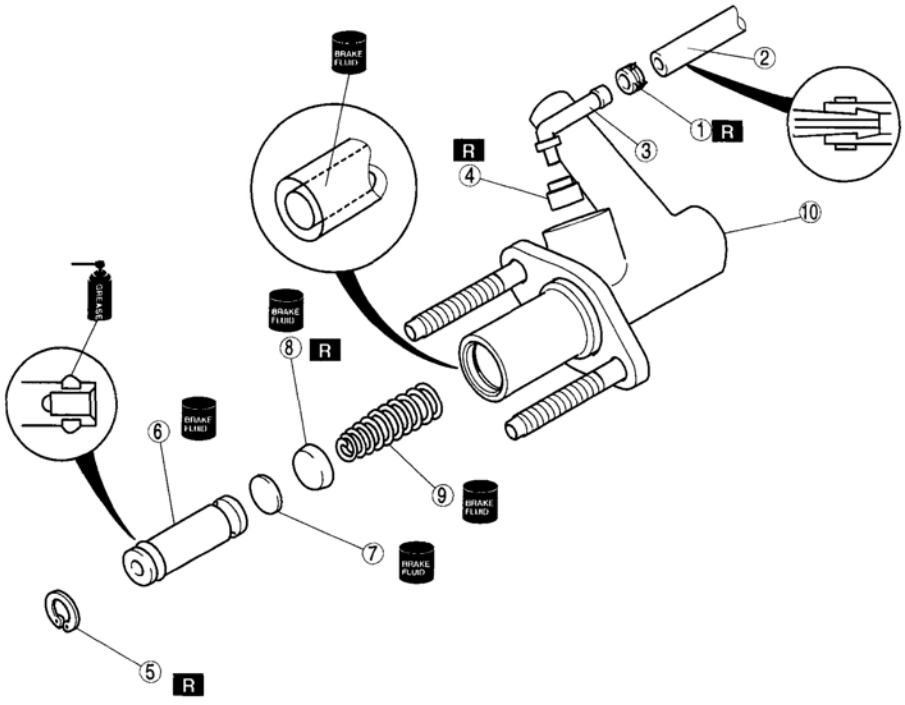
1	Hose clip
2	Clutch pipe
3	Nut

4	Clutch master cylinder
5	Packing

Fig. 11: Identifying Clutch Master Cylinder Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

CLUTCH MASTER CYLINDER DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 12** .
2. Assemble in the reverse order of disassembly.



1	Hose clip
2	Reserve tank hose
3	Joint
4	Bushing
5	Snap ring

6	Piston, secondary cup component
7	Spacer
8	Primary cup
9	Return spring
10	Clutch master cylinder body

Fig. 12: Exploded View Of Clutch Master Cylinder Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

SNAP RING DISASSEMBLY/ASSEMBLY NOTE

1. While pressing the piston in with a cloth-wrapped pin punch to protect the push rod contacting surface, remove/install the snap ring.

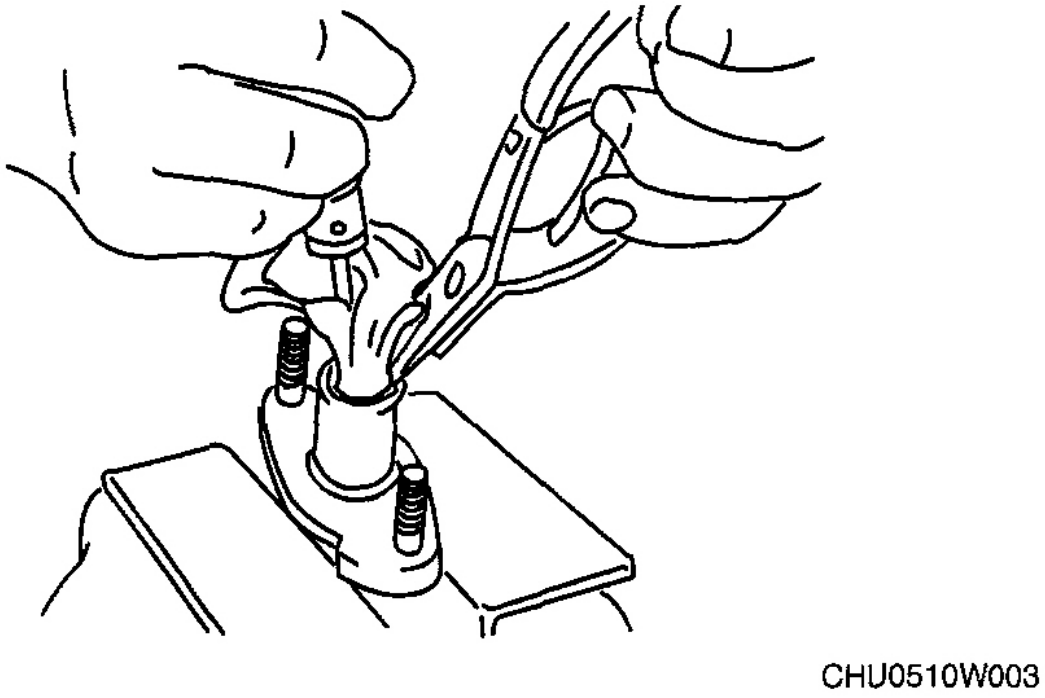


Fig. 13: Removing Snap Ring
Courtesy of MAZDA MOTORS CORP.

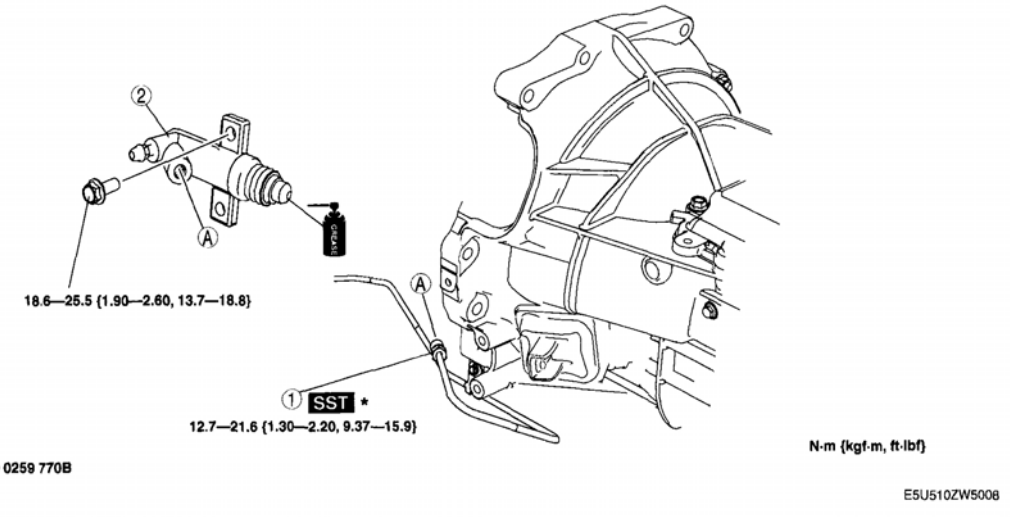
CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION

CAUTION:
- **Fluid will damage painted surfaces. Be careful not to spill any fluid on painted surfaces. If fluid does get on painted surfaces, wipe it off immediately.**

1. Remove in the order indicated in **Fig. 14** .
2. Install in the reverse order of removal.
3. Bleed the air from the system.

   (See **CLUTCH FLUID REPLACEMENT** .)

4. Inspect and adjust the clutch pedal. (See **CLUTCH PEDAL ADJUSTMENT** .)

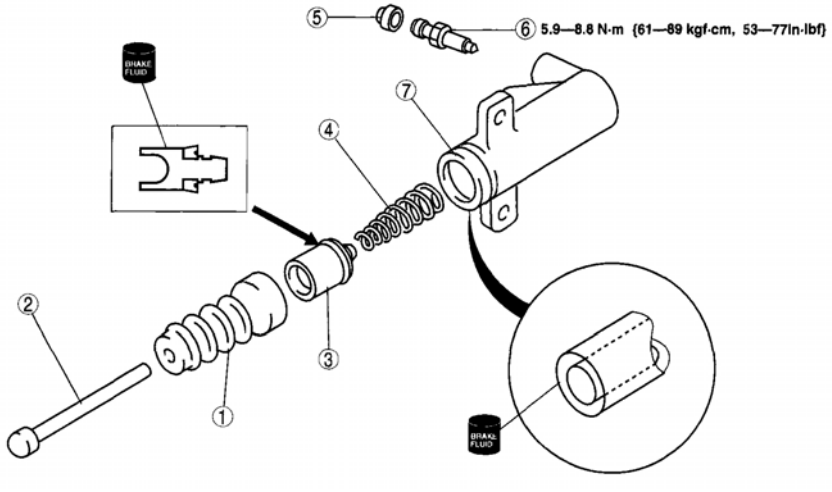


1	Clutch pipe
2	Clutch release cylinder

Fig. 14: Identifying Clutch Release Cylinder Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

CLUTCH RELEASE CYLINDER DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 15** .
2. Assemble in the reverse order of disassembly.



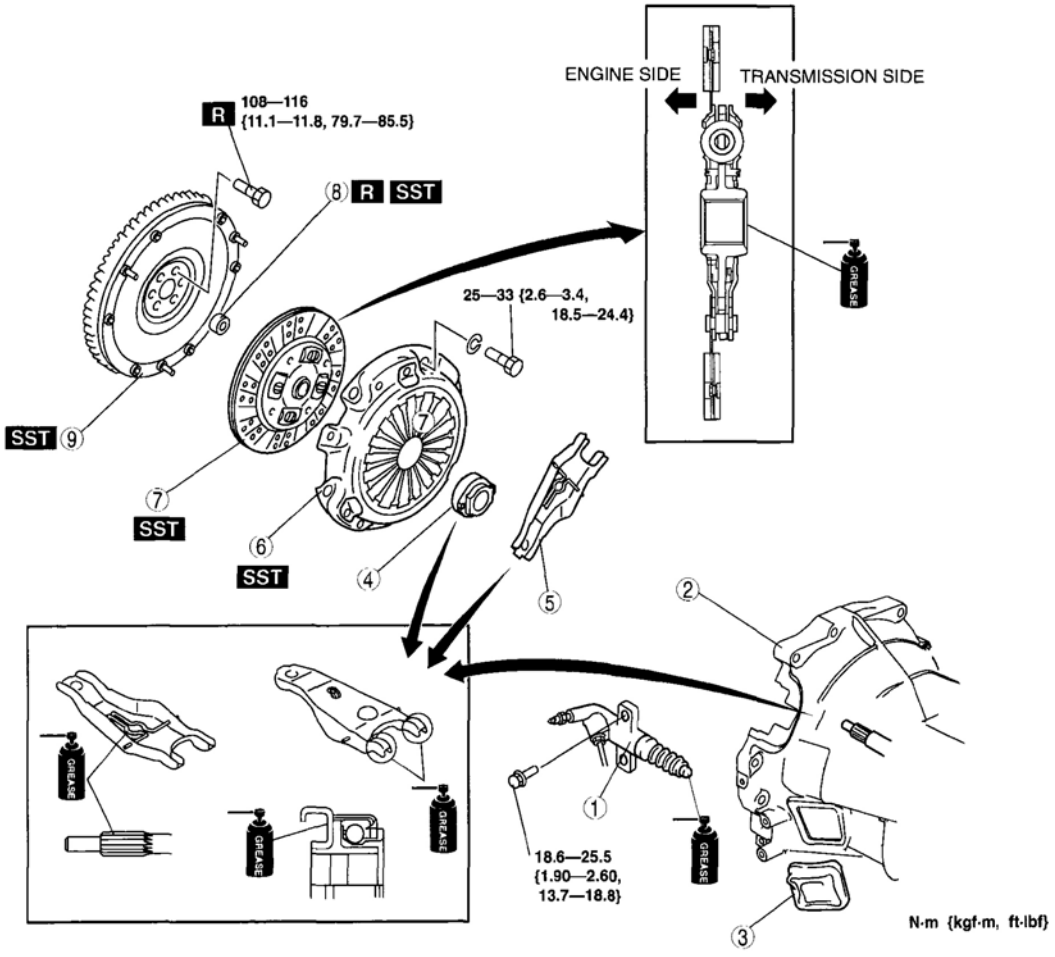
1	Boot
2	Push rod
3	Piston, piston cup component
4	Return spring
5	Bleeder cap
6	Bleeder screw
7	Clutch release cylinder body

Fig. 15: Exploded View Of Clutch Release Cylinder Components (With Torque Specifications)

Courtesy of MAZDA MOTORS CORP.

CLUTCH UNIT REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 16** .
2. Install in the reverse order of removal.



E5U510ZW5010

1	Clutch release cylinder
2	Manual transmission
3	Boot
4	Clutch release collar
5	Clutch release fork
6	Clutch cover
7	Clutch disc
8	Pilot bearing
9	Flywheel

Fig. 16: Identifying Clutch Unit Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CLUTCH COVER AND DISC REMOVAL NOTE

1. Install the **SSTs.**
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released.
3. Remove the clutch cover and disc.

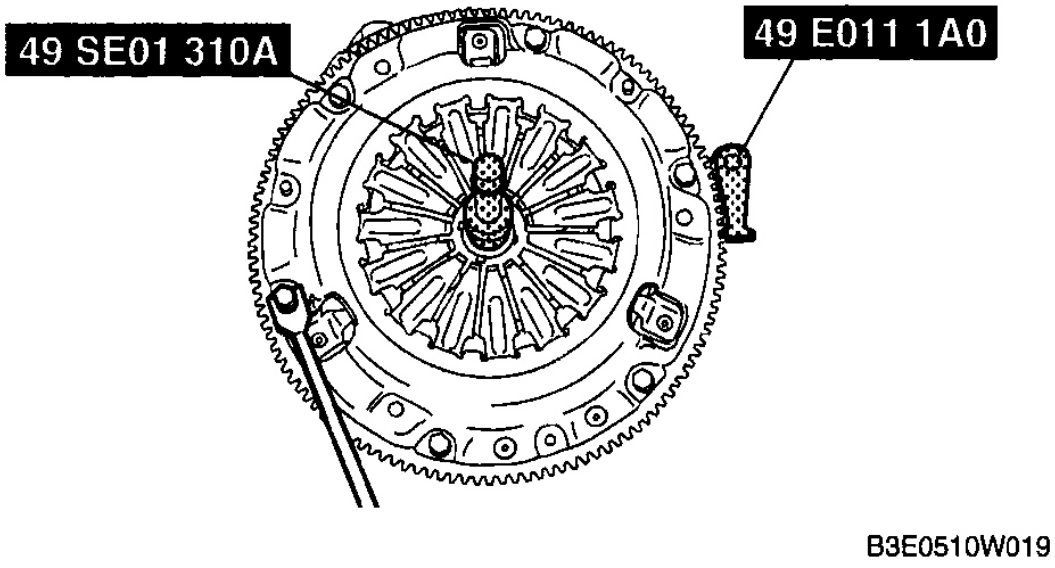


Fig. 17: Identifying SSTs
Courtesy of MAZDA MOTORS CORP.

PILOT BEARING REMOVAL NOTE

NOTE:
- **The pilot bearing does not need to be removed unless you are replacing it.**

1. Use the **SST** to remove the pilot bearing.

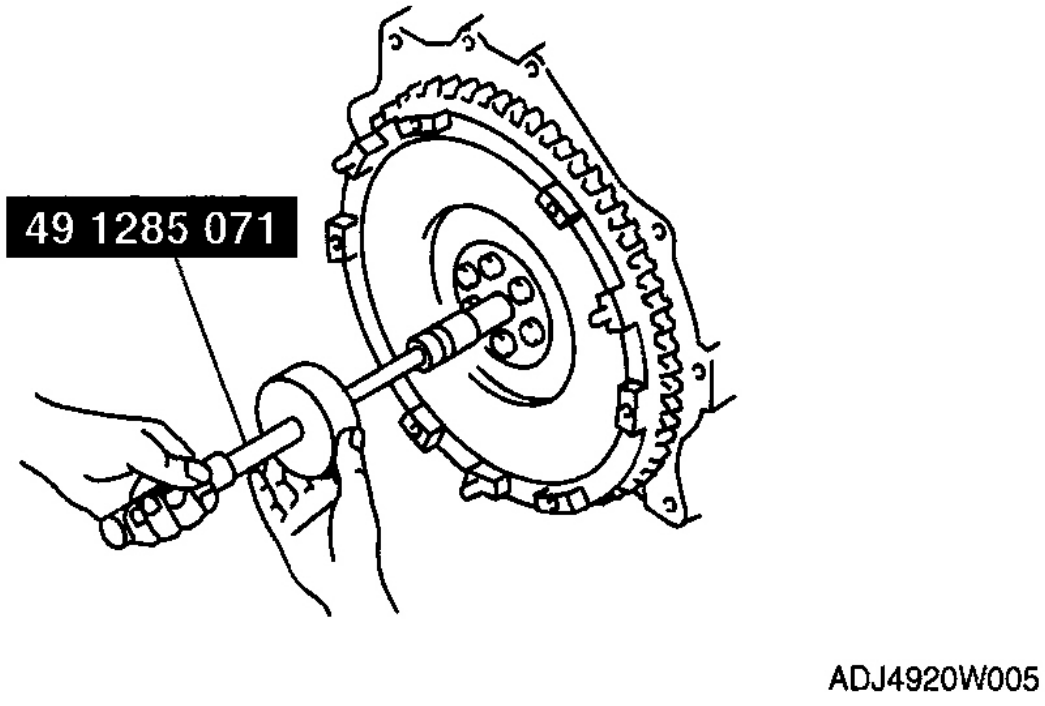


Fig. 18: Removing Pilot Bearing Using SST
Courtesy of MAZDA MOTORS CORP.

PILOT BEARING INSTALLATION NOTE

1. Install the pilot bearing using the corresponding 20mm {0.79} side of a Snap-on brand millimeter size bushing driver set A160M adapter A160M7 (20-22 mm {0.79-0.86 in}) or substitution tool.

   Substitution tool

   Outer diameter: 21 mm {0.83 in}

   Inner diameter: 19 mm {0.75 in}

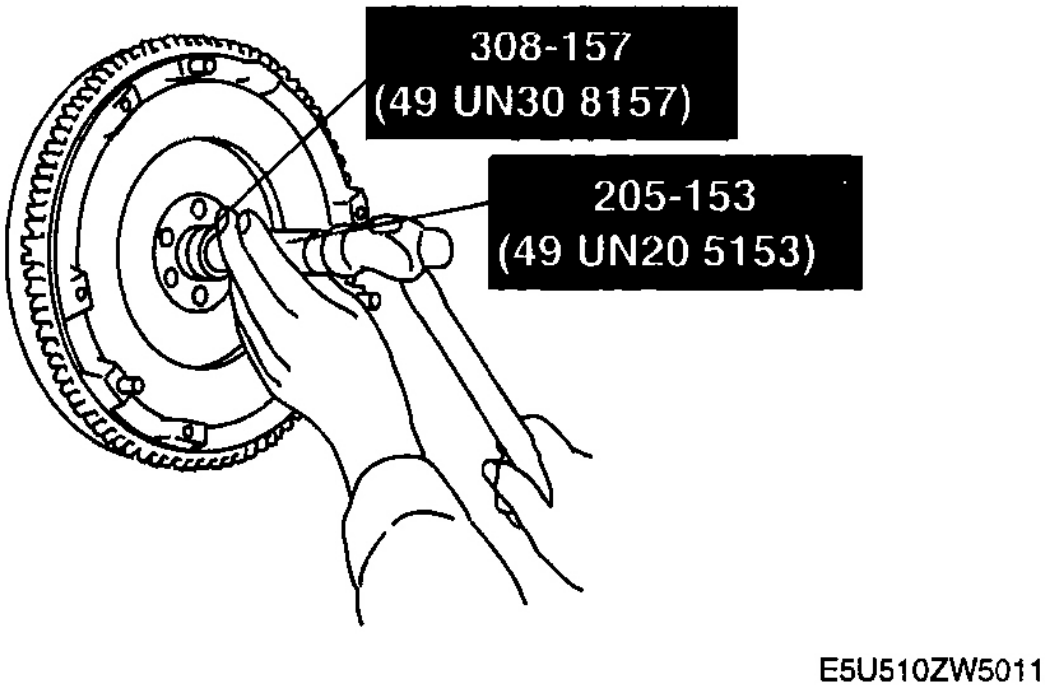


Fig. 19: Installing Pilot Bearing Using SSTs
Courtesy of MAZDA MOTORS CORP.

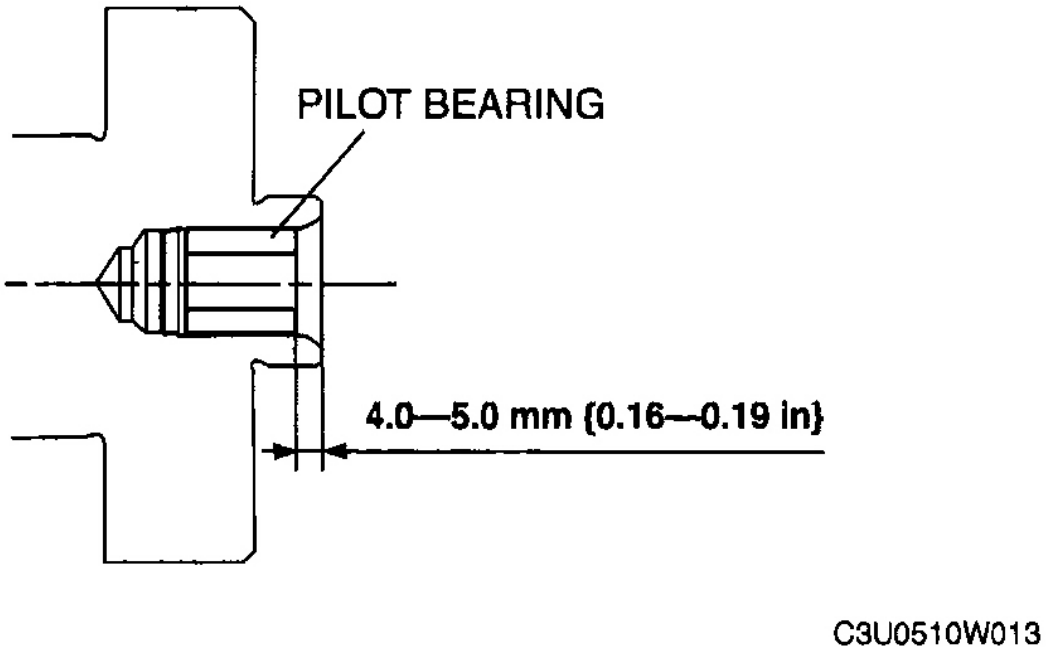


Fig. 20: Identifying Pilot Bearing Installation Dimension
Courtesy of MAZDA MOTORS CORP.

FLYWHEEL REMOVAL NOTE

1. Hold the flywheel using the **SST.**
2. Remove the bolts evenly and gradually in a crisscross pattern.

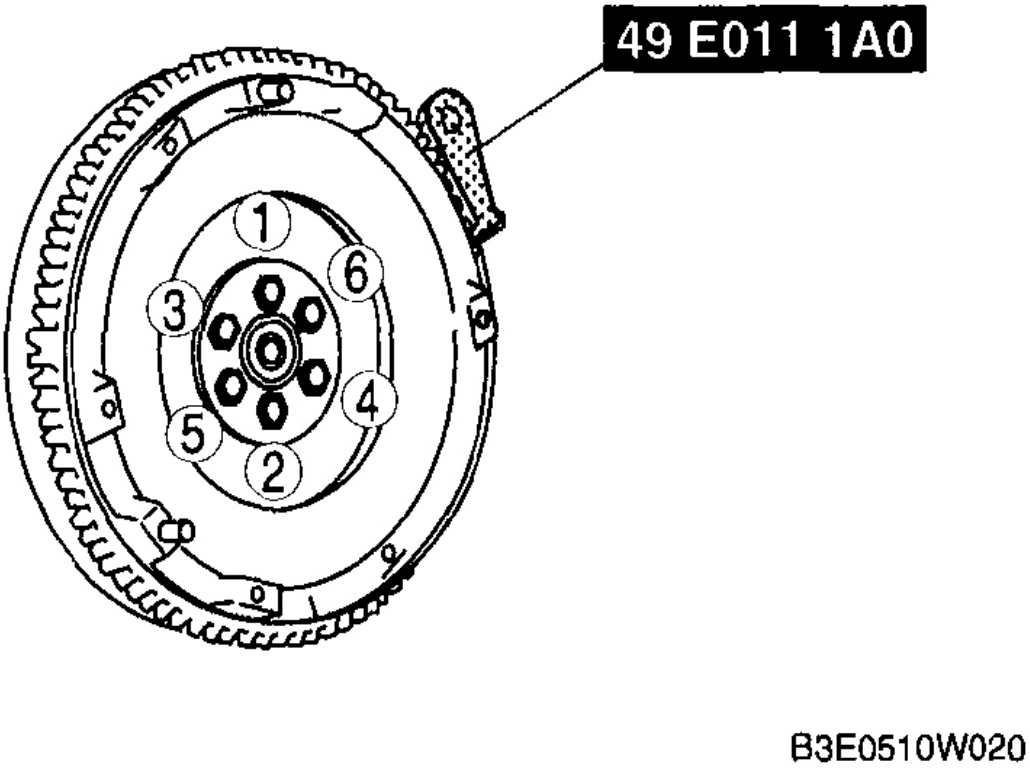


Fig. 21: Identifying Flywheel Bolts Removing Sequence
Courtesy of MAZDA MOTORS CORP.

3. Remove the flywheel.
4. Inspect for oil leakage from the crankshaft rear oil seal.
    - If there is any malfunction, replace the crankshaft rear oil seal. (See **REAR OIL SEAL REPLACEMENT [LF]** .)

FLYWHEEL INSTALLATION NOTE

1. Clean the crankshaft thread holes.
2. Install the flywheel to the crankshaft.
3. Hand-tighten the flywheel lock bolts.
4. Install the **SST** to the flywheel.
5. Gradually tighten the flywheel lock bolts in a crisscross pattern.

Tightening torque

108-116 N.m

{11.1-11.8 kgf.m, 79.7-85.5 ft.lbf}

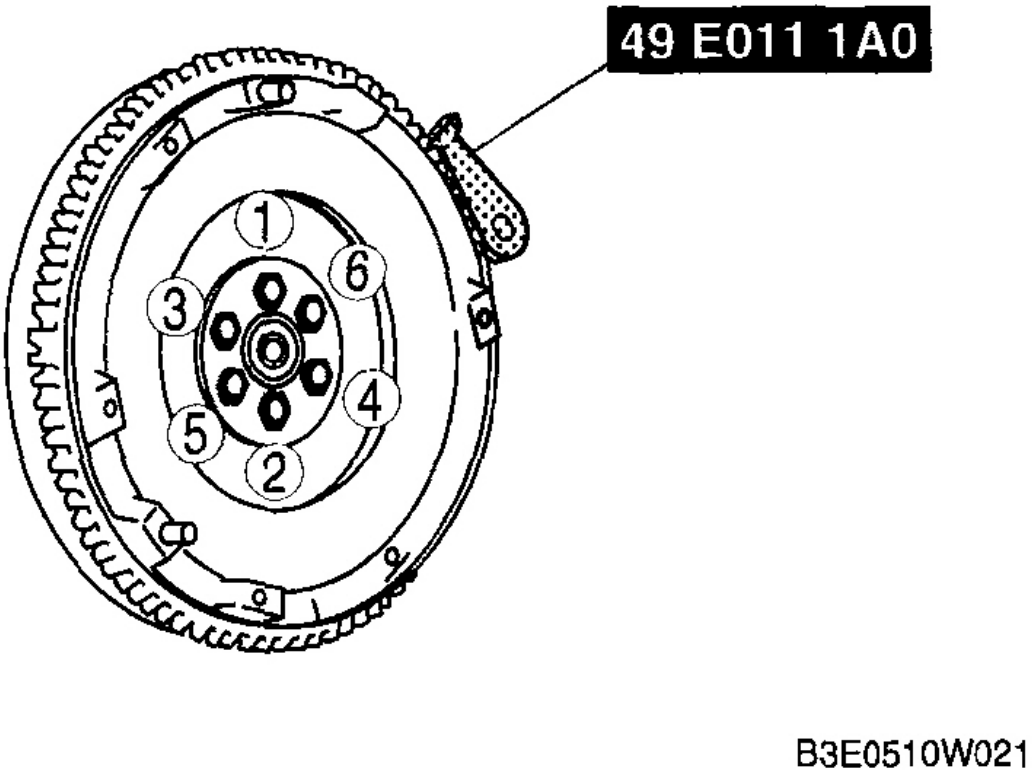


Fig. 22: Identifying Flywheel Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

CLUTCH DISC INSTALLATION NOTE

1. Hold the clutch disc position using the **SST.**

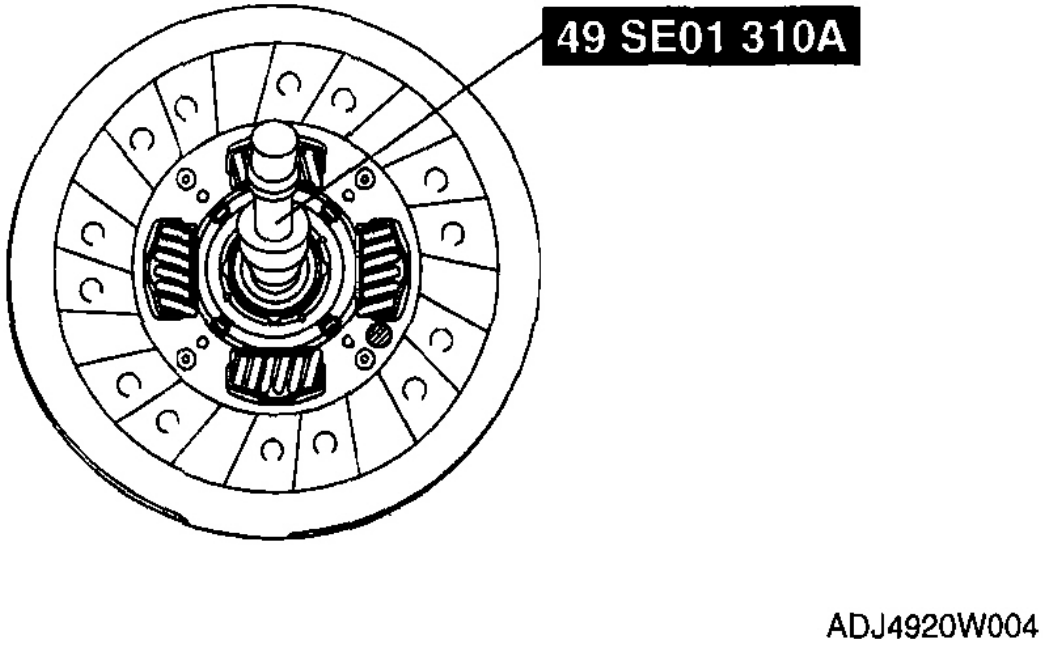


Fig. 23: Holding Clutch Disc Position Using SST
Courtesy of MAZDA MOTORS CORP.

CLUTCH COVER INSTALLATION NOTE

1. Install the **SSTs.**
2. Tighten the bolts evenly and gradually in a crisscross pattern.

   Tightening torque

   25.0-33.0 N.m

   {2.6-3.4 kgf.m, 18.5-24.4 ft.lbf}

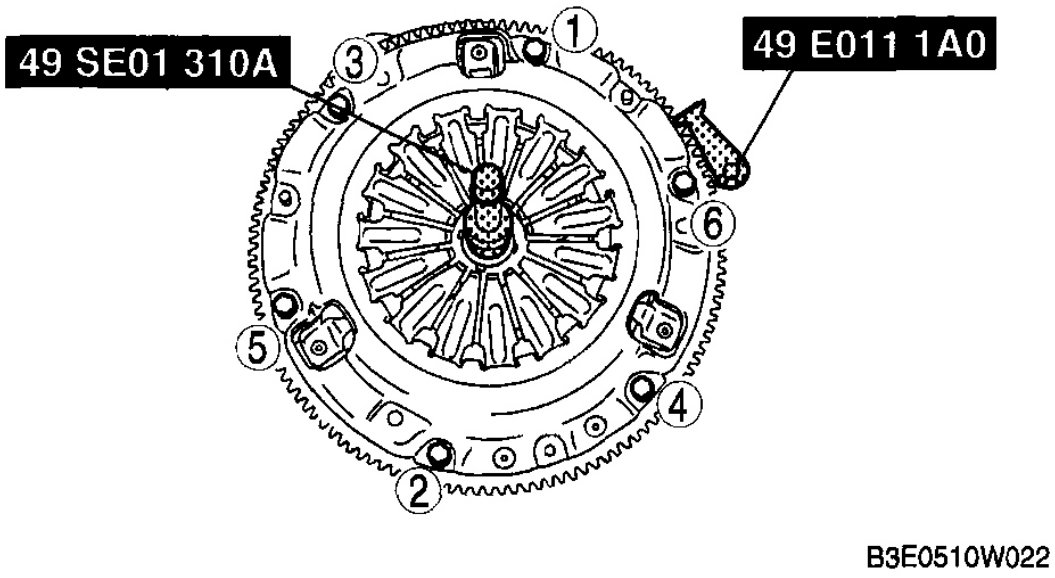


Fig. 24: Identifying Clutch Cover Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

CLUTCH COVER INSPECTION

1. Measure the wear of the diaphragm spring fingers.
    - If it exceeds the maximum specification, replace the clutch cover.

Clutch disc maximum depth

0.6 mm {0.024 in}

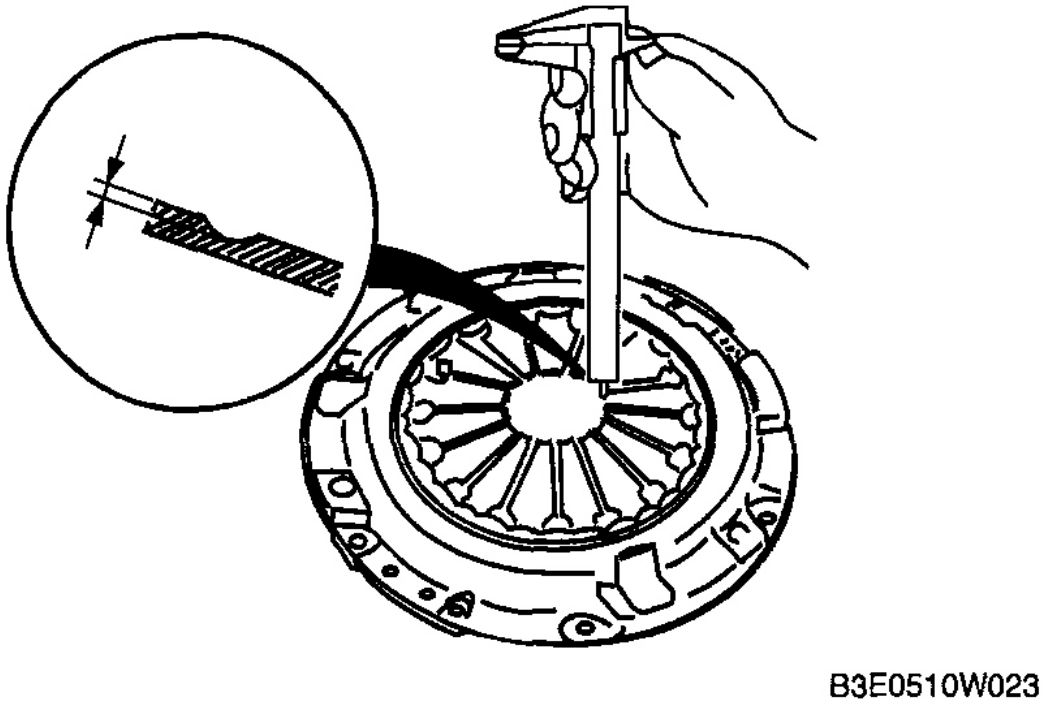


Fig. 25: Measuring Wear Of Diaphragm Spring Fingers
Courtesy of MAZDA MOTORS CORP.

2. Measure the flatness of the pressure plate with a straight edge and a feeler gauge.
   - If it exceeds the maximum specification, replace the clutch cover.

Clutch cover maximum clearance

0.5 mm {0.020 in}

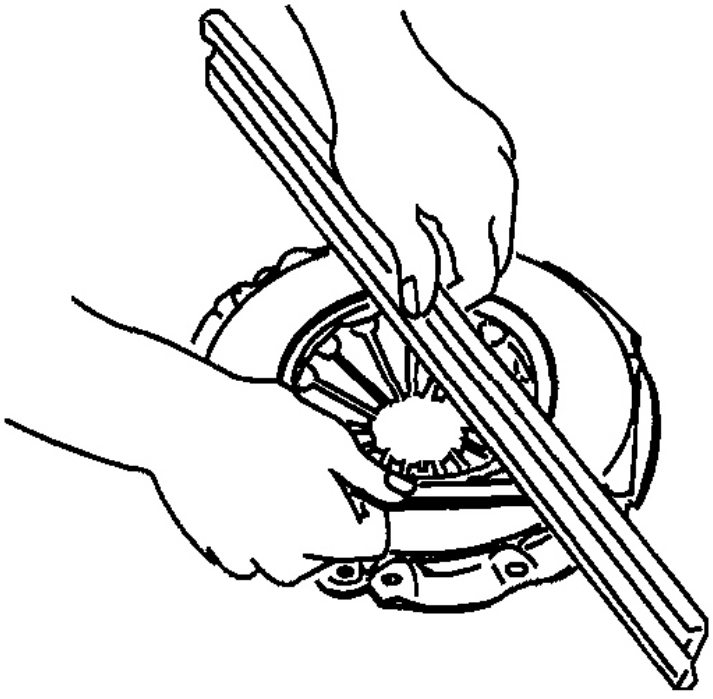


Fig. 26: Measuring Flatness Of Pressure Plate With Straight Edge & Feeler Gauge
Courtesy of MAZDA MOTORS CORP.

3. When checking the diaphragm spring fingers, mount a dial indicator on the cylinder block.
4. Rotate the flywheel and check for misaligned diaphragm spring fingers.
    - If it exceeds the maximum specification, replace the clutch cover.

Clutch cover maximum height difference

1.0 mm {0.039 in}

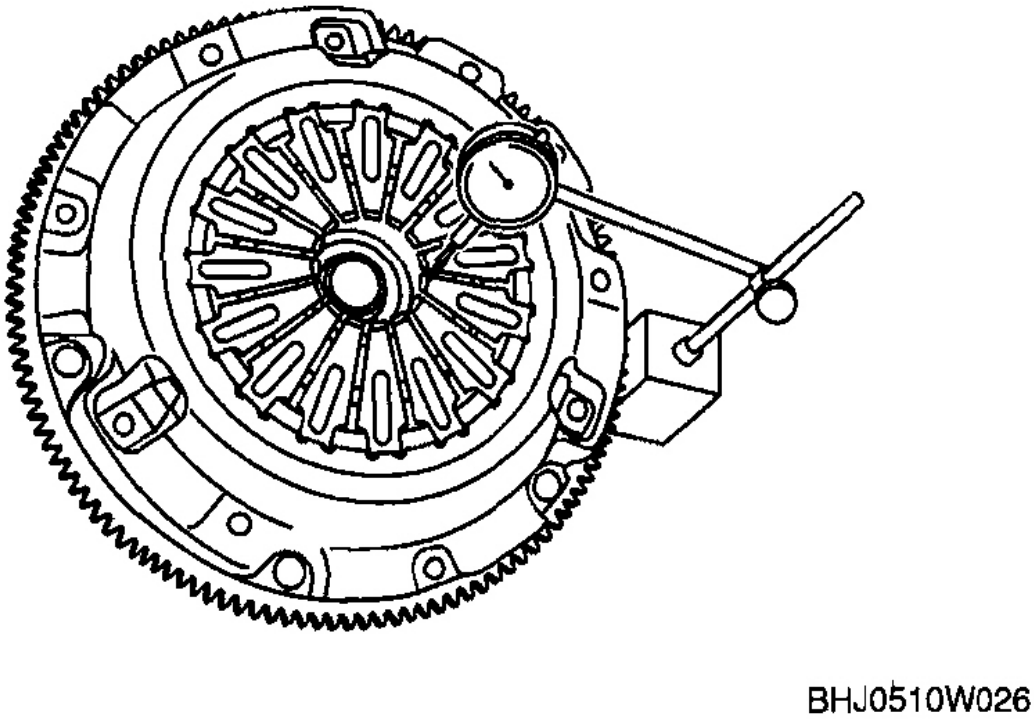


Fig. 27: Measuring Clutch Cover Height Difference
Courtesy of MAZDA MOTORS CORP.

CLUTCH DISC INSPECTION

1. Remove the clutch disc.
2. Inspect the lining surface for discoloration and grease/oil contamination.
3. Inspect the torsion spring for weakness and the rivet for looseness.
4. Using a vernier caliper, measure the depth between the lining surface and the rivet head.

Clutch disc minimum depth

0.3 mm {0.012 in}

- If it is less than the minimum specification, replace the clutch disc.

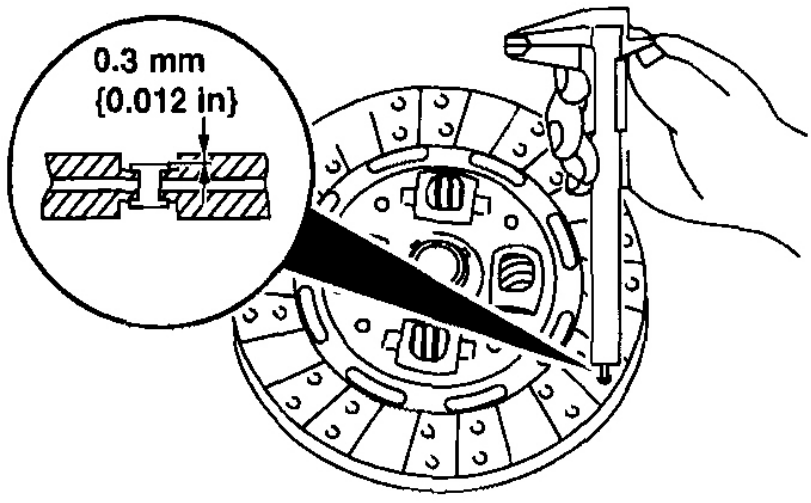


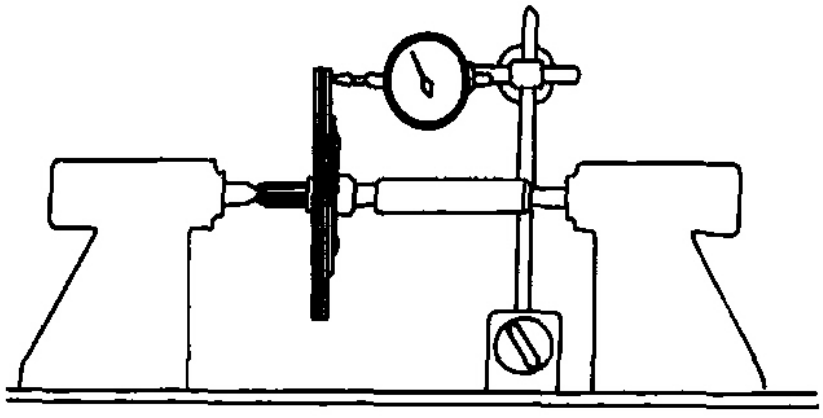
Fig. 28: Measuring Clutch Disc Minimum Depth Using Vernier Caliper
Courtesy of MAZDA MOTORS CORP.

5. Measure the clutch disc runout using a dial gauge.

   Clutch disc maximum runout

   0.7 mm {0.028 in}

   - If it exceeds the maximum specification, replace the clutch disc.



B3E0510W025

Fig. 29: Measuring Clutch Disc Maximum Runout Using Dial Gauge
Courtesy of MAZDA MOTORS CORP.

6. Install the clutch disc.

CLUTCH RELEASE COLLAR INSPECTION

CAUTION:
- **Do not clean the clutch release collar with cleaning fluids or a steam cleaner because it is filled with grease.**

1. Remove the clutch release collar.
2. Turn the collar while applying force in the axial direction, and inspect for sticking, excessive resistance, and an abnormal noise.
   - If there is any malfunction, replace the clutch release collar.

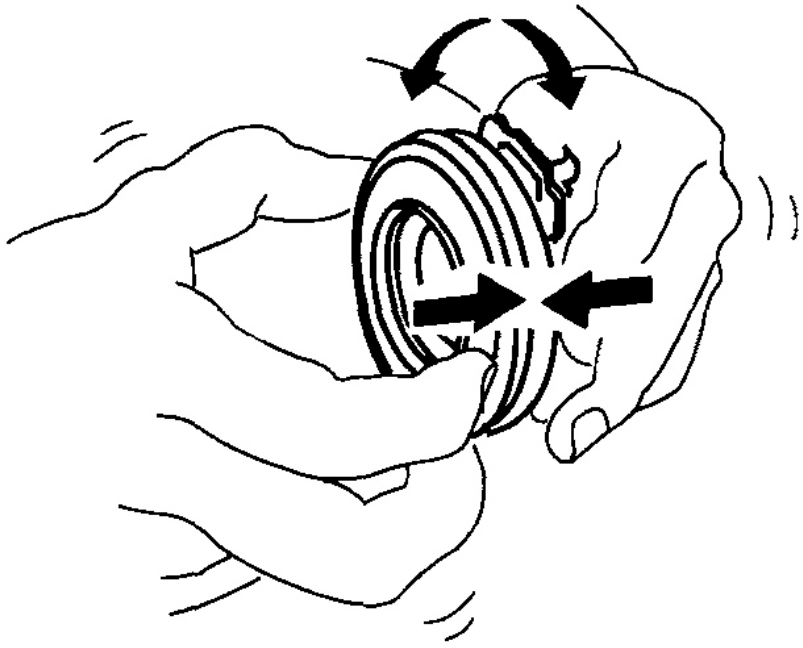


Fig. 30: Inspecting Clutch Release Collar
Courtesy of MAZDA MOTORS CORP.

3. Install the clutch release collar.

PILOT BEARING INSPECTION

1. Without removing the pilot bearing, turn the bearing while applying force in the axial direction.
    - If there is any malfunction, replace the pilot bearing.

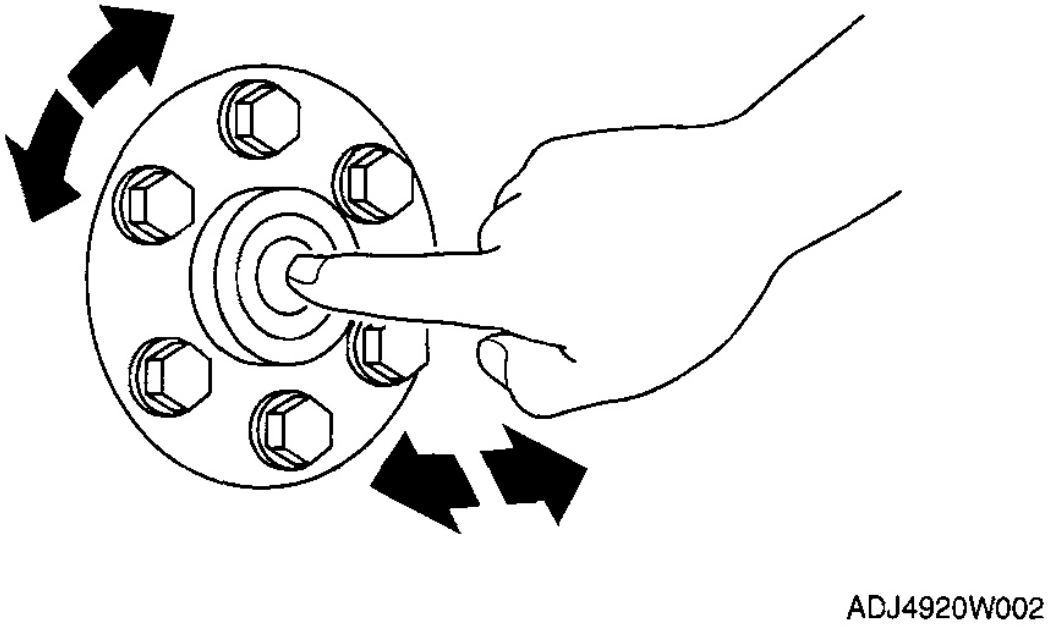


Fig. 31: Inspecting Pilot Bearing
Courtesy of MAZDA MOTORS CORP.

FLYWHEEL INSPECTION

1. Remove the flywheel.

NOTE:

- **Correct slight scratches and discoloration using sandpaper.**
- **Inspect the runout of the surface that contacts the clutch disc with the flywheel installed to the crankshaft.**

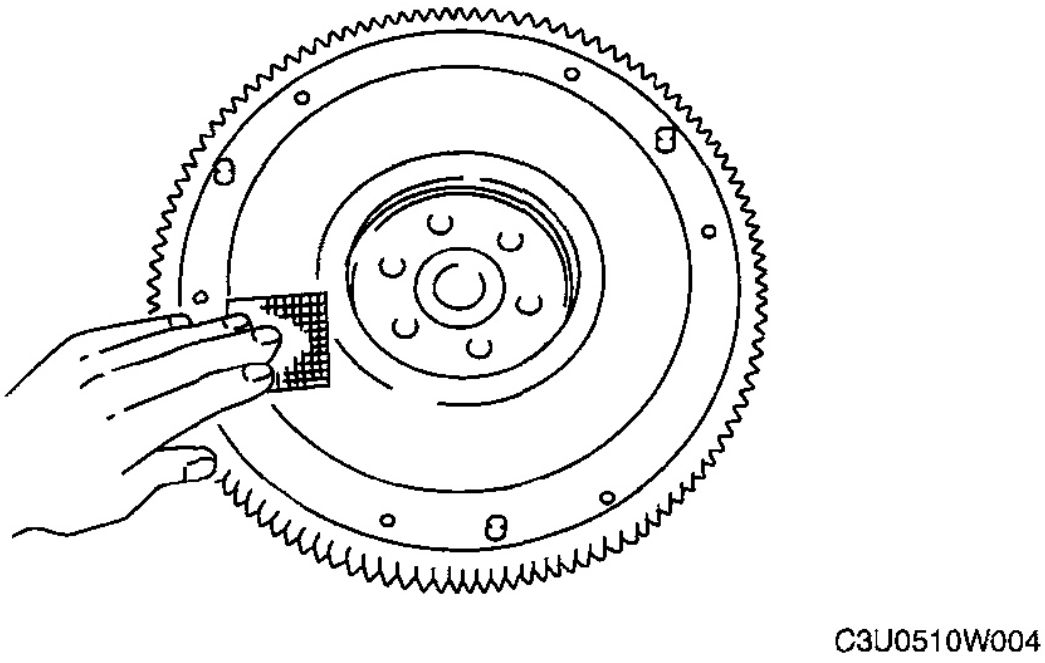


Fig. 32: Correcting Slight Scratches Using Sandpaper
Courtesy of MAZDA MOTORS CORP.

2. Inspect the surface that contacts the clutch disc for scratches, nicks, and discoloration.
3. Inspect the ring gear teeth for damage and wear.
4. Install the flywheel.
5. Measure the runout of the surface that contacts the clutch disc using a dial gauge.

Flywheel maximum runout

0.1 mm {0.004 in}

- If it exceeds the maximum specification, replace the flywheel.

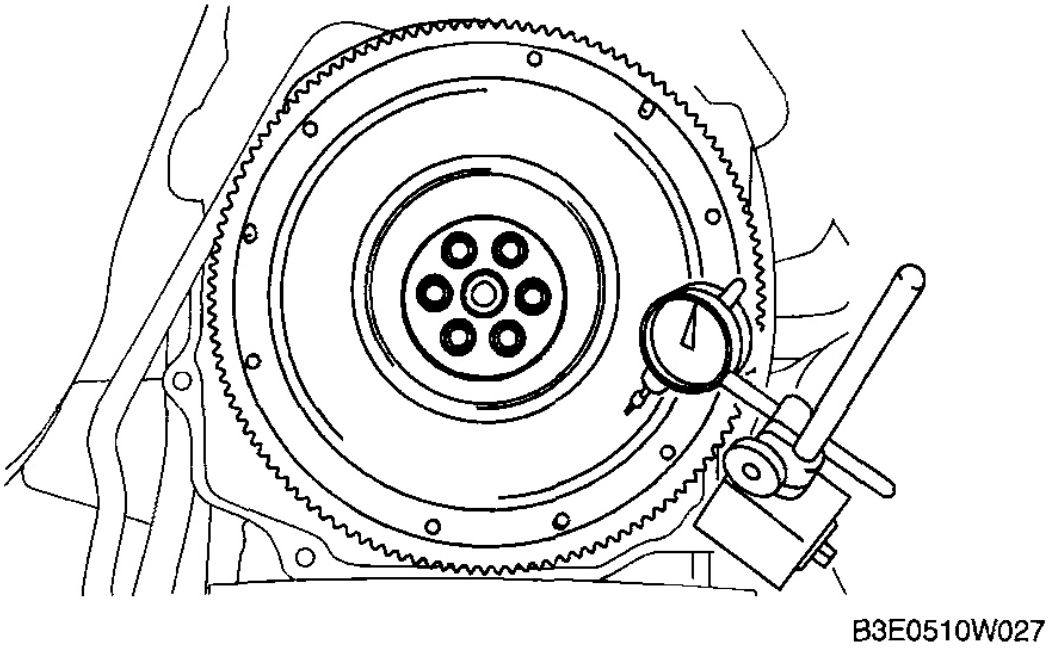
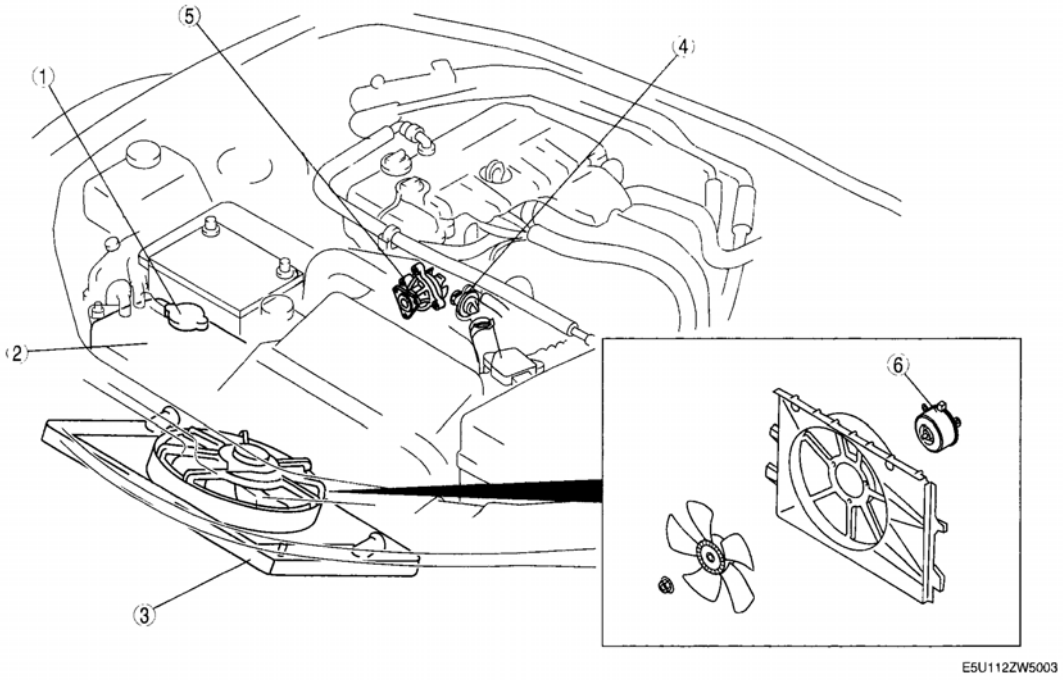


Fig. 33: Measuring Flywheel Maximum Runout Using Dial Gauge
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Cooling System - MX-5 Miata

COOLING SYSTEM LOCATION INDEX [LF]



1	Cooling system cap
2	Coolant reserve tank
3	Radiator

4	Thermostat
5	Water pump
6	Cooling fan motor

Fig. 1: Identifying Location Of Cooling System Components
Courtesy of MAZDA MOTORS CORP.

COOLING SYSTEM SERVICE WARNINGS [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**

- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

ENGINE COOLANT LEVEL INSPECTION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

NOTE:

- **If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.**
- **FL22 type engine coolant is shipped as a diluted solution (55% coolant, 45% water). Use the solution as is when replacing coolant.**

1. Verify that the engine coolant level in the coolant reserve tank is between the L and F marks.
2. If the engine coolant level is below L mark, add engine coolant.

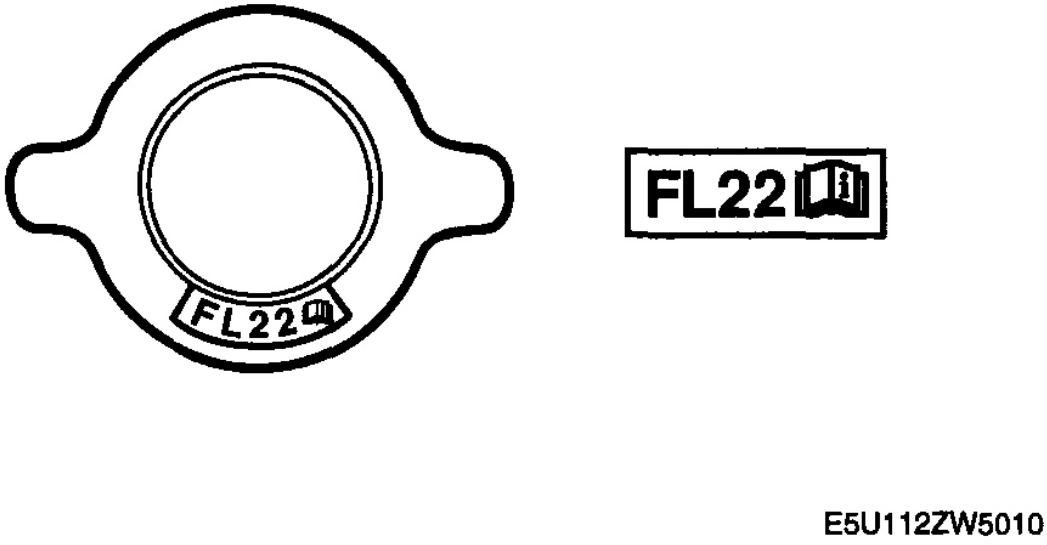


Fig. 2: Identifying Proper Cooling System Cap
Courtesy of MAZDA MOTORS CORP.

ENGINE COOLANT PROTECTION INSPECTION [LF]

1. Measure the coolant temperature and specific gravity using a thermometer and a hydrometer.

CAUTION:

- **Use engine coolant at a concentration that meets the environmental conditions in which the vehicle is driven, otherwise engine damage could occur.**
- **The engine has aluminum parts and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.**
- **Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**
- **Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.**

NOTE:

- **If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.**
- **FL22 type engine coolant is shipped as a diluted solution (55%**

coolant, 45% water). Use the solution as is when replacing coolant.

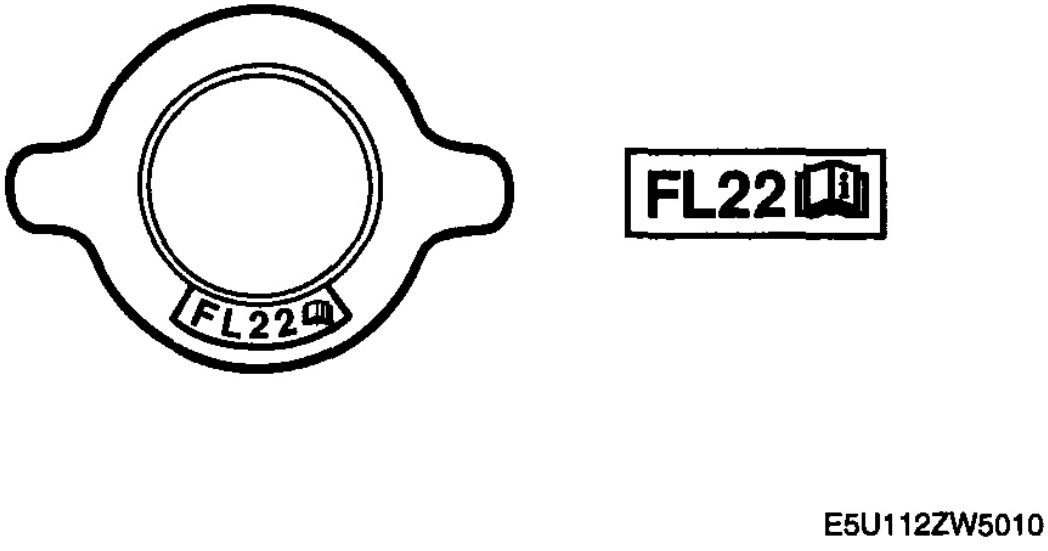


Fig. 3: Identifying Proper Cooling System Cap
Courtesy of MAZDA MOTORS CORP.

2. Determine the coolant protection level by referring to the graph shown in **Fig. 4**.
    - If the coolant protection level is not correct, add water or coolant.

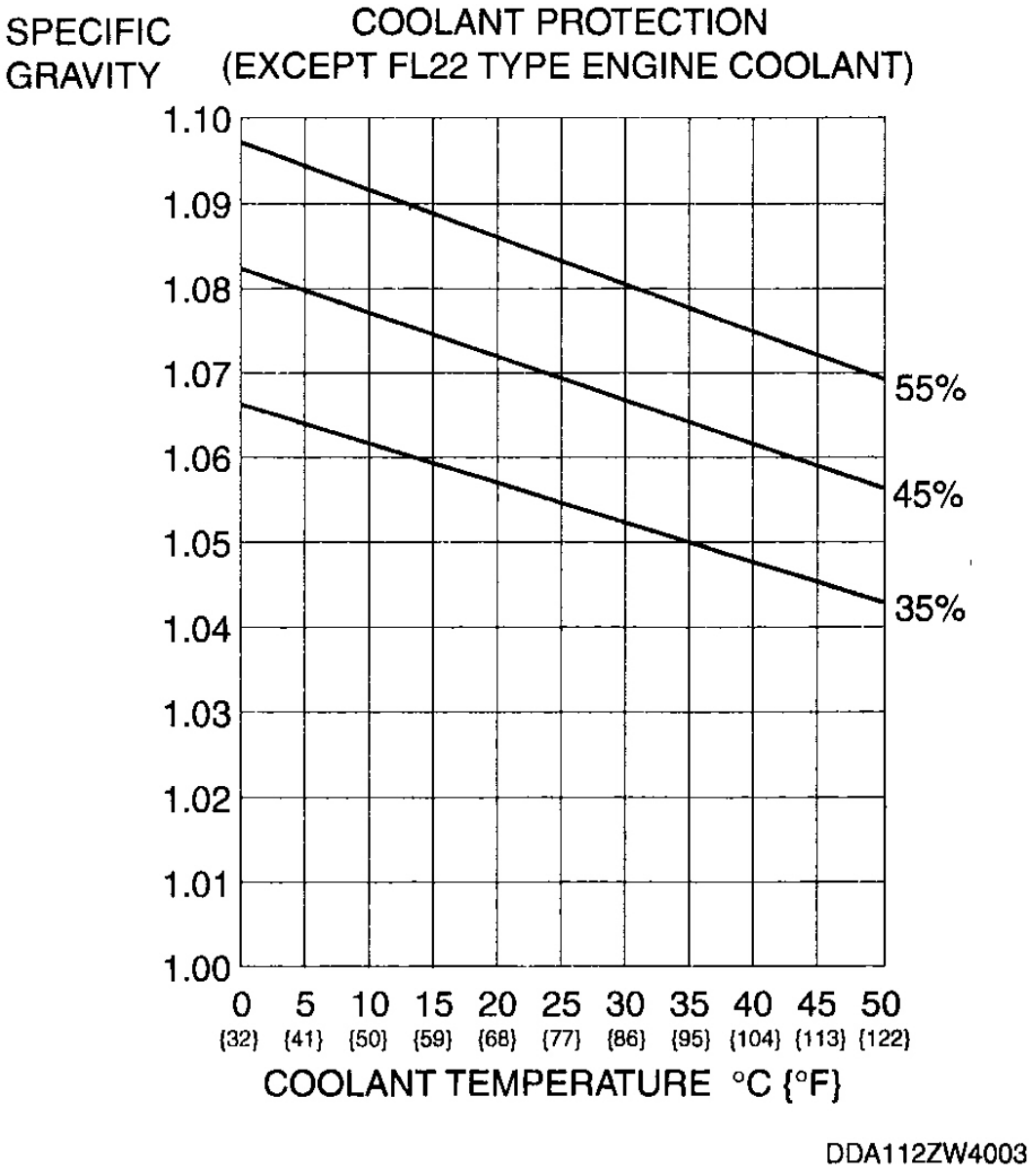


Fig. 4: Coolant Protection Level Graph
Courtesy of MAZDA MOTORS CORP.

ENGINE COOLANT REPLACEMENT [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and**

cause serious injury. It may also damage the engine and cooling system.

- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

CAUTION:

- **Use engine coolant at a concentration that meets the environmental conditions in which the vehicle is driven, otherwise engine damage could occur.**
- **The engine has aluminum parts and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.**
- **Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**
- **Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.**

NOTE:

- **If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.**
- **FL22 type engine coolant is shipped as a diluted solution (55% coolant, 45% water). Use the solution as is when replacing coolant.**

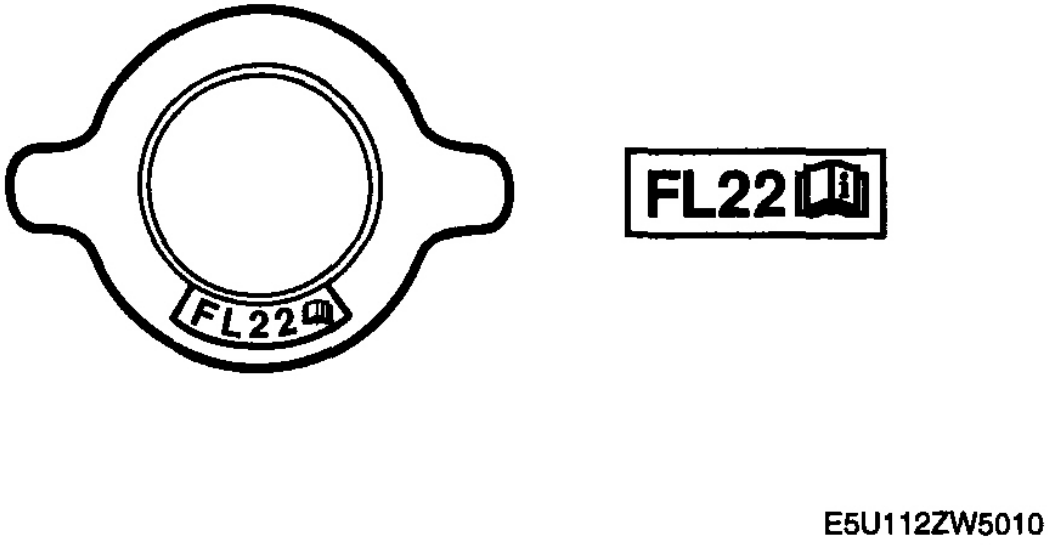


Fig. 5: Identifying Proper Cooling System Cap
Courtesy of MAZDA MOTORS CORP.

Engine coolant capacity (approx. quantity)

7.5 L {7.9 US qt, 6.6 Imp qt}

1. Remove the cooling system cap.

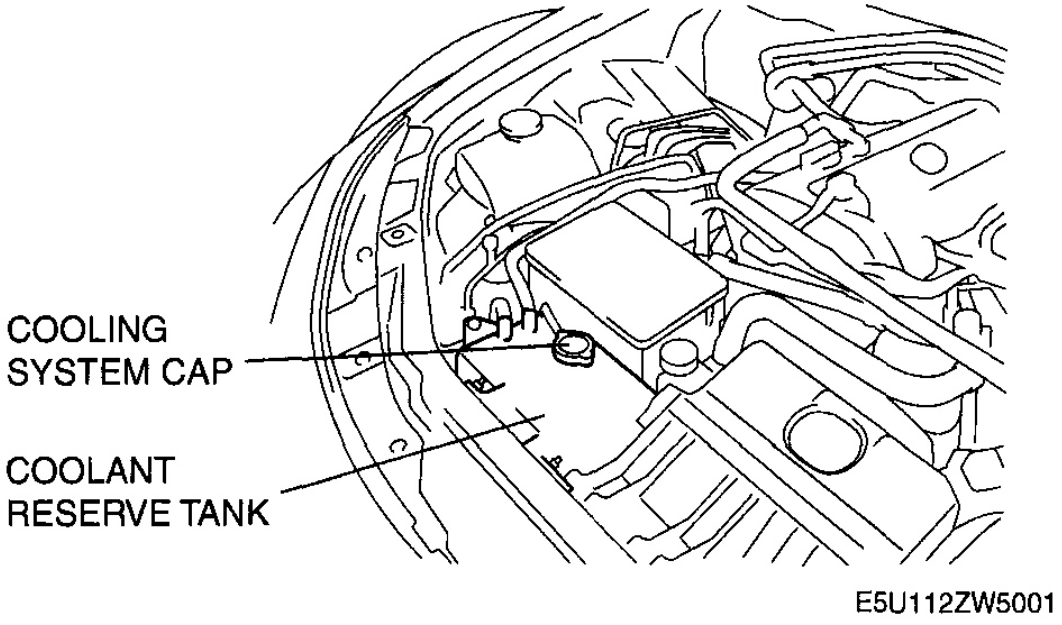


Fig. 6: Identifying Cooling System Cap & Reserve Tank
Courtesy of MAZDA MOTORS CORP.

2. Remove the radiator drain plug and drain the engine coolant into a container.
3. Flush the cooling system with water until all traces of color are gone.
4. Let the system drain completely.
5. Tighten the radiator drain plug.

Tightening torque

0.8-1.5 N.m {8-15 kgf.cm, 7-13 in.lbf}

6. Referring to **ANTIFREEZE SOLUTION MIXTURE PERCENTAGE TABLE** , select the correct volume percentage of the water and coolant.

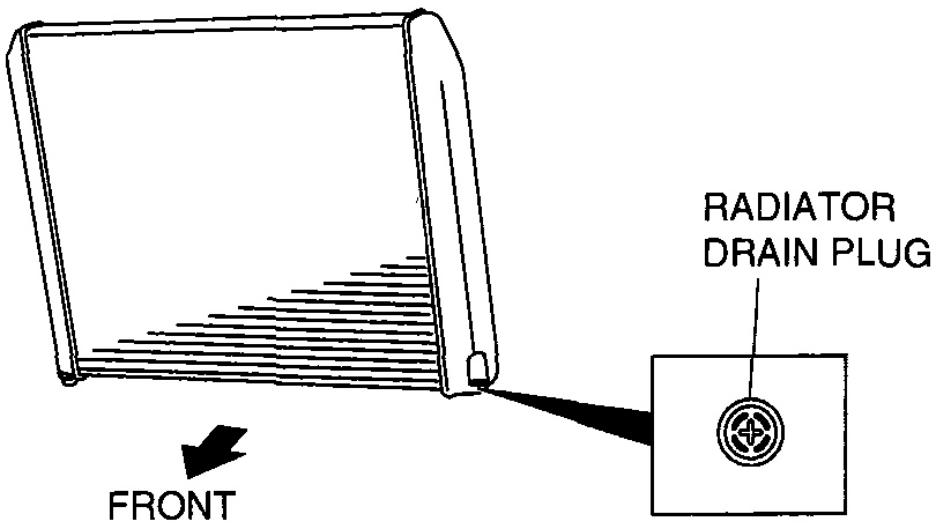


Fig. 7: Identifying Radiator Drain Plug
Courtesy of MAZDA MOTORS CORP.

ANTIFREEZE SOLUTION MIXTURE PERCENTAGE (EXCEPT FL22 TYPE ENGINE COOLANT)

Engine coolant protection	Volume percentage (%)		Gravity at 20°C {68°F}
	Water	Coolant	
Above -16°C {3°F}	65	35	1.057
Above -26°C {-15°F}	55	45	1.072
Above -40°C {-40°F}	45	55	1.086

7. Refill the coolant into the coolant reserve tank up to the F mark on the tank.
8. Install the cooling system cap.

CAUTION:

- **If the water temperature gauge rises too high, stop the engine and decrease the water temperature to prevent overheating. Then, verify the malfunctioning part and repair or replace it.**
- **If the engine coolant level in the coolant reserve tank is below the L mark during engine coolant air bleeding operation, stop the engine, and after the engine coolant temperature decreases, add engine coolant. Then, resume the engine coolant air bleeding operation.**

9. Start the engine and warm up the engine by idling.
10. After the engine warms up, perform the following steps. At this time, be careful of the coolant temperature to prevent overheating.
    1. Run the engine at **approx. 2,500 rpm** for **5 min** .
    2. Run the engine at **approx. 3,000 rpm** for **5s** , then idle.
    3. Repeat step 2 4-5 times.
11. Stop the engine, and inspect the coolant level after the coolant temperature decreases. If it is low, repeat steps 7 thru 10.
12. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)

ENGINE COOLANT LEAKAGE INSPECTION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Inspect the engine coolant level. (See **ENGINE COOLANT LEVEL INSPECTION [LF]** .)
2. Remove the cooling system cap.
3. Clean the installation parts of the cooling system cap.
4. Install the **SST** and a radiator cap tester to the coolant reserve tank filler port.
5. Apply pressure using the radiator cap tester.

CAUTION:

- **Applying more than 122.6 kPa {1.25 kgf/cm^2 , 17.8 psi} can damage the hoses, fittings, and other components, and cause leakage.**

Pressure

122.6 kPa {1.25 kgf/cm^2 , 17.8 psi} [1 min]

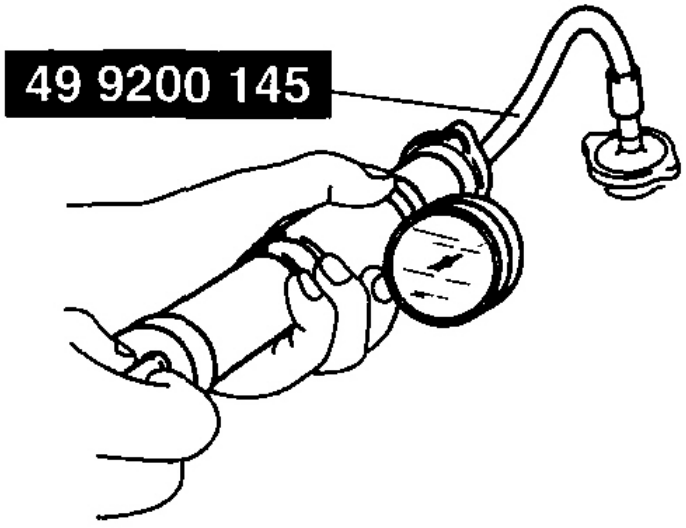


Fig. 8: Applying Pressure Using Radiator Cap Tester
Courtesy of MAZDA MOTORS CORP.

6. When pressurizing the cooling system, verify that the pressure is maintained.
   - If the gauge needle drops, it may indicate water leakage. Repair or replace the applicable part.

COOLING SYSTEM CAP INSPECTION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you're sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Clean the cooling system cap and the sealed part.

2. Inspect for cracks or roll up on the sealed part of the cooling system cap.
   - If there is any malfunction, replace the cooling system cap.
3. Attach the cooling system cap to the **SST** and a radiator cap tester.
4. Hold the cooling system cap downward and apply pressure gradually. Verify that the pressure is held stable for **10s** .
   - If the pressure is not held stable, replace the cooling system cap.

Cooling system cap valve opening pressure

93.2-122.6 kPa {0.95-1.25 kgf/cm^2 , 13.5-17.8 psi}

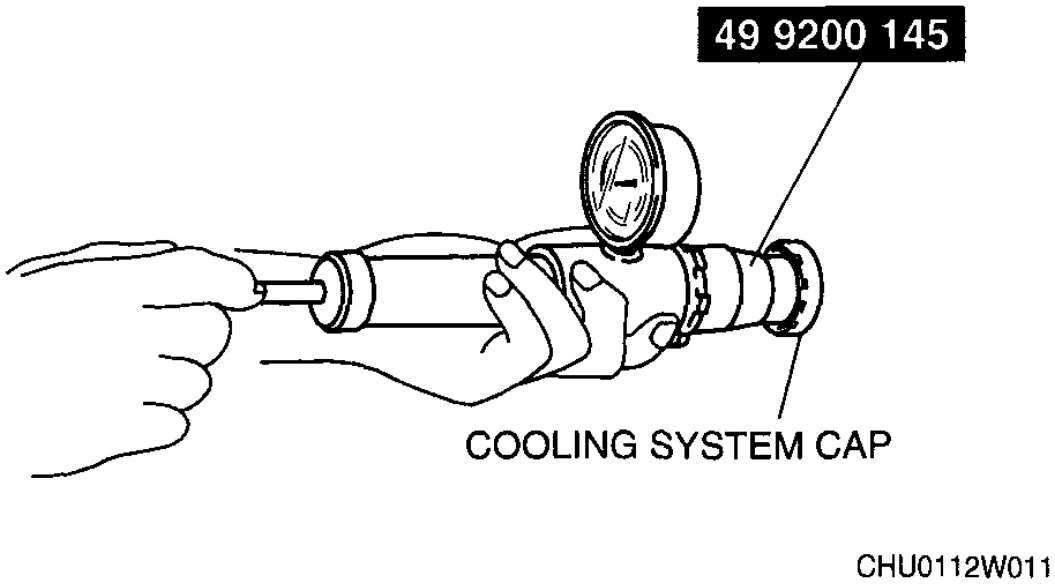


Fig. 9: Attaching Cooling System Cap To SST & Radiator Cap Tester
Courtesy of MAZDA MOTORS CORP.

COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]

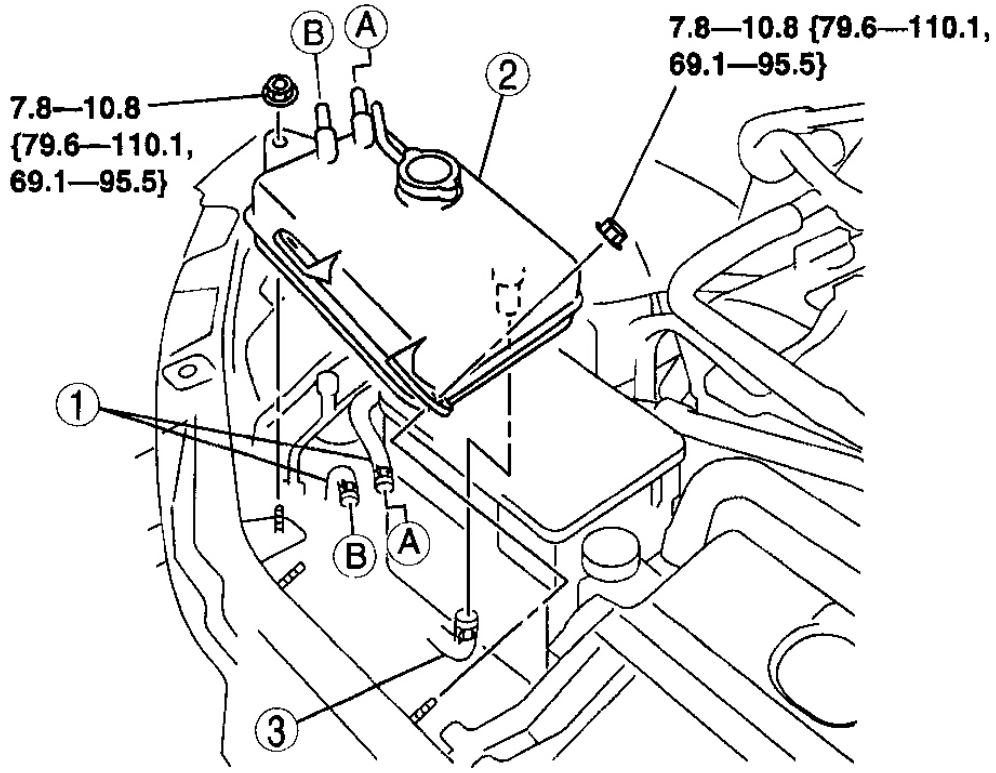
WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and**

slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Drain the engine coolant until the coolant reserve tank becomes empty. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
2. Remove in the order indicated in **Fig. 10** .
3. Install in the reverse order of removal.
4. Add engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
5. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)



E5U112ZW5004

1	Hose
2	Coolant reserve tank
3	Hose

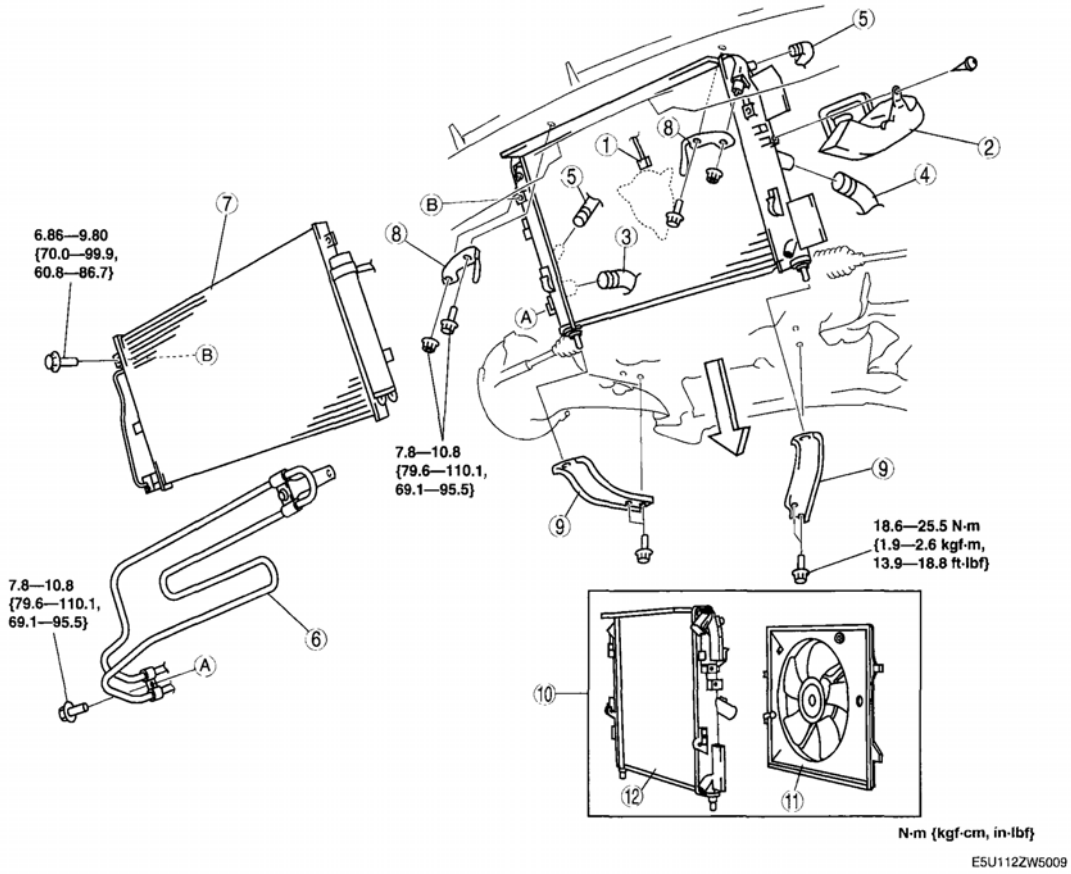
Fig. 10: Identifying Removal Order Of Coolant Reserve Tank (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

RADIATOR REMOVAL/INSTALLATION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Remove the splash shield and under cover.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
3. Remove the battery, battery tray, and battery duct. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the PCM and air cleaner insulator. (See **PCM REMOVAL/INSTALLATION [LF]** .)
6. Remove the coolant reserve tank. (See **COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the ATF oil cooler hose. (AT)
8. Remove in the order indicated in the table.
9. Install in the reverse order of removal.
10. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
11. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)
12. Inspect the ATF level. (AT) (See **AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION [SJ6A-EL]** .)



1	Cooling fan motor connector	7	Condenser
2	PCM duct	8	Upper mount rubber bracket
3	Radiator lower hose	9	Lower mount rubber bracket
4	Radiator upper hose	10	Radiator and cooling fan component
5	Coolant reserve tank hose	11	Cooling fan component
6	P/S cooling pipe	12	Radiator

Fig. 11: Identifying Removal Order Of Radiator (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

P/S COOLING PIPE REMOVAL NOTE

1. Remove the P/S cooling pipe with the hoses still connected.

CONDENSER REMOVAL NOTE

1. Remove the condenser with the cooler pipes still connected.

THERMOSTAT REMOVAL/INSTALLATION [LF]

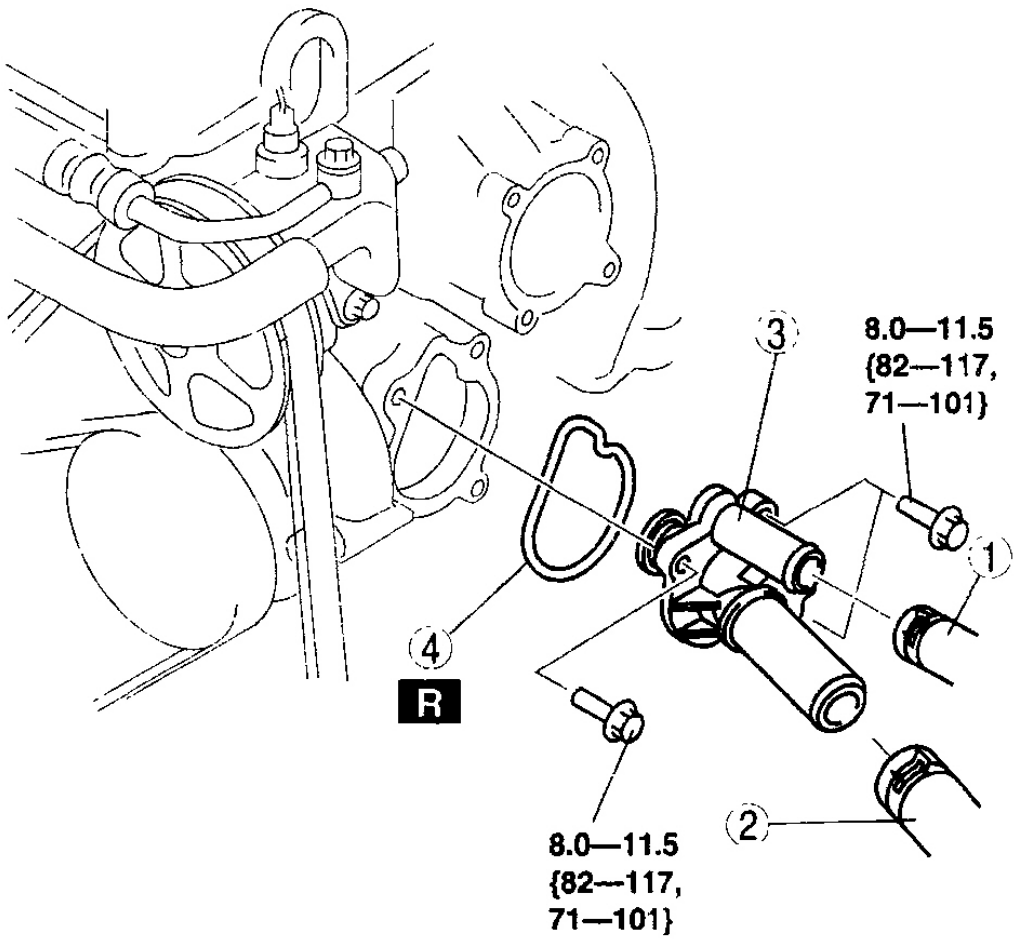
WARNING:

- **Never remove the cooling system cap or loosen the radiator drain**

plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.

- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the throttle body. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove in the order indicated in **Fig. 12** .
6. Install in the reverse order of removal.
7. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
8. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)



1	Bypass hose
2	Lower radiator hose
3	Thermostat component
4	Gasket

Fig. 12: Identifying Removal Order Of Thermostat (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

THERMOSTAT INSPECTION [LF]

1. Inspect the thermostat for the following.

WARNING:

- **During inspection, the thermostat and water are extremely hot and can cause severe burns. Do not touch the thermostat and water.**

- The valve should not open under normal temperature.
- Opening temperature and valve lift
  - If there is malfunction, replace the thermostat.

Thermostat initial-opening temperature

80-84°C {176-183°F}

Thermostat full-open temperature

97°C {207°F}

Thermostat full-open lift

More than 8.0 mm {0.31 in}

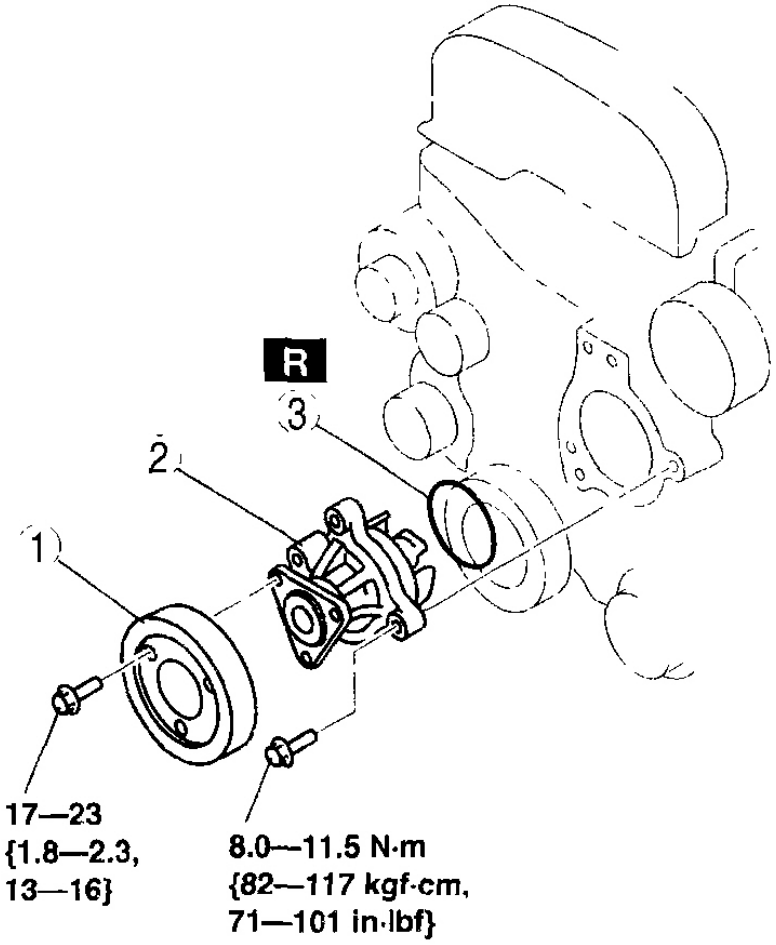
WATER PUMP REMOVAL/INSTALLATION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Loosen the water pump pulley bolt and remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)

6. Remove in the order indicated in **Fig. 13** .
7. Install in the reverse order of removal.
8. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
9. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)



N·m {kgf·m, ft·lbf}

E5U112ZW5006

1	Water pump pulley
2	Water pump
3	O-ring

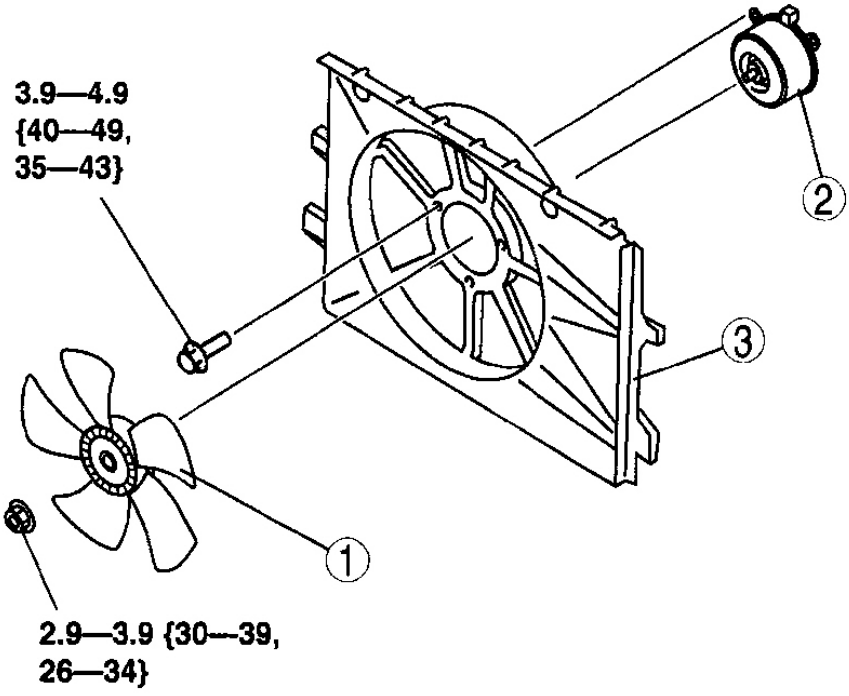
Fig. 13: Identifying Removal Order Of Water Pump (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

FAN MOTOR REMOVAL/INSTALLATION [LF]

WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

1. Remove the splash shield and under cover.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
3. Remove the battery, battery tray, and battery duct. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the PCM and air cleaner insulator. (See **PCM REMOVAL/INSTALLATION [LF]** .)
6. Remove the coolant reserve tank. (See **COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the ATF oil cooler hose. (AT)
8. Remove the radiator and cooling fan component. (See **RADIATOR REMOVAL/INSTALLATION [LF]** .)
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
12. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)
13. Inspect the ATF level. (AT) (See **AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION [SJ6A-EL]** .)



1	Cooling fan
2	Cooling fan motor
3	Radiator cowling

Fig. 14: Identifying Removal Order Of Fan Motor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

FAN MOTOR INSPECTION [LF]

PART INSPECTION

1. Verify that the battery is fully charged.
2. Install a tester and battery to the cooling fan motor connector (4 terminals) as shown in **Fig. 15** .

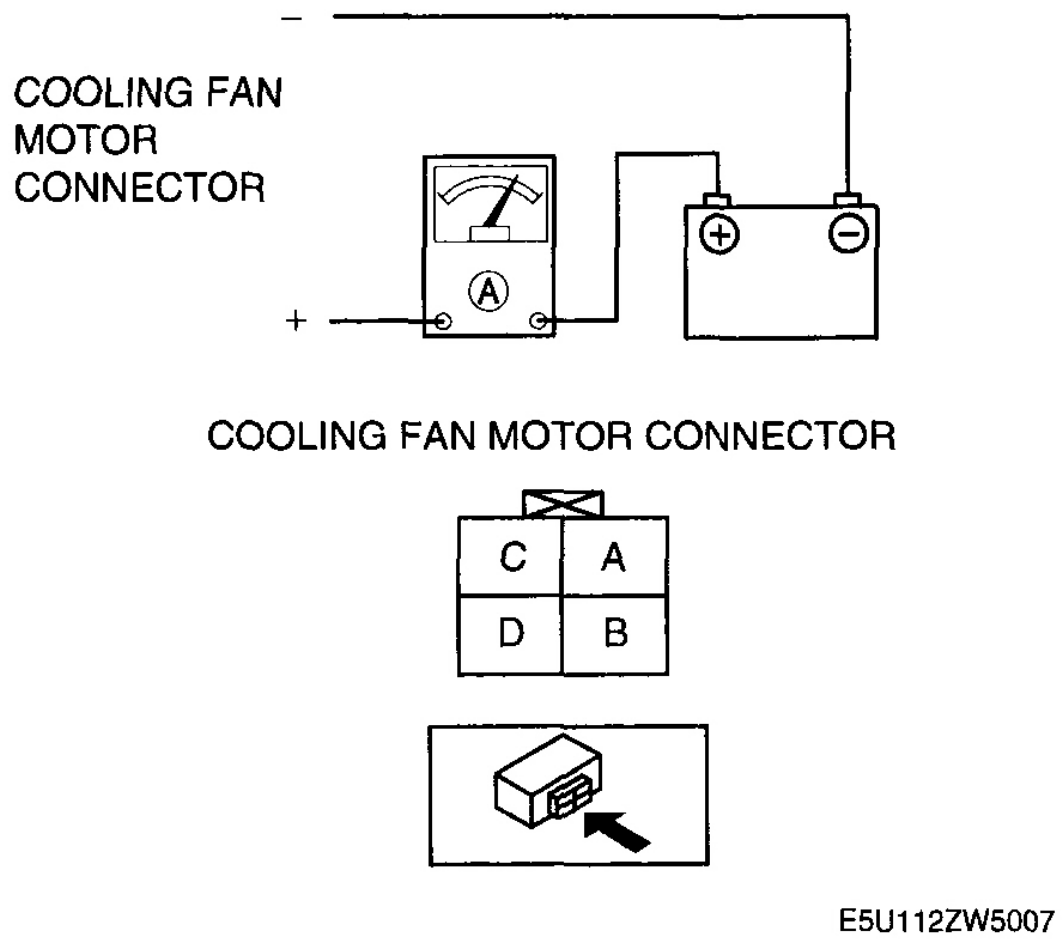


Fig. 15: Identifying Cooling Fan Motor Connector
Courtesy of MAZDA MOTORS CORP.

FAN MOTOR OPERATION TABLE

Fan motor rotation speed	Connection terminal	
	Positive	Negative
High	A and C	B and D
Middle	C	B and D
Low	C	B

3. Verify that fan motor operates smoothly at the standard current.
   - If there is any malfunction, replace the applicable part.

Cooling fan motor current

High: 9.0-12.0 A

Middle: 6.4-9.4 A

Low: 4.8-7.8 A

2007 ACCESSORIES & EQUIPMENT

Cruise Control System - MX-5 Miata

CRUISE CONTROL SWITCH INSPECTION [LF]

1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
3. Disconnect the audio control switch connector. (See **AUDIO CONTROL SWITCH REMOVAL/INSTALLATION** .)
4. Inspect for resistance and continuity between cruise control switch terminals B-C using a tester.
   - If not as specified, replace the cruise control switch. (See **AUDIO CONTROL SWITCH REMOVAL/INSTALLATION** .)

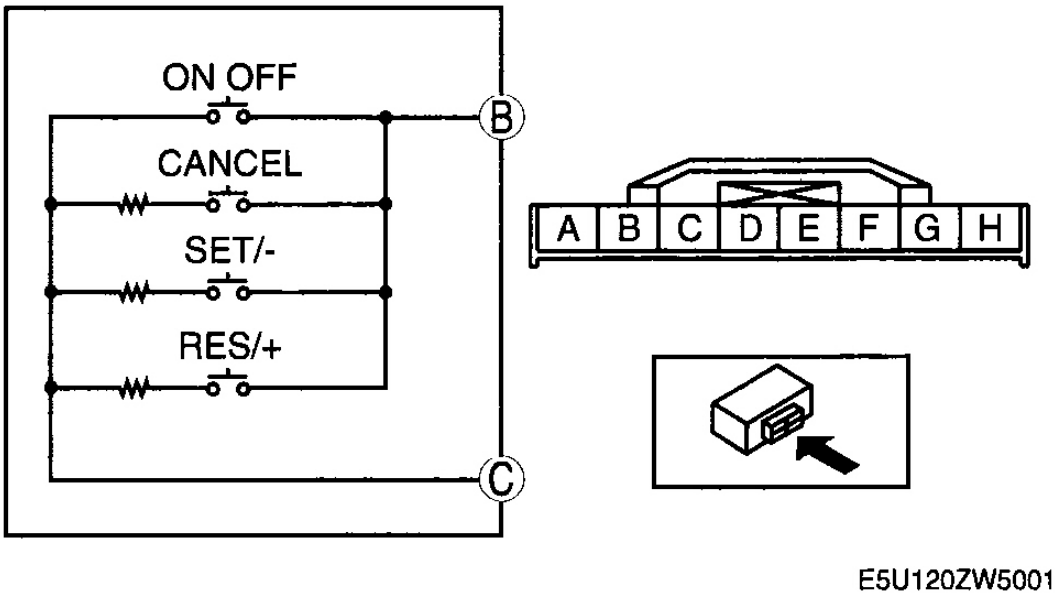


Fig. 1: Identifying Cruise Control Switch Terminals B & C
Courtesy of MAZDA MOTORS CORP.

CRUISE CONTROL SWITCH RESISTANCE SPECIFICATION

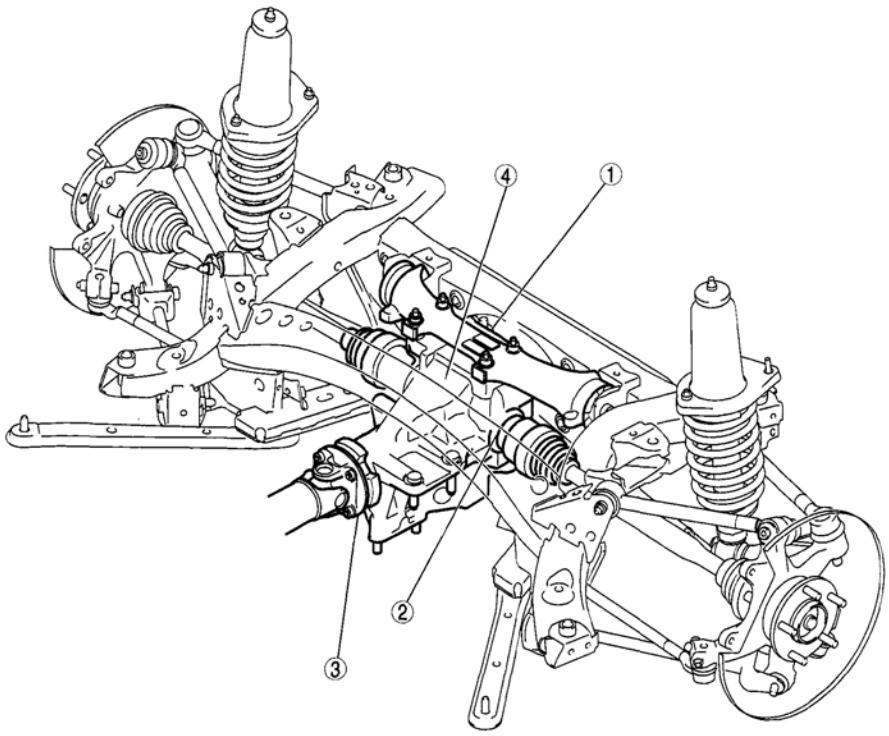
Switch condition	Resistance (ohm)
ON OFF button pressed	Continuity
CANCEL button pressed	117-123
SET/- button pressed	666-694
RES/+ button pressed	2,156-2,244

No button pressed	No continuity

2007 DRIVELINE/AXLES

Differential - MX-5 Miata

REAR DIFFERENTIAL LOCATION INDEX



1	Differential oil, oil-fill plug and drain plug	3	Oil seal (companion flange)
2	Oil seal (side gear)	4	Rear differential

Fig. 1: Identifying Location Of Rear Differential Components
Courtesy of MAZDA MOTORS CORP.

DIFFERENTIAL OIL INSPECTION

1. Park the vehicle on level ground for approx. 5min. to stabilize the differential oil.
2. Remove the oil-fill plug and the washer.

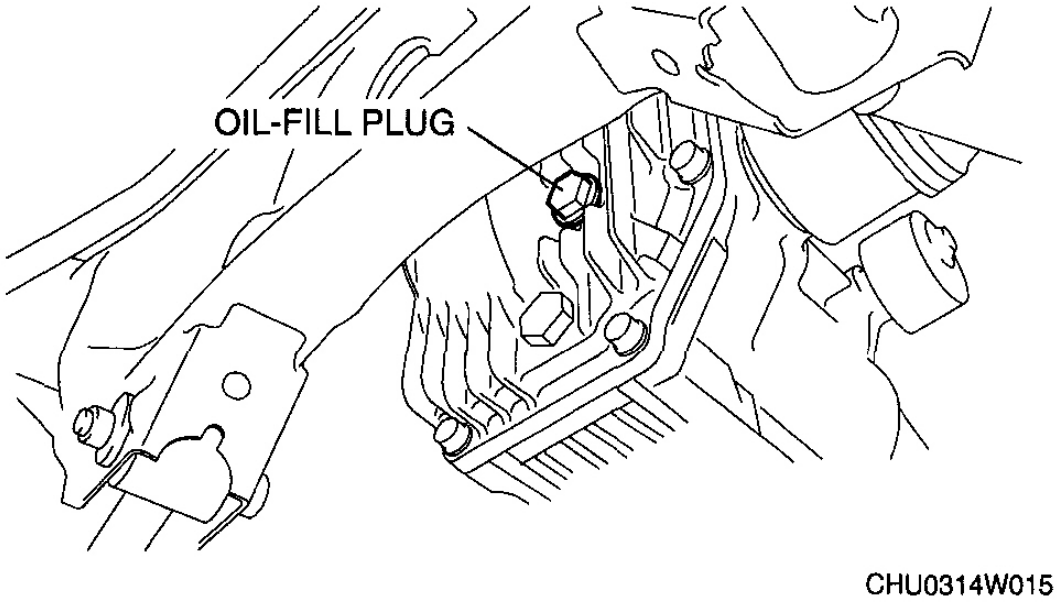


Fig. 2: Identifying Oil-Fill Plug
Courtesy of MAZDA MOTORS CORP.

3. Inspect if the oil level is close to the rim of the oil-fill plug hole.

NOTE:

- **Each vehicle is filled with a specified amount of oil (0.7 +/- 0.1 L) when it is delivered, therefore, the oil level is lower than the lower end of the plug hole as shown in the figure. However, this has no affect on the differential function.**

4. If the oil level is lower than approx. 12 mm {0.47 in} from the lower end of the oil-fill plug hole, inspect for oil leakage and add the specified oil.

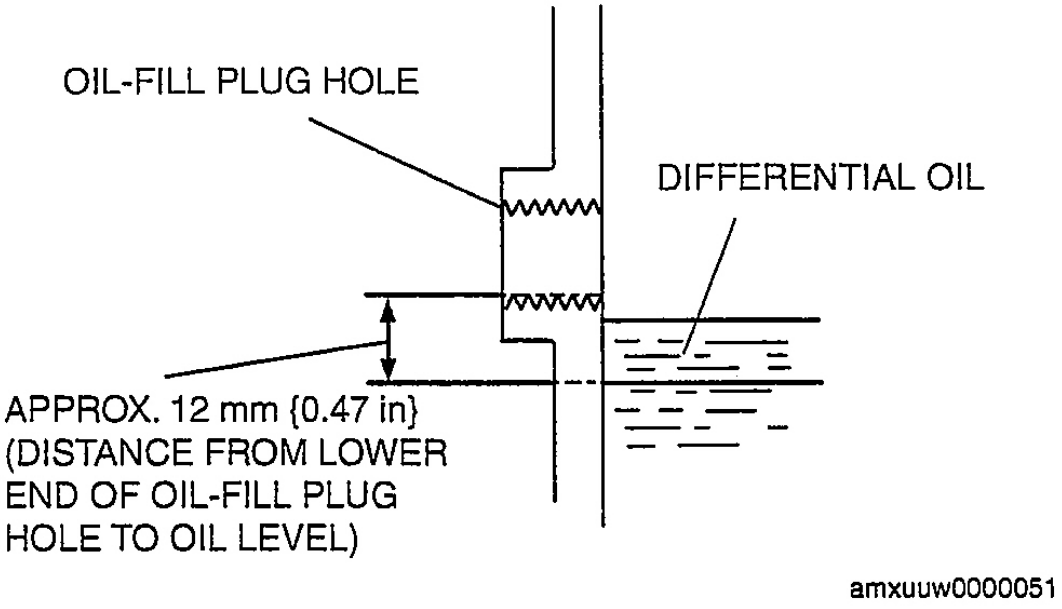


Fig. 3: Identifying Oil Fill Level
Courtesy of MAZDA MOTORS CORP.

Differential oil

Grade: API service GL-5

Viscosity: SAE 90, SAE 80W-90, SAE 75W-90 (Not available from Mazda)

5. Install the oil-fill plug with a new washer and tighten.

   Tightening torque

   39.2-53.9 N.m {4.00-5.49 kgf.m, 29.0-39.7 ft.lbf}

DIFFERENTIAL OIL REPLACEMENT

1. Park the vehicle on level ground.
2. Remove the oil-fill plug.
3. Remove the drain plug and drain the oil.

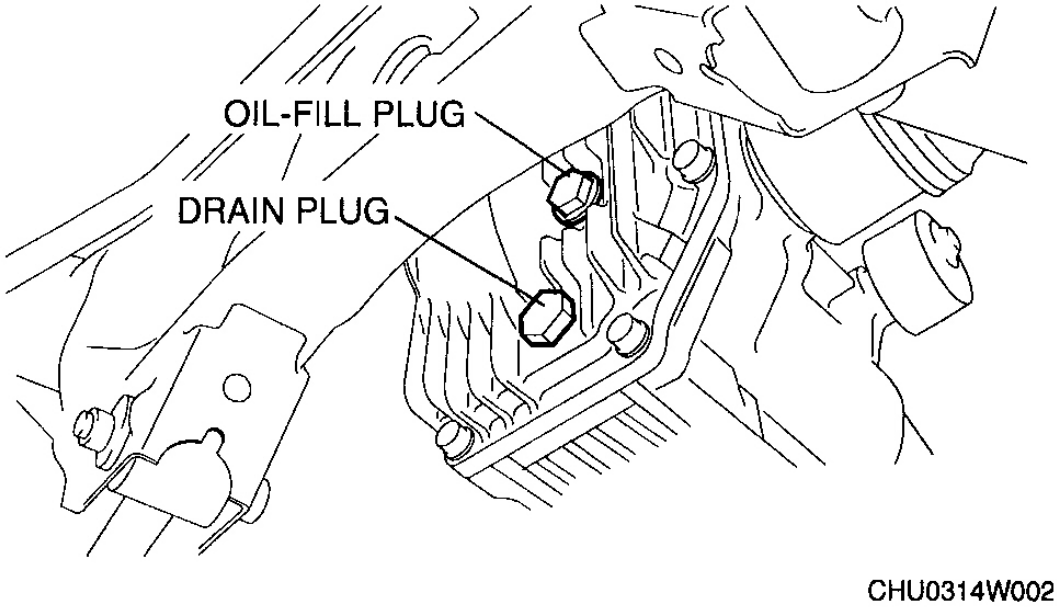


Fig. 4: Identifying Oil Fill Plug & Drain Plug
Courtesy of MAZDA MOTORS CORP.

4. Install the drain plug with a new washer and tighten.

   Tightening torque

   39.2-53.9 N.m

   {4.00-5.49 kgf.m, 29.0-39.7 ft.lbf}

5. Add the specified oil through the oil-fill plug hole until the oil level reaches the lower end of the plug hole.

   Differential oil

   Grade: API service GL-5

   Viscosity: SAE 90, SAE 80W-90, SAE 75W-90 (Not available from Mazda)

   Capacity (approx. quantity): 0.6-0.8 L {0.63-0.85 US qt, 0.53-0.70 Imp qt}

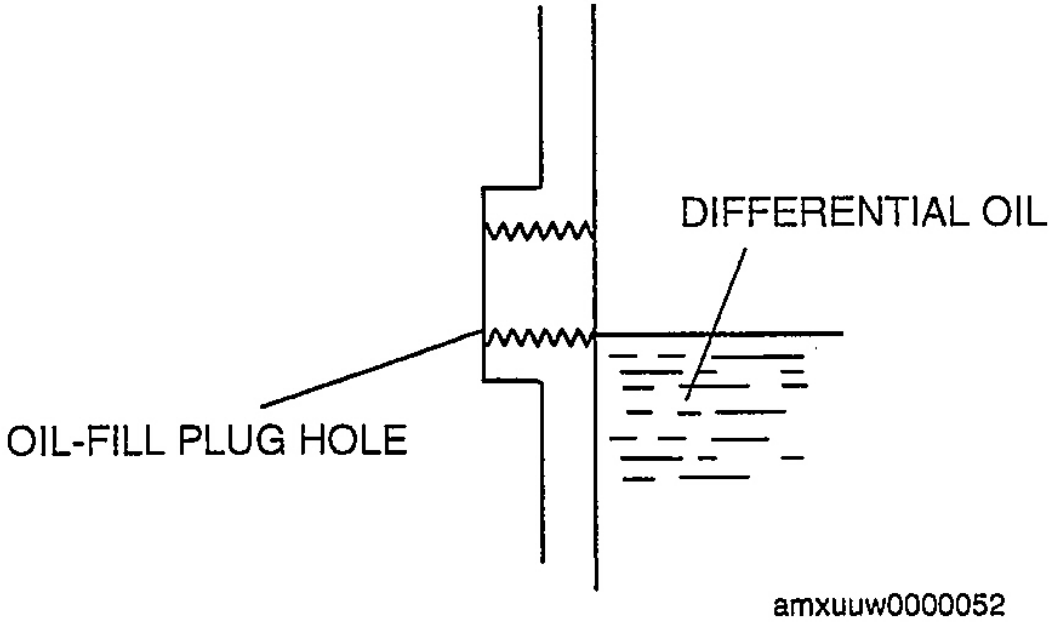


Fig. 5: Identifying Oil-Fill Plug Hole And Differential Oil
Courtesy of MAZDA MOTORS CORP.

6. Install the oil-fill plug with a new washer and tighten.

   Tightening torque

   39.2-53.9 N.m

   {4.00-5.49 kgf.m, 29.0-39.7 ft.lbf}

OIL SEAL (SIDE GEAR) REPLACEMENT

1. Remove the drain plug and drain the oil.
2. Install the drain plug with a new washer and tighten.

   Tightening torque

   39.2-53.9 N.m {4.00-5.49 kgf.m, 29.0-39.7 ft.lbf}

3. Disconnect the rear drive shaft on the differential side.

   (See **REAR DRIVE SHAFT, REAR KNUCKLE COMPONENT REMOVAL NOTE** .)

4. Remove the clip from the rear drive shaft.

CAUTION:
- **To prevent damaging the inside of the differential casing, wrap cloth on the end of the flathead screwdriver.**

5. Remove the oil seal from the differential carrier using a flathead screwdriver.
6. Apply differential oil to the lip of a new oil seal.

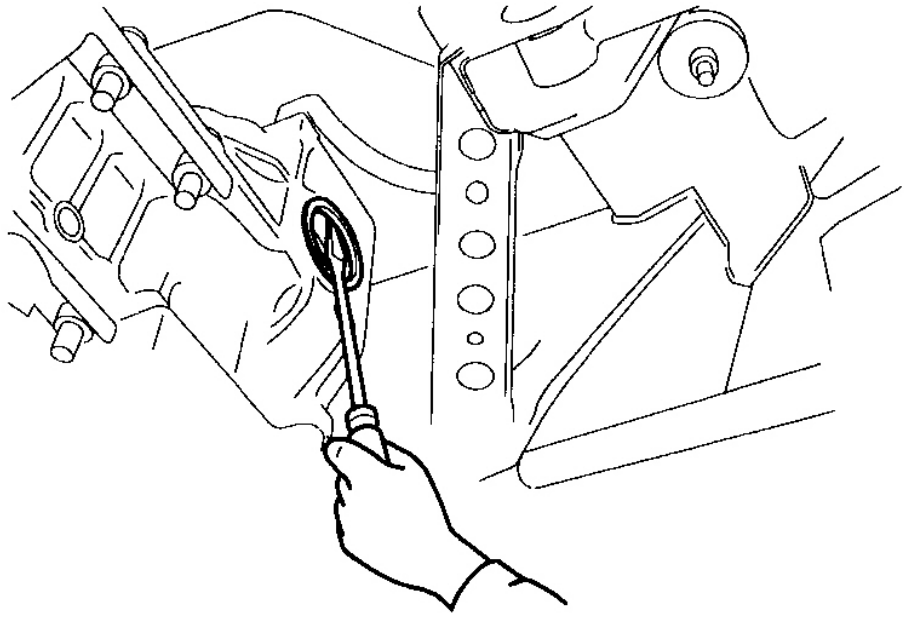


Fig. 6: Removing Oil Seal From Differential Carrier Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

7. Tap in the new oil seal until it reaches the differential carrier using the **SSTs** .

NOTE:
- **Install the oil seal at a straight angle.**

8. After installing a new clip to the rear drive shaft, insert it into the rear differential.

(See **REAR DRIVE SHAFT, REAR KNUCKLE COMPONENT INSTALLATION NOTE** .)

9. Verify that the rear drive shaft is held securely by the clip by pulling the outer ring on the differential side towards the axle.

10. Add differential oil.
11. After adding the oil, perform the oil level inspection. (See **DIFFERENTIAL OIL INSPECTION** .)
12. Install the oil-fill plug with a new washer and tighten.

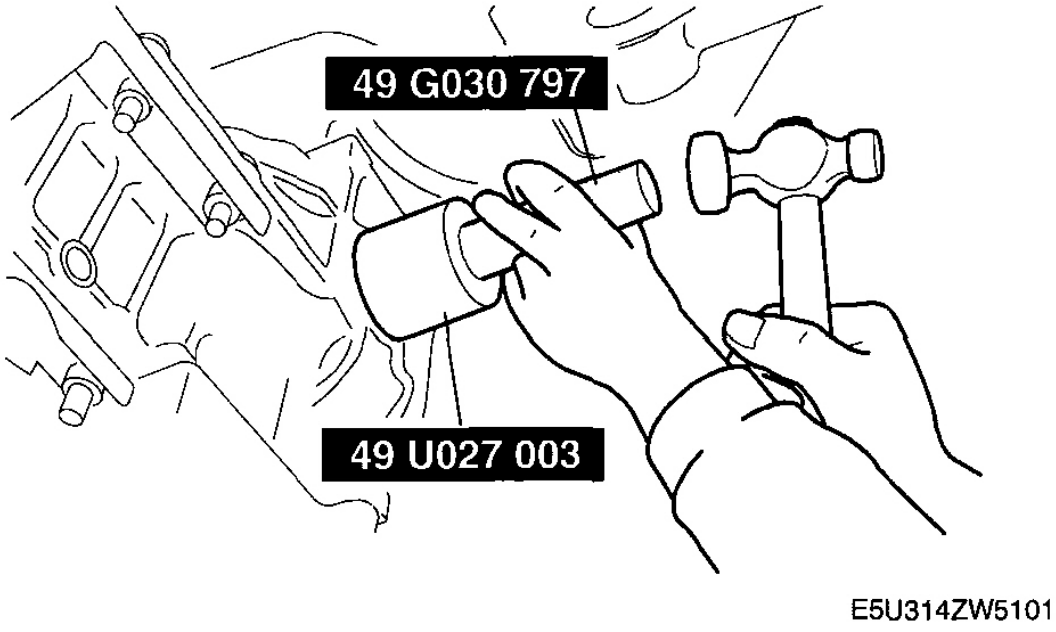


Fig. 7: Tapping In New Oil Seal Using SSTs
Courtesy of MAZDA MOTORS CORP.

Tightening torque

39.2-53.9 N.m {4.00-5.49 kgf.m, 29.0-39.7 ft.lbf}

OIL SEAL (COMPANION FLANGE) REPLACEMENT

1. Remove the rear differential. (See **REAR DIFFERENTIAL REMOVAL/INSTALLATION** .)
2. Replace the oil seal (companion flange) referring to the rear differential disassembly/assembly procedure. (See **REAR DIFFERENTIAL DISASSEMBLY** .) (See **REAR DIFFERENTIAL ASSEMBLY** .)
3. Install the rear differential. (See **REAR DIFFERENTIAL REMOVAL/INSTALLATION** .)

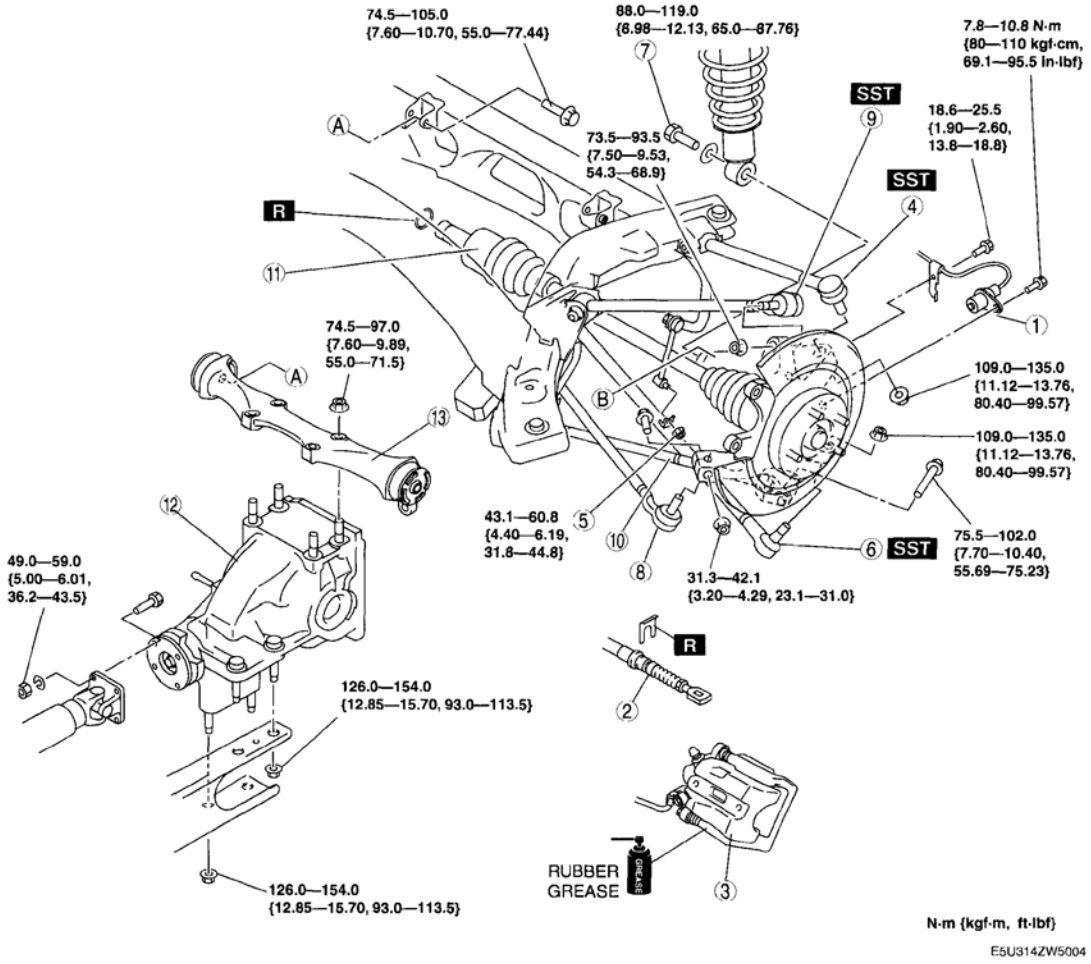
REAR DIFFERENTIAL REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring**

harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Drain the rear differential oil.
2. Remove the middle pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
3. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
4. Remove the power plant frame. (See **POWER PLANT FRAME REMOVAL NOTE** .) (See **POWER PLANT FRAME INSTALLATION NOTE** .) (See **POWER PLANT FRAME REMOVAL NOTE** .) (See **POWER PLANT FRAME INSTALLATION NOTE** .) (See **POWER PLANT FRAME REMOVAL NOTE** .) (See **POWER PLANT FRAME INSTALLATION NOTE** .)
5. Remove in the order indicated in **Fig. 8** .
6. Install in the reverse order of removal.
7. Add rear differential oil. (See **DIFFERENTIAL OIL REPLACEMENT** .)



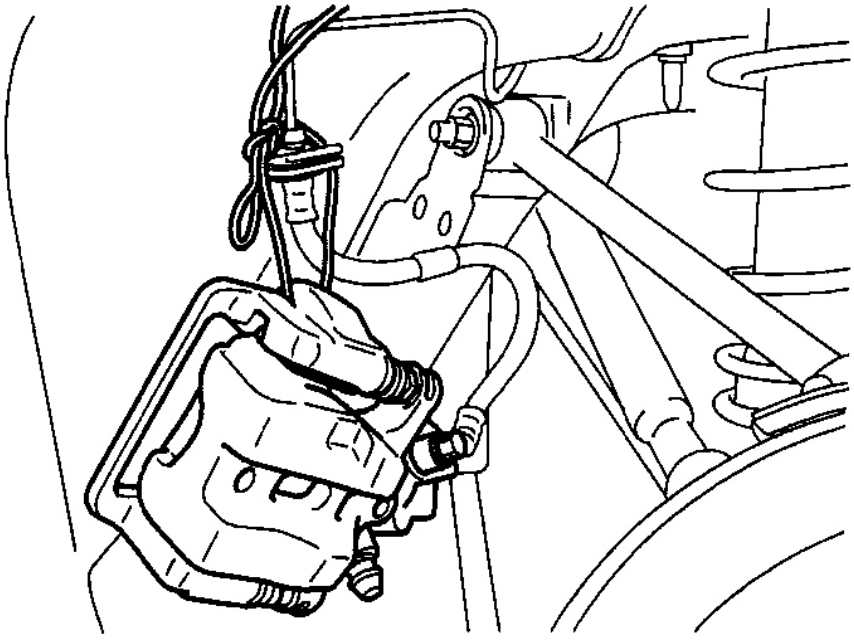
1	ABS wheel-speed sensor
2	Parking brake cable
3	Brake caliper component
4	Rear lateral link (upper) ball joint
5	Stabilizer control link (lower)
6	Rear lateral link (lower) ball joint
7	Shock absorber bolt (lower)

8	Toe control link ball joint
9	Rear trailing link (upper) ball joint
10	Rear trailing link (lower) bolt (outer side)
11	Rear drive shaft, rear knuckle component
12	Rear differential
13	Differential mount

Fig. 8: Identifying Rear Differential Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

BRAKE CALIPER COMPONENT REMOVAL NOTE

1. Suspend the brake caliper component using a cable or equivalent.



E5U314ZW5001

Fig. 9: Suspending Brake Caliper
Courtesy of MAZDA MOTORS CORP.

2. Temporarily tighten the wheel nut to prevent the disc plate from falling off.

REAR DRIVE SHAFT, REAR KNUCKLE COMPONENT REMOVAL NOTE

1. Insert a tire lever or equivalent between the rear differential and differential side outer ring, and remove the rear drive shaft.

CAUTION:
- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful not to damage the oil seal when removing the drive shaft from the differential.**

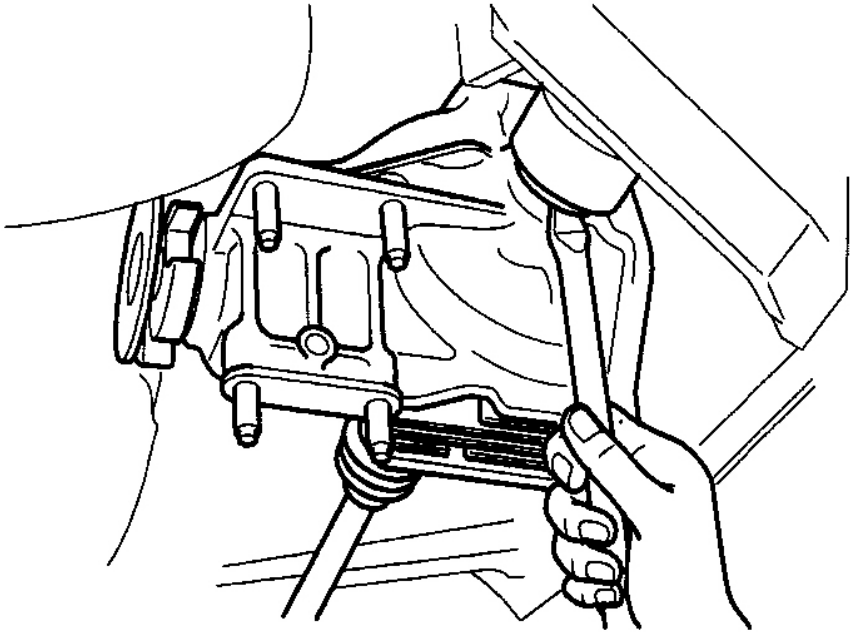


Fig. 10: Removing Rear Drive Shaft & Rear Knuckle Components
Courtesy of MAZDA MOTORS CORP.

2. Pull the rear drive shaft and rear knuckle component to the outer side, and detach the rear drive shaft from the rear differential.
3. To hold the rear drive shaft and rear knuckle component, install the rear lateral link (upper) to the rear knuckle temporarily after disconnecting the rear drive shaft.

REAR DIFFERENTIAL REMOVAL/INSTALLATION NOTE

WARNING:

- **If the rear differential falls off, it can cause serious injuries or death, and damage to the vehicle. When removing/installing the rear differential, verify that it is supported securely with a jack.**

1. Remove or install the rear differential, while supporting it securely with a jack, and moving the jack gradually.

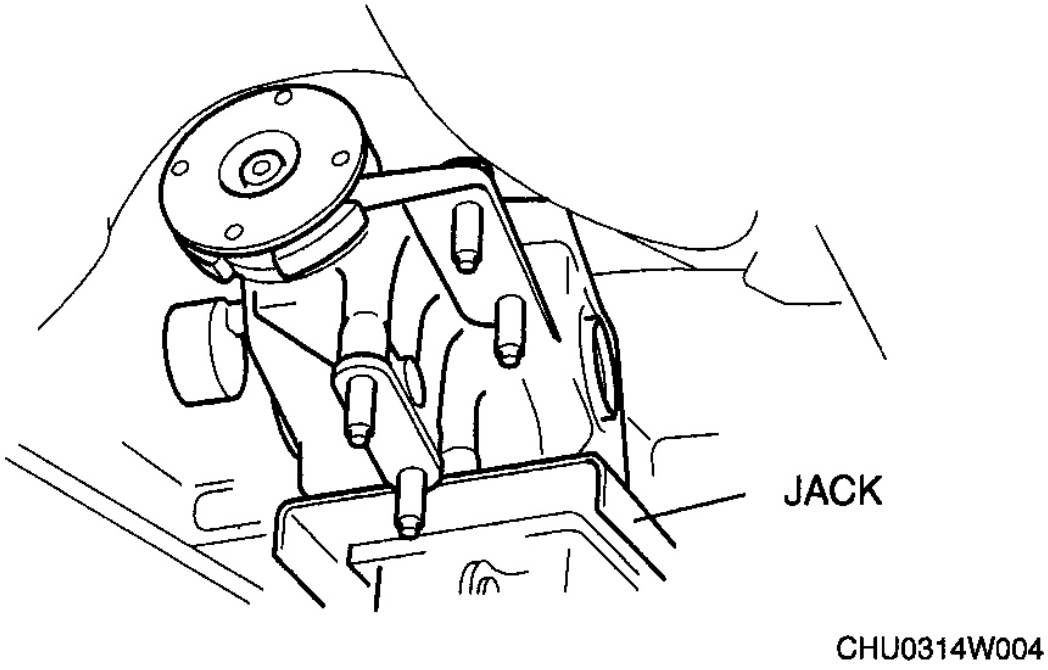


Fig. 11: Supporting Differential With Jack
Courtesy of MAZDA MOTORS CORP.

REAR DRIVE SHAFT, REAR KNUCKLE COMPONENT INSTALLATION NOTE

1. Install a new drive shaft clip to the clip groove at the top of the rear drive shaft with the clip opening facing upward and the clip width within the specification.

   Standard

   31.2 mm {1.23 in}

2. After installing the clip, measure the outer diametric if it exceeds the specification, reinstall a new clip.
3. Apply differential oil to the differential oil seal lip.

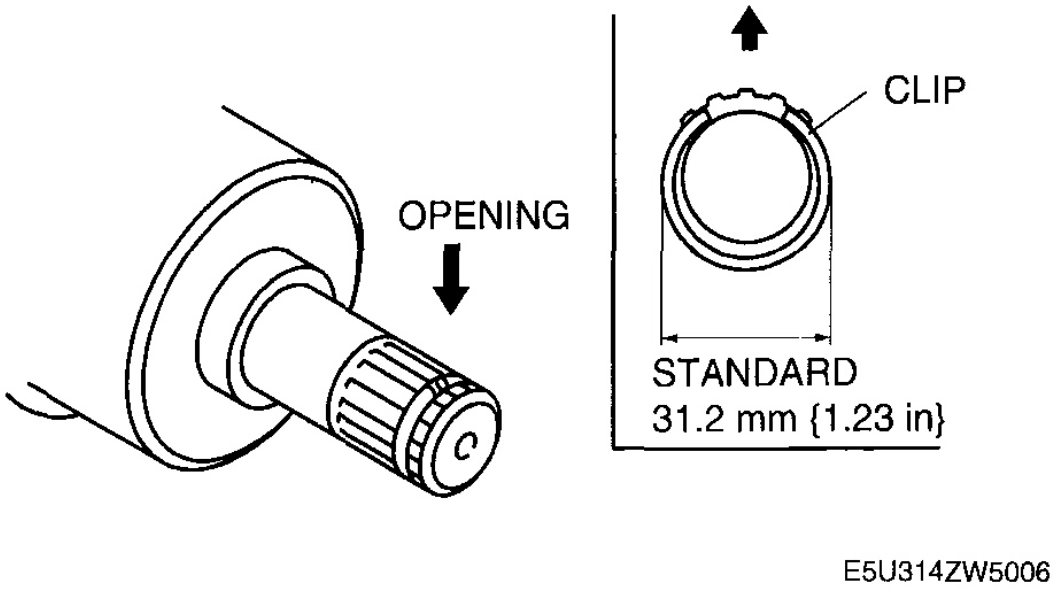


Fig. 12: Installing New Drive Shaft Clip To Clip Groove At Top Of Rear Drive Shaft
Courtesy of MAZDA MOTORS CORP.

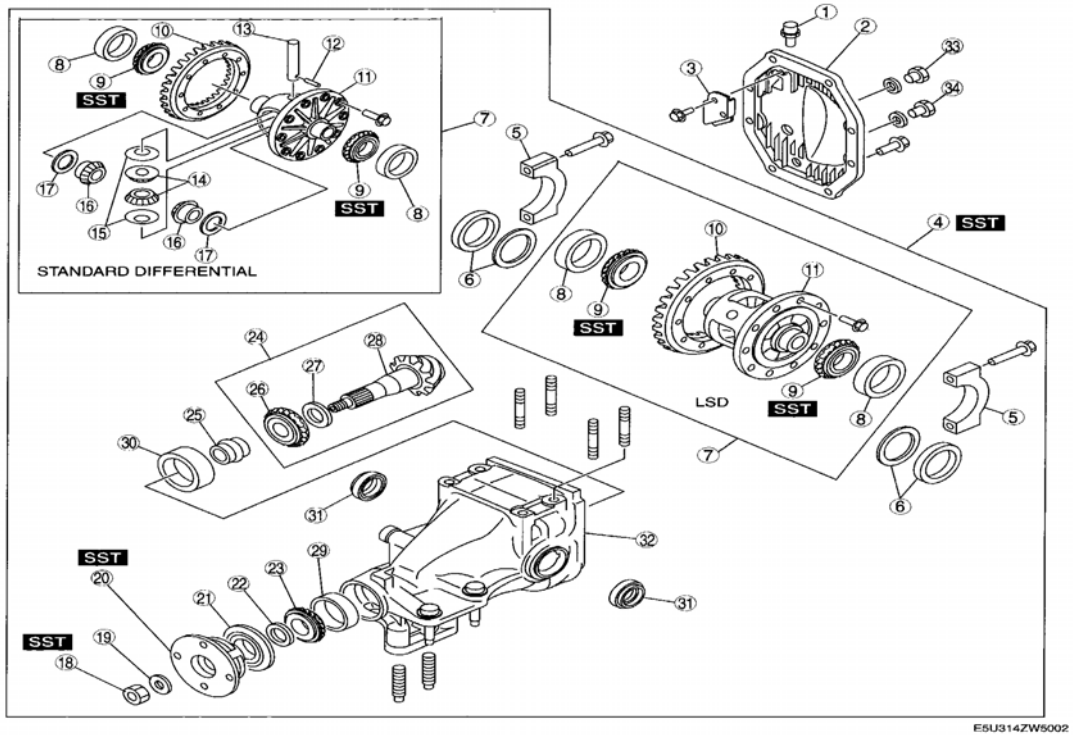
CAUTION:
- **The sharp edges of the rear drive shaft can slice or puncture the oil seal Be careful not to damage the oil seal when installing the rear drive shaft from the rear differential.**

4. Insert the rear drive shaft into the rear differential with the clip opening facing upward.
5. After installation, verify that the rear drive shaft is securely held by the clip by pulling the outer ring on the differential side towards the axle.

REAR DIFFERENTIAL DISASSEMBLY

WARNING:
- **The engine stand is equipped with a self-lock mechanism, however, if the rear differential is tilted, the self-lock mechanism could become inoperative. If the rear differential unexpectedly rotates, it could cause injury, therefore do not maintain the rear differential tilted. When turning the rear differential, grasp the rotation handle firmly.**

1. Disassemble in the order indicated in **Fig. 13** .



1	Breather plug
2	Rear cover
3	Baffle plate
4	Differential component
5	Bearing cap
6	Adjustment shim
7	Differential gear case component
8	Side bearing outer race
9	Side bearing
10	Ring gear
11	Gear case
12	Roll pin
13	Pinion shaft

14	Pinion gear
15	Thrust washer
16	Side gear
17	Washer
18	Locknut
19	Washer
20	Companion flange
21	Oil seal (companion flange)
22	Spacer
23	Front bearing
24	Drive pinion component
25	Collapsible spacer
26	Rear bearing
27	Spacer
28	Drive pinion
29	Front bearing outer race
30	Rear bearing outer race
31	Oil seal (side gear)
32	Differential carrier
33	Oil-fill plug
34	Drain plug

Fig. 13: Exploded View Of Rear Differential Components
Courtesy of MAZDA MOTORS CORP.

DIFFERENTIAL COMPONENT DISASSEMBLY NOTE

1. Install the differential component to the **SSTs** .

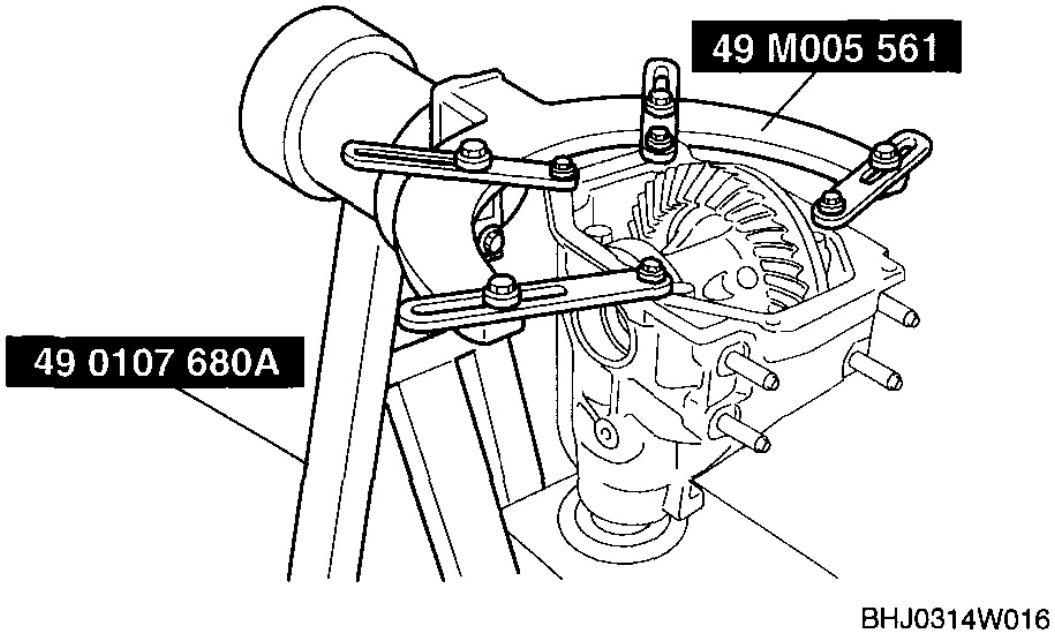


Fig. 14: Installing Differential Component To SSTs
Courtesy of MAZDA MOTORS CORP.

BEARING CAP DISASSEMBLY NOTE

1. Mark the bearing cap and differential carrier for proper installation.

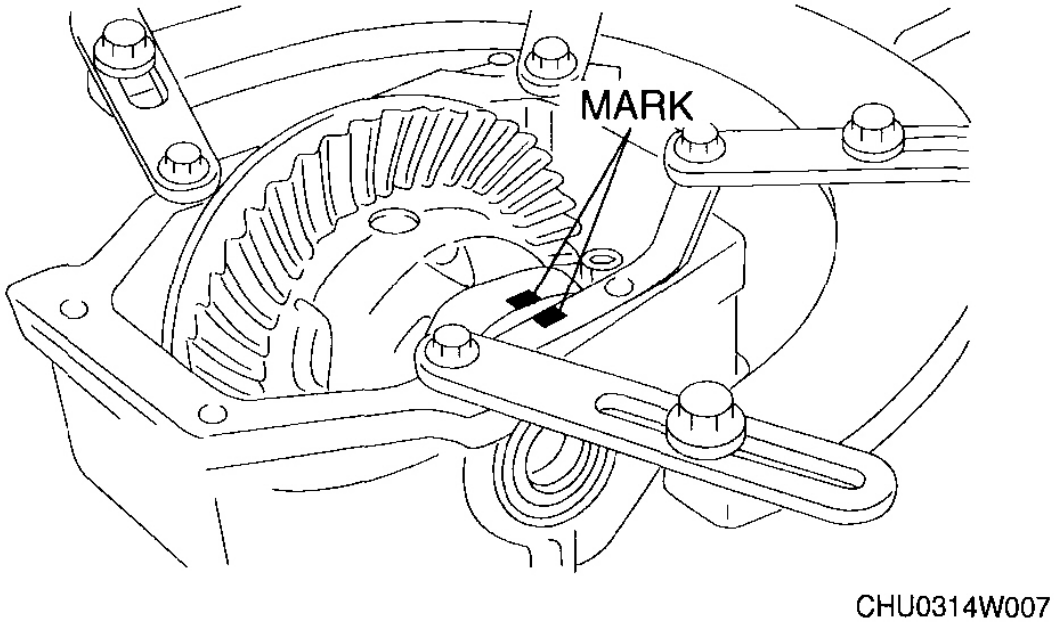


Fig. 15: Marking Bearing Cap & Differential Carrier For Installation
Courtesy of MAZDA MOTORS CORP.

ADJUSTMENT SHIM, SIDE BEARING OUTER RACE DISASSEMBLY NOTE

1. Remove the adjustment shim using a flathead screwdriver.

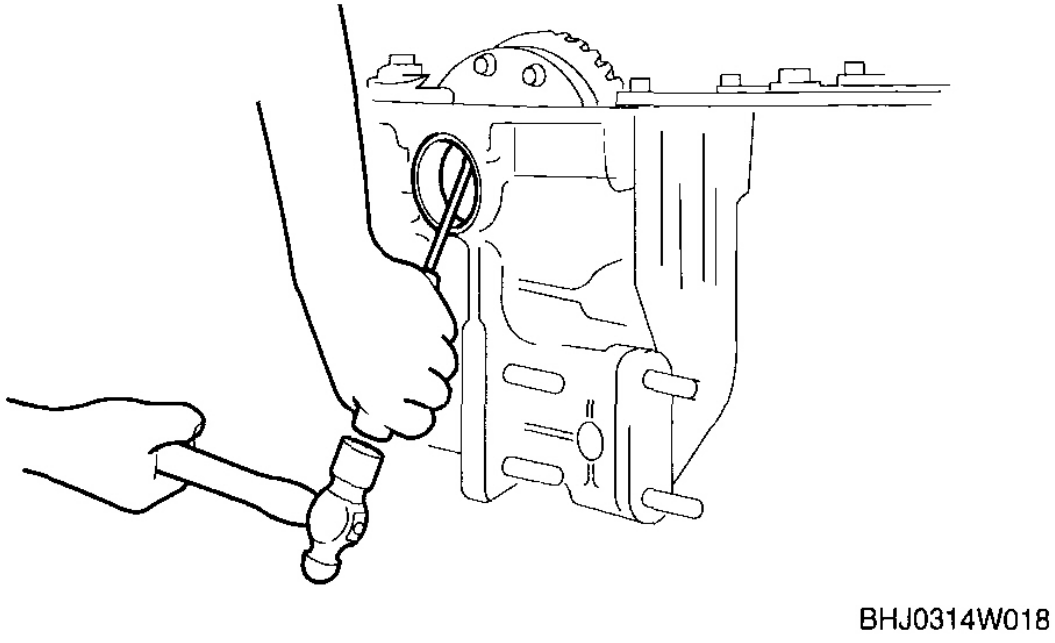


Fig. 16: Removing Adjustment Shim Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

2. Put left and right identification marks on the removed adjustment shims and side bearing outer races.

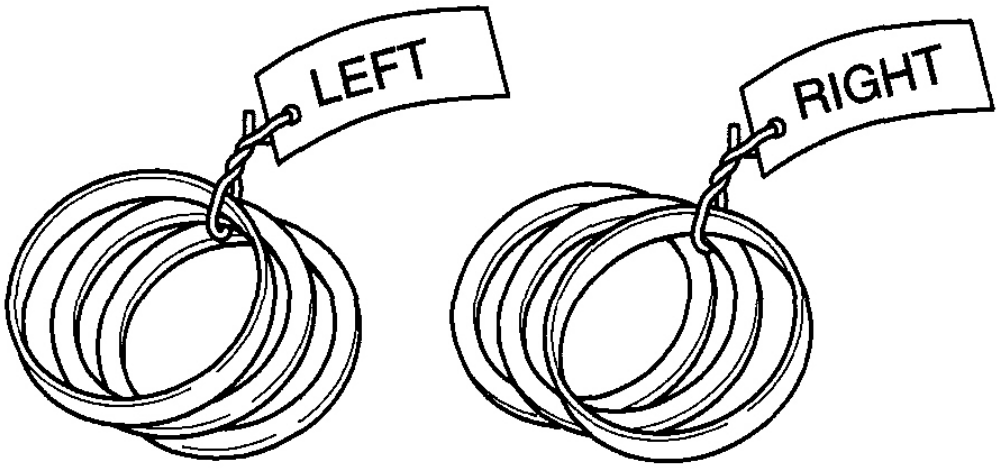


Fig. 17: Putting Left & Right Identification Marks On Adjustment Shims & Side Bearing Outer Races
Courtesy of MAZDA MOTORS CORP.

SIDE BEARING DISASSEMBLY NOTE

1. Remove the side bearing using the **SST** .
2. Put left and right identification marks on the removed side bearings.

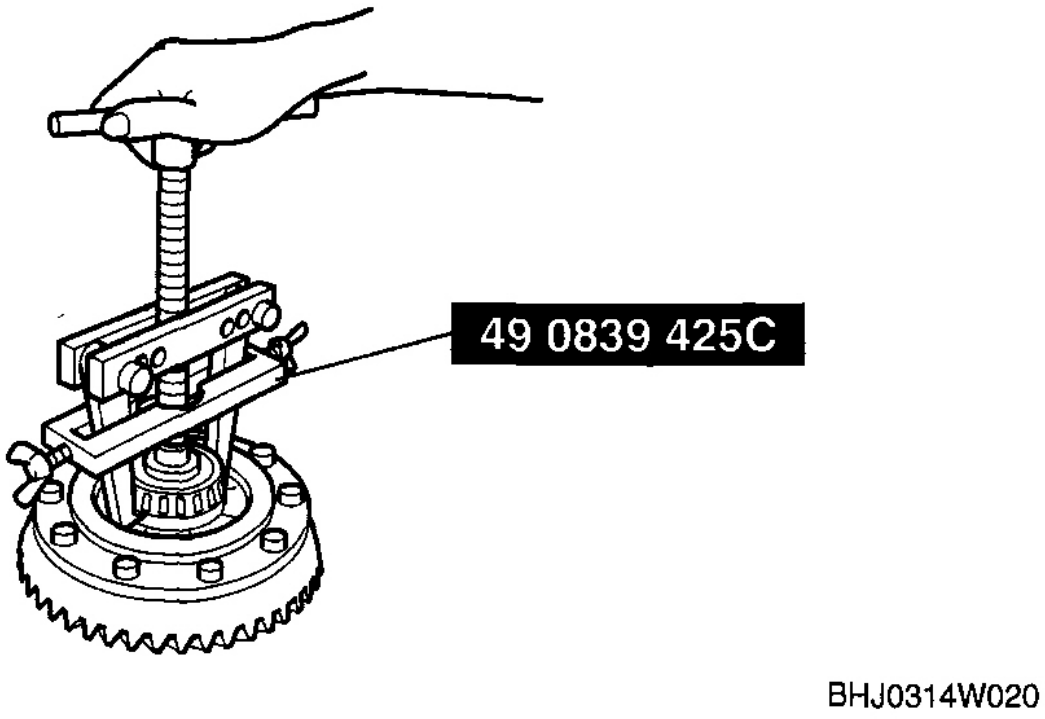


Fig. 18: Removing Side Bearing Using SST
Courtesy of MAZDA MOTORS CORP.

ROLL PIN DISASSEMBLY NOTE

1. Tap the roll pin out from the direction shown in **Fig. 19** using a pin punch.

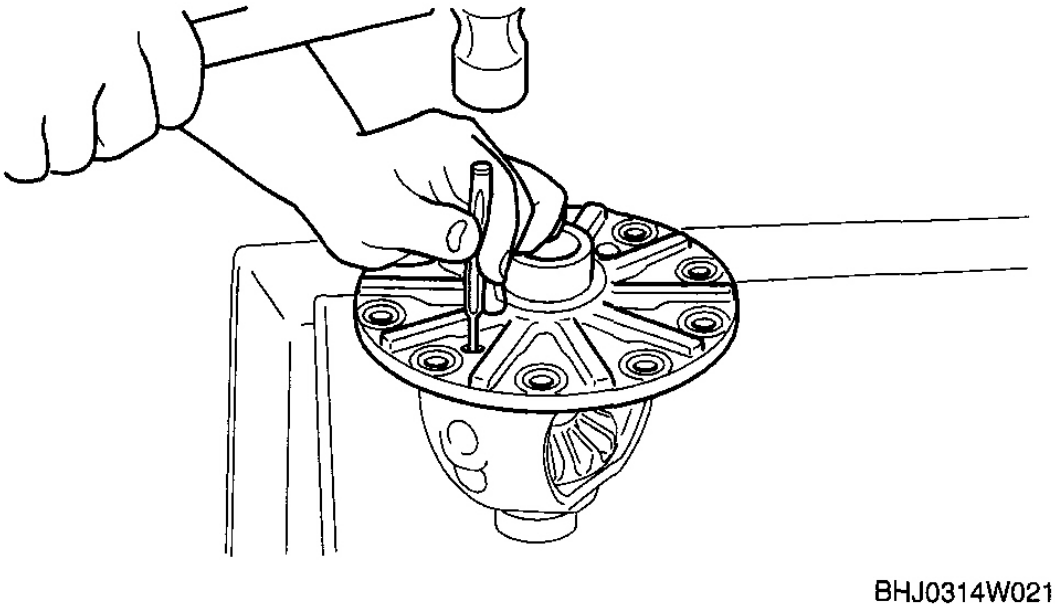


Fig. 19: Tapping Roll Pin Out Using Pin Punch
Courtesy of MAZDA MOTORS CORP.

LOCKNUT DISASSEMBLY NOTE

1. Remove the locknut while fixing the companion flange using the **SST** .

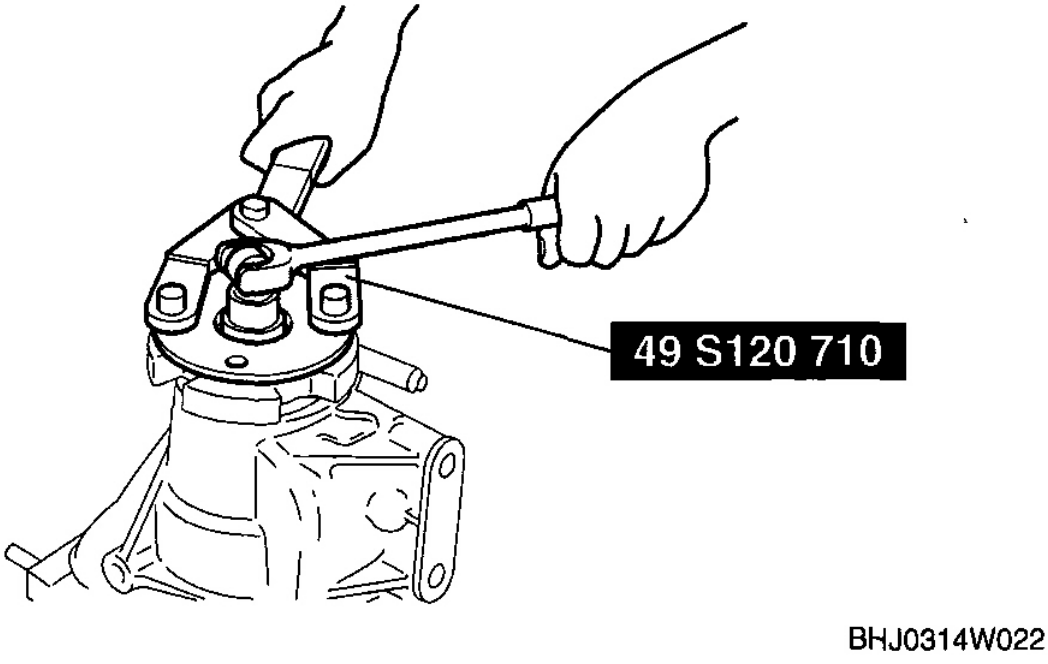


Fig. 20: Removing Locknut While Fixing Companion Flange Using SST
Courtesy of MAZDA MOTORS CORP.

COMPANION FLANGE DISASSEMBLY NOTE

1. Remove the companion flange using the **SST** .

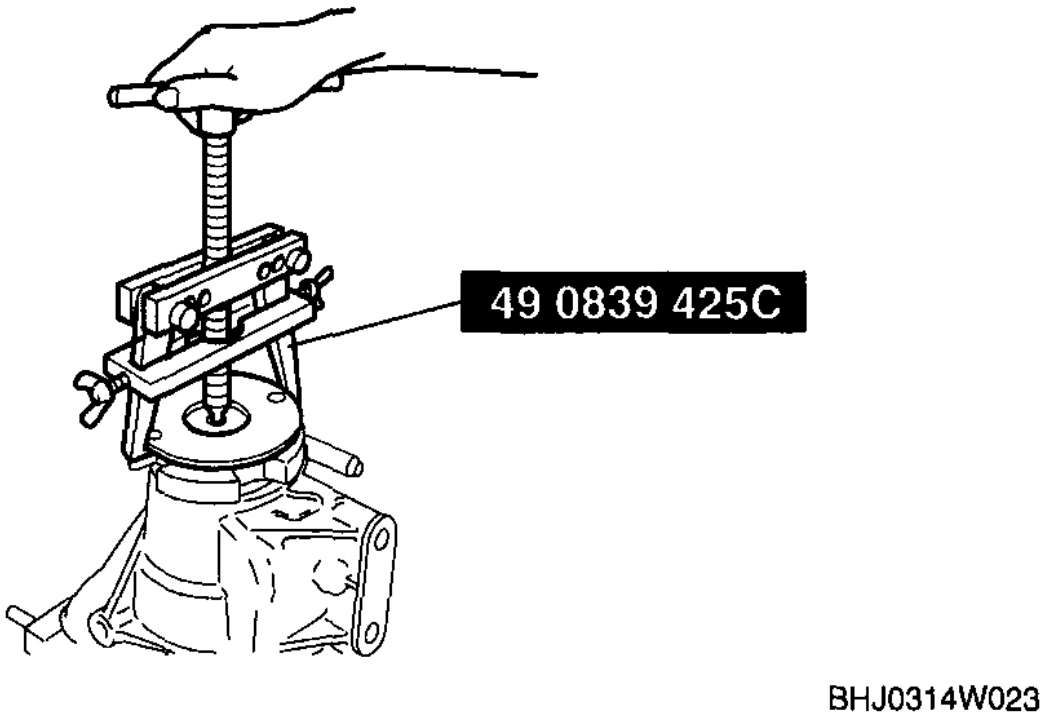


Fig. 21: Removing Companion Flange Using SST
Courtesy of MAZDA MOTORS CORP.

DRIVE PINION COMPONENT DISASSEMBLY NOTE

1. Install the removed locknut to the drive pinion top to prevent damage to the thread.
2. Remove the drive pinion component by tapping the locknut lightly using a plastic hammer.
3. Remove the locknut installed in Step 1.

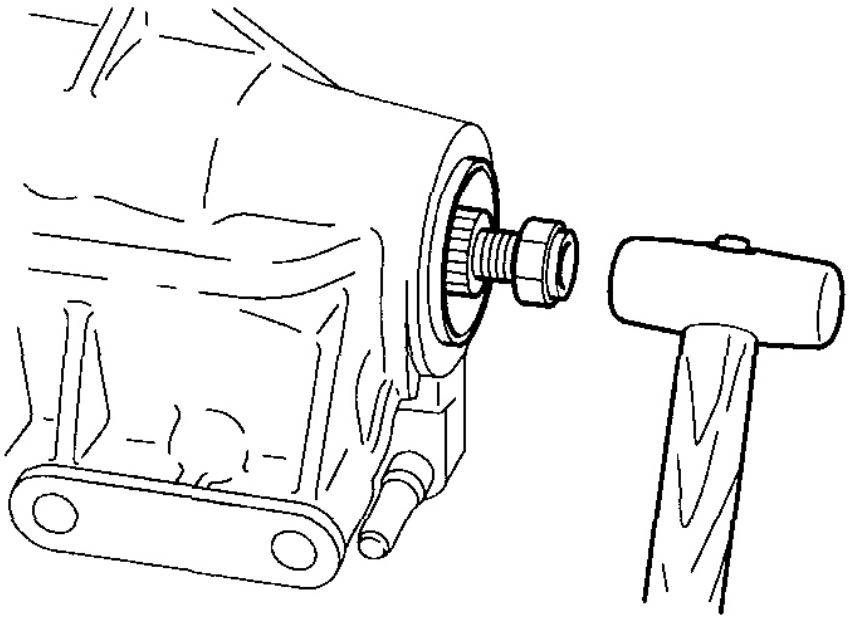


Fig. 22: Removing Drive Pinion Component By Tapping Locknut Using Plastic Hammer
Courtesy of MAZDA MOTORS CORP.

REAR BEARING DISASSEMBLY NOTE

CAUTION:
- **The drive pinion could be damaged if it falls off. Support the drive pinion with your hand when removing the rear bearing.**

1. Remove the rear bearing using the **SST** and a press.

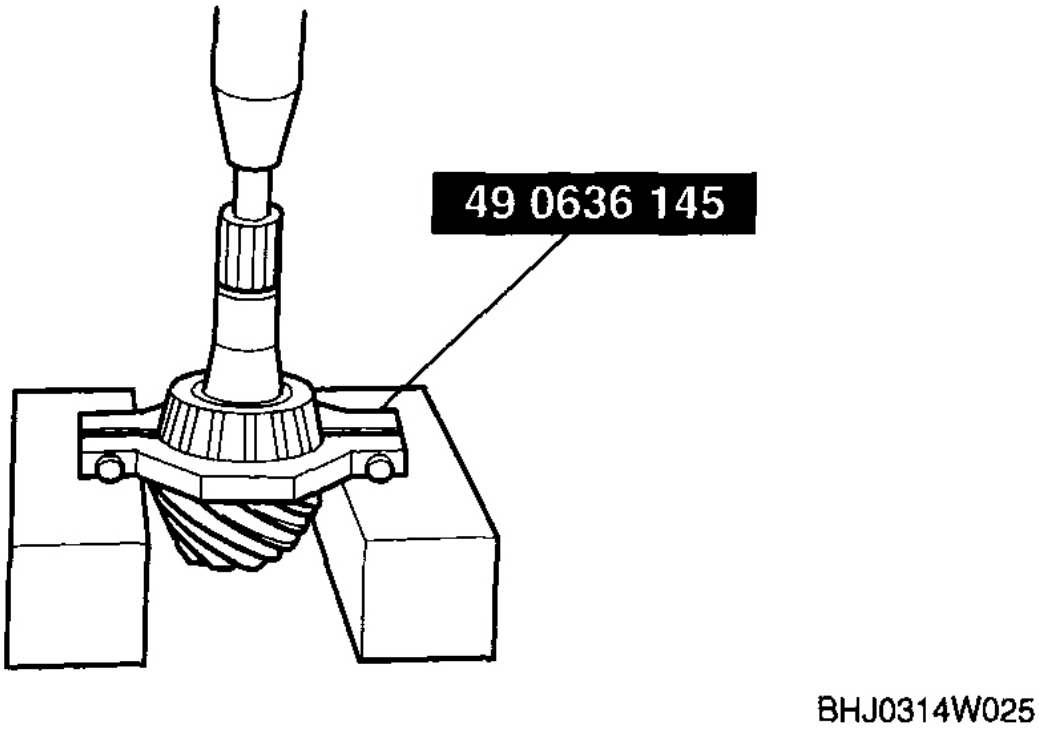


Fig. 23: Removing Rear Bearing Using SST & Press
Courtesy of MAZDA MOTORS CORP.

FRONT BEARING OUTER RACE, REAR BEARING OUTER RACE DISASSEMBLY NOTE

1. Remove the bearing outer race by lightly tapping the edge of the bearing outer race using a flathead screwdriver.

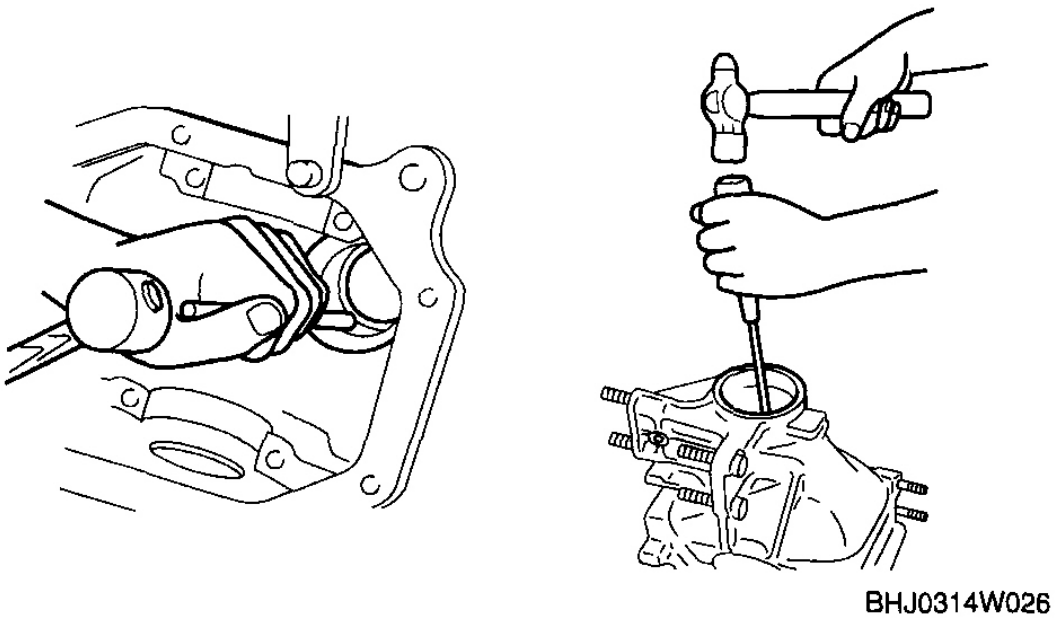


Fig. 24: Removing Bearing Outer Race By Lightly Tapping Edge Of Bearing Outer Race Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

REAR DIFFERENTIAL ASSEMBLY

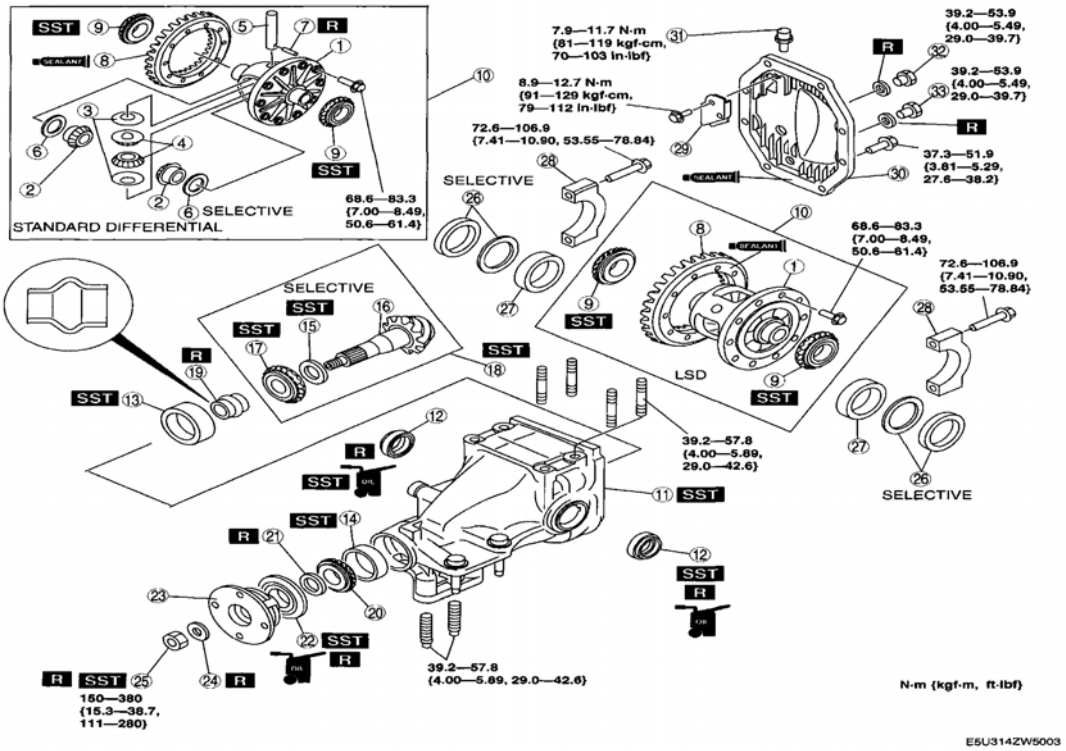
WARNING:

- **The engine stand is equipped with a self-lock mechanism, however, if the rear differential is tilted, the self-lock mechanism could become inoperative. If the rear differential unexpectedly rotates, it could cause injury, therefore do not maintain the rear differential tilted. When turning the rear differential, grasp the rotation handle firmly.**

NOTE:

- **Clean away the old silicone sealant before applying the new silicone sealant.**
- **Install the rear cover within 10 min after applying the silicone sealant.**
- **Allow the sealant to set at least 30 min or more after installation before filling the differential with differential oil.**

1. Assemble in the order indicated in **Fig. 25** .



1	Gear case
2	Side gear
3	Thrust washer
4	Pinion gear
5	Pinion shaft
6	Washer
7	Roll pin
8	Ring gear
9	Side bearing
10	Differential gear case component
11	Differential carrier
12	Oil seal (side gear)
13	Rear bearing outer race
14	Front bearing outer race
15	Spacer
16	Drive pinion
17	Rear bearing
18	Drive pinion component

19	Collapsible spacer
20	Front bearing
21	Spacer
22	Oil seal (companion flange)
23	Companion flange
24	Washer
25	Locknut
26	Adjustment shim
27	Side bearing race
28	Bearing cap
29	Baffle plate
30	Rear cover
31	Breather plug
32	Oil-level plug
33	Drain plug

Fig. 25: Identifying Rear Differential Assembly Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

WASHER ASSEMBLY NOTE

1. Assemble the side gear, thrust washer, pinion gear, and the pinion shaft to the gear case.
2. Install the dial gauge with the measuring probe of the dial gauge attached perpendicularly to the end of

one of the pinion gear teeth.

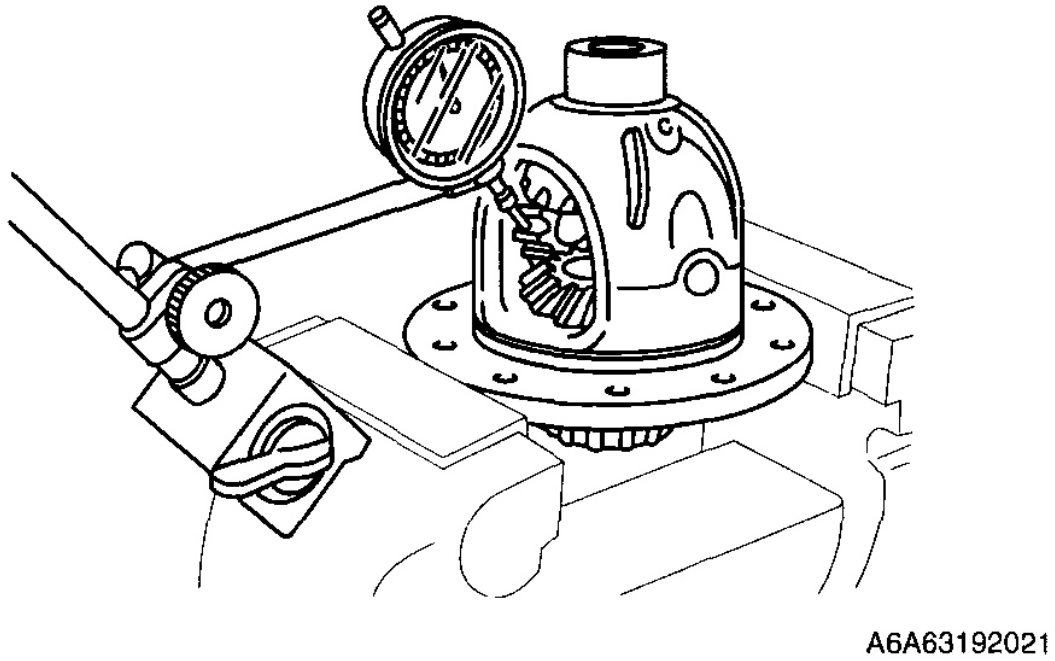


Fig. 26: Installing Dial Gauge
Courtesy of MAZDA MOTORS CORP.

3. Fix either one of the side gears.
4. Move the pinion gear and measure the backlash at the pinion gear top.
    - If it is not within the specification, adjust by choosing the proper washer.

Backlash of pinion gear and side gear

0.1 mm {0.004 in} or less

WASHER TABLE

Identification mark	Part name	Thickness (mm {in})
9	MA29 27 252	0.90 {0.0354}
95	MA29 27 253	0.95 {0.0374}
0	MA29 27 254	1.00 {0.0393}
05	MA29 27 256	1.05 {0.0413}
1	MA29 27 257	1.10 {0.0433}

ROLL PIN ASSEMBLY NOTE

1. Align the differential gear case and pinion shaft pin holes.
2. Tap the roll pin in using a pin punch.

RING GEAR ASSEMBLY NOTE

CAUTION:
- **The gear case and ring gear could be damaged if the ring gear is installed with old thread-locking compound remaining on the bolt threads. Before installing the ring gear, completely remove the old thread-locking compound from the bolt threads.**

1. Apply a small amount of thread-locking compound to each of points A on the back of the ring gear, and bolt thread areas B (around the entire ring).

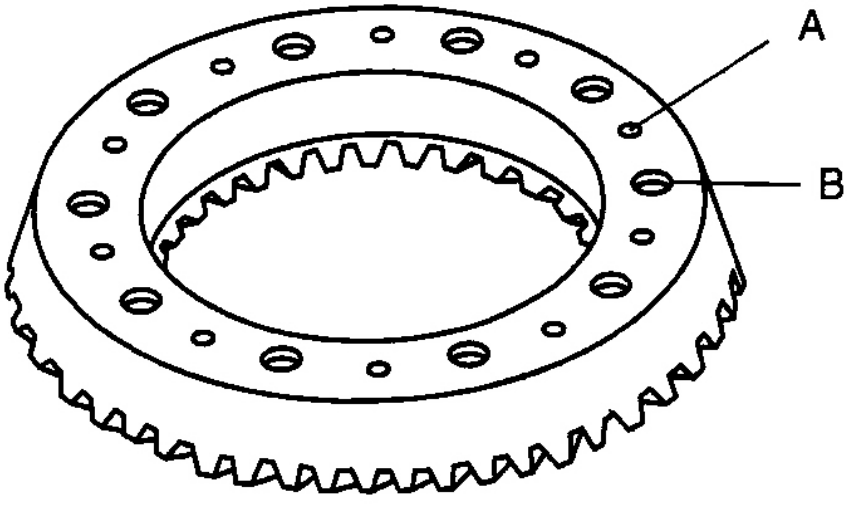
   Application thickness

   Back of ring gear points A:

   Approx. 0.4 cm^3 {0.4 cc, 0.024 cu in} (1 location approx. 0.04 cm^3 {0.04 cc, 0.0024 cu in})

   Ring gear bolt thread points B:

   Approx. 0.4 cm^3 {0.4 cc, 0.024 cu in} (1 location approx. 0.04 cm^3 {0.04 cc, 0.0024 cu in})



A6A63192022

Fig. 27: Identifying Ring Gear Assembly
Courtesy of MAZDA MOTORS CORP.

2. Install the ring gear to the differential gear case and tighten the bolts in a criss-cross pattern.

   Tightening torque

   68.6-83.3 N.m

   {7.00-8.49 kgf.m, 50.6-61.4 ft.lbf}

SIDE BEARING ASSEMBLY NOTE

NOTE:

- **When assembling the side bearings, do not mix the left and right side bearings that were identified during disassembly.**

1. Press the side bearing in using the **SST** and a press.

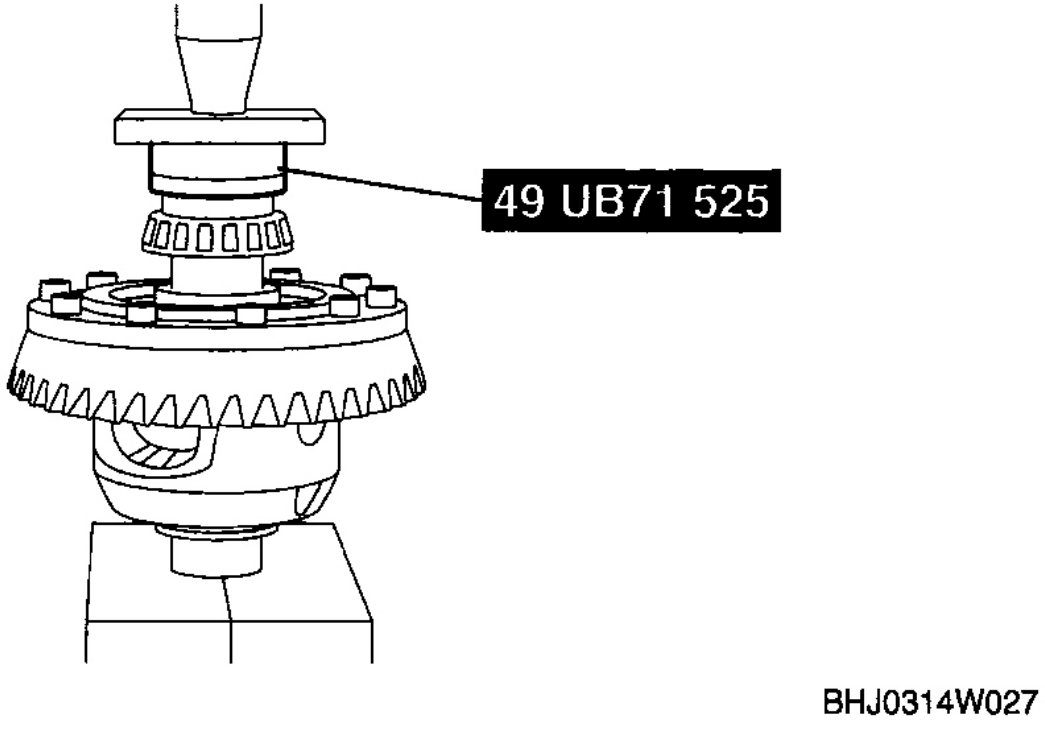


Fig. 28: Pressing Side Bearing In Using SST & Press
Courtesy of MAZDA MOTORS CORP.

OIL SEAL (SIDE GEAR) ASSEMBLY NOTE

1. Apply differential oil to the lip of a new oil seal.
2. Assemble the oil seal using the **SSTs** .

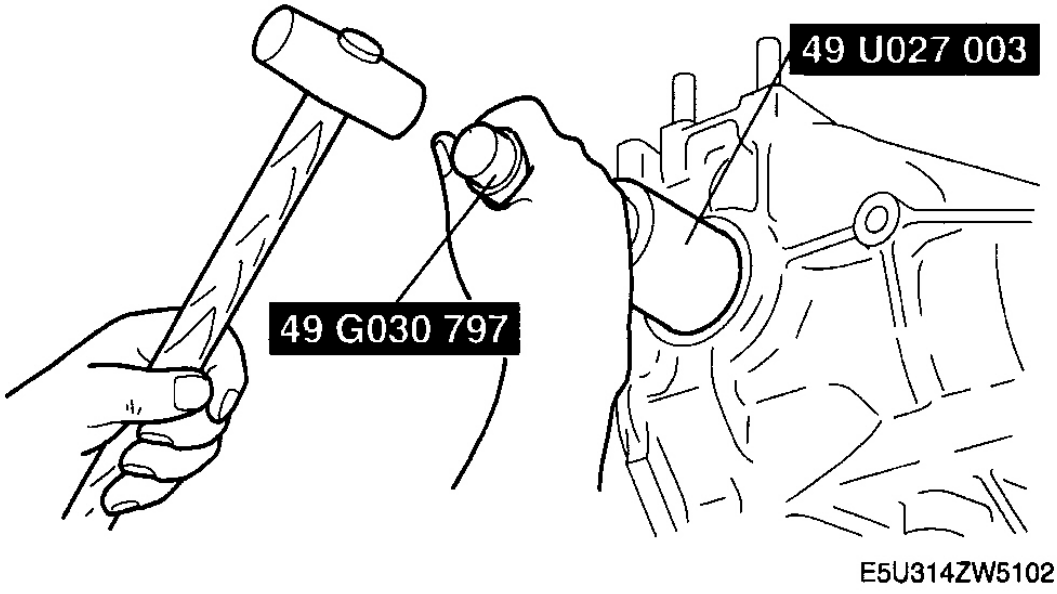


Fig. 29: Assembling Oil Seal Using SSTs
Courtesy of MAZDA MOTORS CORP.

REAR BEARING OUTER RACE ASSEMBLY NOTE

1. Press the rear bearing outer race into the differential carrier using the **SST** and a press.

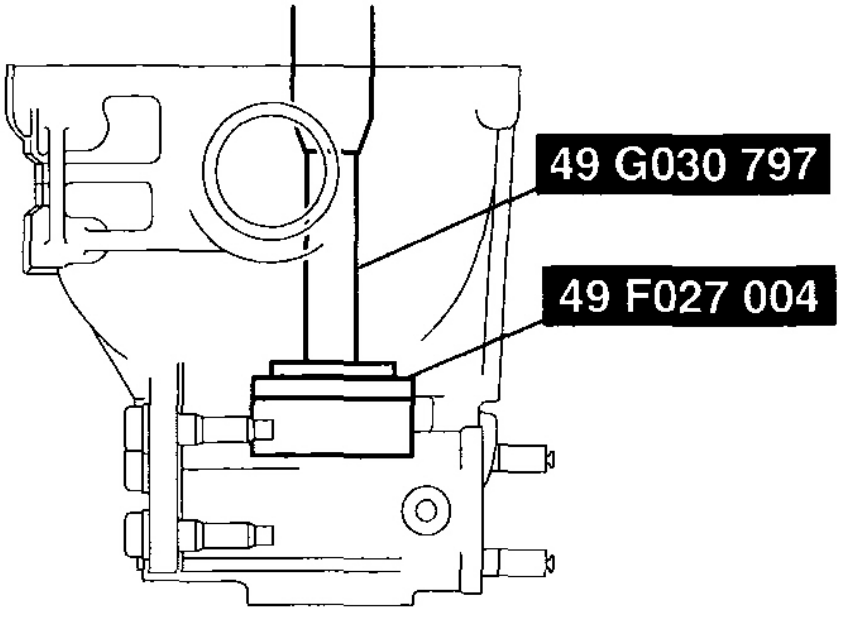


Fig. 30: Pressing Rear Bearing Outer Race Into Differential Carrier Using SST & Press
Courtesy of MAZDA MOTORS CORP.

FRONT BEARING OUTER RACE ASSEMBLY NOTE

1. Press the front bearing outer race into the differential carrier using the **SST** and a press.

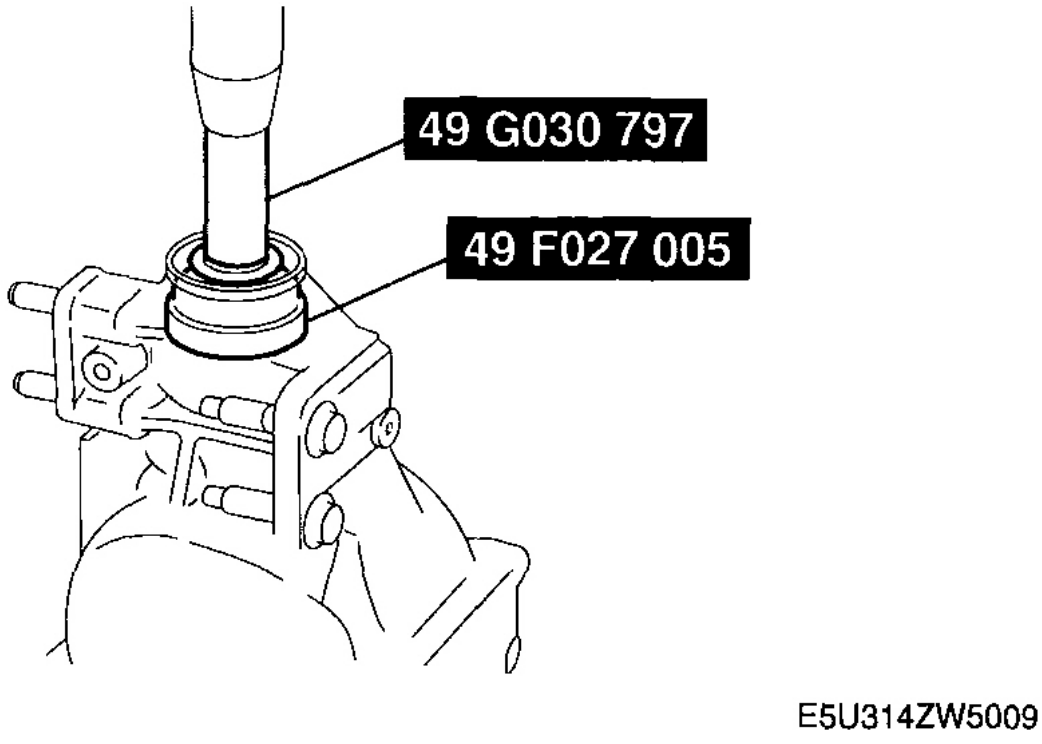


Fig. 31: Pressing Front Bearing Outer Race Into Differential Carrier Using SST & Press
Courtesy of MAZDA MOTORS CORP.

SPACER ASSEMBLY NOTE

Pinion Height Adjustment

NOTE:
- **Use the installed spacer when adjusting.**
- **Install the spacer with the chamfer on the SST side.**

1. Assemble the spacer, bearing inner race (rear side), and the **SST** (O-ring) to the **SST** (49 8531 565) as shown in **Fig. 32** .

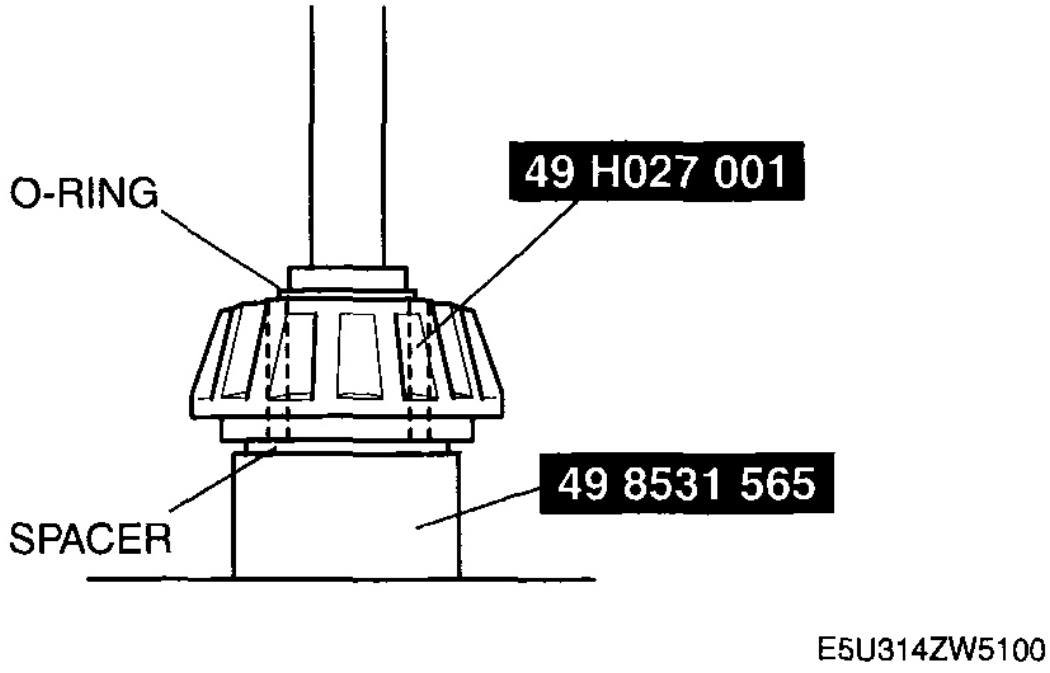


Fig. 32: Assembling Spacer, Bearing Inner Race (Rear Side) & SST (O-Ring) To SST (49 8531 565)
Courtesy of MAZDA MOTORS CORP.

2. Insert the set assembled in Step 1 from the rear side of the differential carrier.
3. Assemble the **SST** (49 8531 567) front bearing, companion flange, and a washer from the front side of the differential carrier.

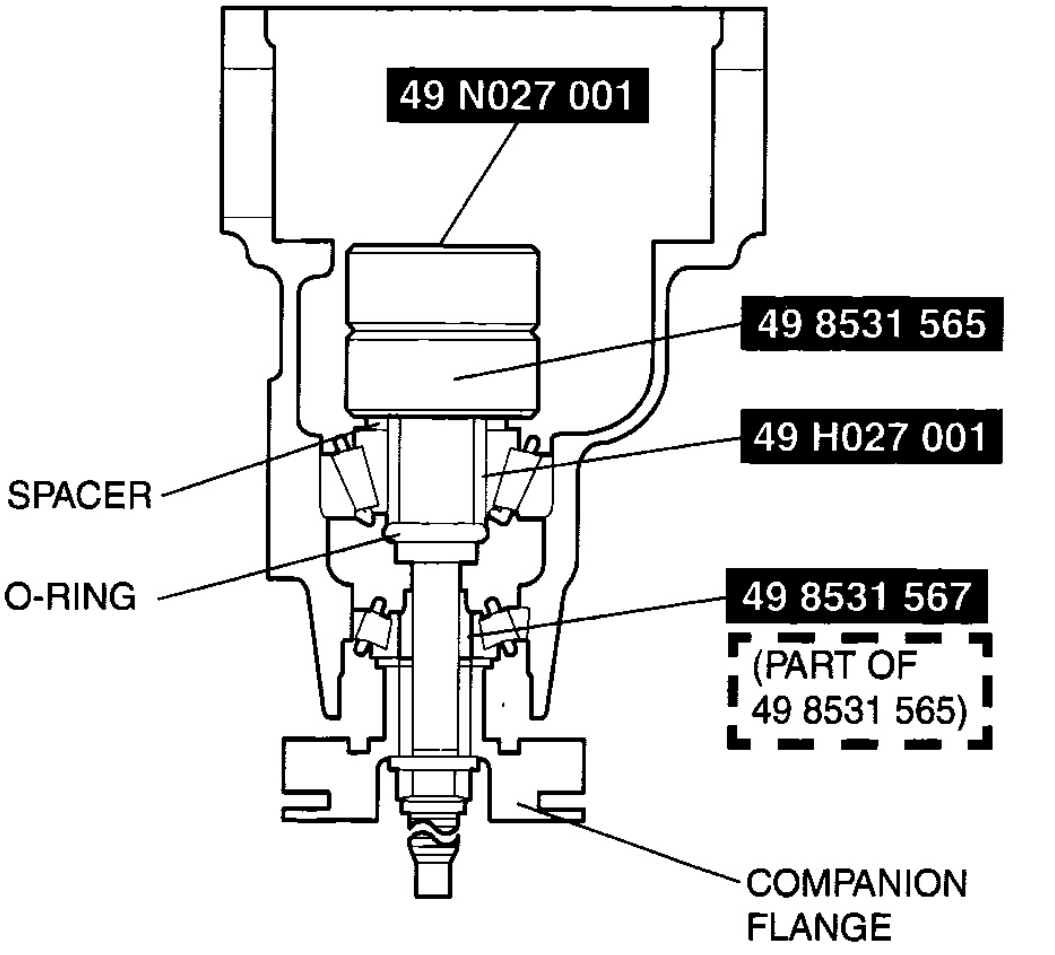


Fig. 33: Inserting Assembled Set In From Rear Side Of Differential Carrier
Courtesy of MAZDA MOTORS CORP.

4. Tighten the locknut to the extent that the **SST** (49 8531 565) can be turned by hand.
5. Place the **SST** (49 N027 001) on top of the **SST** (49 8531 565).
6. Place the **SST** on the surface plate and set the dial gauge to zero.

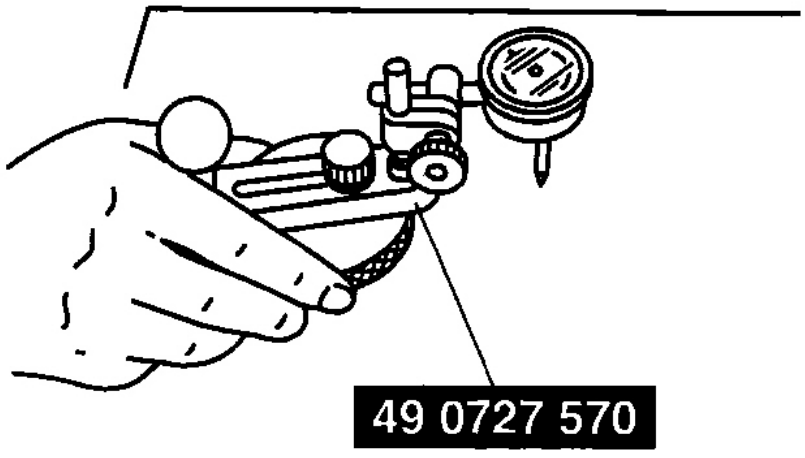


Fig. 34: Placing SST On Surface Plate & Setting Dial Gauge To Zero
Courtesy of MAZDA MOTORS CORP.

7. Set the **SSTs** as shown in **Fig. 35** .
8. Place the measuring probe of the dial gauge at the point where the side bearing is installed in the differential carrier and measure at the lowest position. Measure the left and right sides.

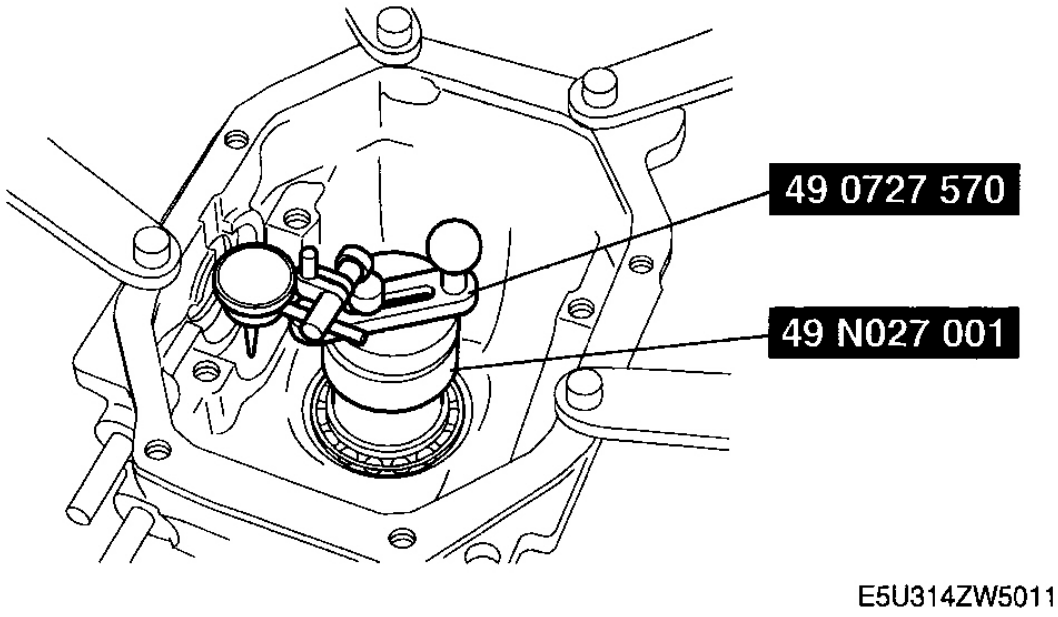


Fig. 35: Placing Measuring Probe Of Dial Gauge Where Side Bearing Is Installed In Differential Carrier
Courtesy of MAZDA MOTORS CORP.

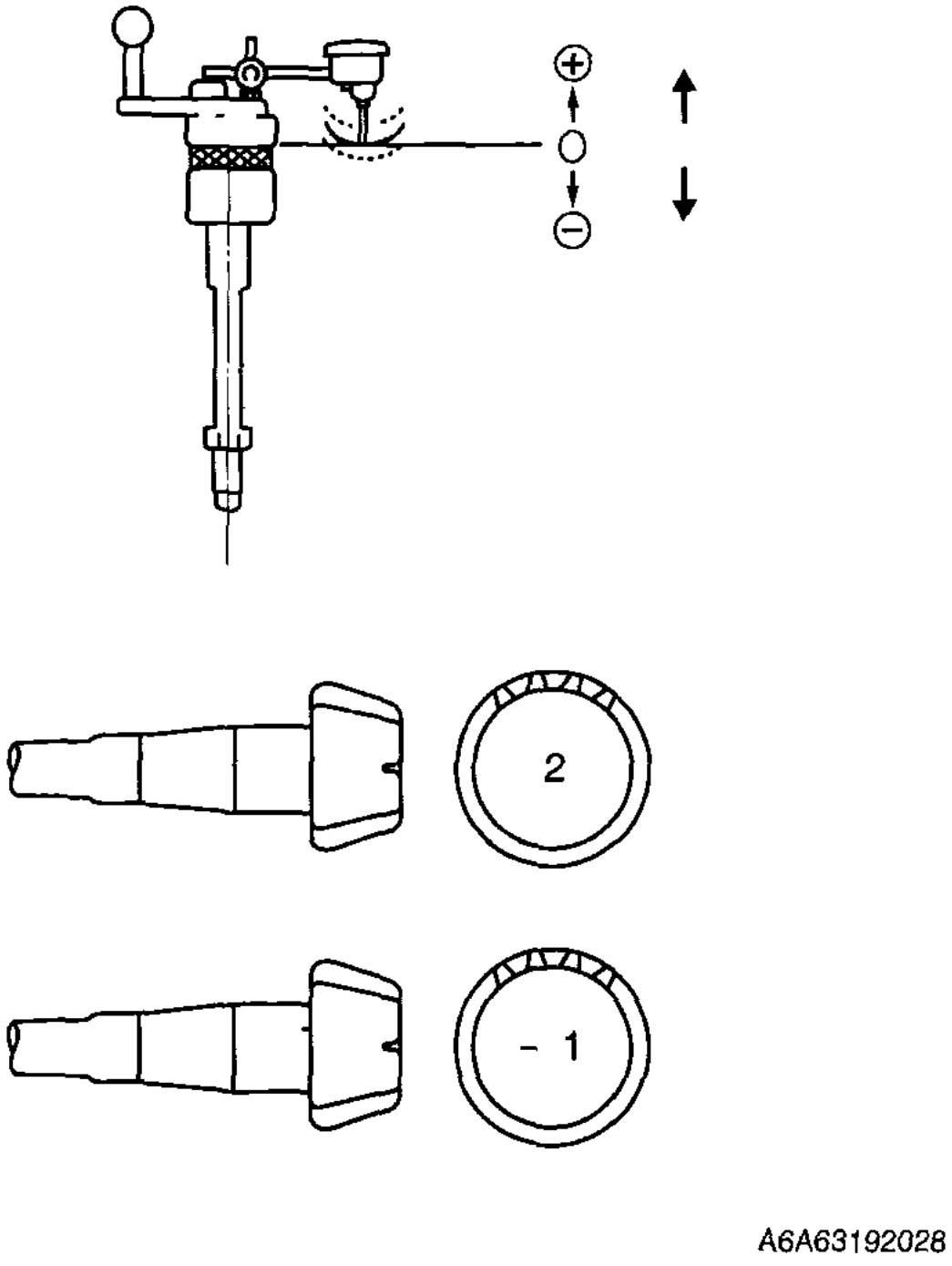


Fig. 36: Measuring Pinion Height Adjustment Value
Courtesy of MAZDA MOTORS CORP.

9. Add the two (left and right) values obtained by the measurements taken in Step 8 and then divide the total by **2** . From this sum, subtract the sum of the number inscribed on the end of the drive pinion divided by **100** . (If there is no figure inscribed, use 0.) This is the pinion height adjustment value.

   Differential pinion height

   0.038 mm {0.0015 in} or less

NOTE:

- **When the values obtained by the measurements taken in Step 8, 9 are 0.06 mm {0.0024 in}, 0.04 mm {0.0016 in} and the tip surface of the drive pinion value is 2, the formula is ((0.06+0.04)/2)-(2/100)=0.03. Therefore, assemble a spacer 0.03 mm {0.0012} thicker than the currently assembled one. The thickness settings are in increments of 0.015 mm {0.0006}, so choose one closest in thickness and install.**

SPACER TABLE

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
08	3.080 {0.1213}	29	3.290 {0.1295}
09	3.095 {0.1220}	30	3.305 {0.1301}
11	3.110 {0.1224}	32	3.320 {0.1307}
12	3.125 {0.1230}	33	3.335 {0.1313}
14	3.140 {0.1234}	35	3.350 {0.1319}
15	3.155 {0.1242}	36	3.365 {0.1325}
17	3.170 {0.1248}	38	3.380 {0.1331}
18	3.185 {0.1254}	39	3.395 {0.1337}
20	3.200 {0.1260}	41	3.410 {0.1343}
21	3.215 {0.1266}	42	3.425 {0.1348}
23	3.230 {0.1271}	44	3.440 {0.1354}
24	3.245 {0.1278}	45	3.455 {0.1360}
26	3.260 {0.1283}	47	3.470 {0.1366}
27	3.275 {0.1289}	-	-

REAR BEARING ASSEMBLY NOTE

NOTE:

- **Install the spacer with the chamfer on the gear side.**

1. Assemble the spacer selected in the pinion height adjustment to the drive pinion.
2. Press the drive pinion into the rear bearing using the **SSTs** and a press.

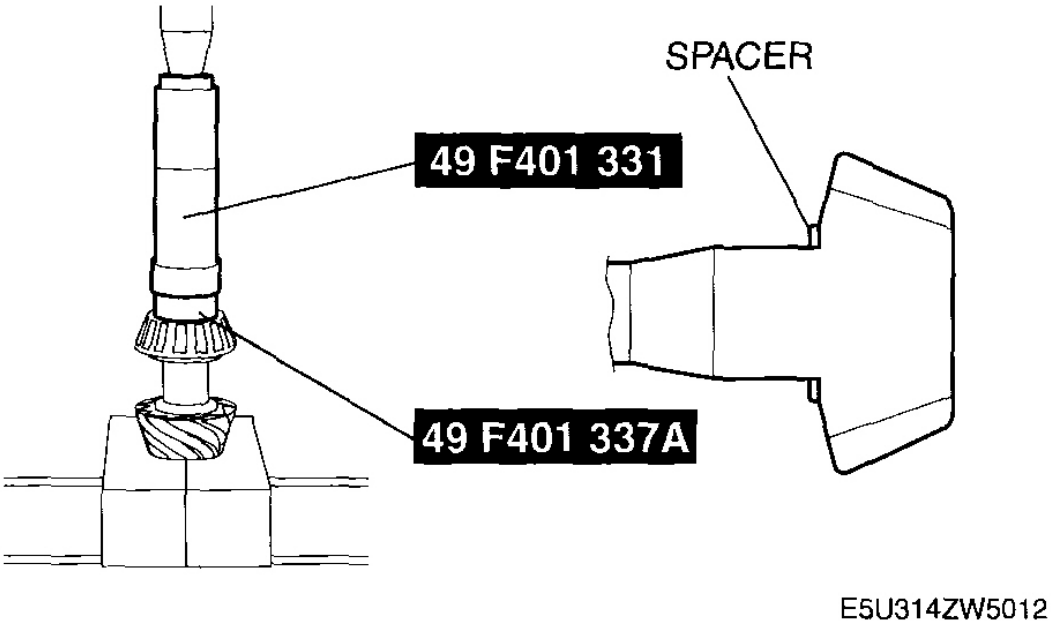


Fig. 37: Pressing Drive Pinion Into Rear Bearing Using SSTs & Press
Courtesy of MAZDA MOTORS CORP.

DRIVE PINION COMPONENT ASSEMBLY NOTE

Drive Pinion Preload Adjustment

NOTE:
- **Perform preload adjustment with the oil seal uninstalled.**

1. Assemble the following parts to the drive pinion.
   - New collapsible spacer
   - Front bearing
   - New spacer
   - Companion flange
   - New washer
   - New locknut
2. Turn the serrated part of the drive pinion by hand to seat the bearing.
3. Tighten the locknut temporarily tightened in Step 1 from the lower limit of the specified tightening torque using the **SST** , and obtain the specified preload. Record the tightening torque at this time.

Tightening torque

150-380 N.m {15.3-38.7 kgf.m, 111-280 ft.lbf}

Drive pinion preload

1.3-1.8 N.m {14-18 kgf.cm, 12-15 in.lbf}

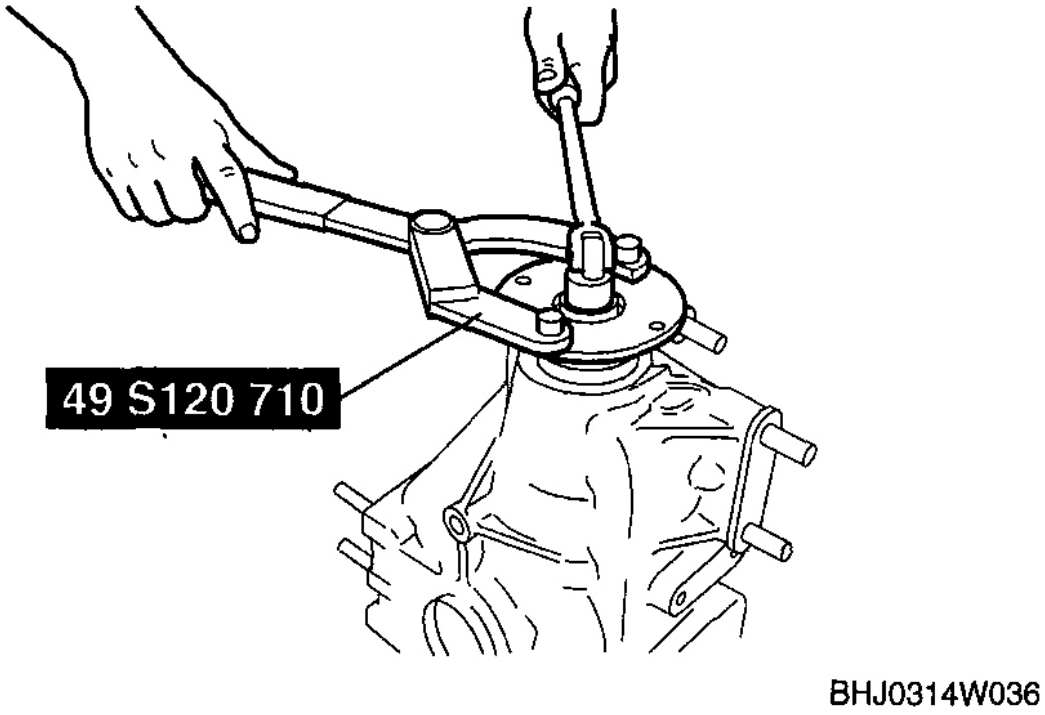


Fig. 38: Tighten Locknut Using SST
Courtesy of MAZDA MOTORS CORP.

- If the specified preload cannot be obtained within the specified tightening torque, replace with a new collapsible spacer and adjust again.

4. Remove the locknut, washer, and companion flange.

OIL SEAL (COMPANION FLANGE) ASSEMBLY NOTE

1. Apply differential oil to the lip of a new oil seal.
2. Assemble the oil seal using the **SST** .

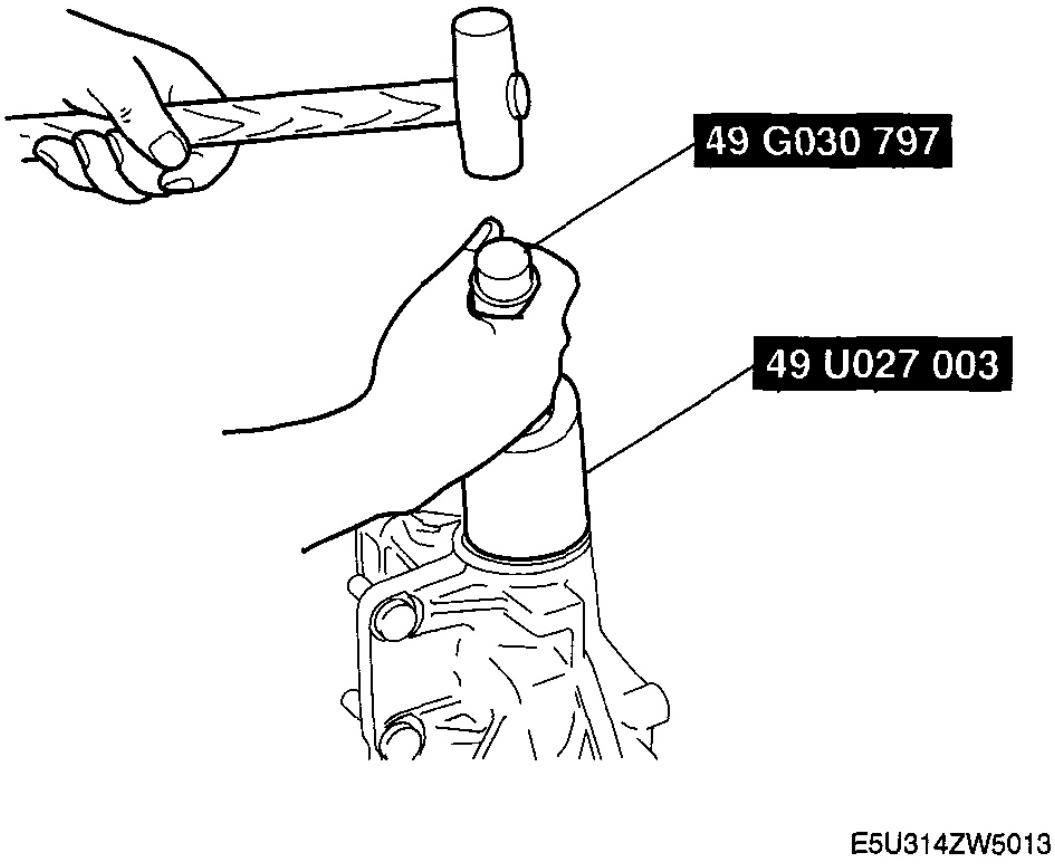


Fig. 39: Assembling Oil Seal Using SST
Courtesy of MAZDA MOTORS CORP.

LOCKNUT ASSEMBLY NOTE

1. Tighten a new locknut with the torque recorded at the drive pinion preload adjustment using the **SST** .

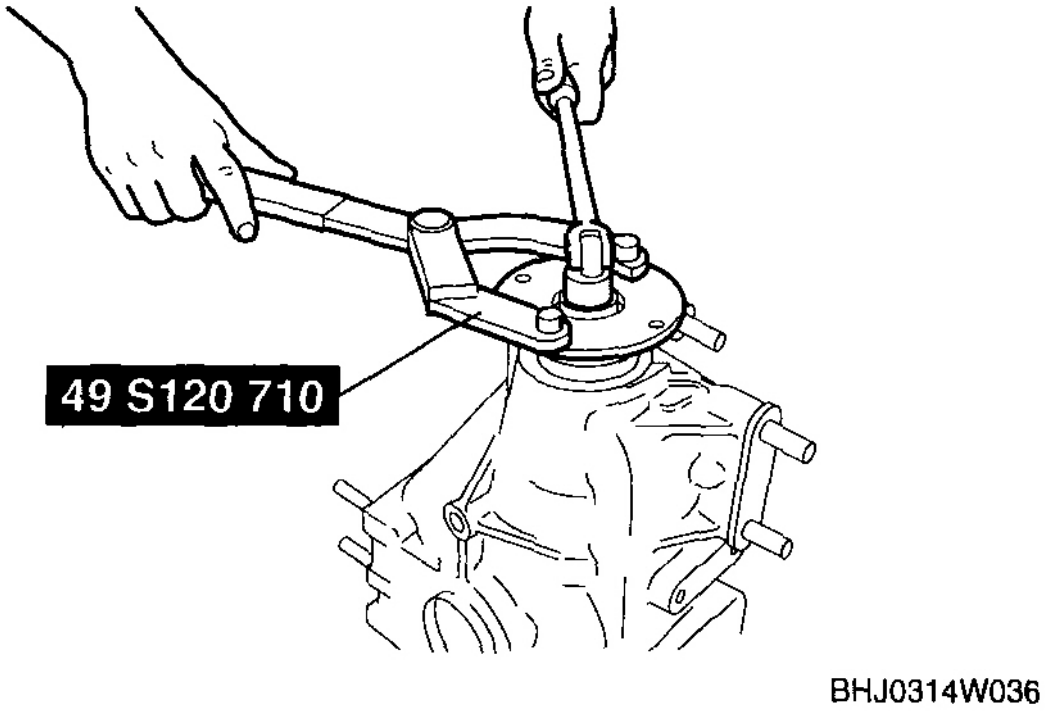


Fig. 40: Tightening Locknut Using SST
Courtesy of MAZDA MOTORS CORP.

2. Verify that the drive pinion preload is within the specification.
   - If not within the specification, perform the preload adjustment again.

Drive pinion preload

1.3-1.8 N.m {14-18 kgf.cm, 12-15 in.lbf}

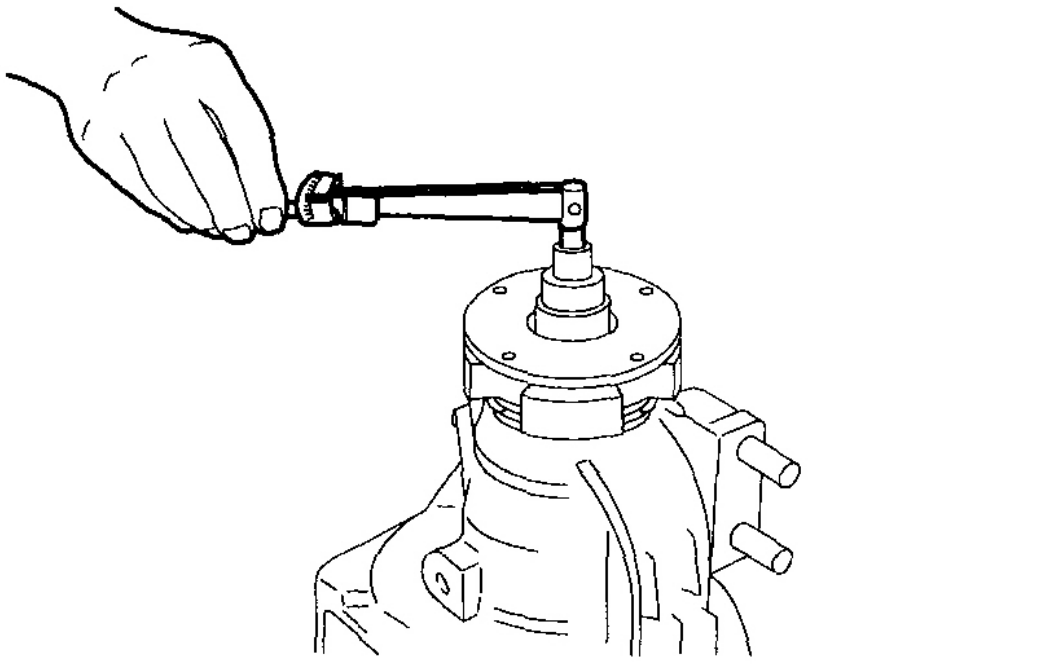


Fig. 41: Measuring Drive Pinion Preload
Courtesy of MAZDA MOTORS CORP.

ADJUSTMENT SHIM ASSEMBLY NOTE

Ring Gear Backlash Adjustment

1. Stack the side bearing race and differential gear case component on the surface plate as shown in **Fig. 42** and measure the height using a caliper and a ruler. This is value A.

   Standard Height A

   151.4-152.6 mm {5.961-6.007 in}

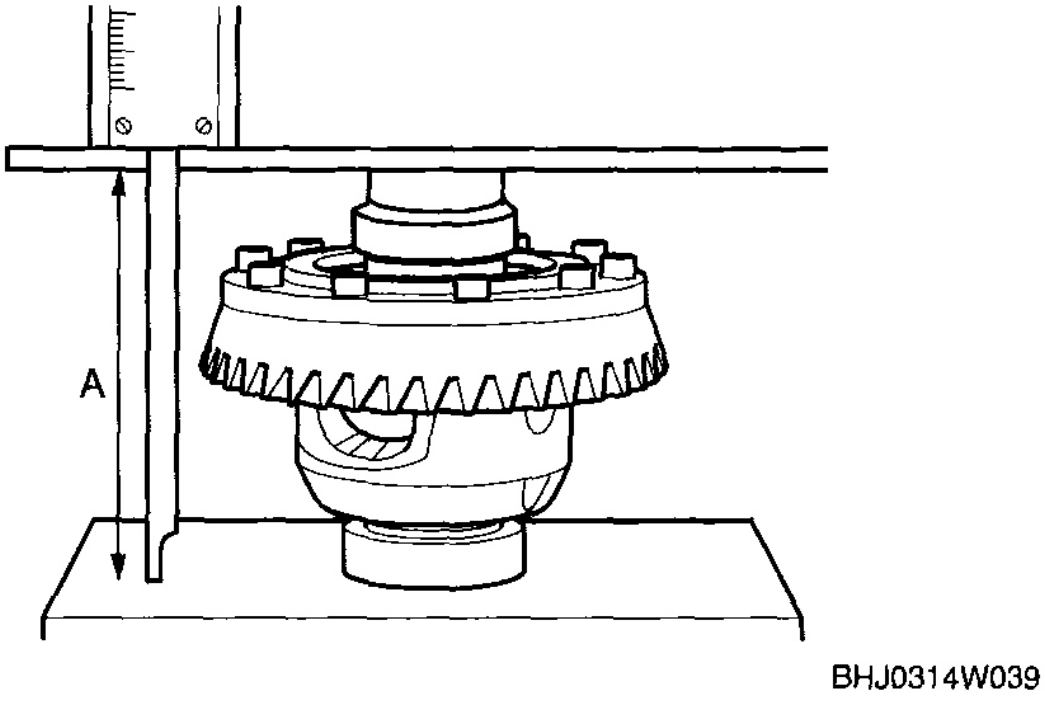


Fig. 42: Measuring Height Using Caliper & Ruler
Courtesy of MAZDA MOTORS CORP.

2. Measure the width of the section of the differential gear case component installed in the differential carrier. This is value B.

   Standard width B

   171 mm {6.73 in}

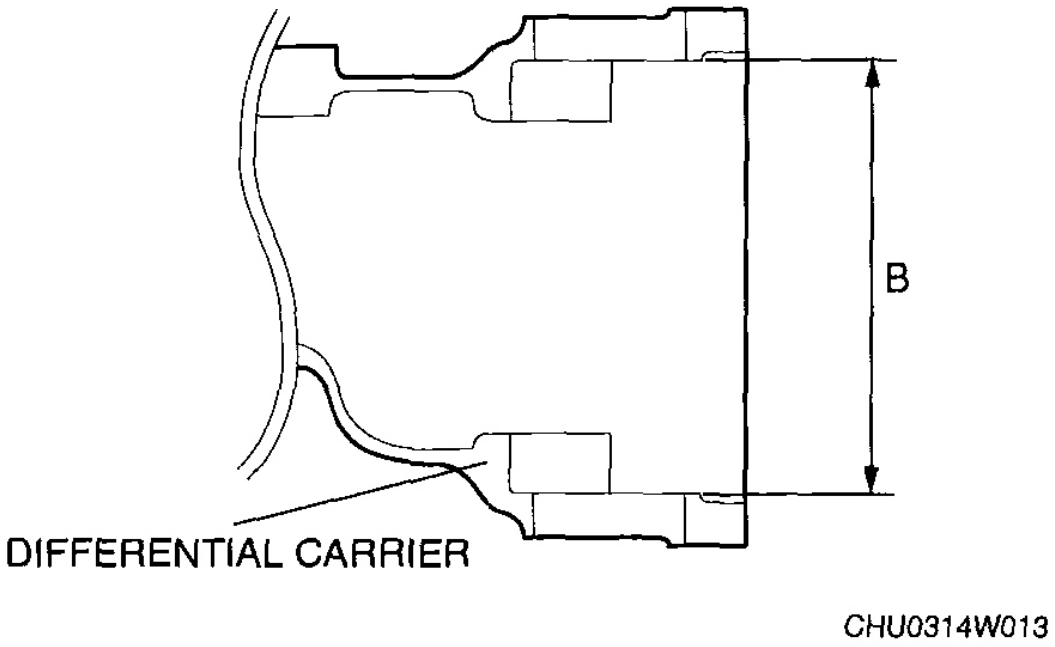


Fig. 43: Measuring Width Of Differential Gear Case Component In Differential Carrier
Courtesy of MAZDA MOTORS CORP.

1. The combined thickness of the left and right adjustment shims is obtained by the following formula.

   Shim thickness (mm {in}) =B-A+ (0.01-0.03 {0.0004-0.0118 in})

2. If the combined thickness of the previously assembled adjustment shims is equal to the calculated thickness, use the shims as they are.
3. If the combined thickness of the previously assembled adjustment shims is not equal to the calculated thickness, or if the adjustment shims have to be replaced, select two appropriate adjustment shims from the table below.

ADJUSTMENT SHIM TABLE

Identification mark	Thickness (mm {in})	Identification mark	Thickness (mm {in})
550	5.50 {0.217}	605	6.05 {0.238}
560	5.60 {0.220}	610	6.10 {0.240}
565	5.65 {0.222}	615	6.15 {0.242}
570	5.70 {0.224}	620	6.20 {0.244}
575	5.75 {0.226}	625	6.25 {0.246}
580	5.80 {0.228}	630	6.30 {0.248}
585	5.85 {0.230}	635	6.35 {0.250}

590	5.90 {0.232}	640	6.40 {0.252}
595	5.95 {0.234}	650	6.50 {0.256}
600	6.00 {0.236}	-	-

NOTE:

- **If the adjustment shims are to be reused, assemble the left and right shims that were identified during disassembly.**
- **When assembling the side bearing races, do not mix the left and right side bearings that were identified during disassembly.**

4. Assemble the differential gear case component and the side bearing race to the differential carrier.
5. Tap the selected adjustment shim between the differential carrier and the side bearing race with a plastic hammer as shown in **Fig. 44** .

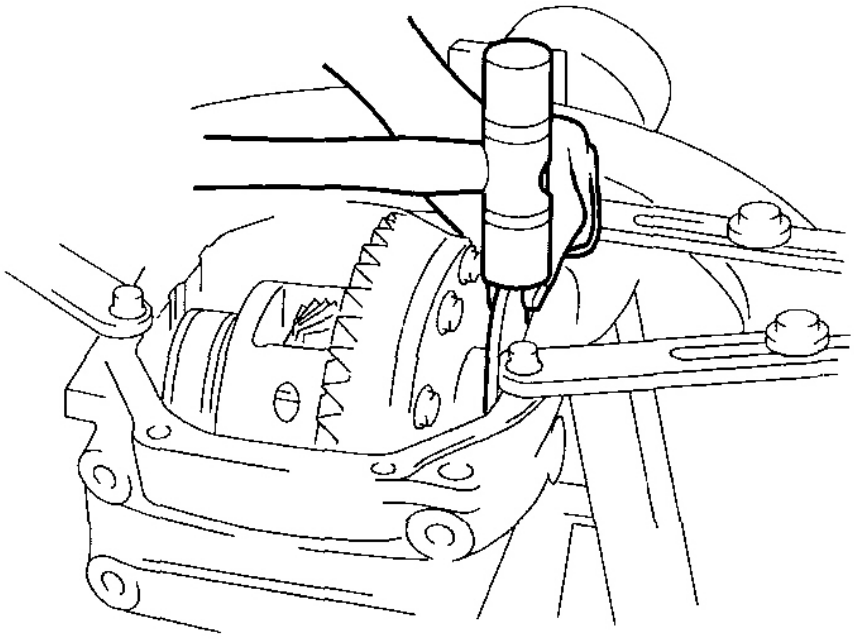


Fig. 44: Tapping Selected Adjustment Shim Between Differential Carrier & Side Bearing Race With Plastic Hammer
Courtesy of MAZDA MOTORS CORP.

6. Align the bearing cap alignment marks, assemble the bearing cap, and then temporarily tighten the bolts.
7. Install the dial gauge with the measuring probe of the dial gauge attached perpendicularly to the end of one of the ring gear teeth.

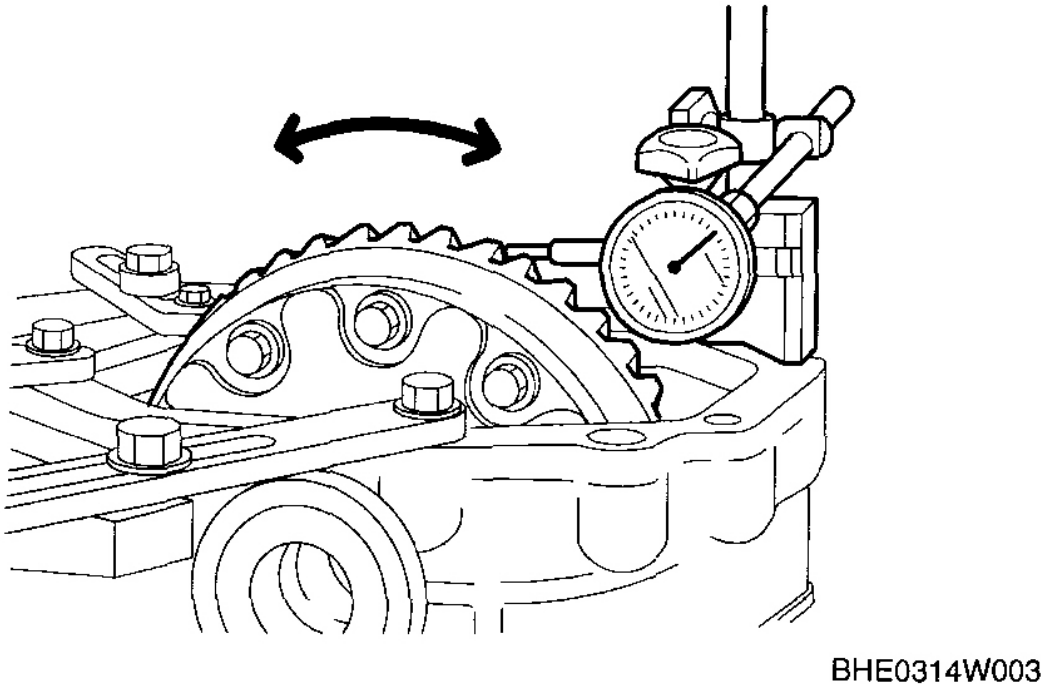


Fig. 45: Measuring Probe Of Dial Gauge Attached To End Of One Of Ring Gear Teeth
Courtesy of MAZDA MOTORS CORP.

8. Secure the drive pinion and measure the backlash of the ring gear.

Backlash of drive pinion and ring gear

Standard: 0.09-0.11 mm {0.0035-0.0043 in}

Minimum value: 0.05 mm {0.0020 in} or more

Variance: 0.07 mm {0.0028 in} or less

NOTE:

- **Measure the backlash at 4 locations around the ring gear. Make sure all of the 4 locations are within specification, and the minimum value for the 4 locations is 0.05 mm {0.0020 in} or more and the variance is 0.07 mm {0.0028 in} or less**

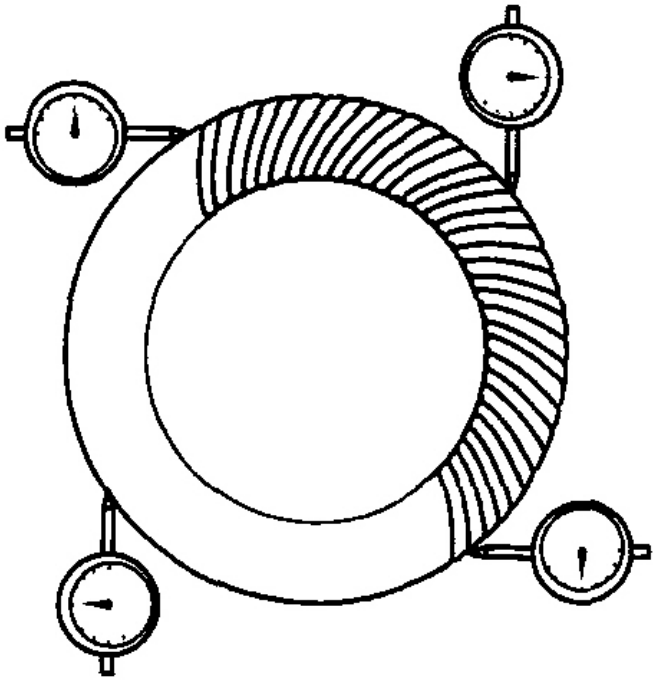


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Fig. 46: Measuring Backlash At 4 Locations Around Ring Gear
Courtesy of MAZDA MOTORS CORP.

9. If the backlash is not within the specification, adjust the gear case component by moving it in the axial direction.

NOTE:

- **When moving the gear case component in the axial direction, replace the adjustment shims. If the adjustment shim on the right side is replaced with one that is 0.05 mm {0.0020 in} thicker, replace the one on the left with one that is 0.05 mm {0.0020 in} thinner.**

BEARING CAP ASSEMBLY NOTE

1. Align the bearing cap alignment marks and assemble the bearing cap with the arrow facing outward.

Tightening torque

72.6-106.9 N.m {7.41-10.91 kgf.m, 53.5-78.84 ft.lbf}

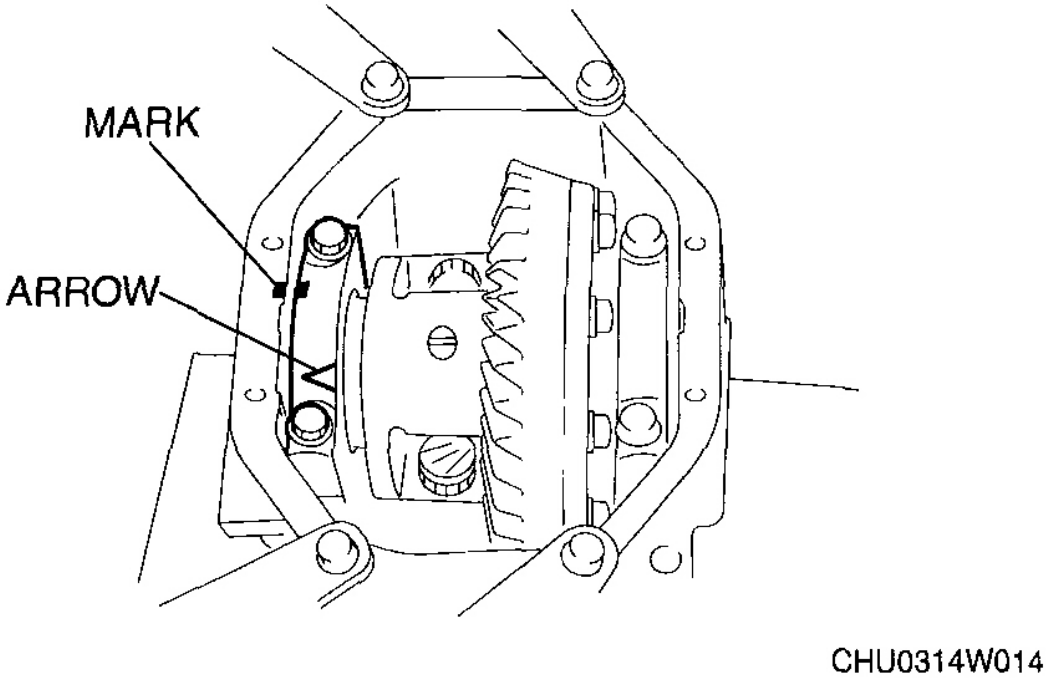


Fig. 47: Aligning Bearing Cap Alignment Marks & Assembling Bearing Cap
Courtesy of MAZDA MOTORS CORP.

2. Perform the drive pinion and ring gear tooth contact inspection.

DRIVE PINION, RING GEAR TOOTH CONTACT INSPECTION

1. Apply tooth marking compound evenly to both surfaces of the ring gear.
2. Rotate the ring gear back and forth for several times.
3. Inspect the tooth contact pattern in 4 locations around the ring gear, and verify that the tooth contact points exhibit the pattern shown in **Fig. 48** .
    - If the tooth contact points are normal, wipe off the marking compound.
    - If the tooth contact points are not normal, adjust the pinion height, then adjust the backlash.

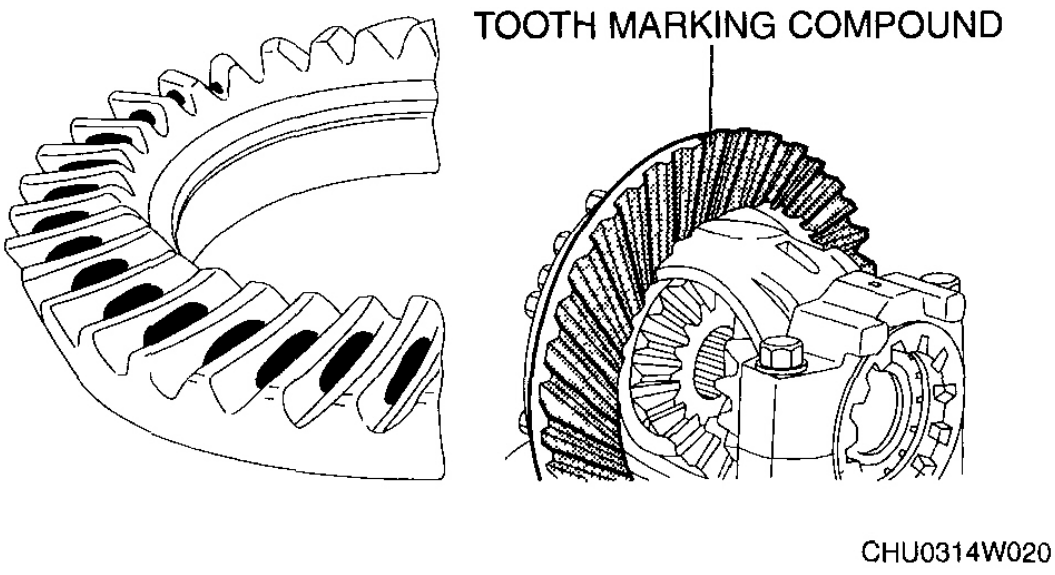


Fig. 48: Inspecting Tooth Contact Pattern In Locations Around Ring Gear
Courtesy of MAZDA MOTORS CORP.

4. If the toe and flank contact points appear as shown in **Fig. 49** after the drive pinion and ring gear teeth contact inspection, replace the spacer with a thinner one, and move the drive pinion outward.

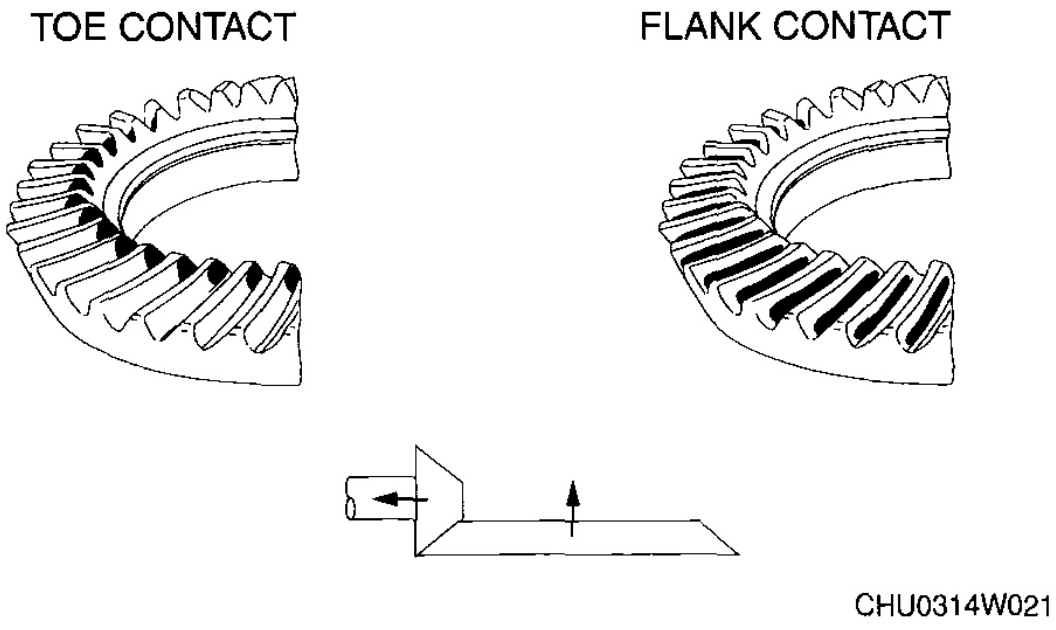


Fig. 49: Identifying Toe Contact & Flank Contact Points
Courtesy of MAZDA MOTORS CORP.

5. If the heel and face contact points appear as shown in **Fig. 50** after the drive pinion and ring gear teeth contact inspection, replace the spacer with a thicker one, and move the drive pinion inward.

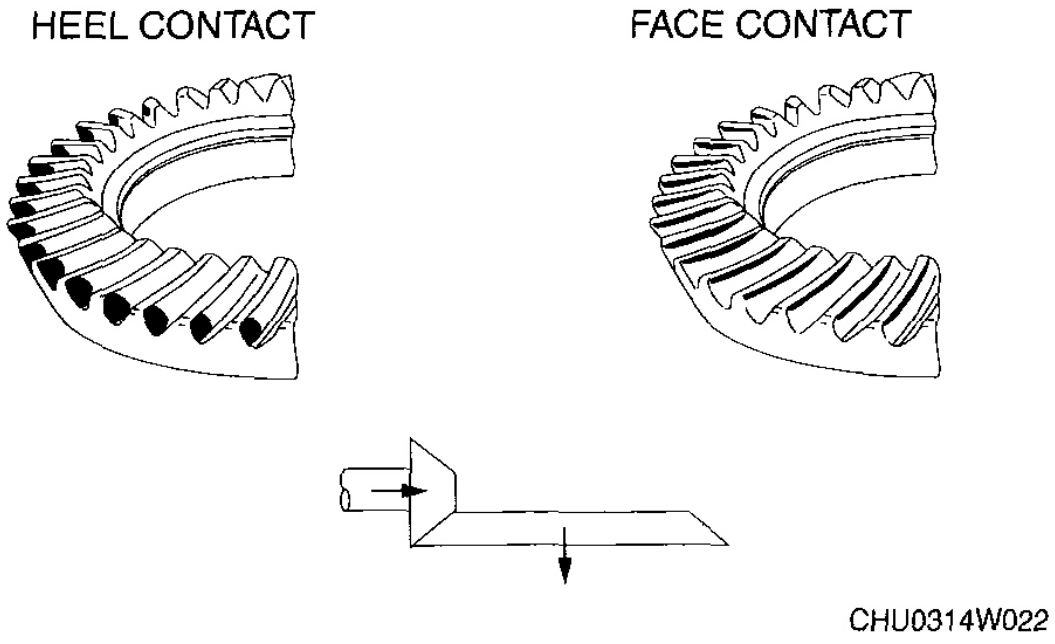


Fig. 50: Identifying Heel & Face Contact Points
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Doors & Liftgate - MX-5 Miata

DOORS LOCATION INDEX

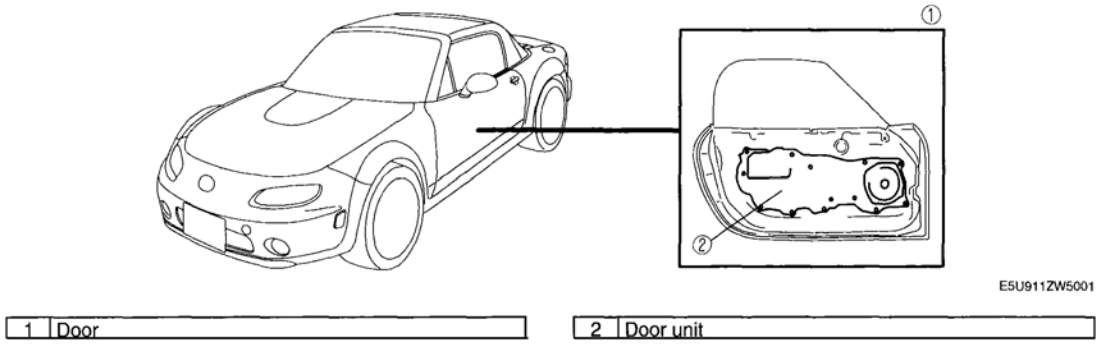
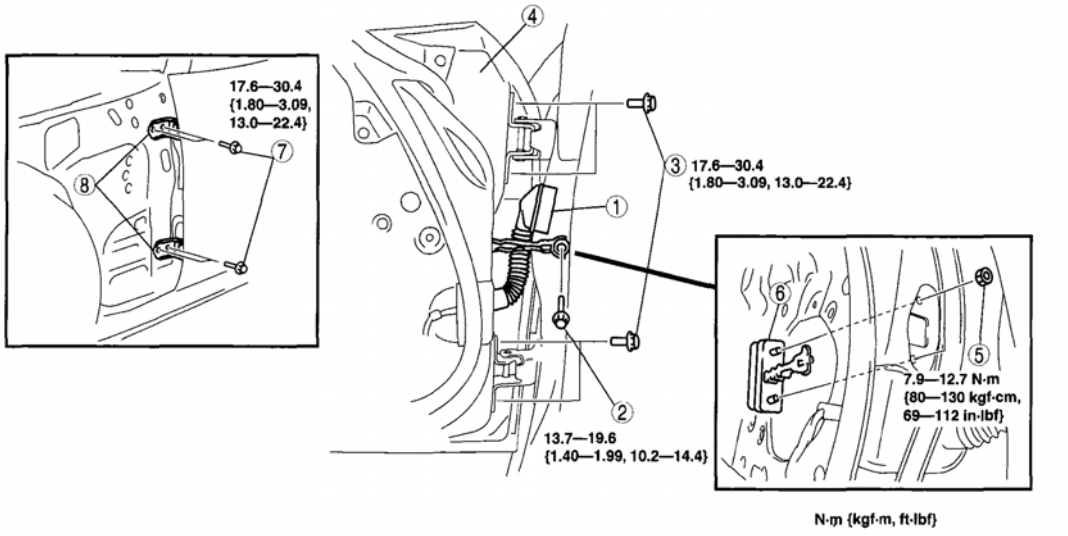


Fig. 1: Identifying Doors & Liftgate Components
Courtesy of MAZDA MOTORS CORP.

DOOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. To remove the door stay (checker), remove the following parts:
    1. Door trim (See **DOOR TRIM REMOVAL/INSTALLATION** .)
    2. Door speaker (See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
3. To remove the door hinges, remove the following parts:
    1. Front bumper (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
    2. Front combination lights (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
    3. Side step molding (See **SIDE STEP MOLDING REMOVAL**) (See **SIDE STEP MOLDING INSTALLATION** .)
    4. Mad guard
    5. Front fender panel (See **FRONT FENDER PANEL REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Adjust the door. (See **DOOR ADJUSTMENT** .)



1	Connector
2	Bolt A
3	Bolt B
4	Door

5	Nut
6	Door stay (checker)
7	Bolt C
8	Door hinge

Fig. 2: Removing/Installing Door (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CONNECTOR REMOVAL NOTE

1. Pull down the lever in the direction indicated by the arrow and disconnect the connector.

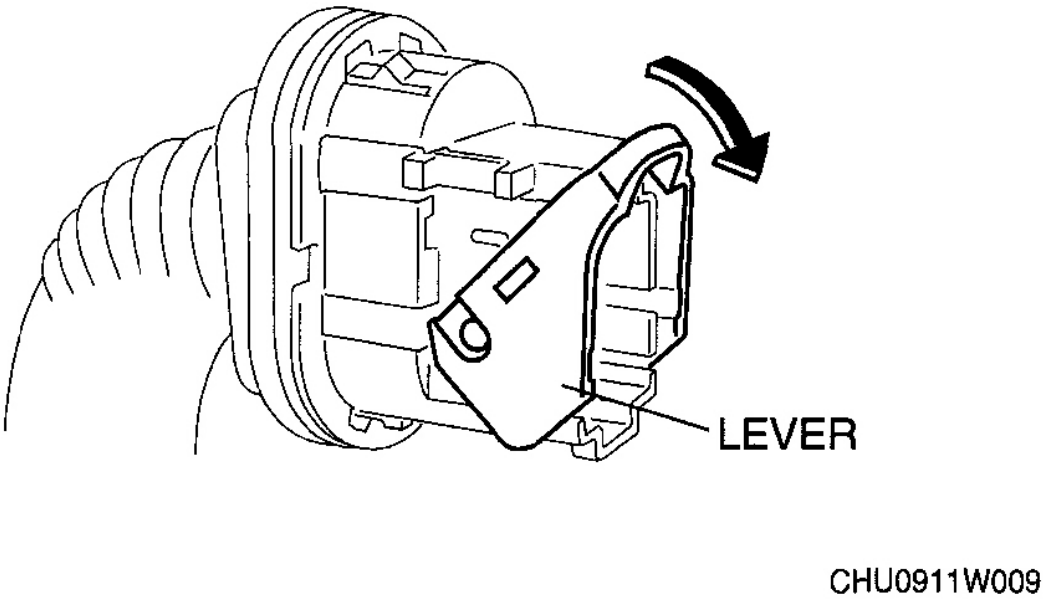


Fig. 3: Pulling Down Lever
Courtesy of MAZDA MOTORS CORP.

DOOR ADJUSTMENT

1. Measure the gap and height difference between the door and the body.
2. Loosen the door hinge installation bolts or the door lock striker installation screws, and adjust the door.
3. Tighten the bolts or screws.

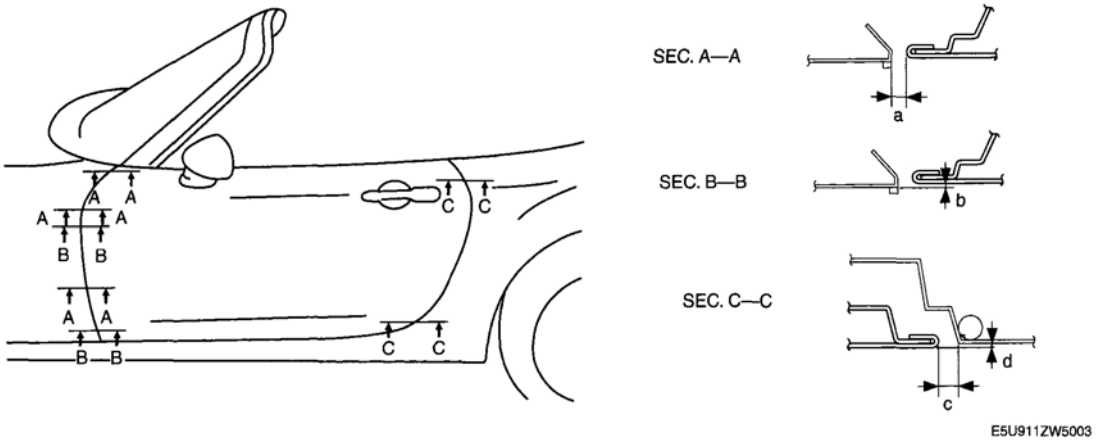


Fig. 4: Identifying Gap & Height Difference Between Door & Body

Courtesy of MAZDA MOTORS CORP.

Standard clearance

A-A top and bottom (a): 3.1-5.0 mm {0.13-0.19 in}

A-A middle (a): 3.3-5.2 mm {0.13-0.20 in}

B-B top (b): -1.0-1.0 mm {-0.040-0.039 in}

B-B bottom (b): -0.5-1.5 mm {-0.020-0.059 in}

C-C top and bottom (c): 3.0-5.0 mm {0.12-0.19 in}

C-C top (c): -1.0-1.0 mm {-0.040-0.039 in}

C-C bottom (d): -0.5-1.5 mm {-0.020-0.059 in}

DOOR UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the following parts:
    1. Door trim (See **DOOR TRIM REMOVAL/INSTALLATION** .)
    2. Door speaker (See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
3. Disconnect the power outer mirror harness connector.
4. Disconnect the door lock actuator connector.
5. Disconnect the power window motor connector.
6. Remove screws A and B.
7. Pull the door unit outward and detach clips C.
8. Remove the door unit.
9. Install in the reverse order of removal.

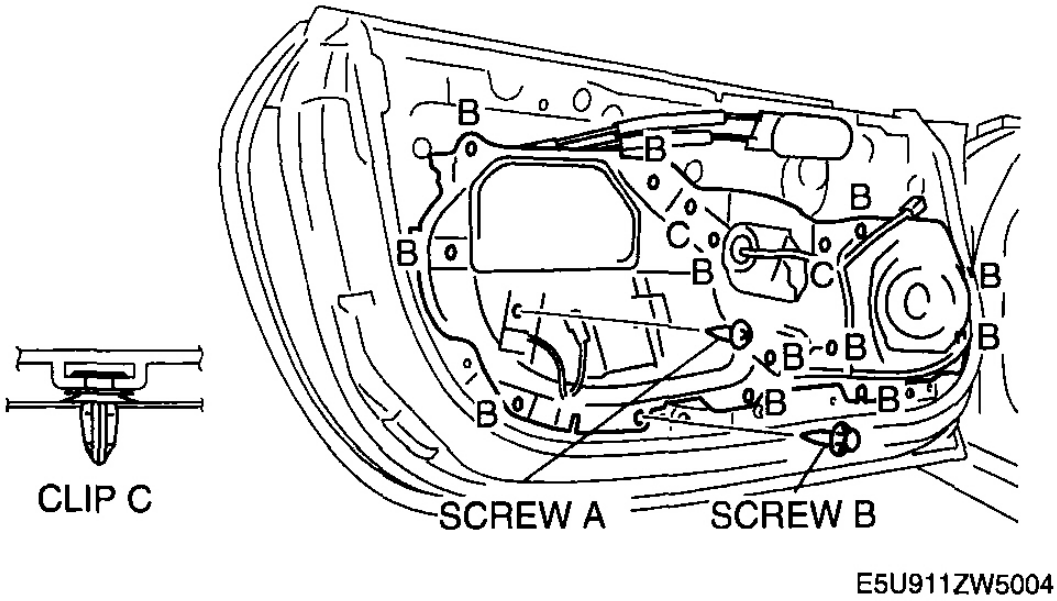
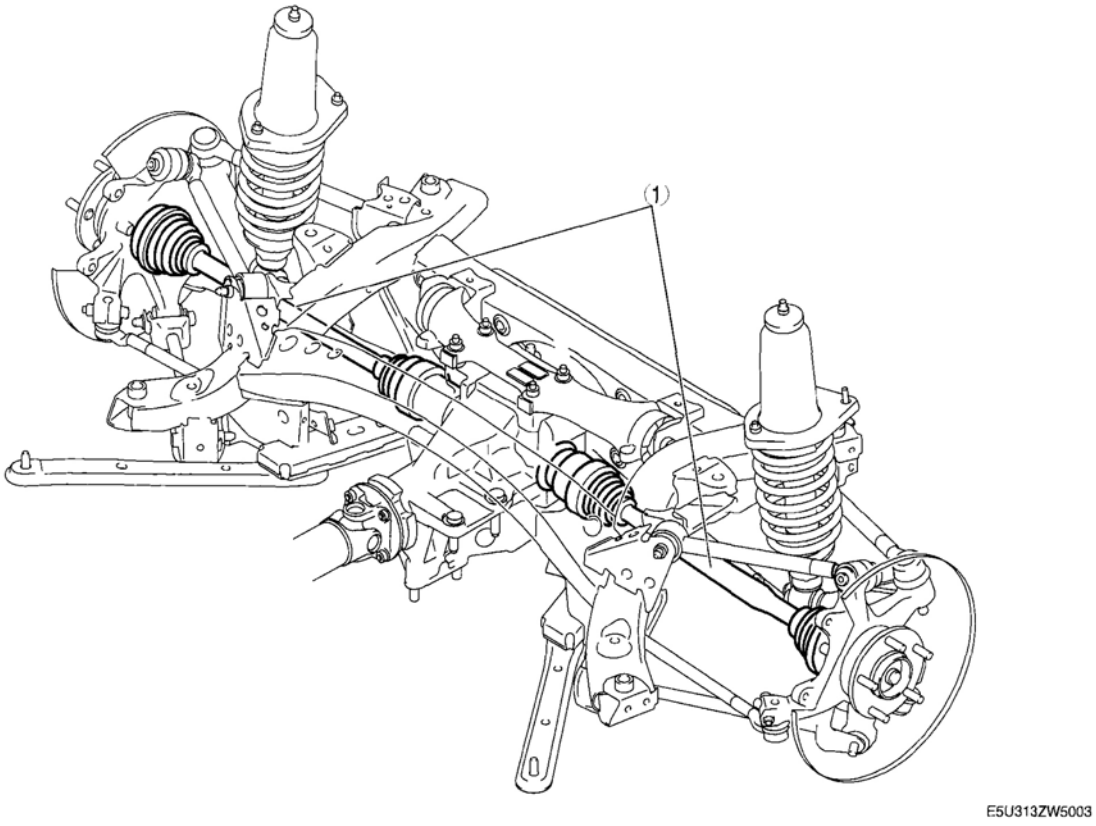


Fig. 5: Removing/Installing Door Unit
Courtesy of MAZDA MOTORS CORP.

2007 DRIVELINE/AXLES

Drive Shaft - MX-5 Miata

REAR DRIVE SHAFT LOCATION INDEX



1	Rear drive shaft

Fig. 1: Identifying Location Of Rear Drive Shaft Components
Courtesy of MAZDA MOTORS CORP.

REAR DRIVE SHAFT INSPECTION

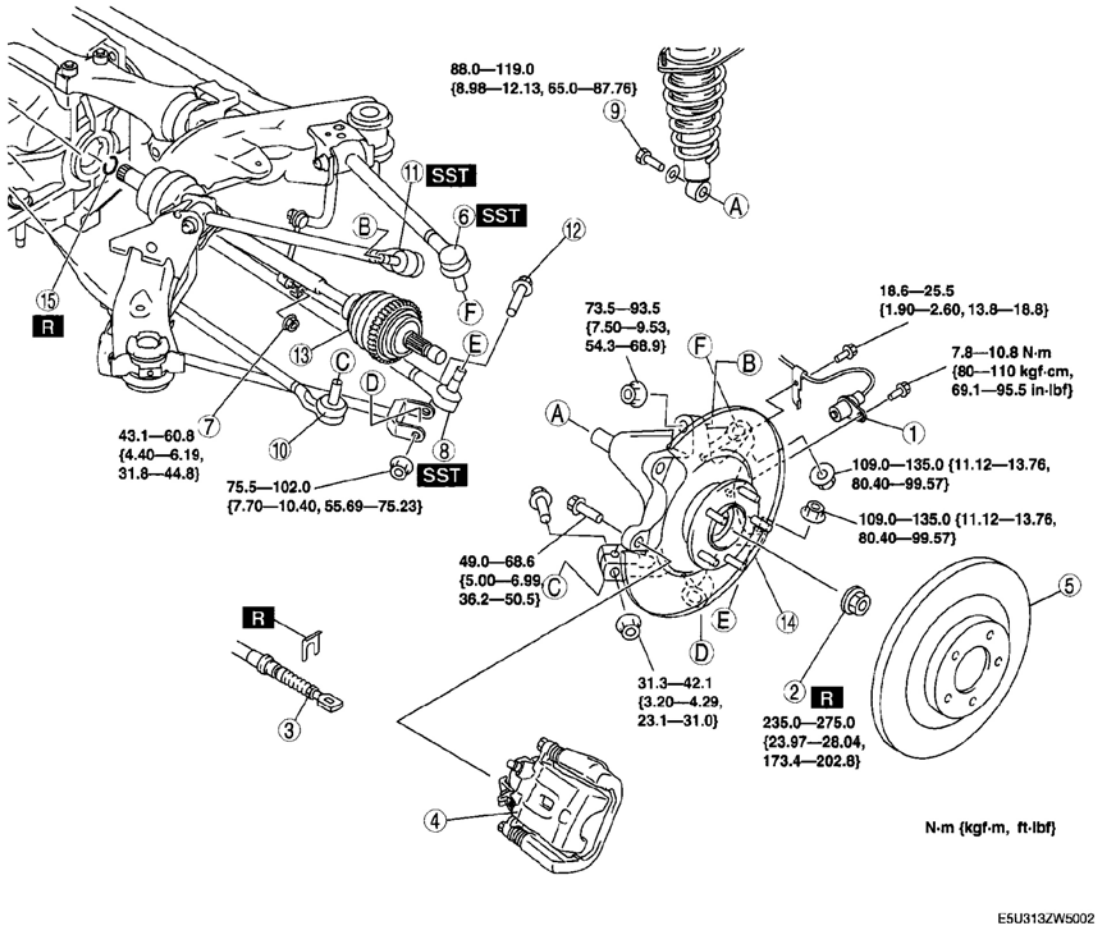
1. Verify that the drive shaft is not twisted or damaged.
    - If there is any malfunction, replace the applicable part.
2. Inspect the dust boot for damage and cracks.
    - If there is any malfunction, replace the applicable part.
3. Move the spline and joint up and down, left and right by hand and verify that there is no roughness.
    - If there is any malfunction, replace the applicable part.

REAR DRIVE SHAFT REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.**

1. Drain the rear differential oil.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Add rear differential oil. (See **DIFFERENTIAL OIL REPLACEMENT** .)



1	ABS wheel-speed sensor
2	Locknut
3	Parking brake cable
4	Brake caliper component
5	Disc plate
6	Rear lateral link (upper) ball joint
7	Stabilizer control link (lower)
8	Rear lateral link (lower) ball joint
9	Shock absorber bolt (lower)
10	Toe control link ball joint
11	Rear trailing link (upper) ball joint
12	Rear trailing link (lower) bolt (outer side)
13	Rear drive shaft
14	Rear knuckle component
15	Clip

Fig. 2: Identifying Rear Drive Shaft (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

LOCKNUT REMOVAL NOTE

1. Lock the disc plate by applying the brakes.
2. Knock the crimped portion of the locknut outward using a chisel and a hammer.

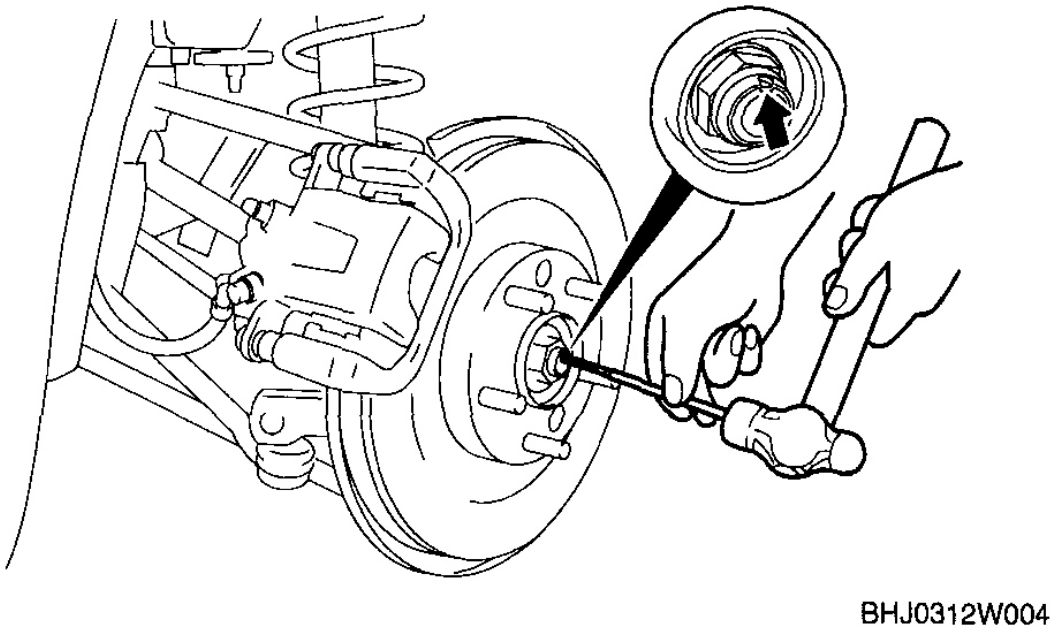


Fig. 3: Knocking Out Crimped Portion Of Locknut Using Chisel & Hammer
Courtesy of MAZDA MOTORS CORP.

3. Remove the locknut.

BRAKE CALIPER COMPONENT REMOVAL NOTE

1. Suspend the brake caliper component using a cable or equivalent.

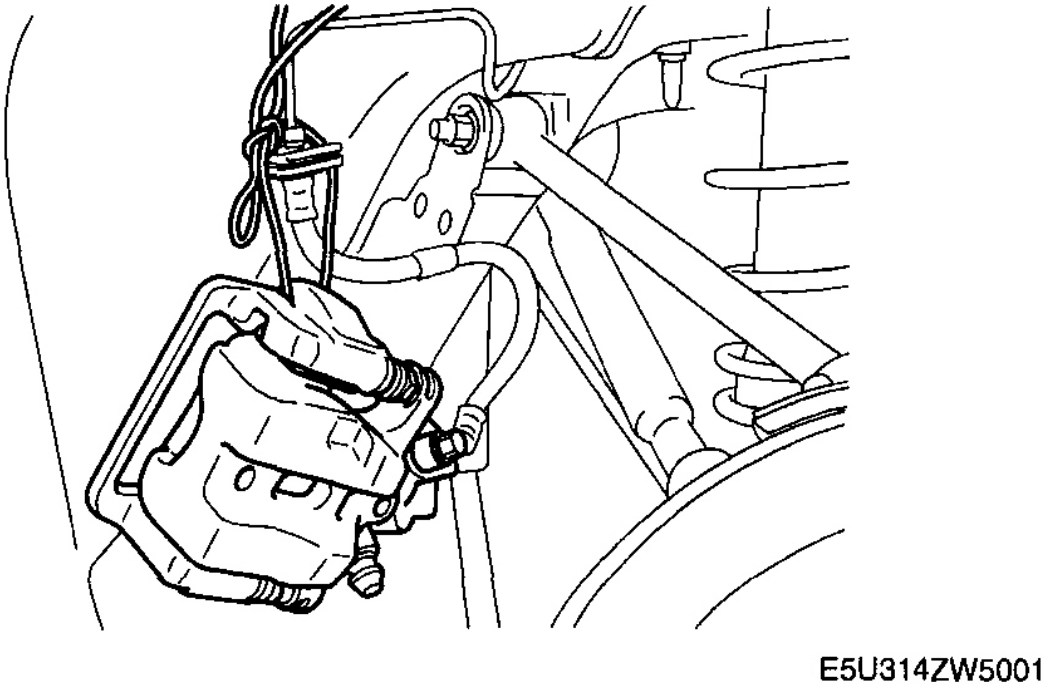


Fig. 4: Suspending Brake Caliper Component
Courtesy of MAZDA MOTORS CORP.

2. Temporarily tighten the wheel nut to prevent the disc plate from falling off.

REAR DRIVE SHAFT REMOVAL NOTE

1. Temporarily install a spare nut to the end of the rear drive shaft.
2. Knock the nut with copper hammer lightly and remove the rear drive shaft from the wheel hub.

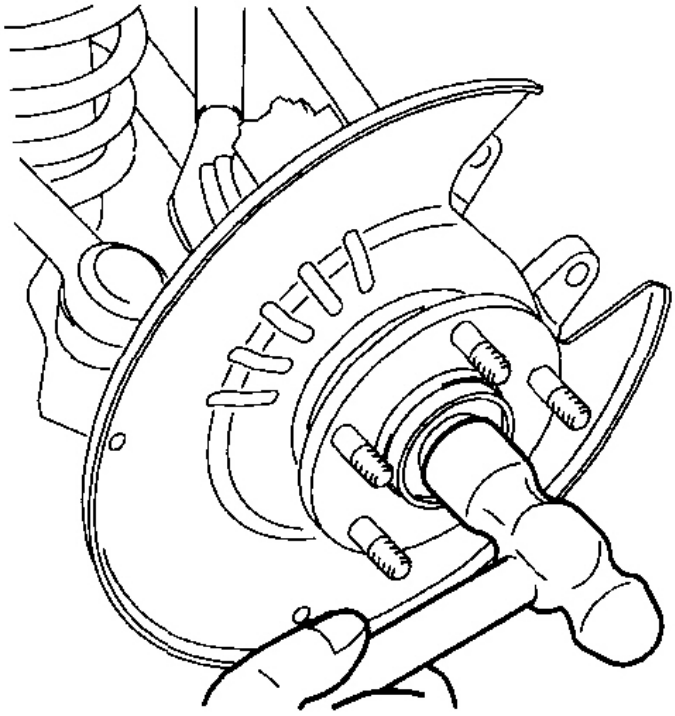


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Fig. 5: Knocking Out Nut With Copper Hammer Lightly & Removing Rear Drive Shaft From Wheel Hub
Courtesy of MAZDA MOTORS CORP.

3. Separate the rear drive shaft from the wheel hub.
4. Insert a tire lever or equivalent between the rear differential and differential side outer ring, and then remove the rear drive shaft.

CAUTION:
- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful not to damage the oil seal when removing the drive shaft from the differential.**

5. Pull the rear drive shaft to the outer side of the vehicle and disconnect it from the rear differential.
6. To hold the rear knuckle component, install the rear lateral link (upper) to the rear knuckle temporarily after disconnecting the rear drive shaft.

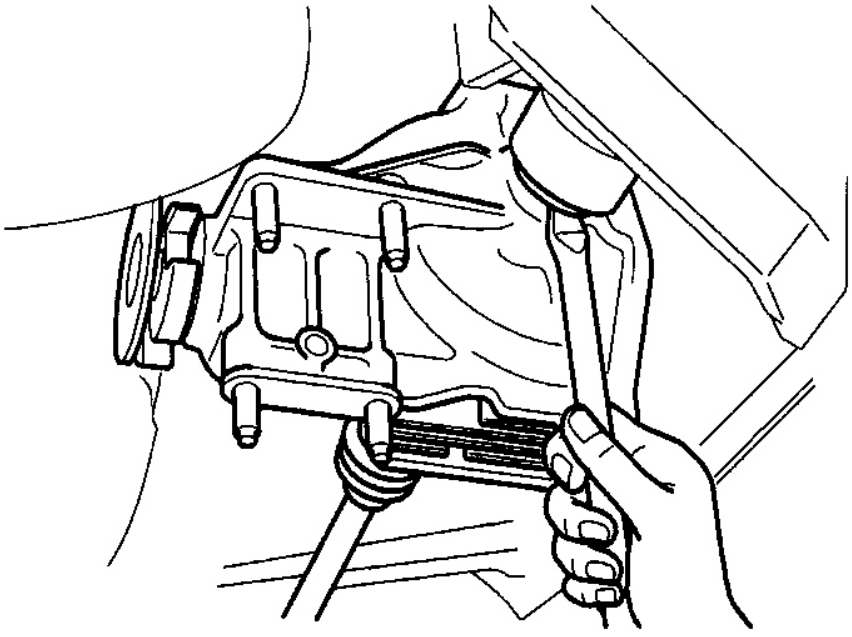


Fig. 6: Removing Rear Shaft
Courtesy of MAZDA MOTORS CORP.

CLIP INSTALLATION NOTE

1. Point the opening of the new drive shaft clip upward, install it to the clip groove at the end of the rear drive shaft with the installation width within the specification.

   Standard 31.2

   mm {1.23 in}

2. After installing the clip, measure the outer diameter. If it exceeds the specification, reinstall the new clip.

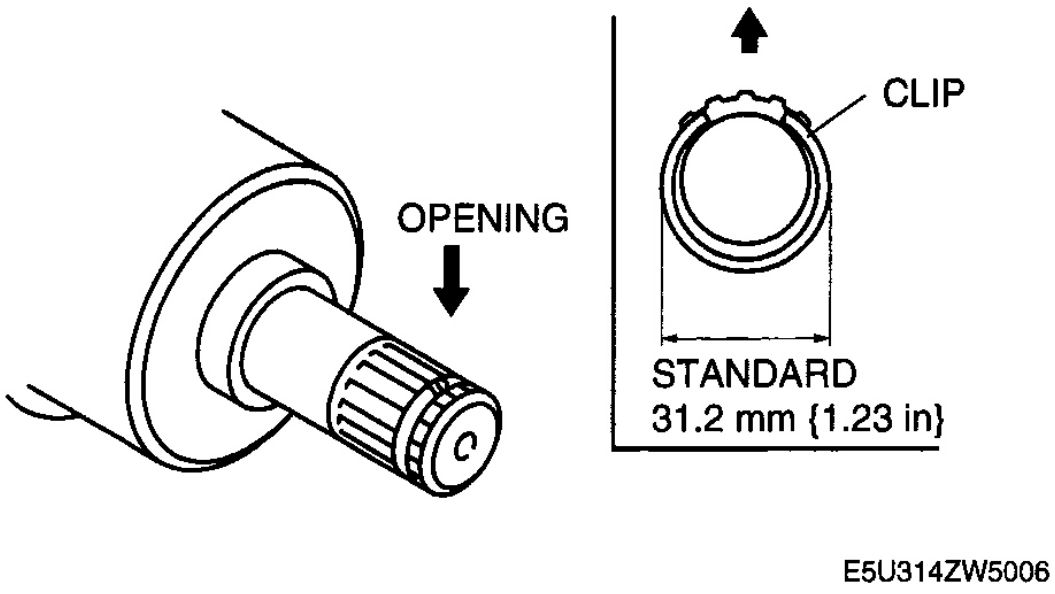


Fig. 7: Identifying Clip Groove End Of Rear Drive Shaft
Courtesy of MAZDA MOTORS CORP.

REAR DRIVE SHAFT INSTALLATION NOTE

1. Apply differential oil to the differential oil seal lip.

CAUTION:
- **The sharp edges of the rear drive shaft can slice or puncture the oil seal. Be careful not to damage the oil seal when installing the rear drive shaft from the rear differential.**

2. Insert the rear drive shaft into the rear differential with the clip opening facing upward.
3. After installation, verify that the rear drive shaft is securely held by the clip by pulling the outer ring on the differential side towards the axle.

LOCKNUT INSTALLATION NOTE

1. Tighten a new locknut.

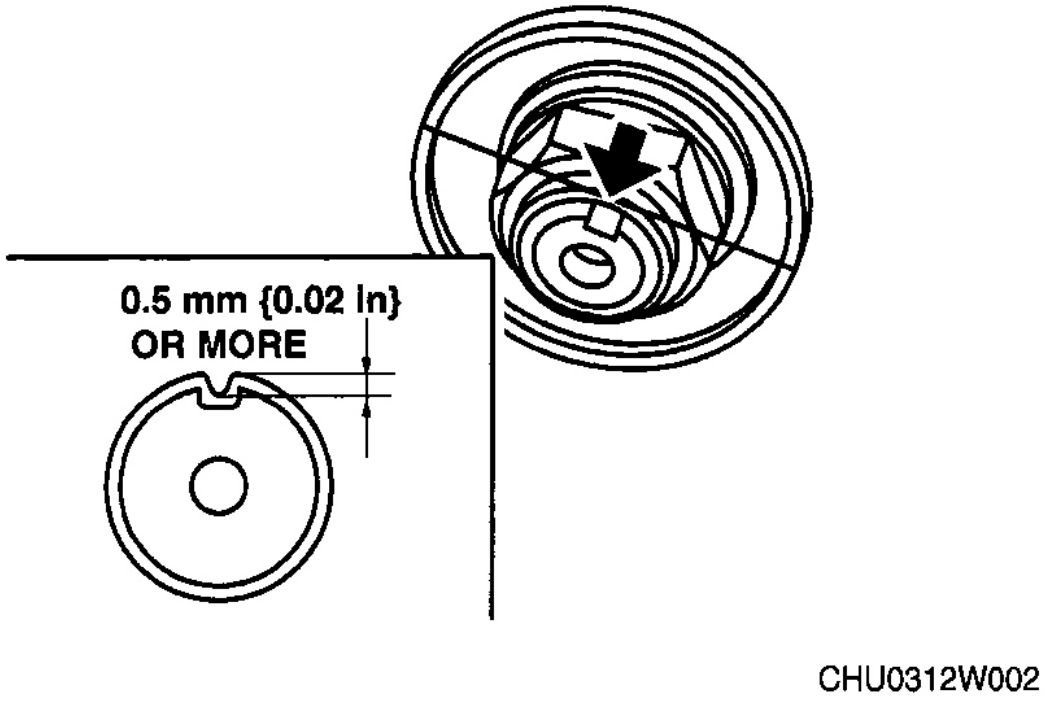
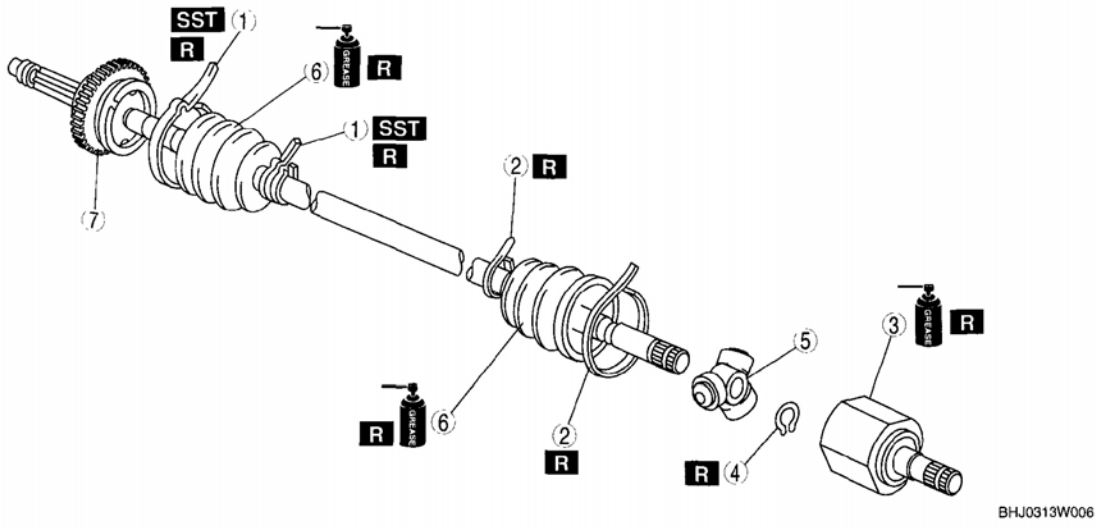


Fig. 8: Tightening New Locknut (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Crimp the locknut, using a chisel and hammer.

REAR DRIVE SHAFT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 9** .



1	Boot band (axle side)
2	Boot band (differential side)
3	Tripod joint socket
4	Snap ring
5	Tripod joint
6	Boot
7	Shaft and ball joint component

Fig. 9: Disassembling/Assembling Rear Drive Shaft
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

BOOT BAND (AXLE SIDE) DISASSEMBLY NOTE

NOTE:
- **Remove the boot band only if there is an abnormality.**

1. Remove the boot band using end clamp pliers.

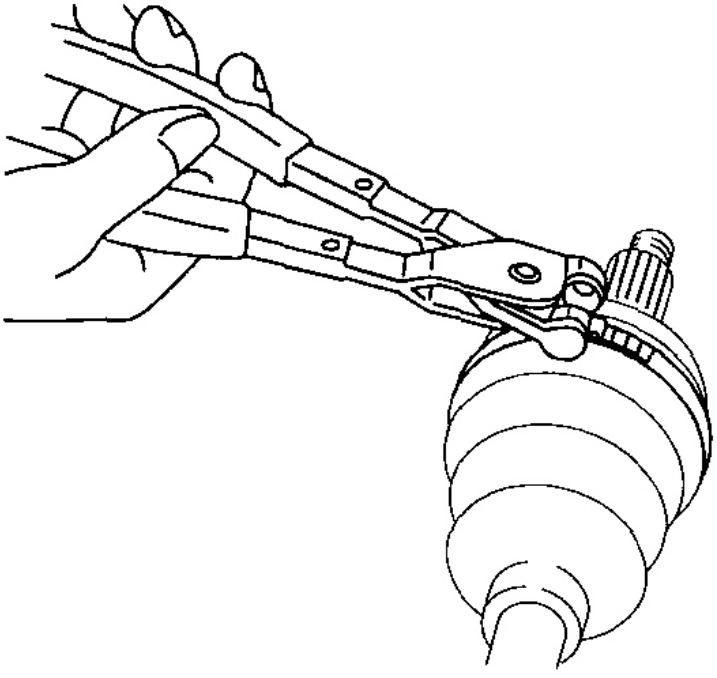


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Fig. 10: Removing Boot Band Using End Clamp Pliers
Courtesy of MAZDA MOTORS CORP.

BOOT BAND (DIFFERENTIAL SIDE) DISASSEMBLY NOTE

1. Remove the crimp of the clip using a flathead screwdriver.

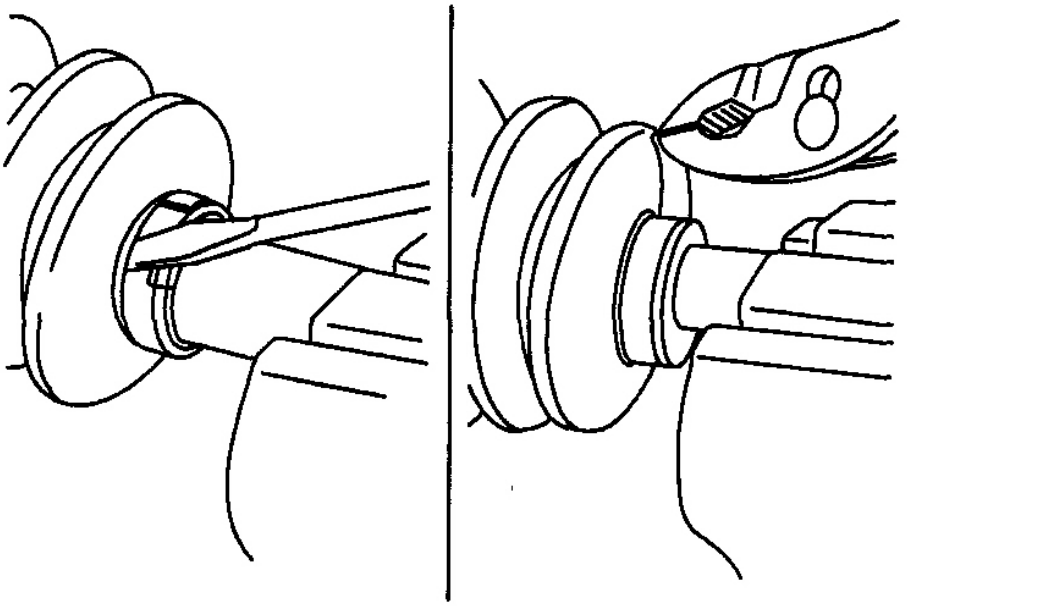


Fig. 11: Removing Crimp Of Clip Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

TRIPOD JOINT SOCKET DISASSEMBLY NOTE

1. Place an alignment mark on the drive shaft and the outer ring.

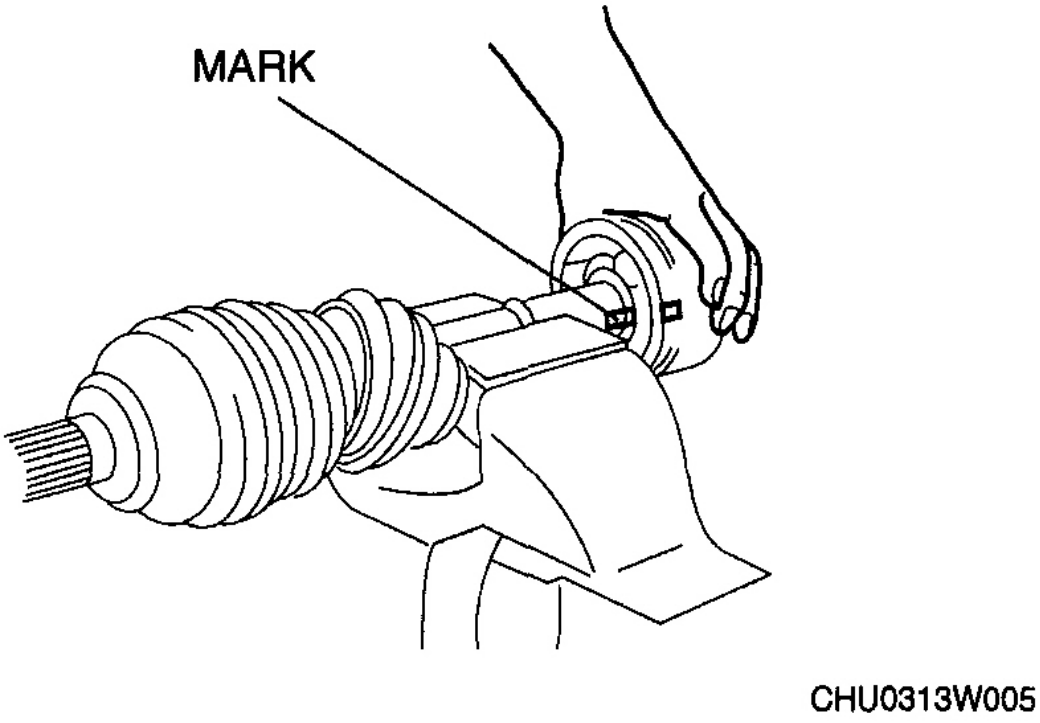


Fig. 12: Placing Alignment Mark On Drive Shaft & Outer Ring
Courtesy of MAZDA MOTORS CORP.

2. Remove the outer ring.

SNAP RING, TRIPOD JOINT DISASSEMBLY NOTE

1. Place an alignment mark on the shaft and tripod joint.
2. Remove the snap ring using a snap ring plier.

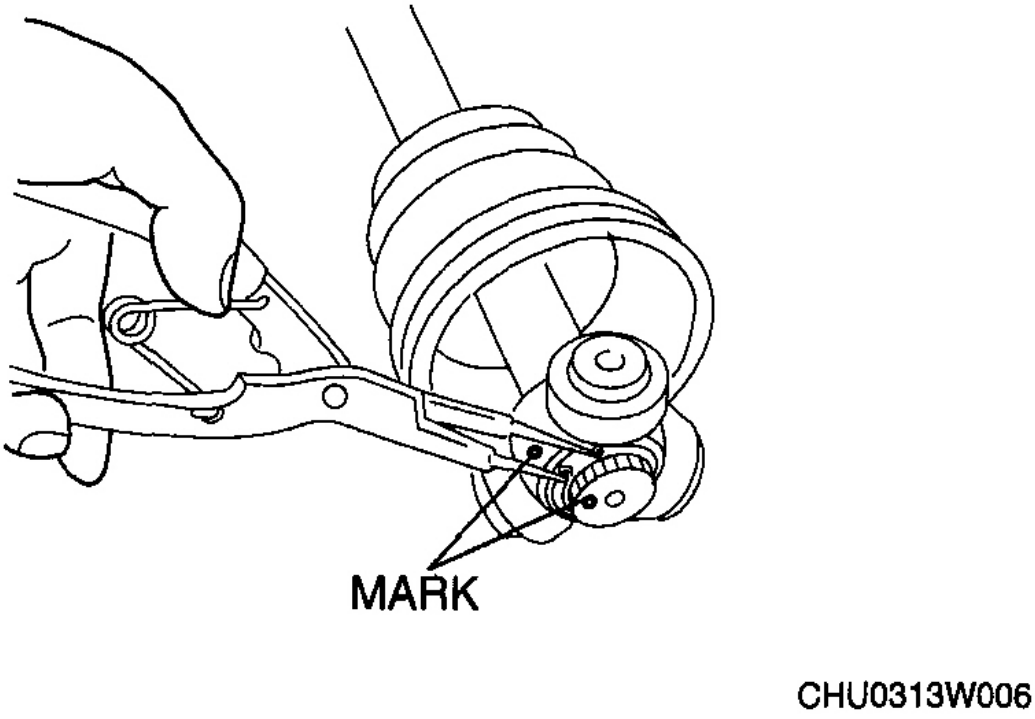


Fig. 13: Removing Snap Ring Using Snap Ring Plier
Courtesy of MAZDA MOTORS CORP.

3. Remove the tripod joint from the shaft.

CAUTION:
- **To prevent damage to the component, do not use a hammer when removing it.**

BOOT DISASSEMBLY NOTE

NOTE:
- **Remove the axle side boot only if there is an abnormality.**

1. Wrap the shaft spline with vinyl tape.

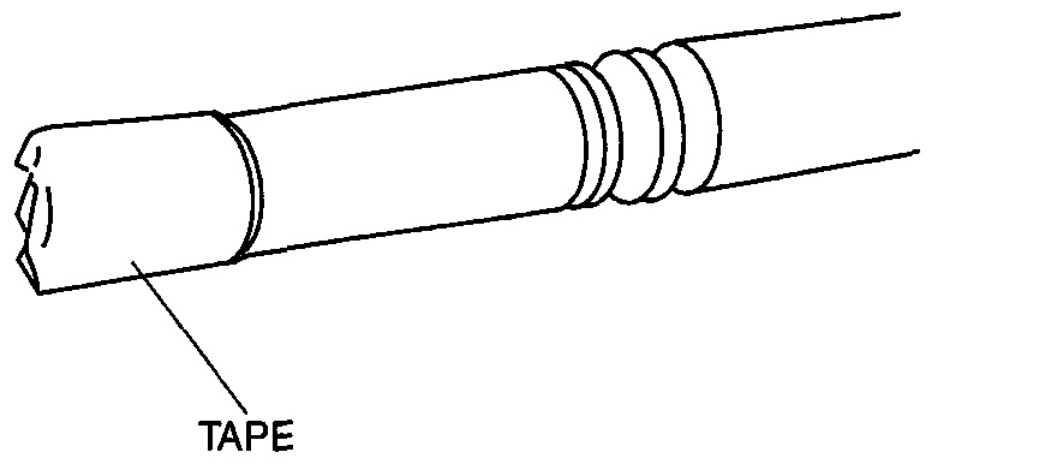


Fig. 14: Wrapping Shaft Spline With Vinyl Tape
Courtesy of MAZDA MOTORS CORP.

2. Remove the boot.

BOOT ASSEMBLY NOTE

NOTE:
- **The boot shapes on the axle side and the differential side are different so do not miss install them.**

1. Fill the inside of the new dust boot (wheel side) with grease.

NOTE:
- **Do not touch the grease with your hand. Apply it from the tube to prevent foreign matter from entering the boot.**

Grease amount

90-110 g {3.18-3.88 oz.}

2. Install the boot with the drive shaft spline still wrapped with vinyl tape.
3. Remove the vinyl tape.

TRIPOD JOINT, SNAP RING ASSEMBLY NOTE

1. Align the tripod joint with the shaft mark and insert it using a brass bar.

CAUTION:
- **To prevent damage to the component, do not tap the roller part when installing.**

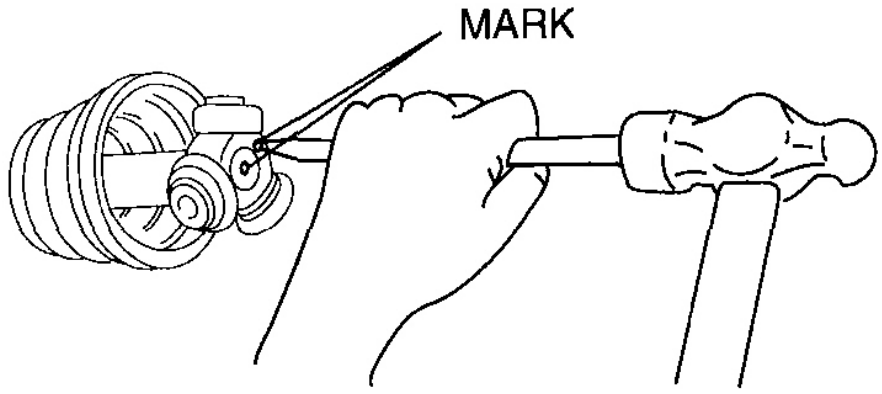


Fig. 15: Aligning Tripod Joint With Shaft Mark
Courtesy of MAZDA MOTORS CORP.

2. Install the new snap ring to the shaft installation slot securely using a snap ring pliers.

TRIPOD JOINT SOCKET ASSEMBLY NOTE

1. Fill the outer ring and boot (differential side) with the repair kit grease.

NOTE:
- **Do not touch the grease with your hand. Apply it from the tube to prevent foreign matter from entering the boot.**

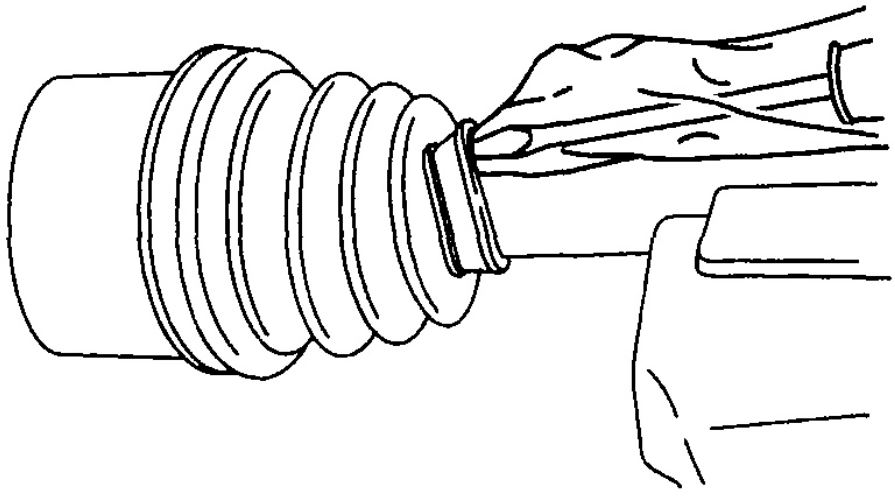
Grease amount

135-155 g {4.77-5.46 oz.}

2. Assemble the outer ring.
3. Release any trapped air from the boots by carefully lifting up the small end of each boot with a cloth wrapped screwdriver.

CAUTION:

- **Do not let the grease leak.**
- **Do not damage the boot.**



A6E6316W007

Fig. 16: Releasing Trapped Air From Boot
Courtesy of MAZDA MOTORS CORP.

4. Set the drive shaft length to the specification when the inside of the boots is at ambient pressure.

   Drive shaft length

   Left side: 778.5-788.5 mm {30.65-31.04 in}

   Right side: 818.5-828.5 mm {32.22-32.62 in}

5. After installation, verify that there is no boot damage or grease leakage.

BOOT BAND (DIFFERENTIAL SIDE) ASSEMBLY NOTE

1. Using pliers, pull the boot band around the boot slot in opposite direction of drive shaft forward rotation direction and tighten.
2. Insert the end of the boot band between the boot band clip and fold back the clip tabs using a flathead screwdriver to secure the boot band.

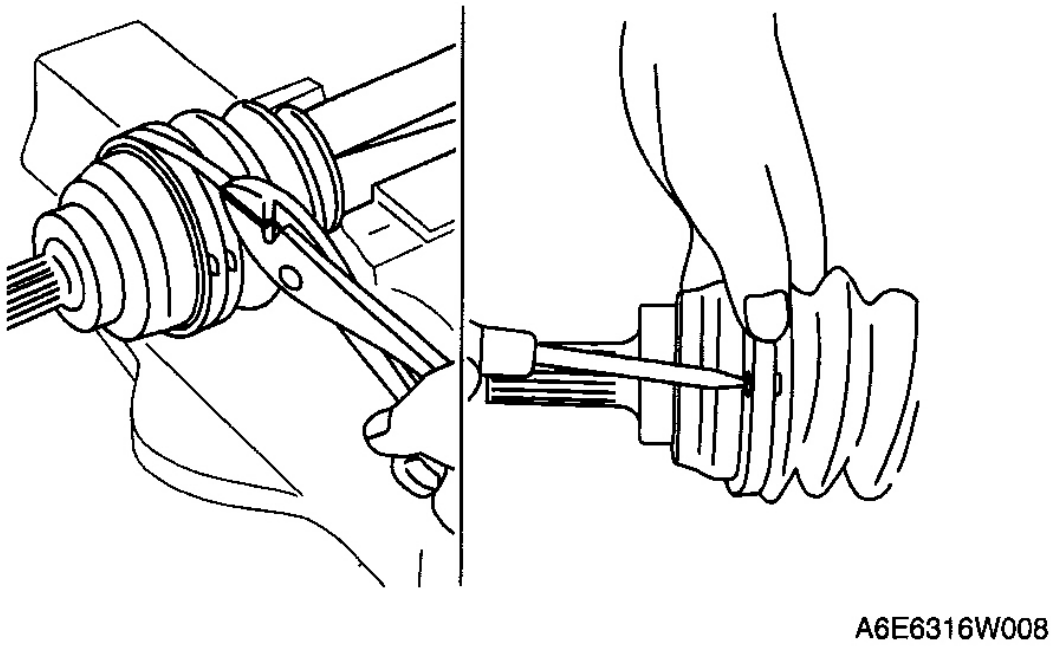


Fig. 17: Inserting End Of Boot Band Between Boot Band Clip & Fold Back Clip Tabs Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

3. Verify that the boot band is installed to the boot slot securely.

BOOT BAND (AXLE SIDE) ASSEMBLY NOTE

1. Turn the adjusting bolt of the **SST** and adjust the opening size to the specification A.

   Specification A

   2.9 mm {0.11 in}

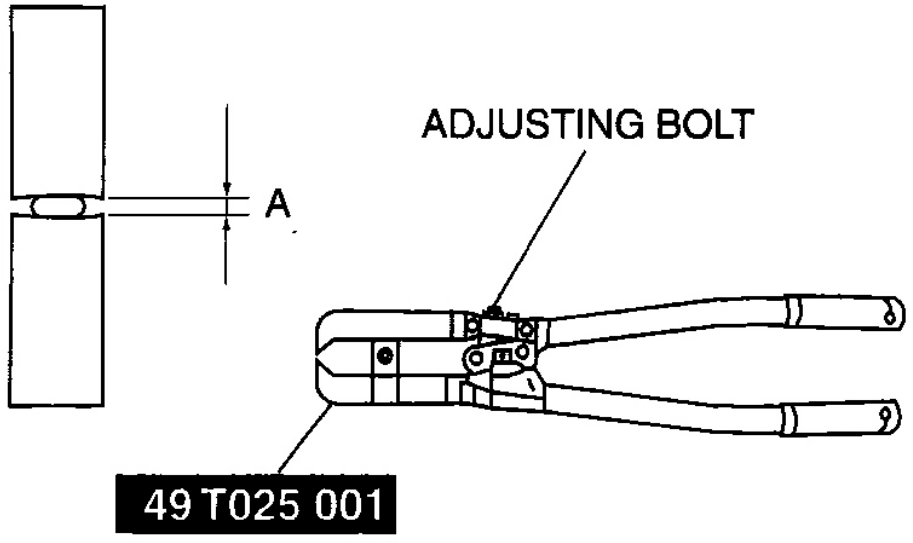


Fig. 18: Identifying Adjusting Bolt Of SST
Courtesy of MAZDA MOTORS CORP.

2. Crimp the boot band (small-size) using the **SST.**
3. Verify that the crimp value B is within the specification.
   - If the crimp value B exceeds the specification, reduce opening length A of the **SST** and recrimp the boot band.
   - If the crimp value B is less than the specification, increase opening length A of the **SST** and crimp the new boot band.

   Specification B

   2.4-2.8 mm {0.095-0.110 in}

4. Verify that the boot band does not protrude from the boot band installation area.
   - If the boot band protrudes from the installation area, replace it with a new band and repeat Step 2 thru 4.

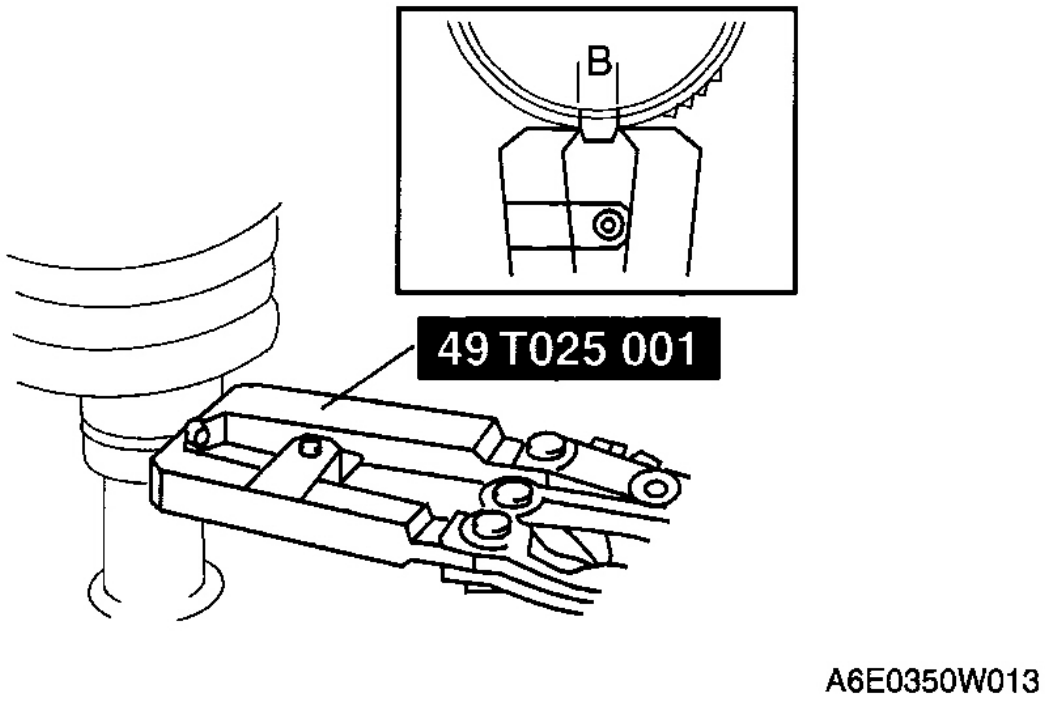


Fig. 19: Crimping Boot Band
Courtesy of MAZDA MOTORS CORP.

5. Fill the boot with the repair kit grease.
6. Adjust opening length A of the **SST** to the specification.

Specification A

3.2 mm {0.13 in}

7. Crimp the boot band (large-size) using the **SST.**
8. Verify that the boot band crimp value B is within the specification.
   - If crimp value B exceeds the specification, reduce opening length A of the **SST** and recrimp the boot band.
   - If the crimp value B is less than the specification, replace the boot band, increase opening length A of the **SST** , and then recrimp the new boot band.

Specification B

2.4-2.8 mm {0.095-0.110 in}

9. Verify that the boot band does not protrude from the boot band installation area.
    - If the boot band protrudes from the installation area, replace it with a new band and repeat Step 7 thru 9.

2007 DRIVELINE/AXLES

Technical Data - MX-5 Miata

DRIVELINE/AXLE TECHNICAL DATA

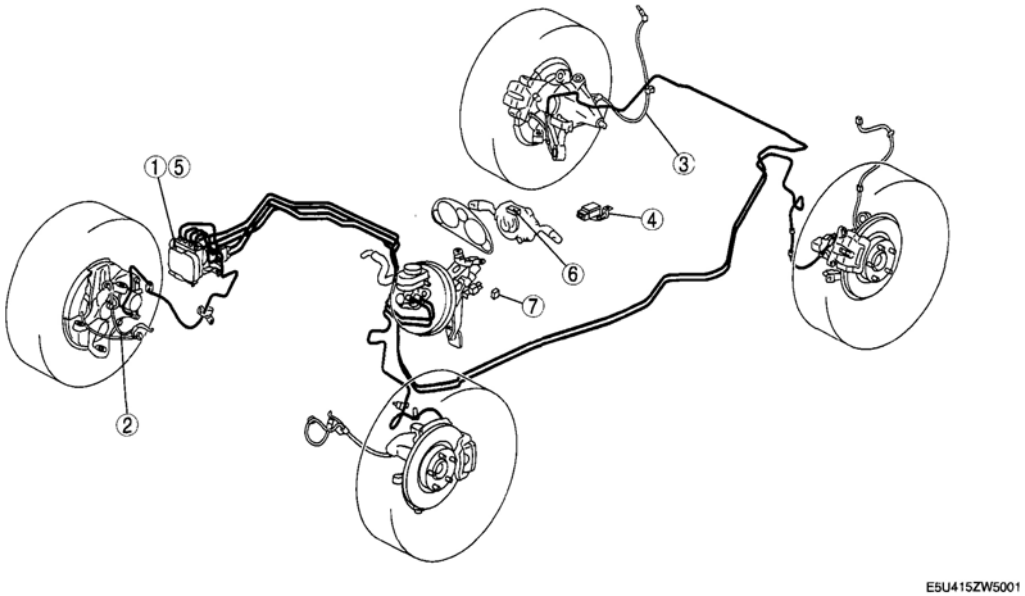
DRIVELINE/AXLE TECHNICAL DATA

Item	Specification
Maximum front wheel bearing play	0.05 mm {0.002 in}
Maximum rear wheel bearing play	0.05 mm {0.002 in}
Drive shaft length	Left side: 778.5-788.5 {30.65-31.04} Right side: 818.5-828.5 {32.22-32.62}
Differential oil	Grade: API service GL-5 Viscosity: SAE 90, SAE 80W-90, SAE 75W-90 (Not available from Mazda) Capacity (approx. quantity): 0.6-0.8 L {0.63-0.85 US qt, 0.53-0.70 Imp qt}
Backlash of pinion gear and side gear	0.1 mm {0.004 in} or less
Differential pinion height	0.038 mm {0.0015 in} or less
Differential drive pinion preload	1.3-1.8 N.m {14-18 kgf.cm, 12.1-15.6 in.lbf}
Backlash of drive pinion and ring gear	Standard: 0.09-0.11 mm {0.0035-0.0043 in} Minimum value: 0.05 mm {0.0020 in} or more Variance: 0.07 mm {0.0028 in} or less
Propeller shaft maximum runout	0.4 mm {0.016 in}
Propeller shaft initial torque (Reference value)	0.29-0.98 N.m

2007 BRAKES

Dynamic Stability Control - MX-5 Miata

DYNAMIC STABILITY CONTROL LOCATION INDEX



1	DSC HU/CM
2	Front ABS wheel-speed sensor
3	Rear ABS wheel-speed sensor
4	Combined sensor
5	Brake fluid pressure sensor (built-into DSC HU/CM)
6	Steering angle sensor
7	DSC OFF switch

Fig. 1: Identifying Location Of Dynamic Stability Control Connector Terminals
Courtesy of MAZDA MOTORS CORP.

DSC SYSTEM WIRING DIAGRAM

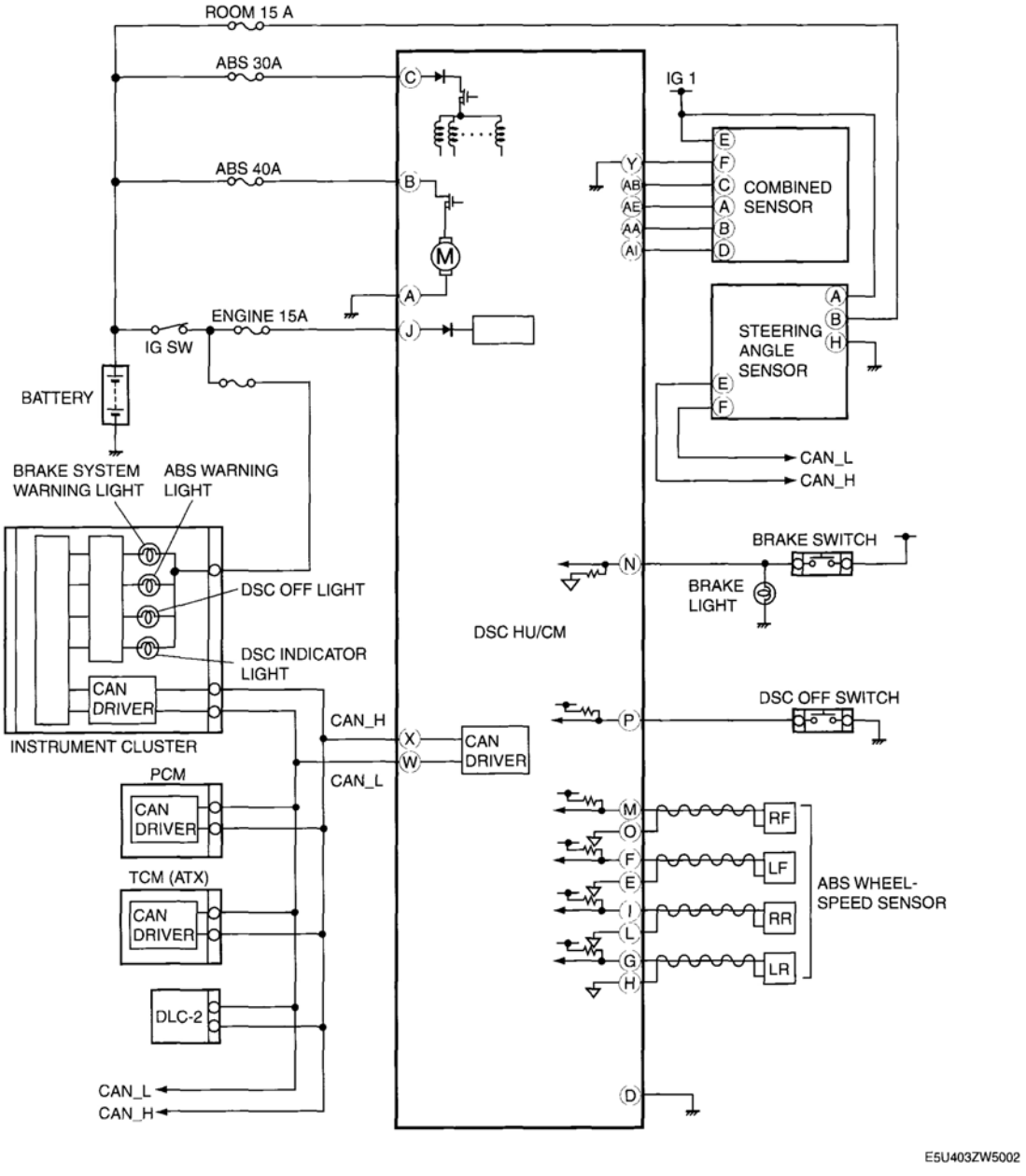


Fig. 2: DSC System Wiring Diagram
Courtesy of MAZDA MOTORS CORP.

DSC SYSTEM INSPECTION

PREPARATION

1. Verify that battery is fully charged.
2. Turn the ignition switch to the ON position, and verify that the ABS warning light goes out after **approx.**

3 s .

3. Turn the ignition switch off.
4. Jack up the vehicle and support it evenly on safety stands.
5. Shift to the N position.
6. Verify that all four wheels rotate.
7. Rotate the inspected wheels by hand, and verify there is no brake drag.
    - If there is any brake drag, perform regular brake inspection.
    - If there is no brake drag, perform DSC HU/CM operation inspection.

ABS CONTROL INSPECTION

1. Perform "Preparation".
2. Connect the M-MDS to the DLC-2.
3. Set up an active command mode inspection according to the combination of commands below.

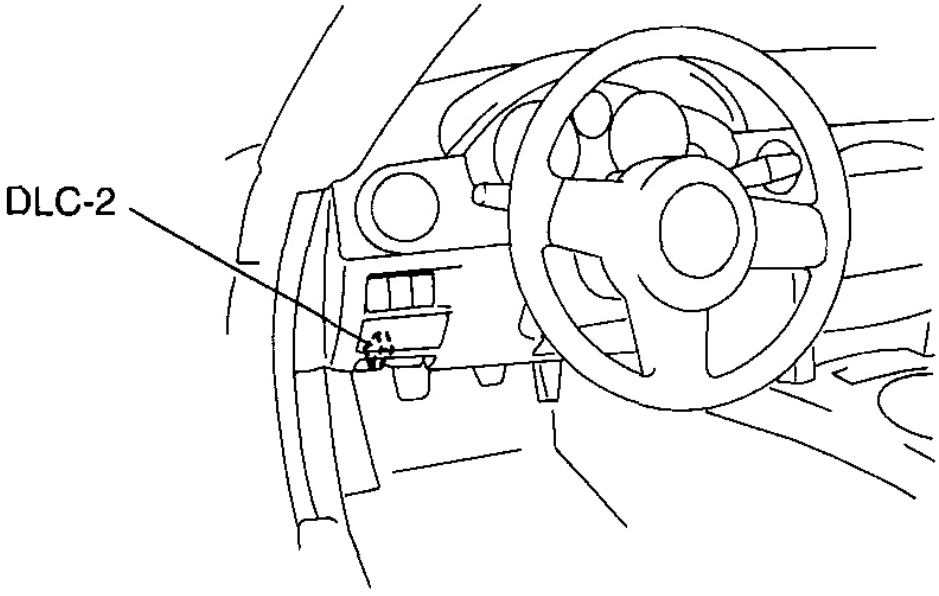


Fig. 3: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

BRAKE PRESSURE RETENTION

Command name	Inspected wheels			
	LF	RF	LR	RR

<table>
<tr><td>V_TRC_L</td><td colspan="4" rowspan="4">OFF</td></tr>
<tr><td>V_TRC_R</td></tr>
<tr><td>V_STB_L</td></tr>
<tr><td>V_STB_R</td></tr>
<tr><td>LF_INLET</td><td>ON</td><td rowspan="4">OFF</td><td>OFF</td><td rowspan="5">OFF</td></tr>
<tr><td>LF_OUTLET</td><td rowspan="6">OFF</td><td>ON</td></tr>
<tr><td>LR_INLET</td><td rowspan="6">OFF</td></tr>
<tr><td>LR_OUTLET</td></tr>
<tr><td>RF_INLET</td><td>ON</td></tr>
<tr><td>RF_OUTLET</td><td rowspan="4">OFF</td><td rowspan="4">OFF</td></tr>
<tr><td>RR_INLET</td><td>ON</td></tr>
<tr><td>RR_OUTLET</td><td rowspan="2">OFF</td></tr>
<tr><td>PMP_MOTOR</td></tr>
</table>

BRAKE PRESSURE REDUCTION

<table>
<tr><th rowspan="2">Command name</th><th colspan="4">Inspected wheels</th></tr>
<tr><th>LF</th><th>RF</th><th>LR</th><th>RR</th></tr>
<tr><td>V_TRC_L</td><td colspan="4" rowspan="4">OFF</td></tr>
<tr><td>V_TRC_R</td></tr>
<tr><td>V_STB_L</td></tr>
<tr><td>V_STB_R</td></tr>
<tr><td>LF_INLET</td><td rowspan="2">ON</td><td rowspan="3">OFF</td><td>OFF</td><td rowspan="5">OFF</td></tr>
<tr><td>LF_OUTLET</td><td rowspan="3">ON</td></tr>
<tr><td>LR_INLET</td><td rowspan="6">OFF</td></tr>
<tr><td>LR_OUTLET</td></tr>
<tr><td>RF_INLET</td><td rowspan="2">ON</td><td rowspan="3">OFF</td></tr>
<tr><td>RF_OUTLET</td></tr>
<tr><td>RR_INLET</td><td rowspan="2">OFF</td><td rowspan="2">ON</td></tr>
<tr><td>RR_OUTLET</td></tr>
<tr><td>PMP_MOTOR</td><td colspan="4">ON</td></tr>
</table>

CAUTION:

- **To protect the DSC HU/CM, the solenoid valve and the pump motor used during active command mode stay on for only 10 s or less each time they are switched on.**

NOTE:

- **When working with two people, one should press on the brake pedal, and the other should attempt to rotate the wheel being inspected.**

4. Send the command while depressing on the brake pedal and attempting to rotate the wheel being inspected.
5. While brake pressure is maintained and a DSC HU/CM operation click sound is heard, confirm that the

wheel does not rotate. While brake pressure is being reduced and an DSC HU/CM operation click sound is heard, confirm that the wheel rotates.

- Performing the inspection above determines the following:
  - The DSC HU/CM brake lines are normal.
  - The DSC HU/CM hydraulic system is not significantly abnormal (including DSC HU/CM).
  - The DSC HU/CM internal electrical parts (solenoid, motor and other parts) are normal.
  - The DSC unit and DSC HU/CM output system wiring harnesses (solenoid valve, relay system) are normal.
- However, the following items cannot be verified.
  - Malfunction with intermittent occurrence of the above items
  - Malfunction of DSC HU/CM input system wiring harnesses and parts
  - Extremely small leaks in the DSC HU/CM internal hydraulic system

DSC CONTROL INSPECTION

1. Perform "Preparation".
2. Connect the M-MDS to the DLC-2.
3. Set up an active command mode inspection according to the combination of commands below.

CAUTION:

- **To protect the DSC HU/CM, the solenoid valve and the pump motor used during active command mode stay on for only 10 s or less each time they are switched on.**

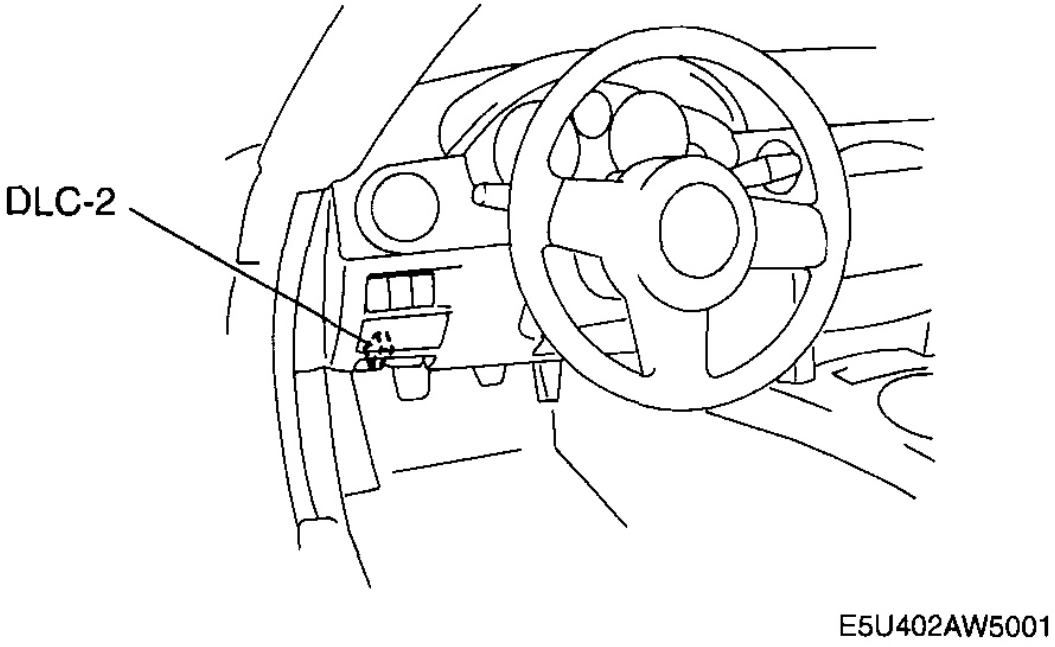


Fig. 4: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

ACTIVE COMMAND MODE INSPECTION

<table>
<tr><th rowspan="3">Command name</th><th colspan="4">Inspected wheels</th></tr>
<tr><th colspan="2">Understeer control inhibited</th><th colspan="2">Oversteer control inhibited</th></tr>
<tr><th>LF</th><th>RF</th><th>LR</th><th>RR</th></tr>
<tr><td>V_TRC_L</td><td>ON</td><td colspan="2">OFF</td><td>ON</td></tr>
<tr><td>V_TRC_R</td><td>OFF</td><td colspan="2">ON</td><td>OFF</td></tr>
<tr><td>V_STB_L</td><td colspan="4" rowspan="2">OFF</td></tr>
<tr><td>V_STB_R</td></tr>
<tr><td>LF_INLET</td><td rowspan="6">OFF</td><td rowspan="2">OFF</td><td rowspan="4">OFF</td><td>ON</td></tr>
<tr><td>LF_OUTLET</td><td rowspan="7">OFF</td></tr>
<tr><td>LR_INLET</td><td>ON</td></tr>
<tr><td>LR_OUTLET</td><td rowspan="5">OFF</td></tr>
<tr><td>RF_INLET</td><td>ON</td></tr>
<tr><td>RF_OUTLET</td><td rowspan="3">OFF</td></tr>
<tr><td>RR_INLET</td><td>ON</td><td rowspan="2">OFF</td></tr>
<tr><td>RR_OUTLET</td><td>OFF</td></tr>
<tr><td>PMP_MOTOR</td><td colspan="4">ON</td></tr>
</table>

4. Send the command while rotating the wheel being inspected by hand in a forward direction.

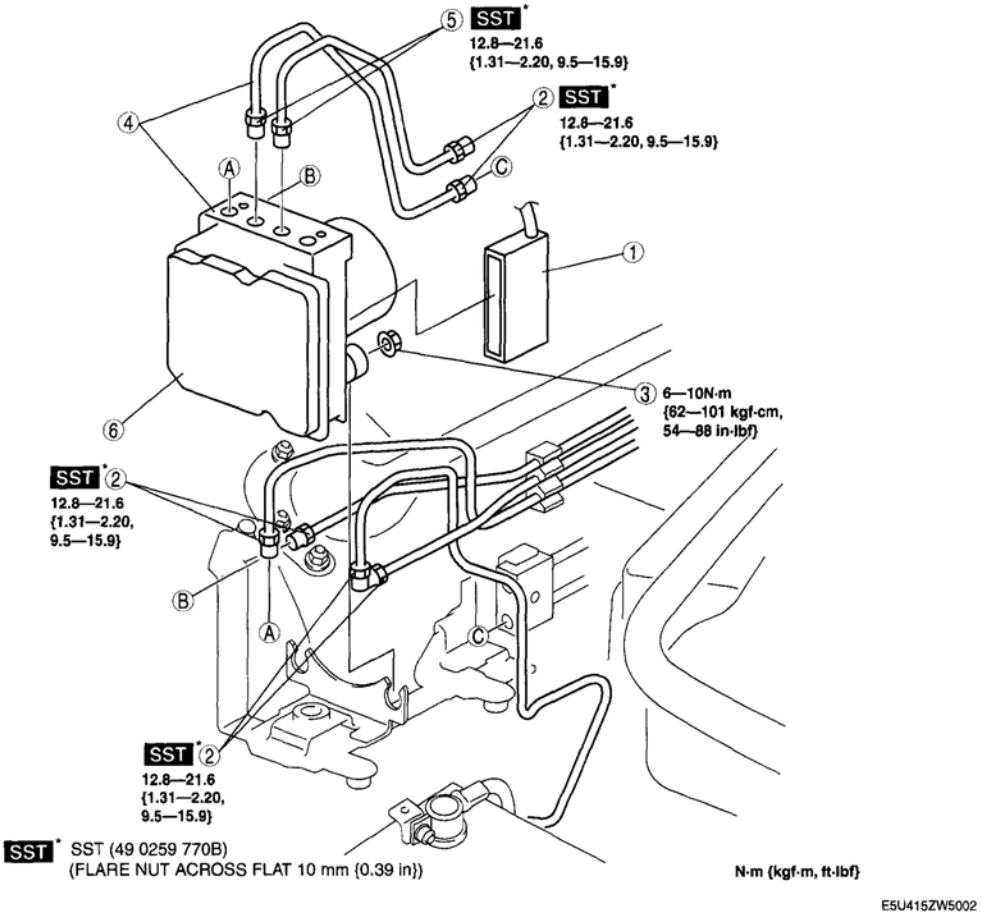
5. Confirm that the wheel does not rotate easily while a DSC HU/CM operation click sound is heard.
    - Performing the inspection above determines the following:
        - The DSC HU/CM brake lines are normal.
        - The DSC HU/CM hydraulic system is not significantly abnormal (including DSC HU/CM).
        - The DSC HU/CM internal electrical parts (solenoid, motor and other parts) are normal.
        - The DSC unit and DSC HU/CM output system wiring harnesses (solenoid valve, relay system) are normal.
    - However, the following items cannot be verified.
        - Malfunction with intermittent occurrence of the above items
        - Malfunction of DSC HU/CM input system wiring harnesses and parts
        - Extremely small leaks in the DSC HU/CM internal hydraulic system

DSC HU/CM REMOVAL/INSTALLATION

CAUTION:

- **When replacing the DSC HU/CM with a new one, configuration procedure must be performed before removing the DSC HU/CM. If configuration is not completed before removing the DSC HU/CM, DTC B2477 will be detected.**
- **The DSC may not function normally when the DSC HU/CM is replaced. After installation, always perform the initialization procedures for the DSC HU/CM, combined sensor and the steering angle sensor. (See COMBINED SENSOR INITIALIZATION PROCEDURE .) (See STEERING ANGLE SENSOR INITIALIZATION PROCEDURE .) (See STEERING ANGLE SIGNAL INITIALIZATION PROCEDURE .)**
- **The internal parts of the DSC HU/CM could be damaged if dropped. Be careful not to drop the DSC HU/CM. Replace the DSC HU/CM if it is subjected to an impact.**

1. Perform DSC configuration. (See **DSC CONFIGURATION** .)
2. Remove in the order indicated in **Fig. 5**.
3. Install in the reverse order of removal.
4. After installation, perform the combined sensor initialization procedure. (See **COMBINED SENSOR INITIALIZATION PROCEDURE** .)
5. After installation, perform the steering angle sensor initialization procedure. (See **STEERING ANGLE SENSOR INITIALIZATION PROCEDURE** .)
6. After installation, perform the steering angle signal initialization procedure. (See **STEERING ANGLE SIGNAL INITIALIZATION PROCEDURE** .)



1	DSC HU/CM connector
2	Brake pipe
3	Nut
4	DSC HU/CM, brake pipe
5	Brake pipe (DSC HU/CM—brake pipe joint)
6	ABS HU/CM

Fig. 5: Identifying DSC HU/CM With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

DSC HU/CM CONNECTOR REMOVAL NOTE

1. Pull the lock lever up in the direction of the arrow.
2. Pull the connector toward the vehicle rear and remove it.

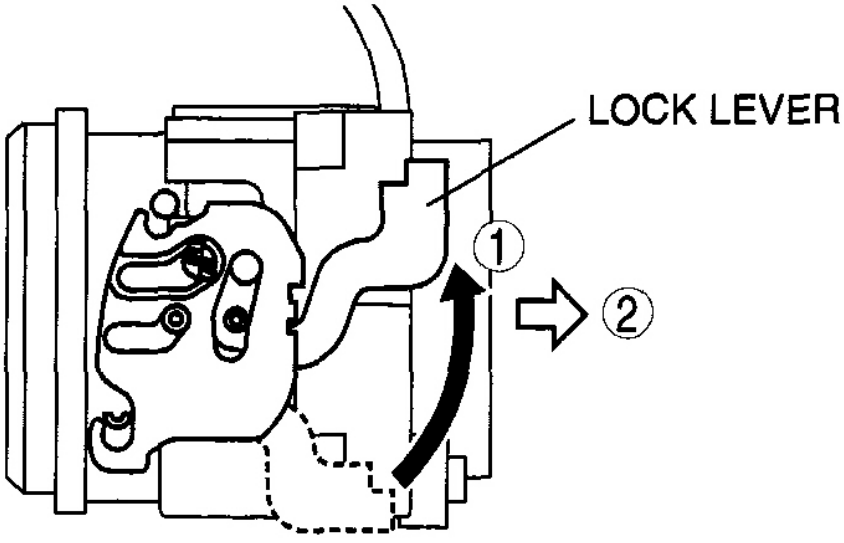


Fig. 6: Identifying Lock Lever Position
Courtesy of MAZDA MOTORS CORP.

BRAKE PIPE REMOVAL NOTE

1. Place an alignment mark on the brake pipe and DSC HU/CM.
2. Apply protective tape to the connector to prevent brake fluid from entering.
3. Remove the brake pipe.

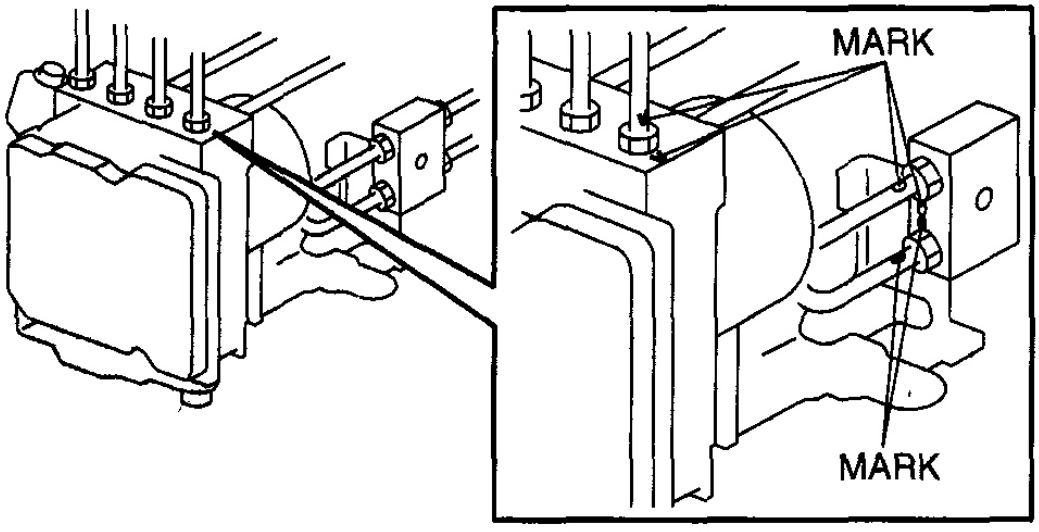


Fig. 7: Brake Pipe At DSC HU/CM
Courtesy of MAZDA MOTORS CORP.

BRAKE PIPE (DSC HU/CM-BRAKE PIPE JOINT) INSTALLATION NOTE

1. Align with the mark made before removing the brake pipe and temporarily install the brake pipe to the DSC HU/CM.

CAUTION:
- **If the brake pipe is tightened to the specified torque, it may be difficult to install it to the vehicle. Therefore, only temporarily tighten the brake pipe so that it can still be moved.**

BRAKE PIPE INSTALLATION NOTE

1. Align the marks made before removal and install the brake pipe to the DSC HU/CM and brake pipe joint referring to the figure.
2. Tighten the brake pipe to the specified torque using the **SST** (49 0259 770B).

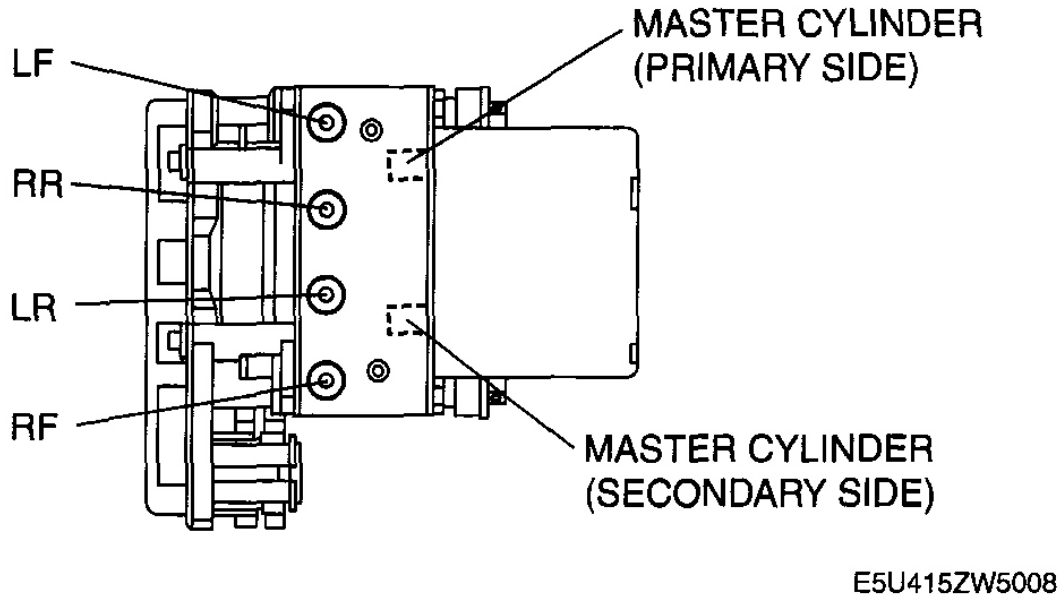


Fig. 8: Identifying DSC HU/CM
Courtesy of MAZDA MOTORS CORP.

DSC HU/CM CONNECTOR INSTALLATION NOTE

1. After connecting the connector, verify that the lock lever is completely pushed in.

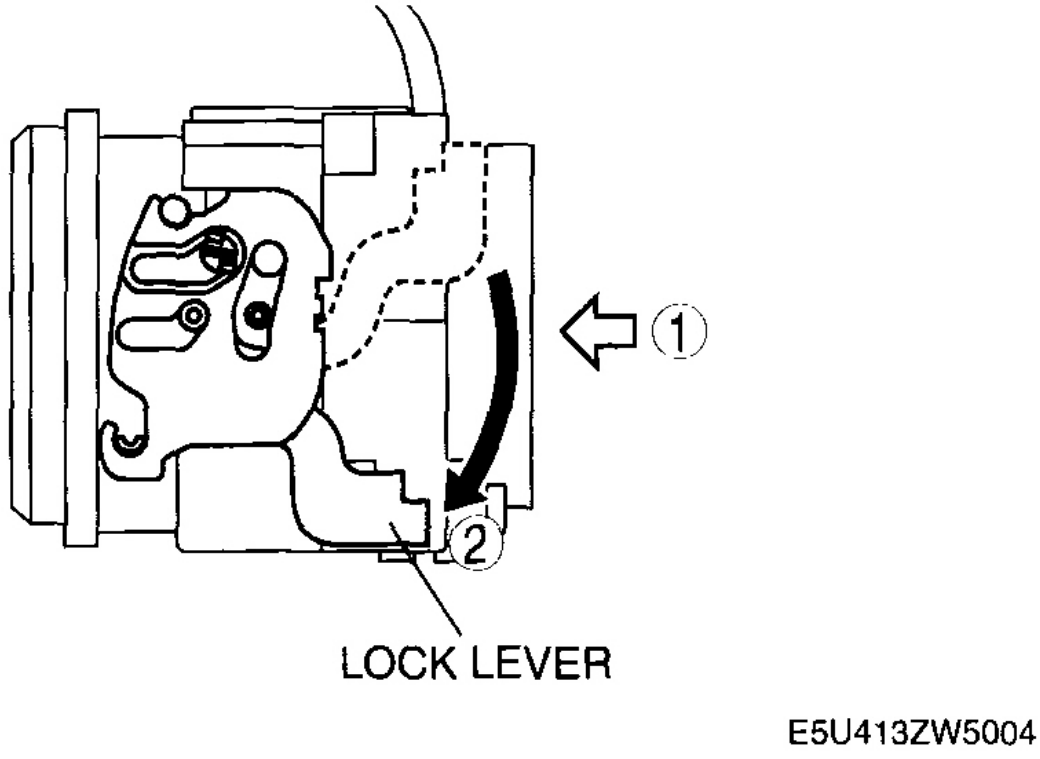


Fig. 9: Identifying Lock Lever Position
Courtesy of MAZDA MOTORS CORP.

DSC CONFIGURATION

1. Connect the M-MDS to the DLC-2 connector.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
   - When using the IDS (laptop PC)
     1. Select the "Module Programming".
   - When using the PDS (Pocket PC)
     1. Select "Programming".
     2. Select "Module Programming".
3. Then, select the "Programmable Module Installation" and "ABS" from the screen menu..
4. Perform the configuration according to the directions on the screen.
5. Retrieve DTCs using the M-MDS, then verify if DTCs are present.
   - If a DTC is present, perform the applicable DTC inspection. (See **ON-BOARD DIAGNOSTIC (DYNAMIC STABILITY CONTROL SYSTEM)** .)

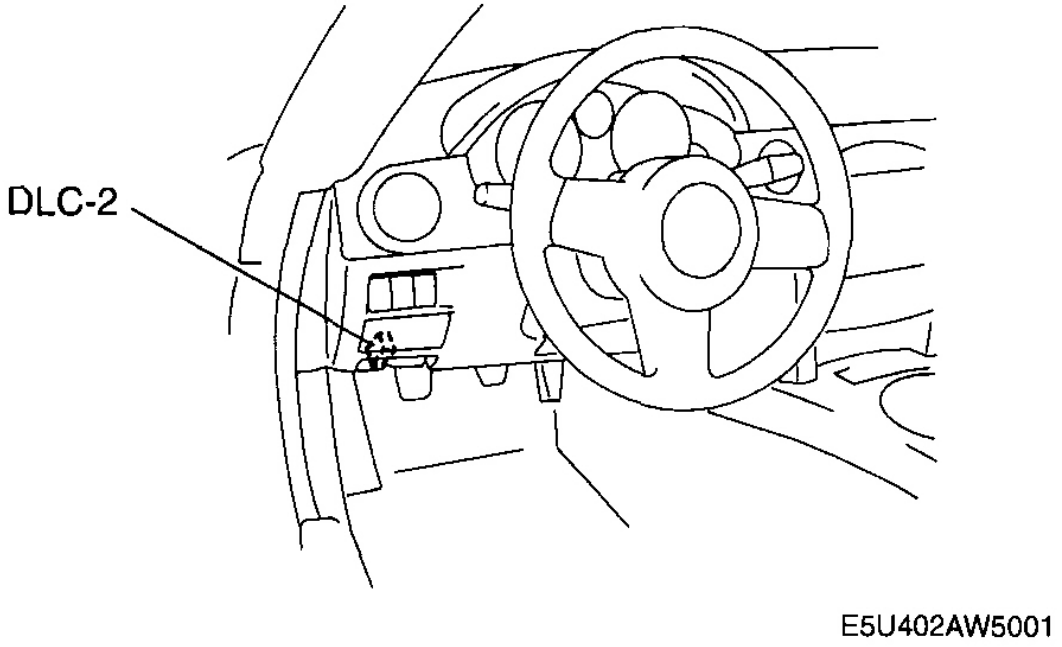


Fig. 10: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

DSC HU/CM INSPECTION

1. Disconnect the DSC HU/CM connector. (See **DSC HU/CM REMOVAL/INSTALLATION** .)
2. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Attach the tester lead to the DSC HU/CM harness side connector, then inspect voltage, continuity or resistance according to the standard (reference value) on **REFERENCE VALUE TABLE** .

STANDARD (REFERENCE VALUE)

Fig. 11: Identifying DSC HU/CM Connector Terminals

Courtesy of MAZDA MOTORS CORP.

STANDARD REFERENCE VALUE TABLE

Terminal	Signal name	Connected to	Measured item	Measured terminal (measured condition)	Standard	Inspection item (s)
A	Ground (ABS motor)	Ground point	Continuity	A-ground point	Continuity detected	• **Wiring harness (A-ground point)**
B	Power supply (ABS motor operation)	Battery	Voltage	Under any condition	B+	• Wiring harness (B-battery)
C	Power supply (solenoid operation)	Battery	Voltage	Under any condition	B+	• Wiring harness (C-battery)
D	Ground (DSC system)	Ground point	Continuity	D-ground point	Continuity detected	• Wiring harness (D-ground point)
E	LF wheel-speed sensor (ground)	LF ABS wheel-speed sensor	Continuity	E-LF ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (E-LF ABS wheel-speed sensor connector terminal B)
F	LF wheel-speed sensor (single)	LF ABS wheel-speed sensor	Continuity	F-LF ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (F-LF ABS wheel-speed sensor connector terminal A)

G	LR wheel-speed sensor (signal)	LR ABS wheel-speed sensor	Continuity	G-LR ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (G-LR ABS wheel-speed sensor connector terminal A)
H	LR wheel-speed sensor (ground)	LR ABS wheel-speed sensor	Continuity	H-LR ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (H-LR ABS wheel-speed sensor connector terminal B)
I	RR wheel-speed (signal)	RR ABS wheel-speed sensor	Continuity	I-RR ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (I-RR ABS wheel-speed sensor connector terminal A)
J	Power supply (system)	Ignition switch	Voltage	Ignition switch at ON	B+	• Wiring harness (J-ignition switch)
				Ignition switch is off.	1 V or less	-
K	-	-	-	-	-	-
L	RR wheel-speed sensor (ground)	RR ABS wheel-speed sensor	Continuity	L-RR ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (L-RR ABS wheel-speed sensor connector terminal

						B)
M	RF wheel-speed sensor (signal)	RF ABS wheel-speed sensor	Continuity	M-RF ABS wheel-speed sensor connector terminal A	Continuity detected	• Wiring harness (M-RF ABS wheel-speed sensor connector terminal A)
N	Brake switch	Brake switch	Voltage	N-ground point (Brake pedal depressed)	B+	• Wiring harness (N-brake switch) • Brake switch
				N-ground point (Brake pedal not depressed)	1 V or less	-
O	RF wheel-speed sensor (ground)	RF ABS wheel-speed sensor	Continuity	O-RF ABS wheel-speed sensor connector terminal B	Continuity detected	• Wiring harness (O-RF ABS wheel-speed sensor connector terminal B)
P	DSC OFF switch	DSC OFF switch	Continuity	P-DSC OFF switch connector terminal A	Continuity detected	• Wiring harness (P-DSC OFF switch connector terminal A)
Q	-	-	-	-	-	-
R	-	-	-	-	-	-
S	-	-	-	-	-	-
T	-	-	-	-	-	-
U	-	-	-	-	-	-

V	-	-	-	-	-	-
W	CAN_L	DLC-2 (CAN_L)	Continuity	W-DLC-2 terminal CAN_L	Continuity detected	• Wiring harness (W-DLC-2 terminal CAN_L)
X	CAN_H	DLC-2 (CAN_H)	Continuity	X-DLC-2 terminal CAN_H	Continuity detected	• Wiring harness (X-DLC-2 terminal CAN_H)
Y	Ground (combined sensor)	Combined sensor	Continuity	Y-combined sensor connector terminal F	Continuity detected	• Wiring harness (Y-combined sensor connector terminal F)
Z	-	-	-	-	-	-
AA	Yaw rate (signal)	Combined sensor	Continuity	AA-combined sensor connector terminal B	Continuity detected	• Wiring harness (AA-combined sensor connector terminal B)
AB	Yaw rate (test signal)	Combined sensor	Continuity	AB-combined sensor connector terminal C	Continuity detected	• Wiring harness (AB-combined sensor connector terminal C)
AC	-	-	-	-	-	-
AD	-	-	-	-	-	-
AE	Yaw rate (reference signal)	Combined sensor	Continuity	AE-combined sensor connector terminal A	Continuity detected	• Wiring harness (AE-combined sensor connector

						terminal A)
AF	-	-	-	-	-	-
AG	-	-	-	-	-	-
AH	-	-	-	-	-	-
AI	Lateral-G (signal)	Combined sensor	Continuity	AI-combined sensor connector terminal D	Continuity detected	• Wiring harness (AI-combined sensor connector terminal D)
AJ	-	-	-	-	-	-
AK	-	-	-	-	-	-
AL	-	-	-	-	-	-
AM	-	-	-	-	-	-
AN	-	-	-	-	-	-
AO	-	-	-	-	-	-
AP	-	-	-	-	-	-
AQ	-	-	-	-	-	-
AR	-	-	-	-	-	-
AS	-	-	-	-	-	-
AT	-	-	-	-	-	-

STEERING ANGLE SIGNAL INITIALIZATION PROCEDURE

WARNING:

- **If the initialization procedure of the steering angle signal is not completed, the DSC will not operate properly and may cause an accident. Therefore, always perform initialization of the DSC HU/CM steering angle signal to ensure proper DSC operation when any of the following items are performed.**
  - **Steering angle sensor replacement**
  - **DSC HU/CM replacement**

1. Inspect the wheel alignment and inflation pressure.
   - If there is any malfunction, adjust the applicable part.
2. Park the vehicle on level ground.
3. Turn the ignition switch off.
4. Connect the M-MDS to the DLC-2.
5. After the vehicle is identified, select the following items from the initial screen of the M-MDS.

- When using the IDS (laptop PC)
  1. Select "Chassis".
  2. Select "ABS/DSC".
  3. Select "Sensor Initialization".
- When using the PDS (Pocket PC)
  1. Select "All Tests and Calibrations".
  2. Select "Sensor Initialization".

6. Perform the initialization procedure according to the directions on the screen.
7. Drive the vehicle forward.
8. After 5 min of driving, verify that the DSC system is normal.

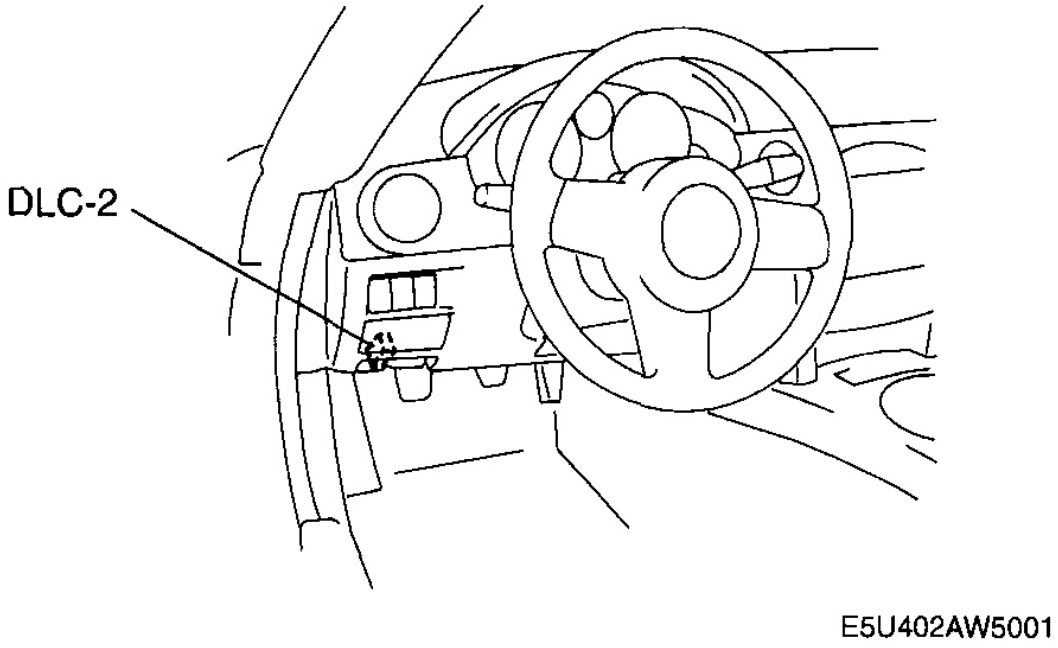


Fig. 12: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

1. Remove or install the front ABS wheel-speed sensor in the same order of vehicles with ABS. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)

FRONT ABS WHEEL-SPEED SENSOR INSPECTION

1. Inspect the front ABS wheel-speed sensor in the same order of vehicles with ABS. (See **FRONT ABS WHEEL-SPEED SENSOR INSPECTION** .)

REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

1. Remove or install the rear ABS wheel-speed sensor in the same order of vehicles with ABS. (See **REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)

REAR ABS WHEEL-SPEED SENSOR INSPECTION

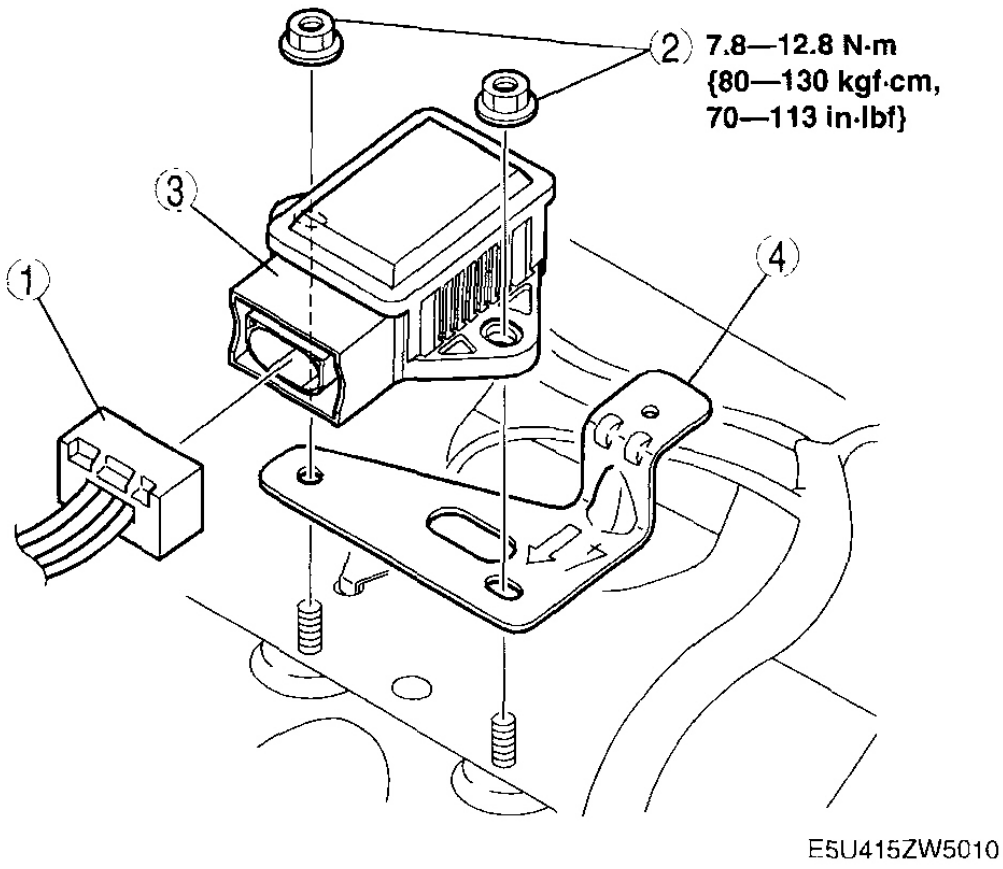
1. Inspect the rear ABS wheel-speed sensor in the same order of vehicles with ABS. (See **REAR ABS WHEEL-SPEED SENSOR INSPECTION** .)

COMBINED SENSOR REMOVAL/INSTALLATION

CAUTION:

- **The internal parts of the combined sensor could be damaged if dropped. Be careful not to drop the combined sensor. Replace the combined sensor if it is subjected to an impact. Also, do not use an impact wrench or other similar air tools when removing/installing the sensor.**

1. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
2. Remove in the order indicated in **Fig. 13** .



1	Combined sensor connector
2	Nut
3	Combined sensor
4	Bracket

Fig. 13: Combined Sensor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.
4. After installation, perform the combined sensor initialization procedure. (See **COMBINED SENSOR INITIALIZATION PROCEDURE** .)

COMBINED SENSOR INSPECTION

1. Turn the ignition switch off.

2. Connect the M-MDS to the DLC-2.
3. Select the following PIDs, then inspect the lateral acceleration speed and the yaw rate.
    - LAT_ACCL: (lateral acceleration speed)
    - YAW_RATE: (yaw rate)
    1. Lateral acceleration speed inspection

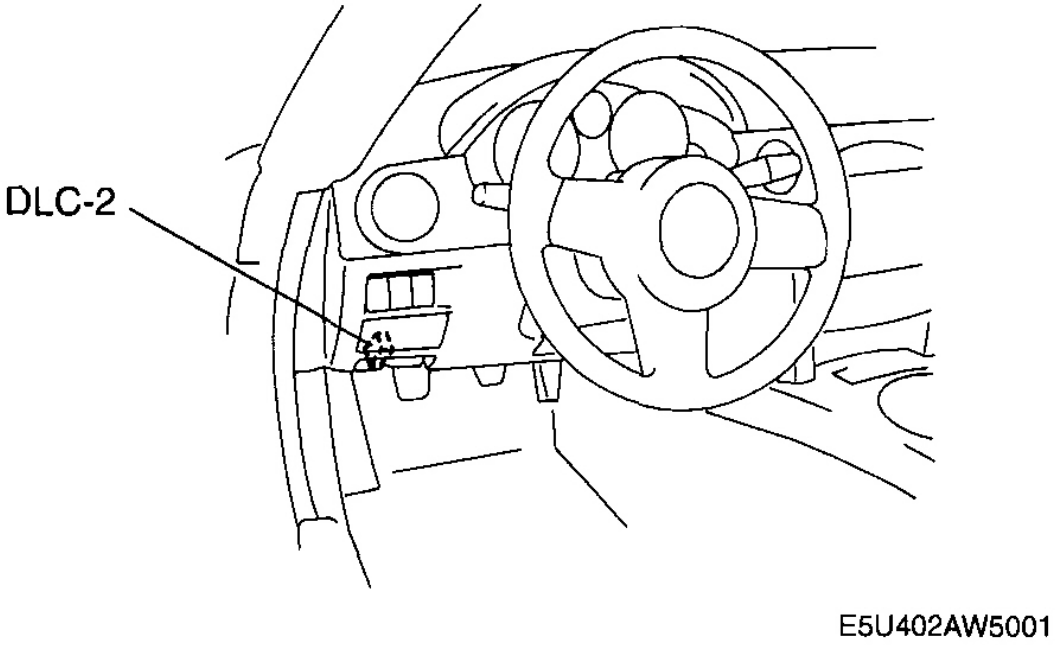


Fig. 14: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

1. Verify the LAT_ACCL change when the combined sensor is tilted to the left and right.
    - If there is any malfunction, replace the combined sensor.

Standard

When the sensor is tilted to the right (A):

LAT_ACCL changes negatively.

When the sensor is tilted to the left (B):

LAT_ACCL changes positively.

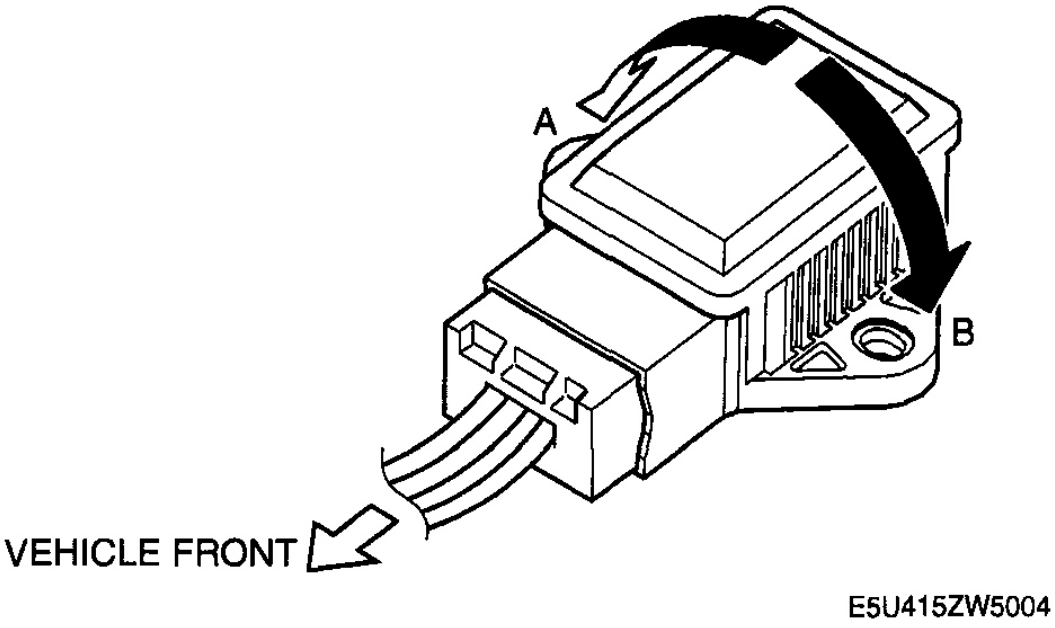


Fig. 15: Tilting Combined Sensor Left And Right
Courtesy of MAZDA MOTORS CORP.

2. Yaw rate inspection
    1. Verify the YAW_RATE change when the combined sensor is rotated to the left and right.
        - If there is any malfunction, replace the combined sensor.

Standard

When the sensor is rotated to the right (A):

YAW_RATE changes negatively.

When the sensor is rotated to the left (B):

YAW RATE changes positively.

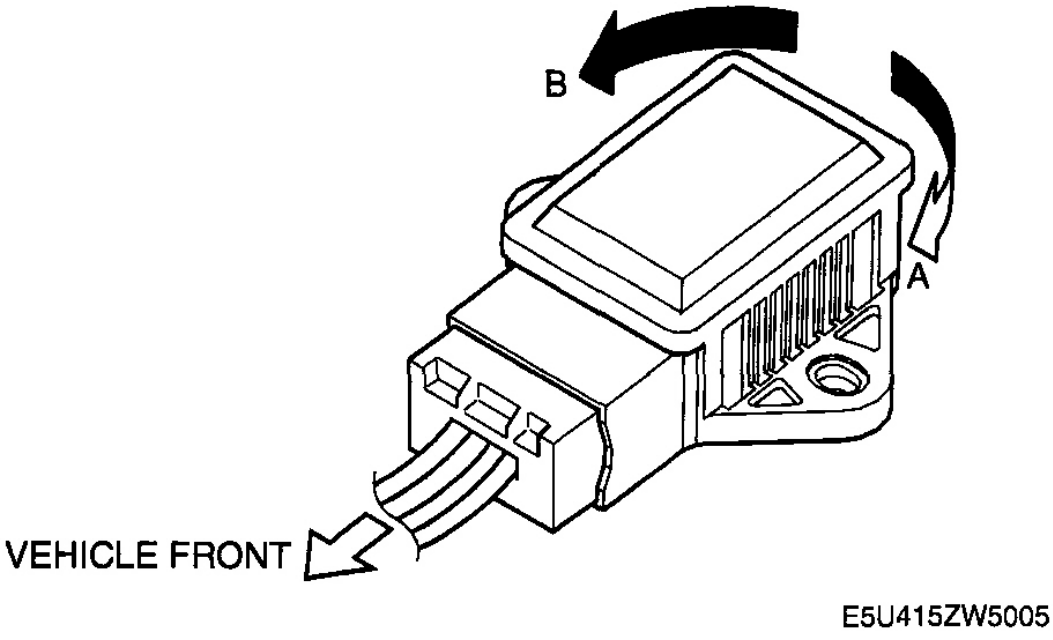


Fig. 16: Tilting Combined Sensor Left And Right
Courtesy of MAZDA MOTORS CORP.

COMBINED SENSOR INITIALIZATION PROCEDURE

WARNING:

- **Unless the initialization procedure of the combined sensor is completed, the DSC will not operate, causing an unexpected accident. Therefore, always perform the initialization procedure to ensure DSC operation if the combined sensor and DSC HU/CM have been removed or replaced.**

1. Inspect the wheel alignment and inflation pressure.
   - If there is any malfunction, adjust the applicable part.
2. Park the vehicle on level ground.
3. Turn the ignition switch off.
4. Connect the M-MDS to the DLC-2.

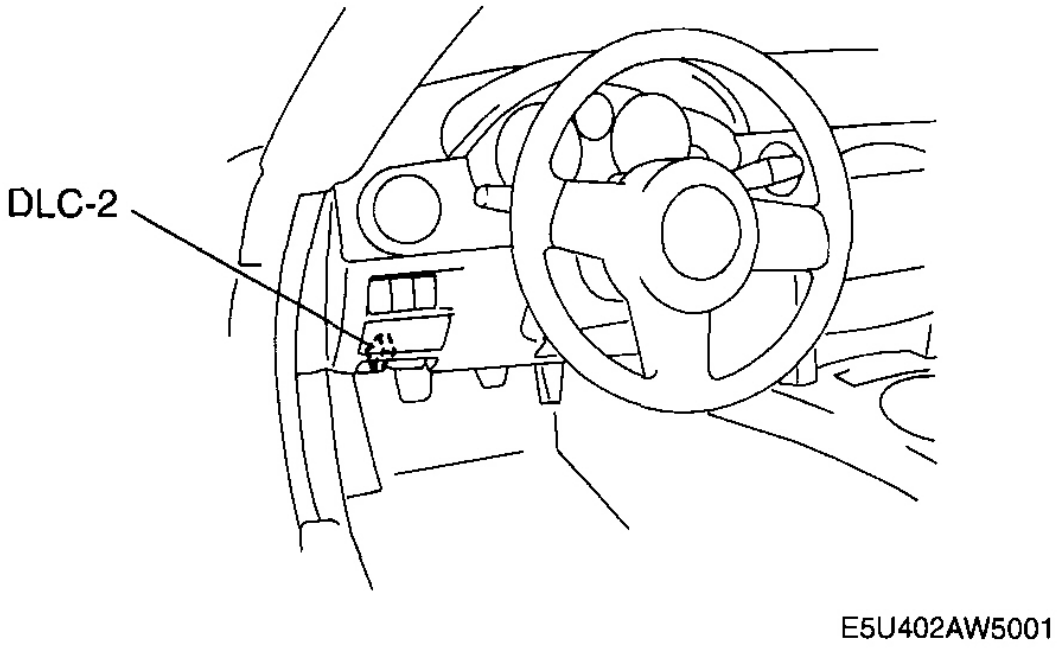


Fig. 17: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

5. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
   - When using the IDS (laptop PC)
     1. Select "Chassis".
     2. Select "ABS/DSC".
     3. Select "Sensor Initialization".
   - When using the PDS (Pocket PC)
     1. Select "All Tests and Calibrations".
     2. Select "Sensor Initialization".
6. Drive the vehicle forward.
7. After 5 min of driving, verify that the DSC system is normal.

BRAKE FLUID PRESSURE SENSOR INSPECTION

1. Turn the ignition switch off.
2. Install the **SSTs** to the master cylinder.

NOTE:

- **Install the SST (49 N043 001) to the master cylinder using a commercially available flare nut wrench.**

- **Flare nut across flat: 12 mm {0.47 in}**

3. Bleed the air from the **SSTs** and the brake line. (Bleed air from the **SSTs** through air bleeding valve A.)

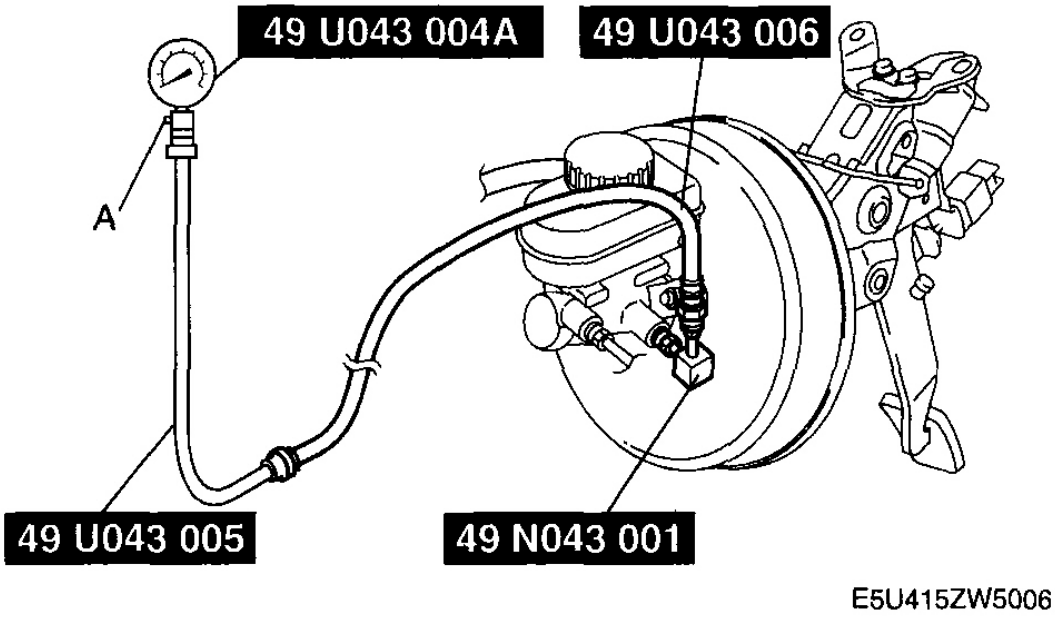


Fig. 18: Installing SSTs To Master Cylinder
Courtesy of MAZDA MOTORS CORP.

4. Connect the M-MDS to the DLC-2.
5. Select the MCYLI P PID.
6. Start the engine.
7. Depress the brake pedal, and confirm that the fluid pressure value of the **SST** (Gauge) and the value shown on the M-MDS are equal.
   - If the fluid pressures are different, replace the DSC HU/CM.

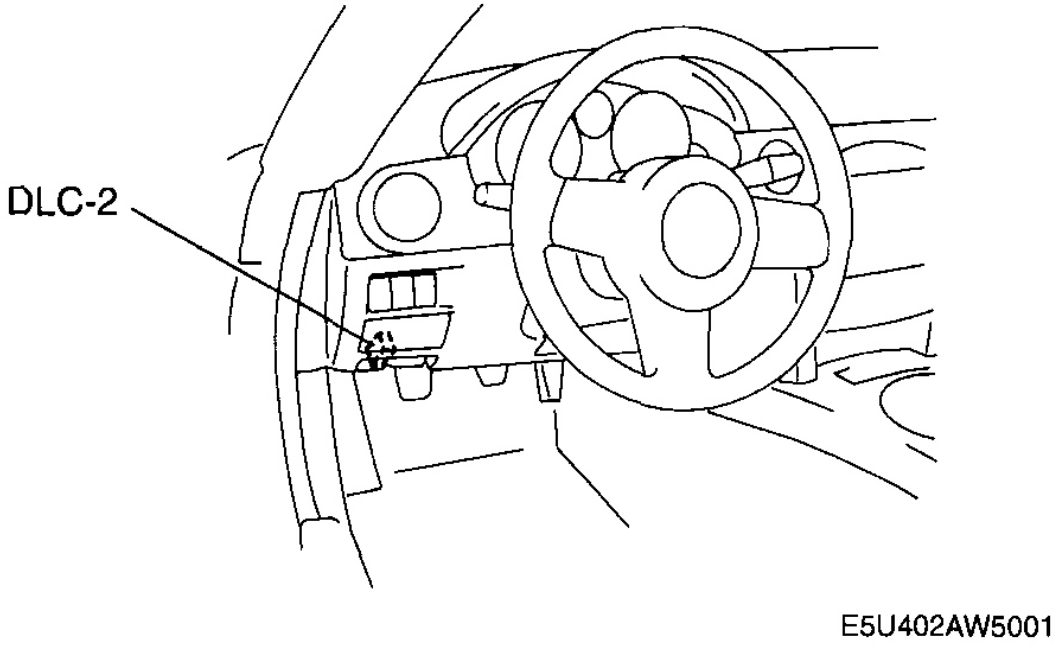


Fig. 19: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

STEERING ANGLE SENSOR REMOVAL/INSTALLATION

NOTE:

- **The steering angle sensor is integrated into the combination switch to ensure sensor performance. Replace the steering angle sensor and combination switch as a single unit. (See COMBINATION SWITCH REMOVAL/INSTALLATION .)**

STEERING ANGLE SENSOR INSPECTION

1. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
2. Measure the voltage between steering angle sensor terminal B and ground.
   - If there is any malfunction, inspect the wiring harness between steering angle sensor terminal B and battery, then repair or replace if necessary.

Standard voltage

B+

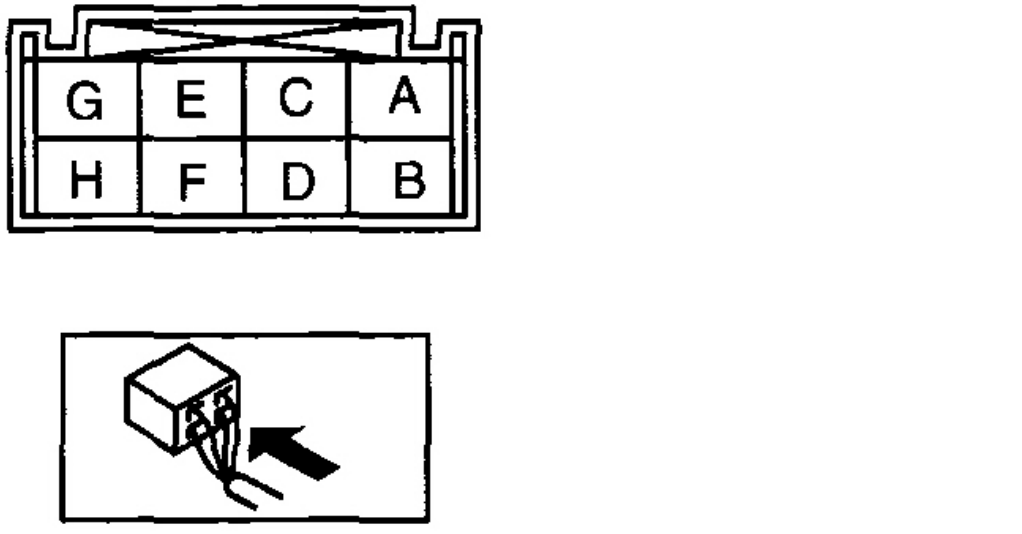


Fig. 20: Identifying Steering Angle Sensor Connector Terminals
Courtesy of MAZDA MOTORS CORP.

3. Turn the ignition switch to the ON position, then measure the voltage between steering angle sensor terminal A and ground.
    - If there is any malfunction, inspect the wiring harness between steering angle sensor terminal A and ignition switch, then repair or replace if necessary.

    Standard voltage

    B+

4. Measure the voltage between steering angle sensor terminal H and the ground.
    - If there is any malfunction, inspect the wiring harness between steering angle sensor terminal H and ground point, then repair or replace if necessary.

    Standard voltage

    0 V

5. Turn the ignition switch off.
6. Connect the M-MDS to the DLC-2.
7. Select the SWA_POS PID.
8. Verify the SWA_POS changes when the steering wheel is turned to the left and right.
    - If there is any malfunction, replace the steering angle sensor.

Standard

When the steering wheel is turned to the right:

SWA_POS changes positively.

When the steering wheel is turned to the left:

SWA_POS changes negatively.

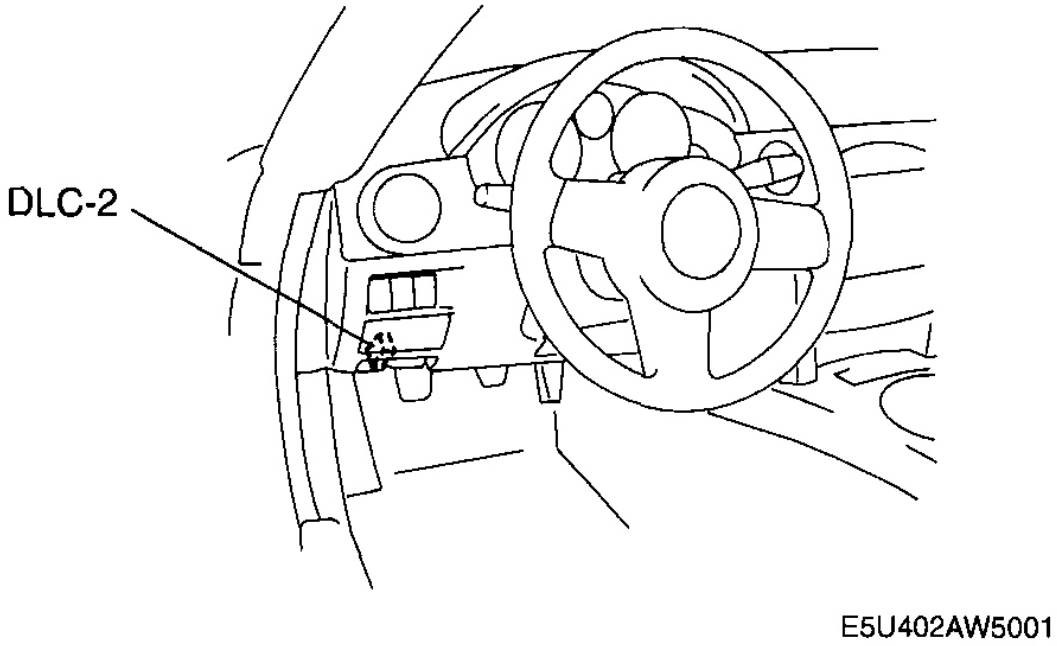


Fig. 21: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

STEERING ANGLE SENSOR INITIALIZATION PROCEDURE

WARNING:

- **Unless the initialization procedure of the steering angle sensor is**

completed, the DSC will not operate, causing an unexpected accident. Therefore, always perform the initialization procedure to ensure DSC operation if the power supply to the steering angle sensor has been cut off due to disconnection of the steering angle sensor connector or negative battery cable, or any other cause.

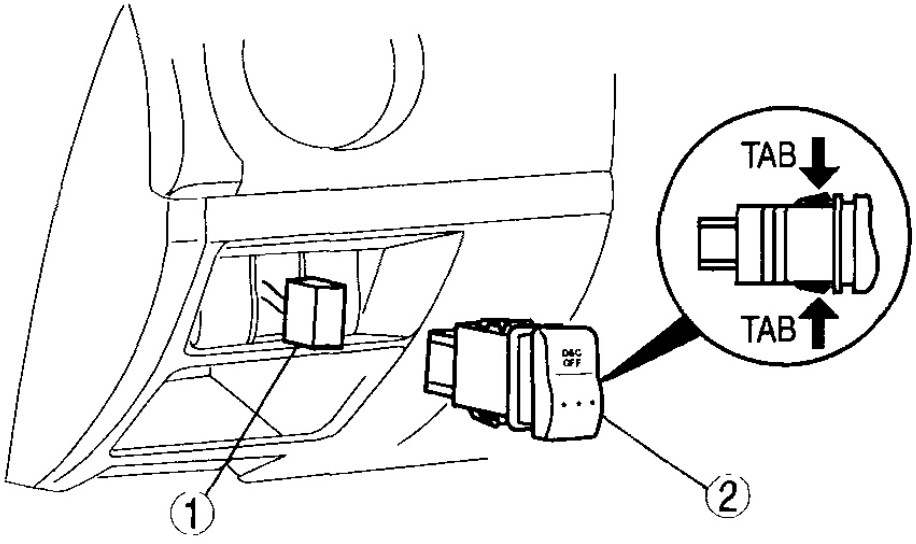
NOTE:

- **The initialization value of the steering angle sensor is stored using the battery power supply. Therefore, the battery power supply of the steering angle sensor is cut and the stored initialization value is cleared when any of the following items are performed.**
  - **Negative battery cable disconnection**
  - **Steering angle sensor connector disconnection**
  - **Fuse (ROOM 15A) removal**
  - **Wiring harness disconnection between battery and steering angle sensor connector**

1. Inspect the wheel alignment, inflation pressure, and the installation condition of the steering wheel.
   - If there is any malfunction, adjust the applicable part.
2. Connect the negative battery cable.
3. Turn the ignition switch to the ON position.
4. Confirm that the DSC indicator light illuminates and that the DSC OFF light flashes.
5. Turn the steering wheel to full right lock, then turn it to full left lock.
6. Confirm that the DSC OFF light goes out.
7. Turn the ignition switch off.
8. Turn the ignition switch to the ON position again, and confirm that the DSC indicator light goes out.
   - If the DSC indicator light does not go out, disconnect the negative battery cable, and perform the procedure again starting from Step 2 shown above.
9. Drive the vehicle for **approx. 10 min** , and confirm that the ABS warning and DSC indicator lights do not illuminate.

DSC OFF SWITCH REMOVAL/INSTALLATION

1. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
2. Remove in the order indicated in **Fig. 22** .



1	DSC OFF switch connector
2	DSC OFF switch

Fig. 22: Identifying DSC OFF Switch
Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.

DSC OFF SWITCH CONNECTOR REMOVAL NOTE

1. Access the DSC OFF switch connector from behind of the dashboard, and squeeze the tabs of the switch connector.
2. Disconnect the DSC OFF switch connector from the DSC OFF switch.

DSC OFF SWITCH REMOVAL NOTE

1. Access the DSC OFF switch from behind of the dashboard, and squeeze the tabs of the switch.
2. Pull the DSC OFF switch towards the driver's side to remove it.

DSC OFF SWITCH INSPECTION

1. Remove the DSC OFF switch.

2. Verify that the continuity is as indicated in **Fig. 23** .
   - If not as indicated in **Fig. 23** replace the DSC OFF switch.

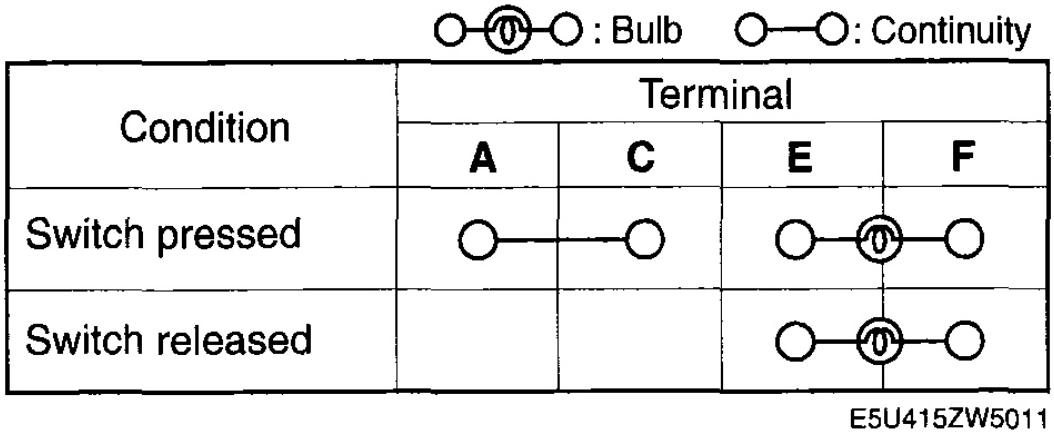


Fig. 23: DSC OFF Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

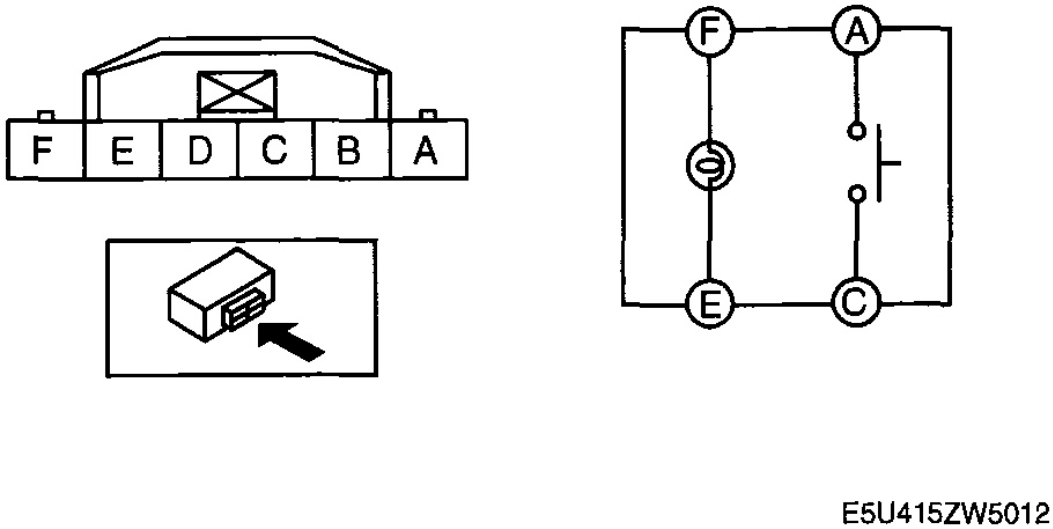


Fig. 24: Identifying DSC OFF Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

2007 MAZDA

MX-5 Miata

BUZZERS, RELAYS & TIMERS

BUZZERS, RELAYS & TIMERS LOCATION

Component	Location
A/C Relay (AIR COND)	In relay & main fuse block. See **Fig. 1**.
Blower Relay (HEATER)	In relay & main fuse block. See **Fig. 1**.
Cooling Fan Relay No. 1 (COOLING FAN1)	In relay & main fuse block. See **Fig. 1**.
Cooling Fan Relay No. 2 (COOLING FAN2)	In relay & main fuse block. See **Fig. 1**.
Cooling Fan Relay No. 3 (COOLING FAN3)	In relay & main fuse block. See **Fig. 1**.
Drive-By-Wire Relay (ETV)	In relay & main fuse block. See **Fig. 1**.
Front Fog Light Relay (FOG)	In relay & main fuse block. See **Fig. 1**.
Fuel Pump Relay (CIRCUIT)	In relay & main fuse block. See **Fig. 1**.
Headlight Relay (HEAD)	In relay & main fuse block. See **Fig. 1**.
Horn Relay (HORN)	In relay & main fuse block. See **Fig. 1**.
Ignition Relay (IGNITION)	In relay & main fuse block. See **Fig. 1**.
Keyless Buzzer	Front of luggage compartment. See **Fig. 35**.
Main Relay (EGI)	In relay & main fuse block. See **Fig. 1**.
Rear Window Defroster Relay (DEFOG)	In relay & main fuse block. See **Fig. 1**.
Starter Relay (ST)	In relay & main fuse block. See **Fig. 1**.
TNS Relay (TAIL)	In relay & main fuse block. See **Fig. 1**.
Trunk Lid Opener Relay	Lower rear center of luggage compartment. See **Fig. 38**.

CIRCUIT PROTECTION DEVICES

CIRCUIT PROTECTION DEVICES LOCATION

Component	Location
Fuse Block	Behind left end of dash. See **Fig. 9**.
Relay & Main Fuse Block	Left side of engine compartment. See **Fig. 4**.

CONTROL UNITS

CONTROL UNITS LOCATION

Component	Location
ABS HU/CM	Right front of engine compartment. See **Fig. 16**.
DRL Control Module	Behind left side of dash. See **Fig. 40**.
DSC HU/CM	Right front of engine compartment. See **Fig. 17**.
Flasher Control Module	Behind left side of dash. See **Fig. 41**.

Keyless Control Module	Behind left end of dash. See **Fig. 32**.
PCM	Left front corner of engine compartment. See **Fig. 9**.
Power Retractable Hardtop Control Module	Left side of retractable top storage compartment. See **Fig. 57**.
SAS Control Module	Under front of center console. See **Fig. 24**.
Seat Weight Sensor Control Module	Under passenger seat. See **Fig. 27**.
TCM	Behind left end of dash. See **Fig. 19**.

MOTORS

MOTORS LOCATION

Component	Location
Airflow Mode Actuator	Behind center of dash. See **Fig. 22**.
Air Intake Actuator	Behind right side of dash. See **Fig. 22**.
Blower Motor	Integral to blower unit, behind right side of dash. See **Fig. 21**.
Cooling Fan Motor	Behind radiator. See **Fig. 5**.
Deck Panel Motor (Left)	Left side of retractable top storage compartment. See **Fig. 54**.
Deck Panel Motor (Right)	Right side of retractable top storage compartment. See **Fig. 52**.
Evaporative System Leak Detection Pump	Under rear center of vehicle. See **Fig. 14**.
Front Door Lock Actuator (Left/Right)	In respective front door. See **Fig. 36**.
Fuel Pump Unit	Under rear center of vehicle. See **Fig. 6**.
Mix Air Actuator	Behind right side of dash. See **Fig. 22**.
Power Outer Mirror (Left/Right)	On front respective door. See **Fig. 30**.
Power Window Motor (Left/Right)	In respective front door. See **Fig. 29**.
Roof Motor (Left)	Left side of retractable top storage compartment. See **Fig. 58**.
Roof Motor (Right)	Right Side Of Retractable Top Storage Compartment. See **Fig. 50**.
Starter	Lower left side of engine. See **Fig. 8**.
Trunk Lid Opener	Lower rear center of luggage compartment lid. See **Fig. 38**.
Washer Motor	On washer fluid reservoir. See **Fig. 43**.
Wiper Motor	On left side of firewall. See **Fig. 43**.

SENDING UNITS & SENSORS

SENDING UNITS & SENSORS LOCATION

Component	Location
ABS Wheel-Speed Sensor (Left Front)	At left front wheel. See **Fig. 16**.
ABS Wheel-Speed Sensor (Left Rear)	At left rear wheel. See **Fig. 16**.
ABS Wheel-Speed Sensor (Right Front)	At right front wheel. See **Fig. 16**.
ABS Wheel-Speed Sensor (Right Rear)	At right rear wheel. See **Fig. 16**.
Accelerator Pedal Position Sensor	Top of accelerator pedal assembly. See **Fig. 11**.

Brake Fluid Level Sensor	In brake fluid reservoir. See **Fig. 46**.
Camshaft Position Sensor	Right rear of engine. See **Fig. 12**.
Combined Sensor	Under rear of center console. See **Fig. 18**.
Crankshaft Position Sensor	On front of engine. See **Fig. 12**.
Crash Zone Sensor	At front center of engine compartment. See **Fig. 24**.
Driver-Side Side Air Bag Sensor	Near base of left "B" pillar. See **Fig. 25**.
Engine Coolant Temperature Sensor	Top rear of engine. See **Fig. 13**.
Evaporator Temperature Sensor	Behind right side of dash. See **Fig. 22**.
Heated Oxygen Sensor (Front)	Upstream side of catalytic converter. See **Fig. 10**.
Heated Oxygen Sensor (Rear)	Downstream side of catalytic converter. See **Fig. 10**.
Knock Sensor	Left front of engine. See **Fig. 10**.
Manifold Absolute Pressure Sensor	Left rear of engine. See **Fig. 13**.
Mass Air Flow Sensor	Near left front corner of engine. See **Fig. 11**.
Passenger-Side Side Air Bag Sensor	Near base of right "B" pillar. See **Fig. 25**.
Seat Track Position Sensor	Under driver's seat. See **Fig. 26**.
Seat Weight Sensor (Left/Right)	Under respective side of passenger seat. See **Fig. 27**.
Steering Angle Sensor	In steering column. See **Fig. 17**.
Throttle Position Sensor	Left front of engine. See **Fig. 12**.
Transmission Fluid Temperature Sensor	Inside valve control body on transmission. See **Fig. 20**.
Turbine Sensor	On transmission. See **Fig. 19**.
Vehicle Speedometer Sensor	On transmission or transaxle. See **Fig. 13**.

SOLENOIDS & SOLENOID VALVES

SOLENOIDS & SOLENOID VALVES LOCATION

Component	Location
EGR Valve	Rear of engine. See **Fig. 12**.
Fuel Injectors No. 1, 2, 3 & 4	Top of engine. See **Fig. 13**.
Line Pressure Control Solenoid	Inside valve control body on transmission. See **Fig. 20**.
Magnetic Clutch	Left front of engine, on A/C compressor. See **Fig. 23**.
Oil Control Valve	Right front of engine. See **Fig. 12**.
Purge Solenoid Valve	Left side of engine compartment. See **Fig. 12**.
Shift Solenoids A, B, C, D, E, F & G	Inside valve control body on transmission. See **Fig. 20**.
TCC Control Solenoid	Inside valve control body on transmission. See **Fig. 20**.
Variable Intake Air Solenoid Valve	Left side of engine. See **Fig. 12**.

SWITCHES

SWITCHES LOCATION

Component	Location
Back-Up Light Switch	On transmission. See **Fig. 42**.

Brake Switch	Top of brake pedal assembly. See **Fig. 14**.
Buckle Switch (Left/Right)	On respective seat belt buckle. See **Fig. 26**.
Clutch Pedal Position Switch	Top of clutch pedal assembly. See **Fig. 14**.
Deck Panel Limit Switch	Right side of retractable top storage compartment. See **Fig. 53**.
Door Lock-Link Switch (Left)	In driver's door. See **Fig. 34**.
Door Lock-Link Switch (Right)	In passenger door. See **Fig. 36**.
Door Switch (Left/Right)	On respective "B" pillar. See **Fig. 48**.
Hood Latch Switch	Center front of engine compartment. See **Fig. 36**.
Key Reminder Switch	On steering column. See **Fig. 45**.
Neutral Switch	On transmission. See **Fig. 14**.
Oil Pressure Switch	On left side of engine. See **Fig. 47**.
Parking Brake Switch	At base of parking brake lever. See **Fig. 47**.
Power Retractable Hardtop Limit Switch	Right side of retractable top storage compartment. See **Fig. 51**.
Power Steering Pressure Switch	Left front of engine. See **Fig. 13**.
Refrigerant Pressure Switch	Right front of engine compartment. See **Fig. 21**.
Starter Interlock Switch	Behind left side of dash. See **Fig. 8**.
Transmission Range Switch	On transmission. See **Fig. 8**.
Trunk Compartment Light Switch	Right rear of luggage compartment. See **Fig. 39**.
Trunk Lid Opener Cancel Switch	Lower center rear of luggage compartment. See **Fig. 38**.

MISCELLANEOUS

MISCELLANEOUS LOCATION

Component	Location
Audio Amplifier	Right side of luggage compartment. See **Fig. 44**.
Check Connector	In relay & main fuse block. See **Fig. 1**.
Clock Spring	In steering column. See **Fig. 24**.
Coil Antenna (Immobilizer)	In steering column. See **Fig. 37**.
Condenser (Ignition)	Right rear of engine. See **Fig. 10**.
Condenser (Rear Window Defogger)	At left "B" pillar. See **Fig. 28**.
Data Link Connector 2	Under lower left side of dash. See **Fig. 4**.
Driver-Side Air Bag Module	In steering wheel. See **Fig. 24**.
Driver-Side Pre-Tensioner Seat Belt	Near base of left "B" pillar. See **Fig. 25**.
Driver-Side Side Air Bag Module	In driver's seat. See **Fig. 25**.
Filament (Rear Window Defogger)	Left side of rear window. See **Fig. 28**.
Generator	Right front of engine. See **Fig. 7**.
Horn	Behind left side of front bumper. See **Fig. 49**.
Ignition Coils No. 1, 2, 3 & 4	Top of engine. See **Fig. 10**.
Joint Connector (C-18)	Behind left end of dash. See **Fig. 15**.
Joint Connector (C-19)	Behind left end of dash. See **Fig. 15**.

Joint Connector (C-20)	Behind center of dash. See **Fig. 15**.
Joint Connector (C-21)	Right front of luggage compartment. See **Fig. 44**.
Joint Connector (C-22)	Left side of retractable top storage compartment. See **Fig. 56**.
Keyless Antenna (Center)	Under center console. See **Fig. 33**.
Keyless Antenna (Instrument Panel)	Behind right end of dash. See **Fig. 35**.
Keyless Antenna (Left/Right)	In respective door. See **Fig. 34**.
Keyless Antenna (Rear)	Center rear of luggage compartment. See **Fig. 34**.
Keyless Antenna (Rear No. 2)	Rear of center console. See **Fig. 33**.
Keyless Antenna (Trunk)	Front of luggage compartment. See **Fig. 33**.
Keyless Receiver	Behind right side of dash. See **Fig. 35**.
Keyless Receiver (Rear)	Front of luggage compartment. See **Fig. 32**.
Passenger-Side Air Bag Module	Behind right side of dash. See **Fig. 24**.
Passenger-Side Pre-Tensioner Seat Belt	Near base of right "B" pillar. See **Fig. 25**.
Passenger-Side Side Air Bag Module	In passenger's seat. See **Fig. 25**.
Power Metal Oxide Semiconductor Field Effect Transistor (Power MOS FET)	Behind right end of dash. See **Fig. 21**.
Seat Warmer (Left/Right)	In respective seat cushion. See **Fig. 31**.
Selector Lever Component	Under center console. See **Fig. 19**.
Transmission Fluid Temperature Connector	Behind left side of dash. See **Fig. 19**.

CONNECTORS

CONNECTORS LOCATION

Component	Location
C-02 (14 Pin)	Left side of engine. See **Fig. 10**.
C-03 (56 Pin)	Behind left side of dash. See **Fig. 4**.
C-04 (14 Pin)	Behind left side of dash. See **Fig. 4**.
C-05 (Except M/T) (Gray, 56 Pin)	Behind left kick panel. See **Fig. 9**.
C-05 (M/T) (Gray, 14 Pin)	Behind left kick panel. See **Fig. 9**.
C-06 (12 Pin)	Behind left kick panel. See **Fig. 4**.
C-08 (Except M/T) (56 Pin)	Behind left kick panel. See **Fig. 6**.
C-08 (M/T) (14 Pin)	Behind left kick panel. See **Fig. 6**.
C-10 (A/T) (Blue, 40 Pin)	Left side of engine compartment. See **Fig. 8**.
C-10 (M/T) (Gray, 14 Pin)	Left side of engine compartment. See **Fig. 8**.
C-11 (56 Pin)	Behind center of dash. See **Fig. 4**.
C-12 (Yellow, 4 Pin)	Behind center of dash. See **Fig. 24**.
C-13 (Yellow, 4 Pin)	Behind right kick panel. See **Fig. 24**.
C-14 (56 Pin)	Behind right end of dash. See **Fig. 44**.

C-15 (32 Pin)	Behind right kick panel. See **Fig. 29**.
C-16 (32 Pin)	Behind left kick panel. See **Fig. 29**.
C-17 (4 Pin)	Left side of luggage compartment. See **Fig. 34**.

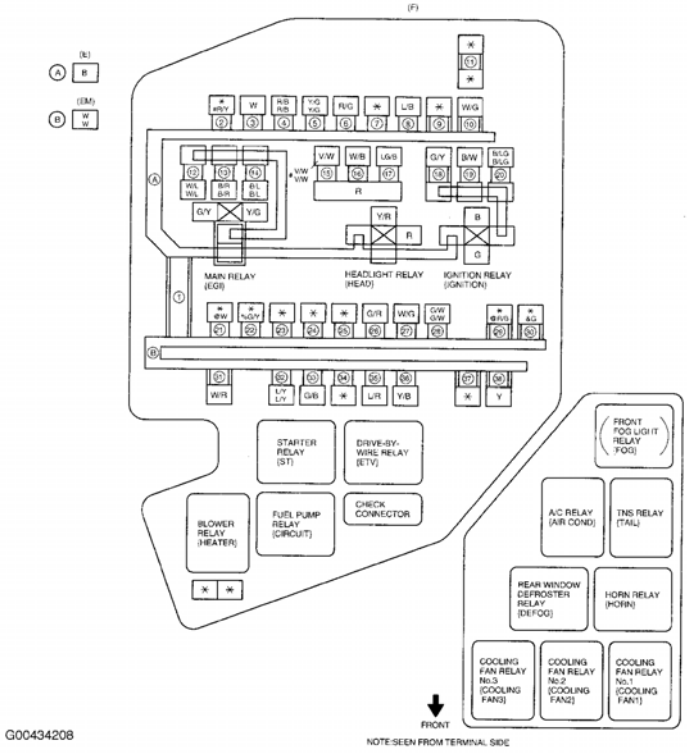
GROUNDS

GROUNDS LOCATION

Component	Location
G1	Left rear corner of engine compartment. See **Fig. 2**.
G2	Behind left kick panel. See **Fig. 2**.
G3	Left rear corner of engine compartment. See **Fig. 2**.
G4	Right rear corner of engine compartment. See **Fig. 2**.
G5	Behind left headlight assembly. See **Fig. 2**.
G6	Behind right headlight assembly. See **Fig. 2**.
G7	Center rear of engine compartment. See **Fig. 2**.
G8	Behind right side of dash. See **Fig. 3**.
G9	Behind left side of dash. See **Fig. 3**.
G10	Behind center of dash. See **Fig. 3**.
G11	Behind right kick panel. See **Fig. 3**.
G12	Under passenger's seat. See **Fig. 3**.
G13	Under front of center console. See **Fig. 3**.
G14	Under driver's seat. See **Fig. 3**.
G15	Under rear of center console. See **Fig. 3**.
G16	Base of left "B" pillar. See **Fig. 3**.
G17	Center rear of luggage compartment. See **Fig. 3**.
G18	Base of right "B" pillar. See **Fig. 2**.
G19	Left side of retractable top storage compartment. See **Fig. 59**.
G20	Left side of retractable top storage compartment. See **Fig. 55**.

COMPONENT LOCATION GRAPHICS

NOTE: Figures may show multiple component locations. Refer to appropriate table for proper figure references.



*...VACANT
%...WITH FRONT FOG LIGHT
@...WITH ABS, DSC
#...WITH DRL SYSTEM
&...WITH ADVANCED KEYLESS ENTRY & START SYSTEM AND KEYLESS ENTRY SYSTEM, BOSE

NO.	FUSE NAME	FUSE	NO.	FUSE NAME	FUSE
1	MAIN	120A	20	W/PEH	20A
2	(DRL)	15A	21	(ABS)	30A
3	HORN	15A	22	(FOG)	15A
4	STOP	10A	23	(R.FOG)	7.5A
5	ETV	10A	24	*	*
6	FUEL PUMP	15A	25	*	*
7	*	*	26	MAG	7.5A
8	HAZARD	10A	27	ST	20A
9	(P.WIND2)	20A	28	TAIL	15A
10	IG KEY1	40A	29	(ABS)	40A
11	*	*	30	(BTN)	30A
12	EGI INJ	10A	31	FAN	30A
13	EGI COMP1	10A	32	FAN	7.5A
14	EGI COMP2	10A	33	DEFOG	20A
15	HEAD LOW L	15A	34	(HICLEAN)	20A
16	HEAD LOW R	15A	35	ROOM	15A
17	HEAD	15A	36	IG KEY2	15A
18	(P.WIND)	20A	37	*	*
19	ENGINE	15A	38	HEATER	40A

( )NAME INDICATED ON FUSE BOX COVER
( )IF EQUIPPED

Fig. 1: Relay & Main Fuse Block
Courtesy of MAZDA MOTORS CORP.

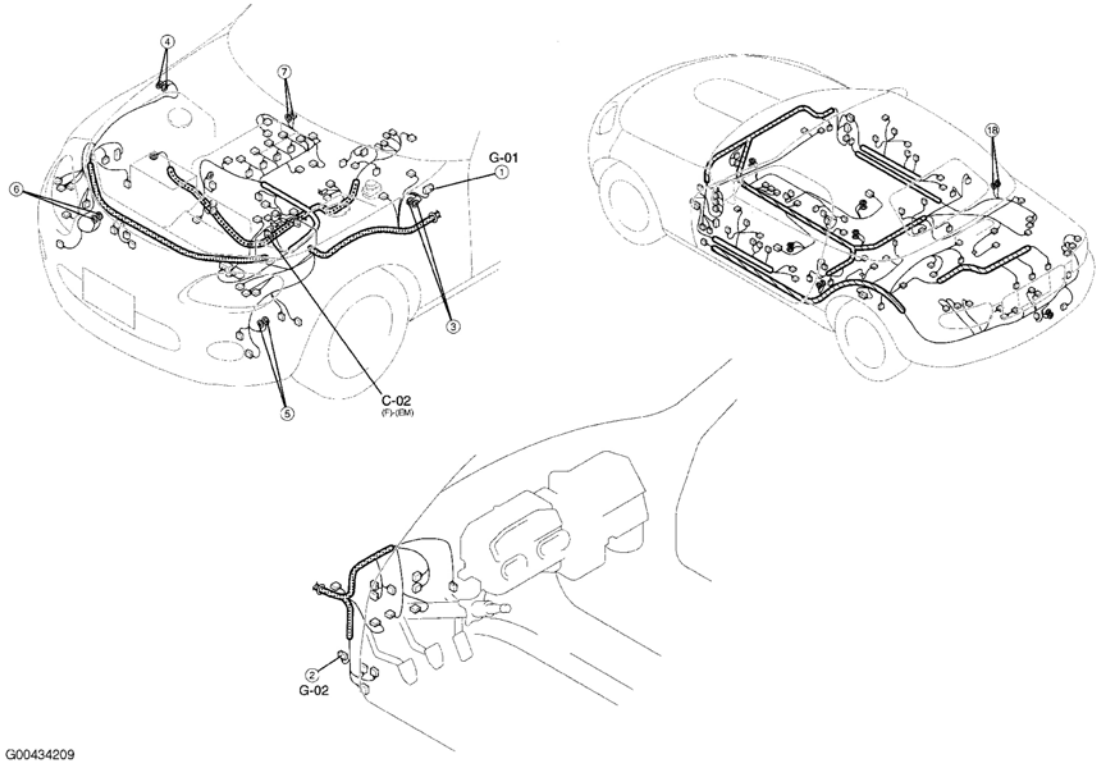


Fig. 2: Ground System
Courtesy of MAZDA MOTORS CORP.

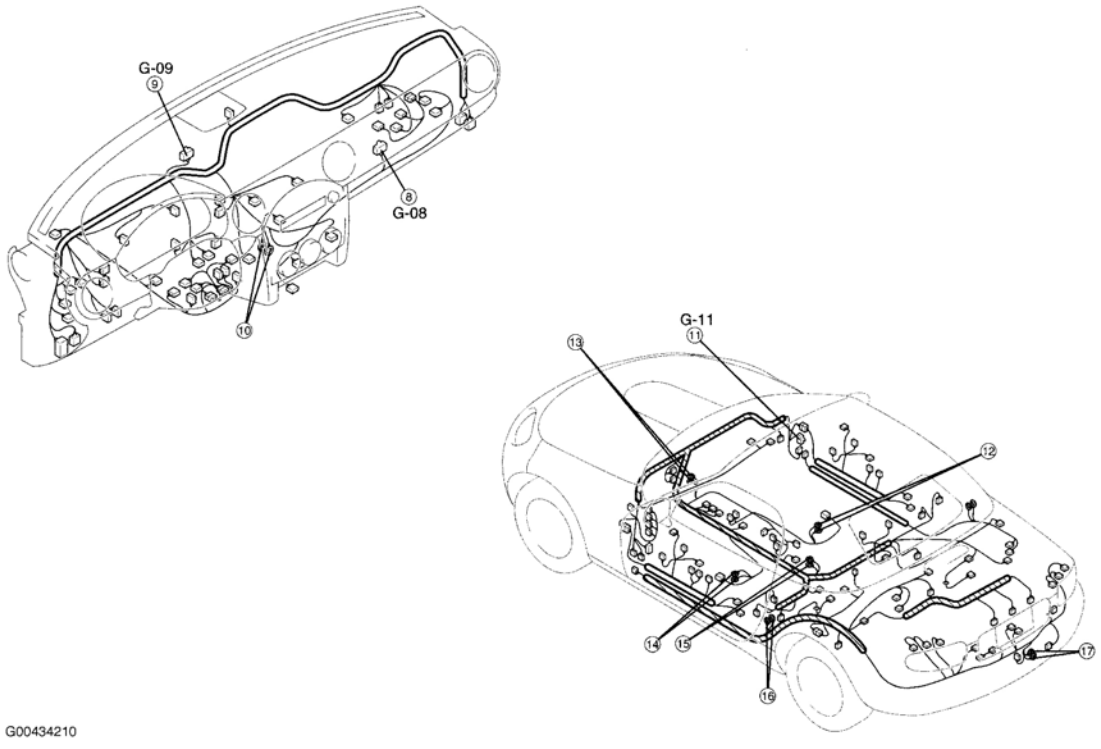


Fig. 3: Ground System
Courtesy of MAZDA MOTORS CORP.

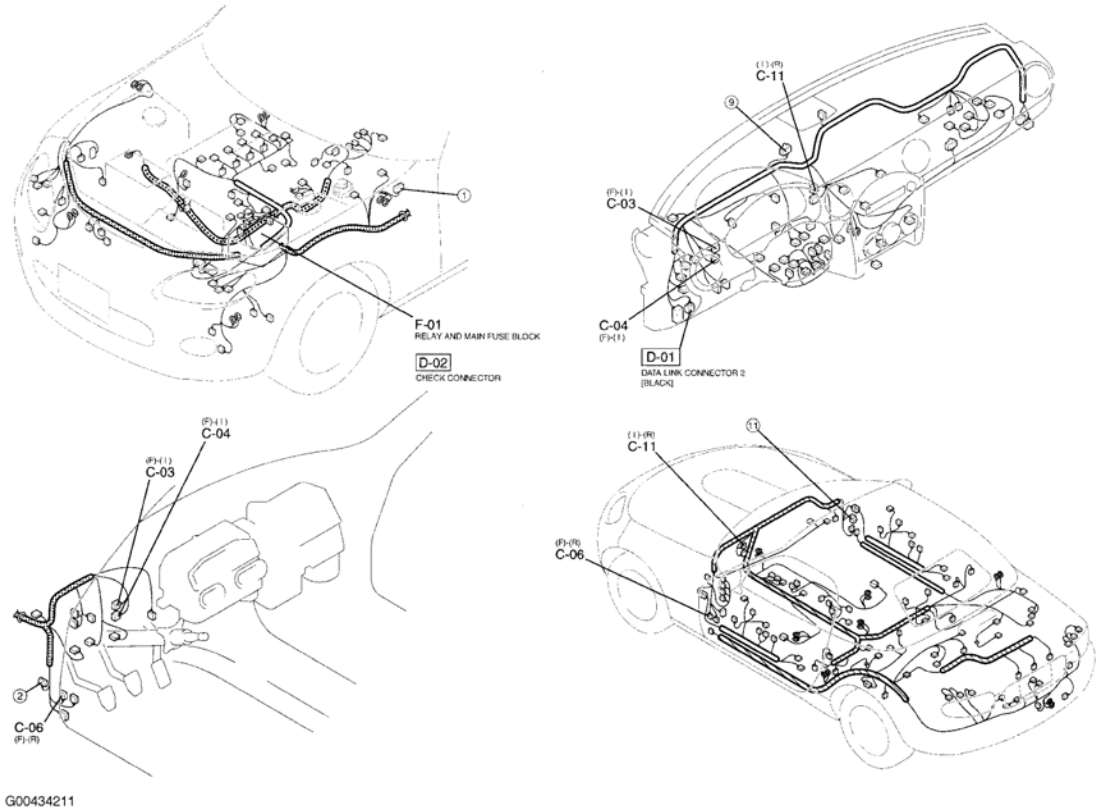


Fig. 4: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

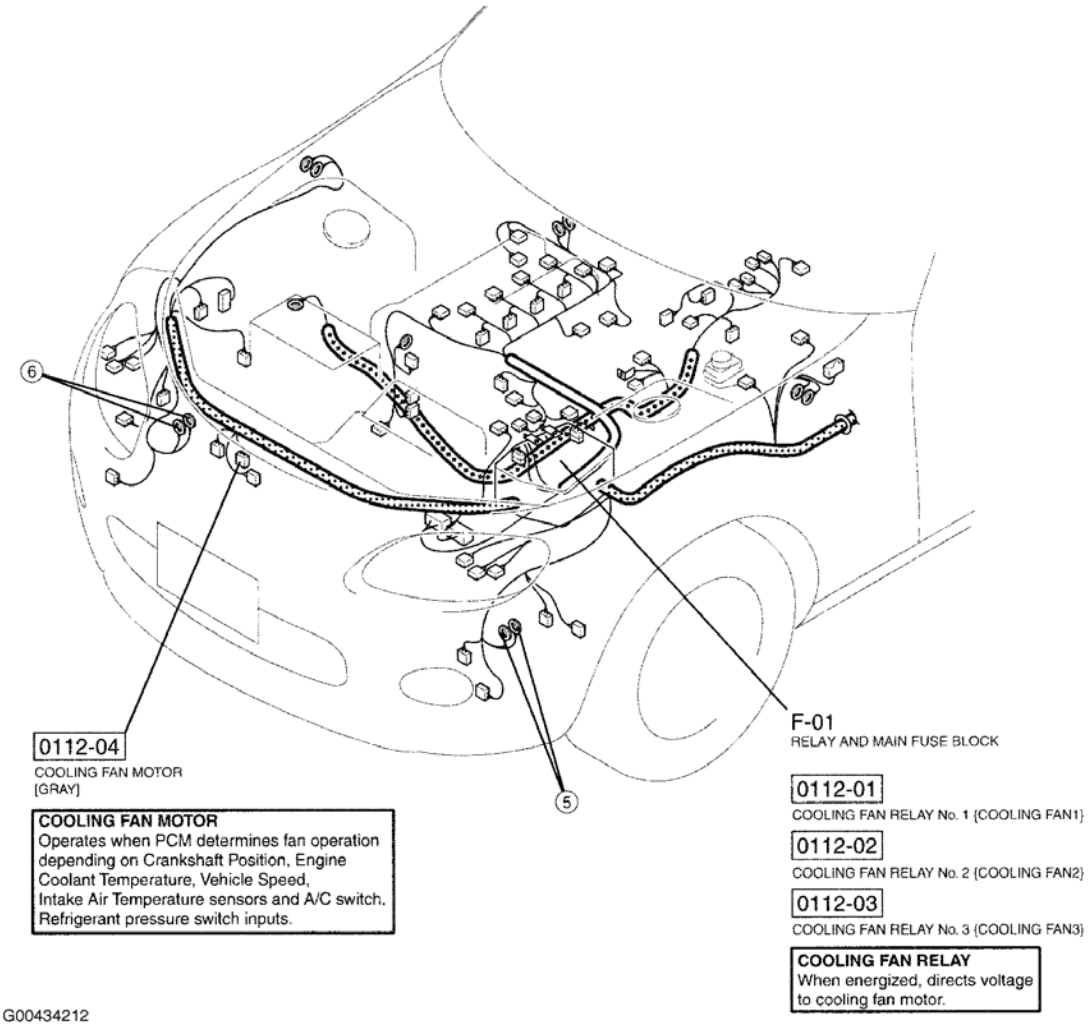


Fig. 5: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

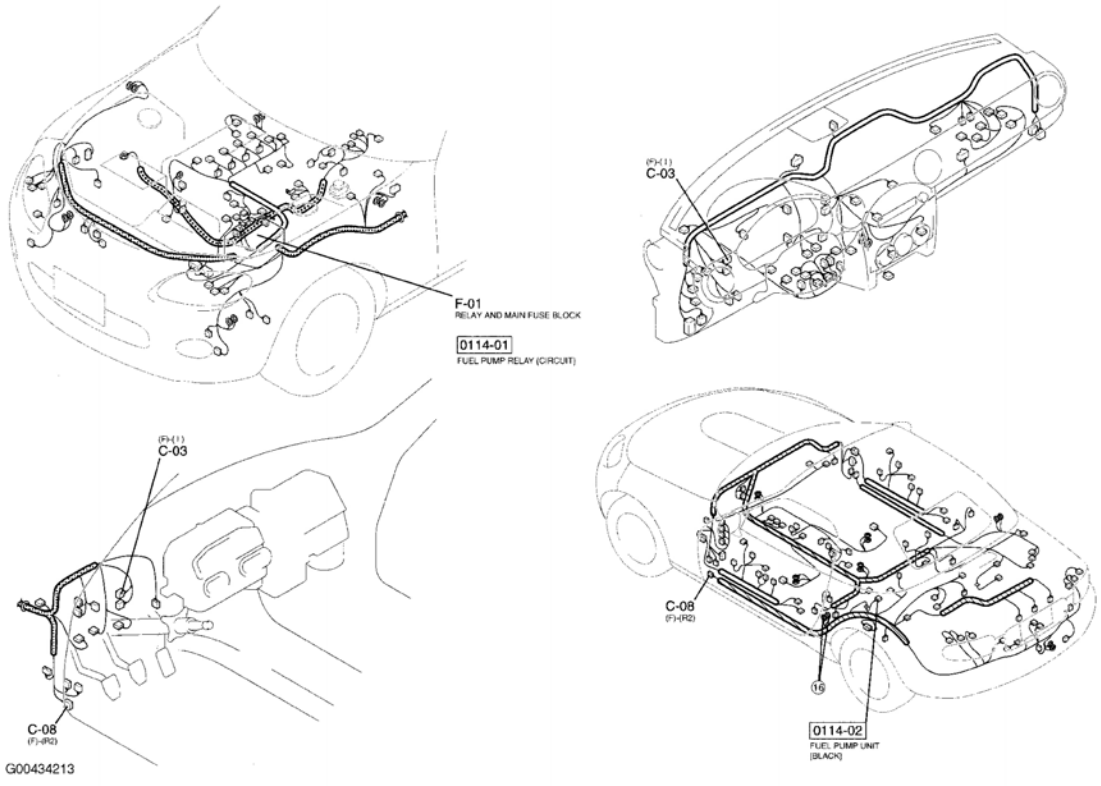


Fig. 6: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

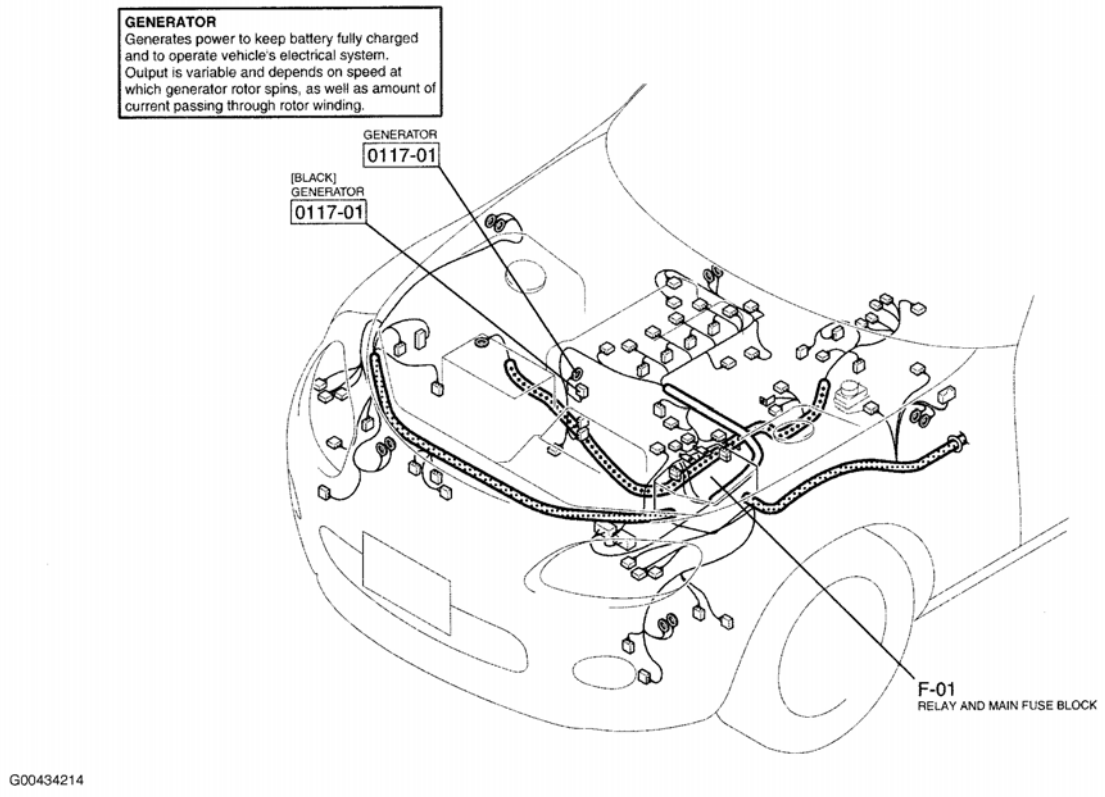


Fig. 7: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

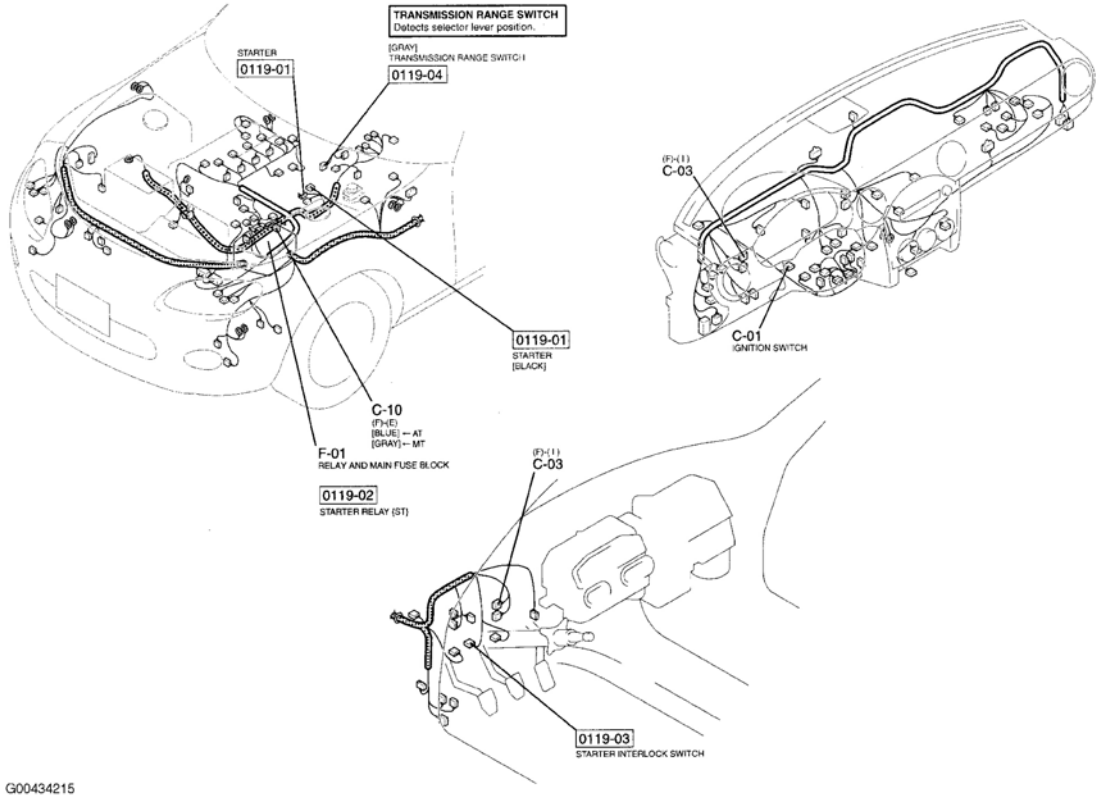


Fig. 8: Dash & Engine Compartment
Courtesy of MAZDA MOTORS CORP.

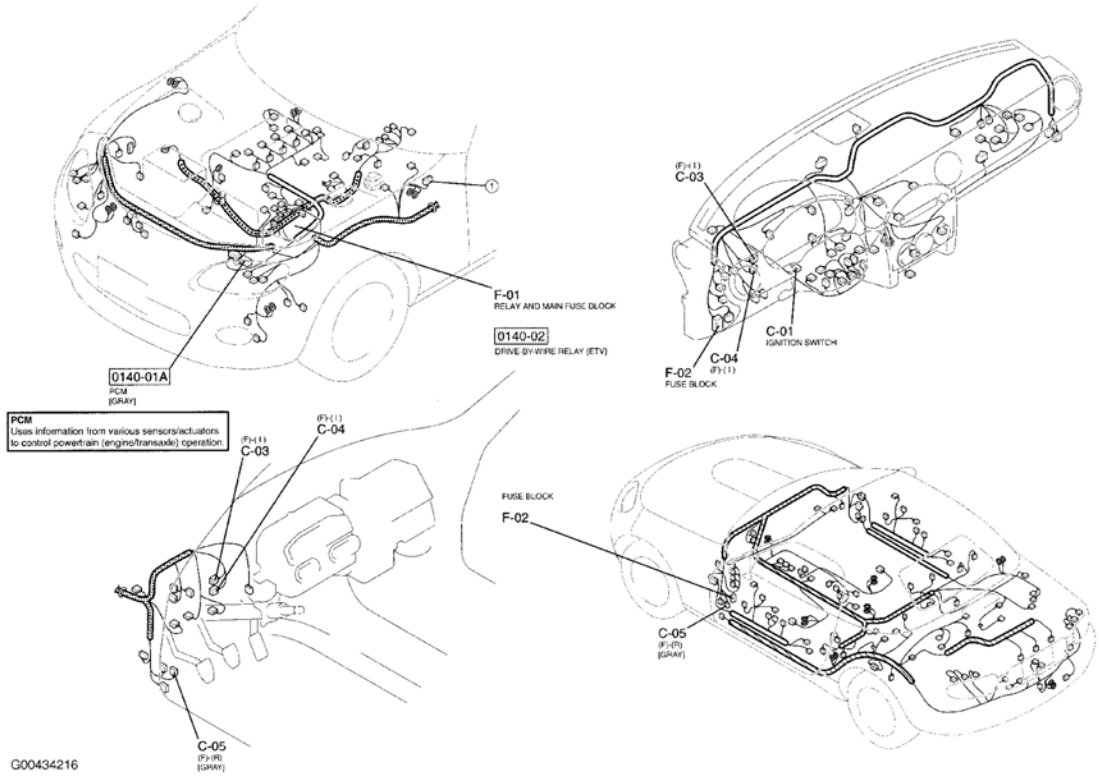


Fig. 9: Engine Control System
Courtesy of MAZDA MOTORS CORP.

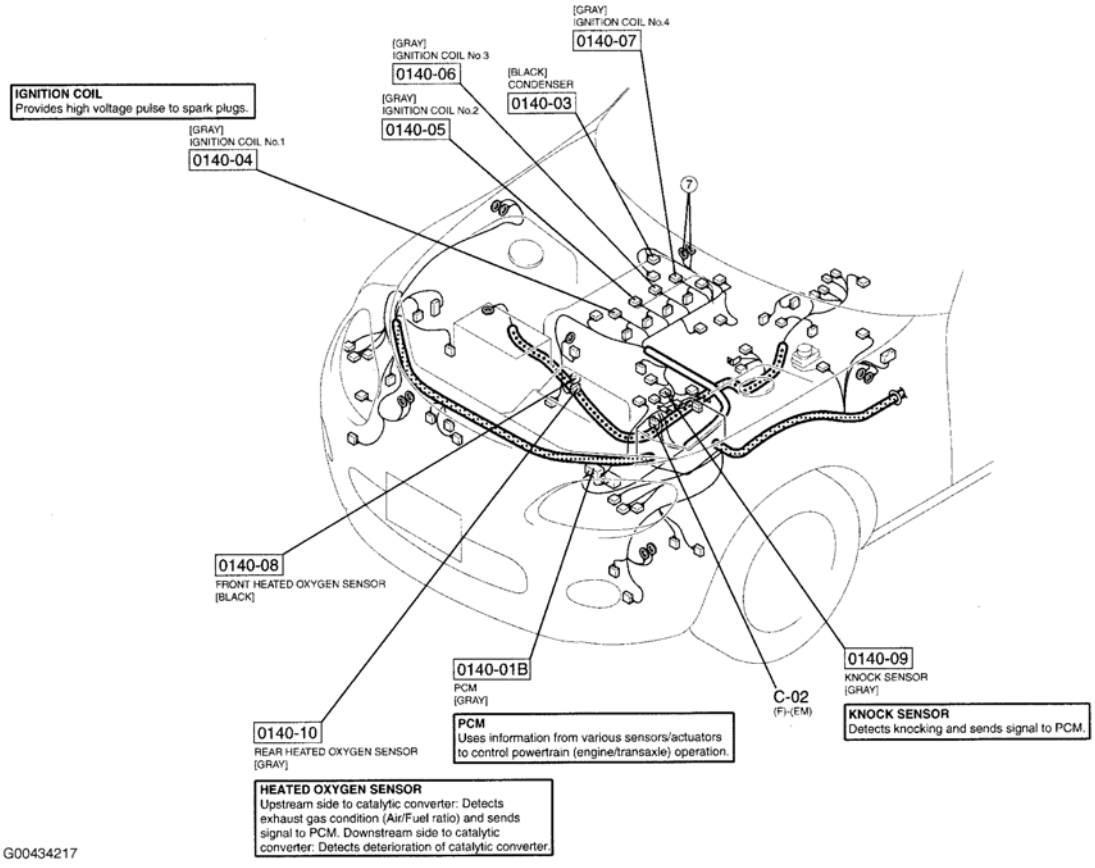


Fig. 10: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

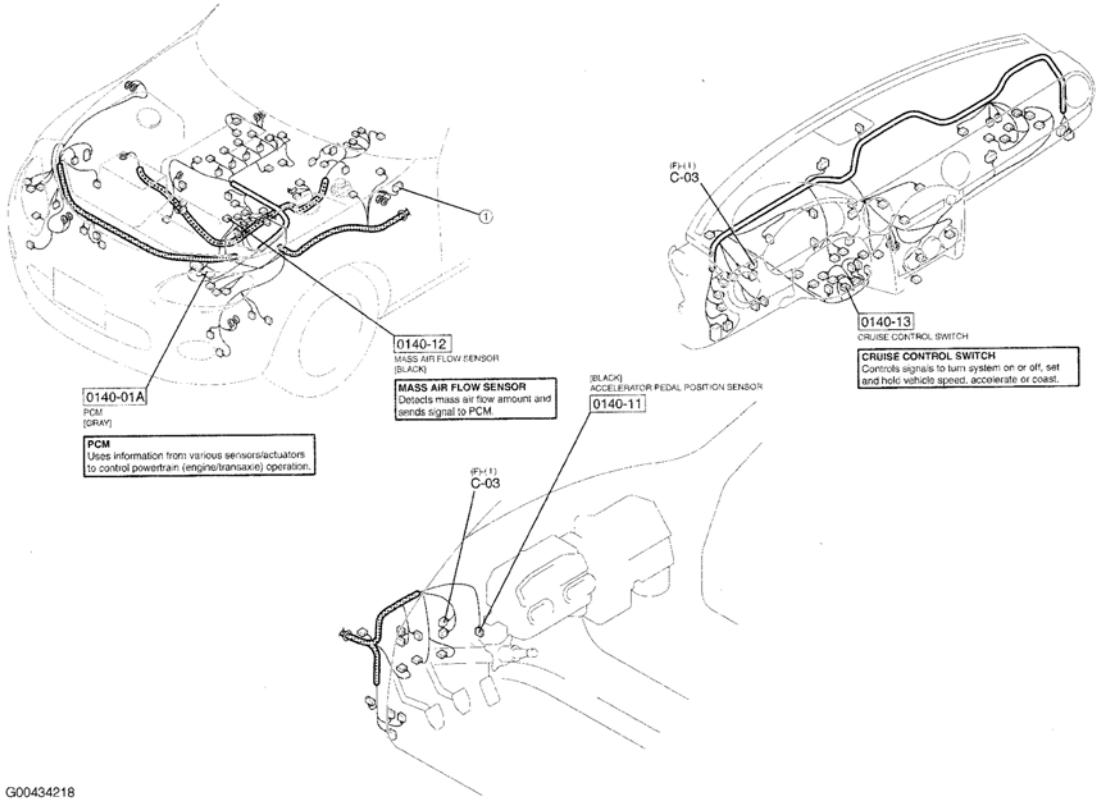


Fig. 11: Dash & Engine Compartment
Courtesy of MAZDA MOTORS CORP.

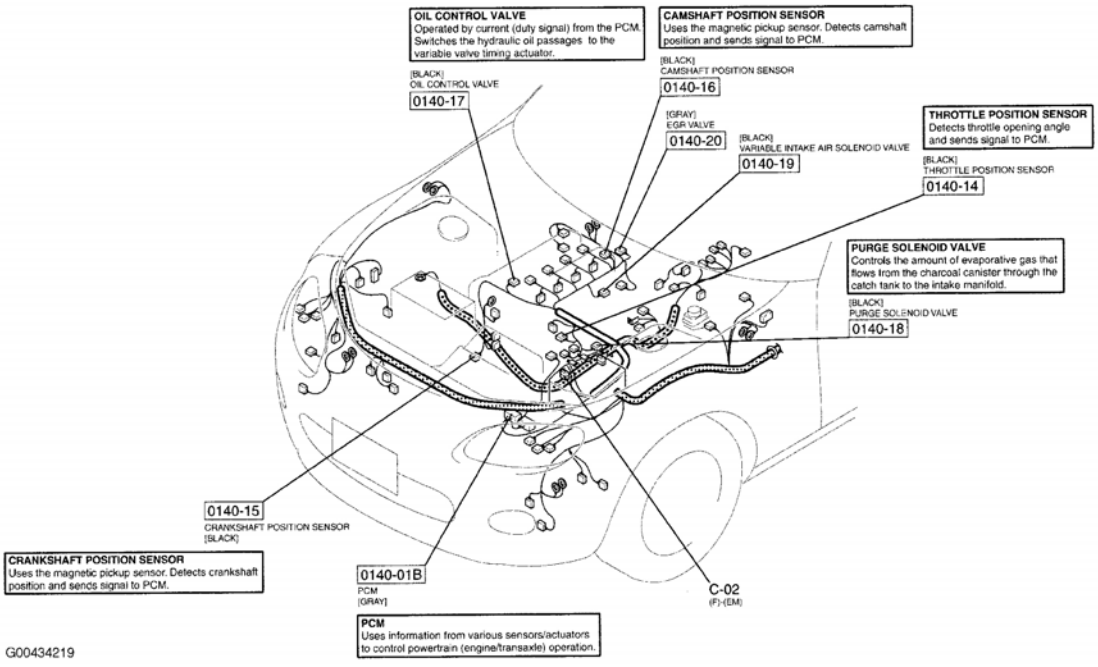


Fig. 12: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

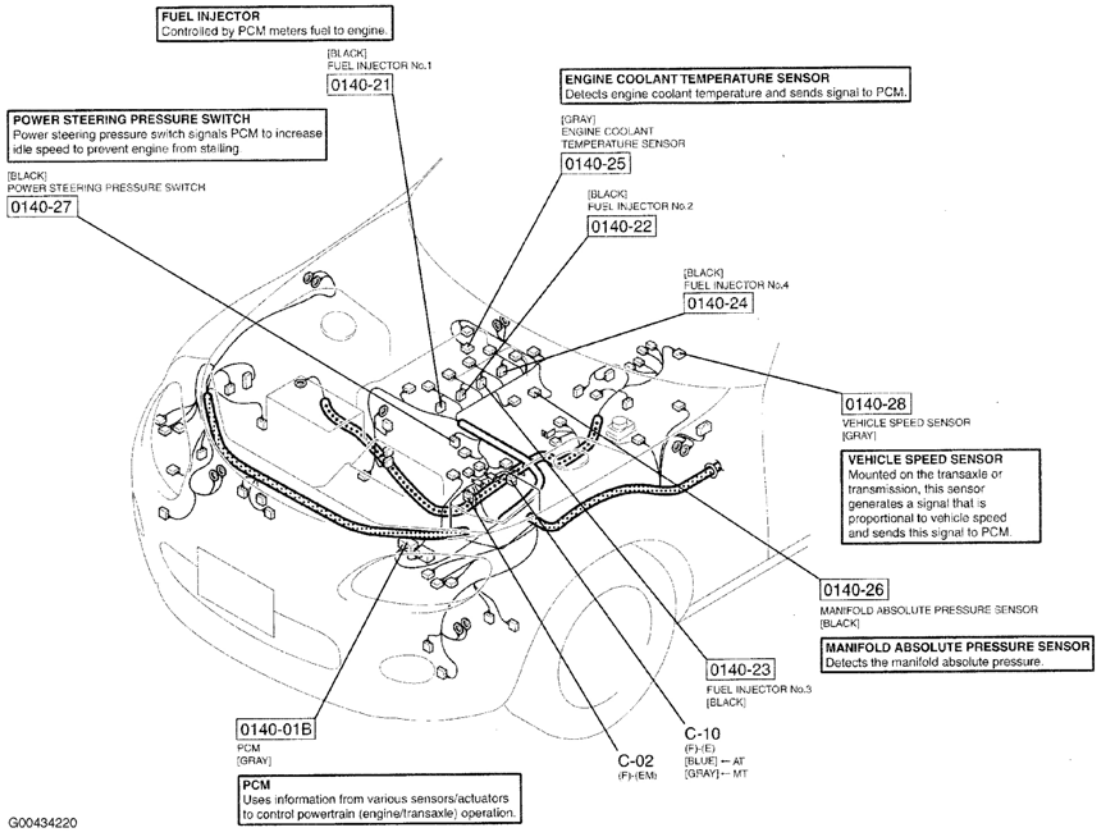


Fig. 13: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

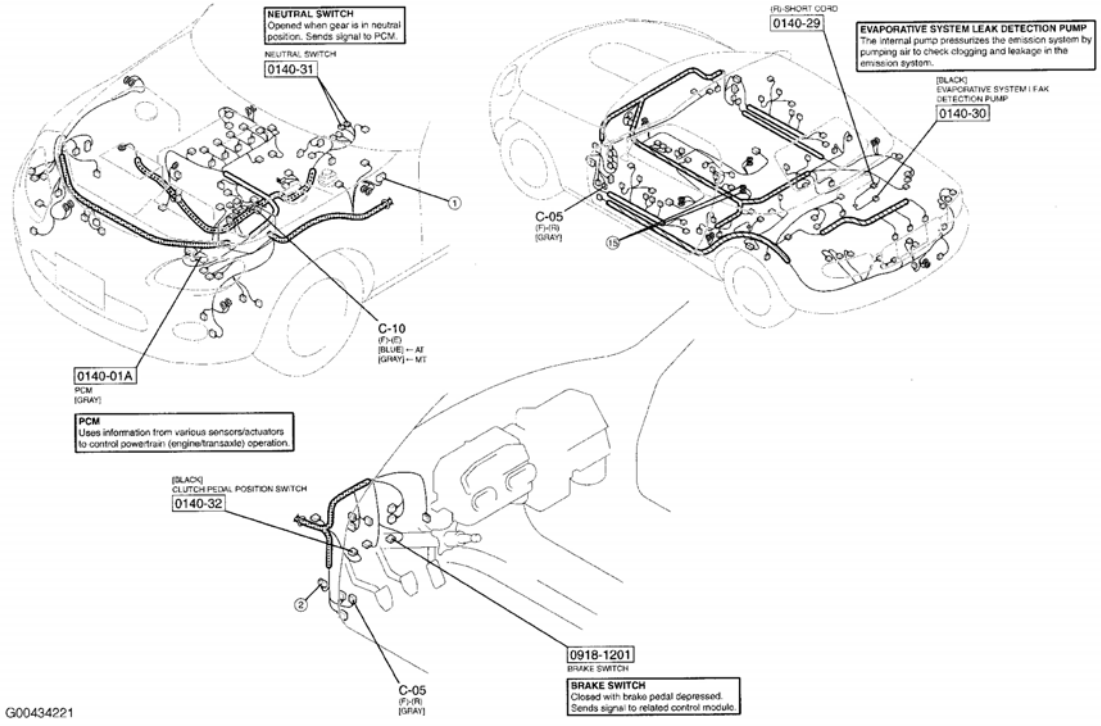


Fig. 14: Engine Control System
Courtesy of MAZDA MOTORS CORP.

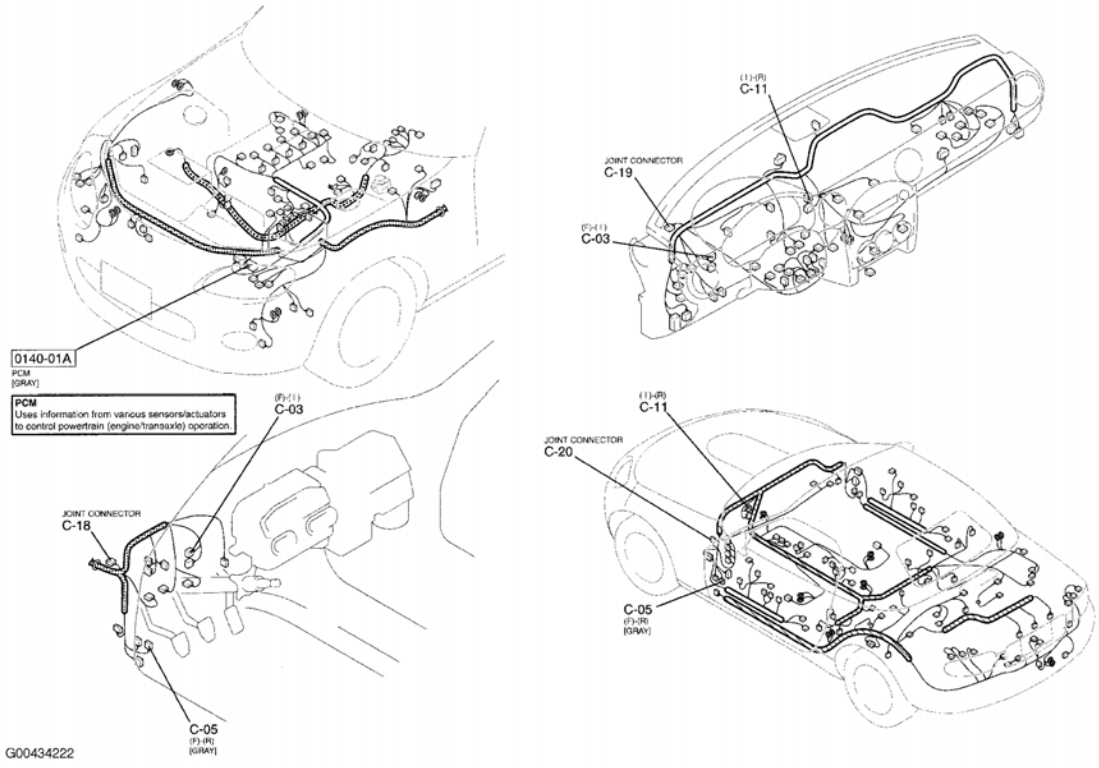


Fig. 15: Dash & Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

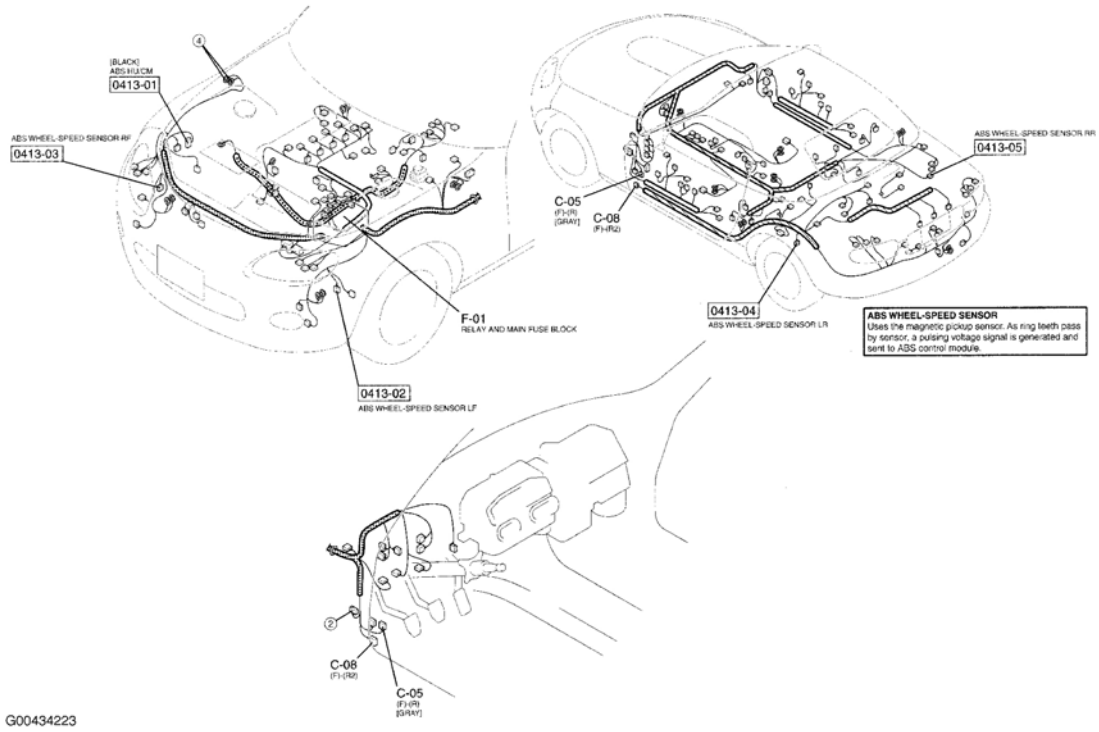


Fig. 16: Engine Compartment & Rear Of Vehicle
Courtesy of MAZDA MOTORS CORP.

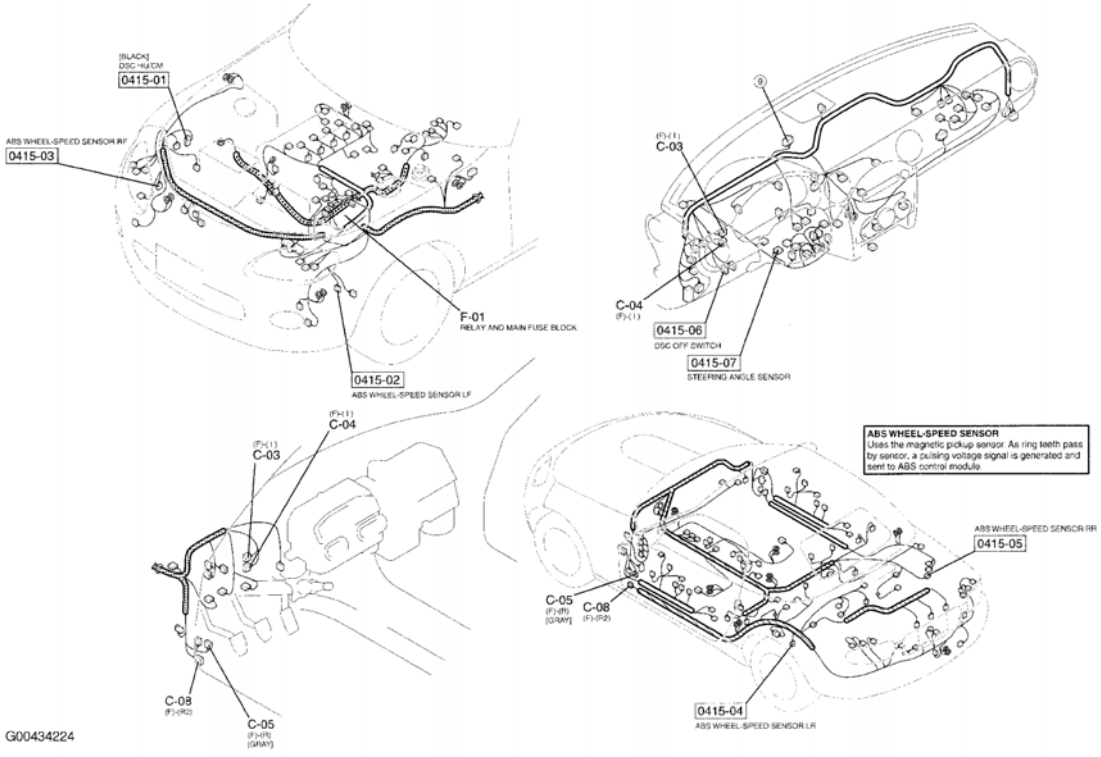


Fig. 17: Dash & Engine Compartment
Courtesy of MAZDA MOTORS CORP.

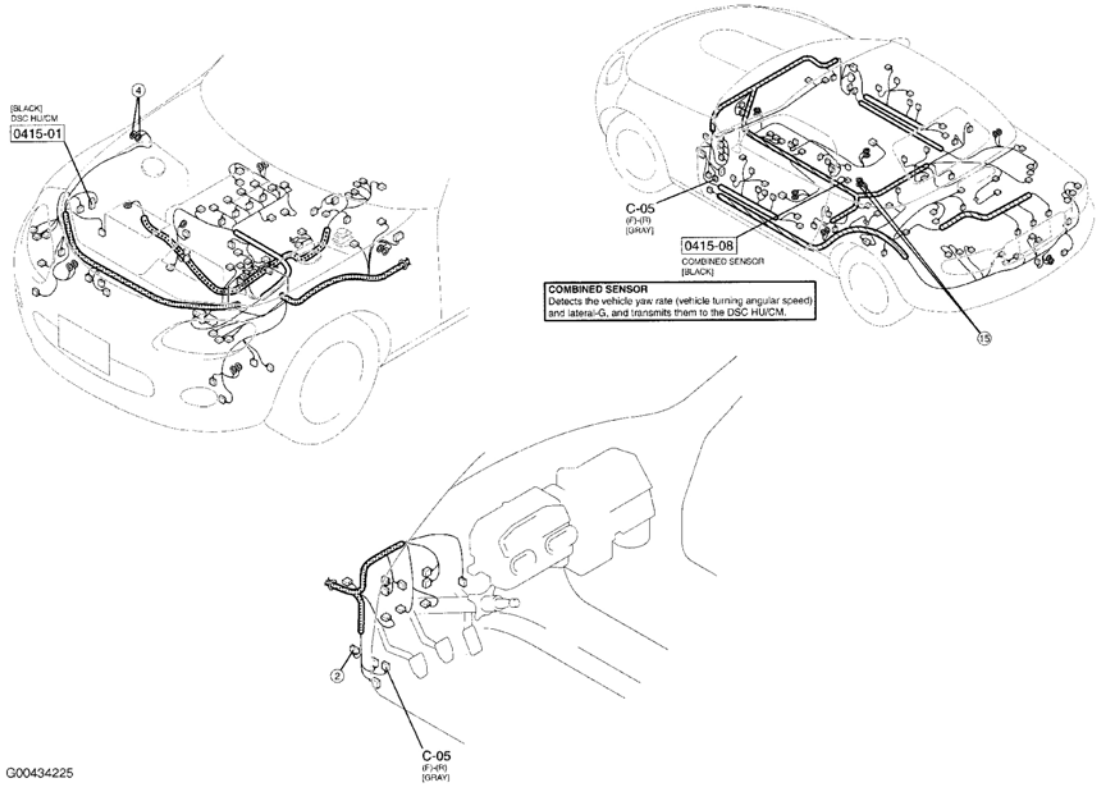


Fig. 18: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

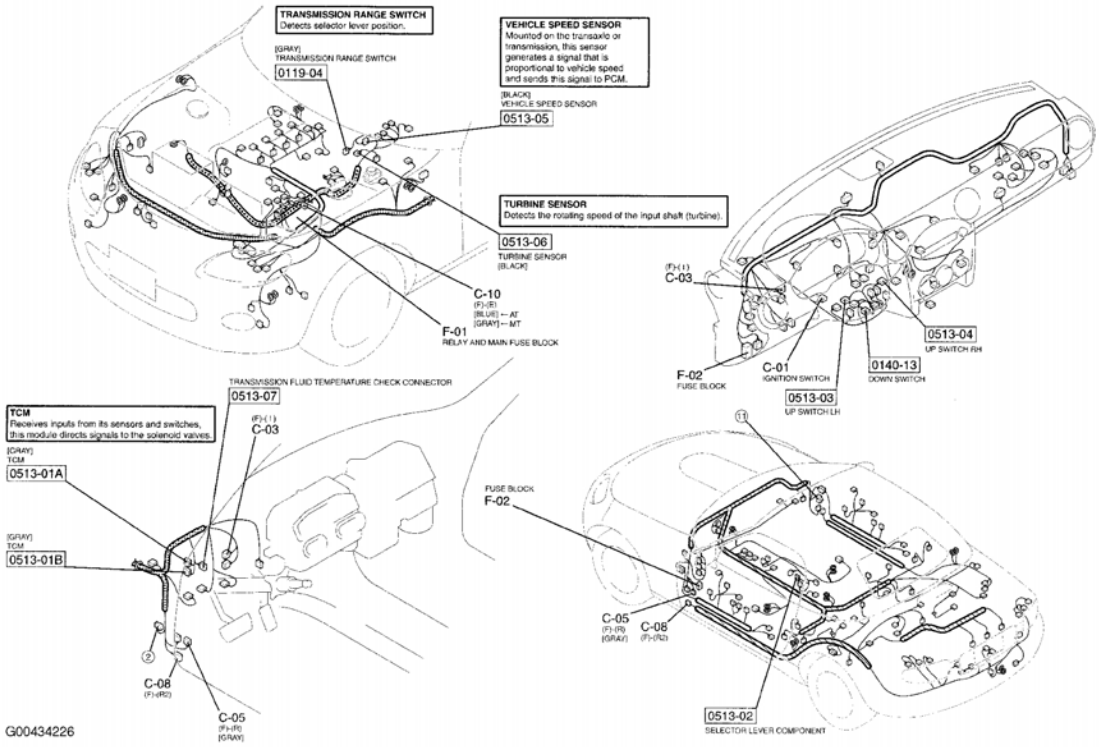


Fig. 19: Automatic Transmission Control System
Courtesy of MAZDA MOTORS CORP.

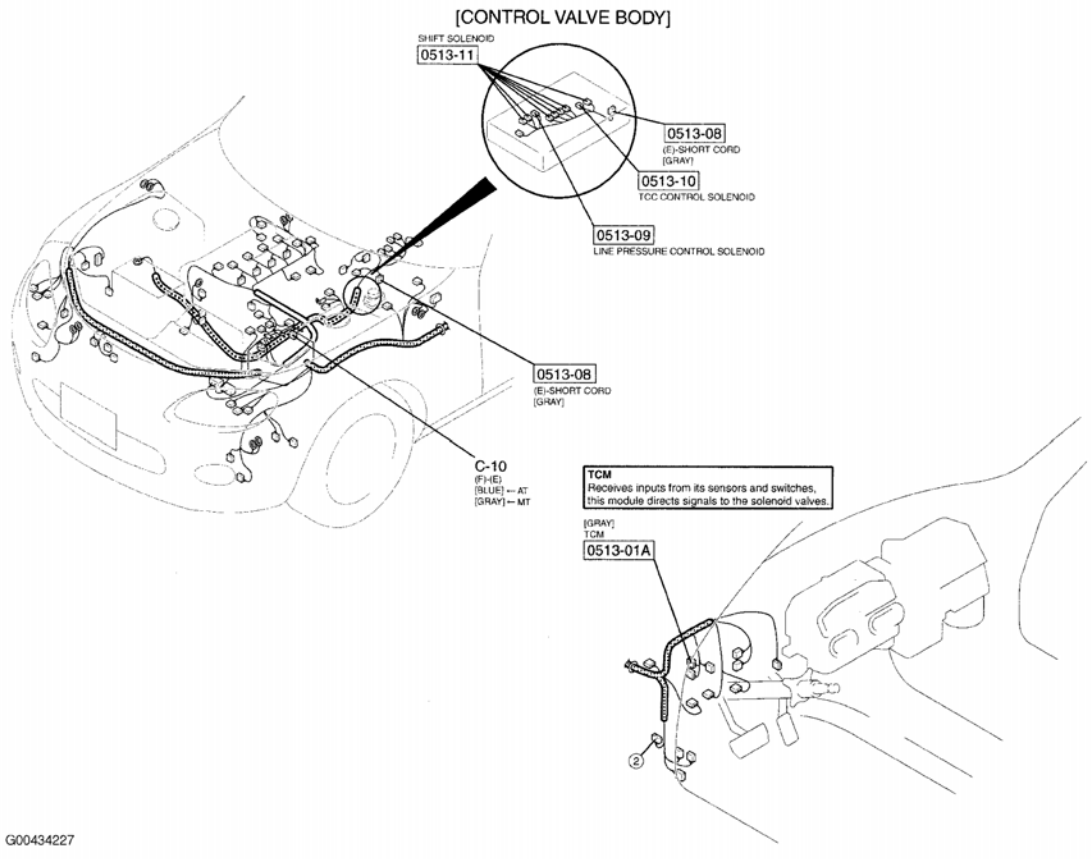


Fig. 20: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

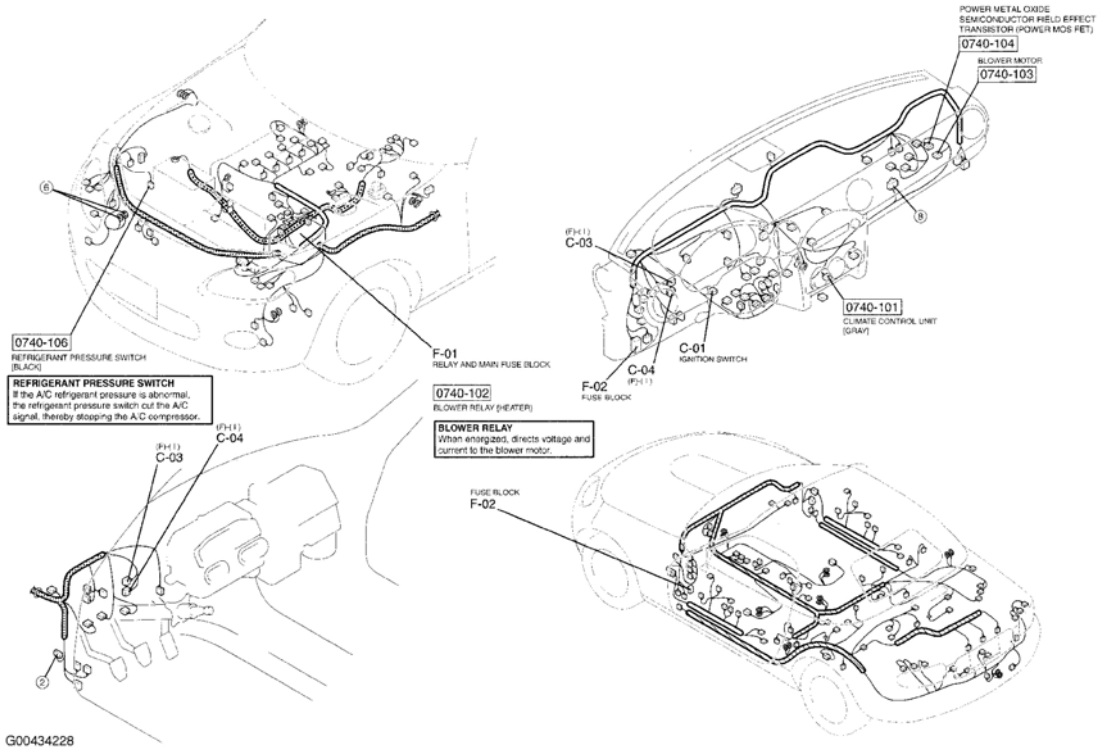


Fig. 21: Dash & Engine Compartment
Courtesy of MAZDA MOTORS CORP.

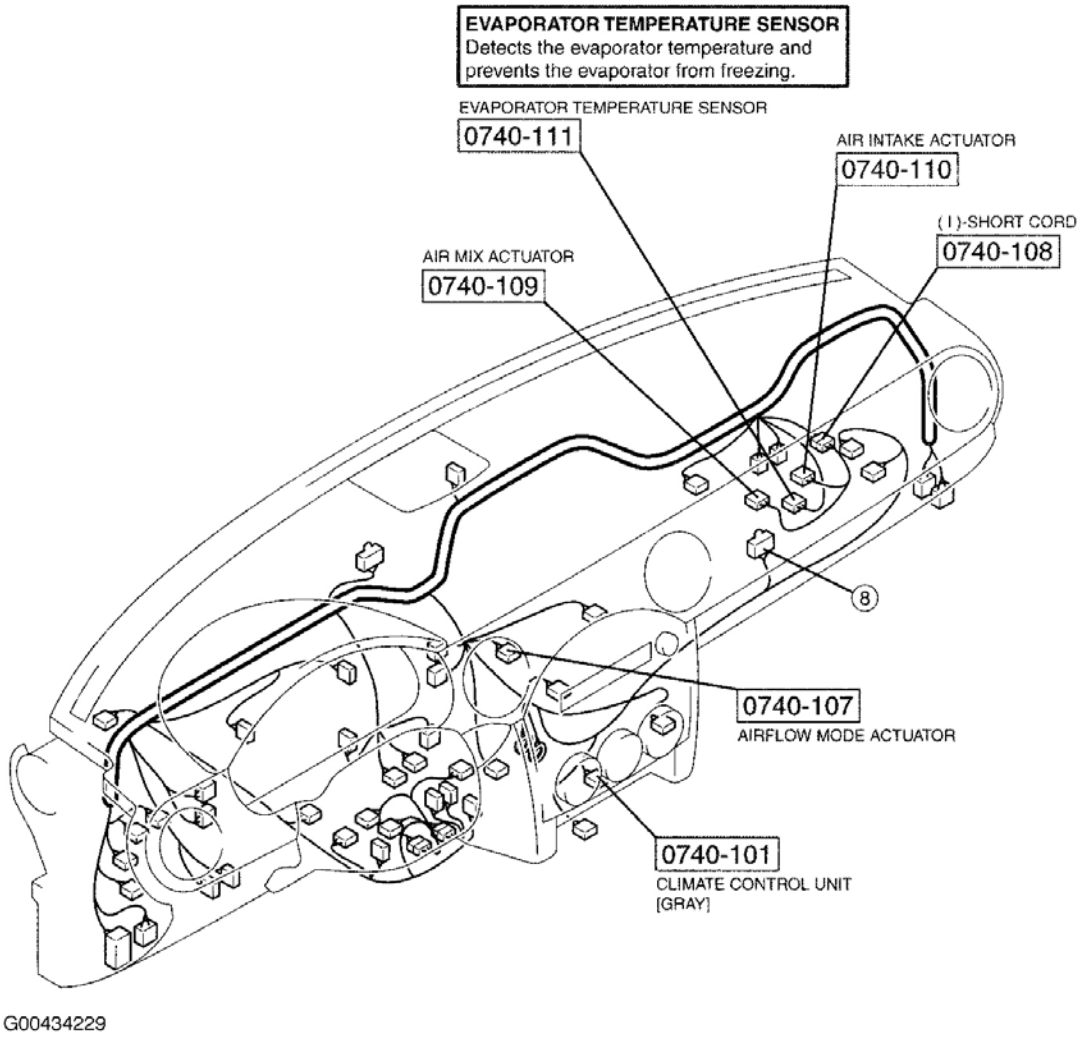


Fig. 22: Dash
Courtesy of MAZDA MOTORS CORP.

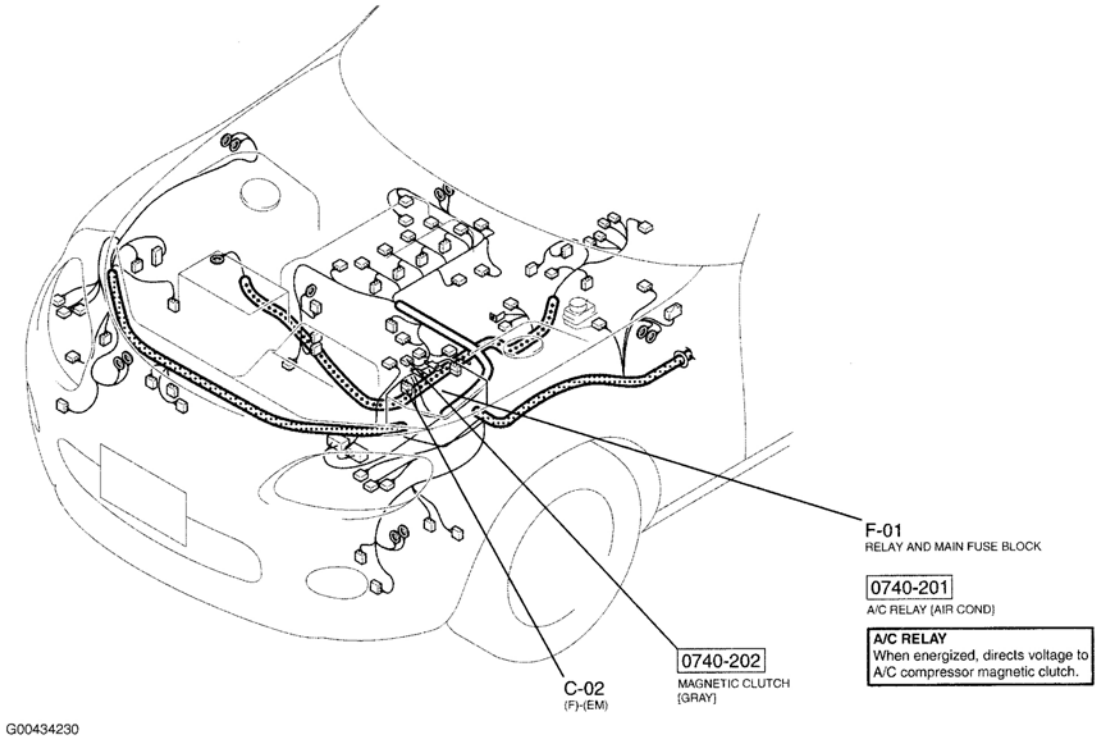


Fig. 23: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

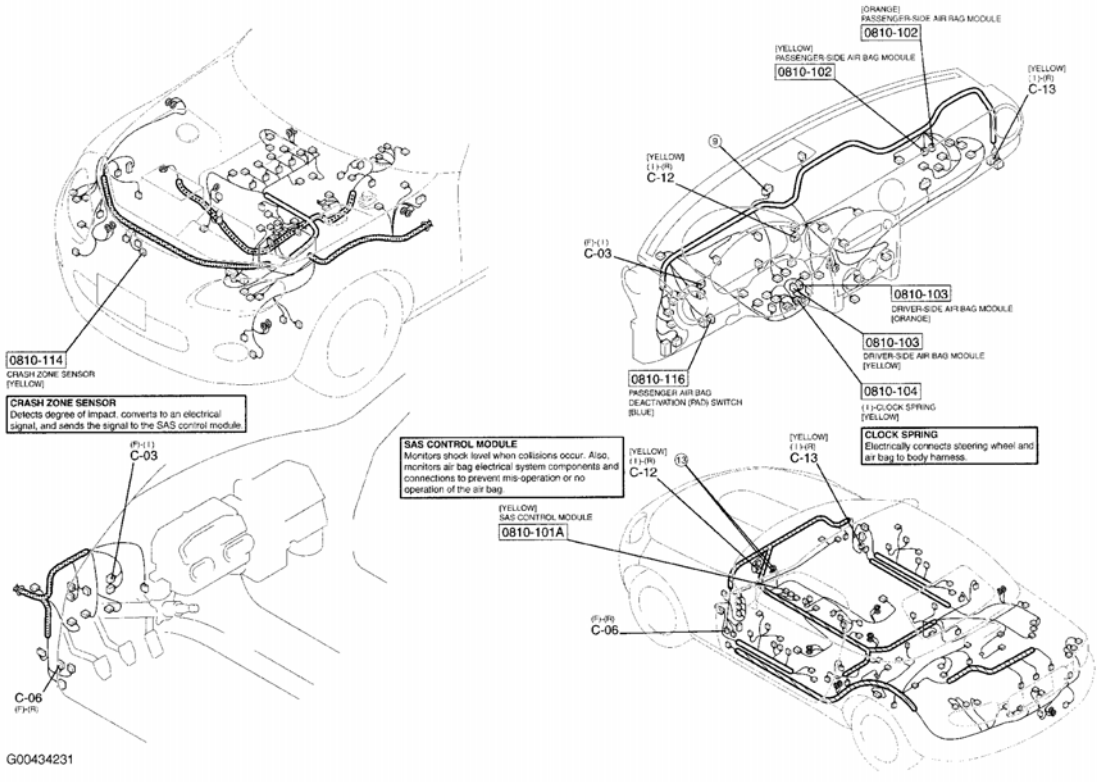


Fig. 24: Air Bag System
Courtesy of MAZDA MOTORS CORP.

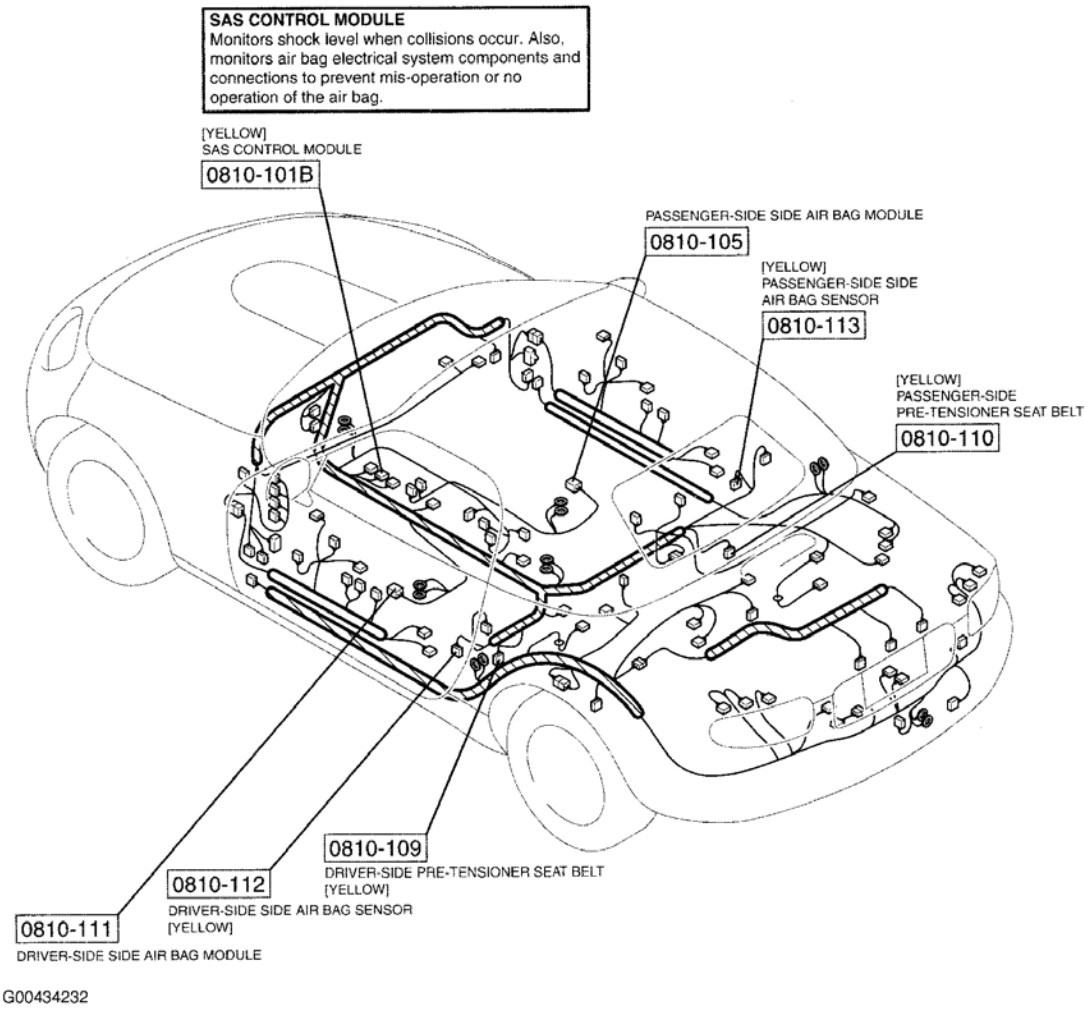


Fig. 25: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

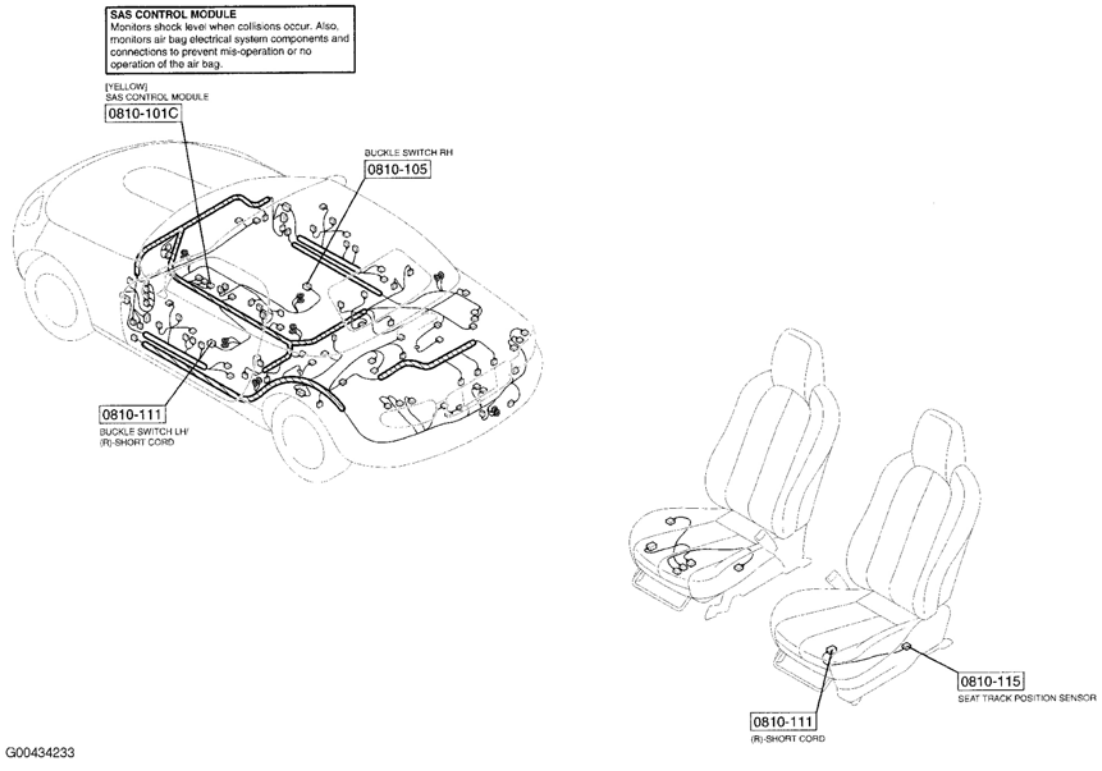


Fig. 26: Seats
Courtesy of MAZDA MOTORS CORP.

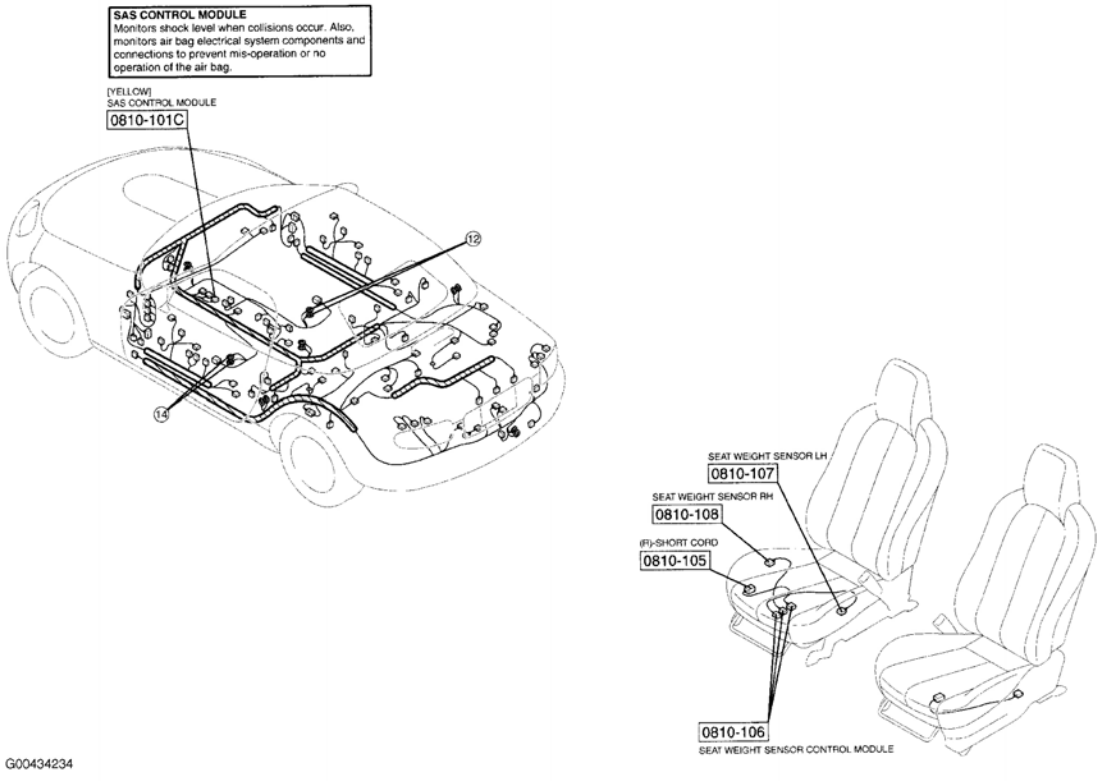


Fig. 27: Passenger Seat
Courtesy of MAZDA MOTORS CORP.

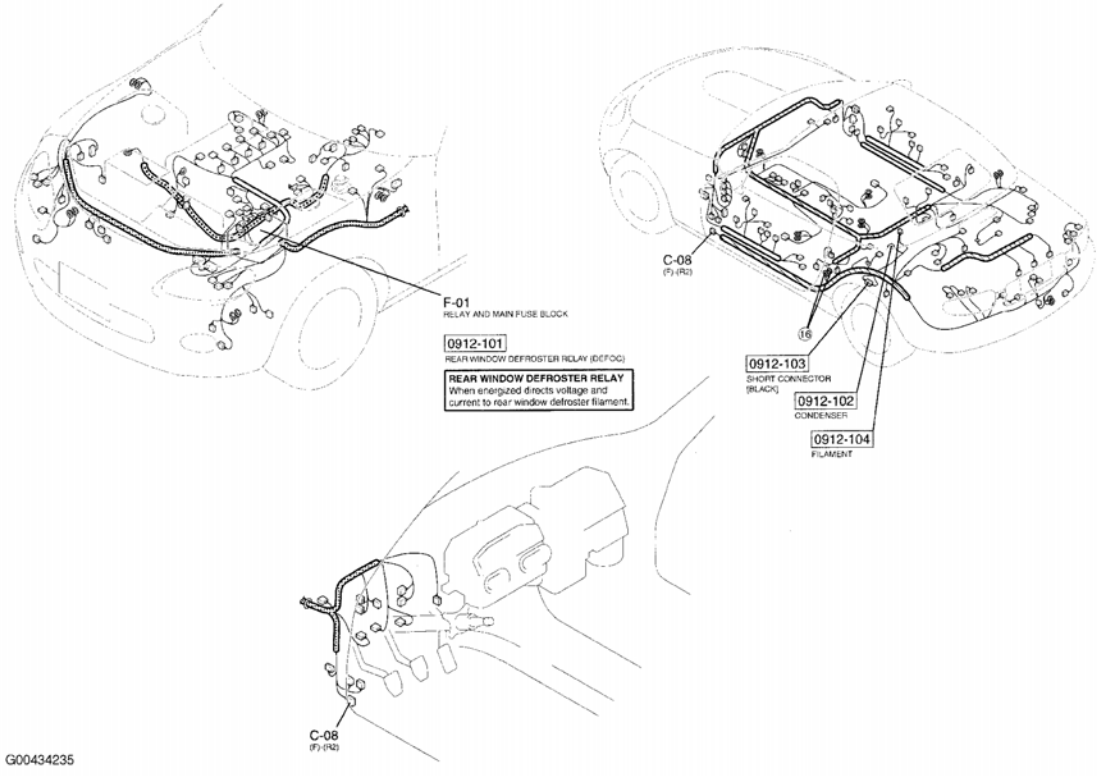


Fig. 28: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

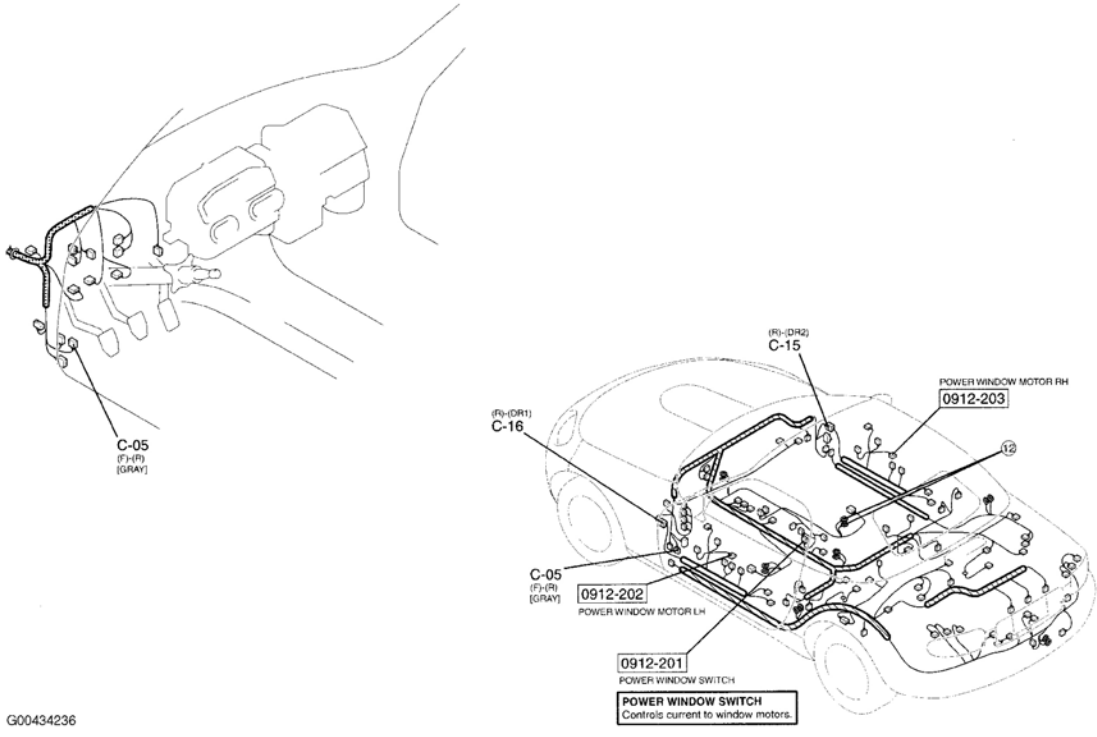


Fig. 29: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

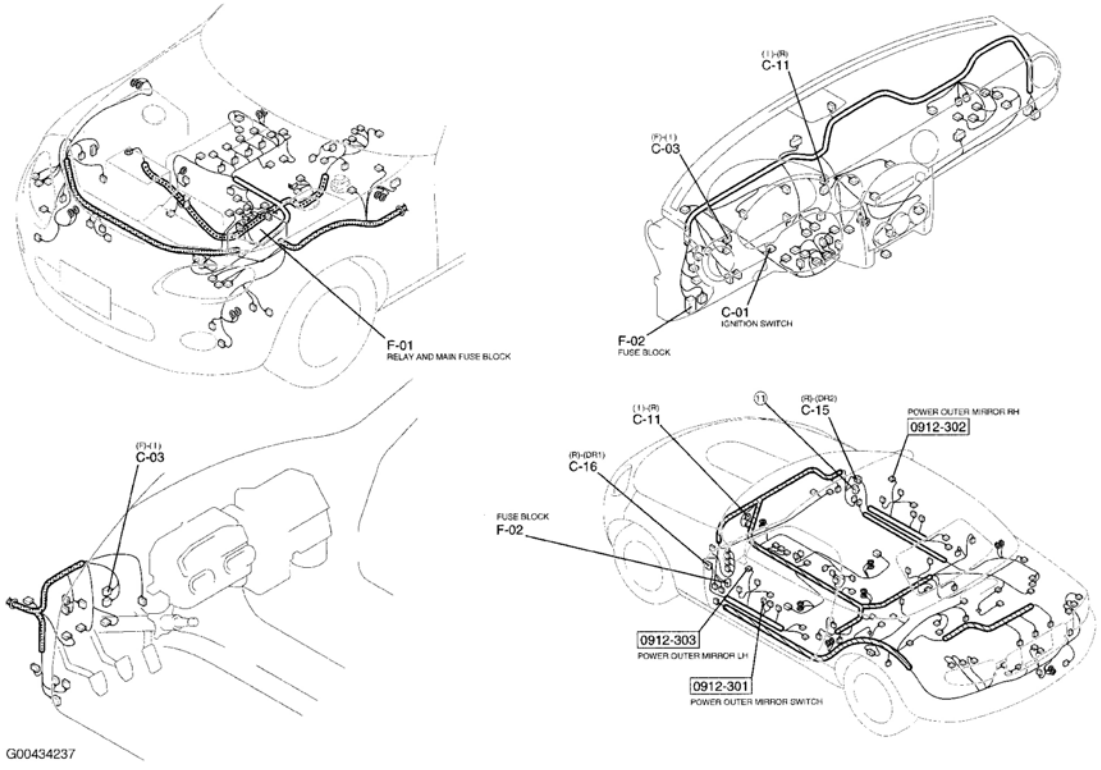


Fig. 30: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

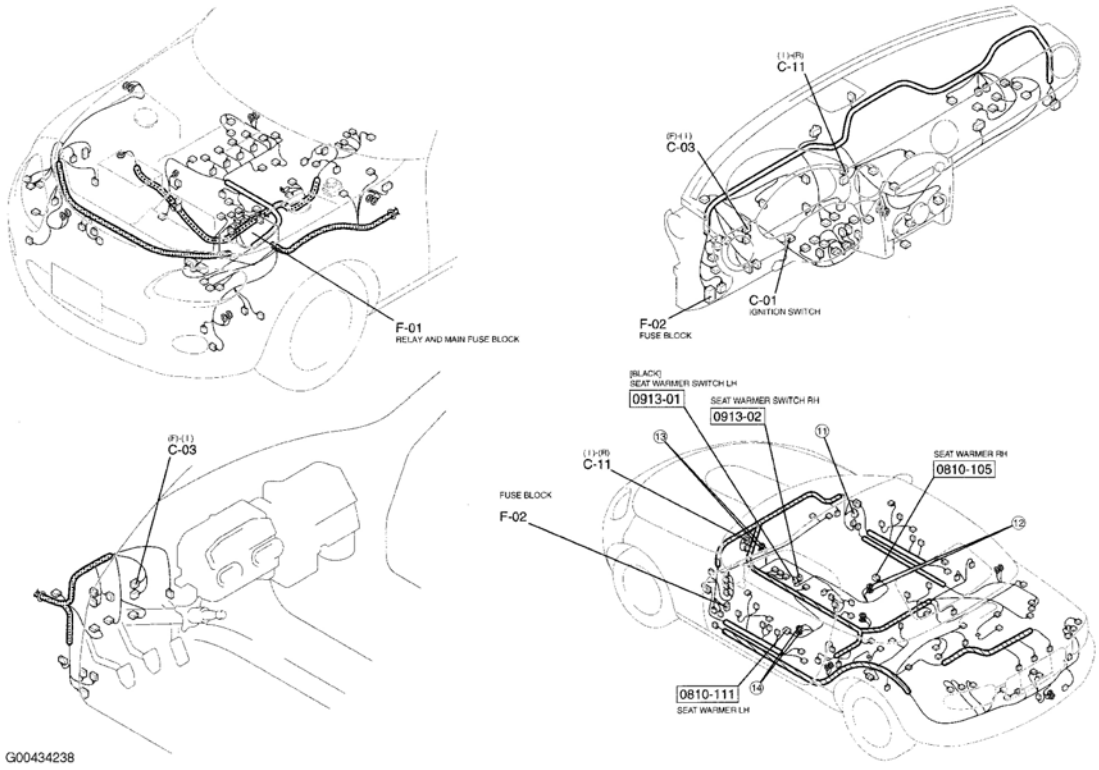


Fig. 31: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

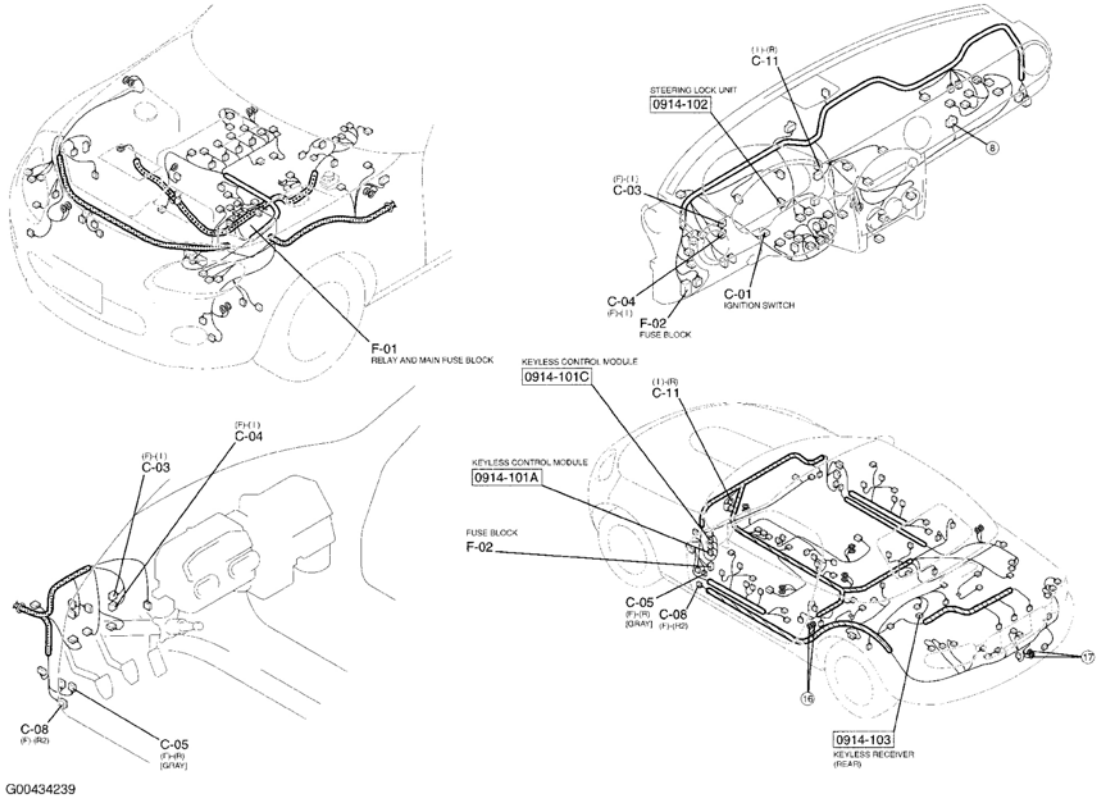


Fig. 32: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

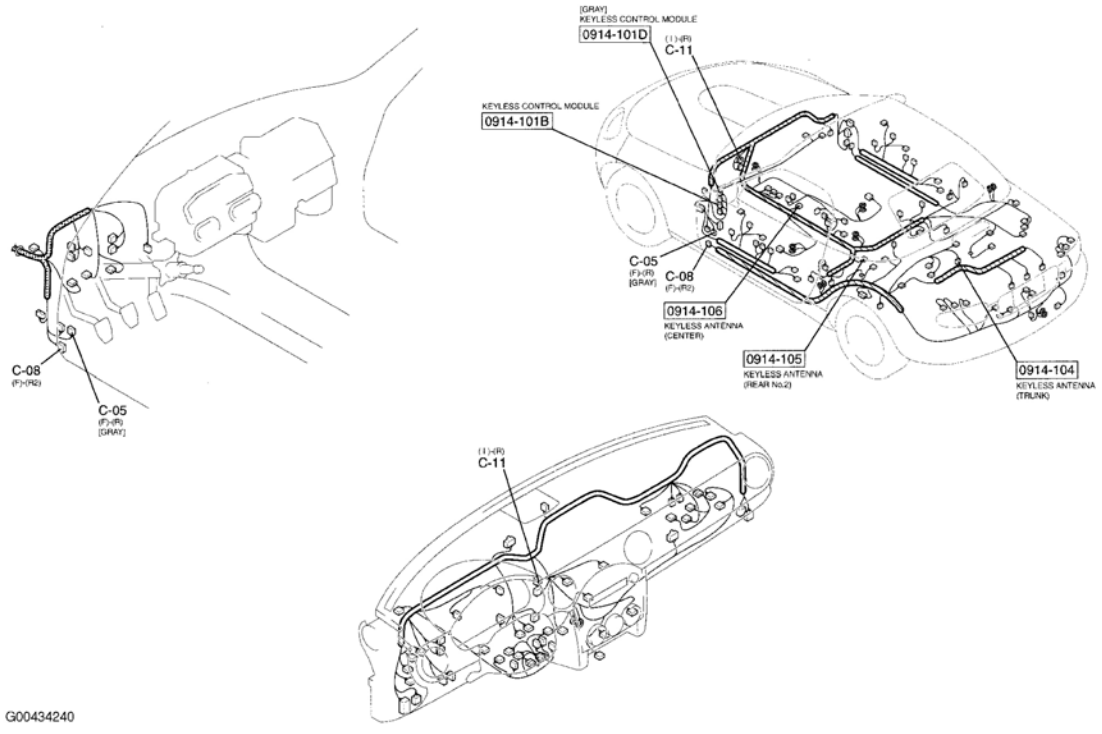


Fig. 33: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

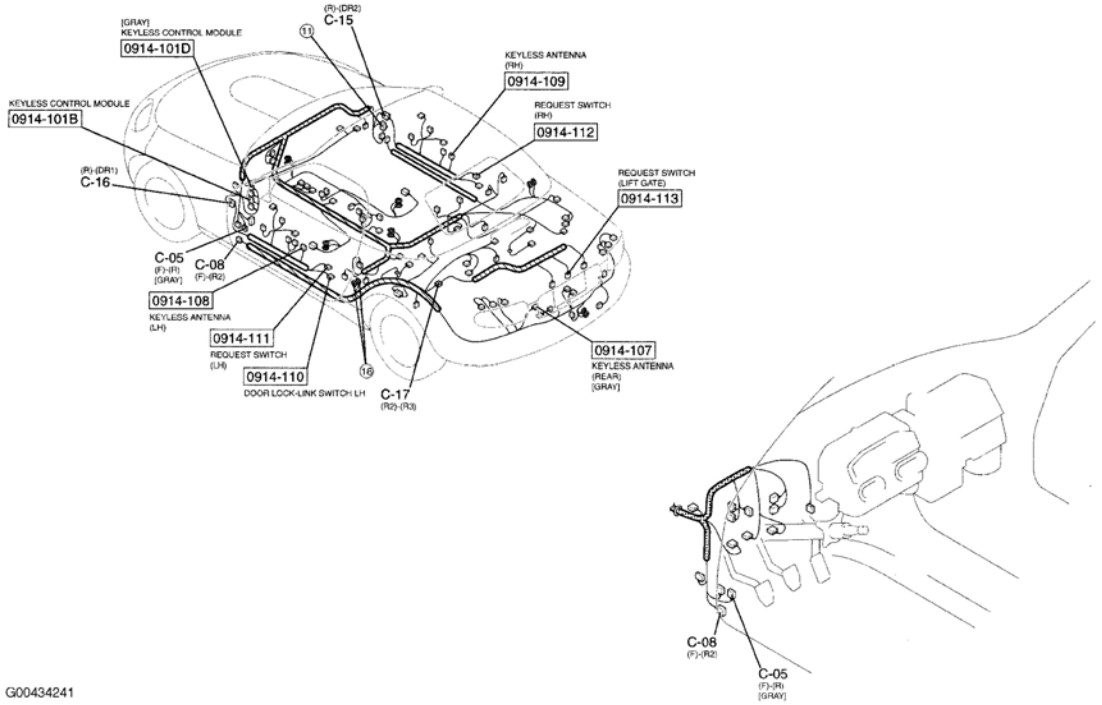


Fig. 34: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

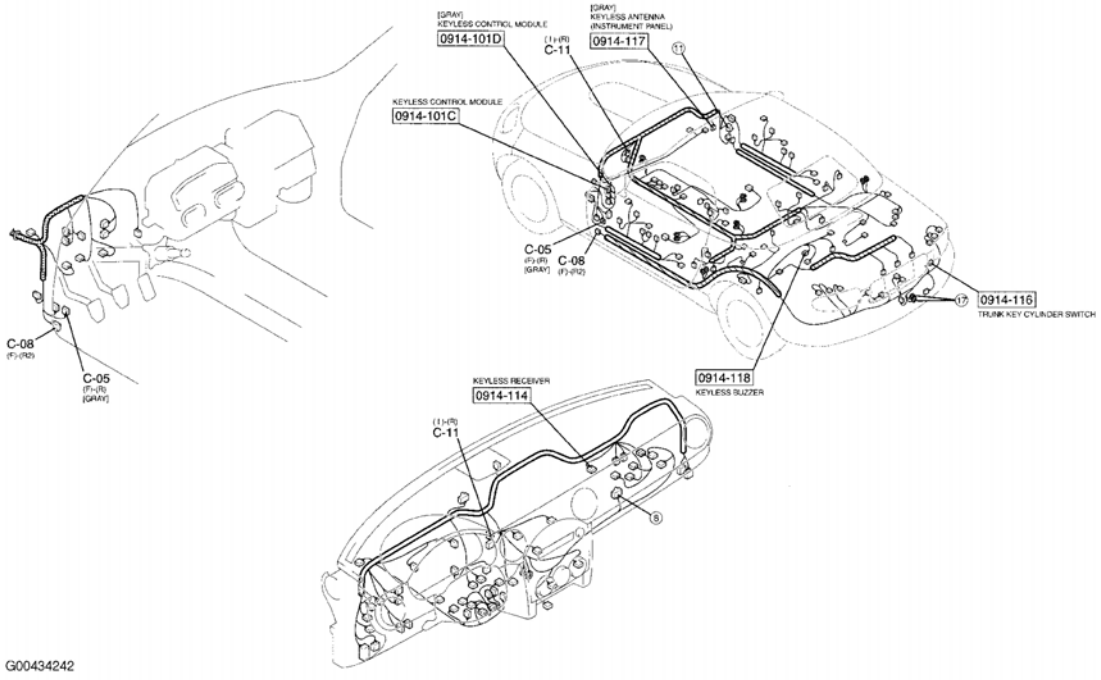


Fig. 35: Dash & Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

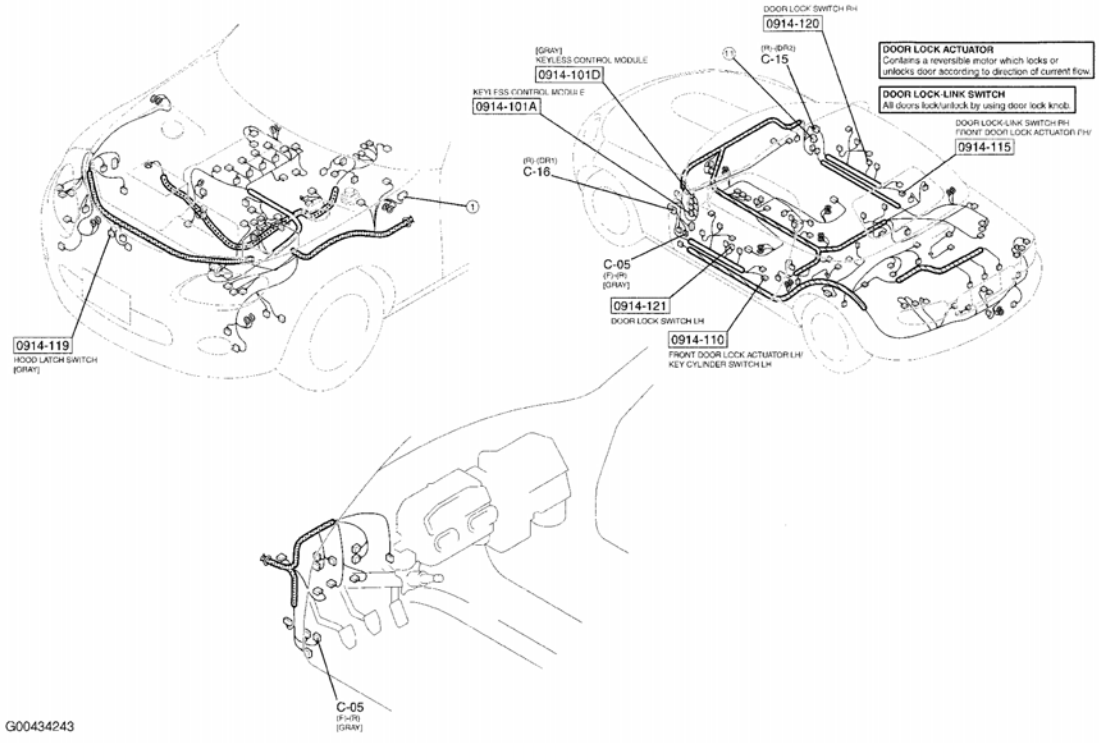


Fig. 36: Engine Compartment & Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

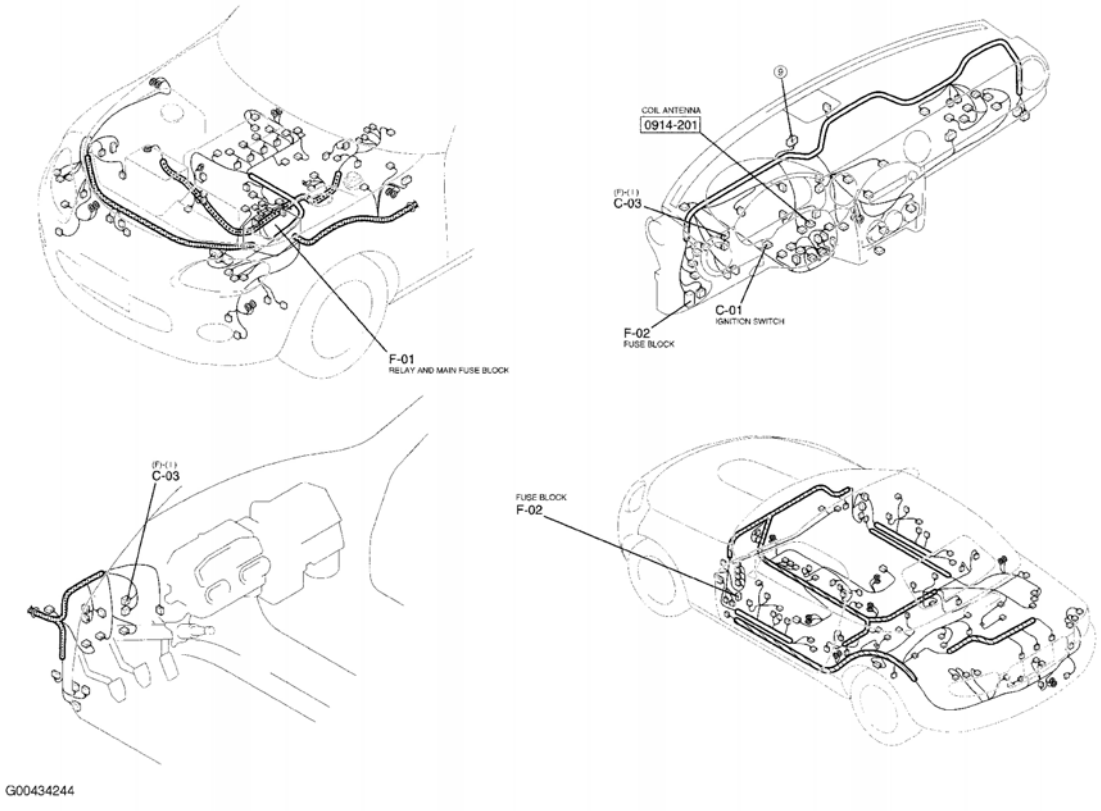


Fig. 37: Dash
Courtesy of MAZDA MOTORS CORP.

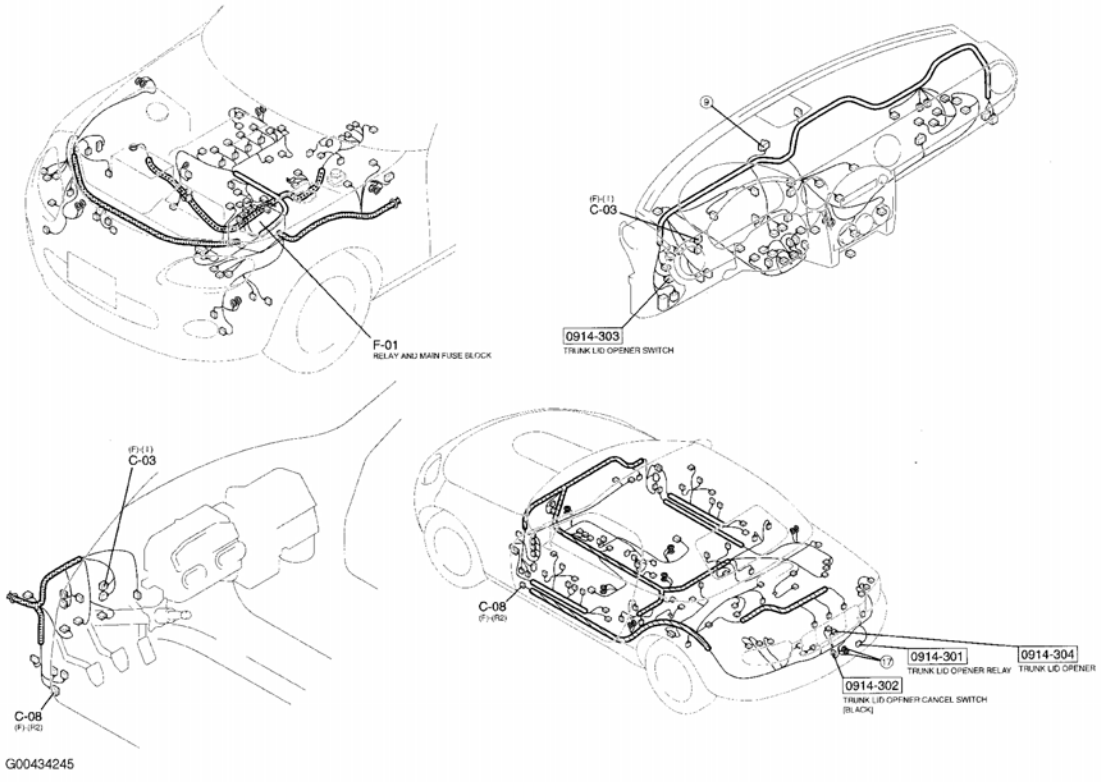


Fig. 38: Rear Of Vehicle
Courtesy of MAZDA MOTORS CORP.

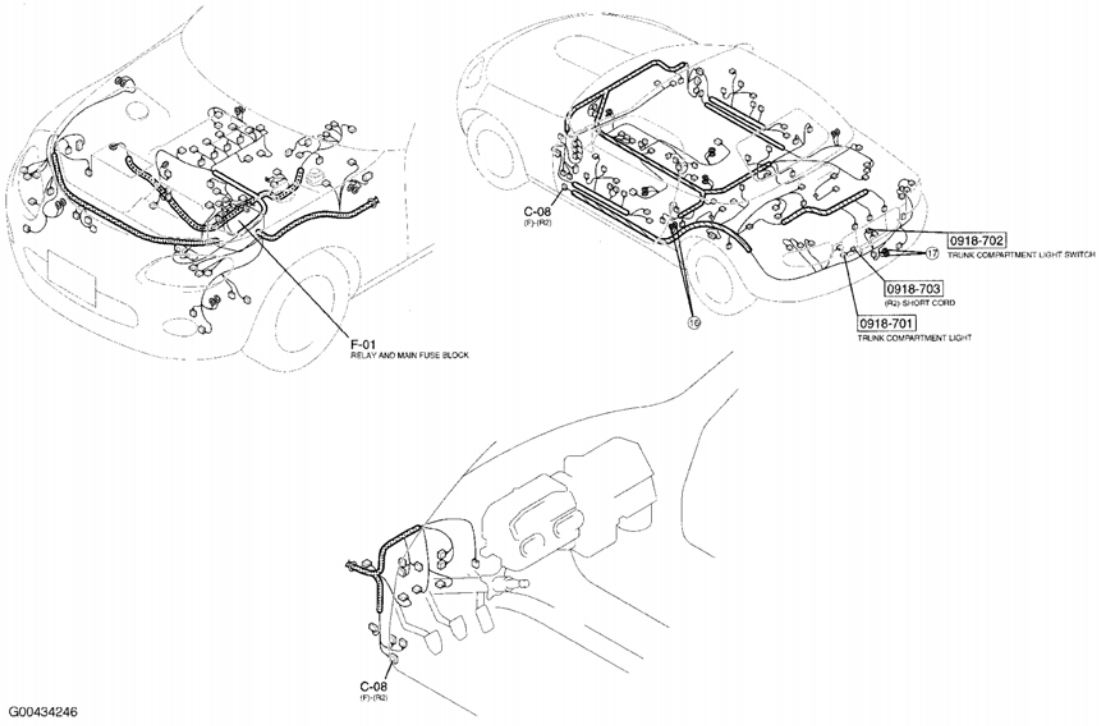


Fig. 39: Rear Of Vehicle
Courtesy of MAZDA MOTORS CORP.

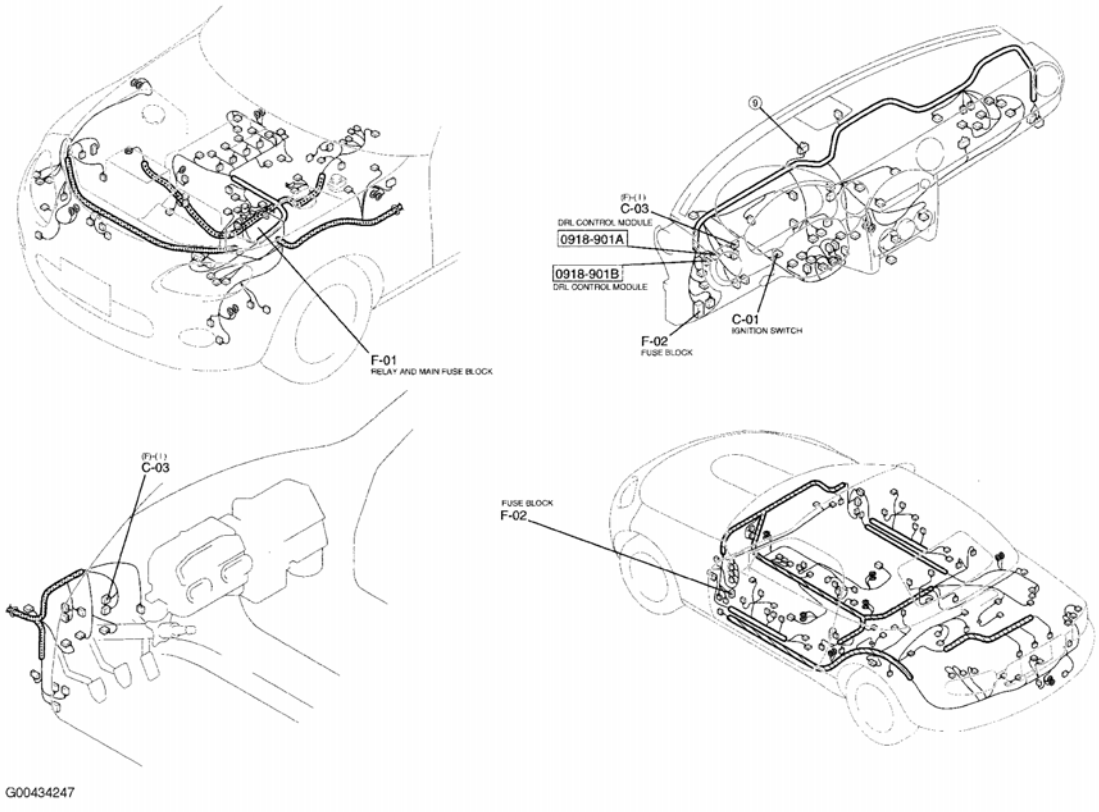


Fig. 40: Dash
Courtesy of MAZDA MOTORS CORP.

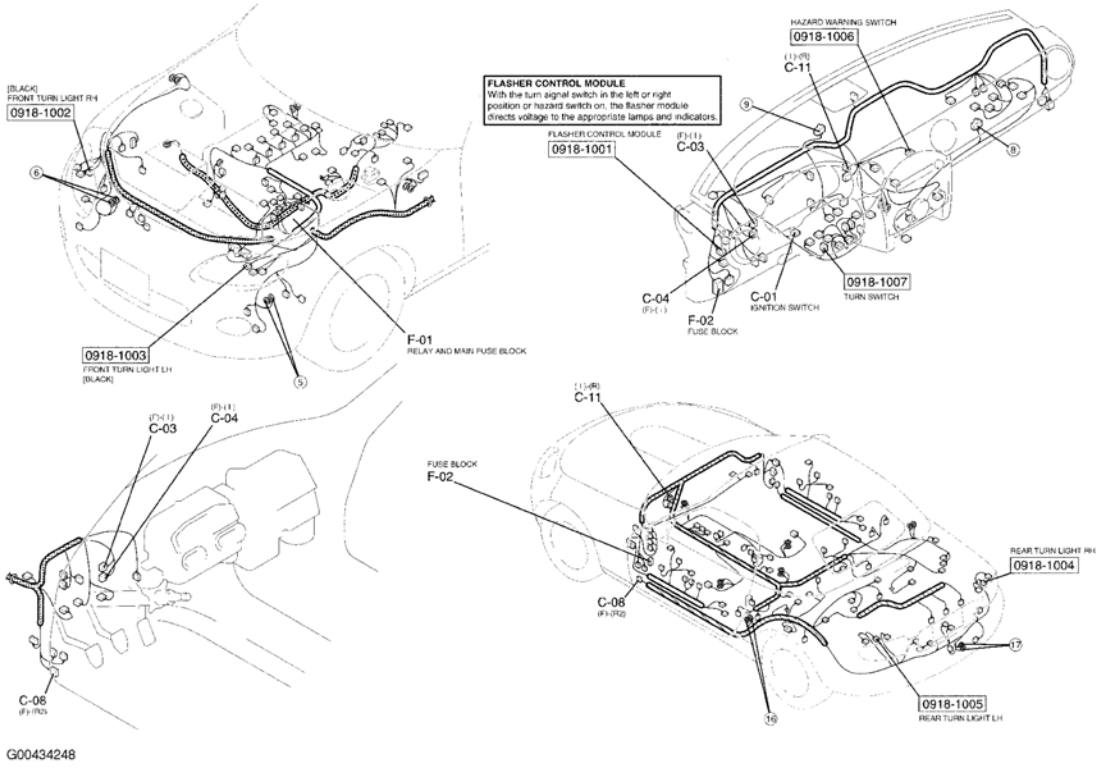


Fig. 41: Dash
Courtesy of MAZDA MOTORS CORP.

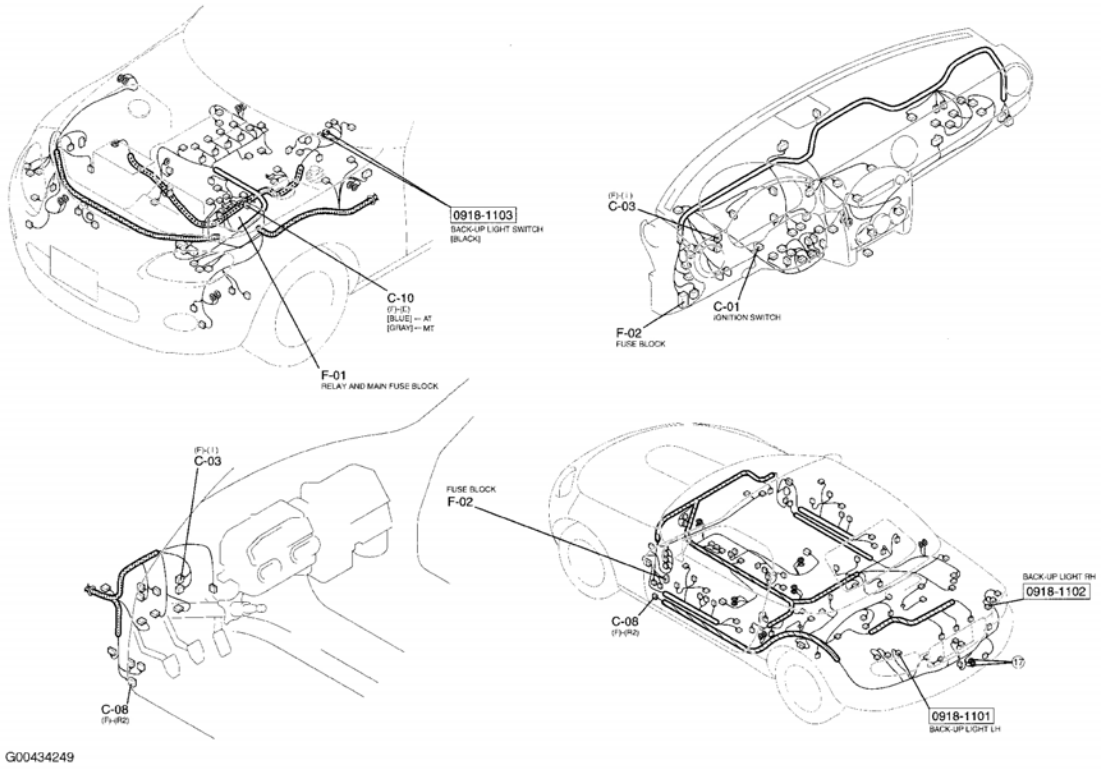


Fig. 42: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

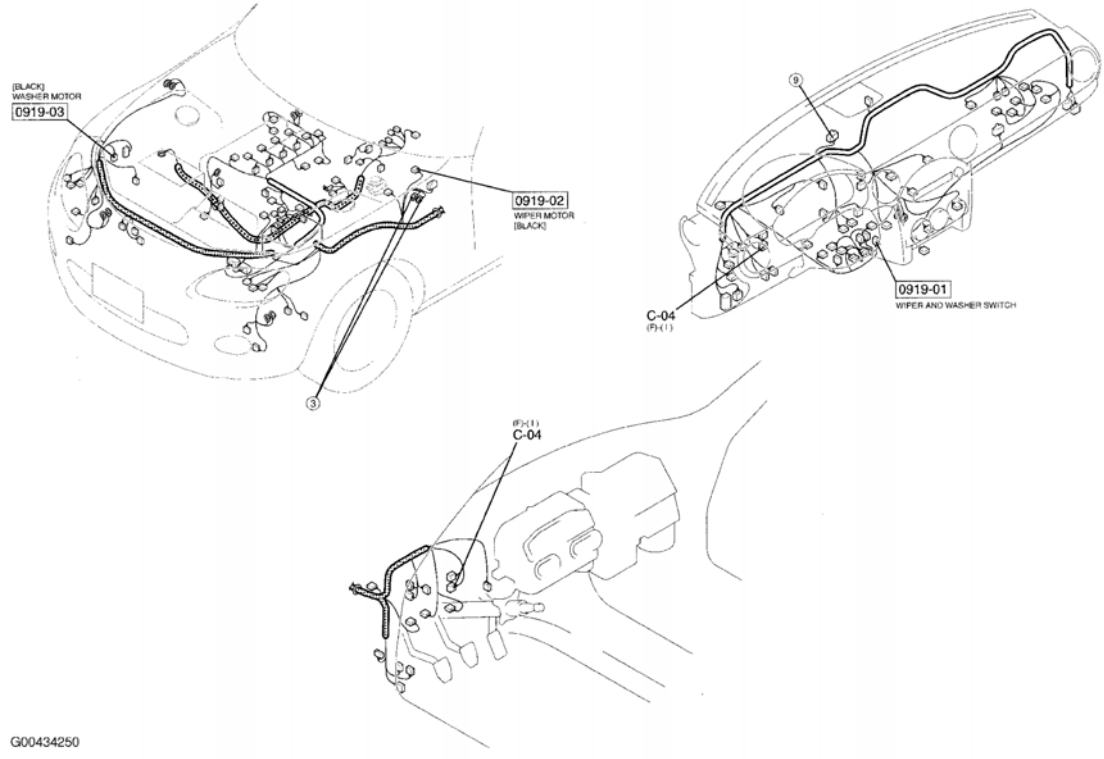


Fig. 43: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

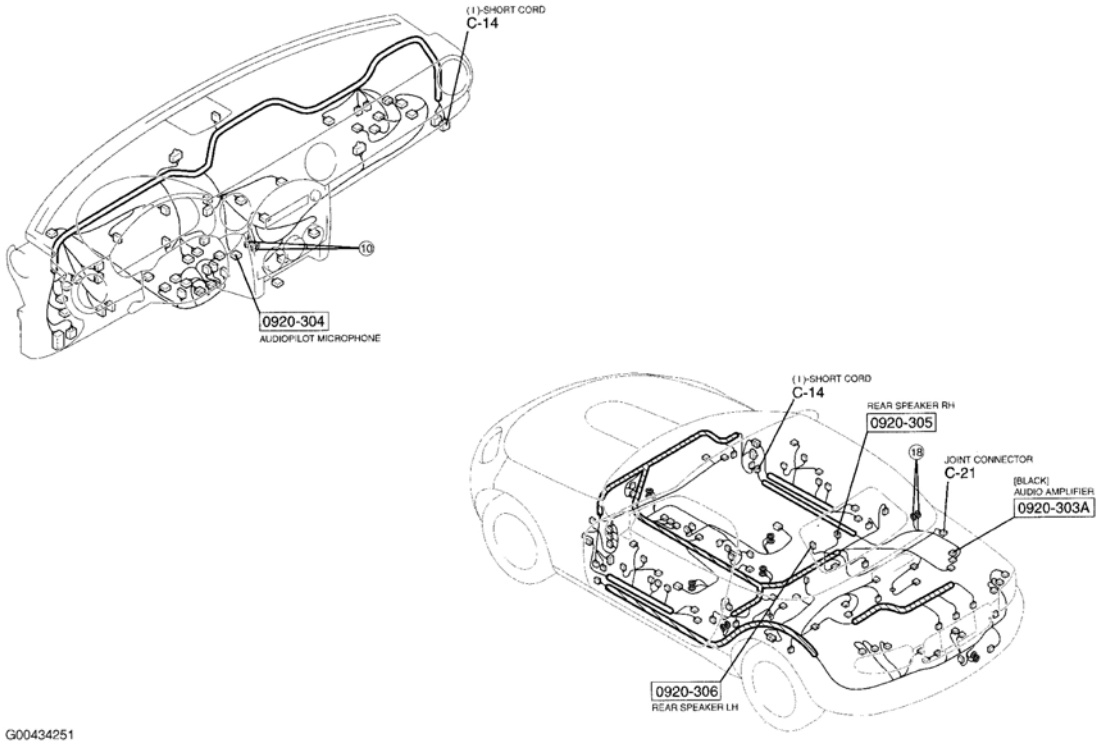


Fig. 44: Dash & Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

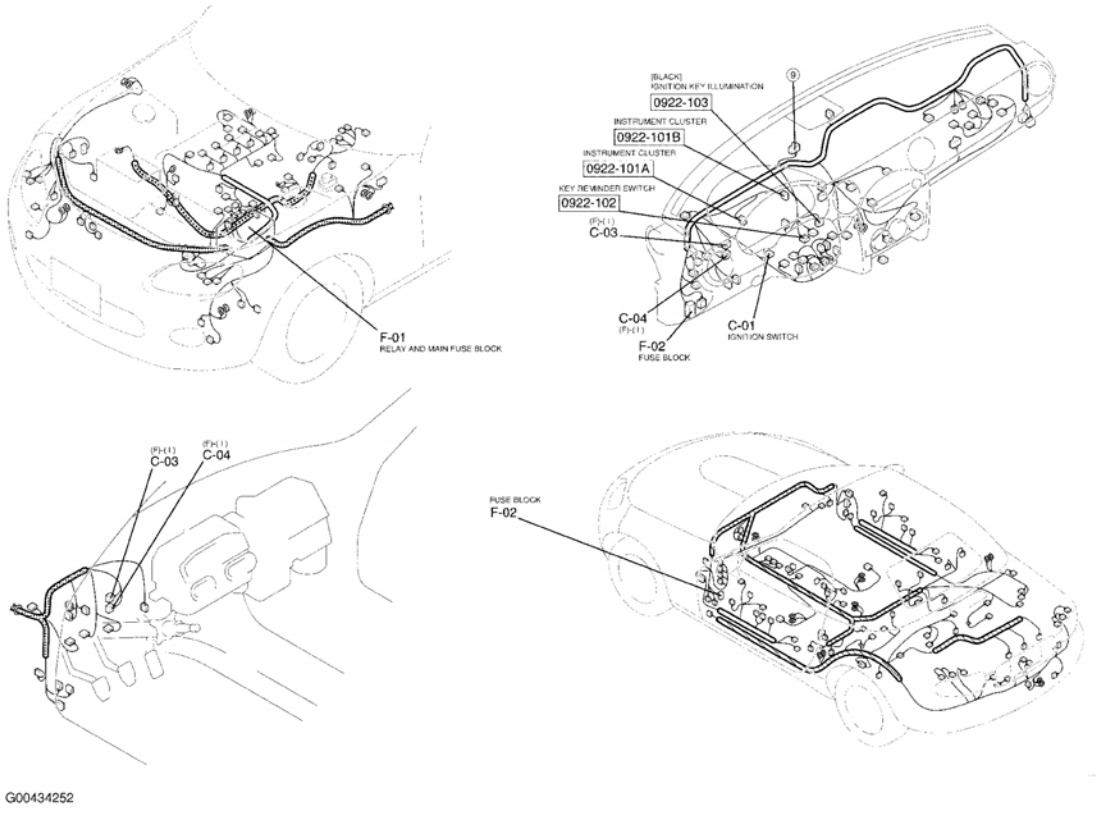


Fig. 45: Dash
Courtesy of MAZDA MOTORS CORP.

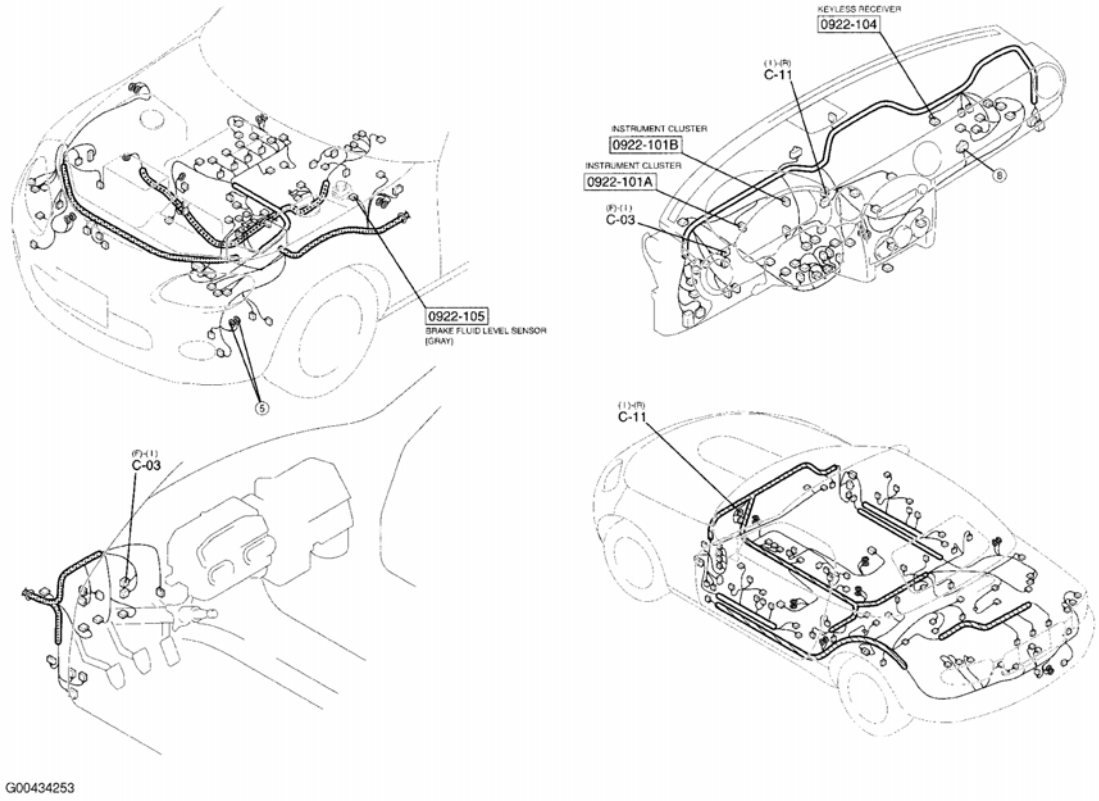


Fig. 46: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

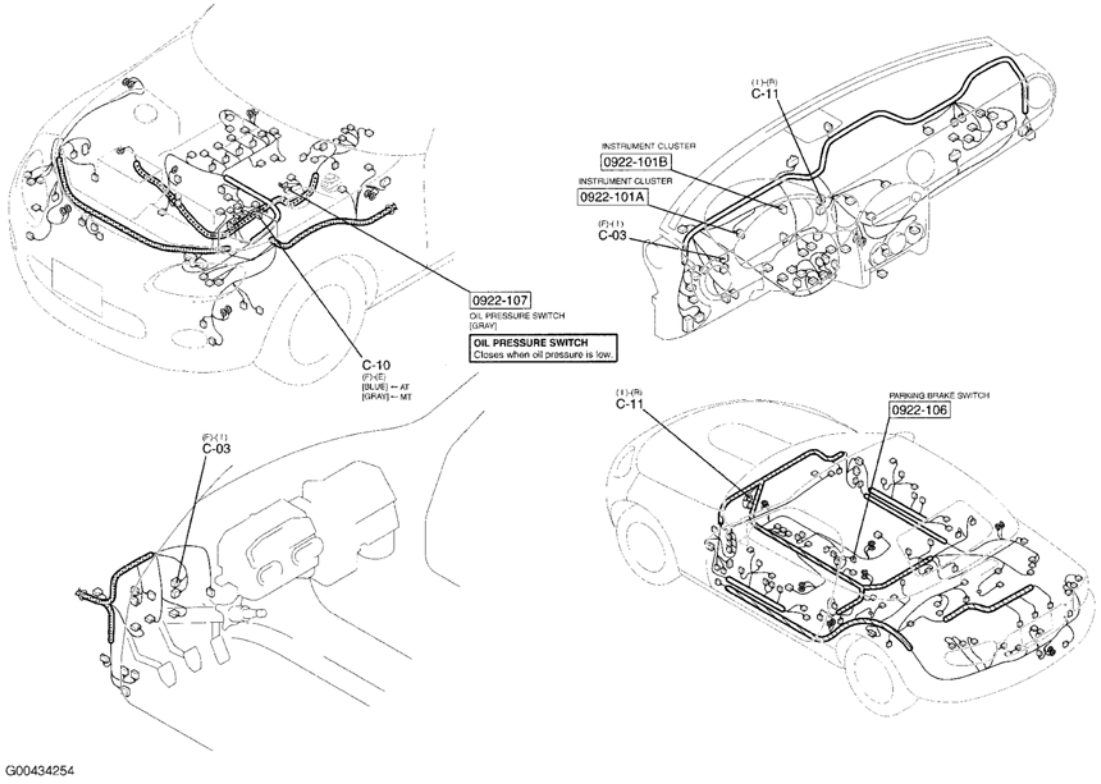


Fig. 47: Engine Compartment & Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

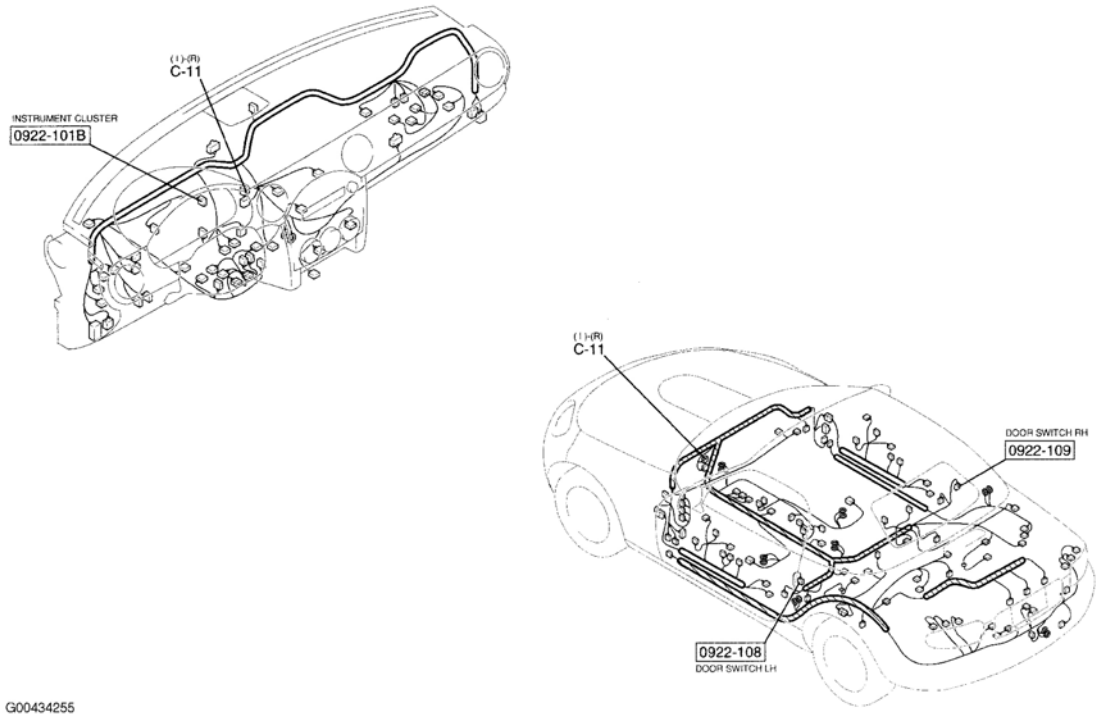


Fig. 48: Vehicle Overview
Courtesy of MAZDA MOTORS CORP.

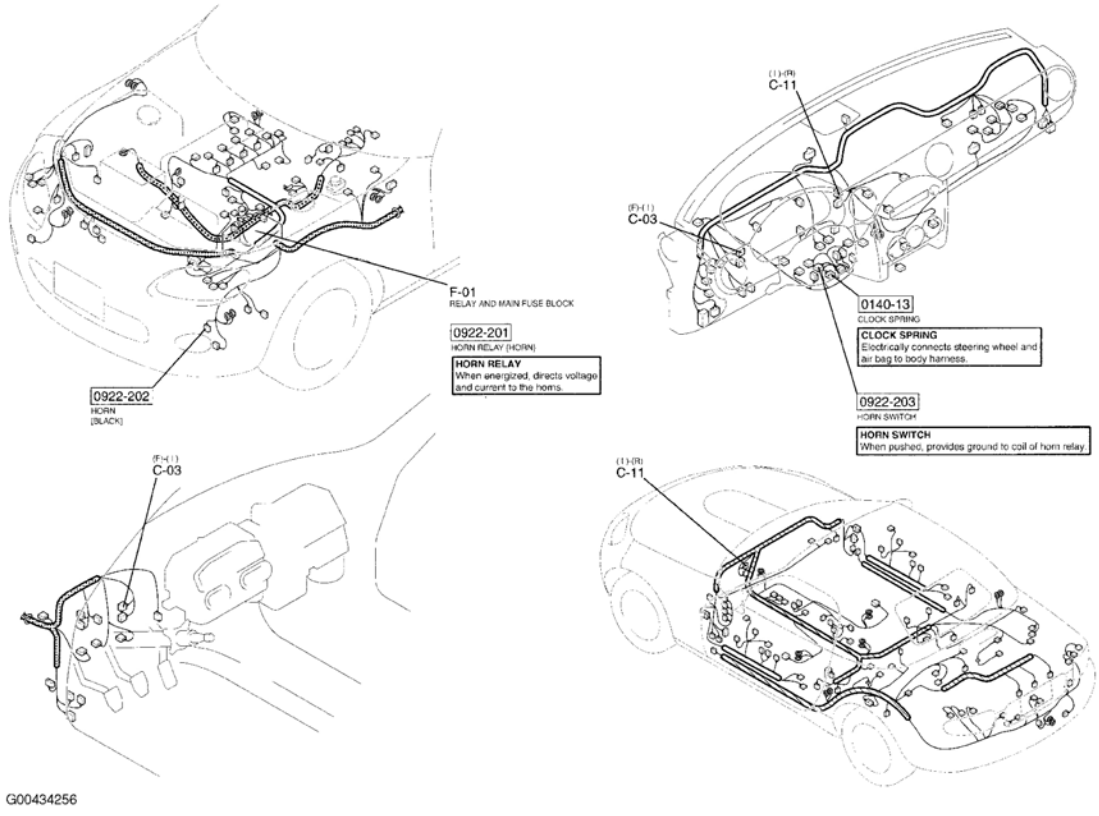


Fig. 49: Engine Compartment
Courtesy of MAZDA MOTORS CORP.

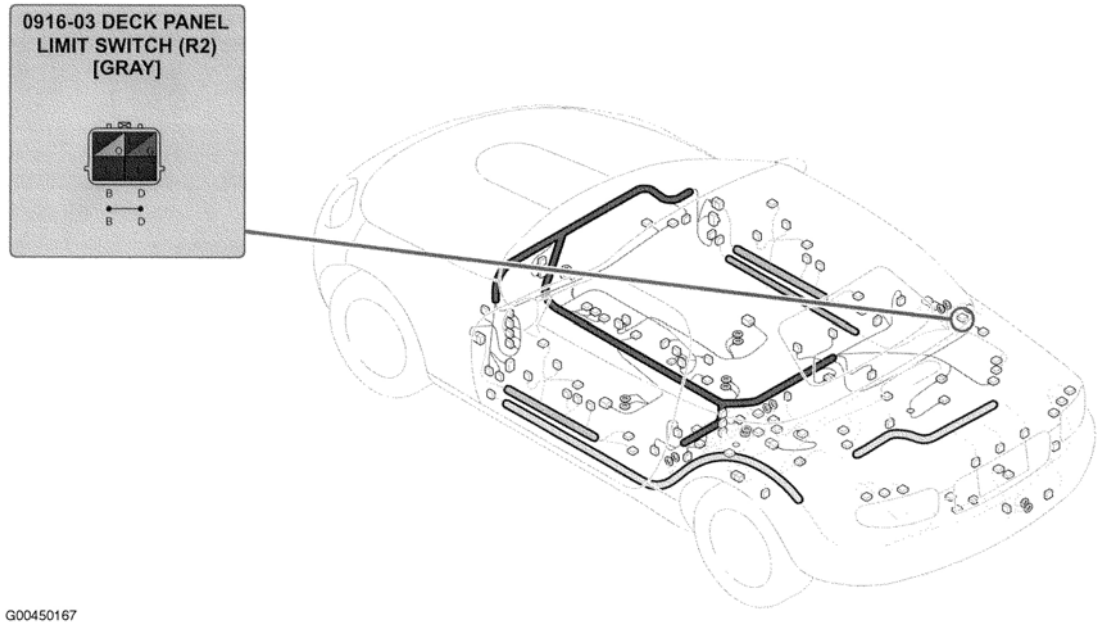


Fig. 50: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

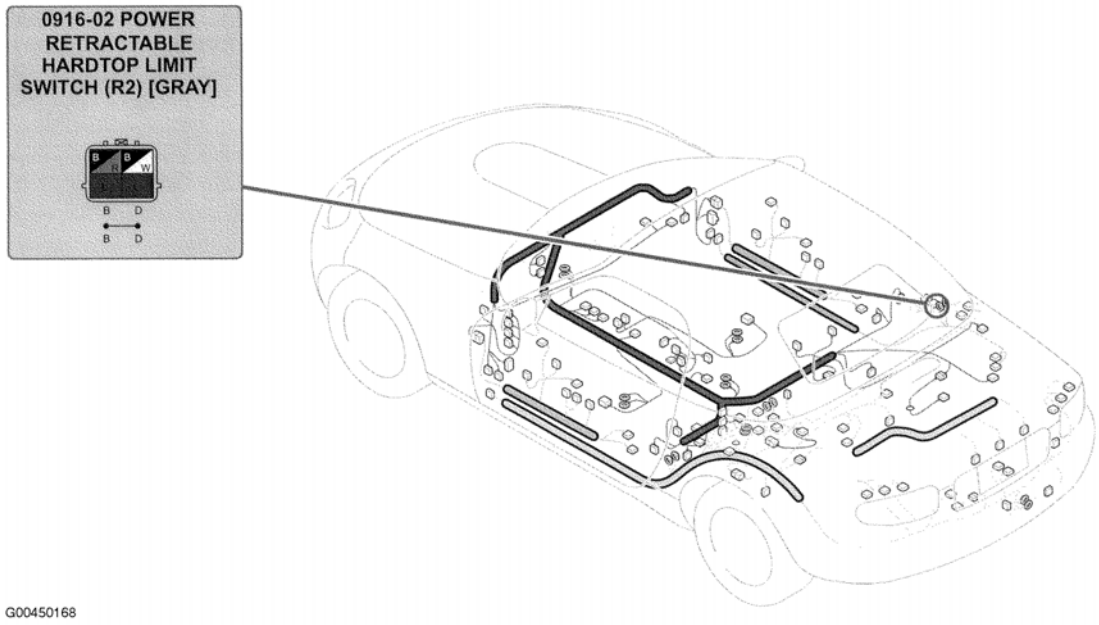


Fig. 51: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

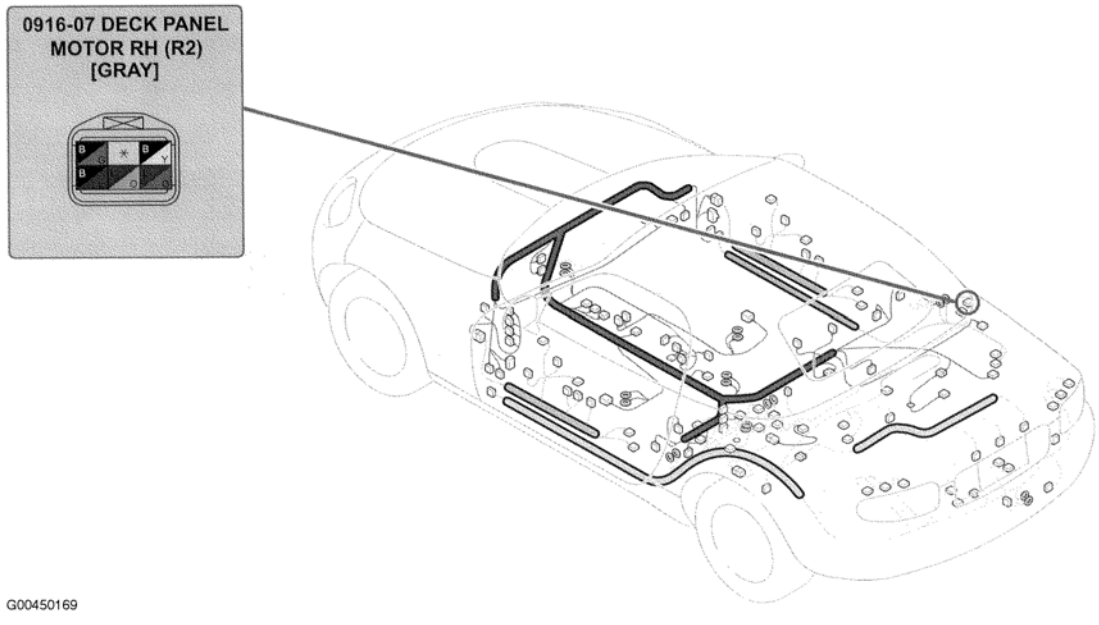


Fig. 52: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

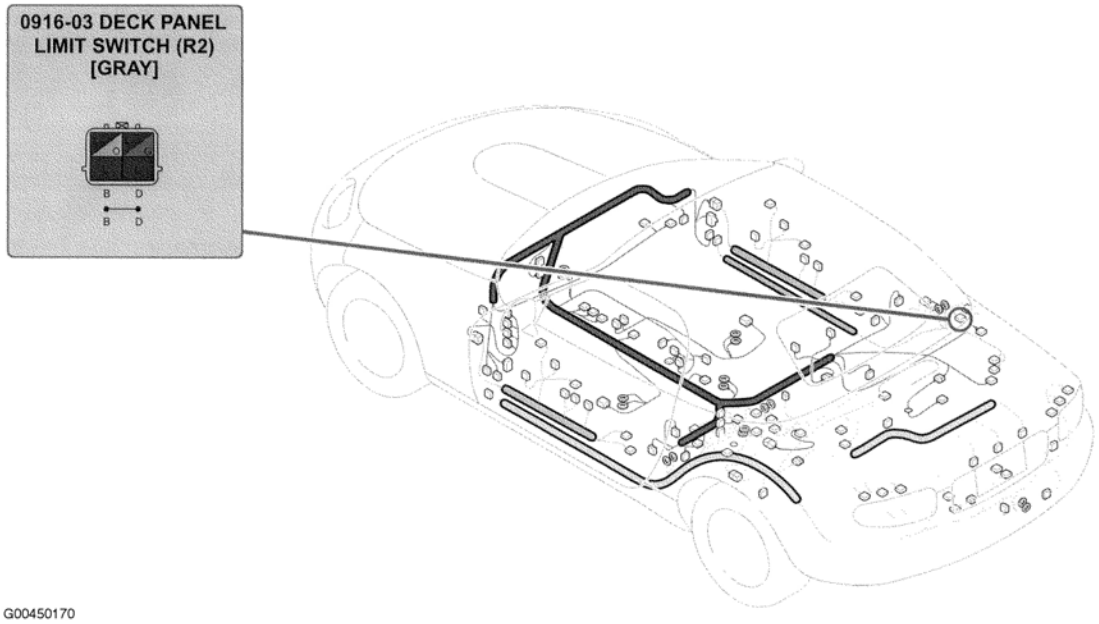


Fig. 53: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

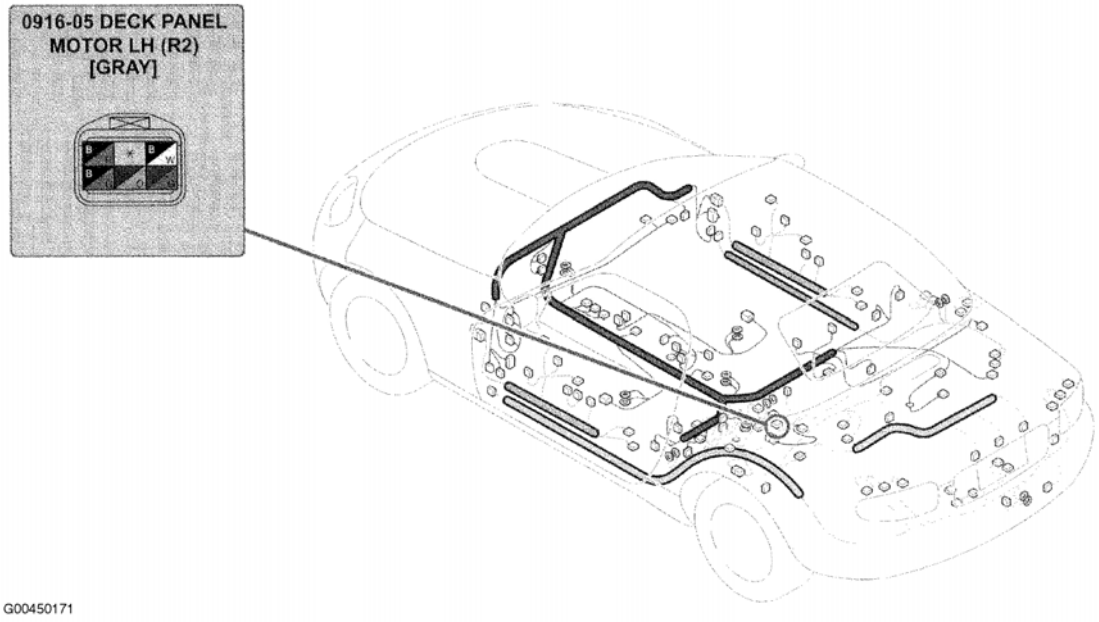


Fig. 54: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

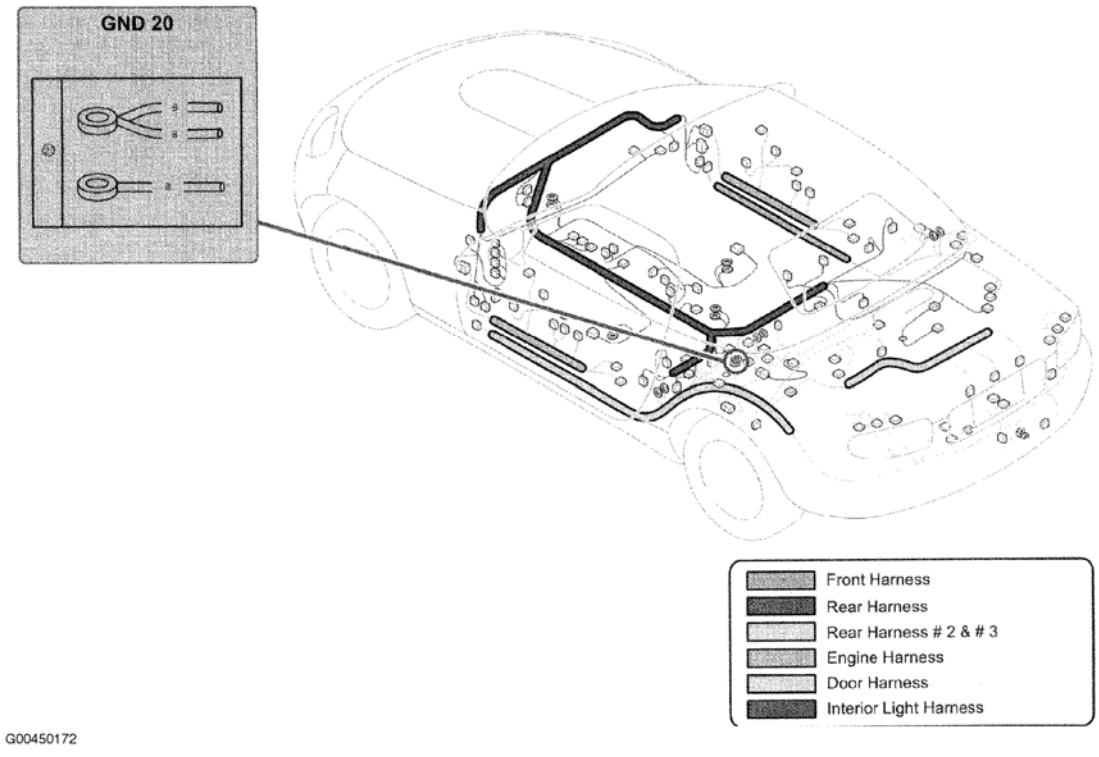


Fig. 55: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

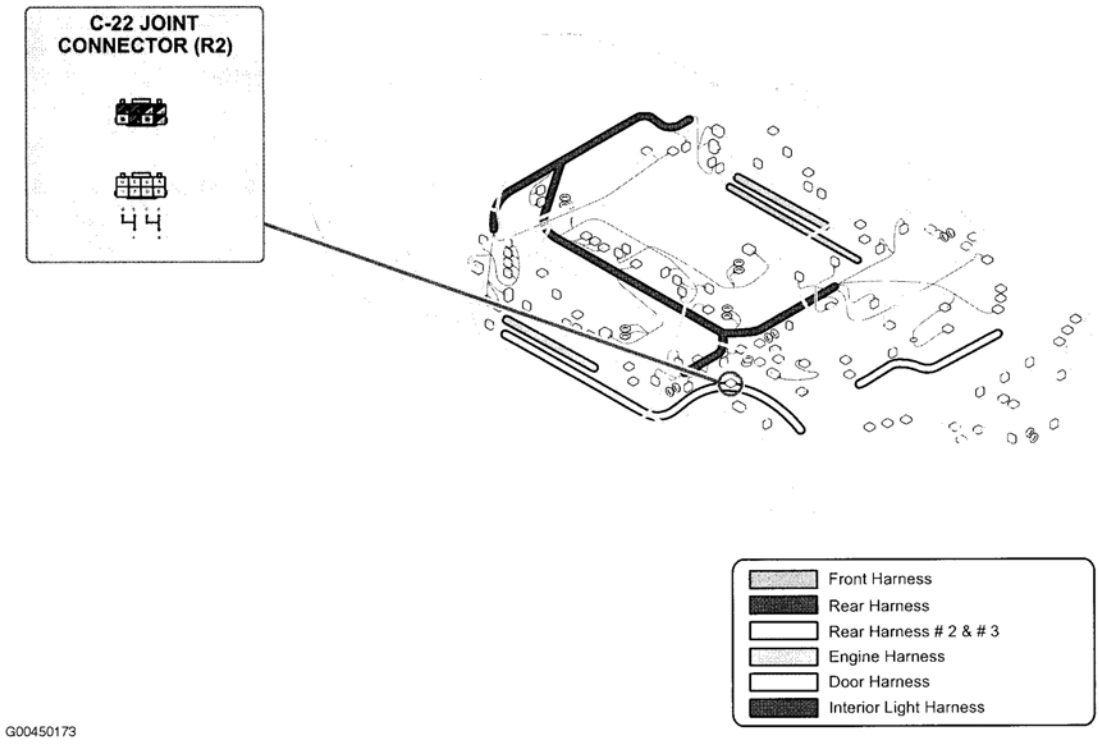


Fig. 56: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

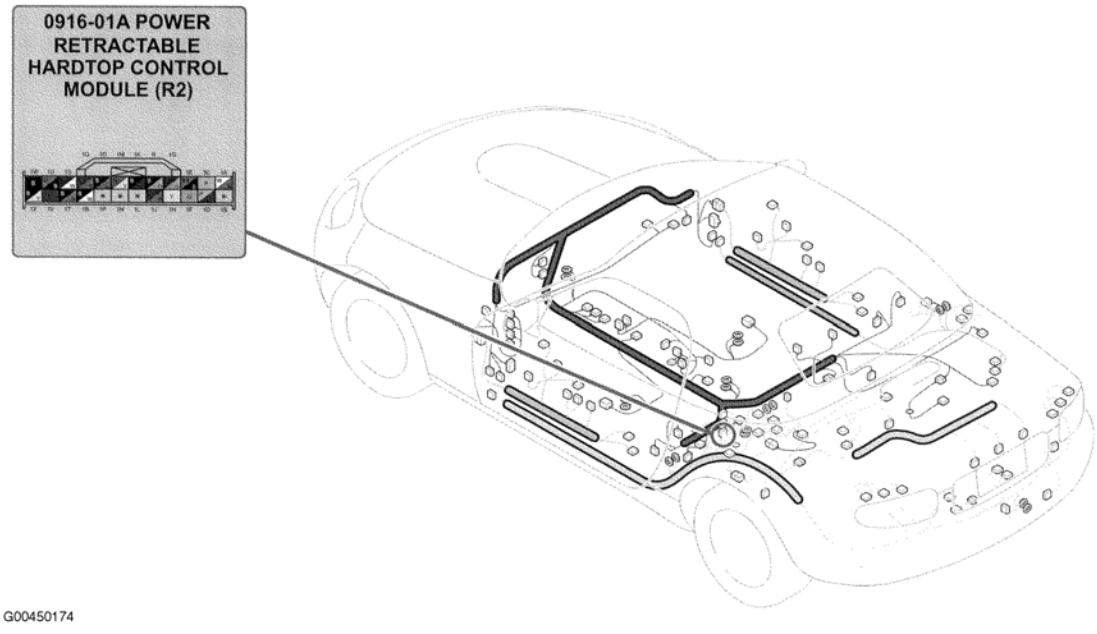


Fig. 57: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

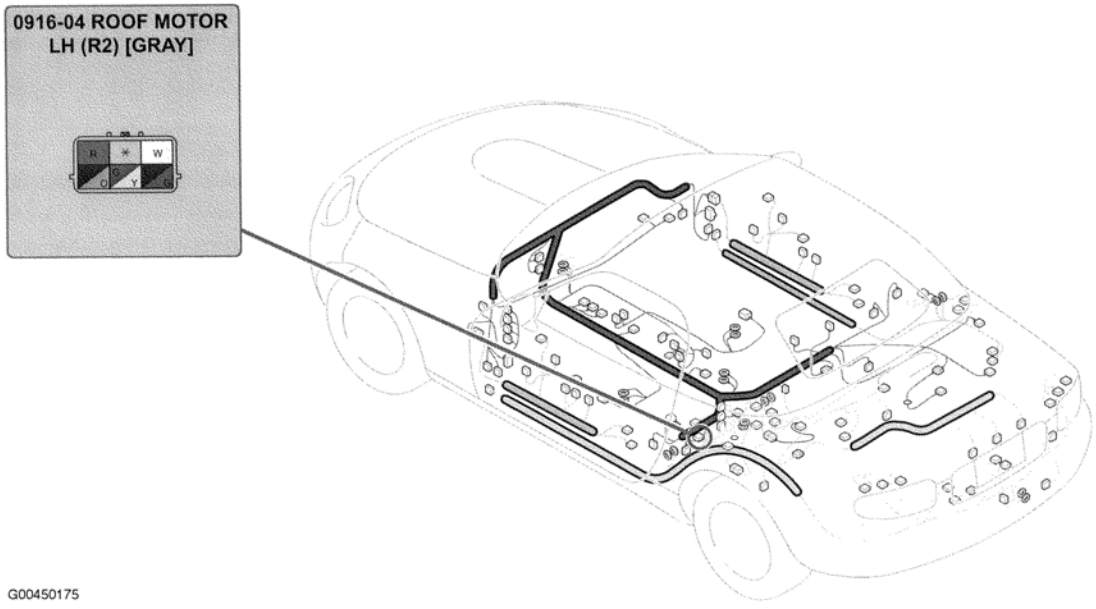


Fig. 58: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

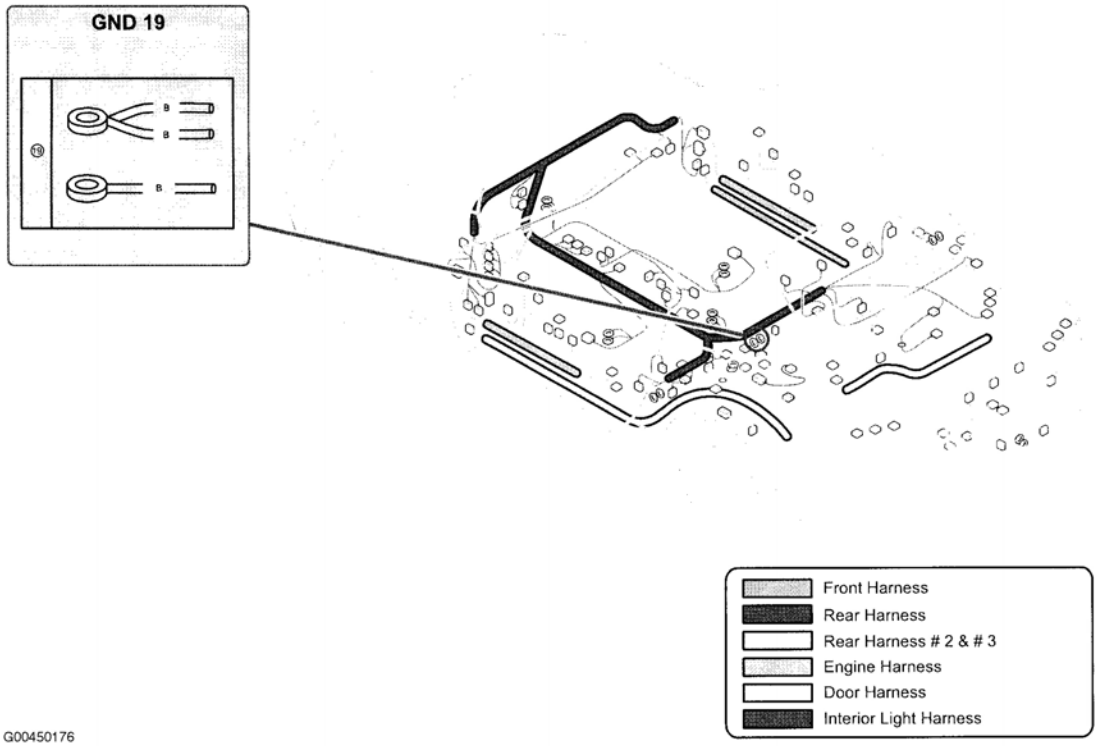


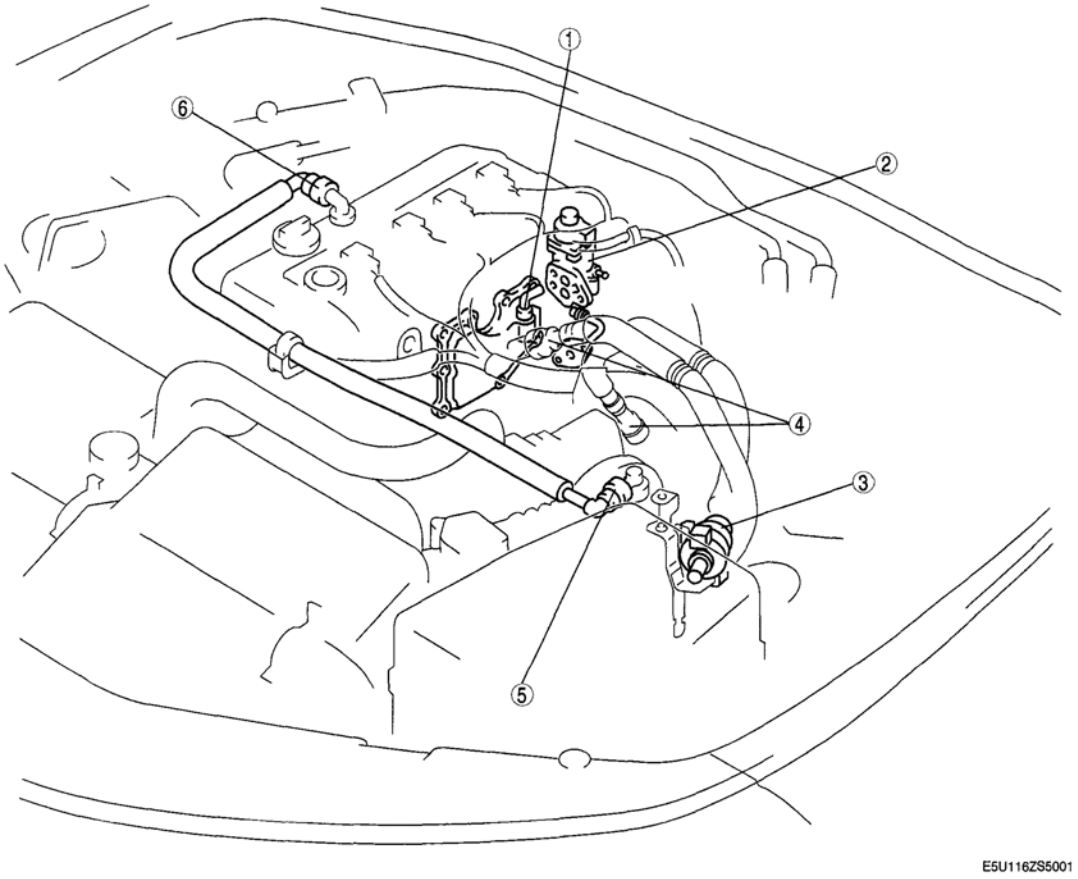
Fig. 59: Retractable Top Storage Compartment
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE PERFORMANCE

Emission System - MX-5 Miata

EMISSION SYSTEM LOCATION INDEX [LF]

ENGINE COMPARTMENT SIDE



1	PCV valve
2	EGR valve
3	Purge solenoid valve
4	Quick release connector (Type A)
5	Quick release connector (Type B)
6	Quick release connector (Type D)

Fig. 1: Identifying Location Of Emission System Engine Compartment Side Components
Courtesy of MAZDA MOTORS CORP.

EXHAUST SYSTEM

1	WU-TWC
2	TWC

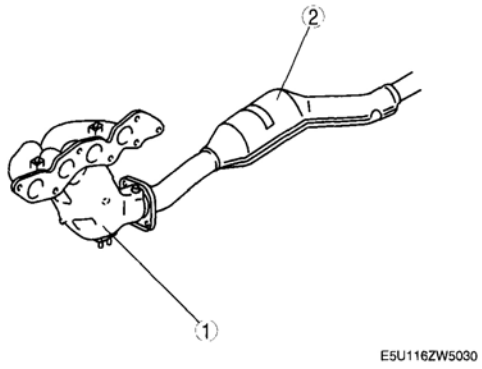
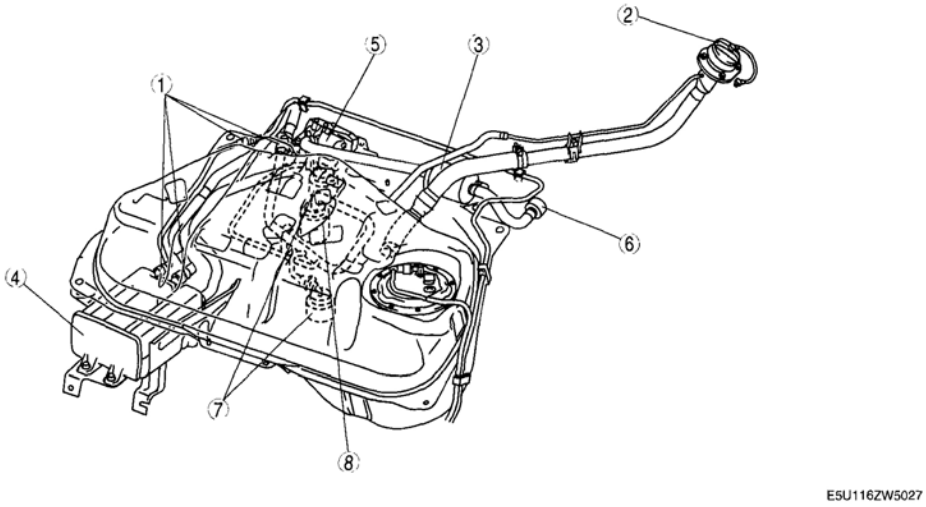


Fig. 2: Identifying Location Of Exhaust System Components
Courtesy of MAZDA MOTORS CORP.

FUEL TANK SIDE



1	Quick release connector (Type C)
2	Fuel-filler cap
3	Air filter
4	Charcoal canister
5	EVAP system leak detection pump
6	Evaporative chamber
7	Rollover valve
8	Fuel shut-off valve

Fig. 3: Identifying Location Of Fuel Tank Side Components
Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER CAP INSPECTION [LF]

LEAKAGE INSPECTION

1. Perform the following **SST** (Evaporative Emission System Tester 134-01049) self-test:

NOTE:

- **If the tester does not work correctly during self-test, refer to the tester operators manual for more detailed procedures.**

1. Verify the gas cylinder valve is closed and the control valve located on the tester is in the TEST position. All tester display should be off at this time.
2. Connect the long hose (part of **SST**) to the tester.
3. Connect the manifold assembly (part of **SST**) to the long hose as shown in **Fig. 4**.

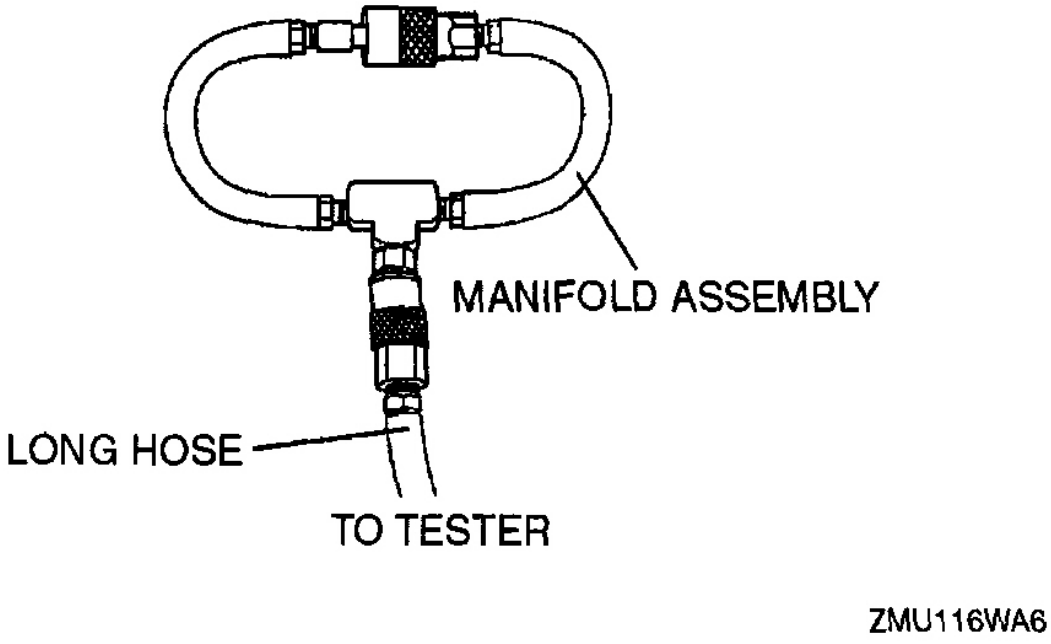


Fig. 4: Connecting Manifold Assembly To Long Hose
Courtesy of MAZDA MOTORS CORP.

4. Open the gas cylinder valve and verify the gas cylinder regulator left gauge reads **10 to 12 psi** (preset at factory).
   - If not, refer to the tester operators manual to contact tester manufacturer.
5. Press the ON/OFF switch to turn on the **SST** and make sure the left display reads **0.0** .
6. Turn the control valve on the tester to the FILL position.
7. Verify the left display reading is **within 13.9 to 14.0 in of water** .
   - If not, adjust the pressure using the regulator knob located on the right side of the tester.
8. Turn the control valve to TEST position and press the START switch.

9. After the **2-min** countdown (left display) is completed, the right display shows the total pressure loss for that period. A **0.5 in of water** loss is acceptable on the self-test.
    - If the loss is **more than 0.5 in of water** , do one or more self-test. If the failed test repeats, check for leak using the ultrasonic leak detector (part of **SST**).
2. Press the RESET switch to set the left display reading to **0.0** .
3. Connect the fuel cap receiver assembly (part of **SST**) to the manifold assembly and fuel-filler cap from the vehicle.
    - If the fuel-filler cap is not a genuine part, replace it.

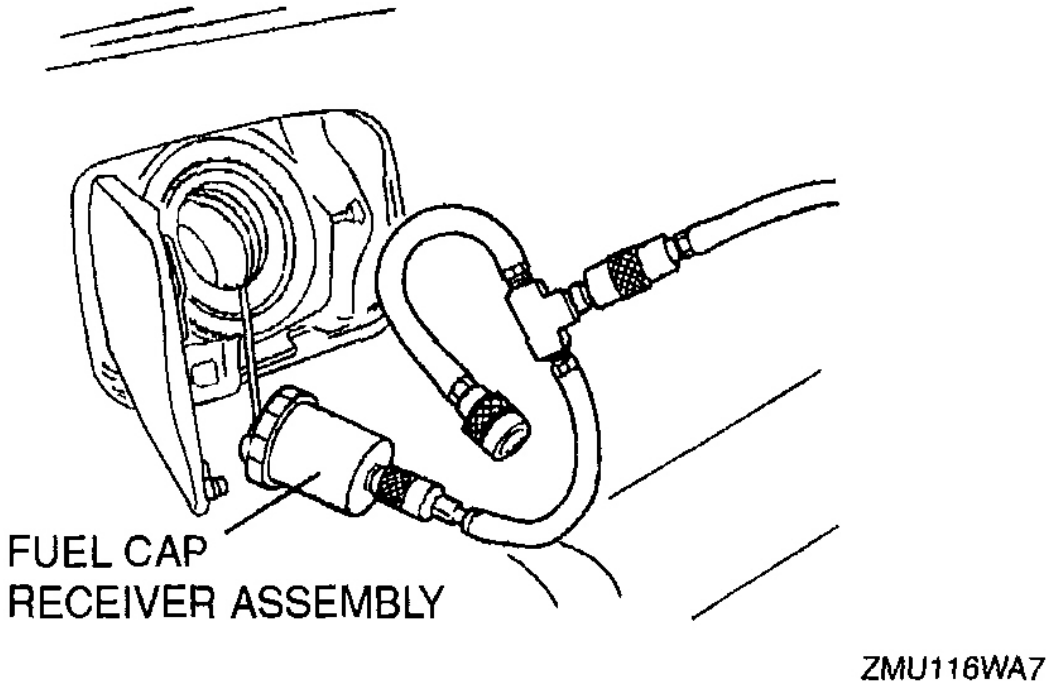


Fig. 5: Connecting Fuel Cap Receiver Assembly
Courtesy of MAZDA MOTORS CORP.

4. Turn the control valve to the FILL position.
5. Wait (**maximum 20s**) until the left display reads **13.9 to 14 in** of water.
    - If the reading is slightly below, adjust it using the regulator knob.
    - If the reading is far below, the fuel-filler cap has leak. Replace it.
6. Turn the control valve to the TEST position and press the START switch.
7. After the **2-min** countdown (left display) is completed, check the test result (the failed/passed light on the tester).
    - If the green light turns on, the fuel-filler cap is OK.

- If the red light turns on, the fuel-filler cap has leakage. Replace it.

8. Close the gas cylinder valve.
9. Turn the control valve to the FILL position.
10. Press the ON/OFF switch to turn off the tester.

EMISSION SYSTEM DIAGRAM [LF]

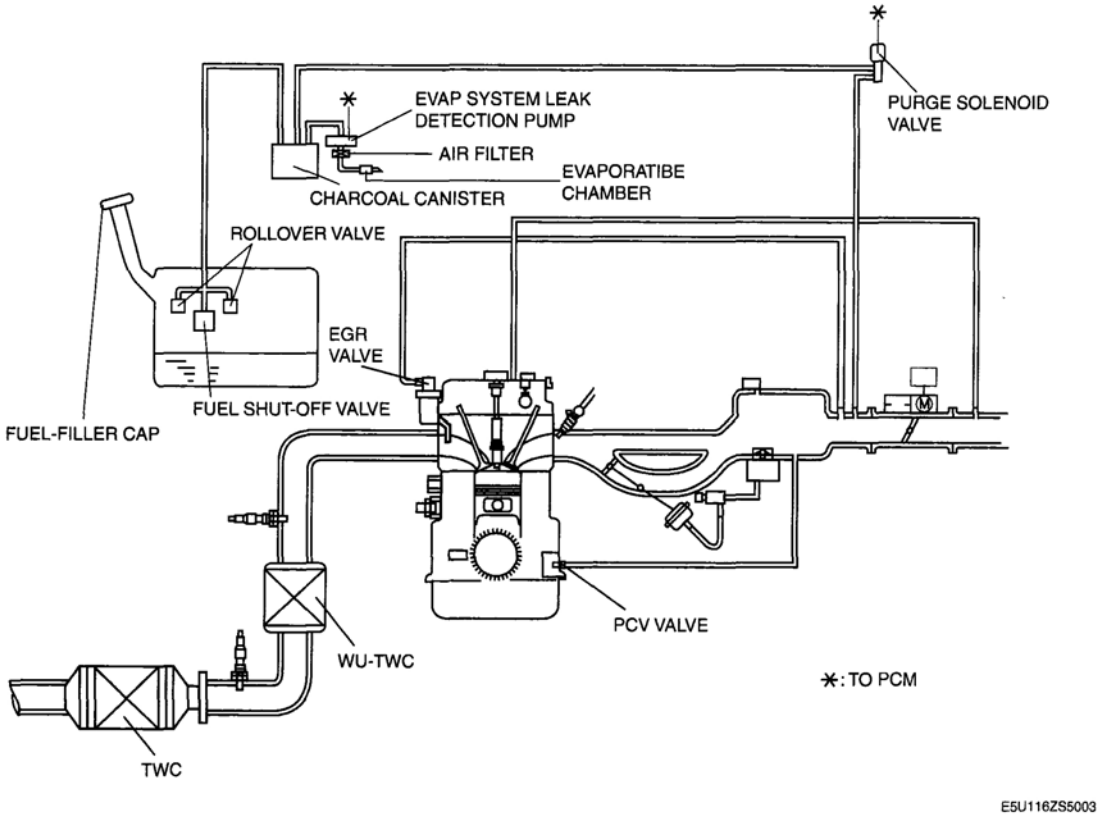


Fig. 6: Identifying Emission System Diagram [LF]
Courtesy of MAZDA MOTORS CORP.

AIR FILTER REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the evaporative hose from the air filter.
4. Cover the evaporative hose with vinyl sheets or the like to prevent them from being scratched or contaminated with foreign material.

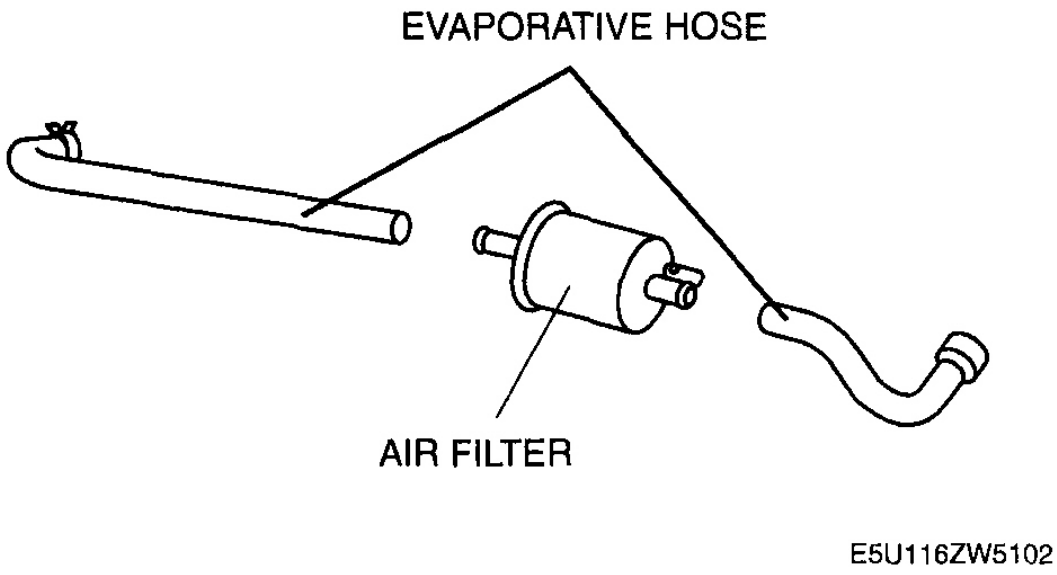


Fig. 7: Identifying Evaporative Hose And Air Filter
Courtesy of MAZDA MOTORS CORP.

5. Remove the air filter.
6. Install in the reverse order of removal.

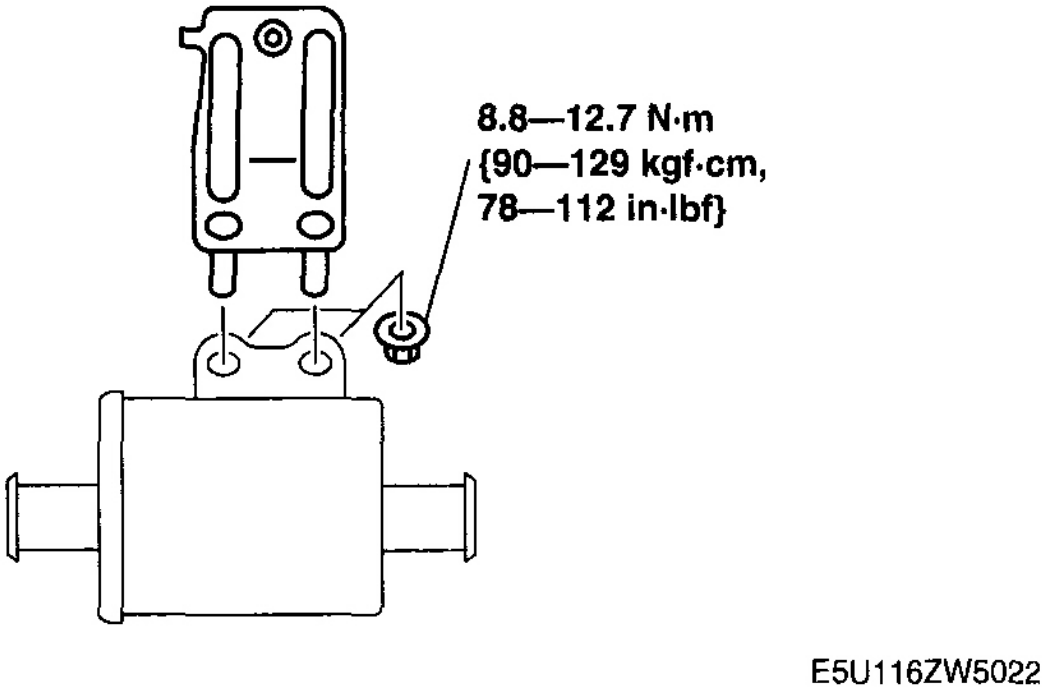


Fig. 8: Removing Air Filter (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

AIR FILTER INSPECTION [LF]

1. Remove the air filter. (See **AIR FILTER REMOVAL/INSTALLATION [LF]**).
2. Blow from port A and verify that there is airflow from port B.
   - If not as specified, replace the air filter.
3. Blow from port B and verify that there is airflow from port A.
   - If not as specified, replace the air filter. (See **AIR FILTER REMOVAL/INSTALLATION [LF]**).

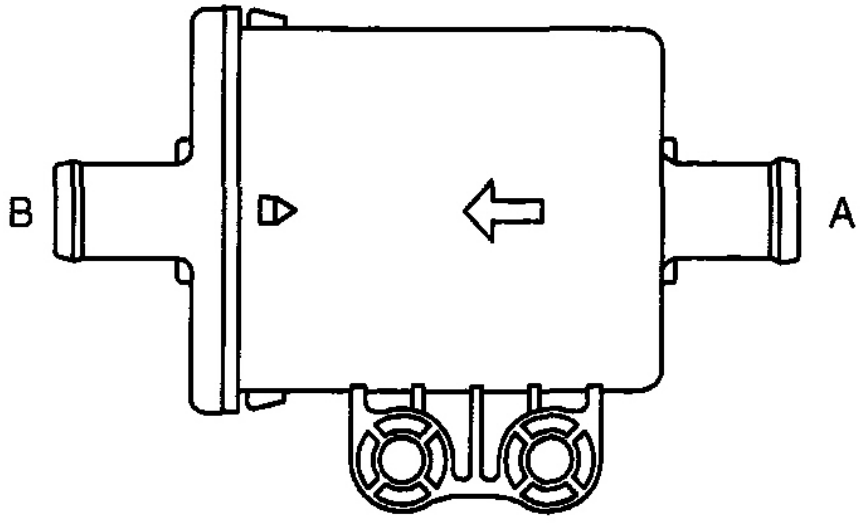


Fig. 9: Identifying Air Filter
Courtesy of MAZDA MOTORS CORP.

CHARCOAL CANISTER REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in **Fig. 10** .
4. Install in the reverse order of removal.

1	Quick connector (Type C)
2	Evaporative hose
3	Charcoal canister bracket
4	Charcoal canister

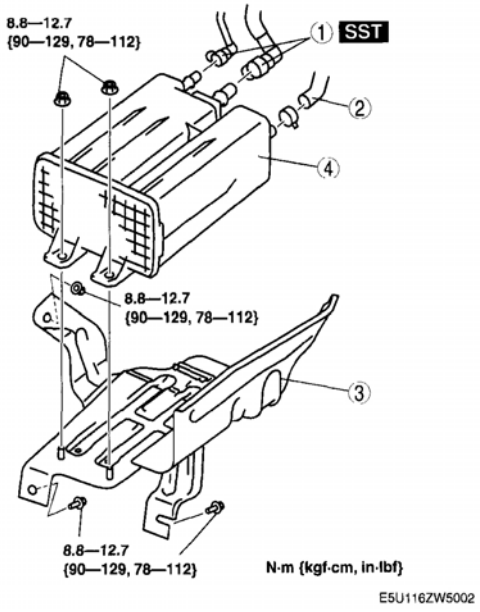


Fig. 10: Identifying Charcoal Canister Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE HOSE INSTALLATION NOTE

1. Fit the evaporative hose onto the respective fittings, and install clamps as shown in **Fig. 11**.
    1. Insert the evaporative hose securely to the nipple.
    2. Inspect the evaporative hose for damage and deformation.

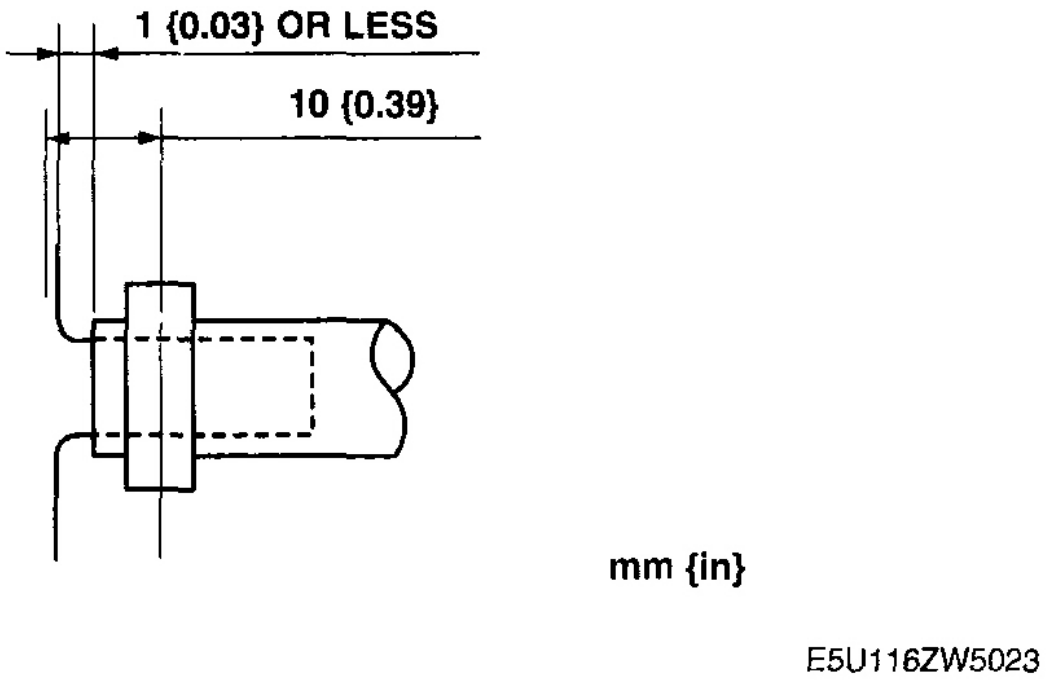


Fig. 11: Inserting Evaporative Hose Securely To Nipple
Courtesy of MAZDA MOTORS CORP.

CHARCOAL CANISTER INSPECTION [LF]

1. Remove the charcoal canister. (See **CHARCOAL CANISTER REMOVAL/INSTALLATION [LF]**).
2. Plug the EVAP leak detection pump side and purge solenoid valve side of the charcoal canister.
3. Inspect for air leakage when blowing air by mouth from the fuel tank side.
    - If air leaks, replace the charcoal canister. (See **CHARCOAL CANISTER REMOVAL/INSTALLATION [LF]**).

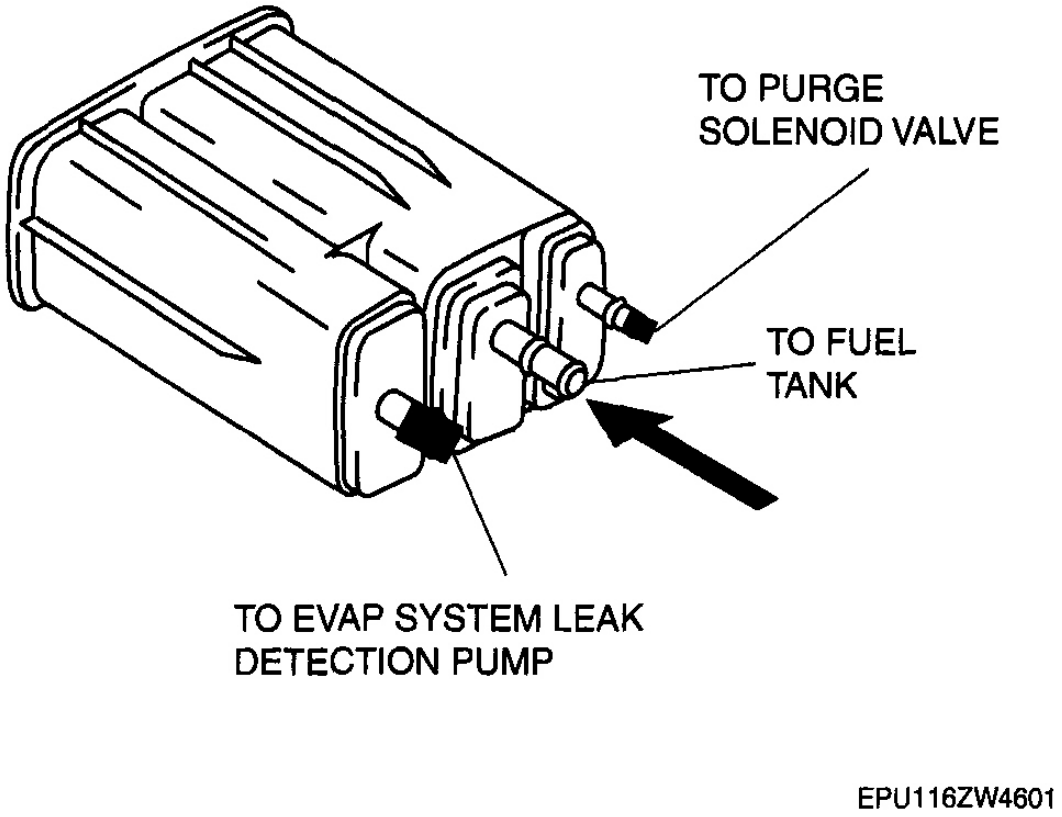


Fig. 12: Identifying Charcoal Canister
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the EVAP system leak detection pump connector.
4. Disconnect the evaporative hose from the EVAP system leak detection pump.
5. Cover the evaporative hose with vinyl sheets or the like to prevent them from being scratched or contaminated with foreign material.
6. Remove the EVAP system leak detection pump with the bracket.

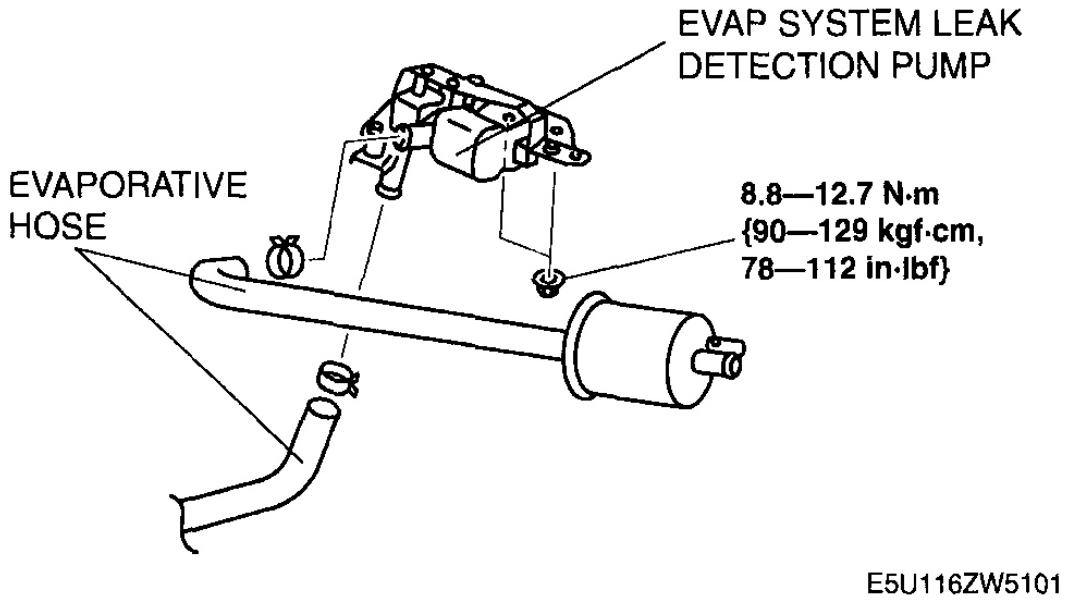


Fig. 13: Identifying Evaporative Emission System Leak Detection Pump And Evaporative Hose (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Remove the bracket from the EVAP system leak detection pump.

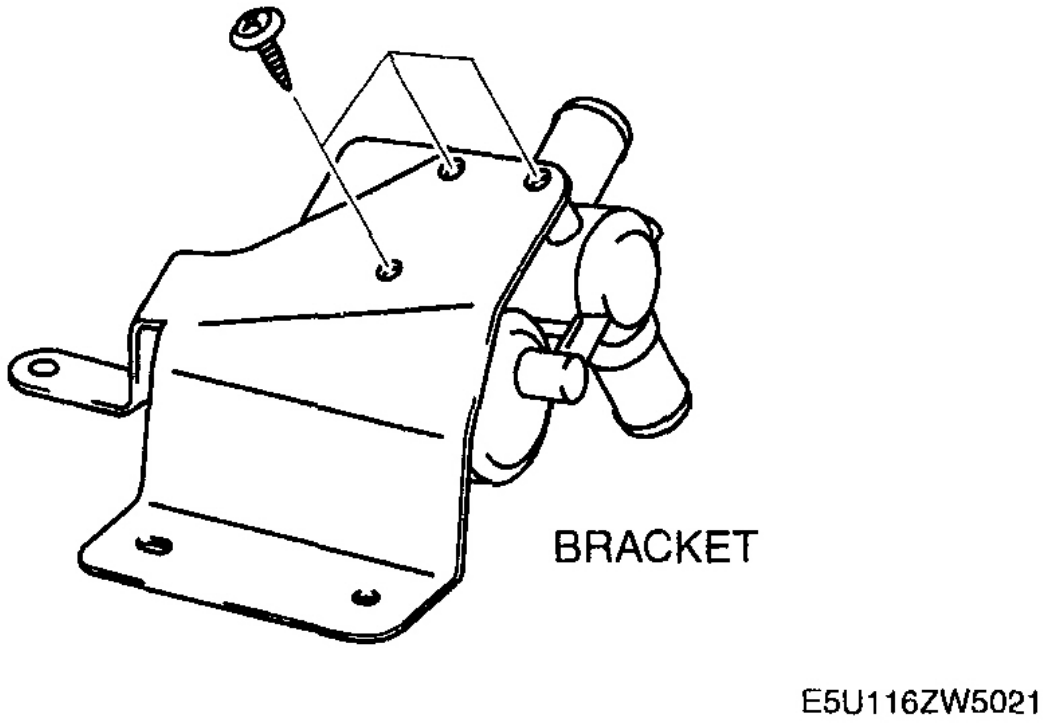


Fig. 14: Removing Bracket From EVAP System Leak Detection Pump
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

EVAPORATIVE HOSE INSTALLATION NOTE

1. Fit the evaporative hose onto the respective fittings, and install clamps as shown in **Fig. 15**.
    1. Insert the evaporative hose securely to the nipple.
    2. Inspect the evaporative hose for damage and deformation.

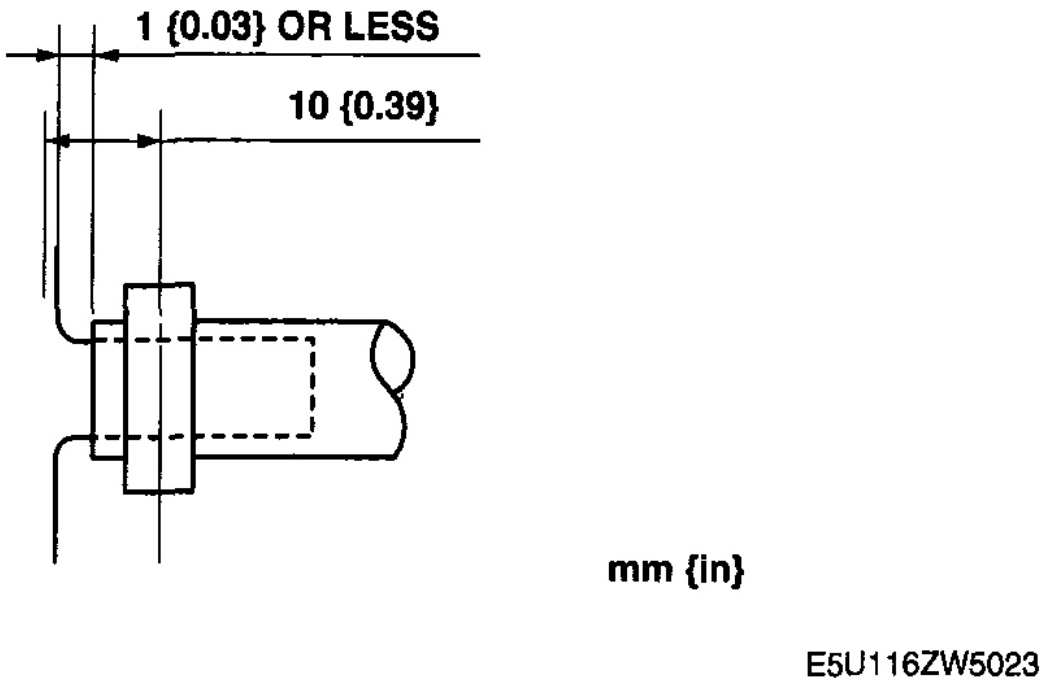


Fig. 15: Inserting Evaporative Hose Securely To Nipple
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP INSPECTION [LF]

NOTE:
- **Perform the following procedure only when directed.**

AIRFLOW INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the EVAP system leak detection pump. (See **EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [LF]** .).
4. Blow air into port A and verify that there is airflow from port B.
   - If not as specified, replace the EVAP system leak detection pump. (See **EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [LF]**).
5. Blow air into port B and verify that there is airflow from port A.
   - If not as specified, replace the EVAP system leak detection pump. (See **EVAPORATIVE**

EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [LF]).

- If as specified, perform the following "**RESISTANCE INSPECTION**".

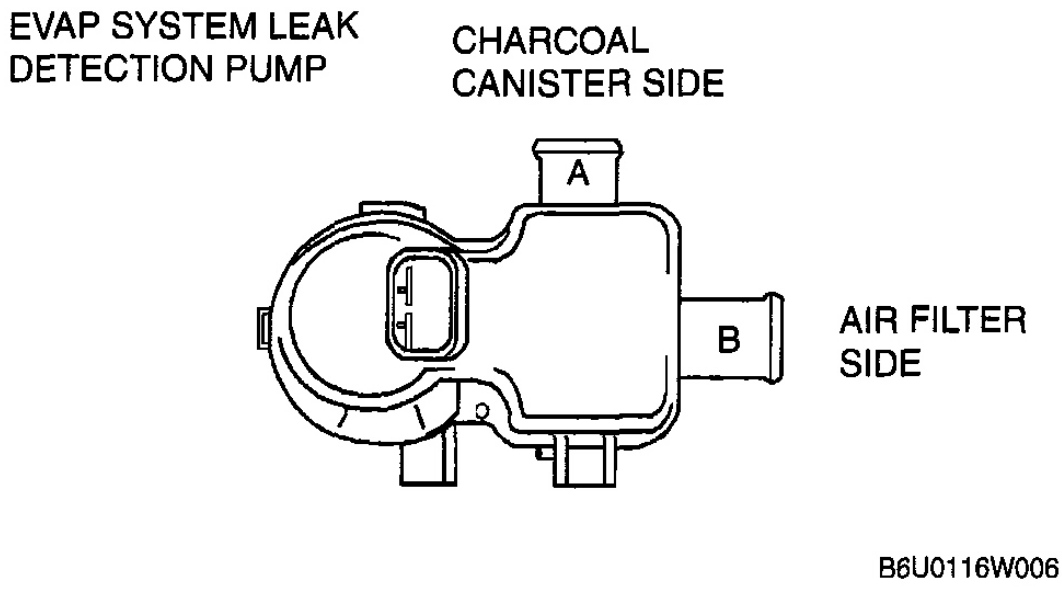


Fig. 16: Identifying Evaporative Emission System Leak Detection Pump Ports
Courtesy of MAZDA MOTORS CORP.

RESISTANCE INSPECTION

1. Inspect resistance of the EVAP system leak detection pump.
   - If not as specified, replace the EVAP system leak detection pump. (See **EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [LF]**).
   - If as specified, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

EVAP SYSTEM LEAK DETECTION PUMP TERMINALS RESISTANCE SPECIFICATIONS

Terminals	Resistance (ohm)
A-B	20-50
A-C	26.6-32.4
A-D	MAX. 118

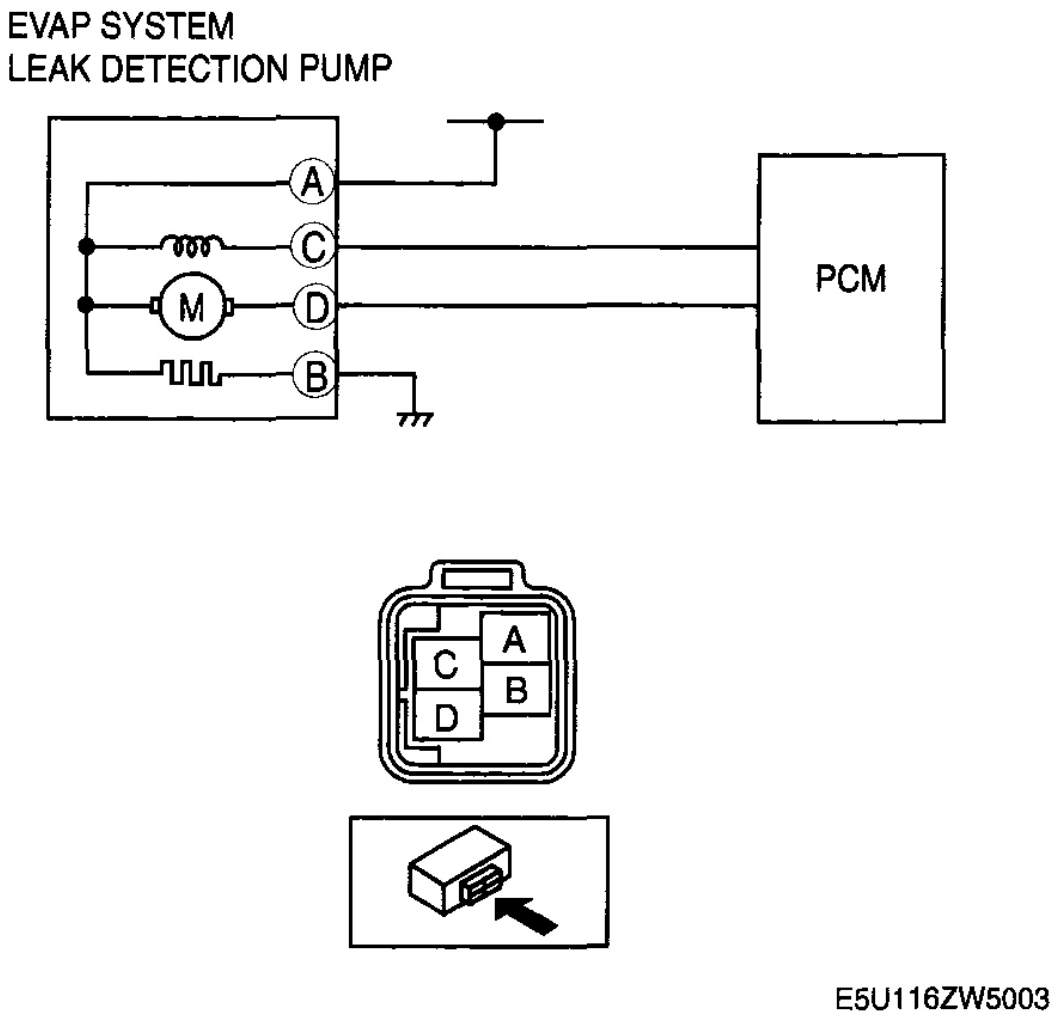


Fig. 17: Identifying EVAP System Leak Detection Pump Connector Terminals
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harness for open or short circuit (continuity check).

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - EVAP system leak detection pump terminal C and PCM terminal 1V
  - EVAP system leak detection pump terminal D and PCM terminal 1U

- EVAP system leak detection pump terminal A and main relay
- EVAP system leak detection pump terminal B and body ground

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - EVAP system leak detection pump terminal C and body ground
  - EVAP system leak detection pump terminal D and body ground
  - EVAP system leak detection pump terminal C and power supply
  - EVAP system leak detection pump terminal D and power supply
  - EVAP system leak detection pump terminal A and body ground
  - EVAP system leak detection pump terminal B and power supply

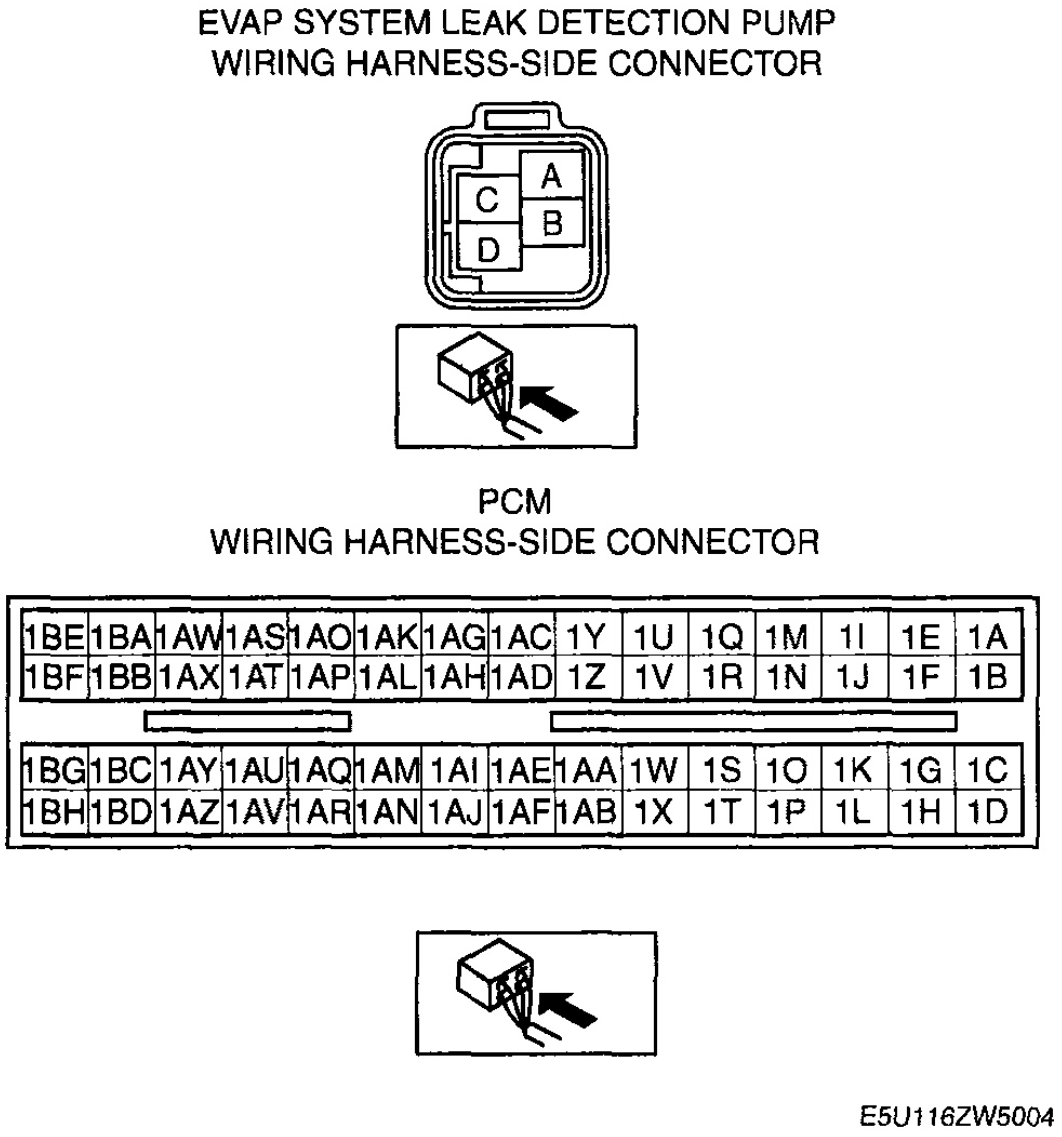


Fig. 18: Identifying PCM Wiring Harness-Side Connector
Courtesy of MAZDA MOTORS CORP.

PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the purge solenoid valve connector.
4. Disconnect the vacuum hose from the purge solenoid valve.
5. Remove the purge solenoid valve from the air hose.

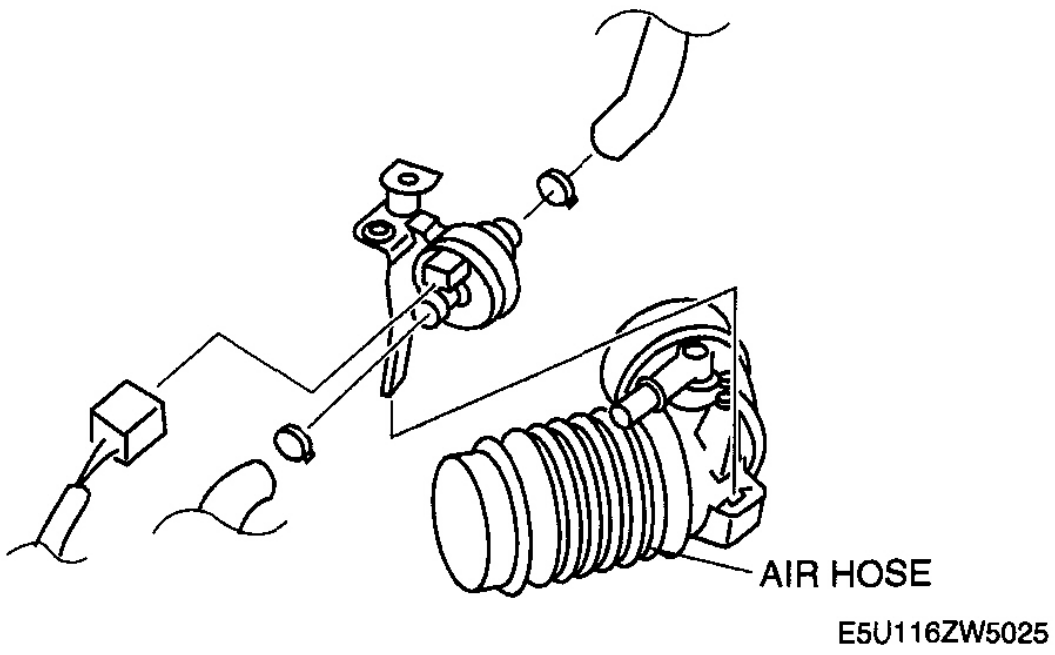


Fig. 19: Removing Purge Solenoid Valve From Air Hose
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

PURGE SOLENOID VALVE INSPECTION [LF]

NOTE:
- **Perform the following procedure only when directed.**

AIRFLOW INSPECTION

1. Remove the purge solenoid valve without disconnecting the evaporative hose. (See **PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]**).
2. Verify that the airflow is as indicated in **PURGE SOLENOID VALVE AIRFLOW REFERENCE TABLE** .
   - If as specified in **PURGE SOLENOID VALVE AIRFLOW REFERENCE TABLE** , perform the **CIRCUIT OPEN/SHORT INSPECTION** .
   - If not as specified in **PURGE SOLENOID VALVE AIRFLOW REFERENCE TABLE** , inspect the purge solenoid valve. (See **PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]** .)

PURGE SOLENOID VALVE AIRFLOW REFERENCE TABLE

Measured condition	Continuity between A-B
When voltage is not applied between terminals A and B	No airflow
When voltage is applied between terminals A and B	Airflow detected

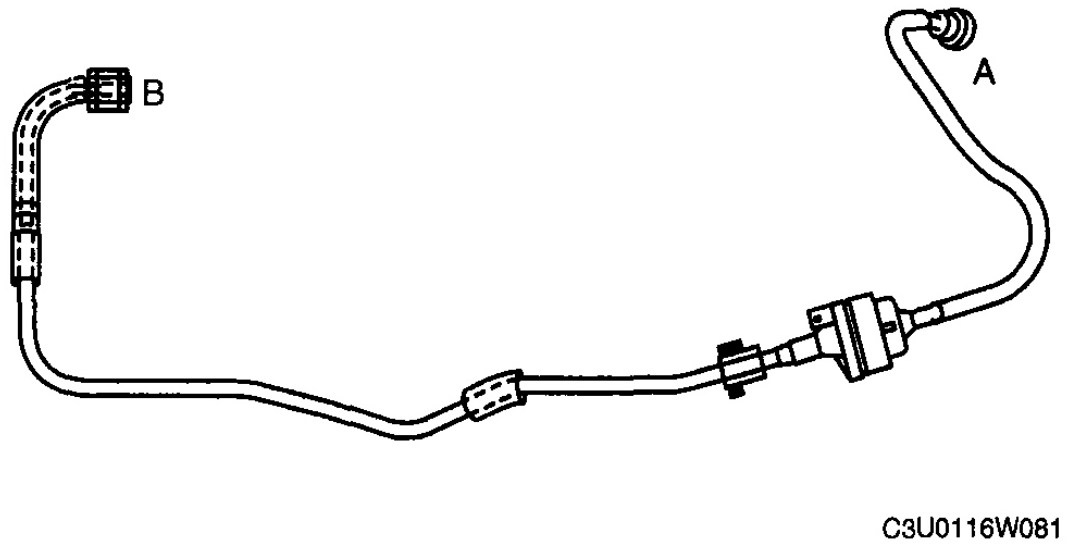


Fig. 20: Inspecting Airflow
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for open or short circuit (continuity check).

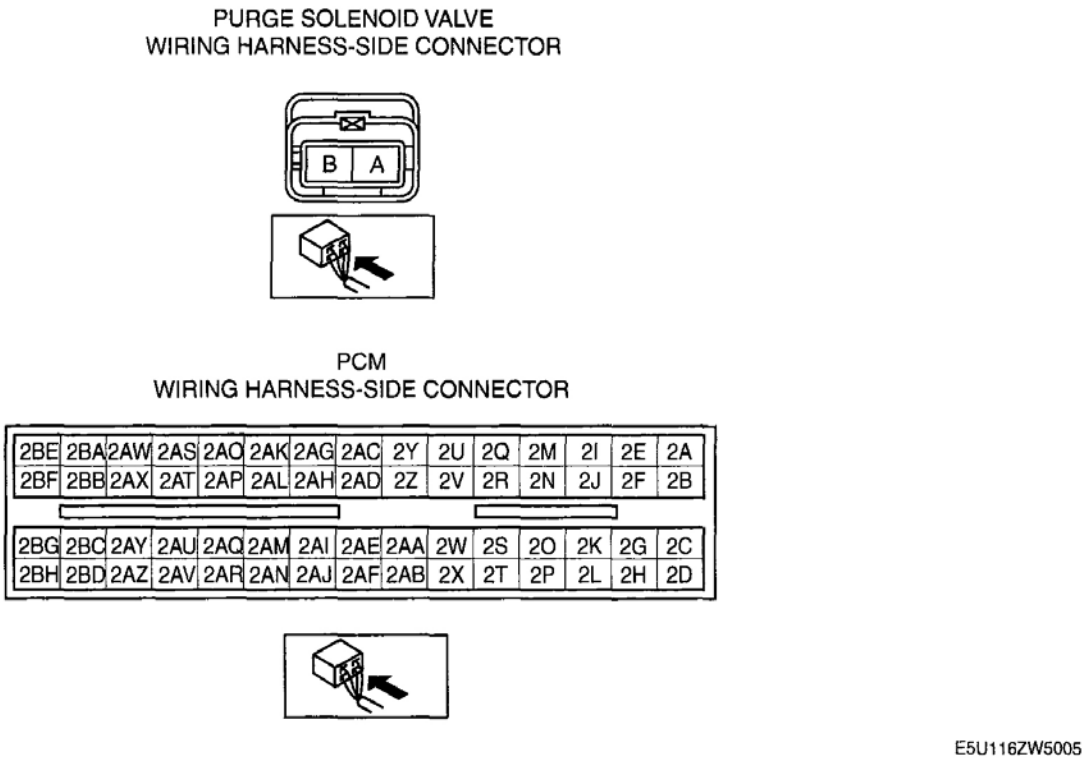


Fig. 21: Purge Solenoid Valve & PCM Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - Purge solenoid valve terminal A and PCM terminal 2C
  - Purge solenoid valve terminal B and main relay

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - Purge solenoid valve terminal A and power supply
  - Purge solenoid valve terminal A and body ground
  - Purge solenoid valve terminal B and body ground

EGR VALVE REMOVAL/INSTALLATION [LF]

1. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

4. Drain the engine coolant from the radiator. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
5. Remove the service hole cover.
    1. Remove the suspension tower bar (joint), (right side) and (left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
    2. Remove the wiper arm: (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
    3. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
    4. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
    5. Move the cooler pipe No.3 and heater pipe slightly out of the way.

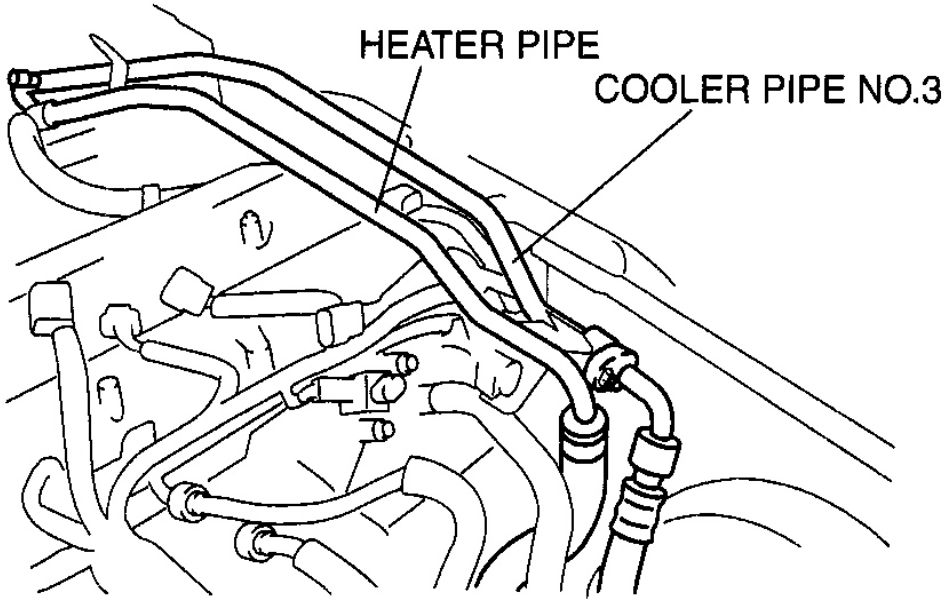


Fig. 22: Identifying Heater Pipe & Cooler Pipe No. 3
Courtesy of MAZDA MOTORS CORP.

6. Remove the service hole cover.

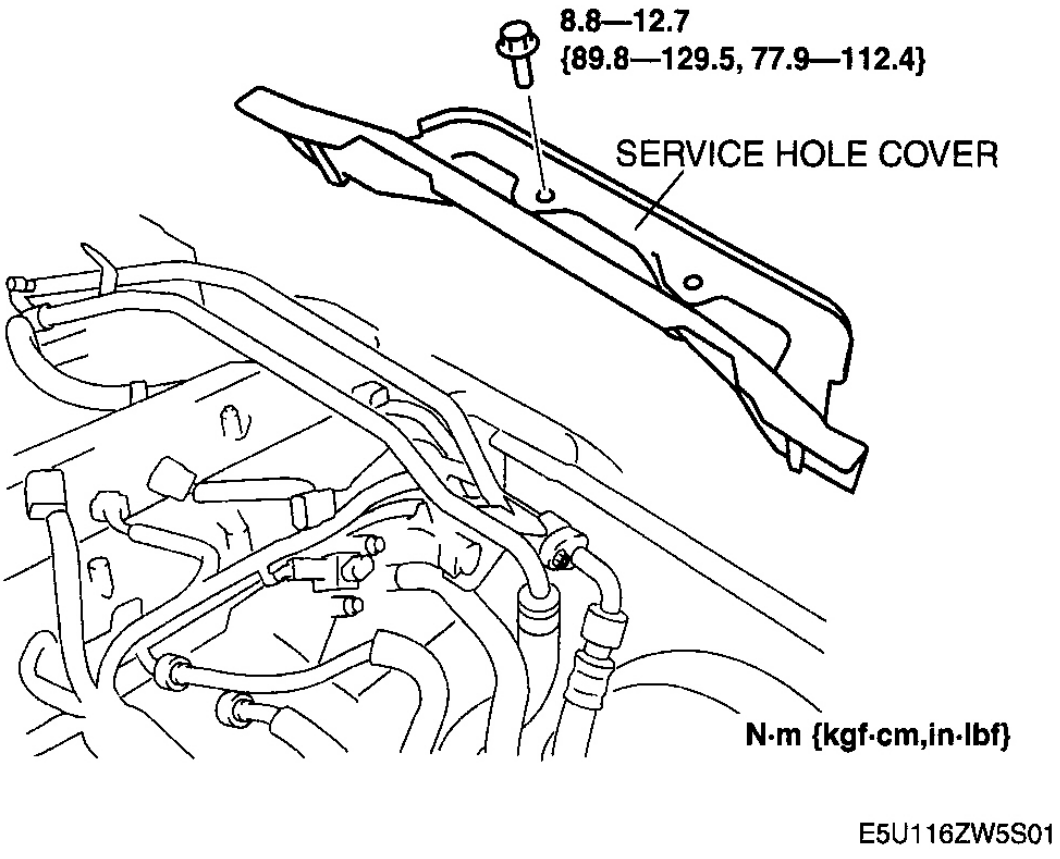


Fig. 23: Removing Service Hole Cover (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Remove the harness bracket.

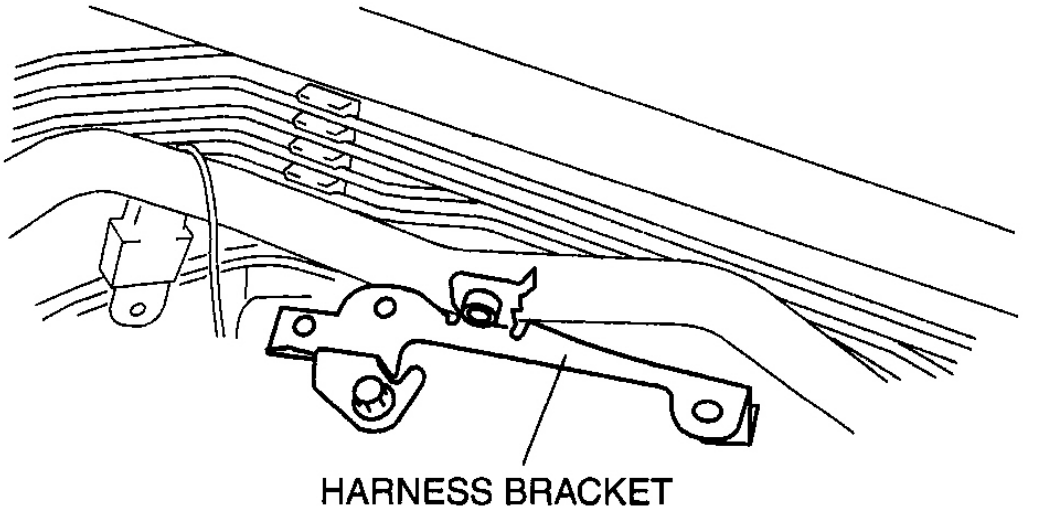


Fig. 24: Removing Harness Bracket
Courtesy of MAZDA MOTORS CORP.

7. Disconnect the heater hose and move the heater pipe slightly out of the way.

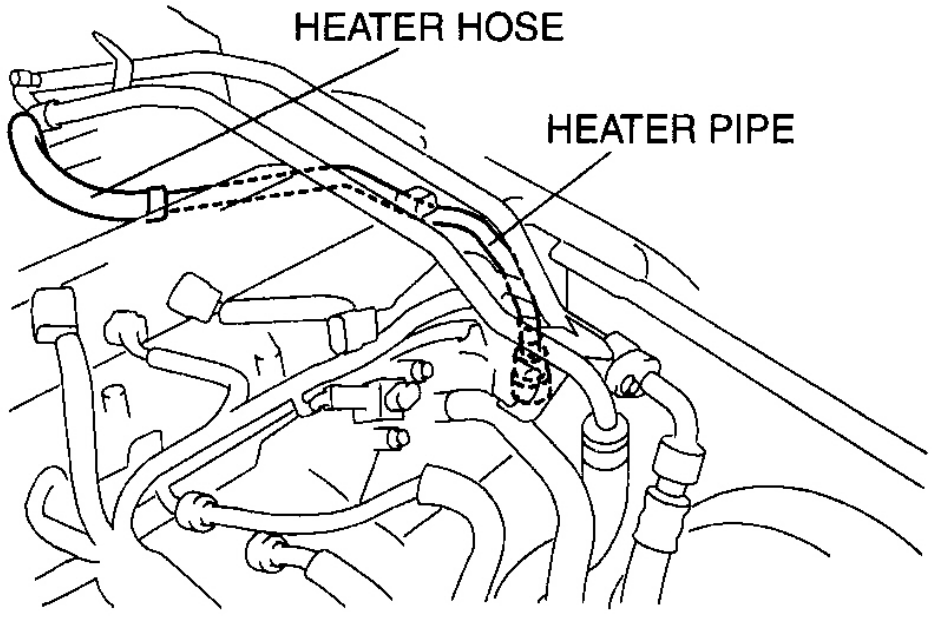


Fig. 25: Identifying Heater Hose & Heater Pipe
Courtesy of MAZDA MOTORS CORP.

8. Disconnect the EGR valve connector.
9. Set the **SST** to the EGR valve installation bolt.

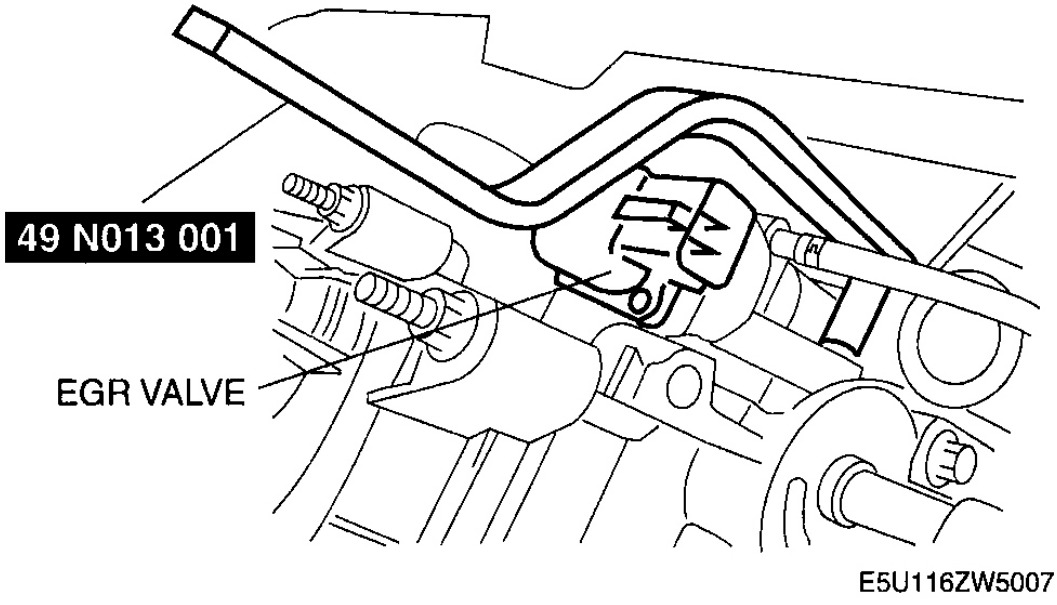


Fig. 26: Setting SST (49 N013 001) To EGR Valve Installation Bolt
Courtesy of MAZDA MOTORS CORP.

10. Remove both EGR valve installation bolts.
11. Remove the EGR valve with the engine coolant hose.

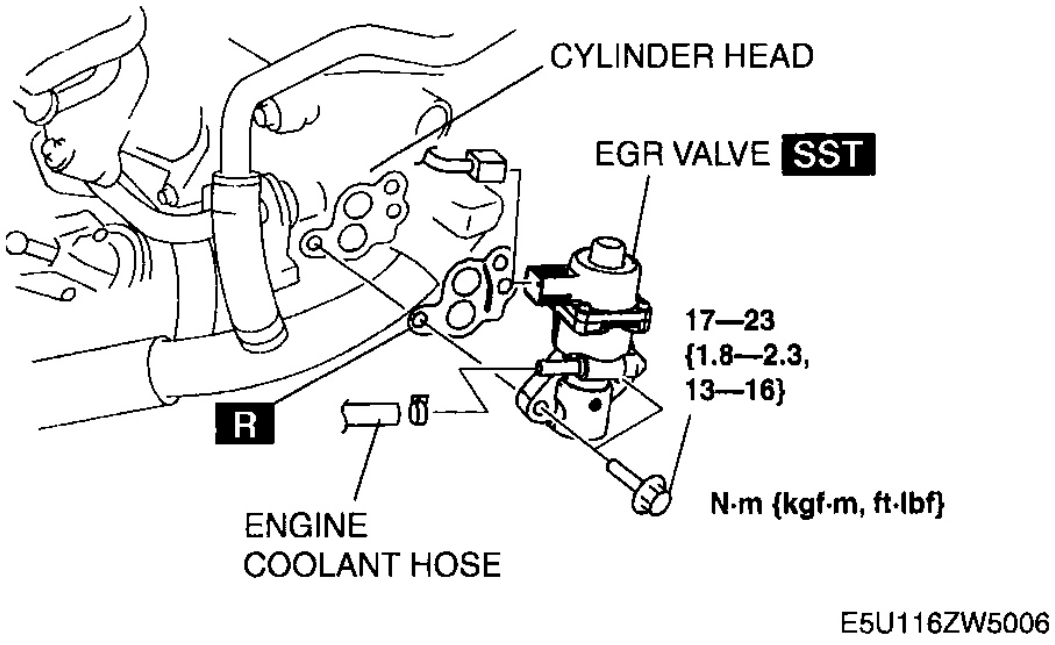


Fig. 27: Removing EGR Valve With Engine Coolant Hose (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

12. Disconnect the engine coolant hose from the EGR valve.
13. Replace the EGR valve gasket.
14. Install in the reverse order of removal.

EGR VALVE INSPECTION [LF]

NOTE:
- **Perform the following procedure only when directed.**

ON-VEHICLE INSPECTION

1. Verify that the buzzing sound (valve operation sound) is heard from the EGR valve when engine cranking.
   - If the buzzing sound is not heard, perform the resistance inspection.

RESISTANCE INSPECTION

1. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

4. Disconnect the EGR valve connector. (See **EGR VALVE REMOVAL/INSTALLATION [LF]**).
5. Measure the resistance between the EGR valve terminals.
   - If within the specification, perform out the **CIRCUIT OPEN/SHORT INSPECTION** .
   - If not within the specification, replace the EGR valve. (See **EGR VALVE REMOVAL/INSTALLATION [LF]**).

STANDARD RESISTANCE SPECIFICATIONS

Terminal	Resistance (ohm)
C-E C-A D-B D-F	12-16

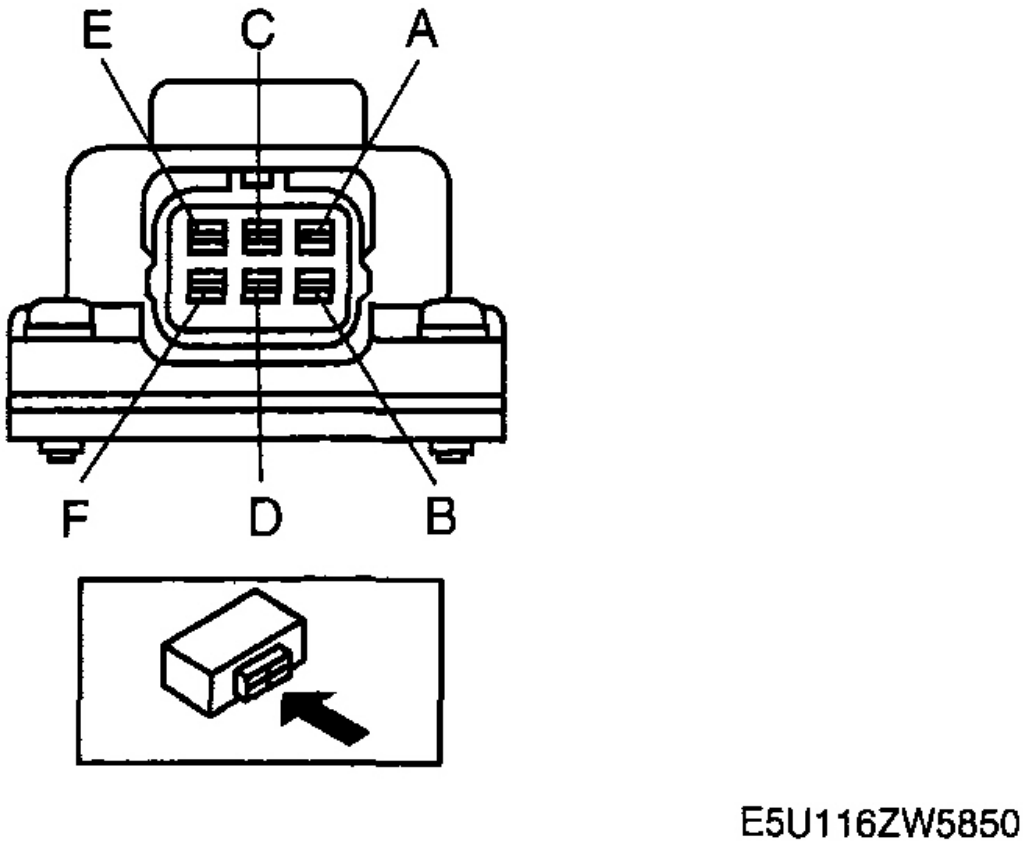


Fig. 28: Identifying EGR Valve Connector Terminals
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for open or short circuit (continuity check).

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - EGR valve terminal A and PCM terminal 2G
  - EGR valve terminal B and PCM terminal 2L
  - EGR valve terminal E and PCM terminal 2K
  - EGR valve terminal F and PCM terminal 2H
  - EGR valve terminal C and main relay
  - EGR valve terminal D and main relay

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - EGR valve terminal A and body ground
  - EGR valve terminal A and power supply
  - EGR valve terminal B and body ground
  - EGR valve terminal B and power supply
  - EGR valve terminal C and body ground
  - EGR valve terminal D and body ground
  - EGR valve terminal E and body ground
  - EGR valve terminal E and power supply
  - EGR valve terminal F and body ground
  - EGR valve terminal F and power supply

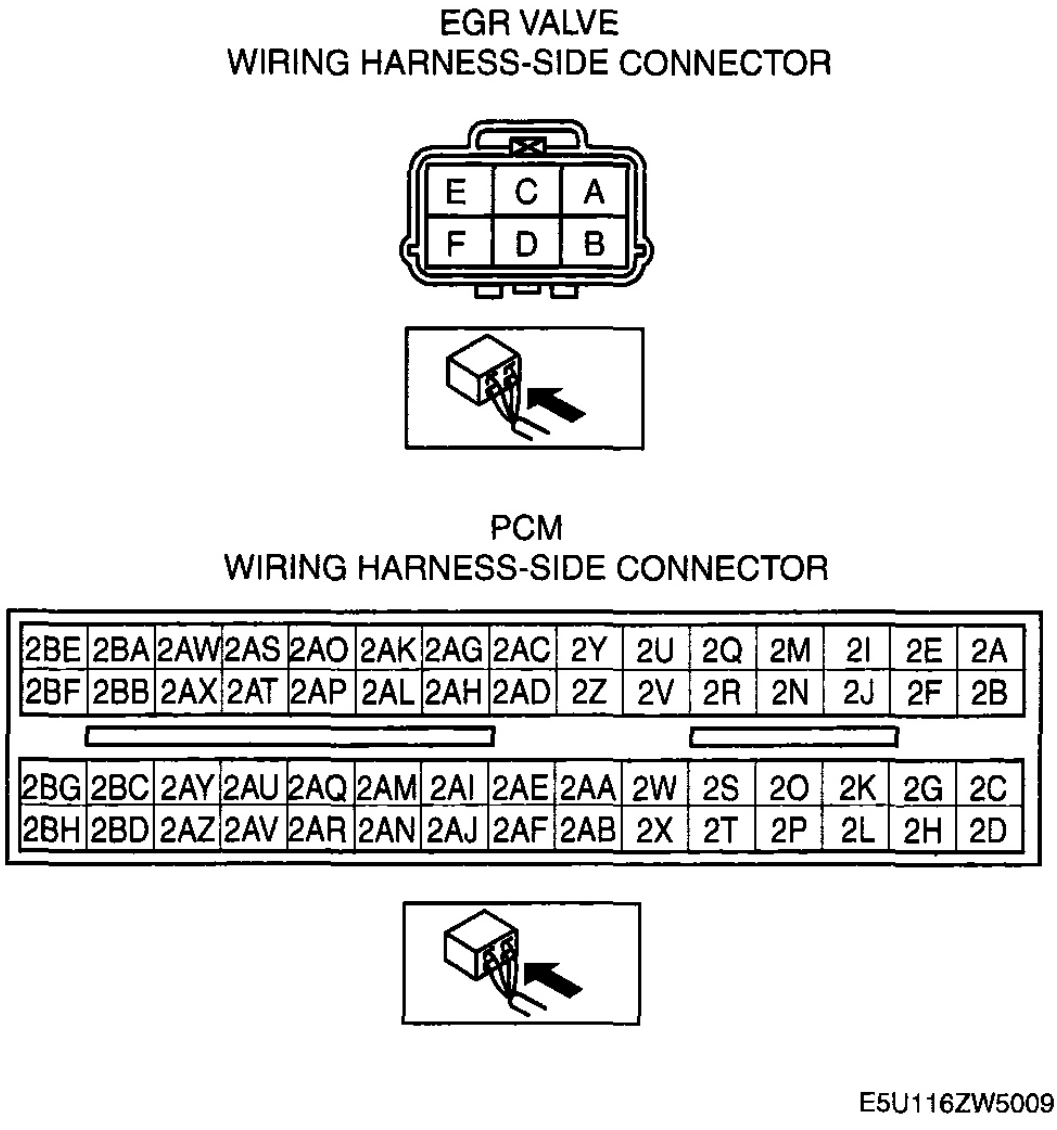


Fig. 29: Identifying EGR Valve & PCM Wiring Harness-Side Connector
Courtesy of MAZDA MOTORS CORP.

POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [LF]

1. Remove the intake manifold. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
2. Remove the PCV valve.
3. Verify that there is no airflow when pressure is applied to port A.
   - If there is airflow, replace the PCV valve.
4. Verify that there is airflow when vacuum is applied to port A.

- If there is no airflow, replace the PCV valve.

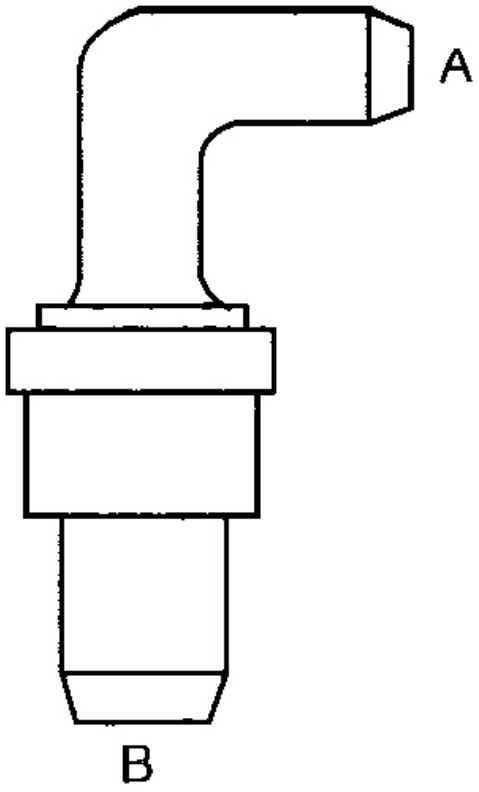


Fig. 30: Identifying PCV Valve
Courtesy of MAZDA MOTORS CORP.

WARM-UP THREE-WAY CATALYTIC CONVERTER (WU-TWC) INSPECTION [LF]

NOTE:

- **Make sure that no HO2S DTCs have been detected. If detected, this inspection is not applicable for WU-TWC inspection.**

1. Connect the M-MDS or equivalent and monitor PIDs as following.
   - Monitor the WU-TWC using O2S11 PID for upstream HO2S and O2S12 PID for downstream HO2S.

2. Monitor the appropriate PIDs.
3. Drive the vehicle for **10 min** at **65-96 km/h {40-60 mph}** to allow the front catalytic converter to reach operating temperature.
4. Stop the vehicle and leave it in a safe place.
5. Idle the engine.
6. Record PIDs for **1 min** .
7. Select the appropriate PIDs and read the graph.
8. Count the number of times (inversions) that the upstream HO2S graph line actually crosses the **0.5 V** line.

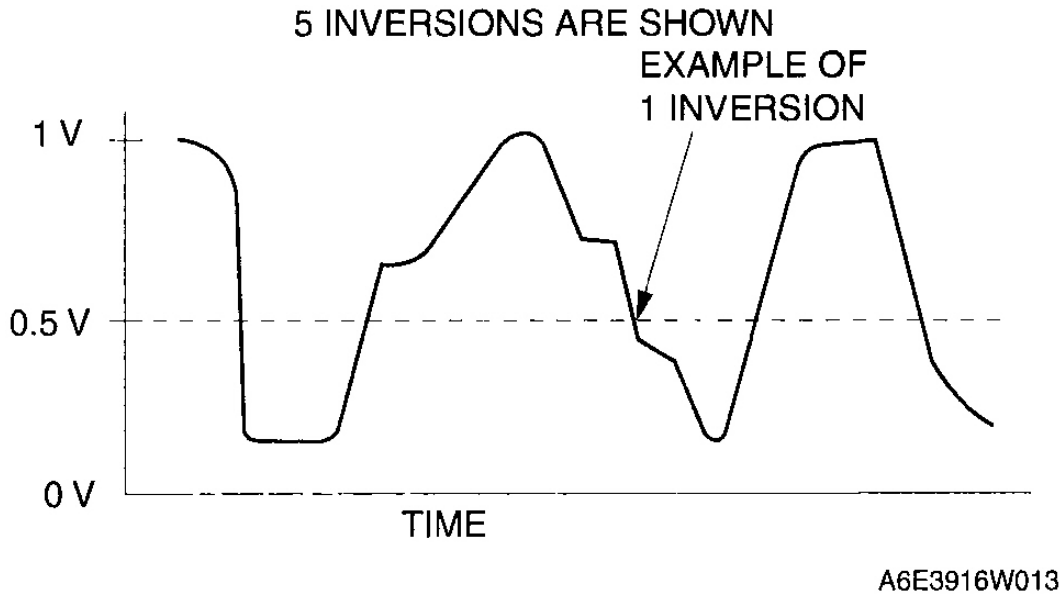


Fig. 31: Identifying HO2S Graph Line (5 Inversions)
Courtesy of MAZDA MOTORS CORP.

9. Count the number of times (inversions) that the downstream HO2S graph line actually crosses the **0.5 V** line.

NOTE:

- **Do not count the number of peaks. Refer to Fig. 31 .**

10. Using the following equation, calculate the value of ratio.

Equation

RATIO = Upstream HO2S inversion divided by downstream HO2S inversion

- If the ratio is **1.5 or more** or there is no downstream HO2S inversion, the WU-TWC is functioning properly.
- If the ratio is **less than 1.5** , the WU-TWC is not functioning properly. Replace the WU-TWC.

Upstream HO2S Graph Line Example

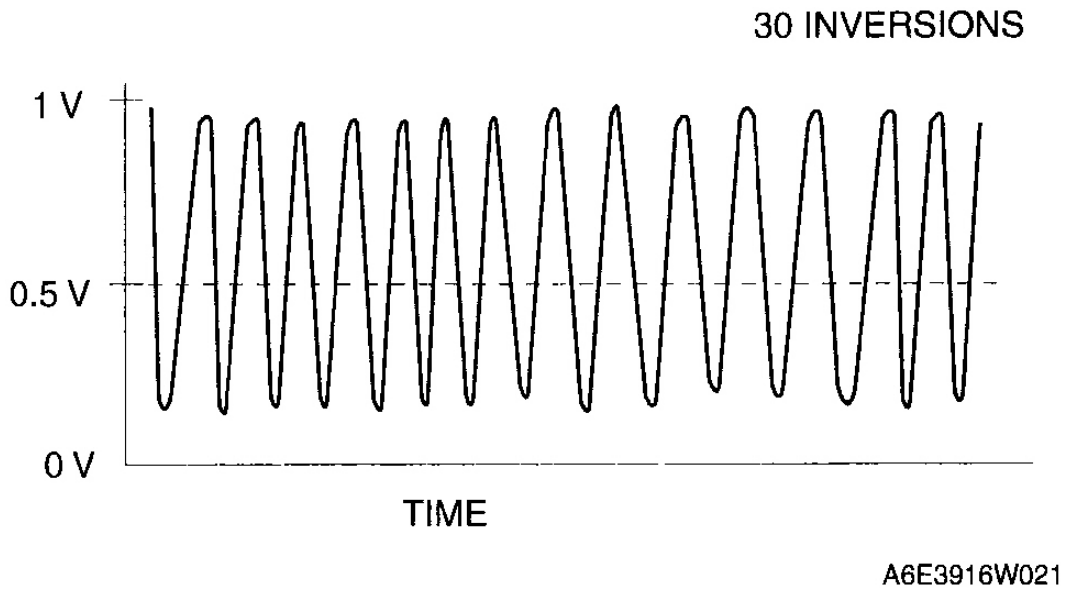


Fig. 32: Upstream HO2S Graph Line Example
Courtesy of MAZDA MOTORS CORP.

Downstream HO2S Graph Line Example 1

Equation

RATIO = 30 inversions (upstream HO2S inversions) divided by 5 inversions (downstream HO2S inversions) = 6.0 (good WU-TWC)

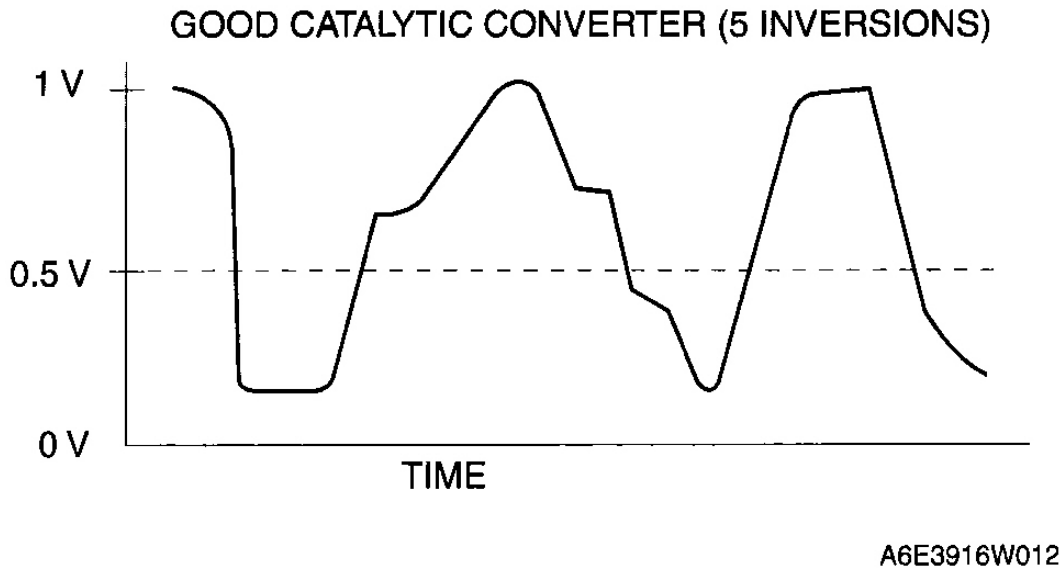


Fig. 33: Downstream HO2S Graph Line Example 1
Courtesy of MAZDA MOTORS CORP.

Downstream HO2S Graph Line Example 2

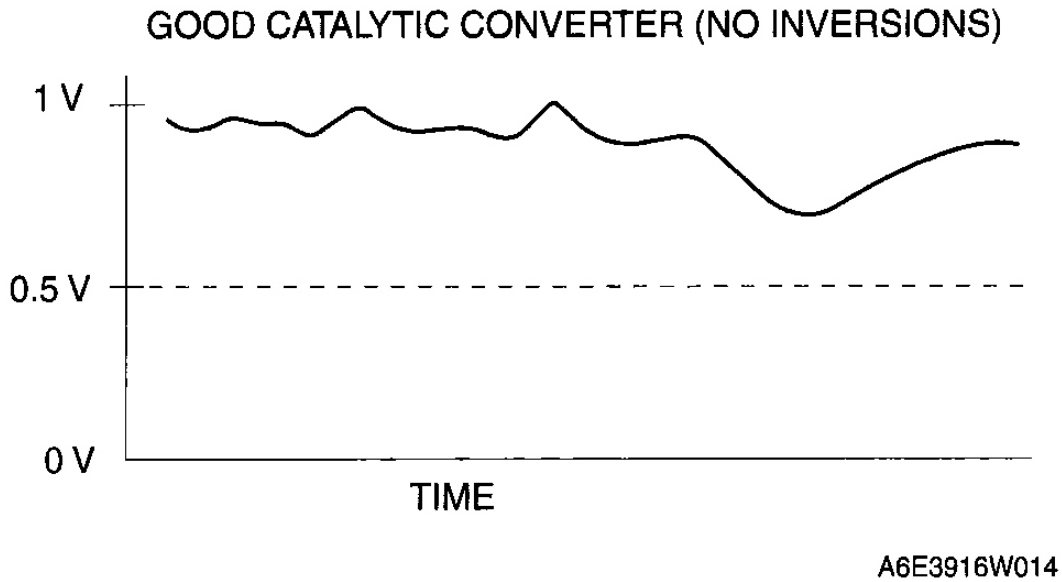


Fig. 34: Downstream HO2S Graph Line Example 2

Courtesy of MAZDA MOTORS CORP.

Downstream HO2S Graph Line Example 3

Equation

RATIO = 30 inversions (upstream HO2S inversions) divided by 27 inversions (downstream HO2S inversions) = 1.1 (bad WU-TWC)

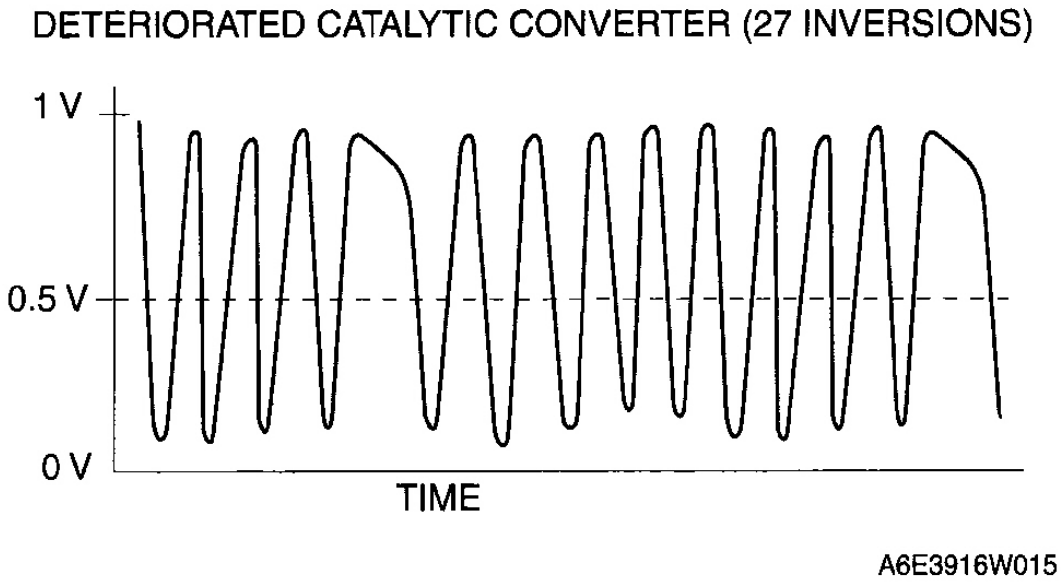


Fig. 35: Downstream HO2S Graph Line Example 3
Courtesy of MAZDA MOTORS CORP.

ROLLOVER VALVE REMOVAL/INSTALLATION [LF]

NOTE:

- **The rollover valve cannot be removed as it is built into the fuel tank.**

ROLLOVER VALVE INSPECTION [LF]

NOTE:

- **The rollover valve cannot be removed and inspected as it is built into the fuel tank.**

1. Perform the fuel tank inspection. (See **FUEL TANK INSPECTION [LF]** .)

FUEL SHUT-OFF VALVE REMOVAL/INSTALLATION [LF]

NOTE:

- **The fuel shut-off valve cannot be removed as it is built into the fuel tank.**

FUEL SHUT-OFF VALVE INSPECTION [LF]

NOTE:

- **The fuel shut-off valve cannot be removed and inspected as it is built into the fuel tank.**

1. Perform the fuel tank inspection. (See **FUEL TANK INSPECTION [LF]** .)

EVAPORATIVE CHAMBER REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the evaporative hose.
4. Remove the evaporative chamber.
5. Cover the evaporative hose with vinyl sheets or the like to prevent them from being scratched or contaminated with foreign material.
6. Install in the reverse order of removal.

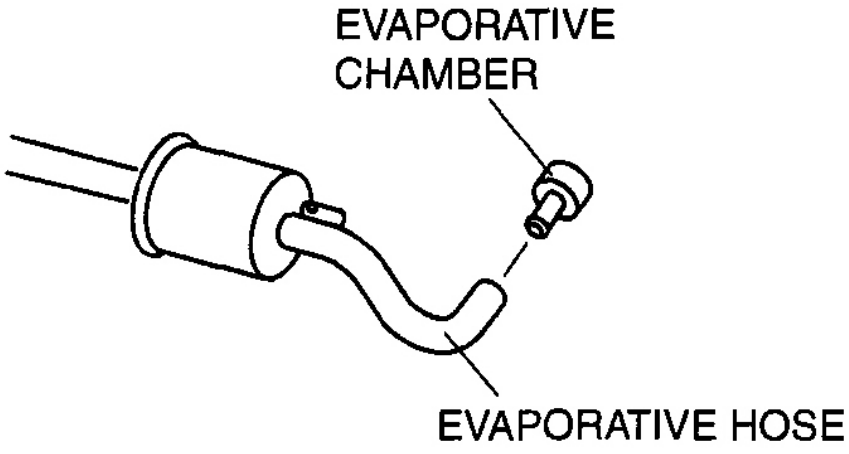


Fig. 36: Identifying Evaporative Chamber And Evaporative Hose
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE CHAMBER INSPECTION [LF]

1. Remove the evaporative chamber.
2. Blow from port A and verify that there is airflow from port B.
    - If not as specified, replace the evaporative chamber.

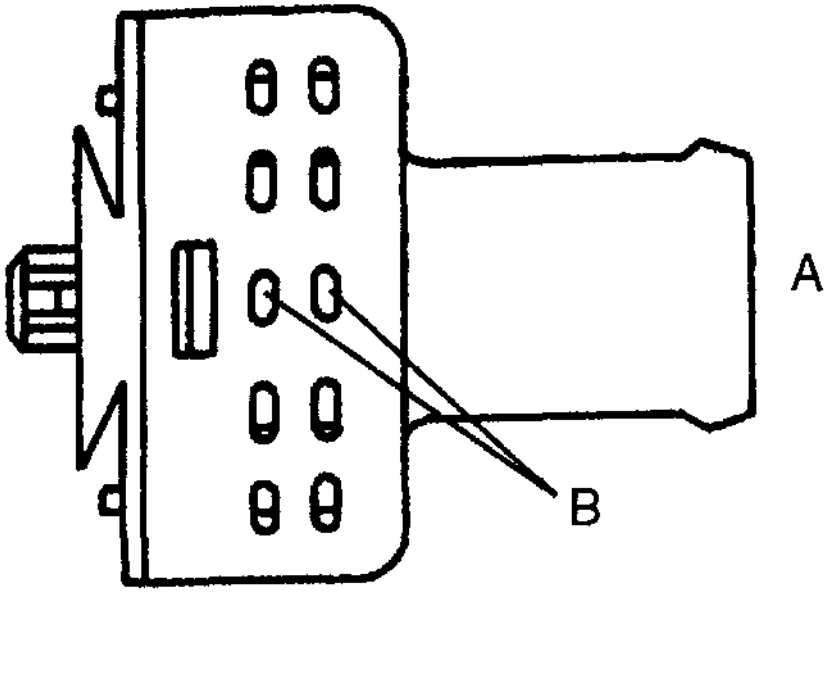


Fig. 37: Inspecting Evaporative Chamber Ports
Courtesy of MAZDA MOTORS CORP.

QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]

QUICK RELEASE CONNECTOR TYPE

CAUTION:
- **There are four types of quick release connectors. Verify the type and location, and install/remove properly.**

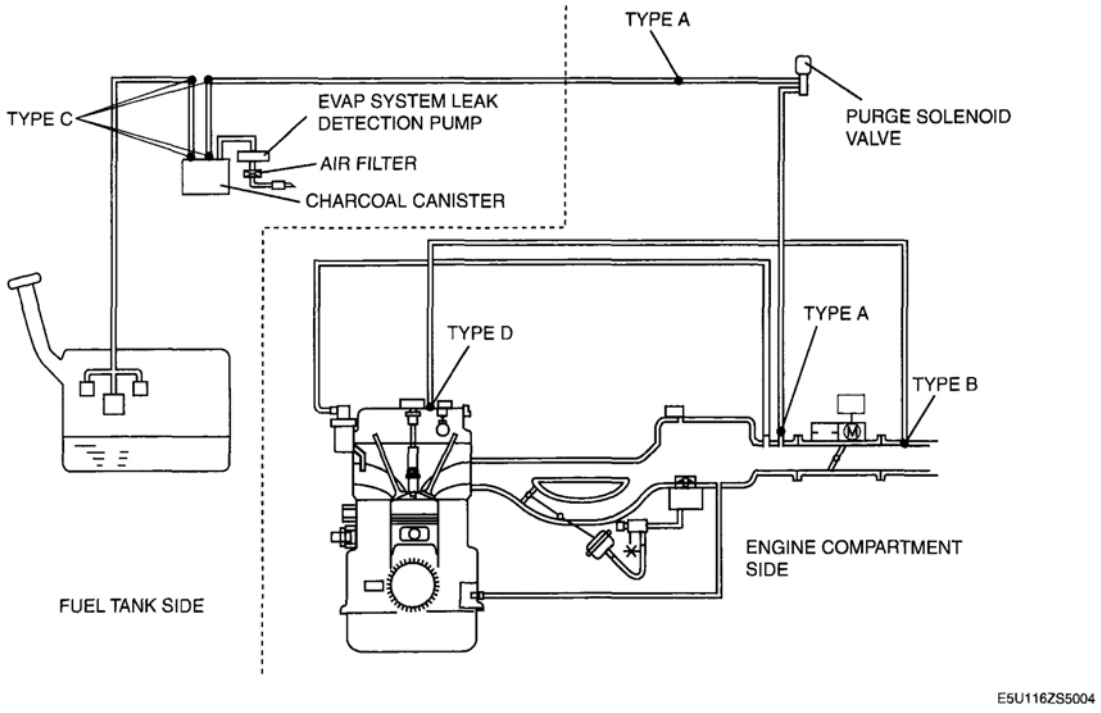


Fig. 38: Identifying Location Of Different Types Of Quick Release Connectors
Courtesy of MAZDA MOTORS CORP.

TYPE A REMOVAL

CAUTION:
- **The quick release connector may be damaged if the release tab is bent excessively. Do not expand the release tab over the stopper.**

NOTE:
- **The evaporative hose can be removed by pushing it to the joint port side to release the lock.**

1. Rotate the release tab on the quick release connector to the stopper position.

NOTE:
- **The retainer is attached to the pipe even after the connector is disconnected.**

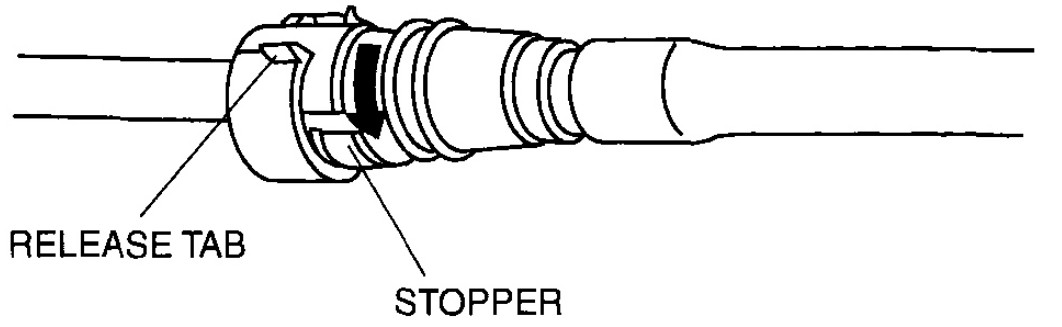


Fig. 39: Rotating Release Tab On Quick Release Connector To Stopper Position
Courtesy of MAZDA MOTORS CORP.

2. Pull out the evaporative hose straight from the joint port and disconnect it.

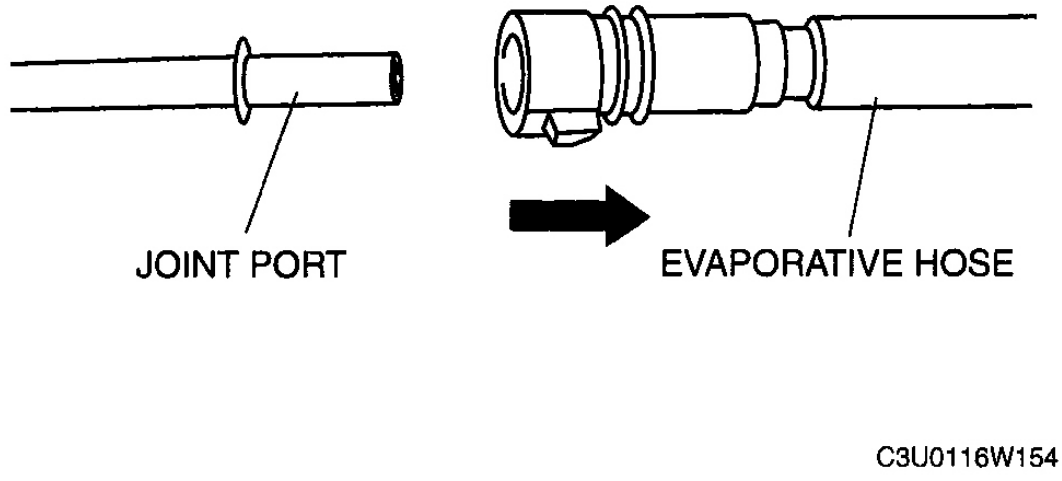


Fig. 40: Disconnecting Evaporative Hose Straight From Joint Port
Courtesy of MAZDA MOTORS CORP.

3. Cover the disconnected quick release connector and joint port with vinyl sheeting or a similar material to prevent it from scratches or dirt.

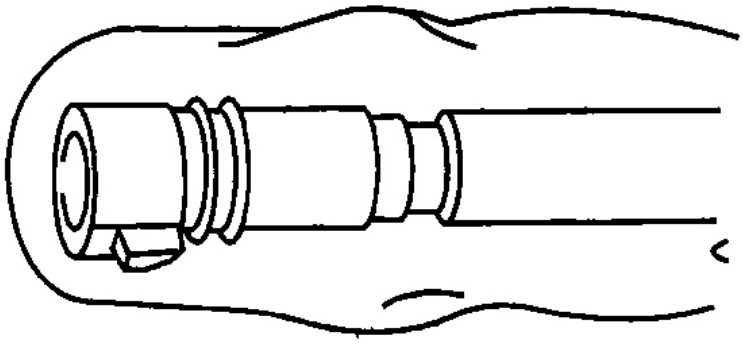


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Fig. 41: Covering Disconnected Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

TYPE B REMOVAL

1. Squeeze the release tab until the locks are released.

NOTE:
- **The retainer has two internal locking tabs which retain the joint port. Be sure that the squeezing place on the retainer is squeezed until it can be released from the joint port.**

2. Pull the quick release connector straight outward.

NOTE:
- **The retainer is attached to the pipe even after the connector is disconnected.**

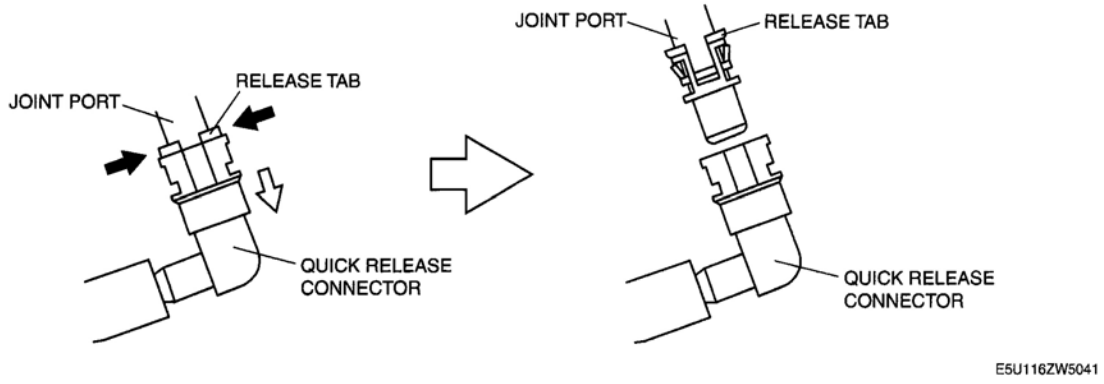


Fig. 42: Removing Type B Components
Courtesy of MAZDA MOTORS CORP.

3. Cover the disconnected quick release connector and joint port with vinyl sheeting or a similar material to prevent it from becoming scratched or dirty.

TYPE C REMOVAL

CAUTION:
- **Be careful not to damage the pipe when unlocking the retainer.**

NOTE:
- **If the quick release connector is removed, replace the retainer with a new one.**

1. Follow "BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations.

NOTE:
- **The retainer is attached to the pipe even after the connector is disconnected.**

2. Set the **SST** parallel to the quick release connector.

NOTE:
- **The quick release connector can be removed by pushing the center of the retainer tabs.**

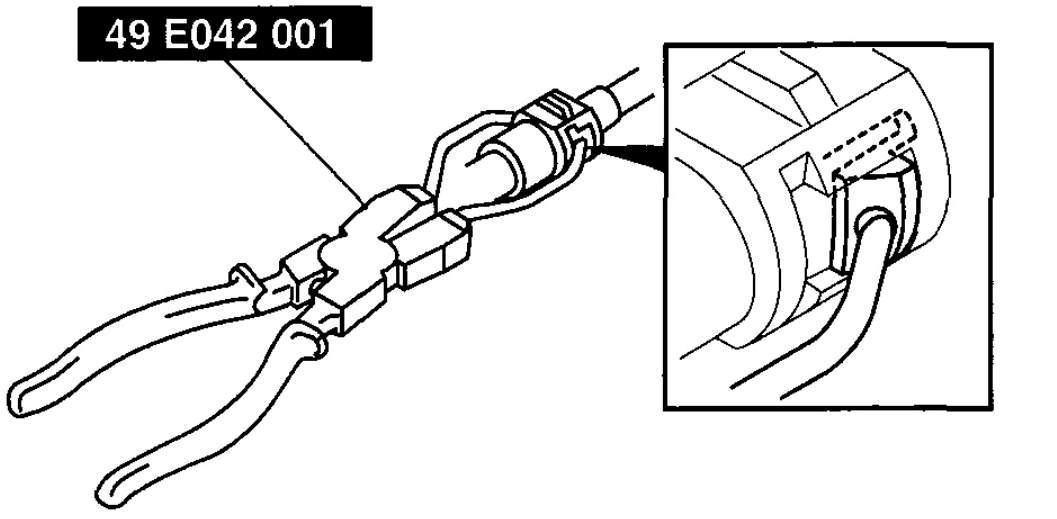


Fig. 43: Disconnecting Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

3. Hold the center of the retainer tabs with the **SST** ends and press the retainer.
4. Pull the connector side and disconnect the quick release connector.
5. Raise a retainer tab using the **SST** and remove the retainer.

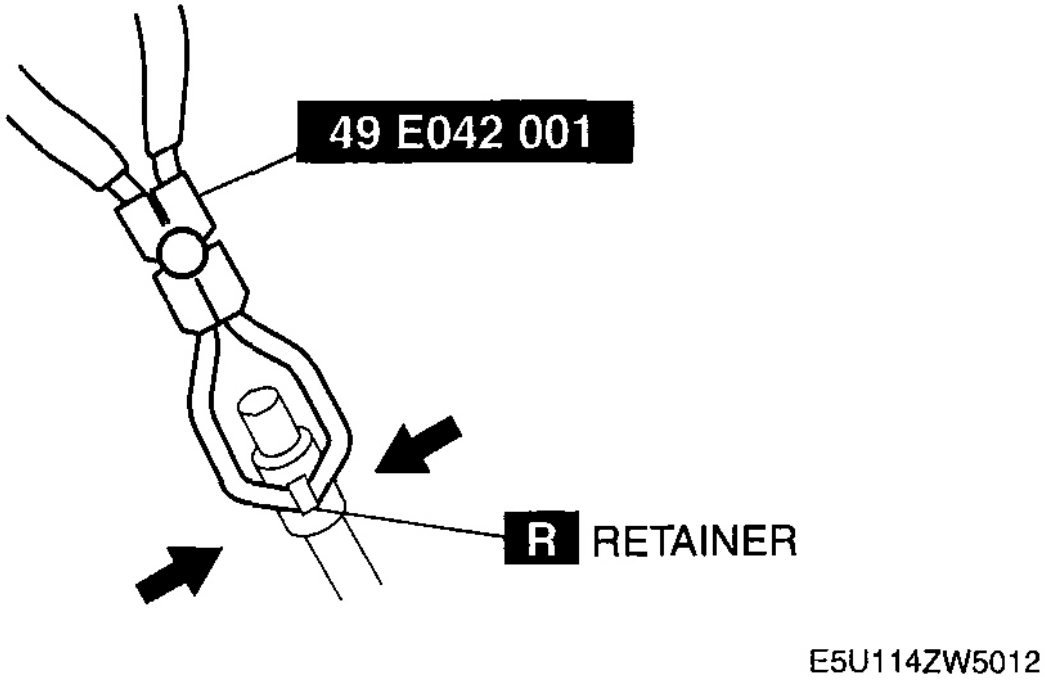


Fig. 44: Raising Retainer Tab Using SST
Courtesy of MAZDA MOTORS CORP.

6. Cover the disconnected quick release connector and joint port with vinyl sheeting or a similar material to prevent it from becoming scratched or dirty.

TYPE D REMOVAL

CAUTION:
- **When releasing the retainer locks, take extreme care not to damage the evaporative hose.**

1. Release the locks between the retainer and joint port by pressing each retainer lock one by one using a flathead screwdriver or a similar tool.

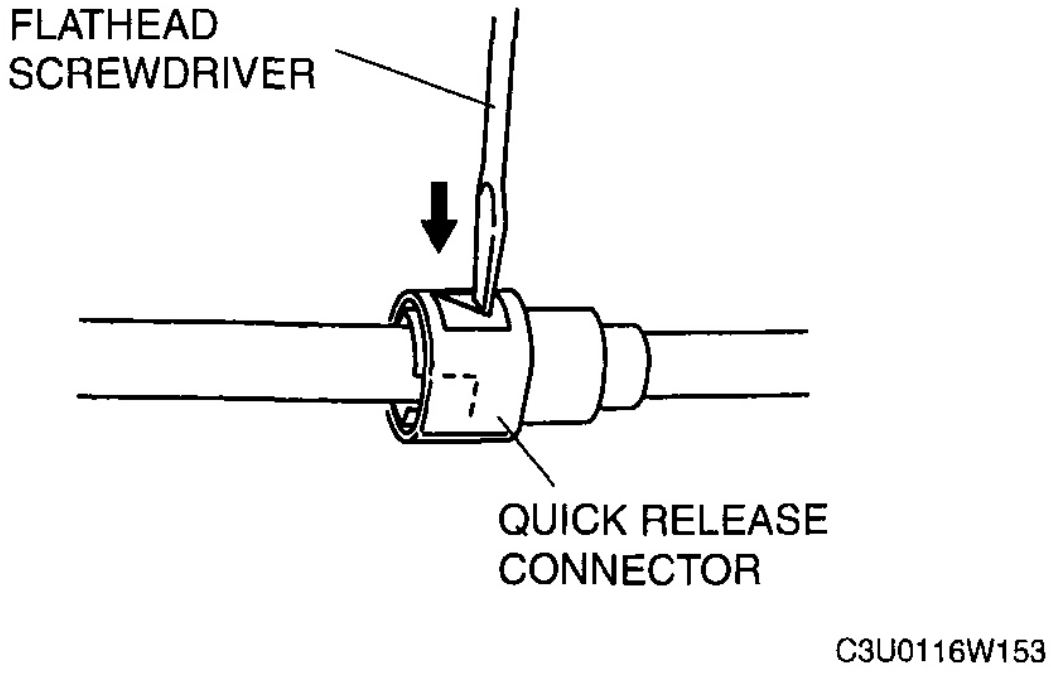


Fig. 45: Releasing Locks Between Retainer And Joint Port
Courtesy of MAZDA MOTORS CORP.

2. Pull out the hose straight from the joint port and disconnect it.

NOTE:
- **The retainer is attached to the pipe even after the connector is disconnected.**

3. Cover the disconnected quick release connector and joint port with vinyl sheeting or a similar material to prevent it from becoming scratched or dirty.

TYPE A INSTALLATION

NOTE:
- **If the quick release connector O-ring is damaged or has slipped, replace the evaporative hose.**
- **A checker tab is integrated with the quick release connector for new evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the joint port.**

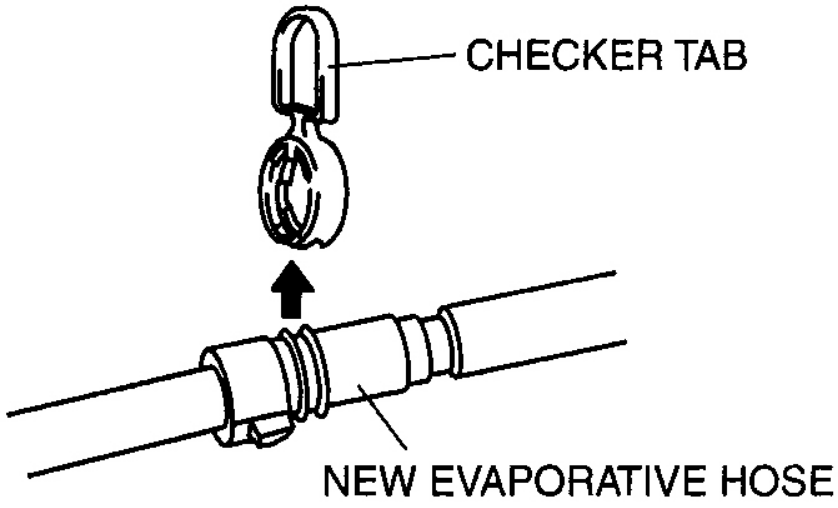


Fig. 46: Removing Checker Tab From Quick Release Connector Completely Engaged With Joint Port
Courtesy of MAZDA MOTORS CORP.

1. Inspect the evaporative hose and joint port sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
2. Apply a small amount of clean engine oil to the sealing surface of the joint port.
3. Reconnect the evaporative hose straight to the joint port until a click is heard.

NOTE:
- **If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.**

4. Lightly pull and push the quick release connector a few times by hand, and then verify that it can move **2.0-3.0 mm {0.08-0.12 in}** and is connected securely.

TYPE B INSTALLATION

NOTE:
- **If the quick release connector O-ring is damaged or has slipped, replace the evaporative hose.**
- **When replacing with a new evaporative hose, disengage the release tabs from the join port.**

- **A checker tab is integrated with the quick release connector for new evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the joint port.**

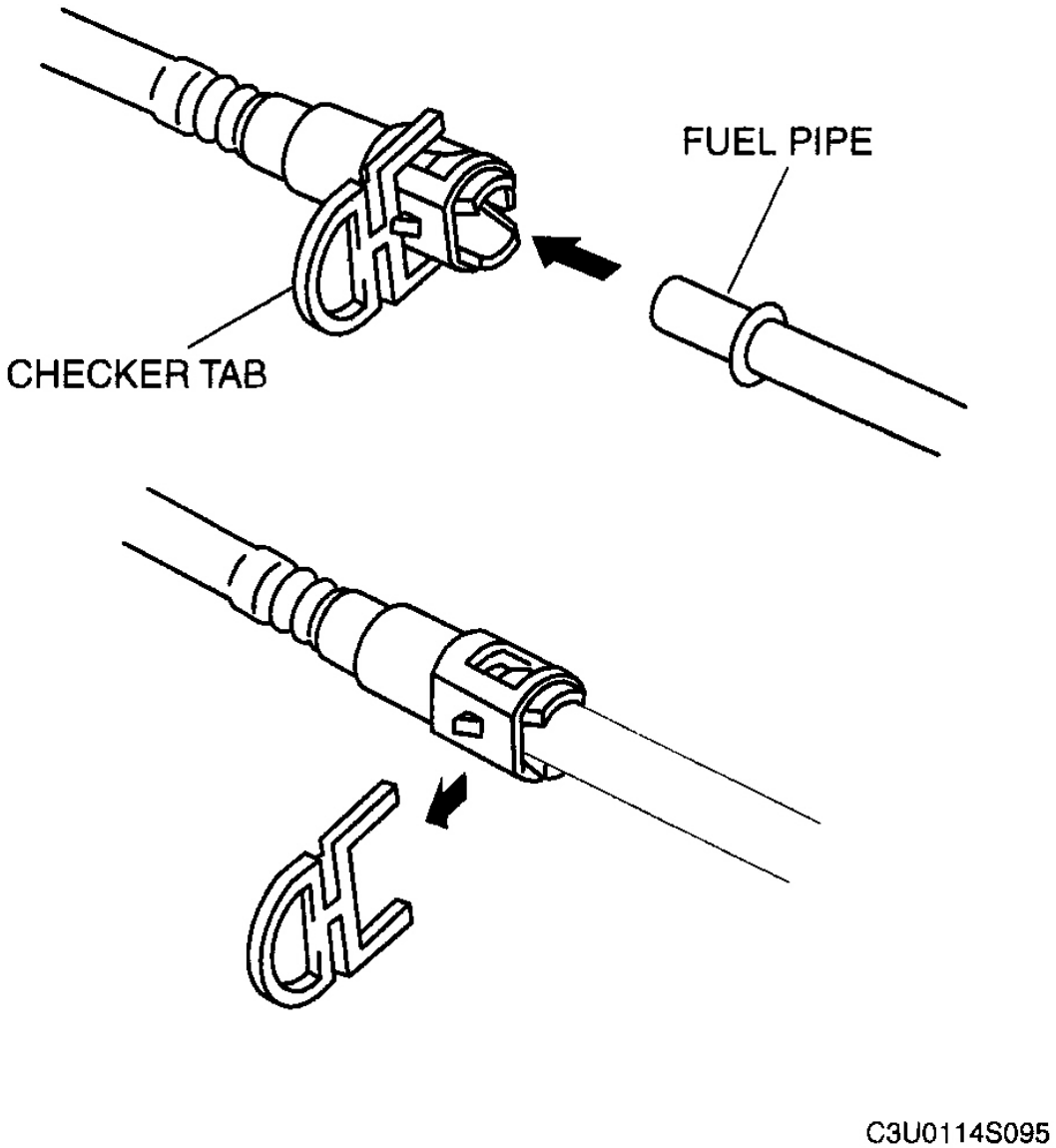


Fig. 47: Removing Checker Tab From Quick Release Connector Completely Engaged With Joint Port
Courtesy of MAZDA MOTORS CORP.

1. When newly replacing the quick release connector, remove the release tab using the following procedure.
    1. Widen the retainer lock using a flathead screwdriver, then pull out the release tab from the joint

port and remove it.

2. Inspect the quick release connector and joint port sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
3. Apply a small amount of clean engine oil to the sealing surface of the joint port.
4. Reconnect the quick release connector straight to the joint port until a click is heard.

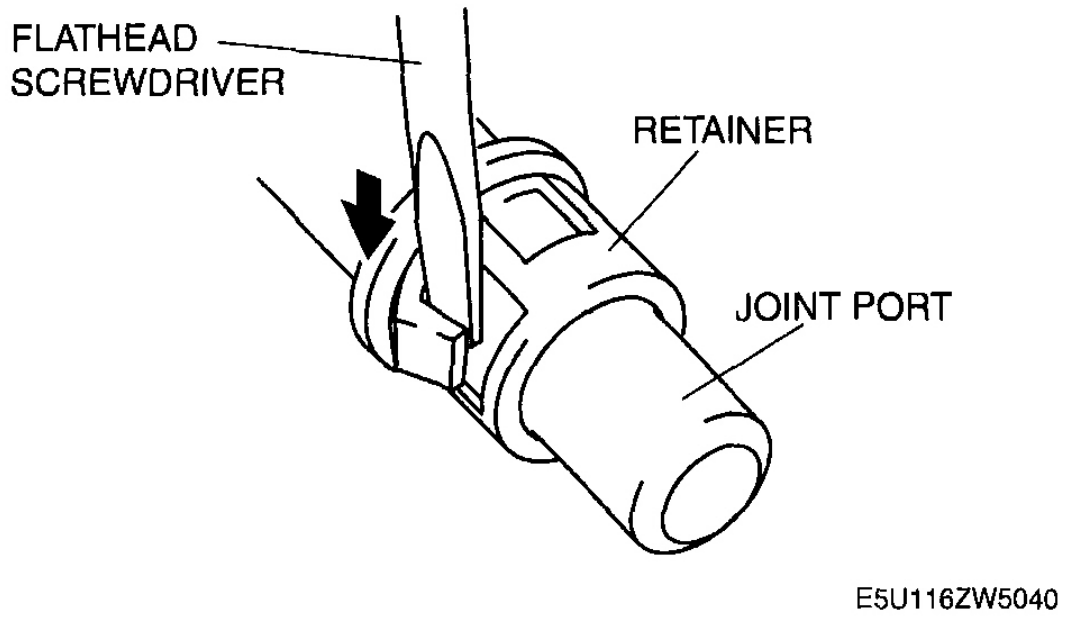


Fig. 48: Removing Tab From Joint Port
Courtesy of MAZDA MOTORS CORP.

NOTE:
- **If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.**

5. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

TYPE C INSTALLATION

NOTE:
- **If the quick release connector O-ring is damaged or has slipped, replace the piping component.**
- **A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel**

pipe.

CAUTION:
- **Be sure to replace the retainer with a new one to prevent gas leakage.**

1. Install a new retainer to the quick release connector.

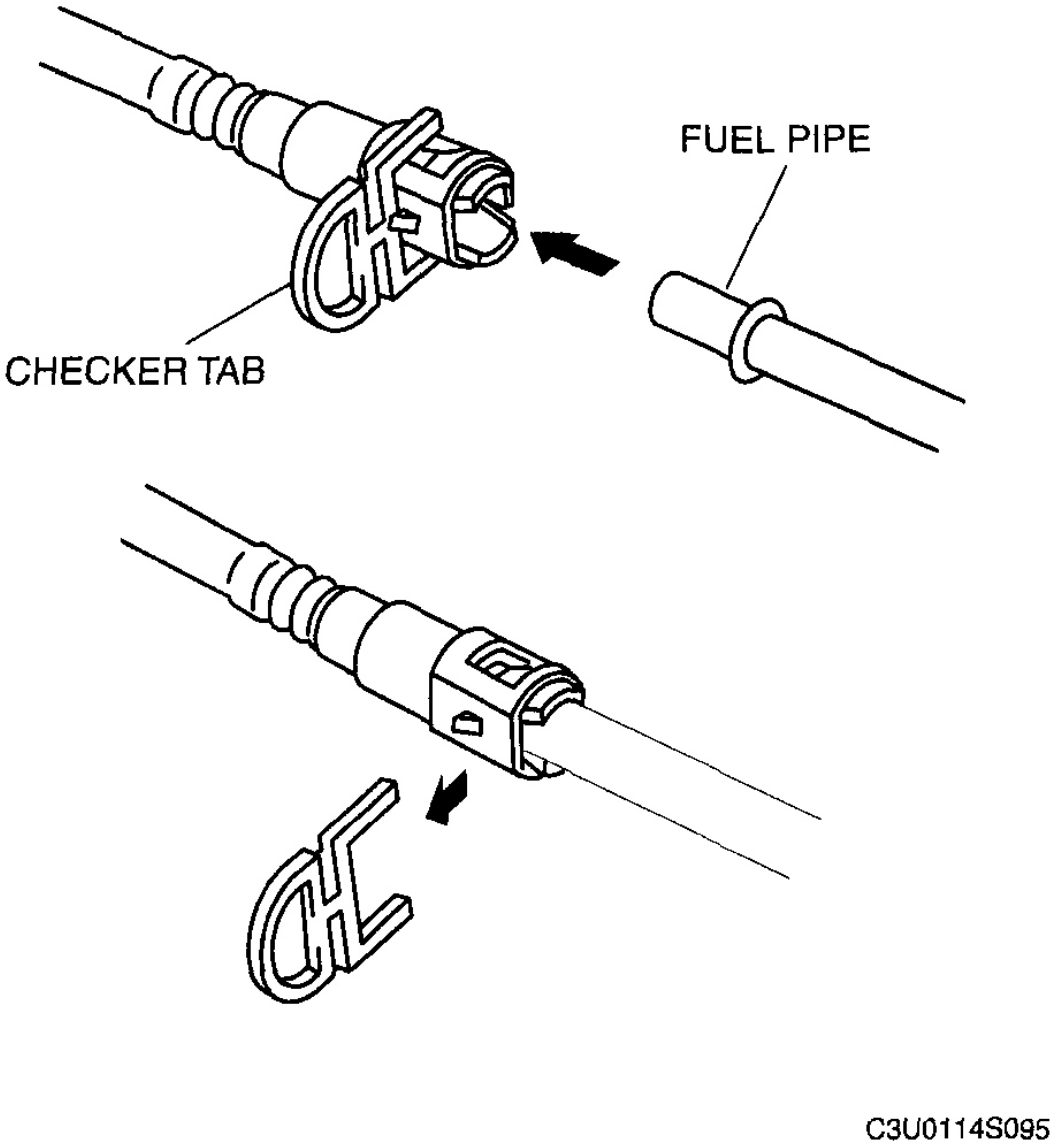


Fig. 49: Installing New Retainer To Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

2. Reconnect the hose straight to the pipe until a click is heard.
3. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

TYPE D INSTALLATION

NOTE:

- **If the quick release connector O-ring is damaged or has slipped, replace the evaporative hose.**
- **When replacing with a new evaporative hose, disengage the release tabs from the join port.**
- **A checker tab is integrated with the quick release connector for new evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the joint port.**

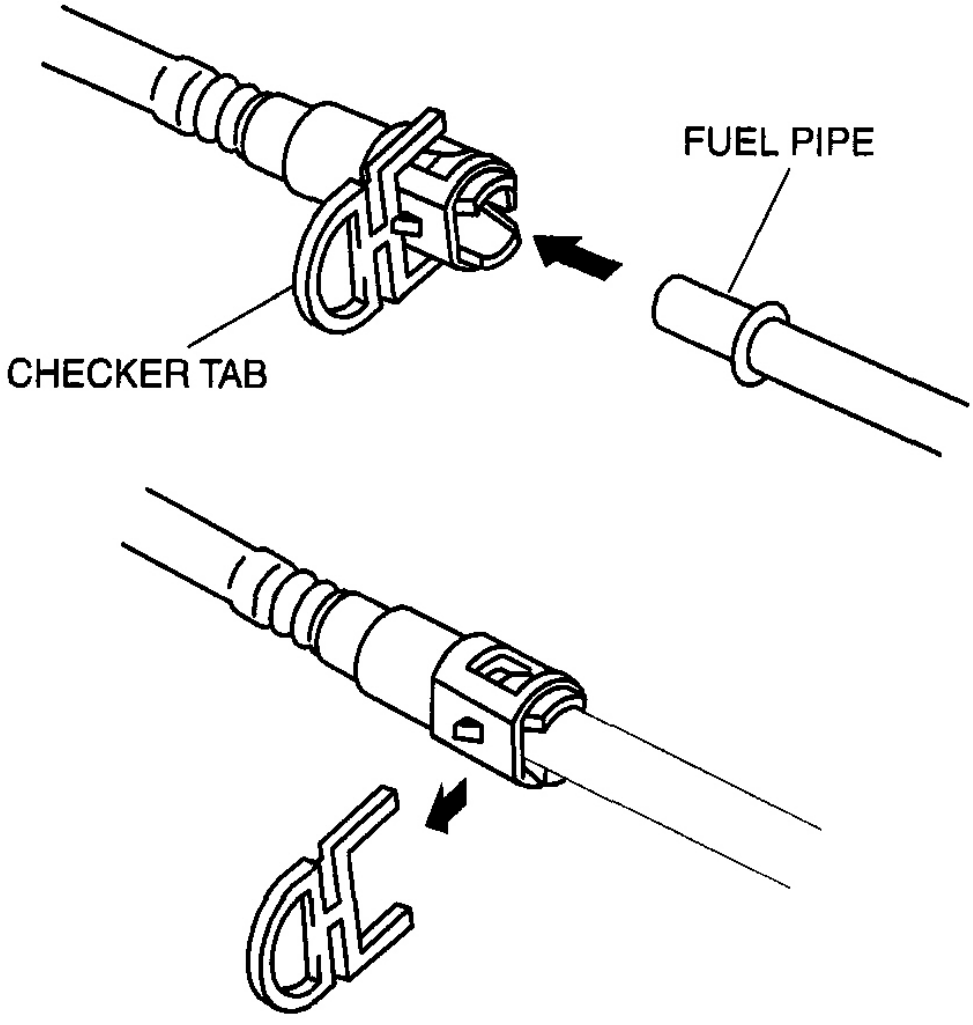


Fig. 50: Removing Checker Tab From Quick Release Connector After Connector Completely Engaged With Joint Port
Courtesy of MAZDA MOTORS CORP.

1. When newly replacing the quick release connector, remove the release tab using the following procedure.
    1. Widen the retainer lock using a flathead screwdriver, then pull out the release tab from the joint port and remove it.

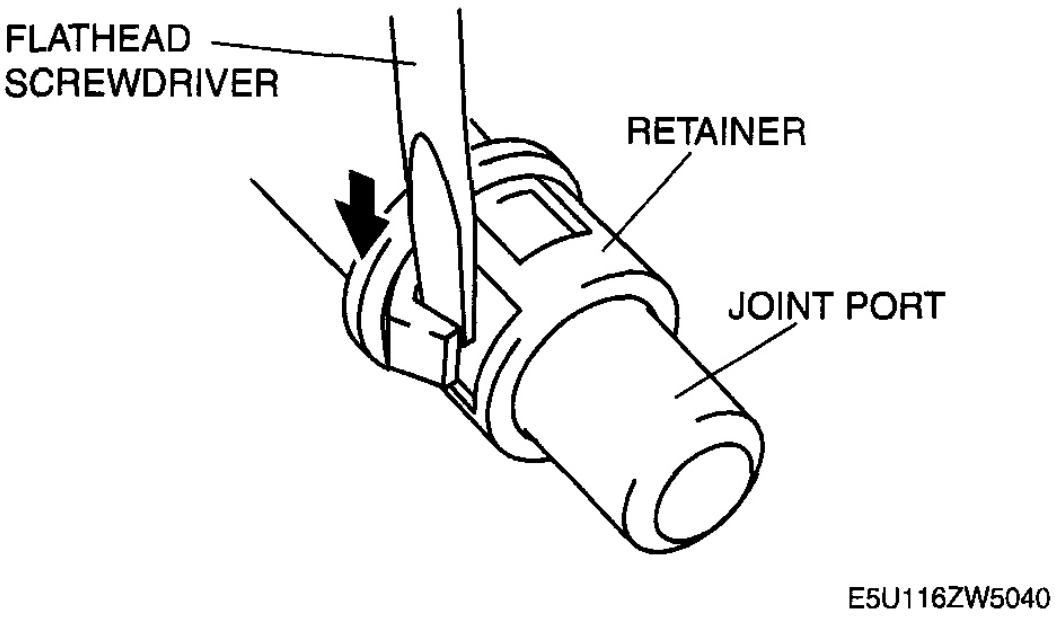


Fig. 51: Removing Tab From Joint Port
Courtesy of MAZDA MOTORS CORP.

2. Inspect the quick release connector and joint port sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
3. Apply a small amount of clean engine oil to the sealing surface of the joint port.
4. Reconnect the quick release connector straight to the joint port until a click is heard.

NOTE:

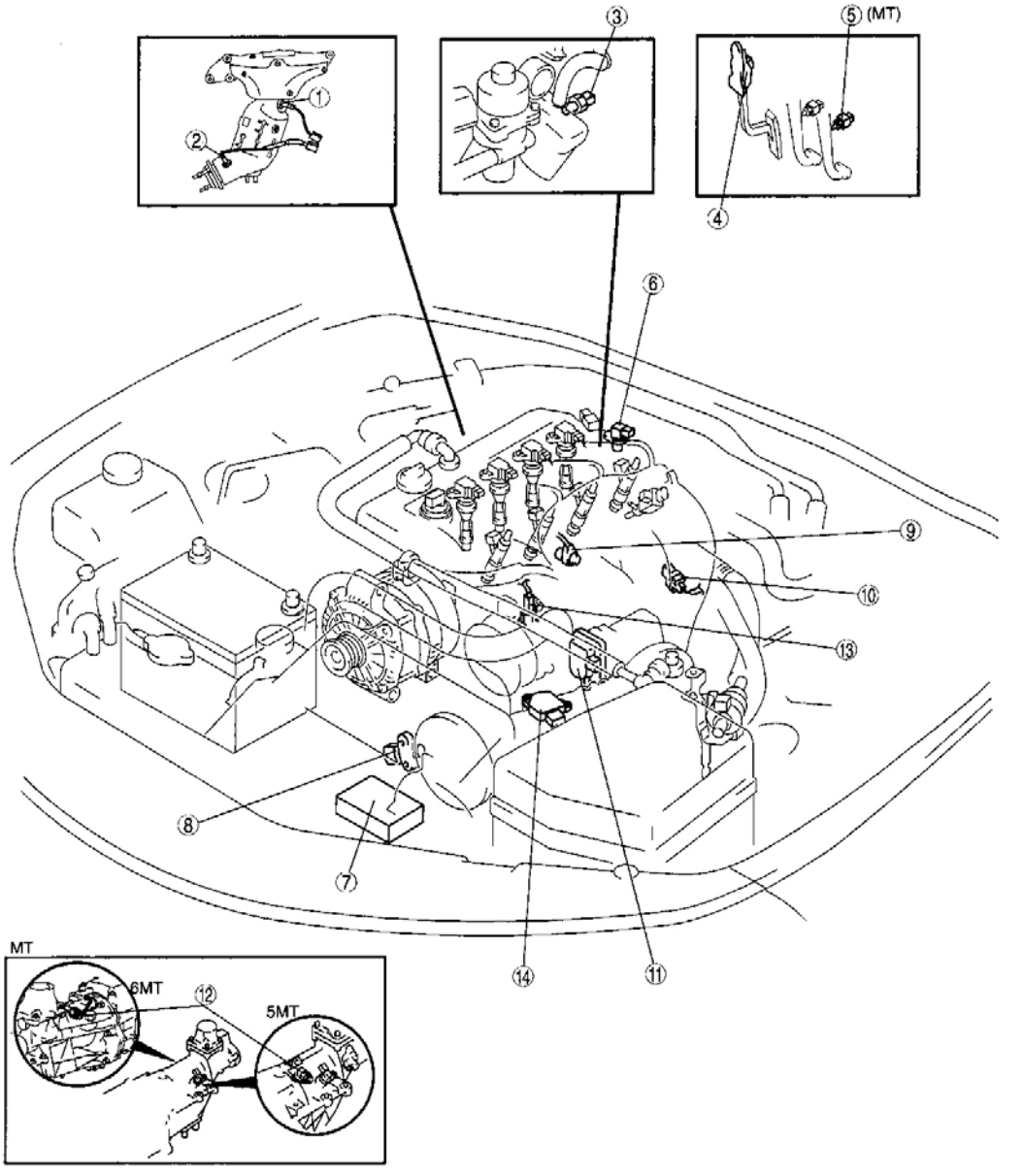
- **If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.**

5. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.

2007 ENGINE PERFORMANCE

Engine Control System - MX-5 Miata

CONTROL SYSTEM LOCATION INDEX [LF]



E5U140ZW4001

1	Front HO2S
2	Rear HO2S
3	ECT sensor
4	APP sensor
5	CPP switch
6	CMP sensor
7	PCM (built into BARO sensor)
8	CKP sensor
9	KS
10	MAP sensor
11	TP sensor
12	Neutral switch
13	PSP switch
14	MAF/IAT sensor

Fig. 1: Identifying Location Of Control System Components
Courtesy of MAZDA MOTORS CORP.

CONTROL SYSTEM DIAGRAM [LF]

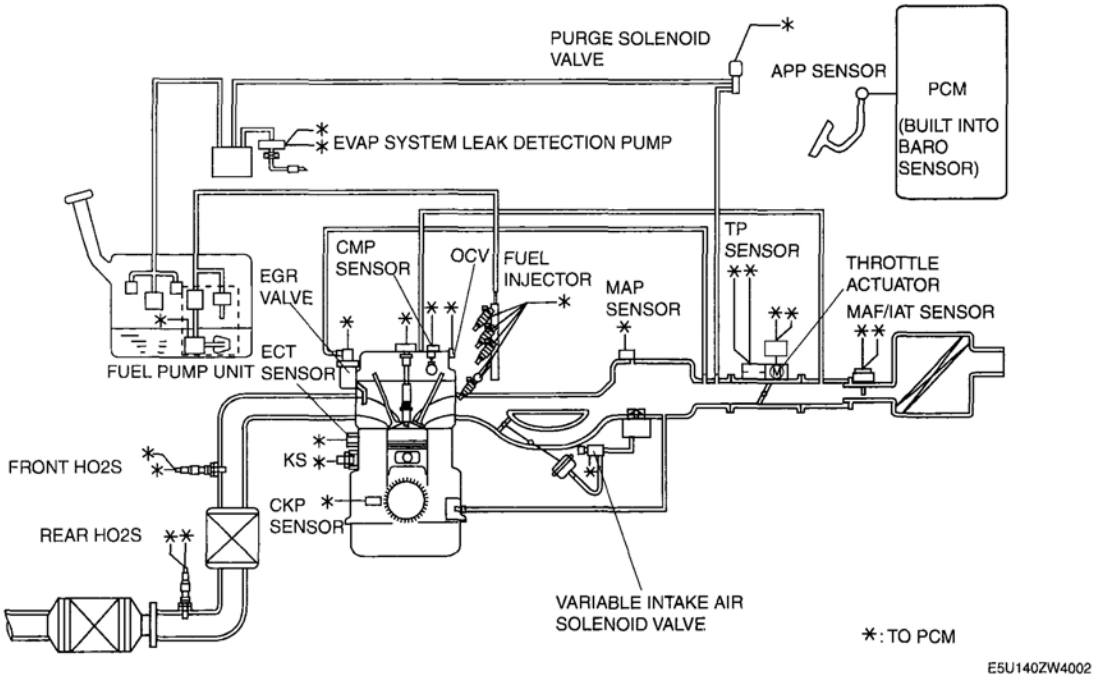


Fig. 2: Engine Control System - System Diagram
Courtesy of MAZDA MOTORS CORP.

CONTROL SYSTEM WIRING DIAGRAM [LF]

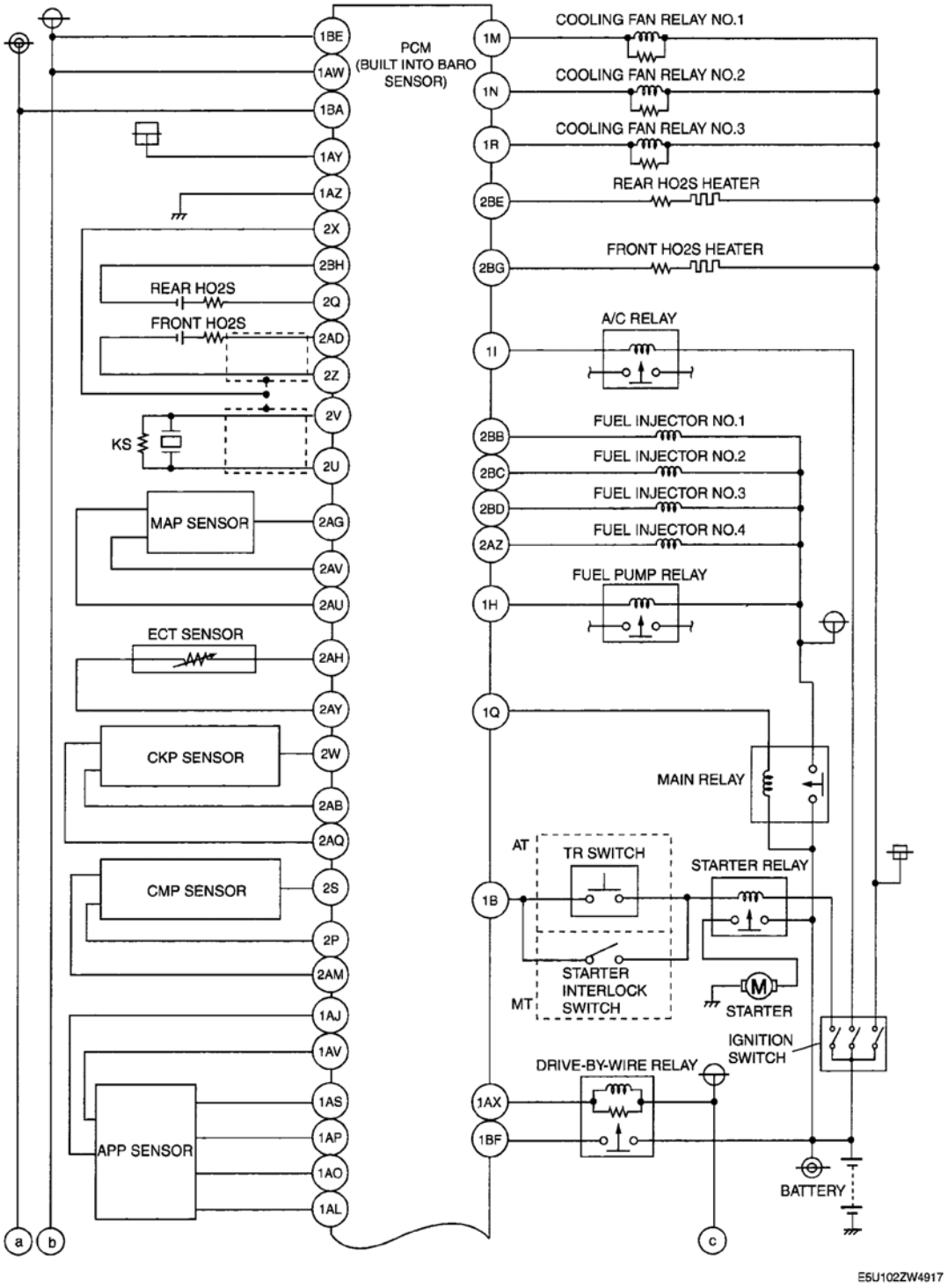


Fig. 3: Engine Control System - Wiring Diagram (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

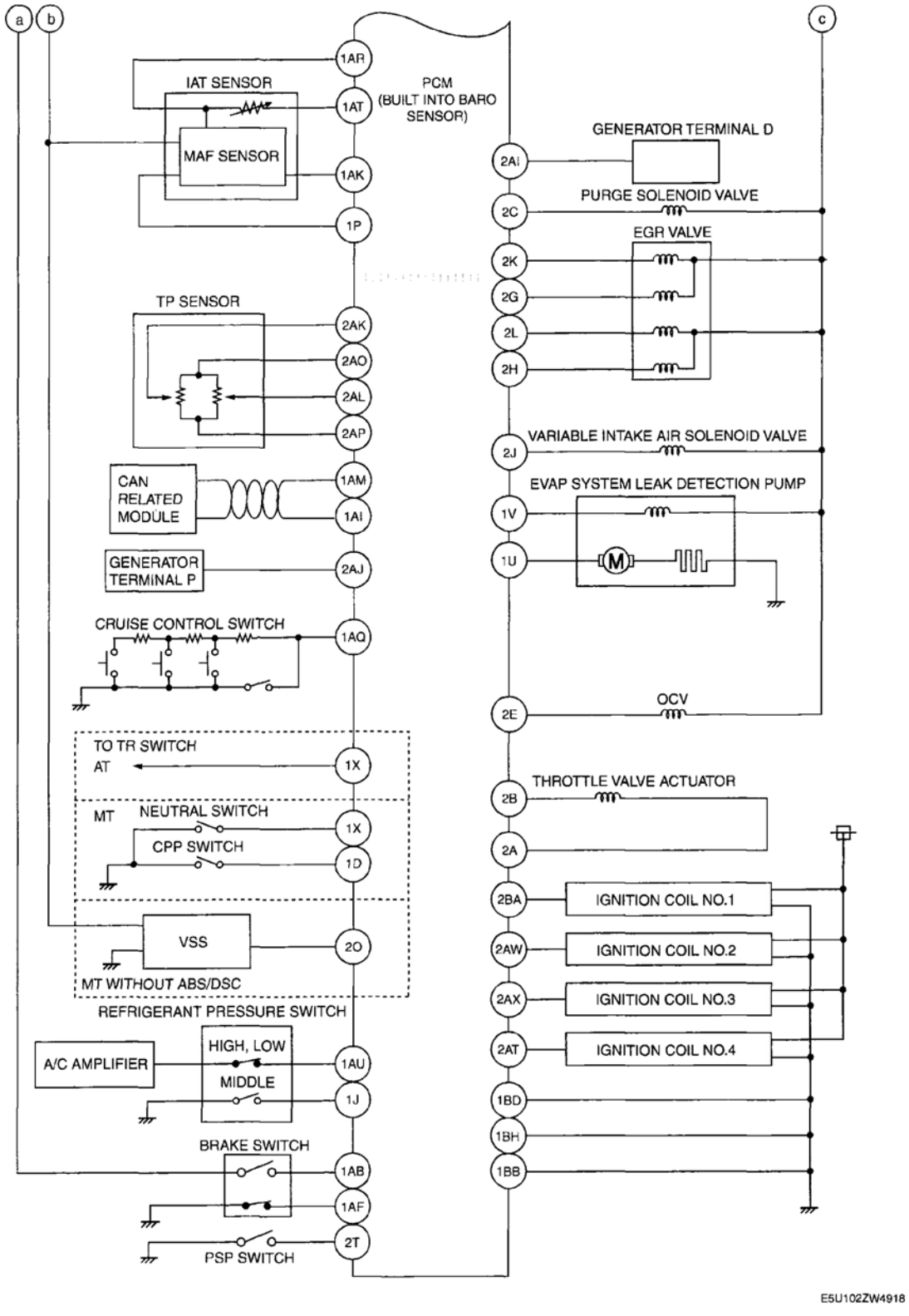
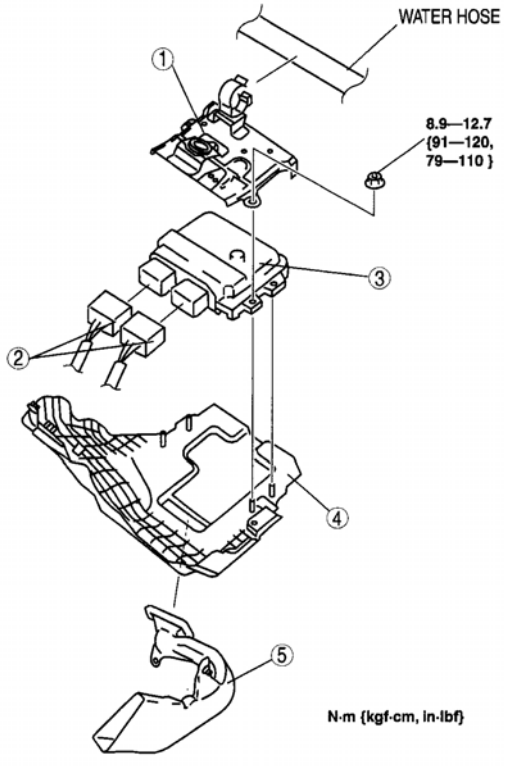


Fig. 4: Engine Control System - Wiring Diagram (2 Of 2)

Courtesy of MAZDA MOTORS CORP.

PCM REMOVAL/INSTALLATION [LF]

1. When replacing the PCM, perform the following:
   - PCM configuration (See **PCM CONFIGURATION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the air cleaner case. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Move the water hose from the PCM cover slightly out of the way.
6. Remove in the order indicated in **Fig. 5** .



1	PCM cover	3	PCM
2	PCM connector	4	Air cleaner insulator
		5	PCM duct

Fig. 5: Removing PCM (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. When replacing the PCM on the vehicles, perform the following:

- PCM parameter reset (See **IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM]** .)

PCM CONNECTOR CONNECTED NOTE

1. Connect the PCM connector fully into the PCM and push the lever until a click is heard.

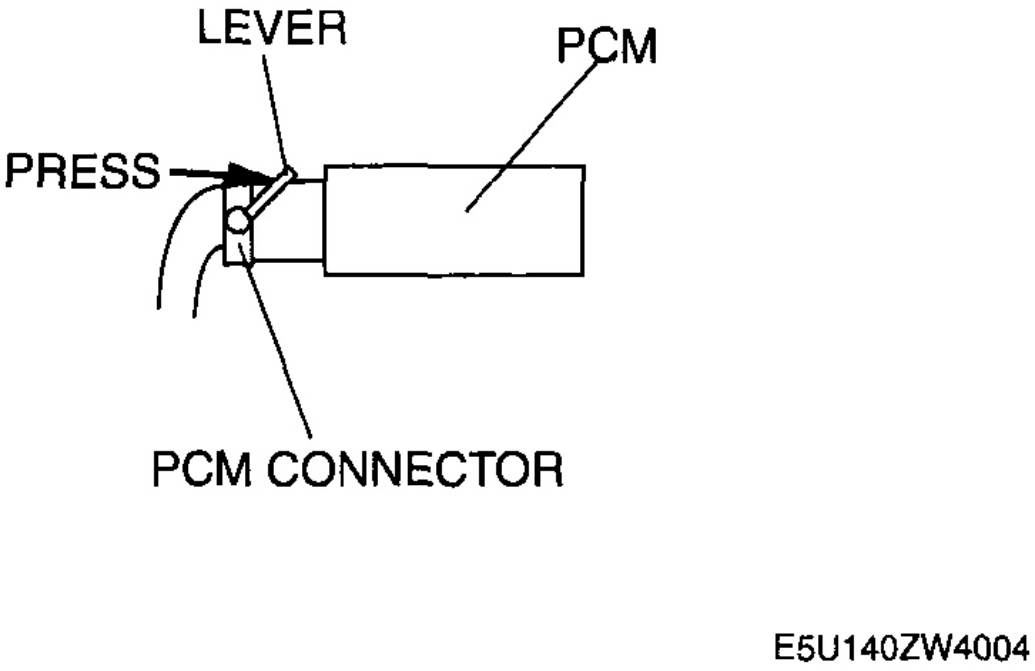


Fig. 6: Connecting PCM Connector Into PCM
Courtesy of MAZDA MOTORS CORP.

PCM INSPECTION [LF]

NOT USING THE M-MDS OR EQUIVALENT

NOTE:

- **The PCM terminal voltage can vary with the conditions when measuring and changes due to aged deterioration on the vehicle, causing false diagnosis. Therefore determine comprehensively where the malfunction occurs among the input systems, output systems, and the PCM.**

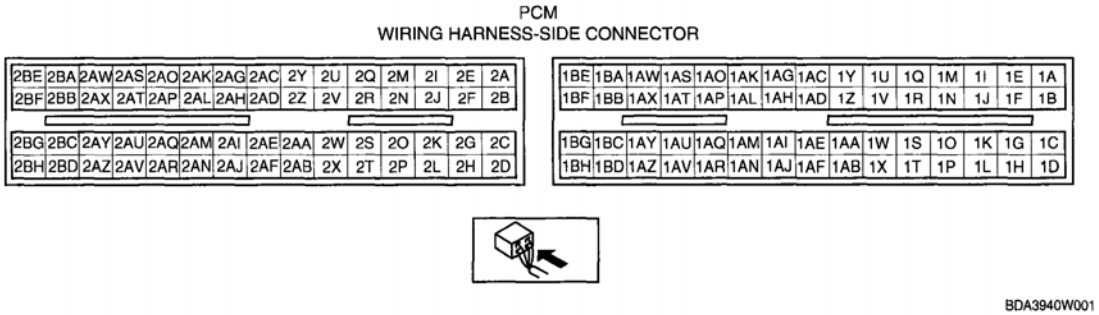


Fig. 7: Identifying PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

PCM TERMINALS VOLTAGE SPECIFICATION TABLE

Terminal	Signal	Connected to	Test condition		Voltage (V)	Inspection item
1A	-	-	-		-	-
1B	Starter relay control	Starter relay	Under any condition		Below 1.0	• Starter relay • Related wiring harness
1C	-	-	-		-	-
1D(2)	Clutch operation	CPP switch	Clutch pedal depressed		Below 1.0	• CPP switch • Related wiring harness
			Clutch pedal released		B+	
1E	-	-	-		-	-
1F	-	-	-		-	-
1G	-	-	-		-	-
1H	Fuel pump control	Fuel pump relay	Ignition switch is turned to the ON position (Engine off) and a certain period has elapsed		B+	• Fuel pump relay • Related wiring harness
			Cranking		Below 1.0	
			Idle		Below 1.0	
11	A/C	A/C relay	Engine running	A/C operating	Below 1.0	• A/C relay • Related wiring harness
				A/C not operating	B+	
			Refrigerant pressure is more than the specification.		Below 1.0	• Refrigerant pressure

1J	Refrigerant pressure switch (middle)	Refrigerant pressure switch (middle)	(Refrigerant pressure switch (middle) is on.)			switch (middle) • Related wiring harness
			Refrigerant pressure is less than the specification. (Refrigerant pressure switch (middle) is off.)		B+	
1K	-	-	-		-	-
1L	-	-	-		-	-
1M	Cooling fan control	Cooling fan relay No.1	During test mode(3)	Accelerator pedal released	B+	• Cooling fan relay No.1 • Related wiring harness
				Accelerator pedal depressed	Below 1.0	
1N	Cooling fan control	Cooling fan relay No.2	During test mode(3)	Accelerator pedal released	B+	• Cooling fan relay No.2 • Related wiring harness
				Accelerator pedal depressed	Below 1.0	
1O	-	-	-		-	-
1P	MAF sensor ground	MAF sensor	Under any condition		Below 1.0	• Related wiring harness
1Q	Main relay control	Main relay	Ignition switch is turned to the ON position		Below 1.0	• Main relay • Related wiring harness
			Ignition switch off and a certain period has elapsed		B+	
1R	Cooling fan control	Cooling fan relay No.3	During test mode(3)	Accelerator pedal released	B+	• Cooling fan relay No.3 • Related wiring harness
				Accelerator pedal depressed	Below 1.0	
1S	-	-	-		-	-
1T	-	-	-		-	-
1U	EVAP system leak detection pump (pump)	EVAP system leak detection pump	Ignition switch is turned to the ON position		B+	• EVAP system leak detection pump • Related
			Idle.		B+	

					wiring harness
1V	EVAP system leak detection pump (solenoid)	EVAP system leak detection pump	Ignition switch is turned to the ON position	B+	• EVAP system leak detection pump • Related wiring harness
			Idle	B+	
1W	-	-	-	-	-
1X	(2)Neutral position	Neutral switch	Shift lever is at neutral position	Below 1.0	• Neutral switch • Related wiring harness
			Shift lever is not at neutral position	B+	
	(1)Selector lever position	TR switch	Ignition switch is turned to the ON position: P, N position	Below 1.0	• TR switch • Related wiring harness
			Ignition switch is turned to the ON position: Except above	B+	
1Y	-	-	-	-	-
1Z	-	-	-	-	-
1AA	-	-	-	-	-
1AB	Brake switch No.1	Brake switch	Brake pedal depressed	B+	• Brake switch • Related wiring harness
			Brake pedal released	Below 1.0	
1AC	-	-	-	-	-
1AD	-	-	-	-	-
1AE	-	-	-	-	-
1AF	Brake switch No.2	Brake switch	Brake pedal depressed	B+	• Brake switch • Related wiring harness
			Brake pedal released	Below 1.0	
1AG	-	-	-	-	-
1AH	-	-	-	-	-
1AI	CAN_J.	CAN related module	Because this terminal is for CAN, no valid determination of terminal voltage is possible		• Related wiring harness
1AJ	APP sensor	APP sensor	Ignition switch is turned to	Approx. 5.0	

	No.2 power supply		the ON position			• Related wiring harness
1AK	MAF	MAF sensor	Ignition switch is turned to the ON position		Approx. 0.7	• MAF sensor • Related wiring harness
			Idle		Approx. 1.4	
1AL	APP sensor No.1 power supply	APP sensor	Ignition switch is turned to the ON position.		Approx. 5.0	• Related wiring harness
1AM	CAN_H	CAN related module	Because this terminal is for CAN, no valid determination of terminal voltage is possible			• Related wiring harness
1AN	-	-	-		-	-
1AO	APP sensor No.1	APP sensor	Ignition switch is turned to the ON position	Accelerator pedal depressed	Approx. 3.9	• APP sensor • Related wiring harness
				Accelerator pedal released	Approx. 1.6	
1AP	APP sensor No.2	APP sensor	Ignition switch is turned to the ON position	Accelerator pedal depressed	Approx. 3.4	• APP sensor • Related wiring harness
				Accelerator pedal released	Approx. 1.0	
1AQ	Cruise control switch	Cruise control switch	Ignition switch is turned to the ON position	ON OFF switch pressed in	Approx. 0	• Cruise control switch • Related wiring harness
				CANCEL switch pressed in	Approx. 1.1	
				SET/- switch pressed in	Approx. 3.1	
				RES/+ switch pressed in	Approx. 4.2	
				Except above	Approx. 5.0	
1AR	Sensor ground	MAF/IAT sensor	Under any condition		Below 1.0	• Related wiring harness
1AS	APP sensor No.1 ground	APP sensor	Under any condition		Below 1.0	• Related wiring

						harness
1AT	IAT	MAF/IAT sensor	Ignition switch is turned to the ON position	IAT is 20°C {68°F}	Approx. 2.4	• IAT sensor • Related wiring harness
				IAT is 60°C {140°F}	Approx. 0.9	
1AU	Refrigerant pressure switch (high, low)	Refrigerant pressure switch (high, low)	Ignition switch is turned to the ON position	A/C operating	Below 1.0	• Refrigerant pressure switch (high, low) • Related wiring harness
				A/C not operating	B+	
1AV	APP sensor No.2 ground	APP sensor	Under any condition		Below 1.0	• Related wiring harness
1AW	B+	Main relay	Ignition switch off		Below 1.0	• Main relay • Battery • Related wiring harness
			Ignition switch is turned to the ON position		B+	
1AX	Drive-by-wire relay control	Drive-by-wire relay	Under any condition		Below 1.0	• Drive-by-wire relay • Related wiring harness
1AY	Ignition switch on	Ignition switch	Ignition switch off		Below 1.0	• Ignition switch • Related wiring harness
			Ignition switch is turned to the ON position		B+	
1AZ	Ground	Ground	Under any condition		Below 1.0	• Related wiring harness
1BA	Back-up power supply	Battery (positive terminal)	Under any condition		B+	• Battery • Related wiring harness
1BB	Ground	Ground	Under any condition		Below 1.0	• Related wiring harness
1BC	-	-	-		-	-

1BD	Ground	Ground	Under any condition		Below 1.0	• Related wiring harness
1BE	B+	Main relay	Ignition switch off		Below 1.0	• Main relay • Related wiring harness
			Ignition switch is turned to the ON position		B+	
1BF	Drive-by-wire relay control	Drive-by-wire relay	Ignition switch is turned to the ON position	Drive-by-wire system is malfunction	Below 1.0	• Drive-by-wire relay • Related wiring harness
				Drive-by-wire system is normal	B+	
1BG	-	-	-		-	-
1BH	Ground	Ground	Under any condition		Below 1.0	• Related wiring harness
2A	Throttle control (+)	Throttle body (Throttle valve actuator)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• Throttle valve actuator • Related wiring harness
2B	Throttle control (-)	Throttle body (Throttle valve actuator)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• Throttle valve actuator • Related wiring harness
2C	Purge control	Purge solenoid valve	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• Purge solenoid valve • Related wiring harness
2D	-	-	-		-	-
2E	OCV control	OCV	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• OCV • Related wiring harness

2F	-	-	-	-	-
2G	EGR valve #2 coil control	EGR valve (terminal A)	Idle (EGR control not operating)	B+	• EGR valve • Related wiring harness
2H	EGR valve #4 coil control	EGR valve (terminal F)	Idle (EGR control not operating)	B+	• EGR valve • Related wiring harness
2I	-	-	-	-	-
2J	Variable intake air control	Variable intake air solenoid valve	Ignition switch is turned to the ON position	Below 1.0	• Variable intake air solenoid valve • Related wiring harness
			Engine speed: less than 4,750 rpm	Below 1.0	
			Engine speed: 4,750 rpm or more	B+	
2K	EGR valve #1 coil control	EGR valve (terminal E)	Idle (EGR control not operating)	Below 1.0	• EGR valve • Related wiring harness
2L	EGR valve #3 coil control	EGR valve (terminal B)	Idle (EGR control not operating)	B+	• EGR valve • Related wiring harness
2M	-	-	-	-	-
2N	-	-	-	-	-
2O (4)	Vehicle speed	VSS	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• VSS • Related wiring harness
2P	CMP sensor ground	CMP sensor	Under any condition	Below 1.0	• Related wiring harness
2Q	Rear HO2S	Rear HO2S	Idle after warm-up	Alternates between 0 and 1.0	• Rear HO2S • Related wiring harness
2R	-	-	-	-	-

2S	CMP	CMP sensor	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• CMP sensor • Related wiring harness
2T	Power steering pressure	PSP switch	Idle	Steering wheel at straight ahead position	B+	• PSP switch • Related wiring harness
				While turning steering wheel	Below 1.0	
2U	Knocking (+)	KS	Ignition switch ON (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Approx. 4.3	• KS • Related wiring harness
2V	Knocking (-)	KS	Ignition switch ON (Use digital type voltmeter, because measurement voltage will be detected less than true voltage when using analog type voltmeter)		Below 1.0	• KS • Related wiring harness
2W	CKP	CKP sensor	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• CKP sensor • Related wiring harness
2X	Ground	Shield wire	Under any condition		Below 1.0	• Related wiring harness
2Y	-	-	-		-	-
2Z	Front HO2S	Front HO2S	Idle after warm-up		Approx. 2.4	• Front HO2S • Related wiring harness
2AA	-	-	-		-	-
2AB	CKP sensor ground	CKP sensor	Under any condition		Below 1.0	• Related wiring harness
2AC	-	-	-		-	-

2AD	Front HO2S	Front HO2S	Idle after warm-up		Approx. 2.8	• Front HO2S • Related wiring harness
2AE	-	-	-		-	-
2AF	-	-	-		-	-
2AG	Manifold absolute pressure	MAP sensor	Ignition switch is turned to the ON position (at sea level)		Approx. 4.1	• MAP sensor • Related wiring harness
			Idle		Approx. 1.2	
2AH	ECT	ECT sensor	Ignition switch is turned to the ON position	ECT is 20°C {68°F}	Approx. 3.0	• ECT sensor • Related wiring harness
				ECT is 80°C {176°F)	Approx. 0.9	
2AI	Generator field coil control	Generator (terminal D)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• Generator • Related wiring harness
2AJ	Generator output voltage	Generator (terminal P)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)			• Generator • Related wiring harness
2AK	Throttle valve opening angle No. 1	Throttle body (TP sensor)	Ignition switch is turned to the ON position	Accelerator pedal depressed	Approx. 4.5	• TP sensor • Related wiring harness
				Accelerator pedal released	Approx. 1.0	
2AL	Throttle valve opening angle No. 2	Throttle body (TP sensor)	Ignition switch is turned to the ON position	Accelerator pedal depressed	Approx. 0.5	• TP sensor • Related wiring harness
				Accelerator pedal released	Approx. 4.0	
2AM	Constant voltage	CMP sensor	Ignition switch is turned to the ON position		B+	• Related wiring harness
2AN	-	-	-		-	-

2AO	Constant voltage (Vref)	Throttle body (TP sensor)	Ignition switch is turned to the ON position	Approx. 5.0	• Related wiring harness
2AP	Sensor ground	Throttle body (TP sensor)	Under any condition	Below 1.0	• Related wiring harness
2AQ	Constant voltage	CKP sensor	Ignition switch is turned to the ON position	B+	• Related wiring harness
2AR	-	-	-	-	-
2AS	-	-	-	-	-
2AT	IGT4	Ignition coil (No.4 cylinders)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Ignition coil No.4 • Related wiring harness
2AU	Constant voltage (Vref)	MAP sensor	Ignition switch is turned to the ON position	Approx. 5.0	• Related wiring harness
2AV	MAP sensor ground	MAP sensor	Under any condition	Below 1.0	• Related wiring harness
2AW	IGT2	Ignition coil (No.2 cylinders)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Ignition coil No.2 • Related wiring harness
2AX	IGT3	Ignition coil (No.3 cylinders)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Ignition coil No.3 • Related wiring harness
2AY	ECT sensor ground	ECT sensor	Under any condition	Below 1.0	• Related wiring harness
2AZ	Fuel injection (#4)	Fuel injector No.4	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Fuel injector No.4 • Related wiring harness

2BA	IGT1	Ignition coil (No.1 cylinders)	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Ignition coil No.1 • Related wiring harness
2BB	Fuel injection (#1)	Fuel injector No.1	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Fuel injector No.1 • Related wiring harness
2BC	Fuel injection (#2)	Fuel injector No.2	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Fuel injector No.2 • Related wiring harness
2BD	Fuel injection (#3)	Fuel injector No.3	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Fuel injector No.3 • Related wiring harness
2BE	Rear HO2S heater control	Rear HO2S heater	Heavy load (Heater control not operating)	B+	• Rear HO2S heater • Related wiring harness
2BF	-	-	-	-	-
2BG	Front HO2S heater control	Front HO2S heater	• Inspect using the wave profile. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)** .)		• Front HO2S heater • Related wiring harness
2BH	Rear HO2S ground	Rear HO2S	Under any condition	Below 1.0	• Related wiring harness

(1) AT

(2) MT

(3) Turn the test mode on using the M-MDS simulation function.

(4) MT without ABS/DSC

INSPECTION USING AN OSCILLOSCOPE (REFERENCE)

Throttle Control (+) Signal

PCM Terminals

- 2A (+)-Negative battery terminal (-)

Oscilloscope Setting

- 5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle Condition

- Idle (Accelerator pedal released)

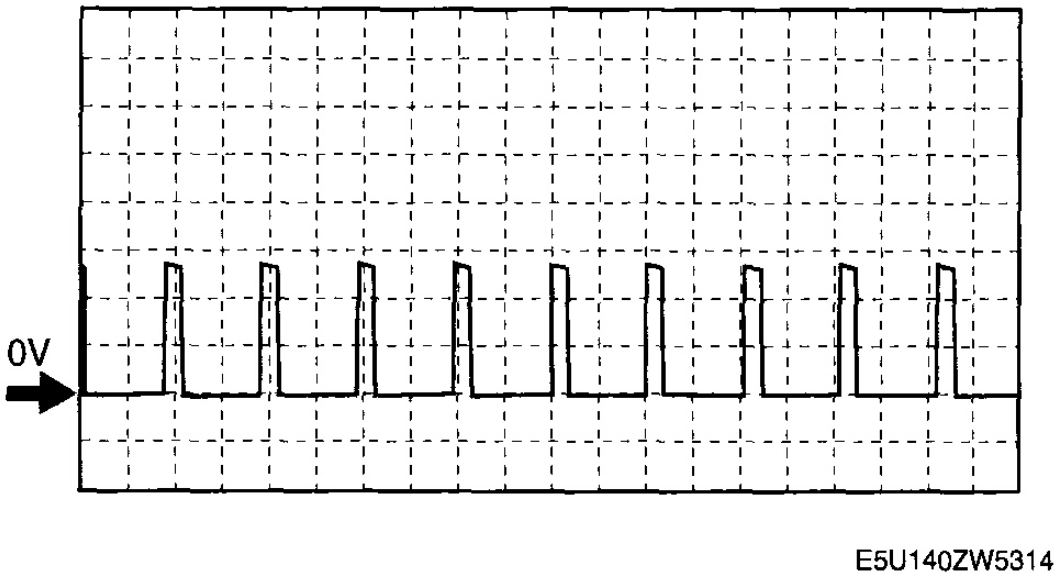


Fig. 8: Waveform Graph (Throttle Control (+) Signal))
Courtesy of MAZDA MOTORS CORP.

Throttle Control (-) Signal

PCM Terminals

- 2B (+) - Negative battery terminal (-)

Oscilloscope Setting

- 5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle Condition

- Idle (Accelerator pedal released)

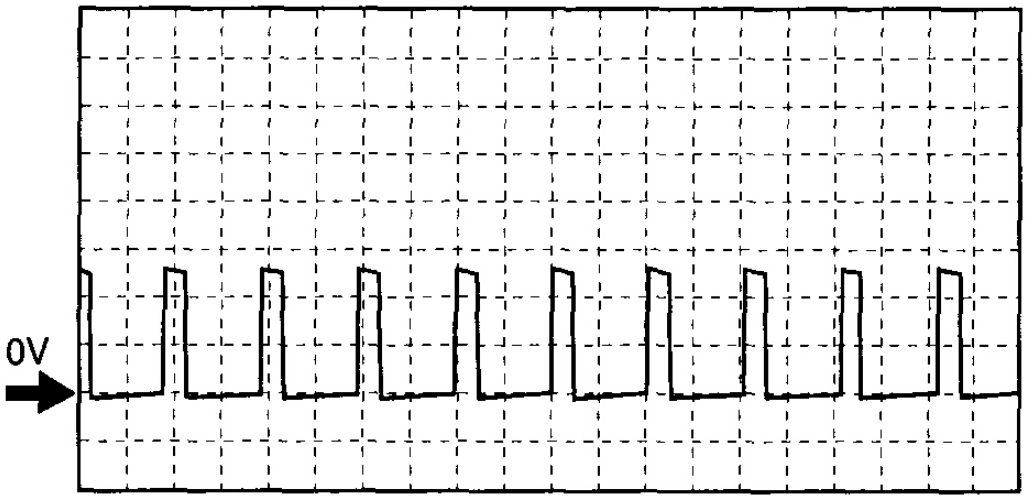


Fig. 9: Waveform Graph (Throttle Control (-) Signal))
Courtesy of MAZDA MOTORS CORP.

Purge Control Signal

PCM Terminals

- 2C (+)-Negative battery terminal (-)

Oscilloscope Setting

- 2 V/DIV (Y), 0.1 s/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

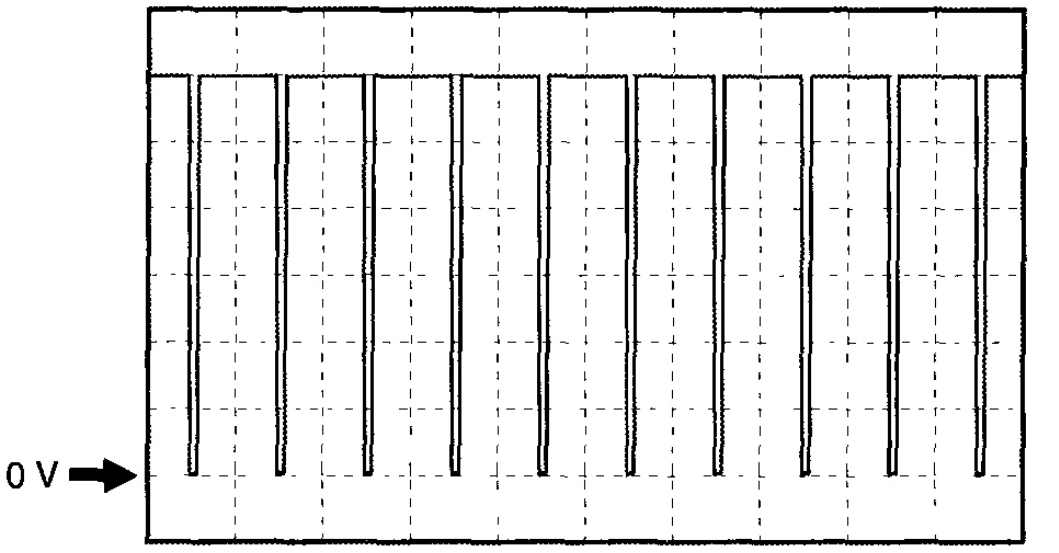


Fig. 10: Waveform Graph (Purge Control Signal)
Courtesy of MAZDA MOTORS CORP.

OCV Control Signal

PCM Terminals

- 2E (+)-Negative battery terminal (-)

Oscilloscope Setting

- 2.5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

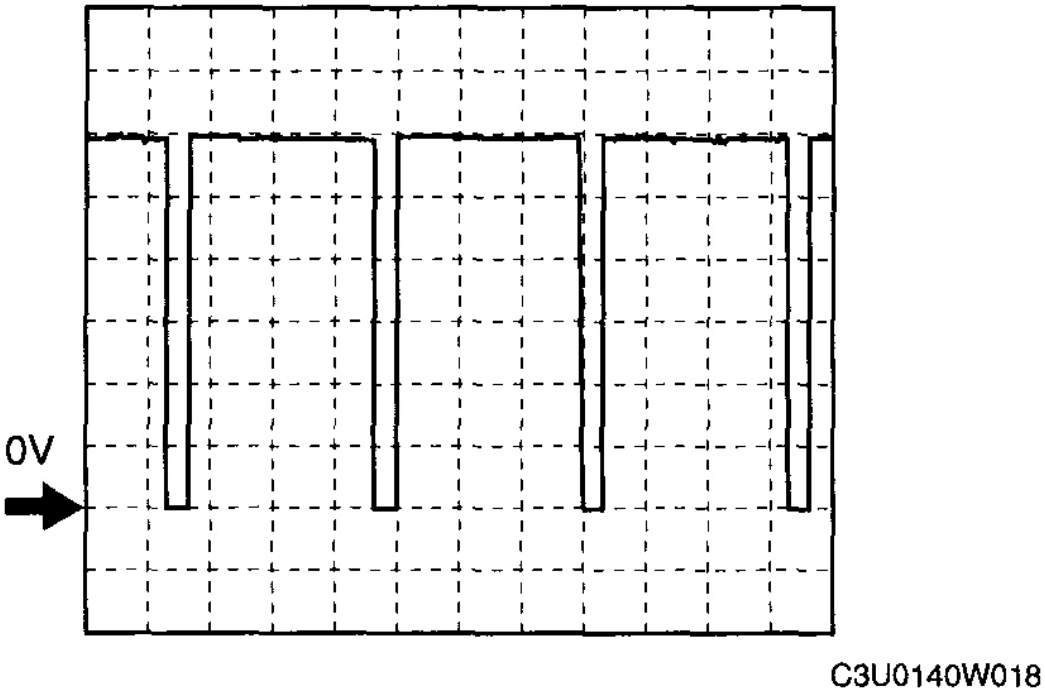


Fig. 11: Waveform Graph (OCV Control Signal)
Courtesy of MAZDA MOTORS CORP.

Vehicle Speed Signal

PCM Terminals

- 2O (+)-Negative battery terminal (-)

Oscilloscope Setting

- 1 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle Condition

- Vehicle speed is 10 km/h {6.2 mph}

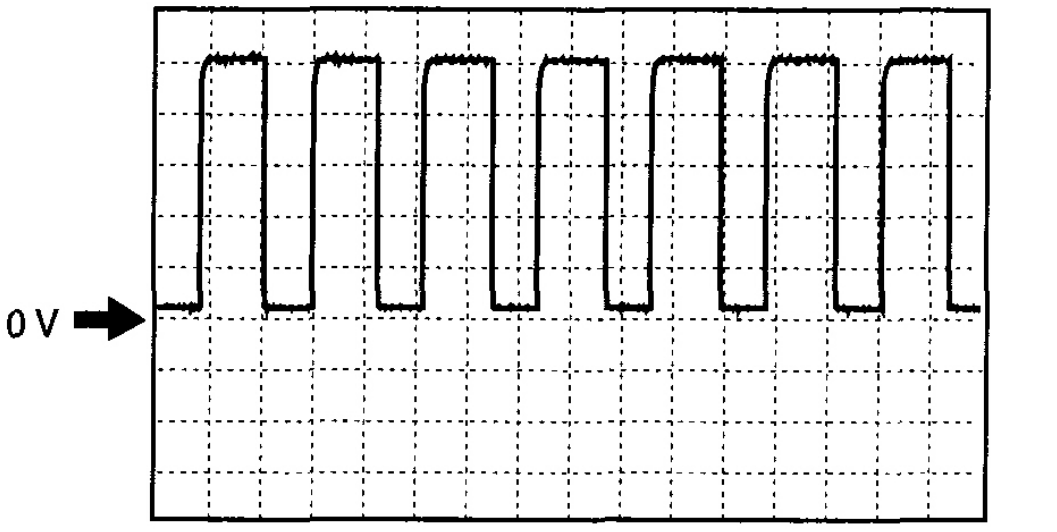


Fig. 12: Waveform Graph (Vehicle Speed Signal)
Courtesy of MAZDA MOTORS CORP.

CMP Signal

PCM Terminals

- 2S (+) - Negative battery terminal (-)

Oscilloscope Setting

- 2 V/DIV (Y), 50 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

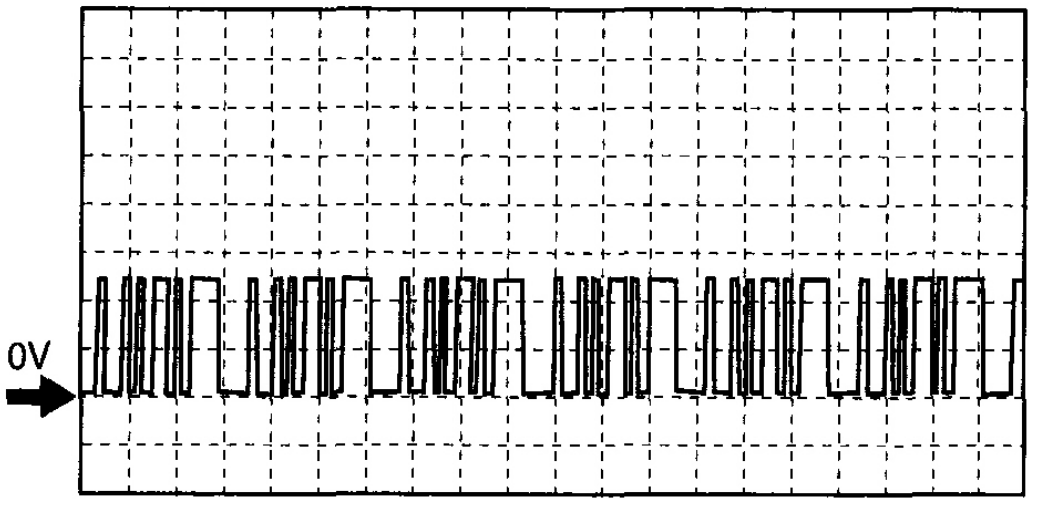


Fig. 13: Waveform Graph (CMP Signal)
Courtesy of MAZDA MOTORS CORP.

CKP Signal

PCM Terminals

- 2W (+) - Negative battery terminal (-)

Oscilloscope Setting

- 2 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

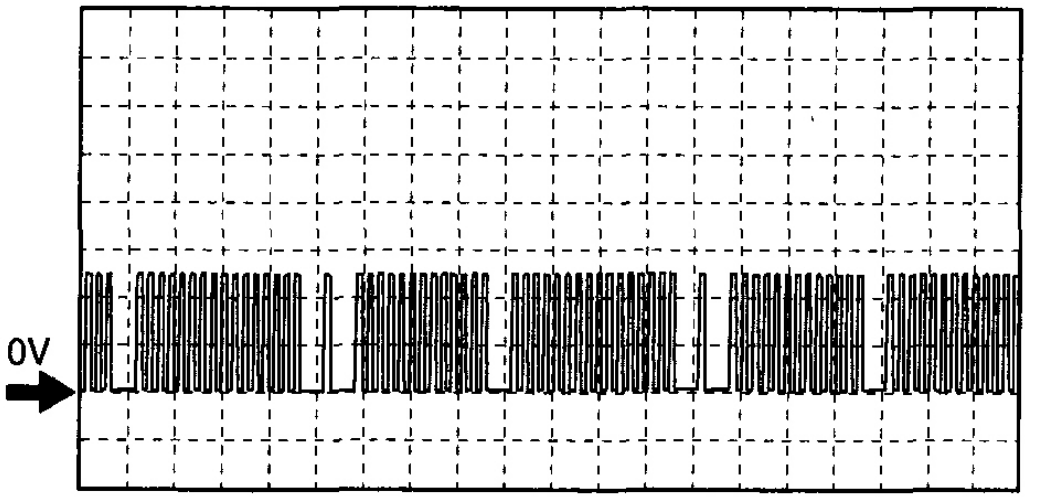


Fig. 14: Waveform Graph (CKP Signal)
Courtesy of MAZDA MOTORS CORP.

Generator Field Coil Control Signal

PCM Terminals

- 2AI (+) - Negative battery terminal (-)

Oscilloscope Setting

- 0.5 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

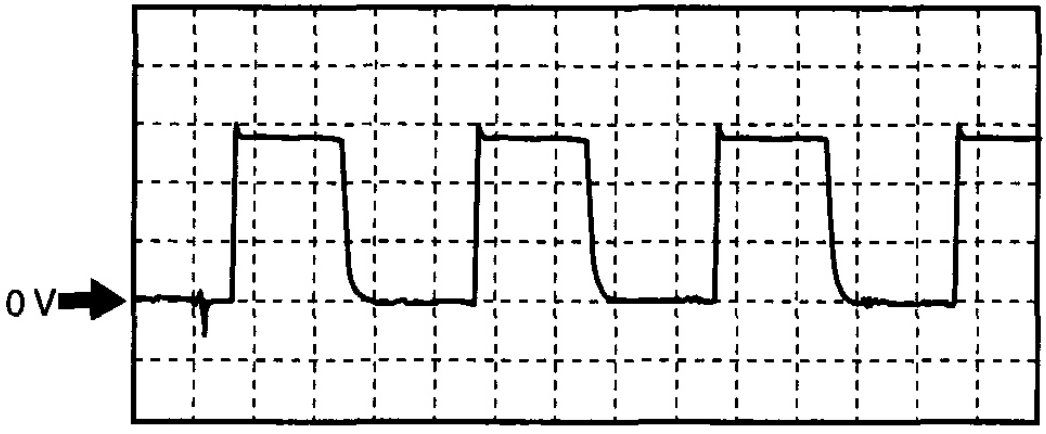


Fig. 15: Waveform Graph (Generator Field Coil Control Signal)
Courtesy of MAZDA MOTORS CORP.

Generator Output Voltage Signal

PCM Terminals

- 2AJ (+) - Negative battery terminal (-)

Oscilloscope Setting

- 2 V/DIV (Y), 1 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

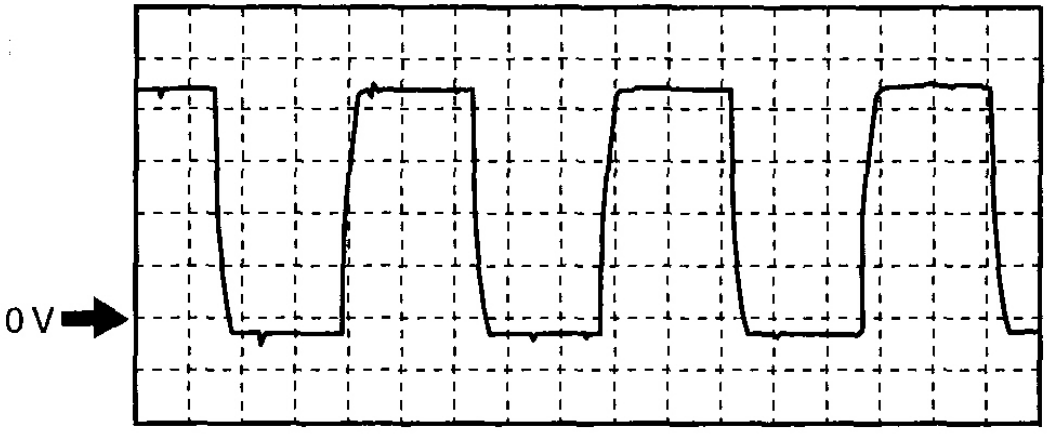


Fig. 16: Waveform Graph (Generator Output Voltage Signal)
Courtesy of MAZDA MOTORS CORP.

Ignition Timing Signals

PCM Terminals

- IGT1 (No.1): 2BA (+) - Negative battery terminal (-)
- IGT2 (No.2): 2AW (+) - Negative battery terminal (-)
- IGT3 (No.3): 2AX (+) - Negative battery terminal (-)
- IGT4 (No.4): 2AT (+) - Negative battery terminal (-)

Oscilloscope Setting

- 2 V/DIV (Y), 50 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

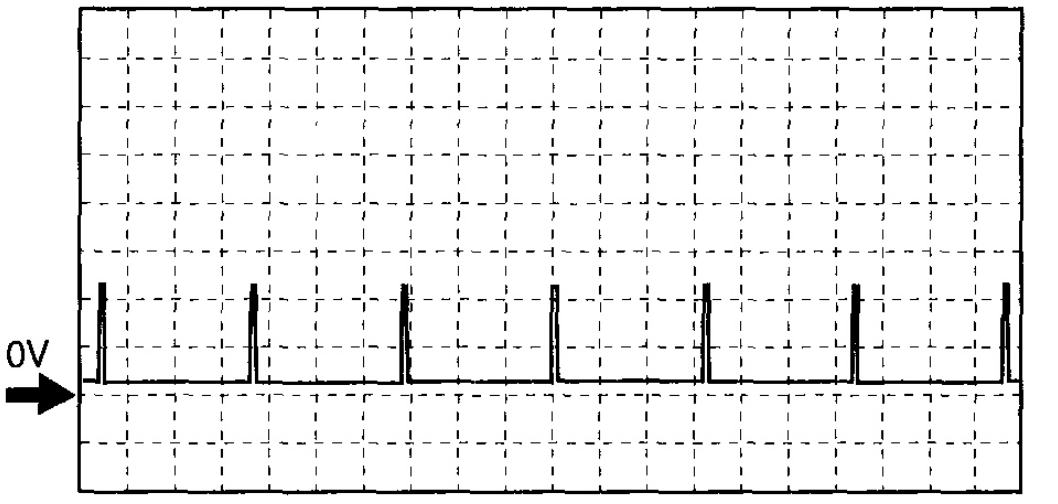


Fig. 17: Waveform Graph (Ignition Timing Signals)
Courtesy of MAZDA MOTORS CORP.

Fuel Injection Signals

PCM Terminals

- Fuel Injection No.1: 2BB (+) - Negative battery terminal (-)
- Fuel Injection No.2: 2BC (+) - Negative battery terminal (-)
- Fuel Injection No.3: 2BD (+) - Negative battery terminal (-)
- Fuel Injection No.4: 2AZ (+) - Negative battery terminal (-)

Oscilloscope Setting

- 10 V/DIV (Y), 10 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up

Fig. 18: Waveform Graph (Fuel Injection Signals)
Courtesy of MAZDA MOTORS CORP.

Front HO2S Heater Control Signal

PCM Terminals

- 2BG (+) - Negative battery terminal (-)

Oscilloscope Setting

- 5 V/DIV (Y), 50 ms/DIV (X), DC range

Vehicle Condition

- Idle after warm-up (no load)

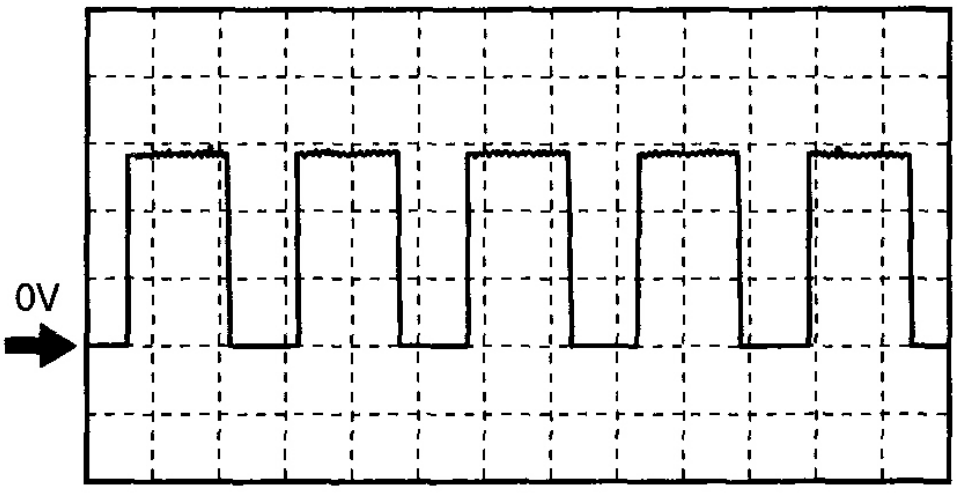


Fig. 19: Waveform Graph (Front HO2S Heater Control Signal)
Courtesy of MAZDA MOTORS CORP.

USING THE M-MDS OR EQUIVALENT

NOTE:

- **PIDs for the following parts are not available on this model. Go to the appropriate part inspection reference.**
  - **CMP sensor**
  - **Main relay**

1. Connect the **SST** (M-MDS or equivalent) to the DLC-2.

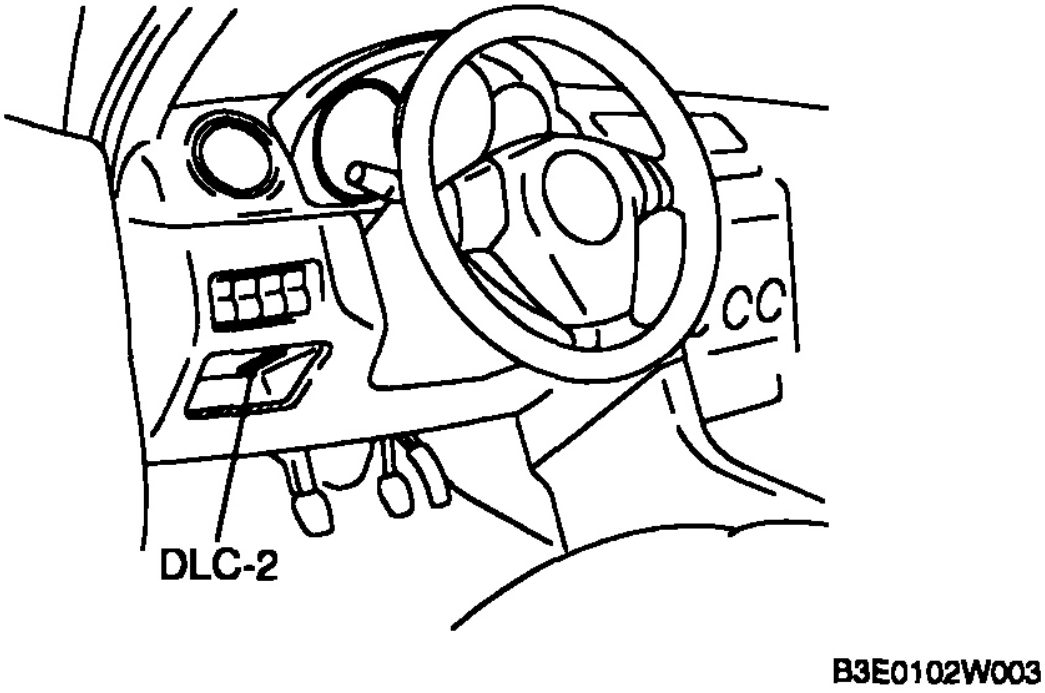


Fig. 20: Locating Connector DLC-2
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to ON position.
3. Measure the PID value.
    - If PID value is not within the specification, follow the instructions in "Inspection item (s)" column.

NOTE:

- **The PID/DATA MONITOR function monitors the calculated value of the input/output signals in the PCM. Therefore, an output device malfunction is not directly indicated as a malfunction of the monitored value for the output device. If a monitored value of an output device is out of specification, inspect the monitored value of the input device related to the output control.**
- **For input/output signals except those of the monitoring items, use a voltmeter to measure the PCM terminal voltage.**
- **The simulation items that are used in the ENGINE CONTROL SYSTEM OPERATION INSPECTION are as follows.**
    - **ACCS, ALTF, EVAPCP, FAN1, FAN2, FAN3, FP, FUELPW1, GENVDSD, HTR11, HTR12, IMTV, INJ_1, INJ_2, INJ_3, INJ_4, SEGRP, test, VT DUTY1 Wt**

PID/DATA Monitor Table (Reference)

PID/DATA MONITOR TABLE

Item (definition)	Unit/Condition		Condition/Specification (Reference)	Inspection item(s)	PCM terminal
AAT (Ambient air temperature)	°C	°F	• Ignition switch is turned to the ON position: Indicate the ambient air temperature	• The following PIDs ○ IAT	-
AC_REQ (Refrigerant pressure switch (high, low)	On/Off		• Refrigerant pressure is more than the specification or less than the specification. (Refrigerant pressure switch (high, low) is off.): Off • Except above: On	• Refrigerant pressure switch (high, low) • A/C amplifier	1AU
ACCS (A/C relay)	On/Off		• A/C relay is ON: On • A/C relay is OFF: Off	• The following PIDs ○ CPP(1), CPP/PNP(1), ECT, RPM, TP, TR(2), AC_REQ, COLP	1I
AFR (Air/fuel ratio)	-		• Idle after warm-up: Approx. 1	• Front HO2S	2AD
AFR_ACT (Actual air/fuel ratio)	-		• Idle after warm-up: Approx. 1	• Front HO2S • Rear HO2S	-
ALTF (Generator field coil control duty value)	%		• Ignition switch is turned to the ON position: 0% • Idle, E/L is operating: Duty value increases.	• Generator	2AI
ALTT V (Generator			• Idle (no E/L): Approx. 14 V	• Generator	2AJ

output voltage)	V	(This is an internal calculation value and differs from the terminal voltage.)		
APP (Accelerator pedal position)	%	• Accelerator pedal released: 0% • Accelerator pedal depressed: 100%	• The following PIDs ○ APP1, APP2	1AO, 1AP
APP1 (APP sensor No.1)	%	• Accelerator pedal released: Approx. 32% • Accelerator pedal depressed: Approx. 78%	• APP sensor	1AO
	V	• Accelerator pedal released: Approx. 1.6 V • Accelerator pedal depressed: Approx. 3.9 V		
APP2 (APP sensor No.2)	%	• Accelerator pedal released: Approx. 21% • Accelerator pedal depressed: Approx. 67%	• APP sensor	1AP
	V	• Accelerator pedal released: Approx. 1.0 V • Accelerator pedal depressed: Approx. 3.4 V		
ARPMDES (Target engine speed)	RPM	• Indicate the target engine speed.	• The following PIDs ○ CPP(1), CPP/PNP(1), ECT, IAT, RPM, TP, MAF, MAP, VSS,	-

					AC_REQ, COLP	
BARO (Barometric pressure)	kPa	Bar	PSI	• Ignition switch is turned to the ON position: Indicate the barometric pressure	-	-
	V			• Ignition switch is turned to the ON position (at sea level): 4.1 V		
BOO (Brake switch)	On/Off			• Brake pedal depressed: On • Brake pedal released: Off	• Brake switch	1AB, 1AF
CATT11_DSD (Catalyst temperature)	°C		°F	• Ignition switch is turned to the ON position: Indicate the catalyst temperature	-	-
CHRGLP (Generator warning light)	On/Off			• Idle, Generator warning light illuminate: On • Idle, Generator warning light not illuminate: Off	• Generator warning light	-
COLP (Refrigerant pressure switch (middle))	On/Off			• Refrigerant pressure is more than the specification. (Refrigerant pressure switch (middle) is on.): On • Refrigerant pressure is less than the specification. (Refrigerant pressure switch (middle) is off.): Off	• Refrigerant pressure switch (middle)	1J
CPP(1) (Clutch				• Clutch pedal	• CPP switch	1D

pedal position)	On/Off		depressed: On • Clutch pedal released: Off.		
CPP/PNP(1) (Shift lever position)	Drive/Neutral		• Neutral: Neutral • Other than neutral: Drive	• Neutral switch	1X
DTCCNT (Number of DTC detected)	-		• Number of DTCs stored	-	-
ECT (Engine coolant temperature)	°C	°F	• Ignition switch is turned to the ON position: Indicate the ECT	• ECT sensor	2AH
	V		• ECT is 20°C {68° F}: Approx. 3.0 V • ECT is 80°C {176°F}: Approx. 0.9 V		
EQ_RAT11 (Actual lambda signal)	-		• Idle after warm-up: Approx. 1	• Front HO2S	-
EQ_RAT11_DSD (Target lambda)	-		• Target lambda (Excess air factor = supplied air amount/theoretical air/fuel ratio)	• Front HO2S	-
ETC_ACT (Throttle control)	°		• Accelerator pedal released: Approx. 0° • Accelerator pedal depressed: Approx. 94.5°	• TP sensor	-
ETC_DSD (Throttle control desired)	%		• Indicate the target throttle valve opening ratio	• The following PIDs ○ APP, RPM	-
	°		• Indicate the target throttle valve opening angle		
EVAPCP (Purge solenoid valve duty value)			• Ignition switch is turned to the ON position: 0% • Increase the	• The following PIDs ○ ECT, IAT, RPM, TP,	2C

	%	engine speed (after warm-up): Duty value rises	MAF, O2S11, O2S12, BOO, VPWR • Purge solenoid valve	
FAN1 (Cooling fan relay No.1 control signal)	On/Off	• During test mode CTP: Off WOT: On	• The following PIDs ○ ECT, test, TP	1M
FAN2 (Cooling fan relay No.2 control signal)	On/Off	• During test mode CTP: Off WOT: On	• The following PIDs ○ ECT, test, TP	1N
FAN3 (Cooling fan relay No.3 control signal)	On/Off	• During test mode CTP: Off WOT: On.	• The following PIDs ○ ECT, test, TP	1R
FLI (Fuel level)	%	• Indicate the fuel level	-	-
FP (Fuel pump relay)	On/Off	• Ignition switch is turned to the ON position and a certain period has elapsed: Off • Cranking: On • Idle: On	• Fuel pump relay	1H
FUELPW (Fuel injector duration)	ms	• Idle: Approx. 2.0 ms	• The following PIDs ○ CPP(1), CPP/PNP(1), ECT, IAT, RPM, TP, MAF, O2S11, O2S12, MAP, VSS, TR	2BB, 2BC, 2BD, 2AZ

			(2), BOO, AC_REQ, COLP, VPWR	
FUELSYS (Fuel system status)	OL/CL/OL-Drive/OL-Fault/CL-Fault	• Idle after warm-up: CL	• The following PIDs ○ CPP(1), CPP/PNP (1), ECT, IAT, RPM, TP, MAF, O2S11, O2S12, MAP, VSS, TR (2), BOO, AC_REQ, COLP, VPWR	-
GENVDSD (Target generator voltage)	V	• Indicate the target generated voltage	• The following PIDs ○ ECT, IAT, RPM, VSS, ALTT V, VPWR • Generator	-
HTR11 (Front HO2S heater control)	On/Off	• Ignition switch is turned to the ON position: Off • Idle: On	• The following PIDs ○ ECT, IAT, RPM, TP, MAF, MAP, VPWR	2BG
HTR12 (Rear HO2S heater control)	On/Off	• Ignition switch is turned to the ON position: Off • Idle: On	• The following PIDs ○ ECT, IAT, RPM, TP, MAF, MAP, VPWR	2BE
		• Ignition switch is		

IAT (Intake air temperature)	°C	°F	turned to the ON position: Indicate the IAT	• IAT sensor	1AT
	V		• IAT is 20°C {68° F}: Approx. 2.4 V • IAT is 60°C {140° F}: Approx. 0.9 V		
IMTV (Variable intake air control)	On/Off		• Engine speed is less than 4,750 rpm: On • Engine speed is 4,750 rpm or more: Off	• The following PIDs ○ RPM	2J
INGEAR (Gears are engaged)	On/Off		**MT** • When the following conditions are satisfied: On ○ Other than neutral ○ Clutch pedal released • Except above: Off	• CPP switch • Neutral switch	1D, 1X
			AT • Driving range: On • Except above: Off	• TR switch	-
IVS (CTP condition)	Idle/Off Idle		• Idle: Idle • Other than idle: Off Idle	• The following PIDs ○ TP	-
KNOCKR (Knocking retard)	°		• Ignition switch is turned to the ON position: 0° • Idle: 0°	• KS.	2U
LDP_EVAPCP (EVAP system leak detection pump detect incorrect purge flow)	mA		• Indicate EVAP control system incorrect purge flow detection value	-	-

LDP_IDL (EVAP system leak detection pump idle current)	mA	• Indicate EVAP system leak detection pump idle current	-	-
LDP_MON (EVAP system leak detection pump monitoring current)	mA	• Indicate EVAP system leak detection pump monitoring current	-	-
LDP_REF (EVAP system leak detection pump reference current)	mA	• Indicate EVAP system leak detection pump reference current	-	-
LDP_SLDV (EVAP system small leak detection value)	mA	• Indicate EVAP system small leak detection value	-	-
LDP_VSL_FV (EVAP system very small leak detection fail value)	mA/s	• Indicate EVAP system very small leak detection fail value	-	-
LDP_VSL_SV (EVAP system very small leak detection safe value)	mA/s	• Indicate EVAP system very small leak detection safe value	-	-
LDP_VSLDV (2) (EVAP system very small leak detection value)	mA/s	• Indicate EVAP system very small leak detection value	-	-
LOAD (Engine load)	%	• Idle after warm-up: Approx. 23%	• The following PIDs ○ MAP, IAT, MAF, RPM	-
LONGFT1 (Long term fuel trim)		• Idle after warm-up: Approx.-15 - /+15%	• The following PIDs ○ CPP(1),	-

	%			CPP/PNP [(1)], ECT, IAT, RPM, TP, MAF, O2S11, O2S12, MAP, VSS, TR [(2)], BOO, AC_REQ, COLP, VPWR	
MAF (Mass air flow)	g/s		• Ignition switch is turned to the ON position: Approx. 0 g/s • Idle: Approx. 4.0 g/s	• MAF sensor	1AK
	V		• Ignition switch is turned to the ON position: Approx. 0.7 V • Idle: Approx. 1.4 V		
MAP (Manifold absolute pressure)	kPa	psi / Bar	• Ignition switch is turned to the ON position: Indicate the MAP	• MAP sensor	2AG
	V		• Ignition switch is turned to the ON position (at sea level): 4.1 V • Idle after warm-up: Approx. 1.2 V		
MIL (Malfunction indicator lamp)	On/Off		• Idle, MIL illuminate: On • Idle, MIL not illuminate: Off	• MIL	-
MIL_DIS (Travelled distance since MIL	km	Mile	Travelled distance since MIL illuminated		-

illuminated)				
O2S11 (Front HO2S)	mA	• Idle after warm-up: Approx. 0 mA	• Front HO2S	2AD
O2S12 (Rear HO2S)	V	• Idle after warm-up: Alternates between 0 and 1.0 V	• Rear HO2S	2Q
PSP (PSP switch)	Low/High	• Steering wheel at straight ahead position: Low • While turning steering wheel: High	• PSP switch.	2T
RFCFLAG (PCM adaptive memory produce verification)	Learnt/Not Learnt	• Idle (after running PCM adaptive memory procedure drive mode): Learnt • Right after the negative battery cable is disconnected (before running PCM adaptive memory procedure drive mode): Not Learnt	• Verify after repair procedure	-
RO2FT1 (Rear HO2S fuel trim)	-	• Idle after warm-up: Approx. 0	• The following PIDs ○ O2S12	-
RPM (Engine speed)	RPM	• When the engine is running: Indicate the engine speed	• CKP sensor	2W
SCCS (Cruise control switch)	V	• ON OFF switch pressed in: Approx. 0 V • CANCEL switch pressed in: Approx. 1.1 V • SET/- switch pressed in: Approx. 3.1 V	• Cruise control switch	1AQ

		• RES/+ switch pressed in: Approx. 4.2 V • Except above: Approx. 5.0 V		
SEGRP (EGR control)	-	• Ignition switch is turned to the ON position: 0 Step • Idle: 0 Step • Engine speed is 1,200-4,200 rpm: 0-52 Step	• EGR valve	2K, 2G, 2L, 2H
SEGRP DSD (EGR valve position desired)	%	• Ignition switch is turned to the ON position: 0% • Idle: 0% • Engine speed is 1,200-4,200 rpm: 0-100%	• The following PIDs ○ MAF, TP, ECT, RPM, VSS	-
SELTESTDTC (Diagnostic trouble codes)	-	• Indicate the diagnostic trouble codes	-	-
SHRTFT1 (Short term fuel trim (front))	%	• Idle after warm-up: -25-25%	• The following PIDs ○ CPP(1), CPP/PNP(1), ECT, IAT, RPM, TP, MAF, O2S11, O2S12, MAP, VSS, TR(2), BOO, AC_REQ, COLP, VPWR	-
SHRTFT 12 (Short term fuel trim (rear))		• Idle after warm-up: Approx. 99%	• The following PIDs ○ CPP(1), CPP/PNP	-

	%		(1), ECT, IAT, RPM, TP, MAF, O2S11, MAP, VSS, TR (2), BOO, AC_REQ, COLP, VPWR	
SPARKADV (Ignition timing)	°	• Indicate the ignition timing	• The following PIDs ○ CPP(1), CPP/PNP (2), ECT, IAT, RPM, TP, MAF, KNOCKR, TR(2), BOO, AC_REQ, COLP	2S
Test (Test mode)	On/Off	• Test mode On: On • Test mode Off: Off	-	-
TIRESIZE (Tire revolution per mile)	rev/mile	• Indicate the tire revolution per a mile		-
TP REL (Throttle position signal (relative value))	%	• Accelerator pedal released: Approx. 10% • Accelerator pedal depressed: Approx. 81%	• The following PIDs ○ TP1, TP2	-
TP1 (TP sensor No.1)	%	• Accelerator pedal released: Approx. 10% • Accelerator pedal depressed: Approx. 90%	• TP sensor	2AK
		• Accelerator pedal		

	V		released: Approx. 0.5 V • Accelerator pedal depressed: Approx. 4.5 V		
TP2 (TP sensor No.2)	%		• Accelerator pedal released: Approx. 10% • Accelerator pedal depressed: Approx. 90%	• TP sensor	2AL
	V		• Accelerator pedal released: Approx. 4.5 V • Accelerator pedal depressed: 0.5 V		
TPCT (TP sensor voltage at CTP)	V		• Ignition switch is turned to the ON position: Approx. 0.5 V	• The following PIDs ○ TP1, TP2	-
VPWR (Battery positive voltage)	V		• Indicate the battery voltage	• Battery	1BA
VSS (Vehicle speed)	Km/h	Mph	• Vehicle running: Indicate the vehicle speed	• ABS, DSC HU/CM(3) • VSS(4) • TCM(5)	2O(4) 1AM(3), (5), 1AI(3), (5)
VT ACT1 (Actual valve timing)	°		• Idle: Approx. 0° • Racing: 0-25°	• The following PIDs ○ ECT, RPM, TP, MAF • OCV	2E
VT DIFF1 (Difference between target valve timing and actual valve timing)	°		• Idle: 0°	• The following PIDs ○ ECT, RPM, TP, MAF • OCV	-
VT DUTY1			• Idle: Approx. 10%	• The following	2E

(OCV control)	%		PIDs ○ ECT, RPM, TP, MAF	

(1) MT

(2) California emission regulation applicable model

(3) With ABS, DSC HU/CM

(4) MT without ABS/DSC

(5) AT without ABS/DSC

PCM CONFIGURATION [LF]

1. Connect the M-MDS or equivalent to the DLC-2.

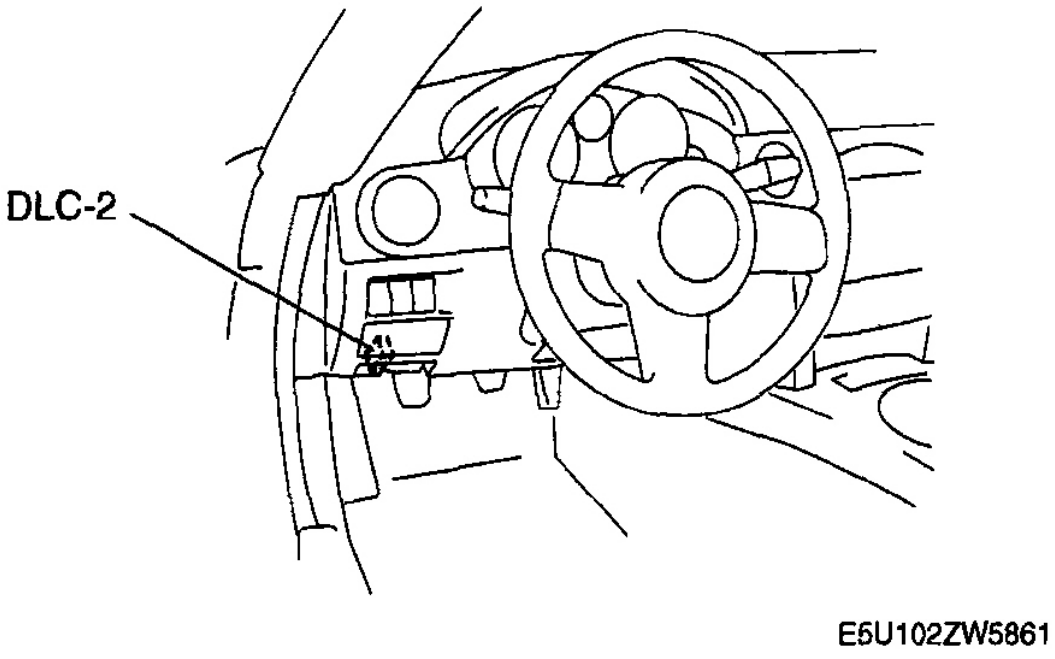


Fig. 21: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Set up the M-MDS or equivalent (including the vehicle recognition).
3. Select "Module Programming".
4. Select "Programmable Module Installation".

5. Select "PCM" and perform procedures according to directions on the M-MDS or equivalent screen.

NOTE:

- **If the PCM is replaced with a new one, the PCM stores DTC P0602 and illuminates the MIL even though no malfunction is detected. This means the PCM has not been configured yet.**

6. Retrieve DTC's by the M-MDS or equivalent, then verify that there in no DTC present.
   - If DTC is present, perform applicable DTC inspection. (See **DTC TABLE [LF]** .)

NEUTRAL SWITCH INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

CONTINUITY INSPECTION

1. Remove the neutral switch. (See **NEUTRAL SWITCH REMOVAL/INSTALLATION [M15M-D]** .) (See **NEUTRAL SWITCH REMOVAL/INSTALLATION [P66M-D]** .)
2. Verify that the continuity between neutral switch terminals 1A and 2A is as indicated in **Fig. 22** .
   - If not as indicated in **Fig. 22** , replace the neutral switch. (See **NEUTRAL SWITCH REMOVAL/INSTALLATION [M15M-D]** .) (See **NEUTRAL SWITCH REMOVAL/INSTALLATION [P66M-D]** .)

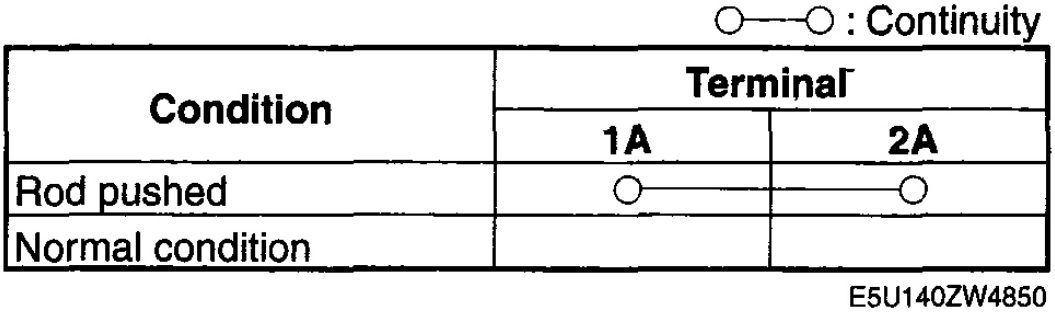


Fig. 22: Neutral Switch Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

- If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the **CIRCUIT OPEN/SHORT INSPECTION** .

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harness for open or short circuit (continuity Inspection).

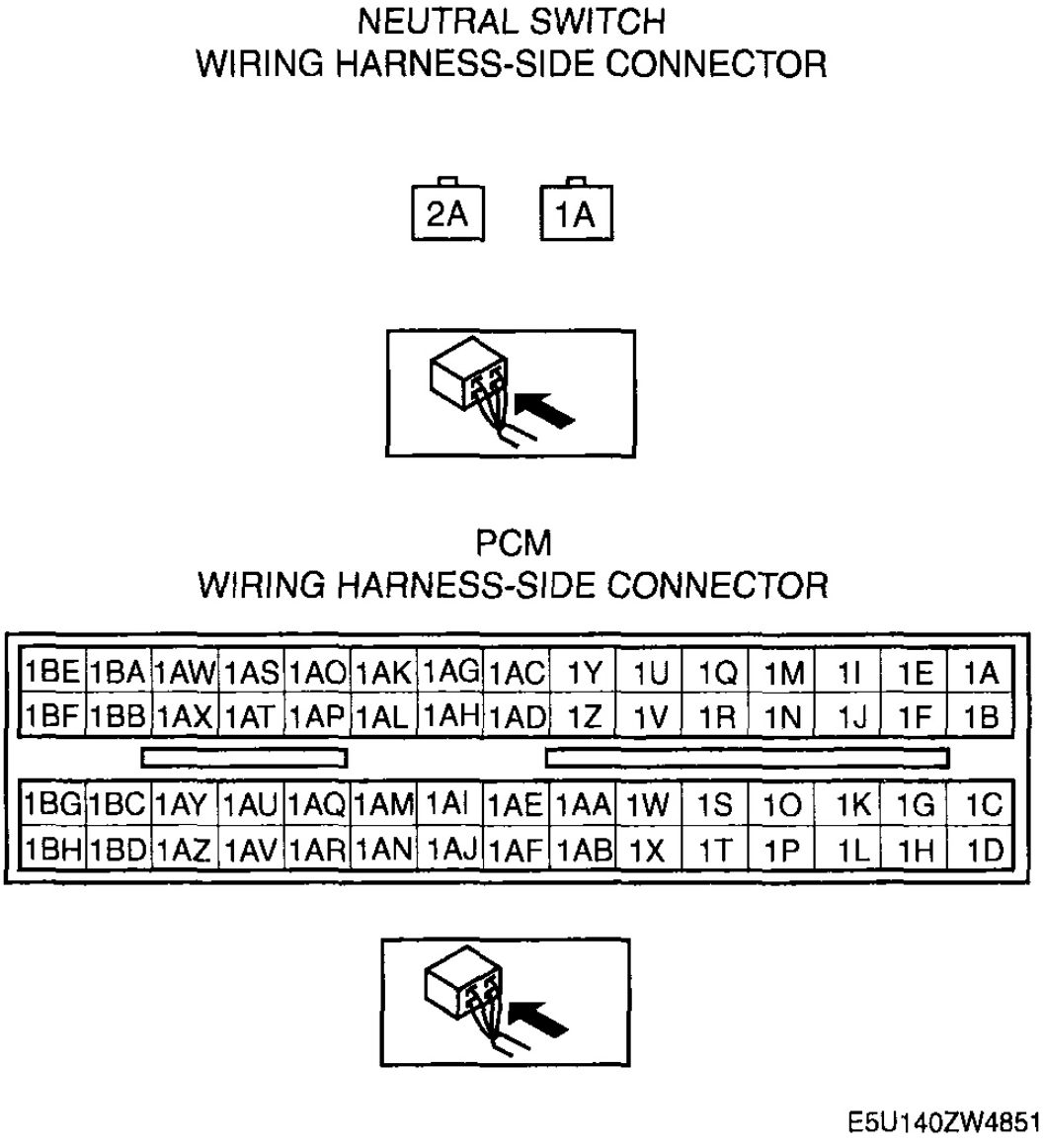


Fig. 23: Identifying Neutral Switch & PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - Neutral switch terminal 2A and PCM terminal 1X

- Neutral switch terminal 1A and body ground

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - Neutral switch terminal 2A and body ground

CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

CONTINUITY INSPECTION

1. Remove the CPP switch. (See **CLUTCH PEDAL REMOVAL/INSTALLATION** .)
2. Verify that the continuity between CPP switch terminals D and B is as indicated in **Fig. 24** .
   - If not as indicated in **Fig. 24** , replace the CPP switch. (See **CLUTCH PEDAL REMOVAL/INSTALLATION** .)

○—○ : Continuity

Condition	Terminal	
	D	B
Normal condition	○	○
Rod pushed		

E5U140ZW4861

Fig. 24: Clutch Pedal Position Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

- If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the **CIRCUIT OPEN/SHORT INSPECTION** .

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harness for open or short circuit (continuity Inspection).

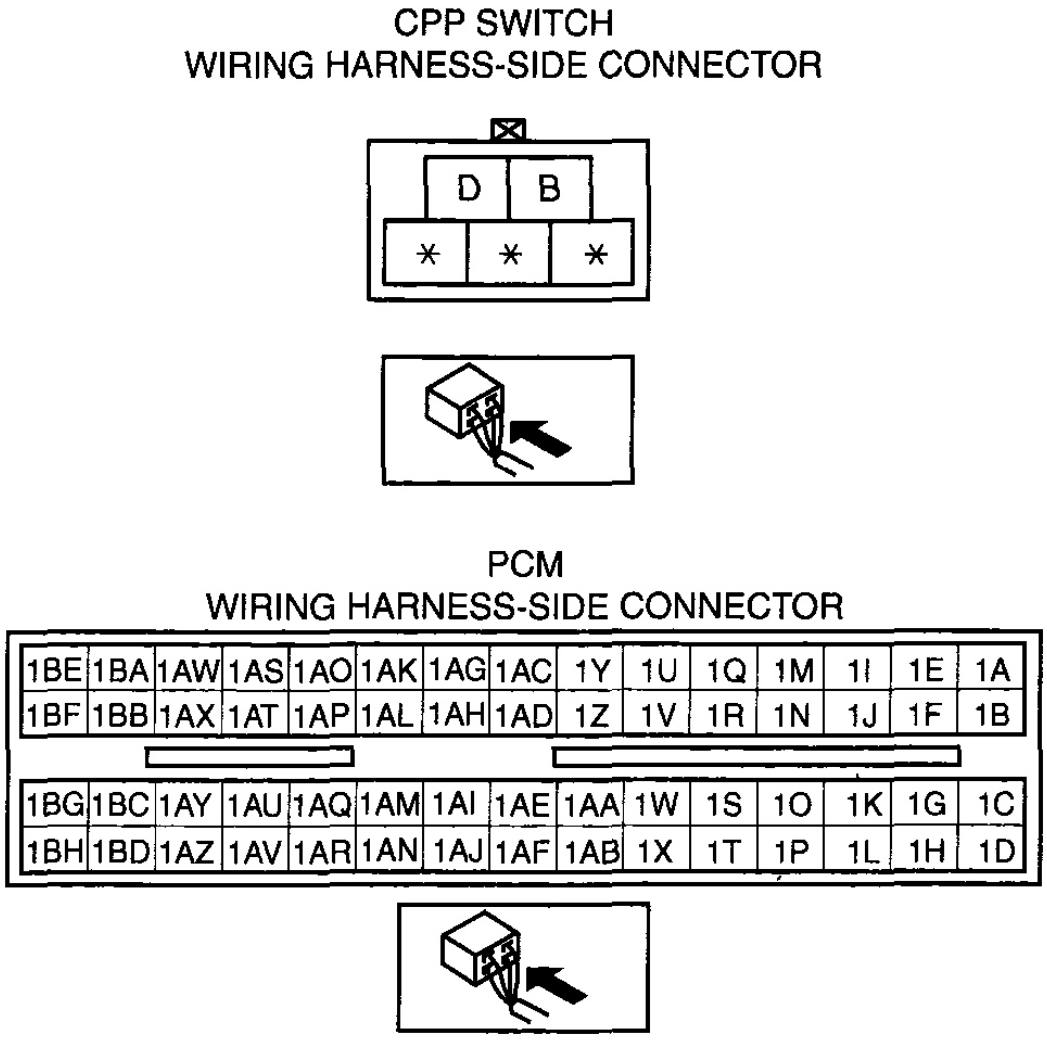


Fig. 25: Identifying CPP Switch & PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - CPP switch terminal B and PCM terminal 1D
  - CPP switch terminal D and body ground

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - CPP switch terminal B and body ground

POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

CONTINUITY INSPECTION

1. Inspect the following items:
   - Power steering fluid amount (See **POWER STEERING FLUID INSPECTION** .)
   - Power steering-related inspection (See **STEERING LOCATION INDEX** .)
2. Disconnect the PSP switch connector.
3. Start the engine.
4. Verify that the continuity between PSP switch terminal A and body ground is as indicated in **Fig. 26** .
   - If not as indicated in **Fig. 26** , replace the CPP switch. (See **POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY** .)

○—○ : Continuity

Condition	Terminal A	GND
Steering wheel in straight ahead position		
While turning sttering wheel	○	○

B3E0140W526

Fig. 26: Power Steering Pressure Switch Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

- If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, perform the **CIRCUIT OPEN/SHORT INSPECTION** .

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)

2. Inspect the following wiring harness for open or short circuit (continuity Inspection).

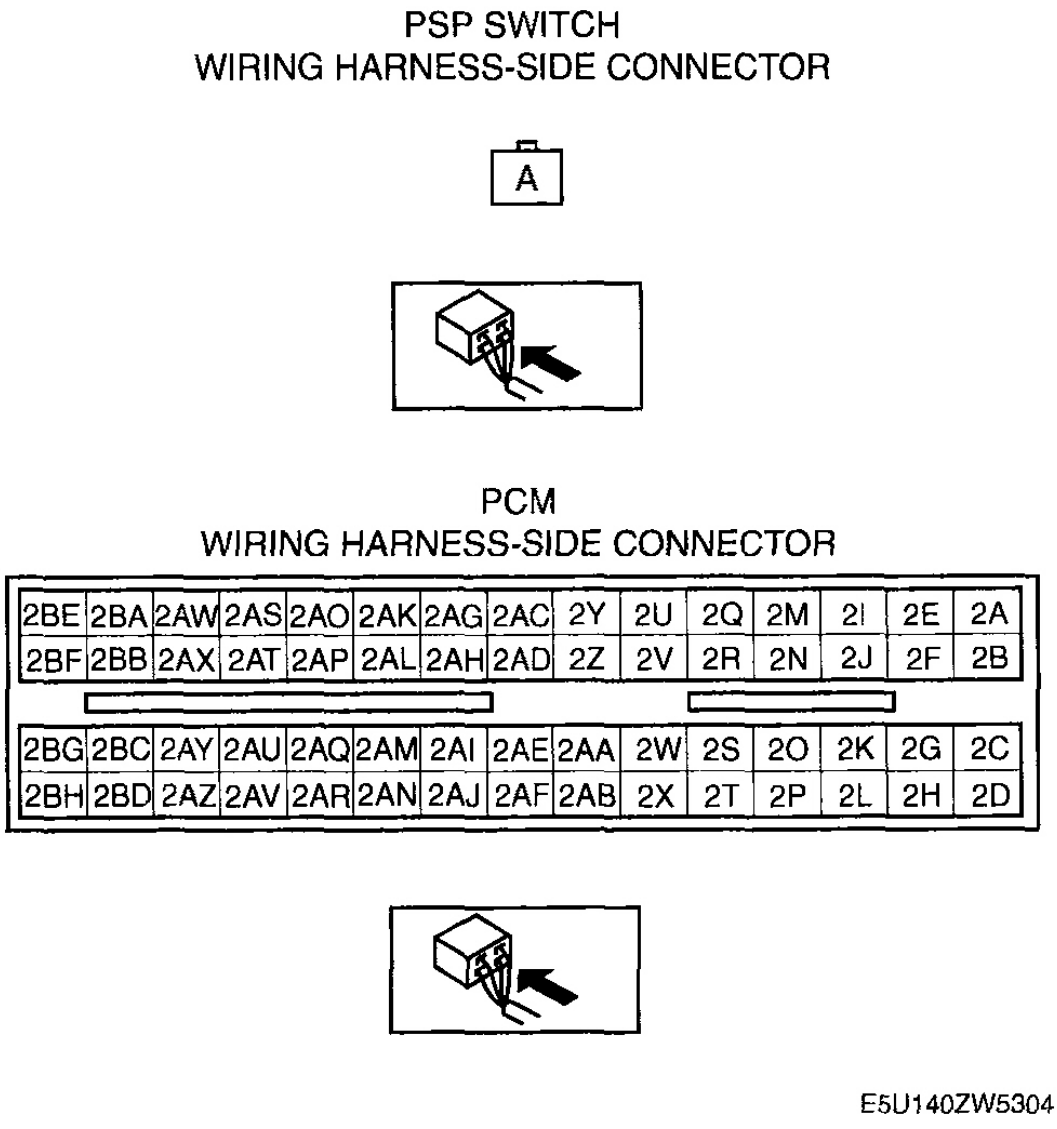


Fig. 27: Identifying PSP Switch & PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - PSP switch terminal A and PCM terminal 2T

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - PSP switch terminal A and body ground

ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant from the radiator. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the service hole cover.
   1. Remove the suspension tower bar (joint), (right side) and (left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
   2. Remove the wiper arm. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
   3. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
   4. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
   5. Move the cooler pipe No.3 and heater pipe slightly out of the way.

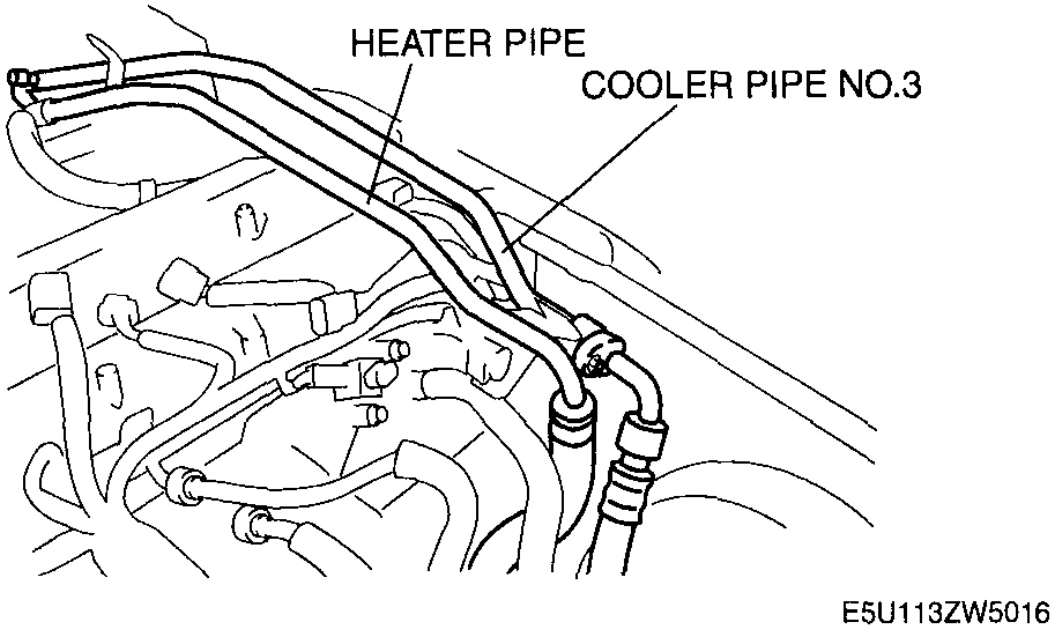


Fig. 28: Identifying Cooler Pipe No. 3 & Heater Pipe
Courtesy of MAZDA MOTORS CORP.

6. Remove the service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)

5. Disconnect the heater hose and move the heater pipe slightly out of the way.
6. Disconnect the ECT sensor connector.

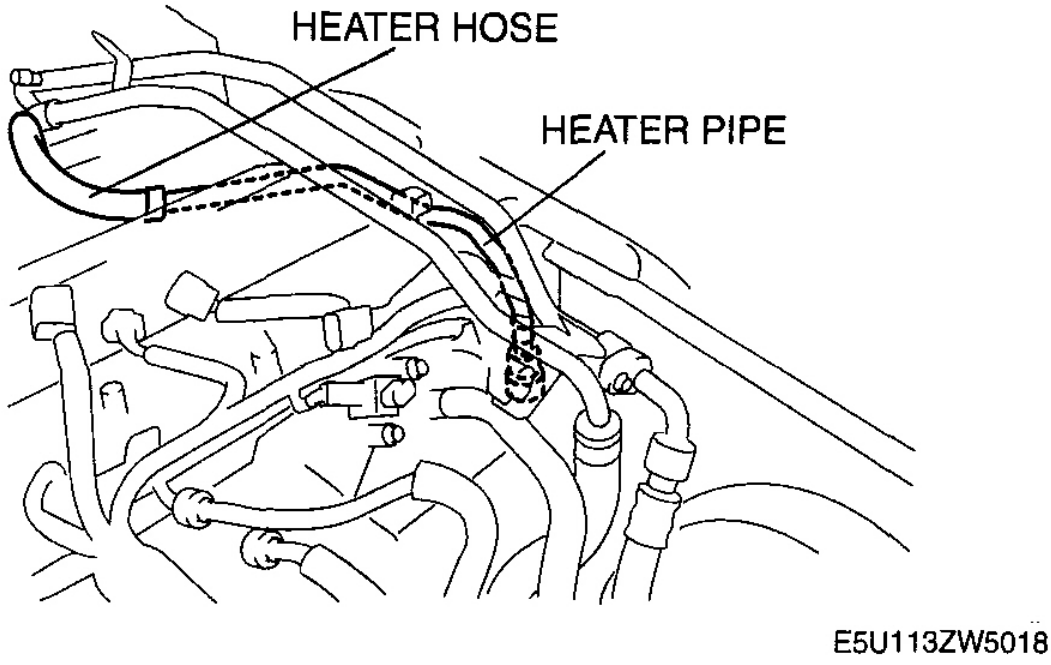


Fig. 29: Identifying Heater Hose & Heater Pipe
Courtesy of MAZDA MOTORS CORP.

7. Remove the ECT sensor.

NOTE:

- **Put the double nut together and install the torque wrench. (See TORQUE FORMULAS .)**

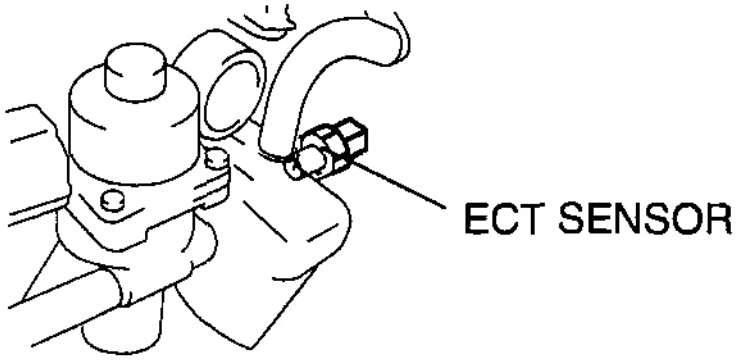


Fig. 30: Identifying ECT Sensor
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

ECT sensor tightening torque

10-14 N.m {1.1-1.4 kgf.m, 7.4-10.3 ft.lbf}

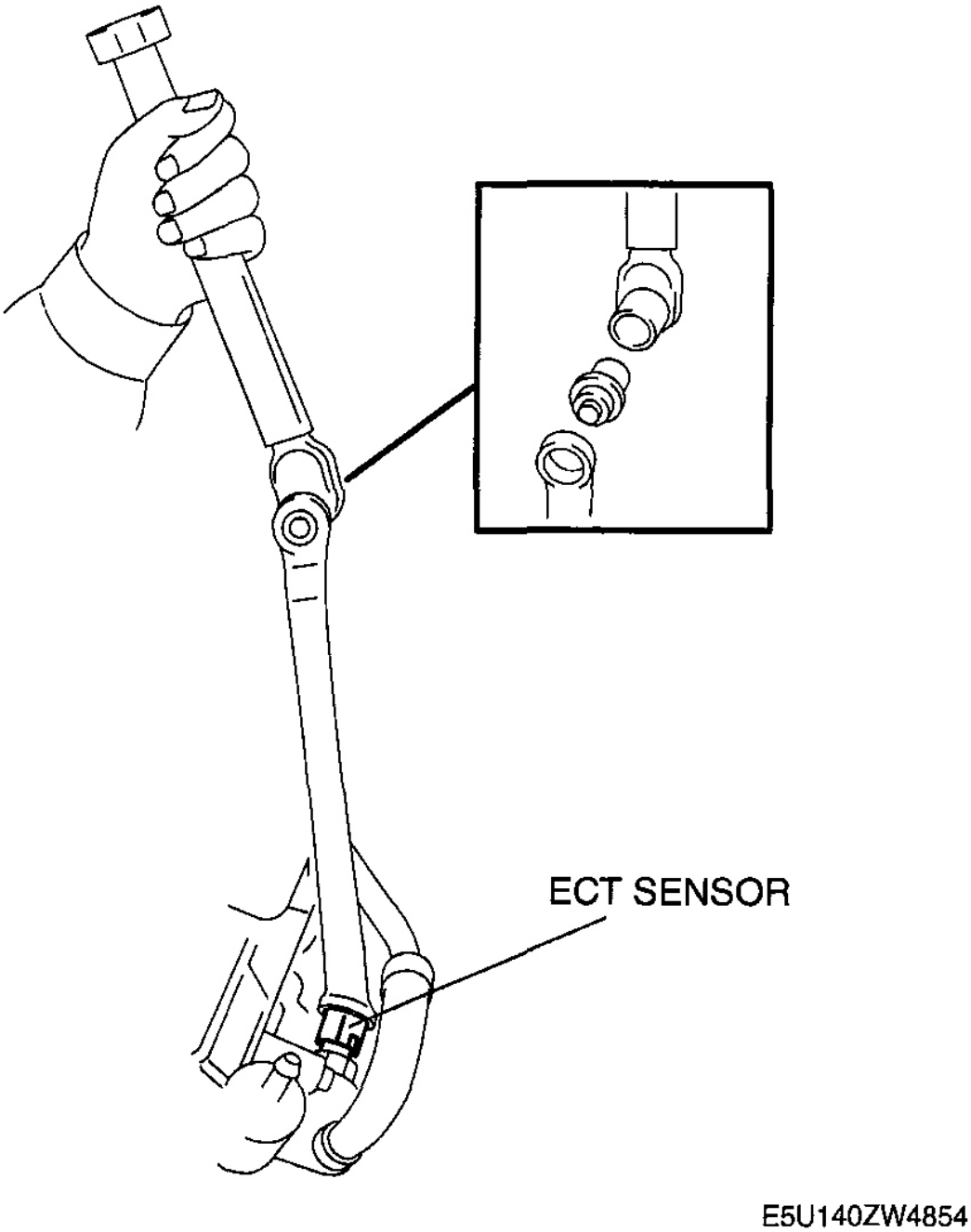


Fig. 31: Installing ECT Sensor
Courtesy of MAZDA MOTORS CORP.

ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

RESISTANCE INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the ECT sensor connector.
4. Remove the ECT sensor. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [LF]** .)
5. Place the ECT sensor in the water and while increasing the water temperature, measure the resistance between ECT sensor terminals A and B.
   - If the monitor item status/specification (reference) is not within the specification, even though the ECT sensor resistance is within the specification, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
   - If not within the specification, replace the ECT sensor. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [LF]**)

STANDARD ECT SENSOR RESISTANCE SPECIFICATION

Water temperature (°C {°F})	Resistance (kilohm)
20 {68}	35.48-39.20
80 {176}	3.65-4.02

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

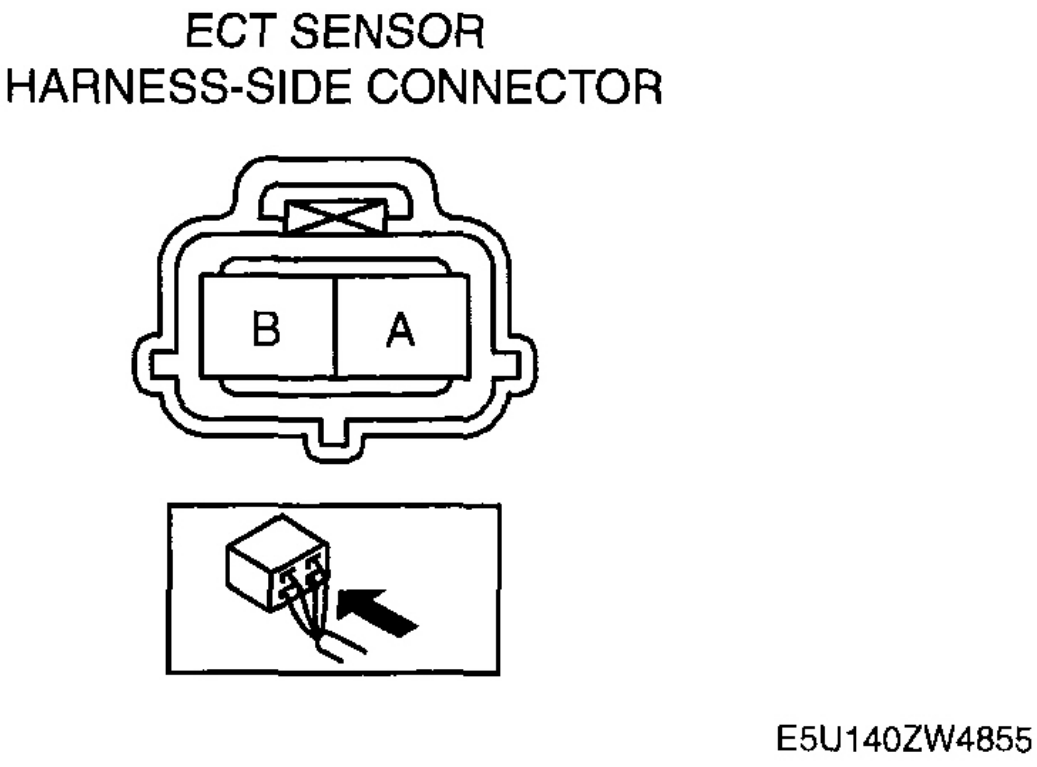


Fig. 32: Identifying ECT Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

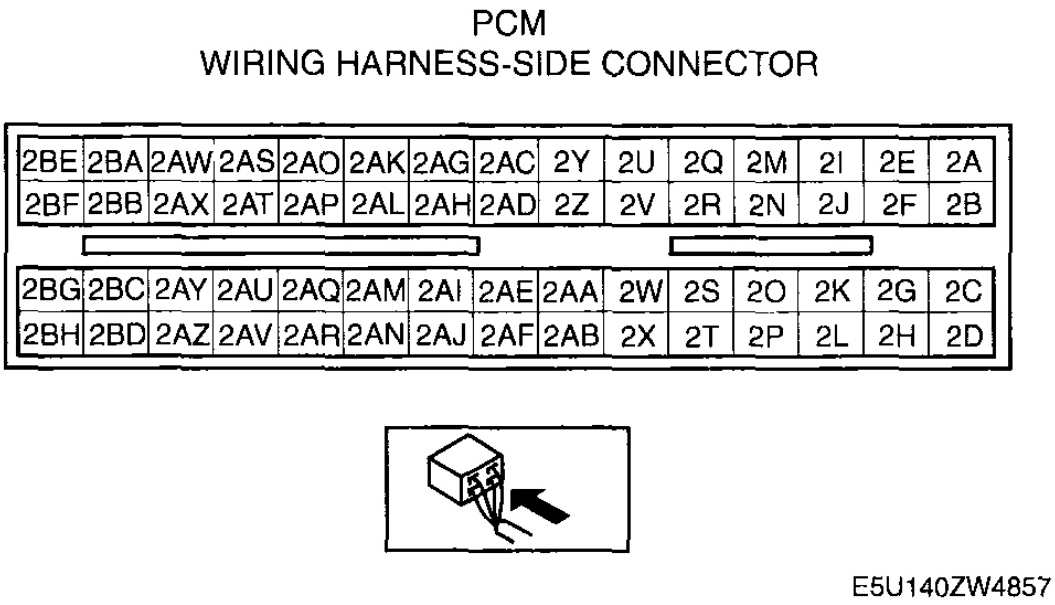


Fig. 33: Identifying PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - ECT sensor terminal A and PCM terminal 2AH
  - ECT sensor terminal B and PCM terminal 2AY

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - ECT sensor terminal A and power supply
  - ECT sensor terminal A and body ground
  - ECT sensor terminal B and power supply

MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect MAF/IAT sensor connector.
4. Remove the MAF/IAT sensor.

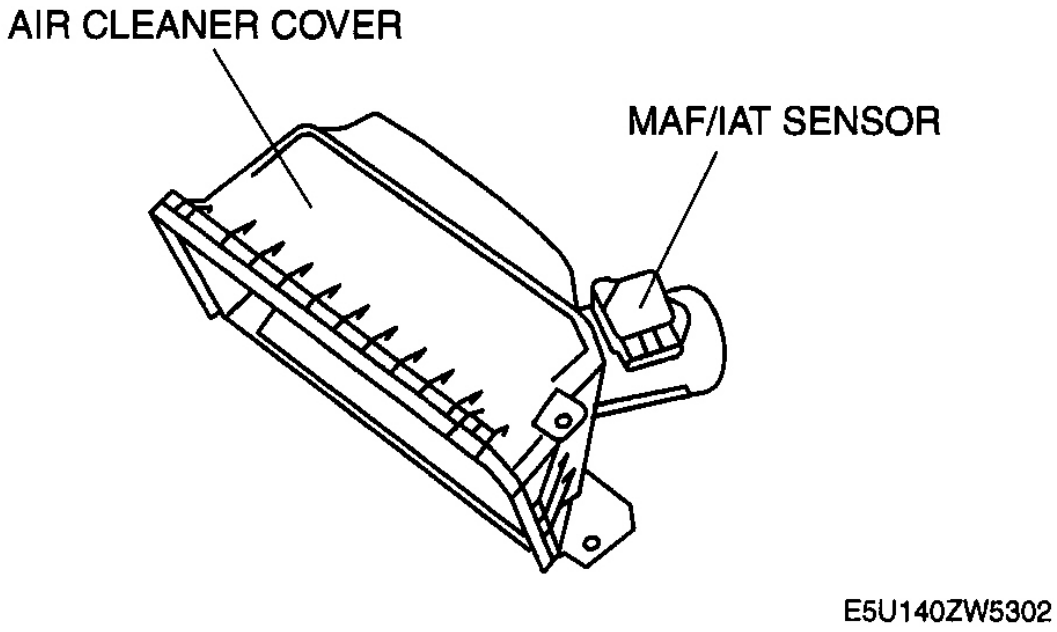


Fig. 34: Identifying MAF/IAT Sensor
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

   MAF/IAT sensor tightening torque

   0.55-0.82 N.m {5.7-8.3 kgf.cm, 4.9-7.2 in.lbf}

MASS AIR FLOW (MAF) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

VISUAL INSPECTION

1. Visually inspect the MAF sensor for the following:
   - Damage, cracks
   - Rusted sensor terminal
   - Bent sensor terminal
     - If there is any malfunction, replace the MAF/IAT sensor. (See **MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR**

REMOVAL/INSTALLATION [LF] .)

VOLTAGE INSPECTION

1. Remove the MAF/IAT sensor without disconnecting the MAF/IAT sensor connector.
2. Turn the ignition switch to the ON position.
3. As the air gradually approaches the MAF detection part of the MAF/IAT sensor, verify that the MAF sensor output voltage (M-MDS PID: MAF) varies.
    - If it cannot be verified even though the related wiring harnesses have no malfunction, replace the MAF/IAT sensor. (See **MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [LF]** .)

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harness for open or short circuit (continuity Inspection).

Open Circuit

- If there is no continuity, there is an open circuit, Repair or replace the wiring harness.
    - MAF/IAT sensor terminal A and PCM main relay
    - MAF/IAT sensor terminal B and PCM terminal 1P
    - MAF/IAT sensor terminal C and PCM terminal 1AK

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
    - MAF/IAT sensor terminal A and body ground
    - MAF/IAT sensor terminal B and power supply
    - MAF/IAT sensor terminal C and power supply
    - MAF/IAT sensor terminal C and body ground

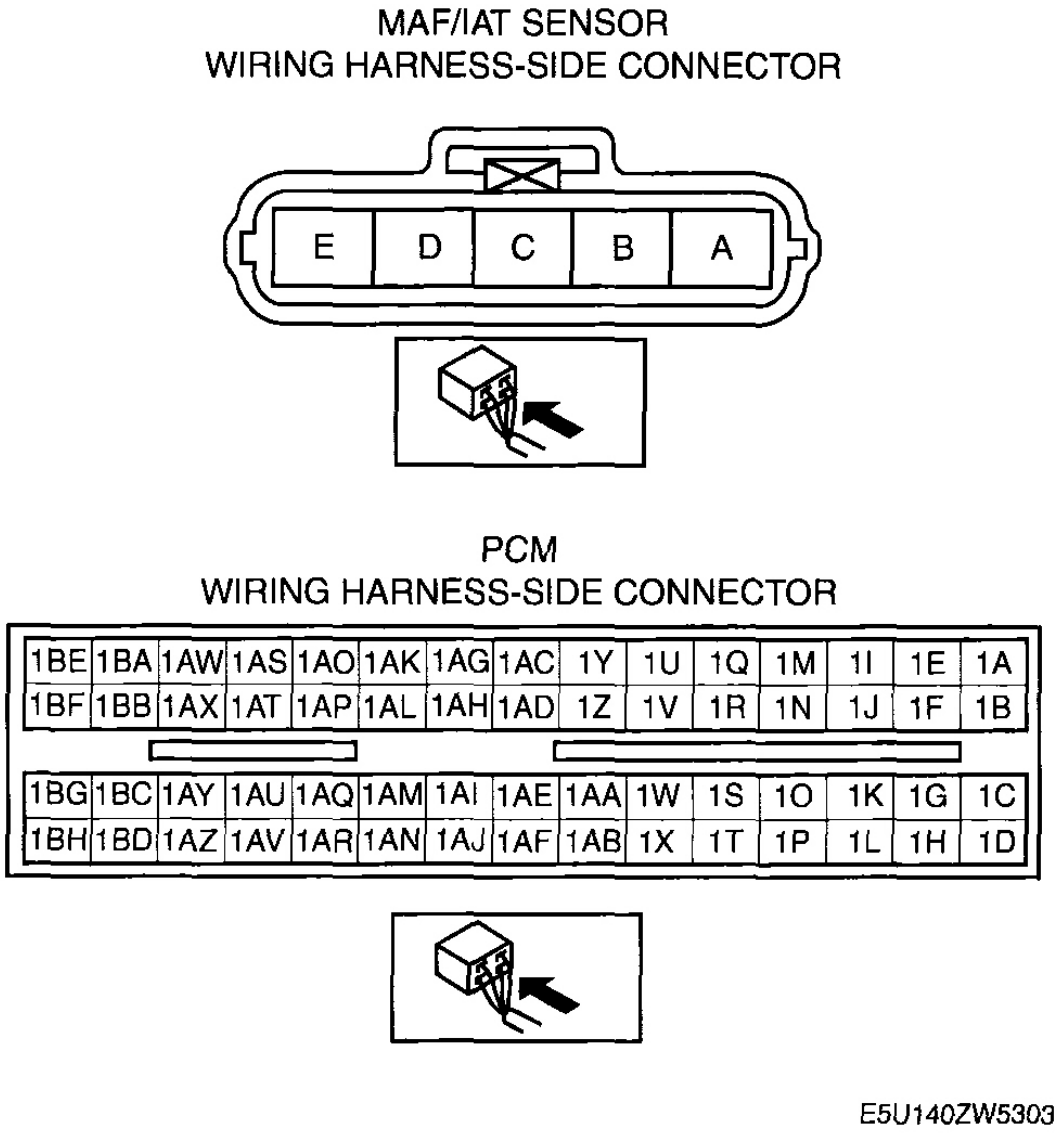


Fig. 35: Identifying MAF/IAT Sensor & PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

INTAKE MAF (G/S) AND ENGINE LOAD CALCULATED VALUE SPECIFICATION

Condition	Intake MAF (g/s)		Engine load calculated value (%)
	MT	AT	
Idle	2.1-2.6	2.3-2.8	13.5-24.0
Engine Speed 2,500 rpm	6.1-7.5	6.7-8.3	11.5-21.5

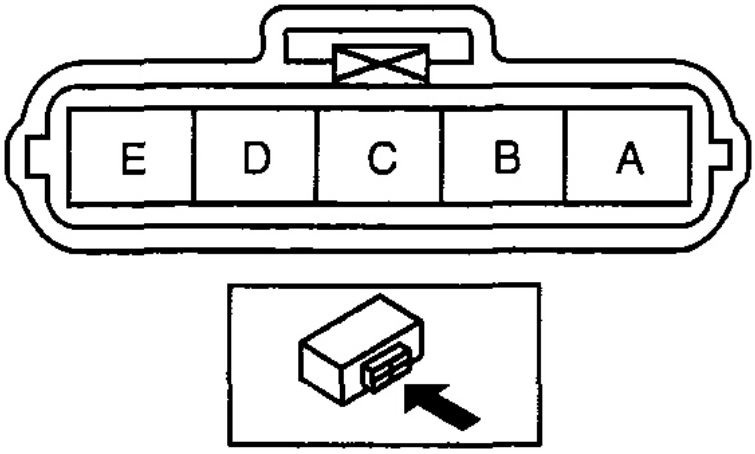
INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

RESISTANCE INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the MAF/IAT sensor connector.
4. Verify that the resistance between MAF/IAT sensor terminals D and E is within the specification.
   - If the monitor item status/specification (reference) is not within the specification, even though the IAT sensor resistance is within the specification, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
   - If not within the specification, replace the MAF/IAT sensor. (See **MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION**



B3E0140W028

Fig. 36: Identifying MAF/IAT Sensor Connectors
Courtesy of MAZDA MOTORS CORP.

STANDARD MAF/IAT SENSOR RESISTANCE SPECIFICATION

Ambient temperature (°C {°F})	Resistance (kilohm)
20 (68}	2.21-2.69

60 {140}	0.493-0.667

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

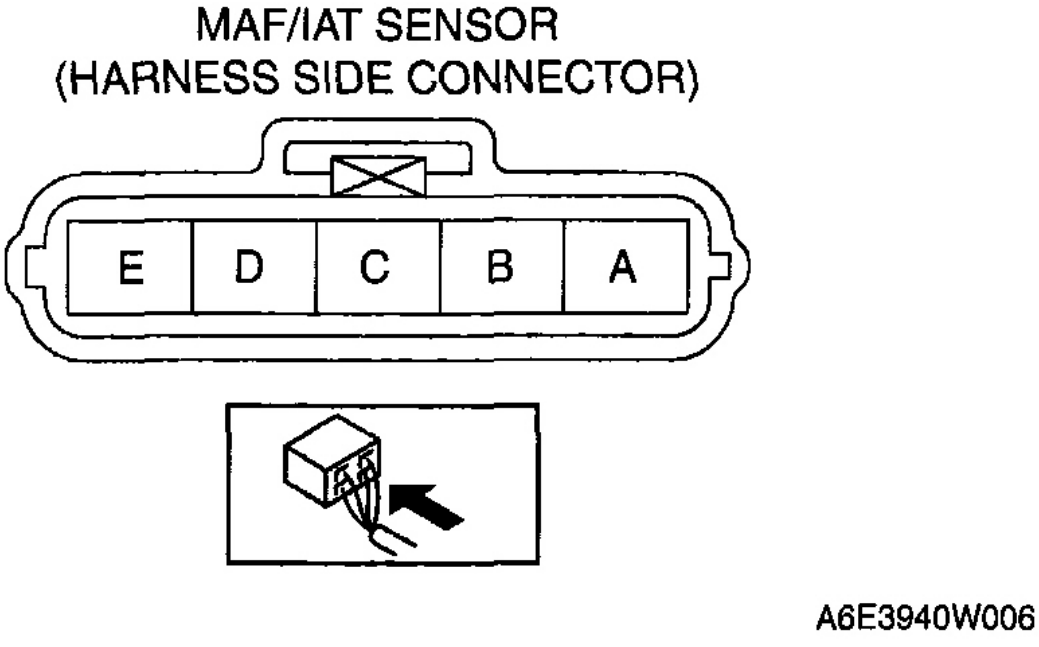


Fig. 37: Identifying MAF/IAT Sensor Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

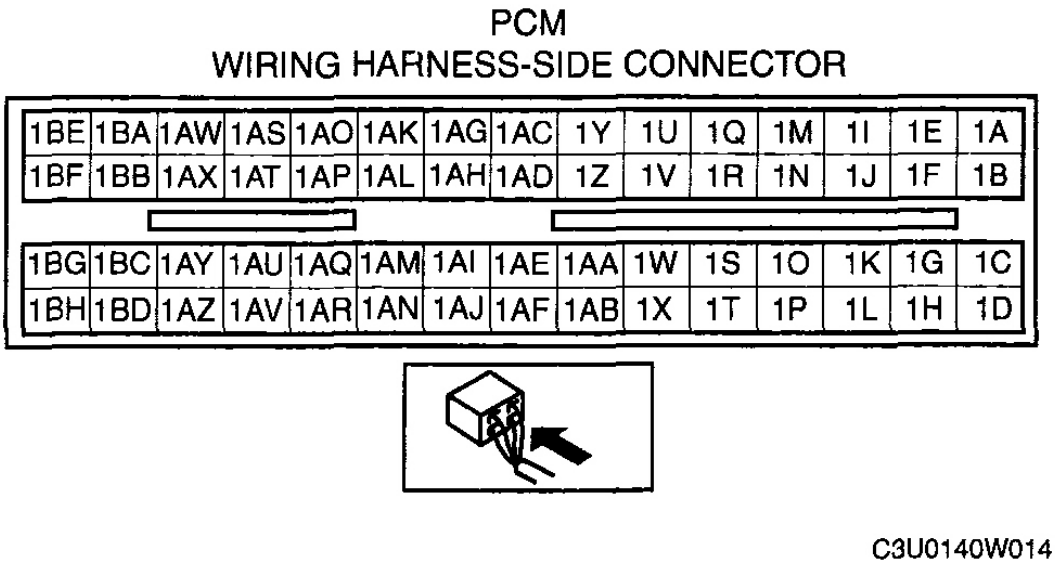


Fig. 38: Identifying PCM Harness Side Connectors
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - MAF/IAT sensor terminal D and PCM terminal 1 AT
  - MAF/IAT sensor terminal E and PCM terminal 1 AR

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - MAF/IAT sensor terminal E and power supply
  - MAF/IAT sensor terminal D and power supply
  - MAF/IAT sensor terminal D and body ground

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the dynamic chamber. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
4. Remove the MAP sensor.

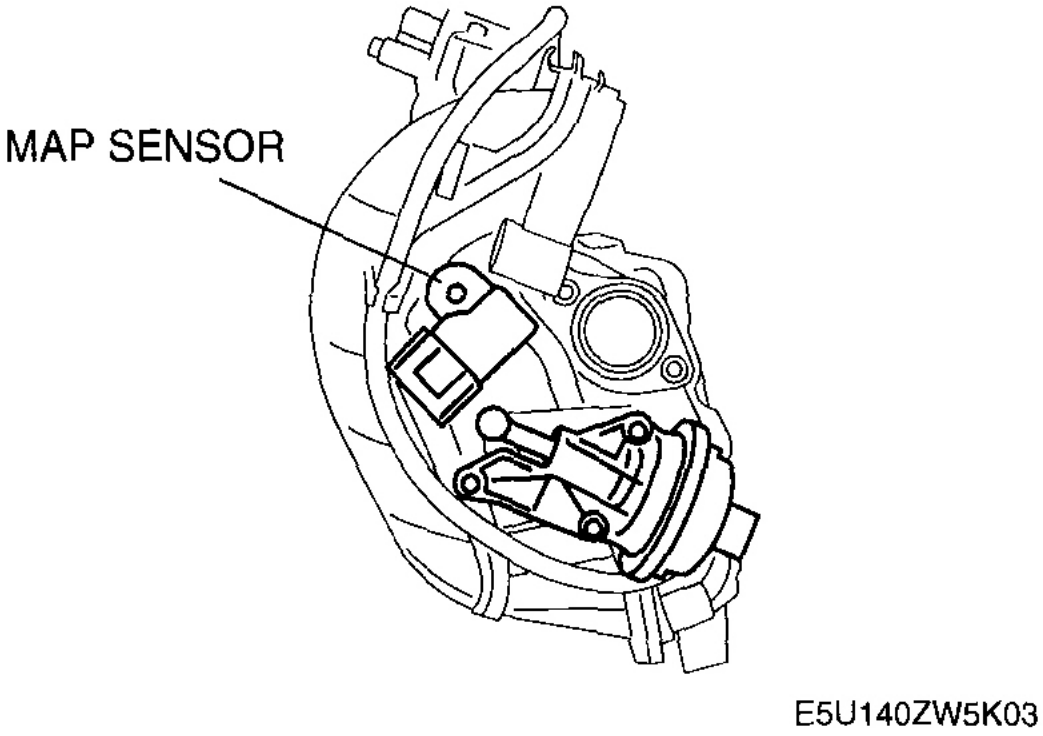


Fig. 39: Removing Manifold Absolute Pressure Sensor
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

MAP sensor tightening torque

2.7-3.7 N.m {28-37 kgf.cm, 24-32 in.lbf}

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

1. Connect the M-MDS or equivalent to the DLC-2.

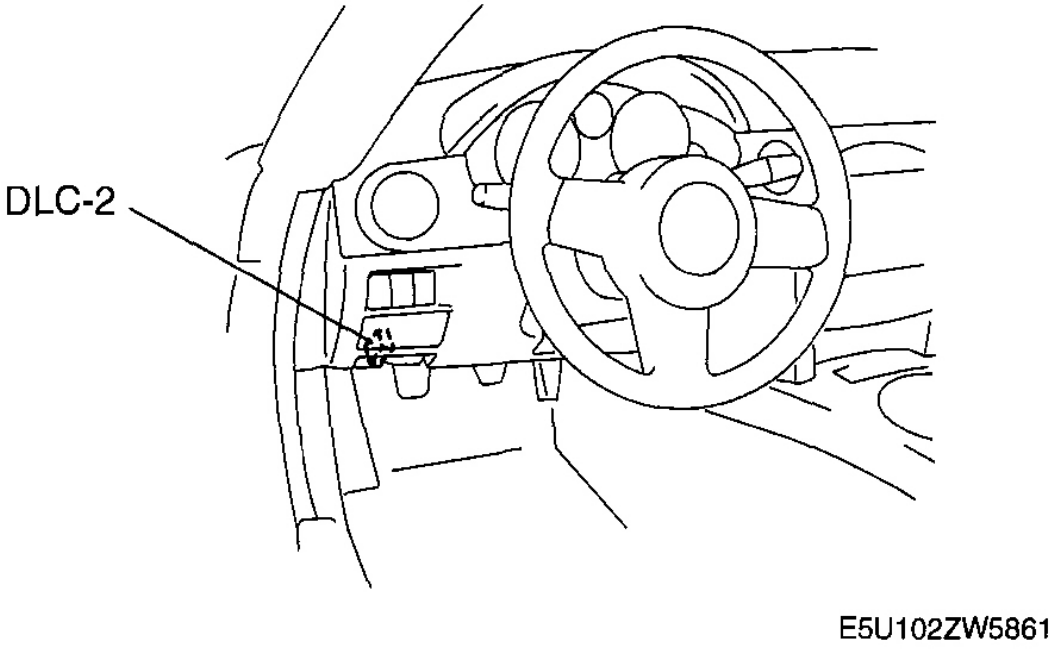


Fig. 40: Identifying Data Link Connector DLC-2
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position (Engine off).
3. Select MAP PID on the M-MDS or equivalent.
4. Verify that the MAP PID (pressure) and barometric pressure are practically equal.
   - If not as verified, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
     - If there is no open or short circuit, replace the MAP sensor. (See **MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [LF]** .)
   - If as verified, go to next step.
5. Apply vacuum of **-25.0 kPa {-187 mmHg, -7.38 inHg}** to the MAP sensor, and verify that the MAP variation from that of Step 4 is **approx. 25.0 kPa {187 mmHg, 7.38 inHg}.**
   - If not as verified, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
     - If there is no open or short circuit, replace the MAP sensor. (See **MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [LF]** .)

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity Inspection)

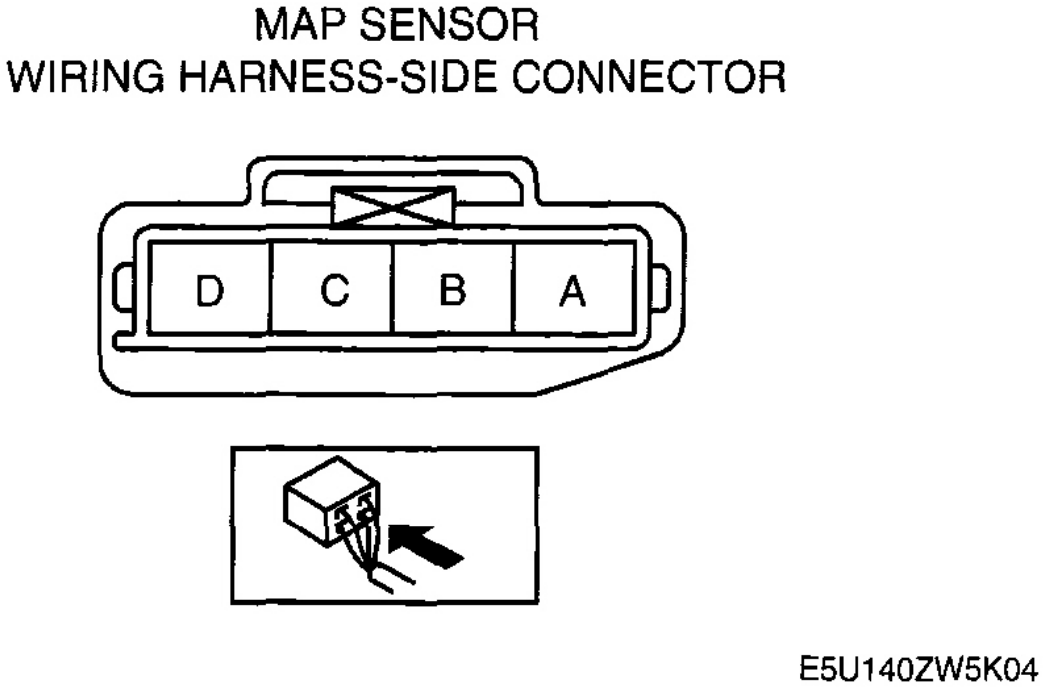
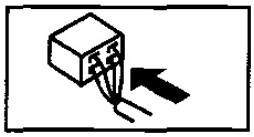


Fig. 41: Identifying MAP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

PCM
WIRING HARNESS-SIDE CONNECTOR

2BE	2BA	2AW	2AS	2AO	2AK	2AG	2AC	2Y	2U	2Q	2M	2I	2E	2A
2BF	2BB	2AX	2AT	2AP	2AL	2AH	2AD	2Z	2V	2R	2N	2J	2F	2B
2BG	2BC	2AY	2AU	2AQ	2AM	2AI	2AE	2AA	2W	2S	2O	2K	2G	2C
2BH	2BD	2AZ	2AV	2AR	2AN	2AJ	2AF	2AB	2X	2T	2P	2L	2H	2D



E5U140ZW4857

Fig. 42: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - MAP/boost air temperature sensor terminal A and PCM terminal 2AV
  - MAP/boost air temperature sensor terminal C and PCM terminal 2AU
  - MAP/boost air temperature sensor terminal D and PCM terminal 2AG

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - MAP/boost air temperature sensor terminal A and power supply.
  - MAP/boost air temperature sensor terminal C and body ground.
  - MAP/boost air temperature sensor terminal D and power supply.
  - MAP/boost air temperature sensor terminal D and body ground.

THROTTLE POSITION (TP) SENSOR INSPECTION [LF]

CAUTION:

- **This inspection procedure cannot be completed correctly if the accelerator pedal position sensor has a malfunction. Before performing this procedure, verify that any one of the DTCs related to**

the accelerator pedal position sensor is not detected.

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

1. Verify that no DTC related to APP sensor has been detected.
   - If any DTCs related to APP sensor have been detected, perform the DTC inspection. (See **DTC TABLE [LF]** .)
2. Connect the M-MDS or equivalent to the DLC-2.

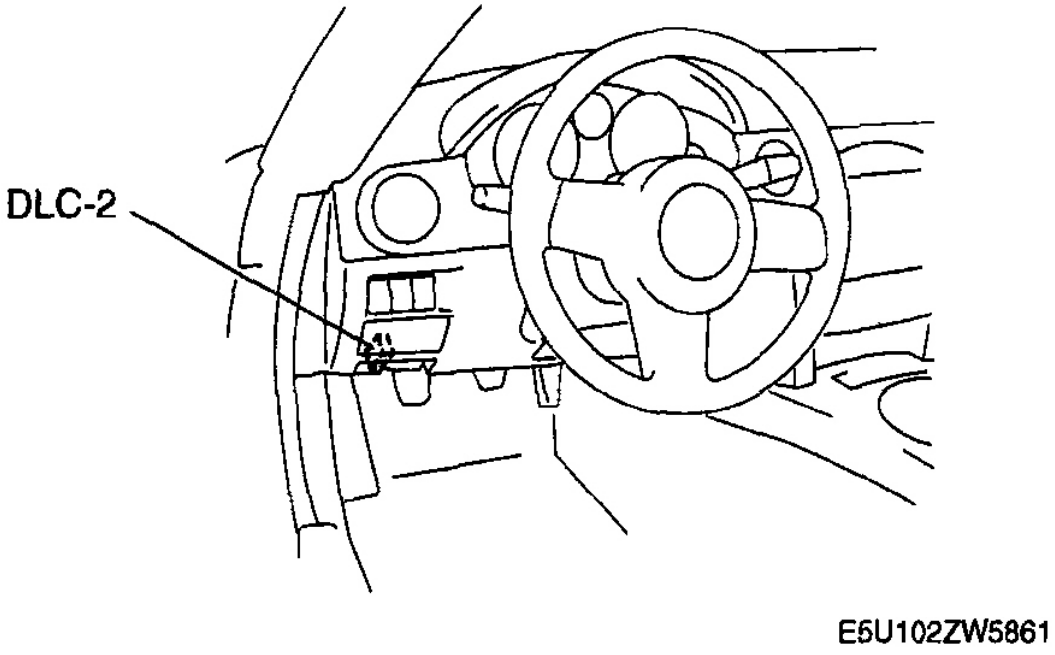


Fig. 43: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Turn the ignition switch to the ON position.
4. Select TP1 or TP2 PID (percentage) on the M-MDS or equivalent.
5. Verify that the TP1 or TP2 PID is within the specification when the accelerator pedal not depressed. (See **PCM INSPECTION [LF]** .)
6. Operate the accelerator pedal and verify that the TP1 or TP2 PID (percentage) changes as shown in **Fig. 44** .
   - If not verified, perform the **CIRCUIT OPEN/SHORT INSPECTION** .

- If there is no open or short circuit, replace the throttle body. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)

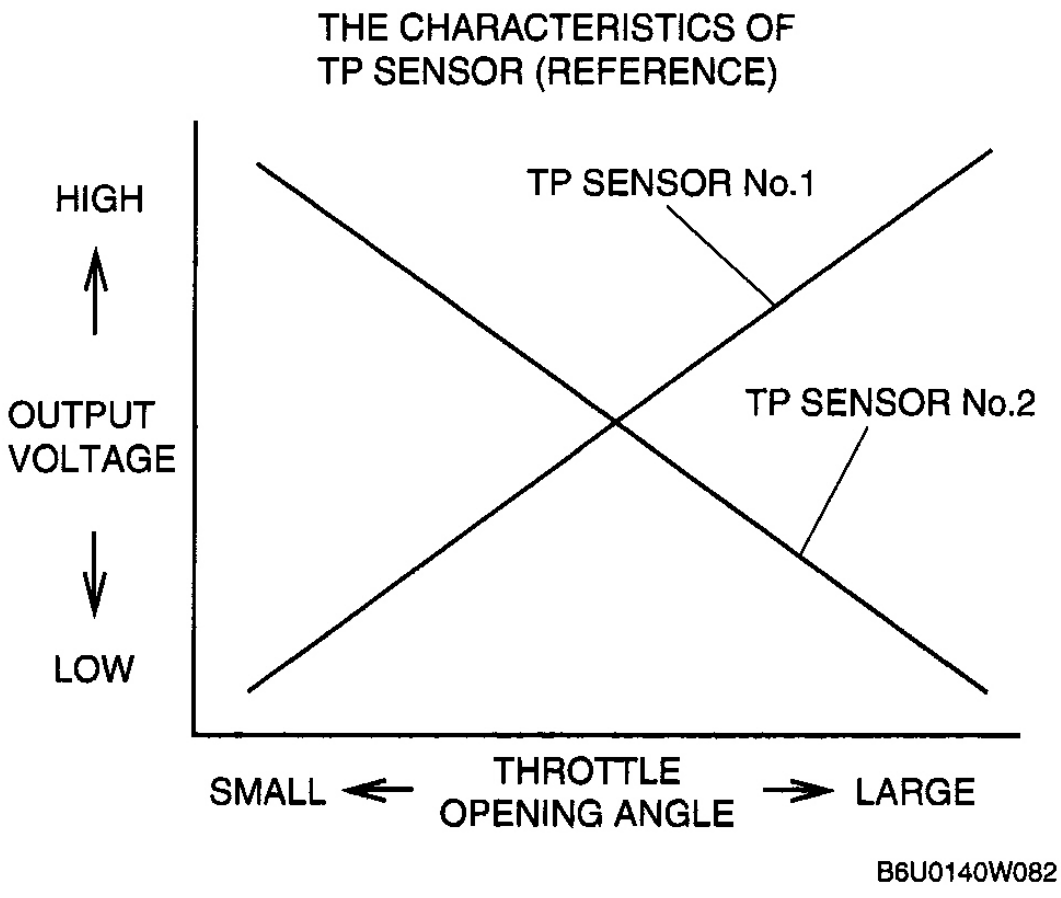


Fig. 44: Throttle Position Sensor Voltage Graph
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the throttle body connector.
3. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

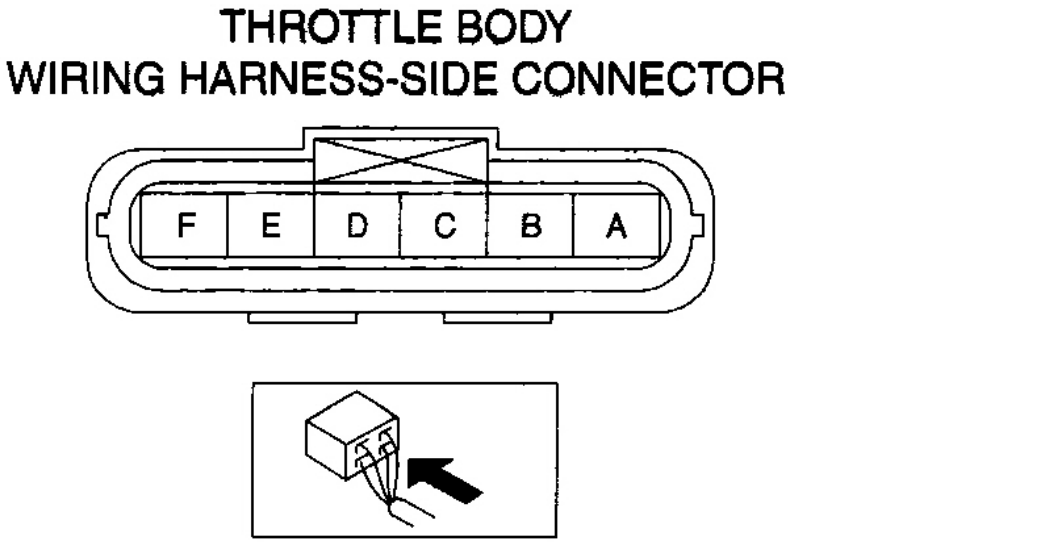


Fig. 45: Identifying Throttle Body Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

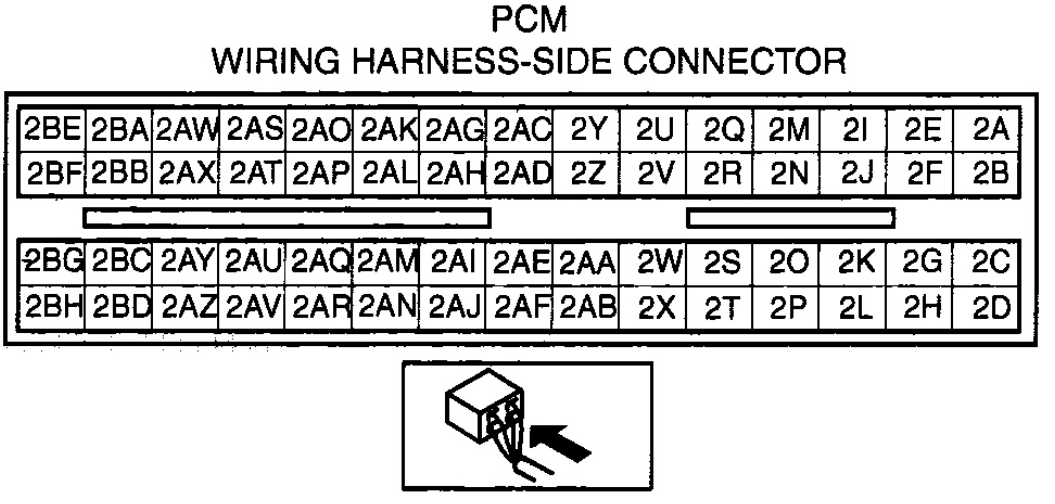


Fig. 46: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity in the following wiring harnesses, there is an open circuit. Repair or replace the wiring harness.
  - Throttle body terminal C and PCM terminal 2AP
  - Throttle body terminal D and PCM terminal 2AL
  - Throttle body terminal E and PCM terminal 2AO
  - Throttle body terminal F and PCM terminal 2AK

Short Circuit

- If there is continuity in the following wiring harnesses, there is a short circuit. Repair or replace the wiring harness.
  - Throttle body terminal C and power supply
  - Throttle body terminal D and body ground
  - Throttle body terminal D and power supply
  - Throttle body terminal E and body ground
  - Throttle body terminal F and body ground
  - Throttle body terminal F and power supply

ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

1. Connect the M-MDS or equivalent to the DLC-2.

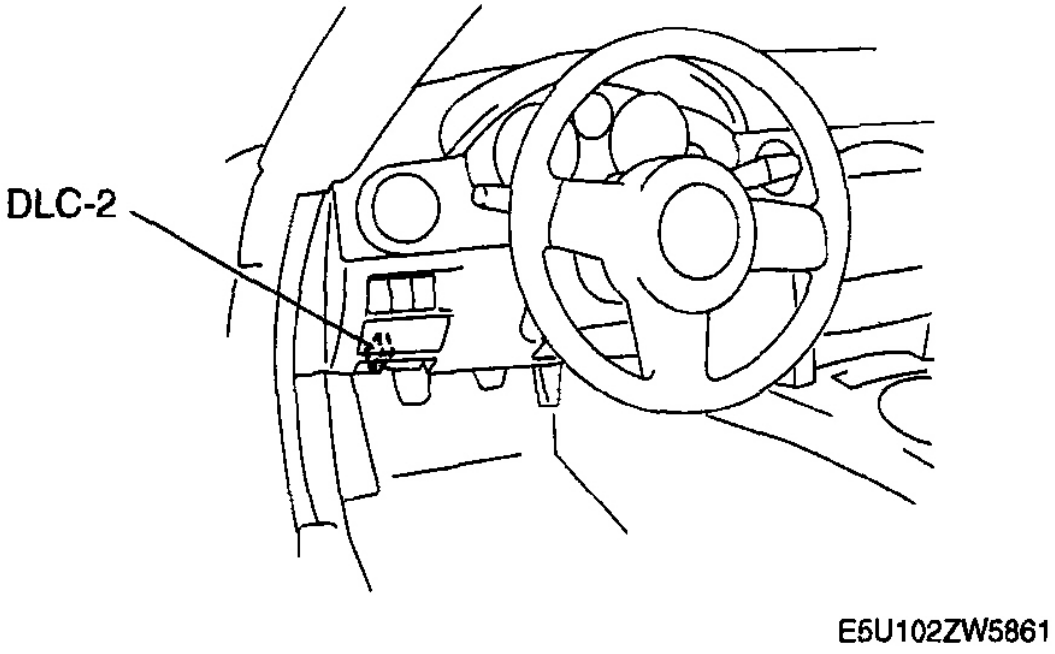


Fig. 47: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position.
3. Select APP1 and APP2 PID on the M-MDS or equivalent.
4. Verify that the APP1 and APP2 PID is within the specification when the accelerator pedal not depressed. (See **PCM INSPECTION [LF]** .)

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the APP sensor connector.
3. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

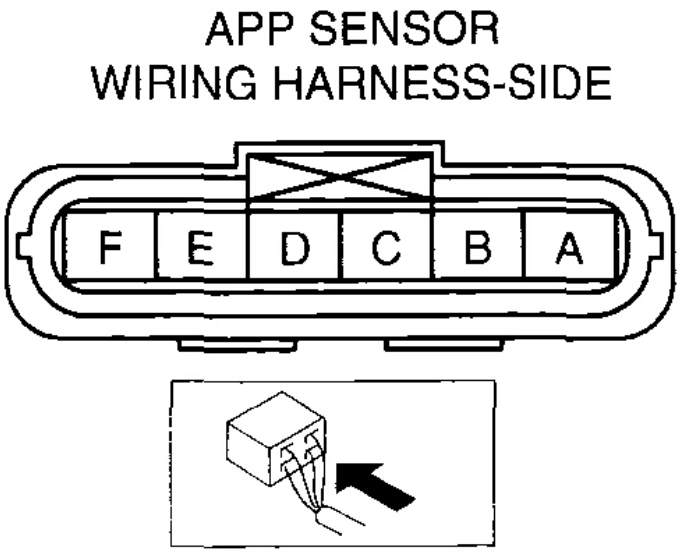


Fig. 48: Identifying APP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

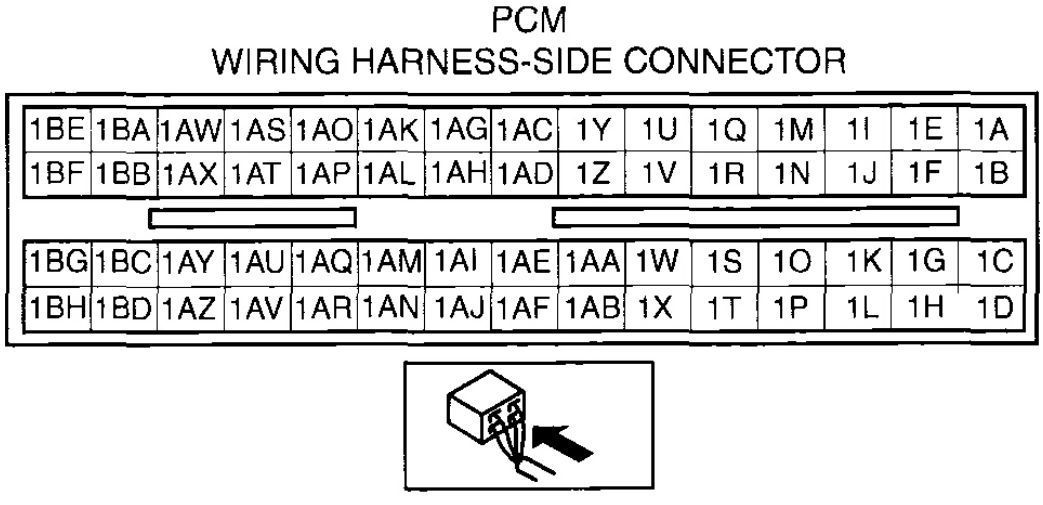


Fig. 49: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity in the following wiring harnesses, there is an open circuit. Repair or replace the wiring harness.
  - APP sensor terminal A and PCM terminal 1AJ
  - APP sensor terminal B and PCM terminal 1AV
  - APP sensor terminal C and PCM terminal 1AP
  - APP sensor terminal D and PCM terminal 1AL
  - APP sensor terminal E and PCM terminal 1AS
  - APP sensor terminal F and PCM terminal 1AO

Short Circuit

- If there is continuity in the following wiring harnesses, there is a short circuit. Repair or replace the wiring harness.
  - APP sensor terminal A and body ground
  - APP sensor terminal B and power supply
  - APP sensor terminal C and body ground
  - APP sensor terminal C and power supply
  - APP sensor terminal D and body ground
  - APP sensor terminal E and power supply
  - APP sensor terminal F and body ground
  - APP sensor terminal F and power supply

CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

AIR GAP INSPECTION

1. Verify that the CKP sensor is securely installed.
2. Using a thickness gauge, measure the air gap between the plate projections at the back of crankshaft pulley and the CKP sensor.
   - If not within the specification, inspect the plate projections for cracks or bending.
     - If there is any malfunction, replace the crankshaft pulley. (See **ENGINE REMOVAL/INSTALLATION [LF]** .)

- If the monitor item condition/specification (reference) is not within the specification, even though there is no malfunction, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

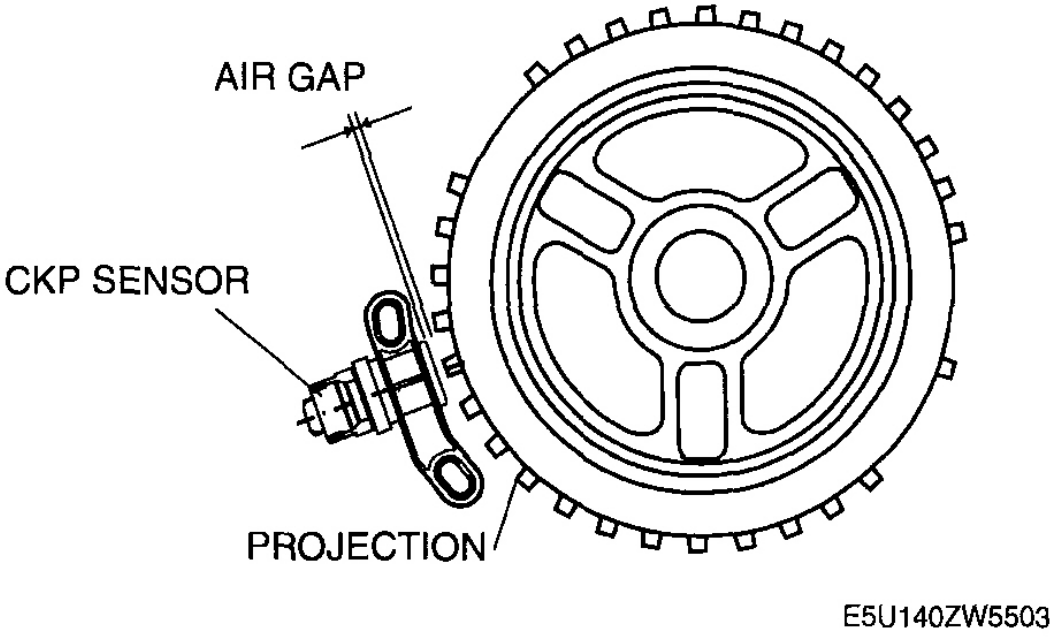


Fig. 50: Identifying Air Gap Between Plate Projections At Back Of Crankshaft Pulley & CKP Sensor
Courtesy of MAZDA MOTORS CORP.

Air gap

0.5-1.5 mm {0.02-0.05 in}

VISUAL INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the CKP sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
4. Verify that there are no metal shavings on the sensor.
   - If the monitor item condition/specification (reference) is without the specification even though there is no malfunction, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

VOLTAGE INSPECTION

1. Install all removed parts.
2. Idle the engine.

CAUTION:
- **Water penetrating the connector will cause sensor malfunction. To prevent this, be careful not to damage the wiring harnesses or the waterproof connector so as to cause water penetration.**

3. Measure the output voltage using an oscilloscope.
   - If not within the specification, replace the CKP sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
   - If the monitor item condition/specification (reference) is without the specification, even though the voltage is within the specification, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

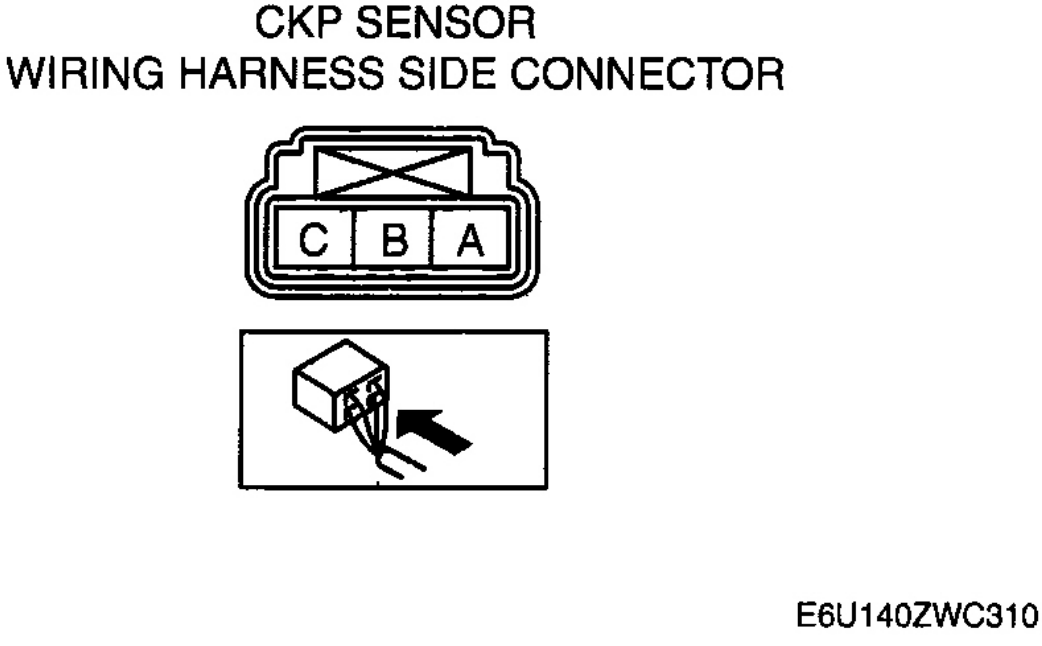


Fig. 51: Identifying CKP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

CKP SENSOR VOLTAGE SPECIFICATION

Terminal	Voltage (V)	Condition
C	B+	Under any condition
B	4.8 or more	High output(1)
	0.8 or less	Low output(1)

A	0	Under any condition

(1) Output voltage varies with crankshaft rotation.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity Inspection)

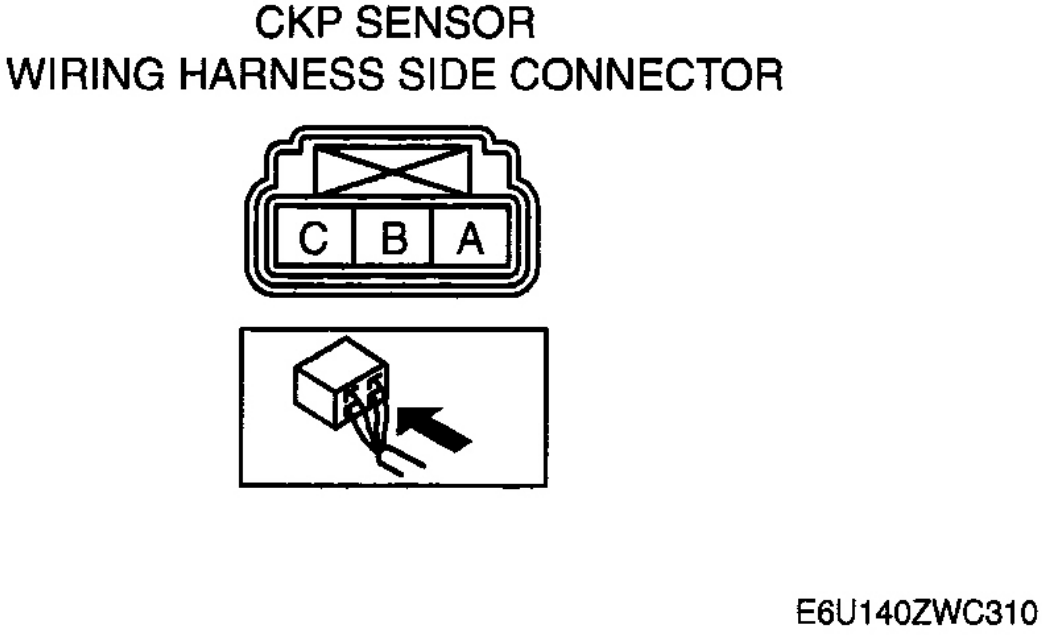


Fig. 52: Identifying CKP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

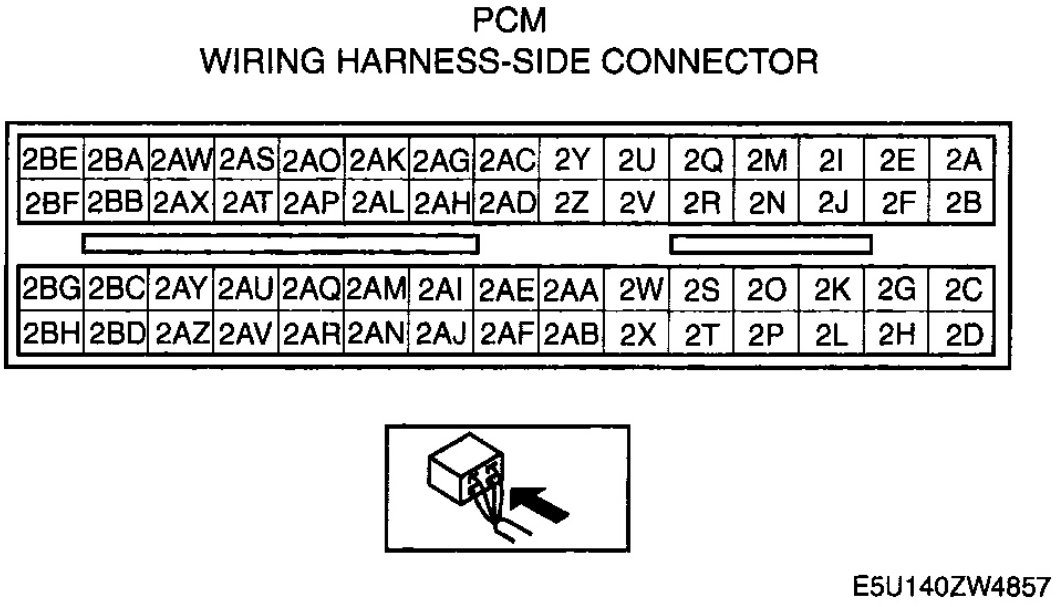


Fig. 53: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.
  - CKP sensor terminal A and PCM terminal 2AB
  - CKP sensor terminal B and PCM terminal 2W
  - CKP sensor terminal C and PCM terminal 2AQ

Short Circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.
  - CKP sensor terminal A and power supply
  - CKP sensor terminal B and power supply
  - CKP sensor terminal B and body ground
  - CKP sensor terminal C and body ground

CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]

REMOVAL

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

2. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
3. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
4. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
5. Disconnect the CKP sensor connector.
6. Remove the installation bolts to remove the CKP sensor.

INSTALLATION

CAUTION:
- **When foreign material, such as an iron chips, gets on the CKP sensor, it can cause abnormal output from the sensor because of flux turbulence and adversely affect engine control. Be sure there is no foreign material on the CKP sensor when replacing.**

1. Perform the following procedure so that piston No.1 is at the top dead center.
    1. Move the ATF hose slightly out of the way. (AT)

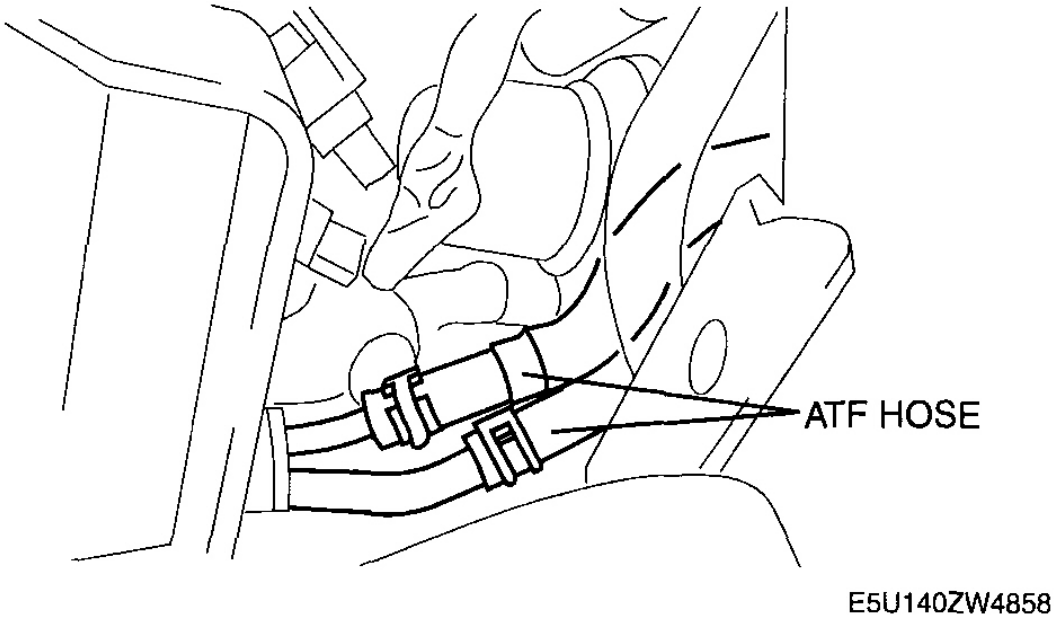


Fig. 54: Identifying ATF Hose
Courtesy of MAZDA MOTORS CORP.

2. Remove the cylinder block lower blind plug and install the **SST.**

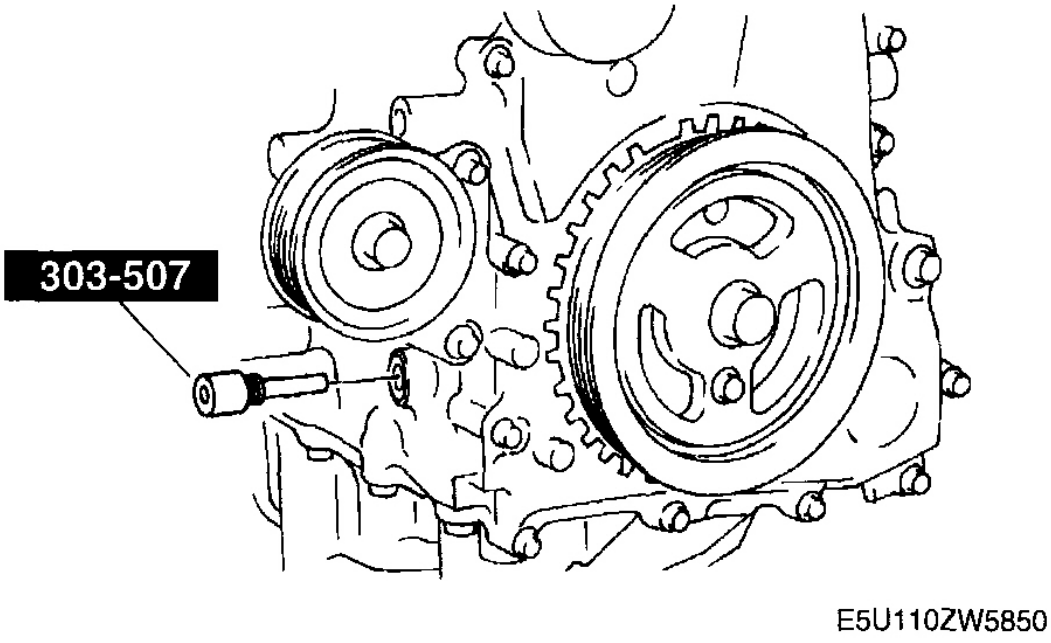


Fig. 55: Installing SST
Courtesy of MAZDA MOTORS CORP.

3. Turn the crankshaft pulley to the clockwise until it stops.

2. Using a straight edge, draw a straight line directly in the center of the 5th tooth of the crankshaft pulley pulse wheel (counting counterclockwise from the empty space).

CAUTION:
- **If the line is not accurately drawn, ignition timing, fuel injection and other engine control systems will be adversely effected. Draw the straight line carefully using a straight edge.**

3. Align the center line of the CKP sensor and the line drawn in Step 2, then install the CKP sensor.

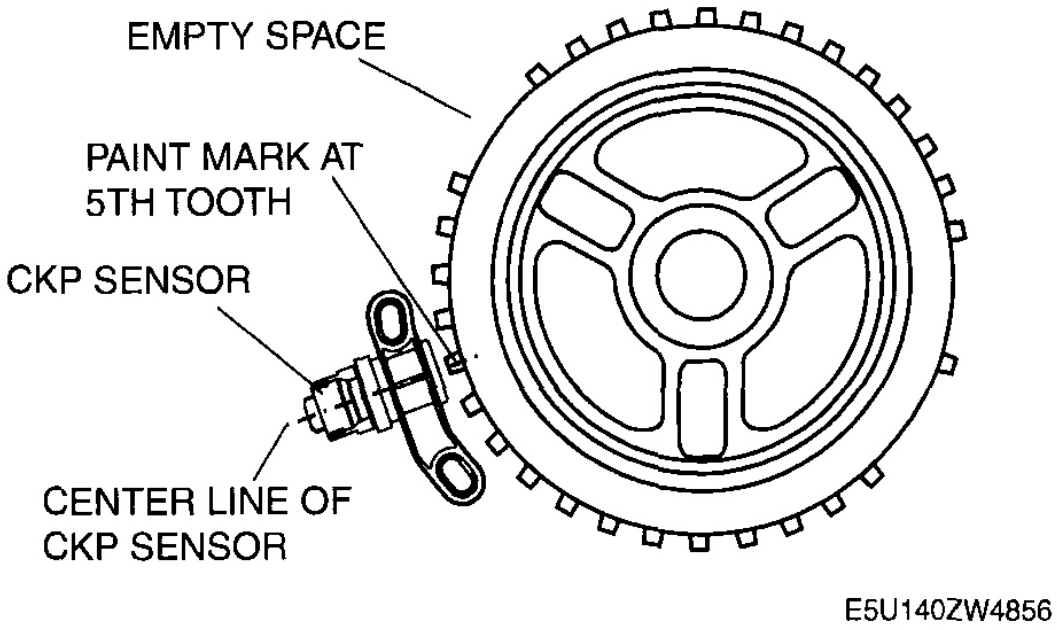


Fig. 56: Installing CKP Sensor
Courtesy of MAZDA MOTORS CORP.

4. Install the CKP sensor fitting bolts.

   Tightening torque

   5.5-7.5 N.m {56-76 kgf.cm, 49-66 in.lbf}

5. Remove the **SST** then install the cylinder block lower blind plug.

   Tightening torque

   18-22 N.m {1.9-2.2 kgf.m, 14-16 ft.lbf}

6. Install in the reverse order of removal.

CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

CAUTION:
- **When replacing the camshaft position sensor, make sure there**

are no metal shavings adhering as they can cause the sensor output signal to malfunction from fluctuation in magnetic flux resulting in a deterioration in engine control. Cover a removed CMP sensor in plastic to protect it from foreign material adhering to it.

3. Disconnect the CMP sensor connector.
4. Remove the CMP sensor installation bolt.
5. Remove the CMP sensor from the cylinder head cover.

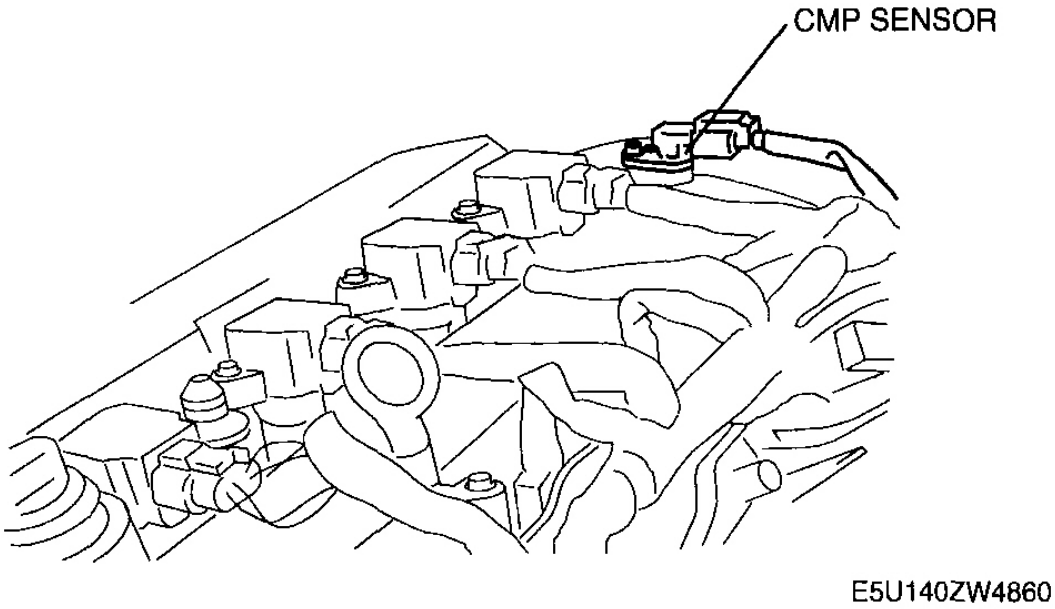


Fig. 57: Identifying CMP Sensor
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

CMP sensor tightening torque

5.5-7.5 N.m {56-76 kgf.cm, 49-66 in.lbf}

CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

VISUAL INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
4. Verify that there are no metal shavings on the sensor.
   - If the monitor item condition/specification (reference) is not within the specification even though there is no malfunction, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

VOLTAGE INSPECTION

1. Install all removed parts.
2. Idle the engine.

CAUTION:

- **Water penetrating the connector will cause sensor malfunction. To prevent this, be careful not to damage the wiring harnesses or the waterproof connector so as to cause water penetration.**

3. Measure the output voltage using an oscilloscope.
   - If not within the specification, replace the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
   - If the monitor item condition/specification (reference) is not within the specification, even though the voltage is within the specification, carry out the **CIRCUIT OPEN/SHORT INSPECTION** .

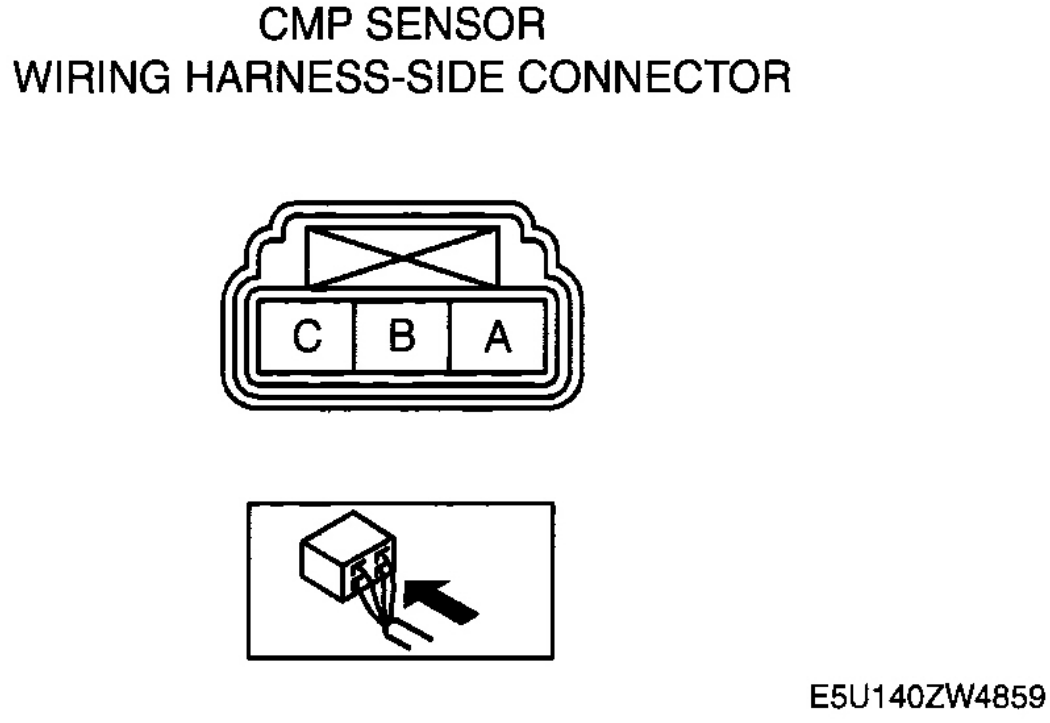


Fig. 58: Identifying CMP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

CMP SENSOR TERMINALS VOLTAGE SPECIFICATION

Terminal	Voltage (V)	Condition
C	B+	Under any condition
B	4.8 or more	High output(1)
	0.8 or less	Low output(1)
A	0	Under any condition
(1) Output voltage varies with camshaft rotation.		

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity Inspection)

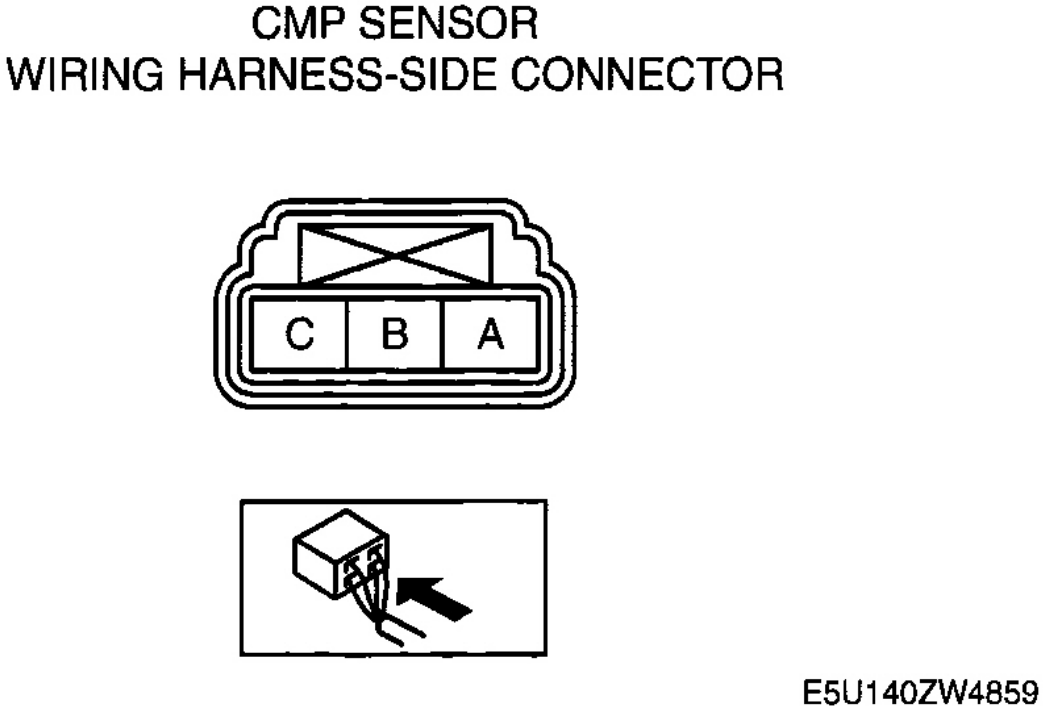


Fig. 59: Identifying CMP Sensor Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

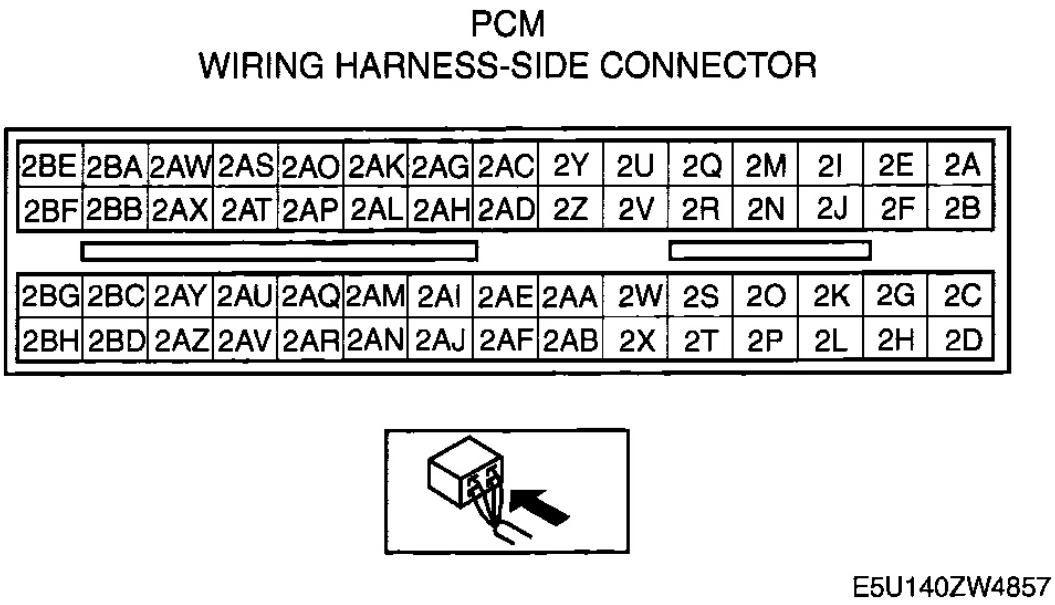


Fig. 60: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.
  - CMP sensor terminal A and PCM terminal 2P
  - CMP sensor terminal B and PCM terminal 2S
  - CMP sensor terminal C and PCM terminal 2AM

Short Circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness. I
  - CMP sensor terminal A and power supply
  - CMP sensor terminal B and power supply
  - CMP sensor terminal B and body ground
  - CMP sensor terminal C and body ground

FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Install the **SST** to the front HO2S.

4. Remove the front HO2S.

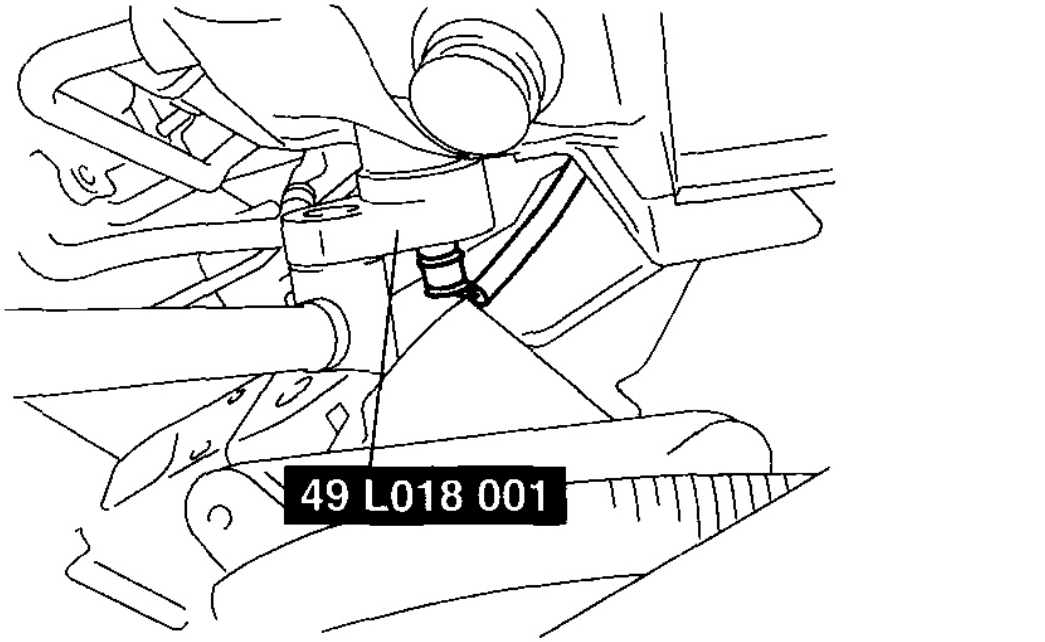


Fig. 61: Removing Front Heated Oxygen Sensor (HO2S)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

Front HO2S tightening torque

29-49 N.m {3.0-4.9 kgf.m, 22-35 ft.lbf}

FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

FRONT HO2S CURRENT INSPECTION

1. Warm up the engine to normal operating temperature.
2. Using the M-MDS or equivalent, monitor the following:

- Vehicle speed (PID: VSS)
- Engine speed (PID: RPM)
- Front HO2S current (PID: O2S11)

3. Drive the vehicle and decelerate the engine speed by releasing the accelerator pedal fully when the engine speed is **3,000 rpm or more.**
4. Verify that the front HO2S current (PID: O2S11) is **0.25 mA or more** while decelerating as shown in **Fig. 62** .

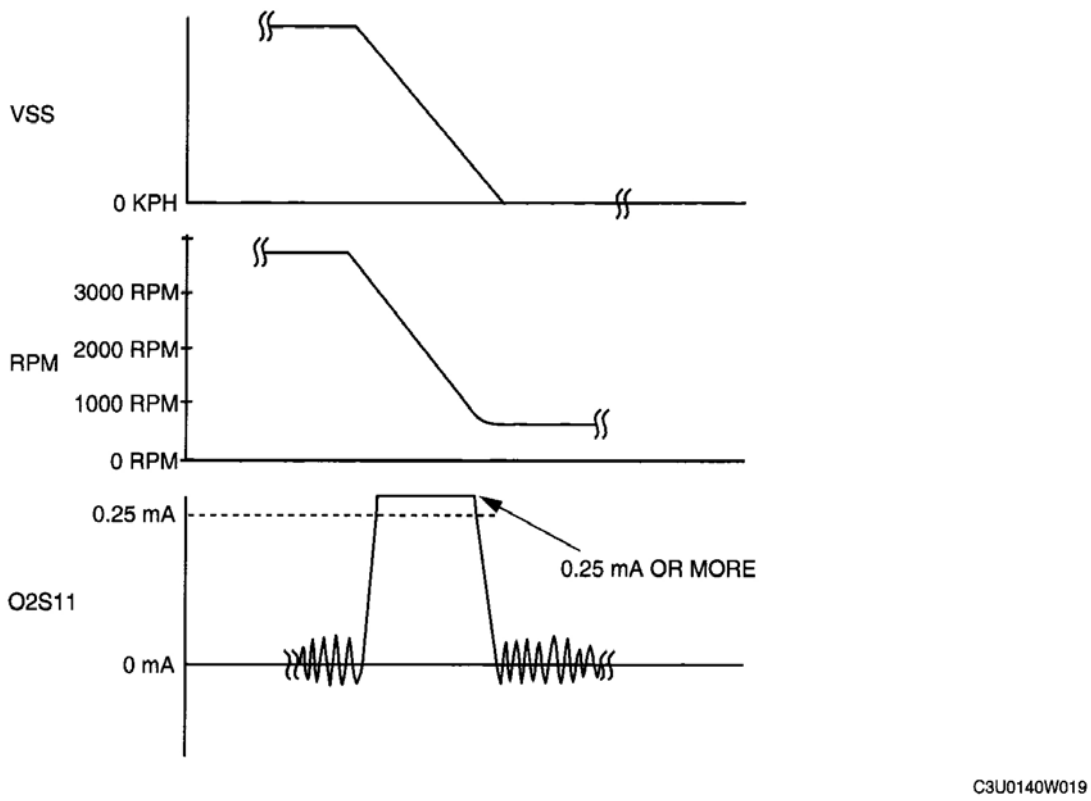
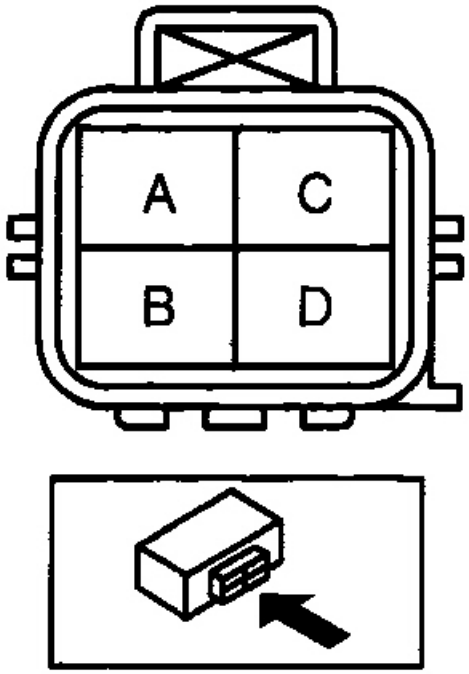


Fig. 62: Front HO2S Current Graph
Courtesy of MAZDA MOTORS CORP.

- If not within the specification, inspect the front HO2S for an open or short circuit. (See **FRONT HO2S CIRCUIT OPEN/SHORT INSPECTION** .) Then if there is no malfunction in the wiring harness, replace the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)

FRONT HO2S HEATER RESISTANCE INSPECTION

1. Disconnect the front HO2S connector.
2. Measure the resistance between front HO2S terminals C and D.



E5U140ZW4862

Fig. 63: Identifying Front HO2S Terminals
Courtesy of MAZDA MOTORS CORP.

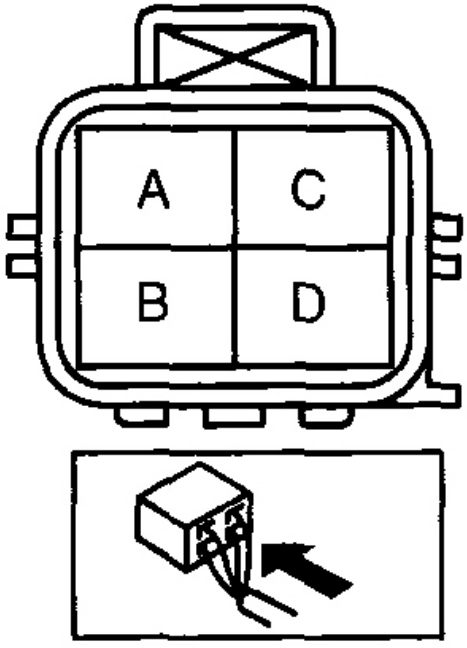
- If not within the specification, replace the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)

Front HO2S heater resistance

1-10 ohms

FRONT HO2S CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the front HO2S connector.
3. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)



C3U0140W052

Fig. 64: Identifying Front HO2S Terminals
Courtesy of MAZDA MOTORS CORP.

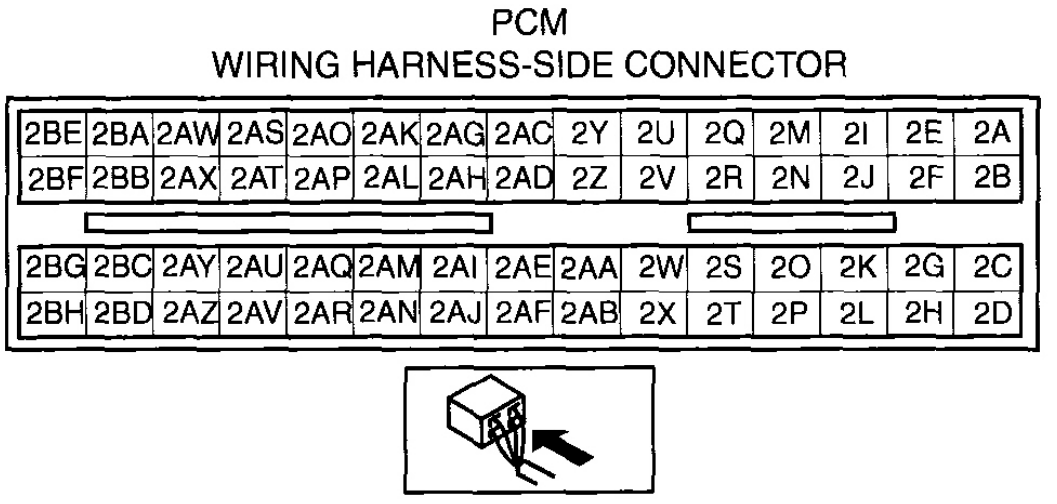


Fig. 65: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity in the following wiring harnesses, there is an open circuit. Repair or replace the wiring harness.
  - Front HO2S terminal A and PCM terminal 2AD
  - Front HO2S terminal B and PCM terminal 2Z
  - Front HO2S terminal C ignition relay
  - Front HO2S terminal D and PCM terminal 2BG

Short Circuit

- If there is continuity in the following wiring harnesses, there is a short circuit. Repair or replace the wiring harness.
  - Front HO2S terminal A and power supply
  - Front HO2S terminal A and body ground
  - Front HO2S terminal B and power supply
  - Front HO2S terminal B and body ground
  - Front HO2S terminal C and body ground
  - Front HO2S terminal D and power supply
  - Front HO2S terminal D and body ground

REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Install the **SST** to the rear HO2S.
4. Remove the rear HO2S.

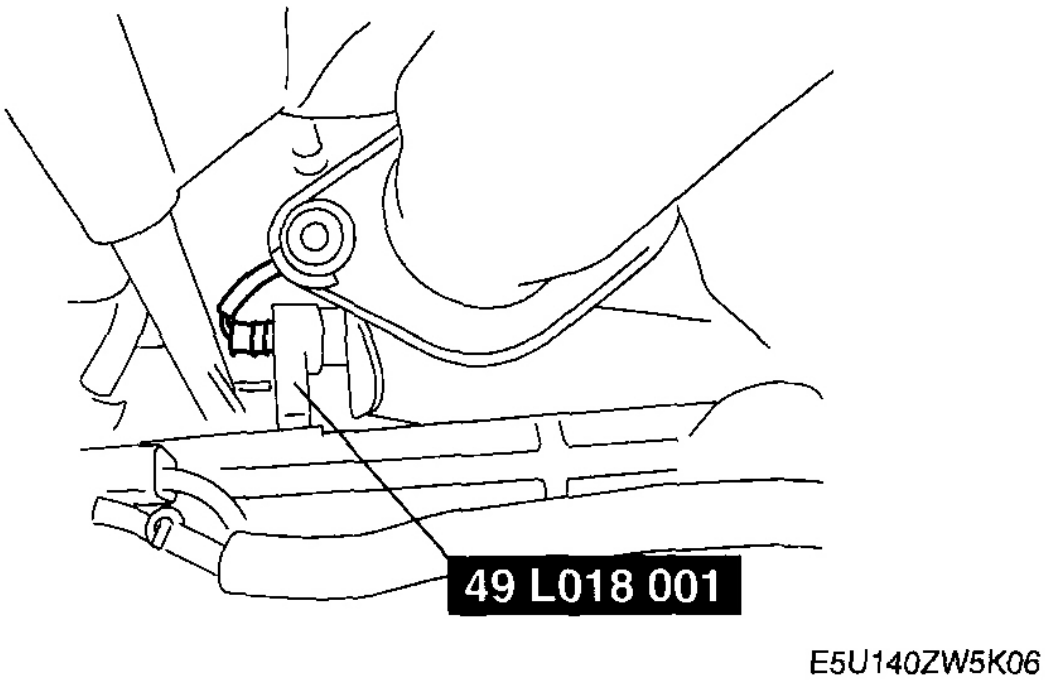


Fig. 66: Removing Rear Heated Oxygen Sensor (HO2S)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

Rear HO2S tightening torque

29-49 N.m {3.0-4.9 kg.fm, 22-35 ft.lbf}

REAR HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

REAR HO2S VOLTAGE INSPECTION

1. Warm up the engine to normal operating temperature.
2. Using the M-MDS or equivalent, monitor the following:
   - Vehicle speed (PID: VSS)
   - Engine speed (PID: RPM)
   - Rear HO2S voltage (PID: O2S12)
3. Drive the vehicle and decelerate the engine speed by releasing the accelerator pedal fully when the engine speed is **3,000 rpm or more.**
4. Verify that the rear HO2S outputs a voltage of **0.6 V or more** , one time or more, then verify that the rear HO2S voltage (PID: O2S12) is **0.3 V or less** while decelerating as shown in **Fig. 67** .

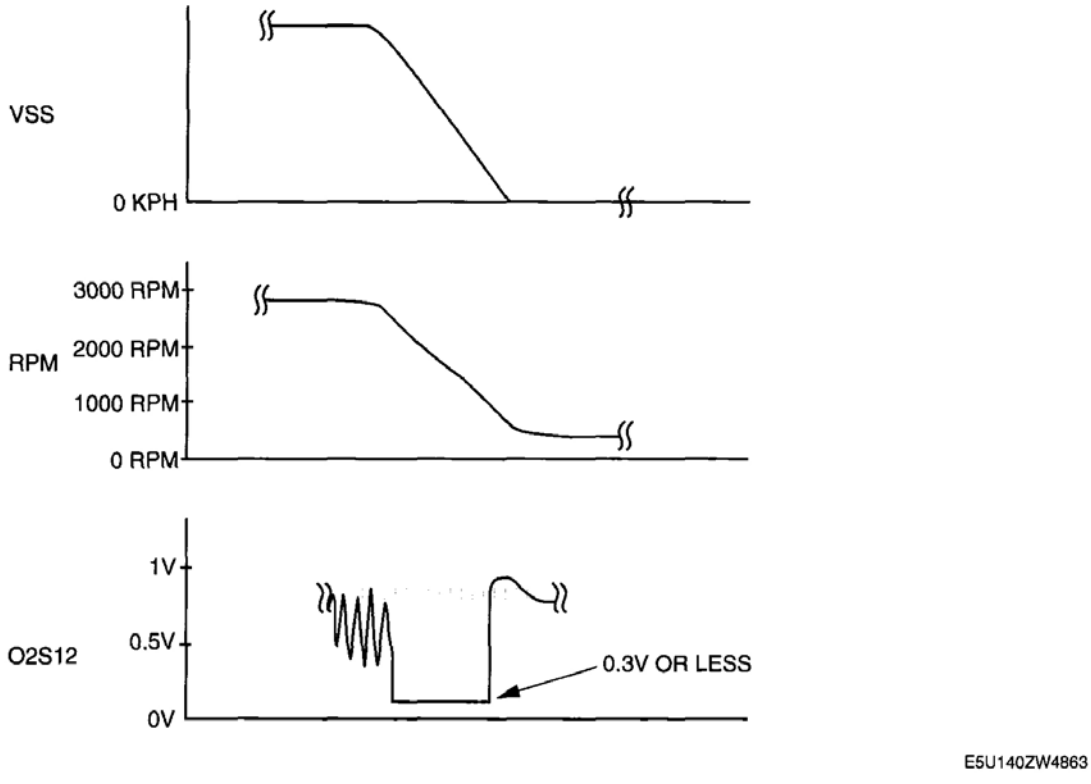


Fig. 67: Rear HO2S Voltage Graph
Courtesy of MAZDA MOTORS CORP.

- If not within the specification, inspect the rear HO2S for an open or short circuit. (See **REAR HO2S CIRCUIT OPEN/SHORT INSPECTION** .) Then if there is no malfunction in the wiring harness, replace the rear HO2S. (See **REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)

REAR HO2S HEATER RESISTANCE INSPECTION

1. Disconnect the rear HO2S connector.
2. Measure the rear HO2S resistance between terminals C and D.
   - If not within the specification, replace the rear HO2S. (See **REAR HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)

Rear HO2S heater resistance

2-50 ohms

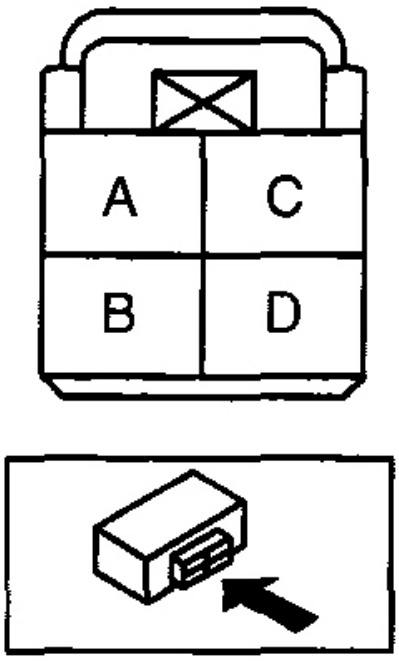


Fig. 68: Identifying Rear HO2S Connector Terminals
Courtesy of MAZDA MOTORS CORP.

REAR HO2S CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector.
2. Disconnect the rear HO2S connector.

3. Inspect the following wiring harnesses for an open or short circuit. (Continuity Inspection)

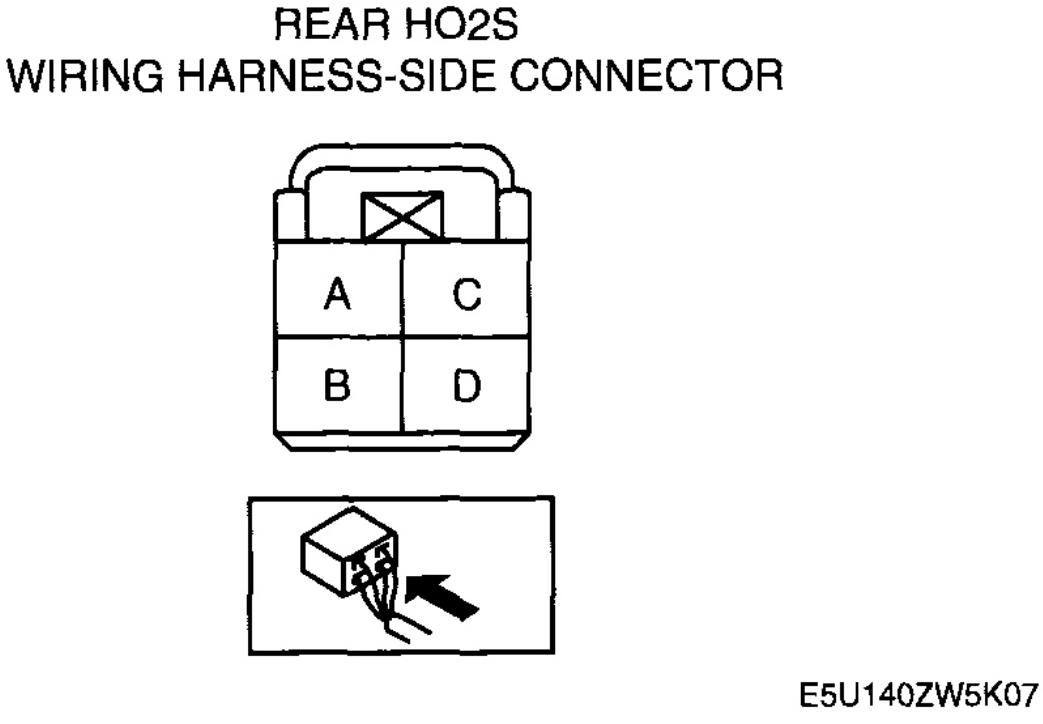


Fig. 69: Identifying Rear HO2S Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

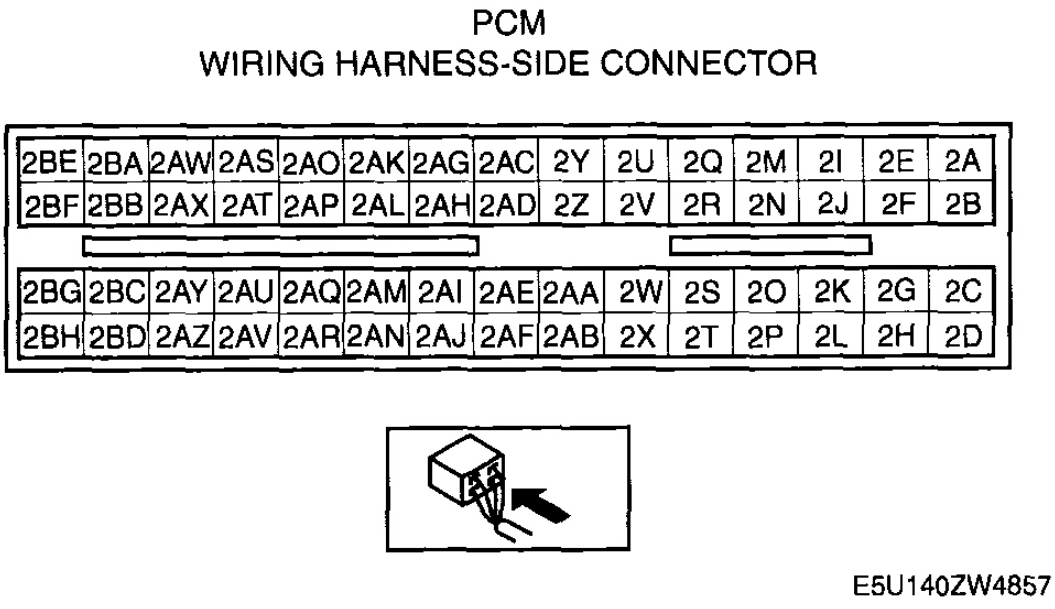


Fig. 70: Identifying PCM Harness Side Connector
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - Rear HO2S terminal A and PCM terminal 2Q
  - Rear HO2S terminal B and PCM terminal 2BH
  - Rear HO2S terminal C and ignition relay
  - Rear HO2S terminal D and PCM terminal 2BE

Short circuit

- If there is continuity in the following wiring harnesses, there is a short circuit. Repair or replace the wiring harness.
  - Rear HO2S terminal A and power supply
  - Rear HO2S terminal A and body ground
  - Rear HO2S terminal B and power supply
  - Rear HO2S terminal B and body ground
  - Rear HO2S terminal C and body ground
  - Rear HO2S terminal D and power supply
  - Rear HO2S terminal D and body ground

KNOCK SENSOR (KS) REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Remove the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the dynamic chamber. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
4. Disconnect the KS connector.

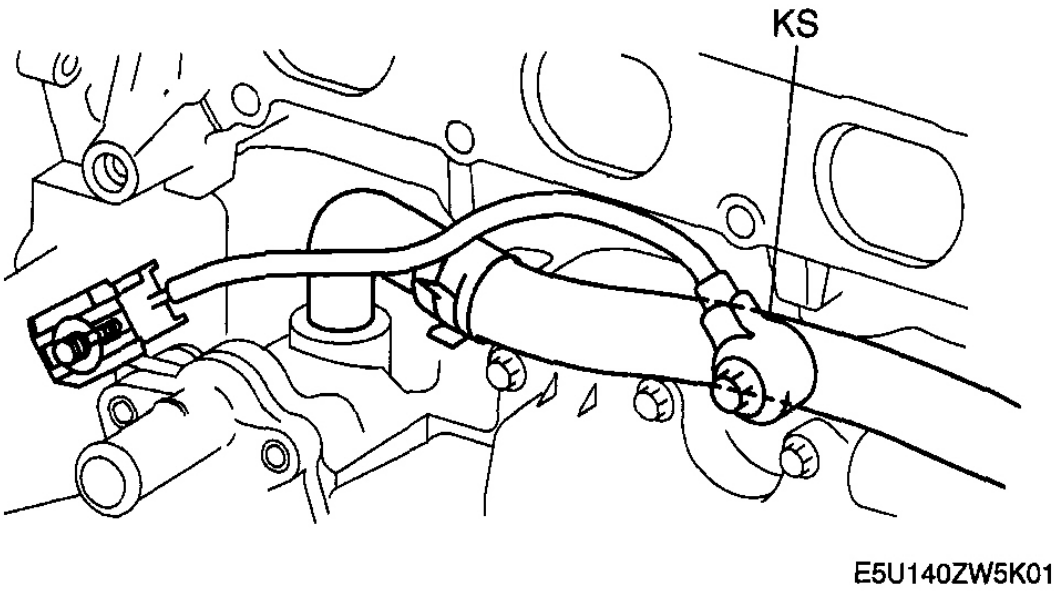


Fig. 71: Identifying Knock Sensor
Courtesy of MAZDA MOTORS CORP.

5. Remove the KS installation bolt, then remove the KS.
6. Install in the reverse order of removal.

KS tightening torque

16-24 N.m {1.7-2.4 kgf.m, 12-17 ft.lbf}

KNOCK SENSOR (KS) INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

RESISTANCE INSPECTION

1. Remove the battery cover.
2. Remove the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the KS connector.
4. Measure resistance between KS terminals A and B.
   - If not within the specification, replace the KS. (See **KNOCK SENSOR (KS) REMOVAL/INSTALLATION [LF]** .)
   - If the monitor item status/specification (reference) is not within the specification, even though the KS resistance is within the specification, perform the **CIRCUIT OPEN/SHORT INSPECTION**.

KS resistance

Approx. 4.87 megohms

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector.
2. Inspect the following wiring harnesses for an open or short circuit. (Continuity inspection)

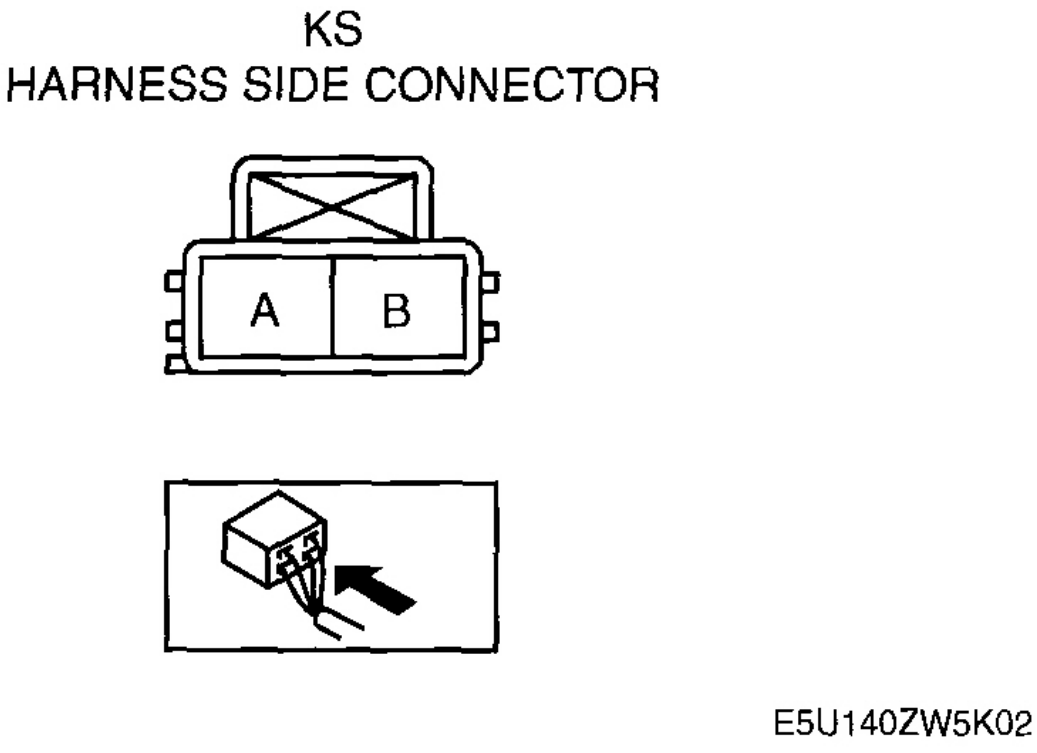


Fig. 72: Identifying Knock Sensor Harness Side Connector

Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - KS terminal A and PCM terminal 2U
  - KS terminal B and PCM terminal 2V

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - KS terminal A and power supply
  - KS terminal A and body ground
  - KS terminal B and power supply
  - KS terminal B and body ground

BAROMETRIC PRESSURE (BARO) SENSOR INSPECTION [LF]

NOTE:

- **Before performing the following inspection, make sure to follow the procedure as indicated in the troubleshooting flow diagram. (See TROUBLESHOOTING PROCEDURE .)**

1. Connect the M-MDS or equivalent to the DLC-2.

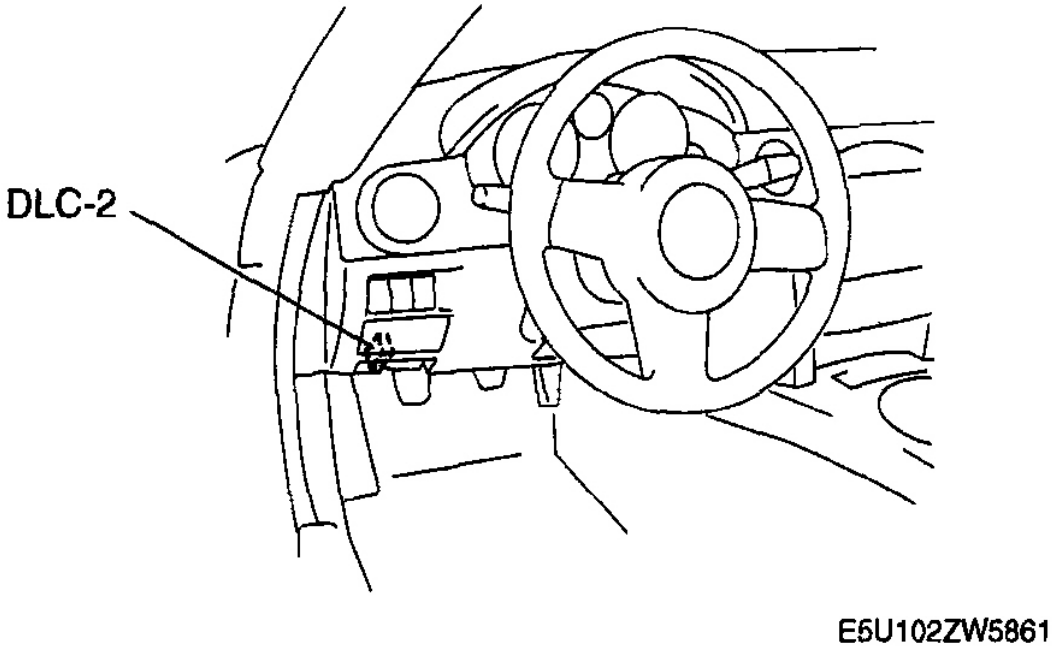


Fig. 73: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position.
3. Select BARO PID on the M-MDS or equivalent.
4. Verify that the BARO PID (pressure) and barometric pressure are practically equal.
    - If not as verified, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

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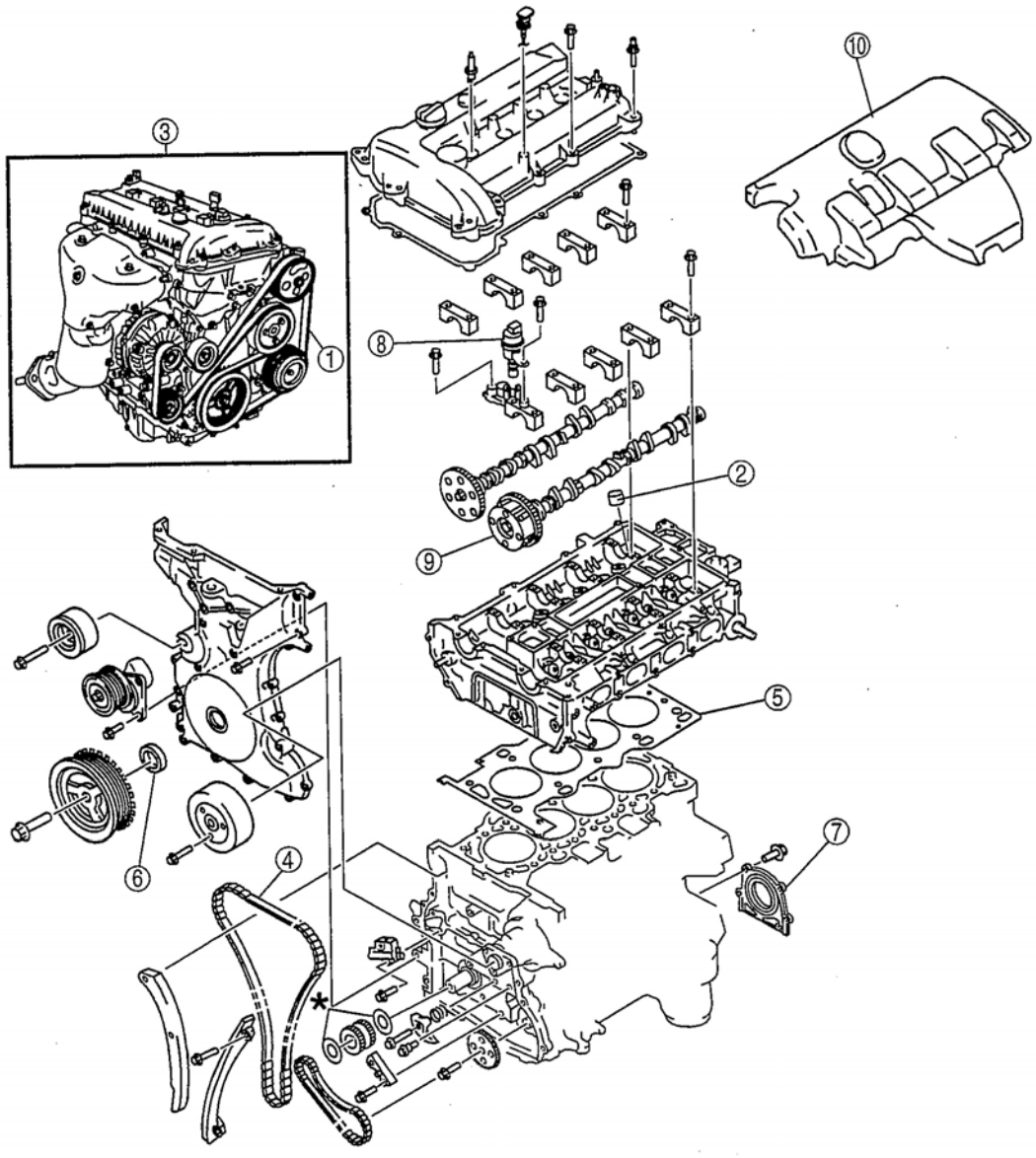
MECHANICAL LOCATION INDEX [LF]



*:IF EQUIPPED

1	Drive belt
2	Tappet
3	Engine
4	Timing Chain
5	Cylinder head gasket
6	Front oil seal
7	Rear oil seal
8	OCV
9	**Variable valve timing actuator**
10	Plug hole plate

Fig. 1: Identifying Location Of Engine Mechanical Components [LF]
Courtesy of MAZDA MOTORS CORP.

PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]

1. Remove the plug hole plate.

NOTE:

- **Lift off and remove the plug hole plate from the installation areas (rubber and clips) as shown in Fig. 2 .**

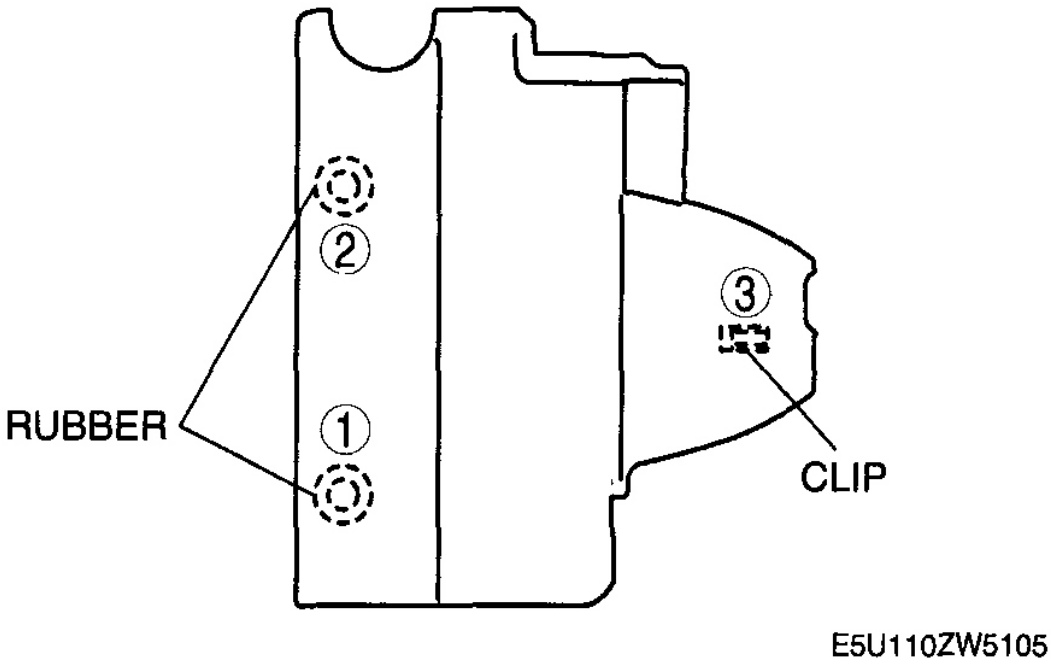


Fig. 2: Removing Plug Hole Plate From Installation Areas (Rubber & Clips)
Courtesy of MAZDA MOTORS CORP.

2. Install the plug hole plate.

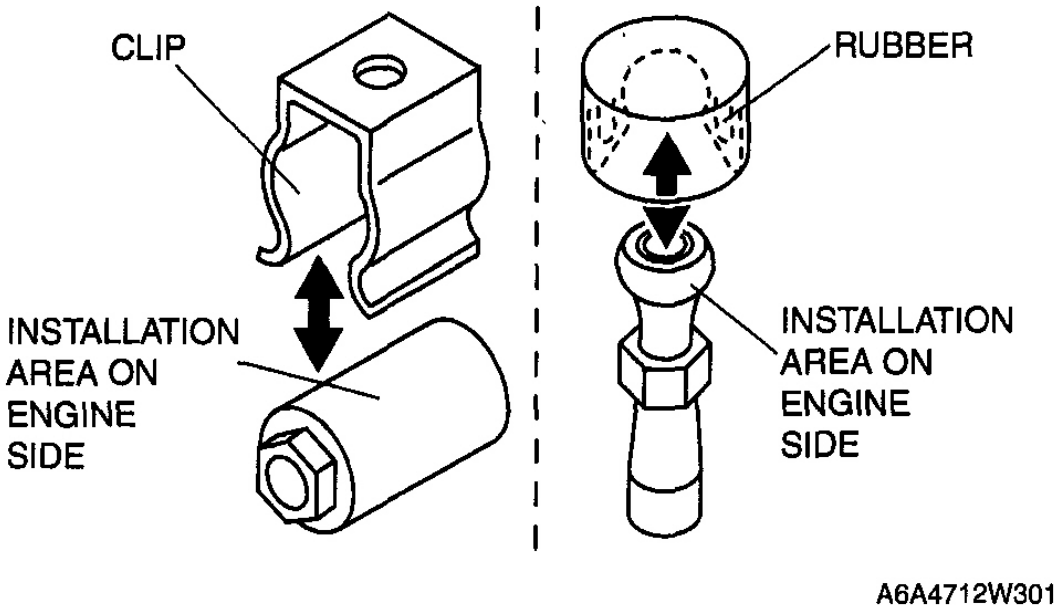


Fig. 3: Installing Plug Hole Plate
Courtesy of MAZDA MOTORS CORP.

1. To position the plug hole plate, grasp rubber 1 and 2, as shown in **Fig. 4** , with your hands and press them in.
2. Grasp clips 3 with your hands and press them in.

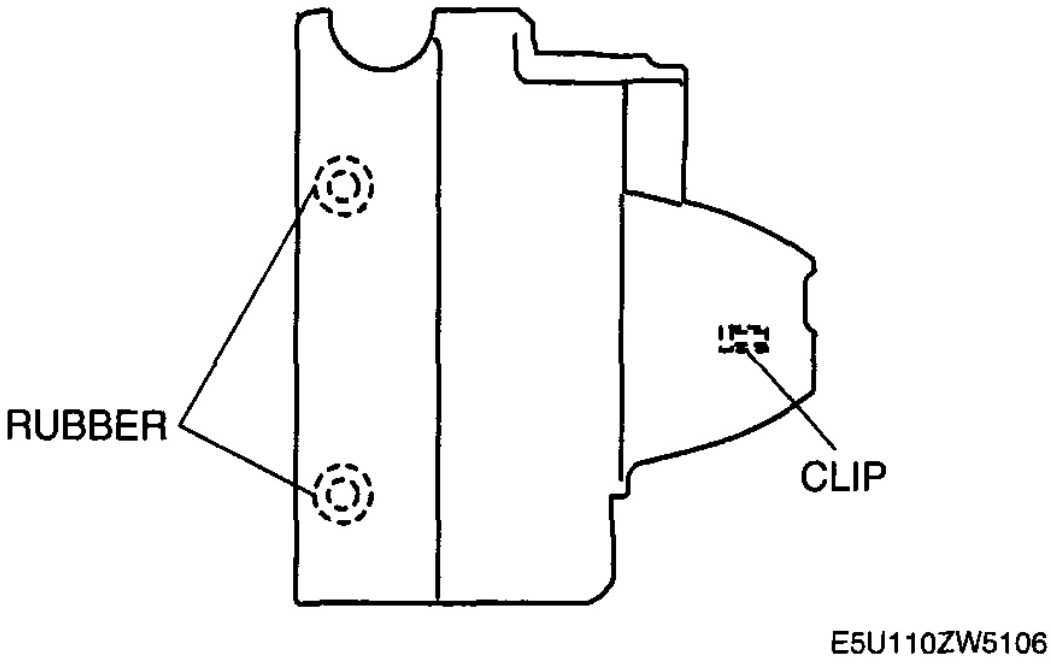


Fig. 4: Position Plug Hole Plate
Courtesy of MAZDA MOTORS CORP.

DRIVE BELT INSPECTION [LF]

NOTE:

- **Drive belt deflection/tension inspection is not necessary because of the use of the auto tensioner.**

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

NOTE:

- **Use a mirror to see the position of the drive belt auto tensioner indicator mark.**

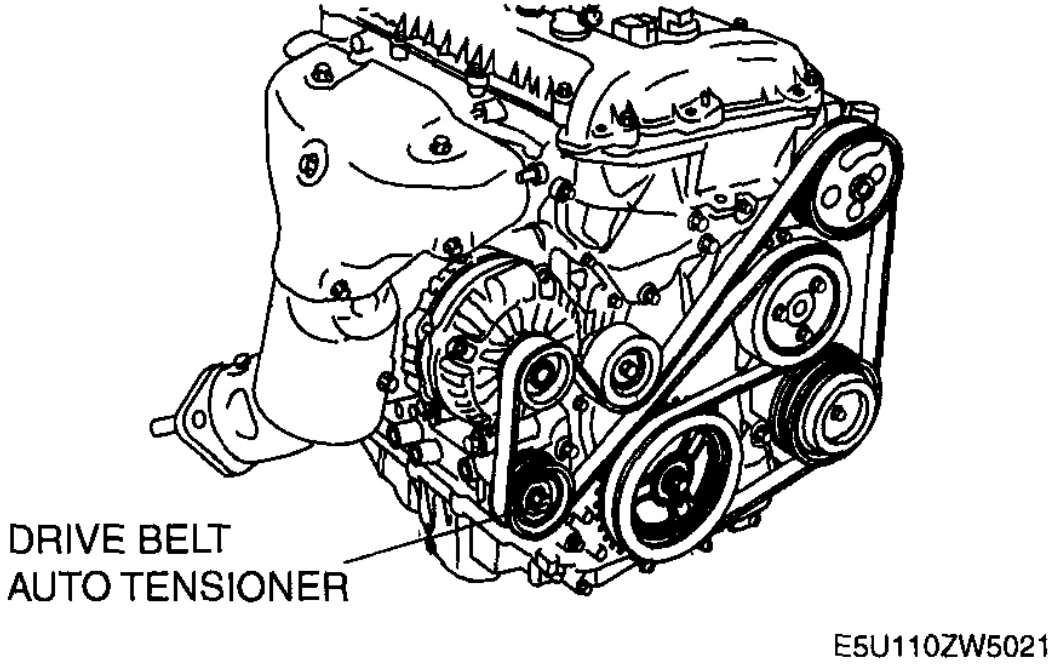


Fig. 5: Identifying Drive Belt Auto Tensioner
Courtesy of MAZDA MOTORS CORP.

2. Verify that the drive belt auto tensioner indicator mark does not exceed the limit.
   - If it exceeds the limit, replace the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)

AT

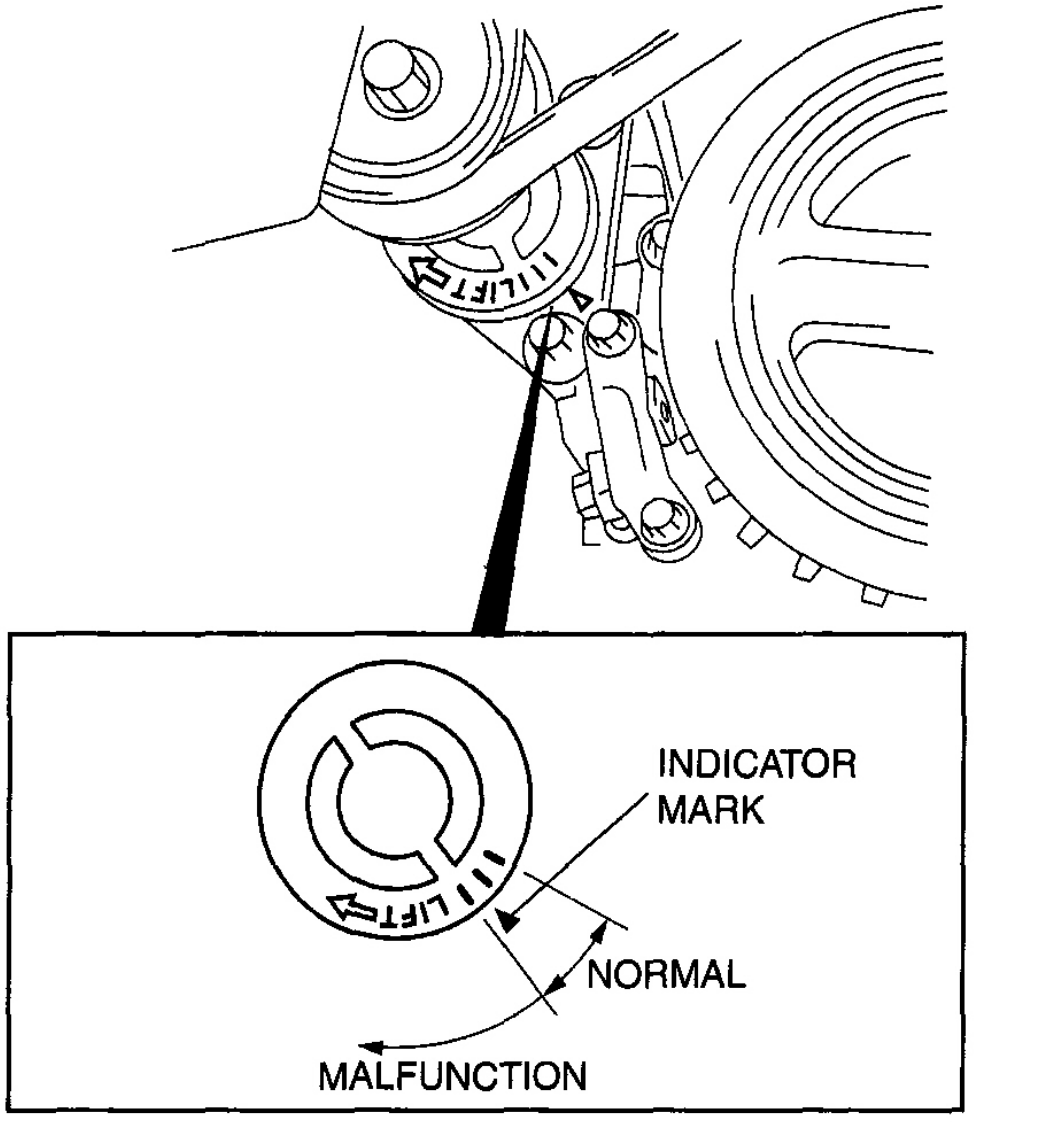


Fig. 6: Verifying Drive Belt Auto Tensioner Indicator Mark (AT)
Courtesy of MAZDA MOTORS CORP.

MT

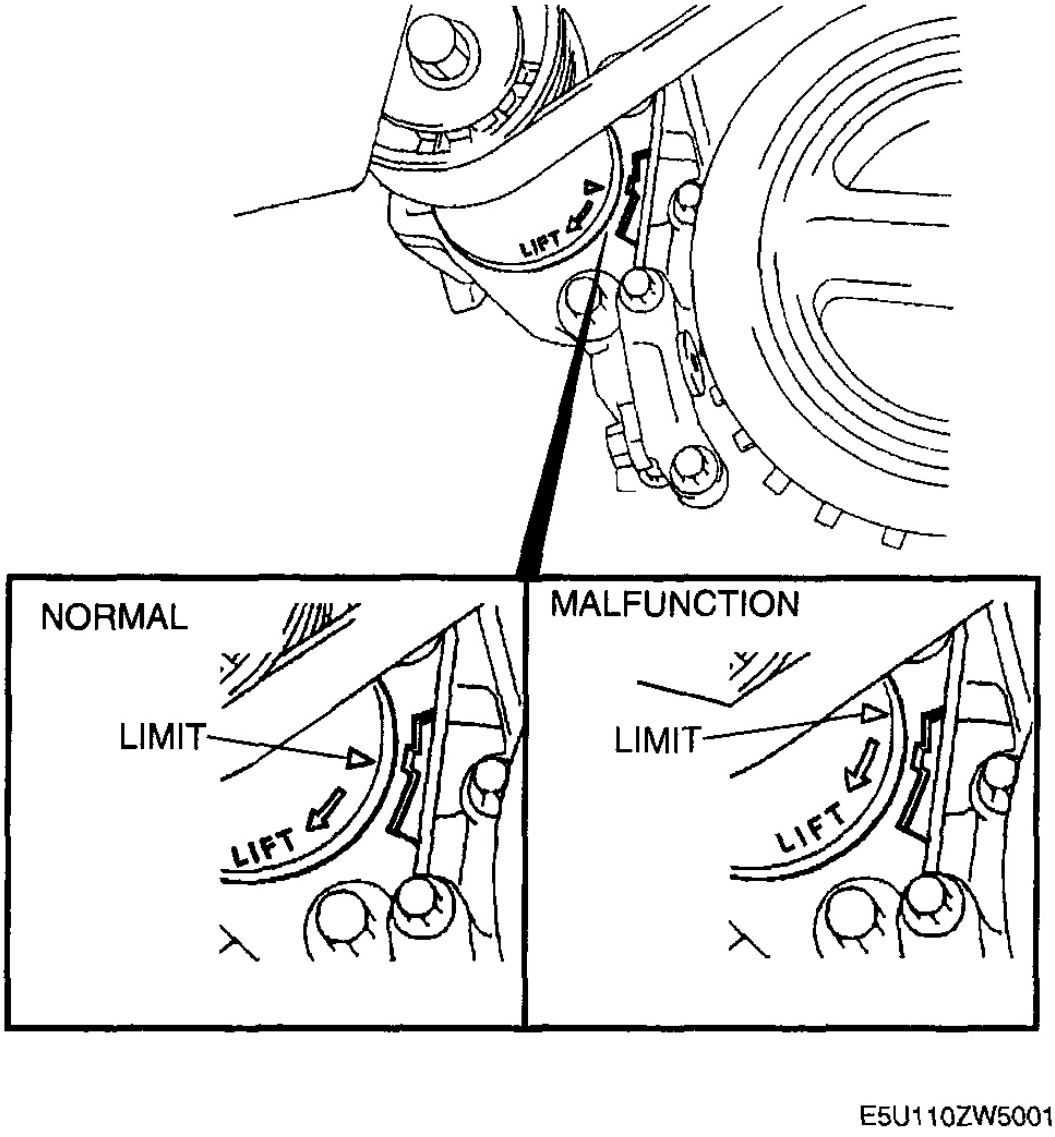


Fig. 7: Verifying Drive Belt Auto Tensioner Indicator Mark (MT)
Courtesy of MAZDA MOTORS CORP.

3. Install the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

DRIVE BELT REPLACEMENT [LF]

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Rotate the drive belt auto tensioner in the direction shown in **Fig. 8** and remove the drive belt.

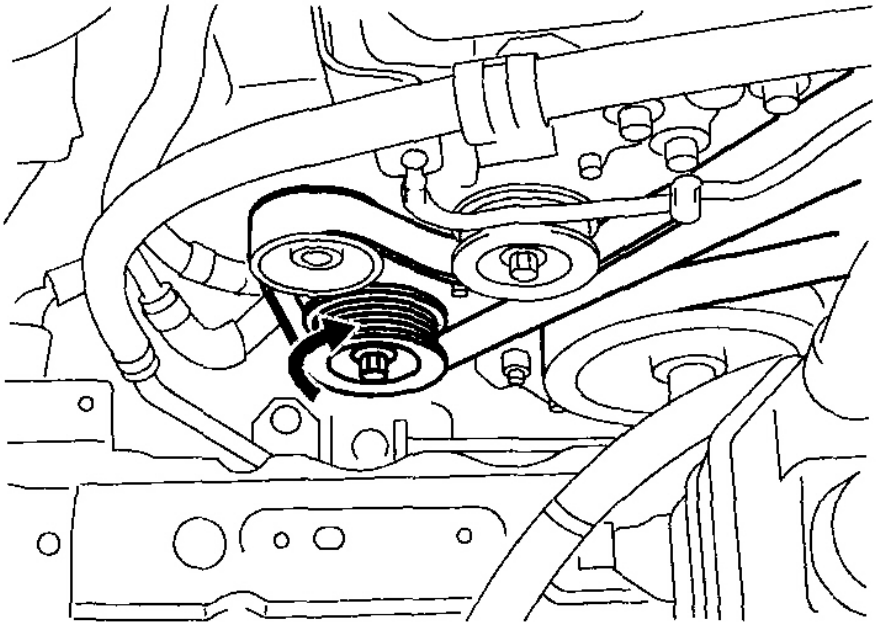


Fig. 8: Rotating Drive Belt Auto Tensioner & Removing Drive Belt
Courtesy of MAZDA MOTORS CORP.

3. Install a new drive belt.

NOTE:

- **Use a mirror to see the position of the drive belt auto tensioner indicator mark.**

4. Verify that the drive belt auto tensioner indicator mark does not exceed the limit. (See **DRIVE BELT INSPECTION [LF]** .)
   - If it exceeds the limit, replace the drive belt.
5. Install the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

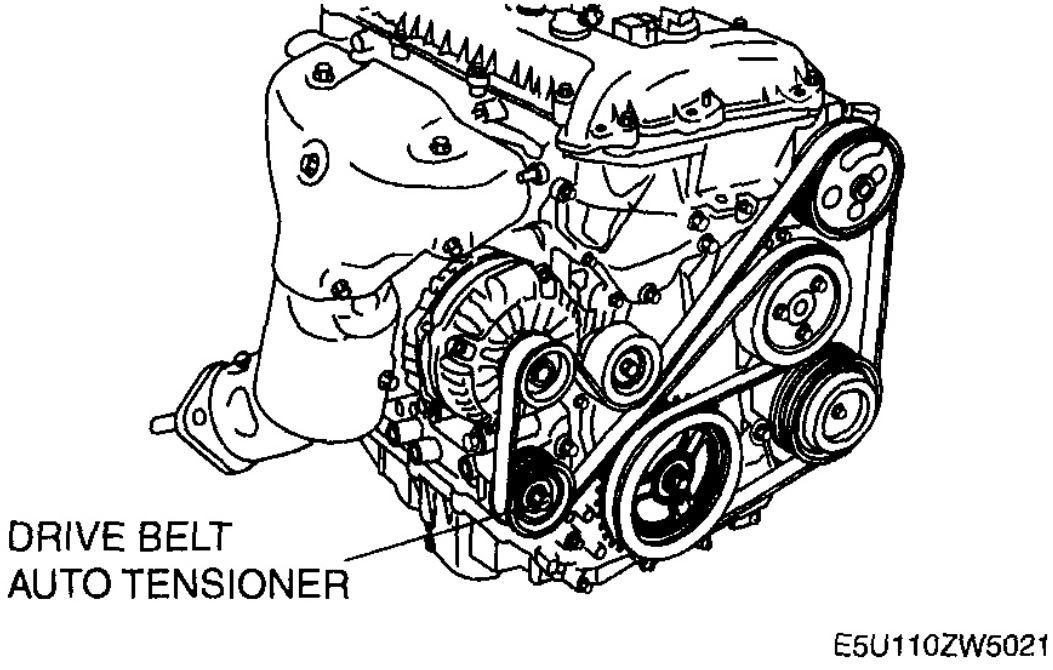


Fig. 9: Identifying Drive Belt Auto Tensioner
Courtesy of MAZDA MOTORS CORP.

DRIVE BELT AUTO TENSIONER INSPECTION [LF]

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)

NOTE:
- **Use a mirror to see the position of the drive belt auto tensioner indicator mark.**

3. Verify that the drive belt auto tensioner moves smoothly in the operational direction.
   - Replace the drive belt auto tensioner if necessary.

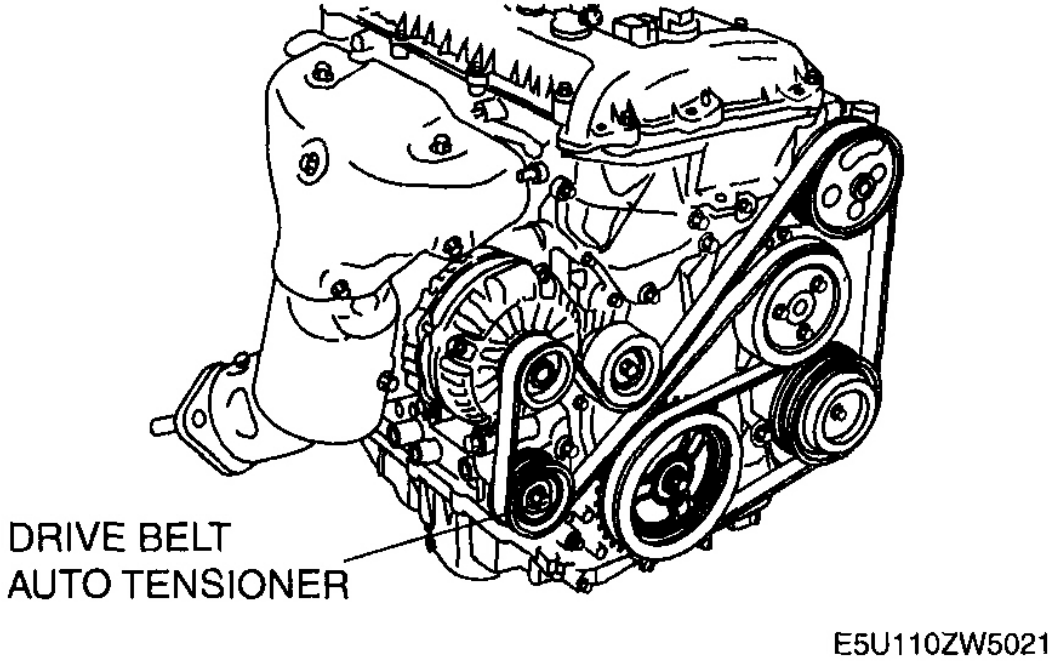


Fig. 10: Identifying Drive Belt Auto Tensioner
Courtesy of MAZDA MOTORS CORP.

4. Turn the drive belt auto tensioner pulley by hand and verify that it rotates smoothly.
    - Replace the drive belt auto tensioner if necessary.

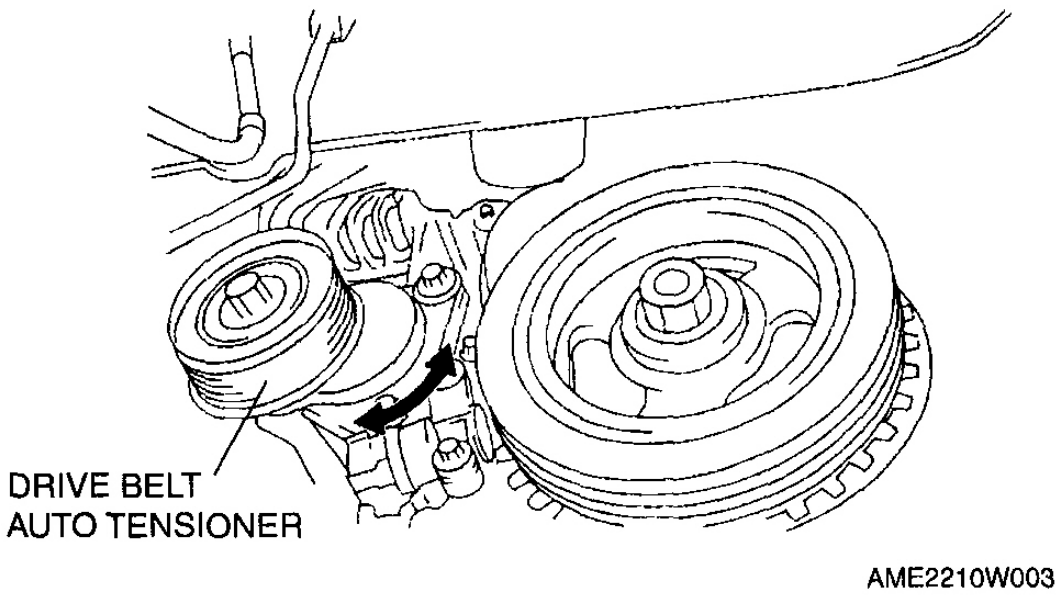


Fig. 11: Turning Drive Belt Auto Tensioner Pulley
Courtesy of MAZDA MOTORS CORP.

5. Install the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
6. Install the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

VALVE CLEARANCE INSPECTION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
4. Disconnect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
5. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
6. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the OCV connector.
8. Disconnect the P/S pressure switch connector.
9. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
10. Remove the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
11. Measure the valve clearance.
    1. Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.

2. Measure the valve clearance at A in **Fig. 12** .
   - If the valve clearance is out of the specification, adjust it. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)

NOTE:
- **Make sure to note down the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

3. Turn the crankshaft **360°** clockwise so that the No.4 piston is at TDC of the compression stroke.
4. Measure the valve clearance at B in **Fig. 12** .
   - If the valve clearance is out of the specification, adjust it. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)

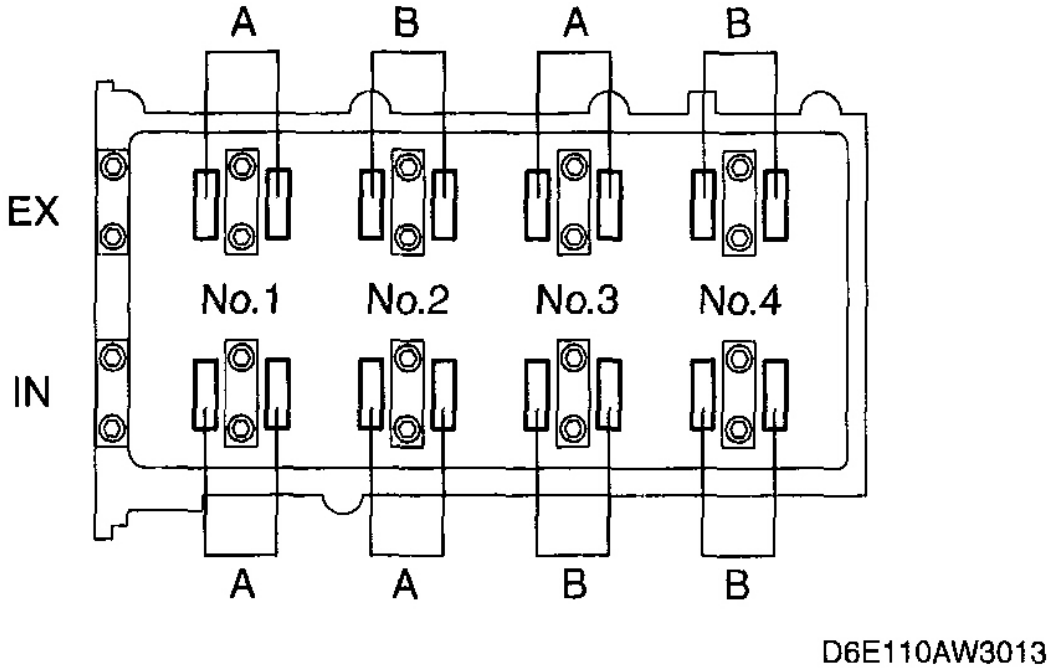


Fig. 12: Identifying Where To Measure Valve Clearance
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **Make sure to note down the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

12. Install the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
13. Install the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
14. Connect the P/S pressure switch connector.
15. Connect the OCV connector.
16. Install the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
17. Install the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
18. Connect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
19. Install the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
20. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
21. Install the battery cover.

VALVE CLEARANCE ADJUSTMENT [LF]

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
3. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
4. Disconnect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
5. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
6. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the OCV connector.
8. Disconnect the P/S pressure switch connector.
9. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
10. Remove the cylinder head cover. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
11. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
12. Remove the engine front cover lower blind plug.

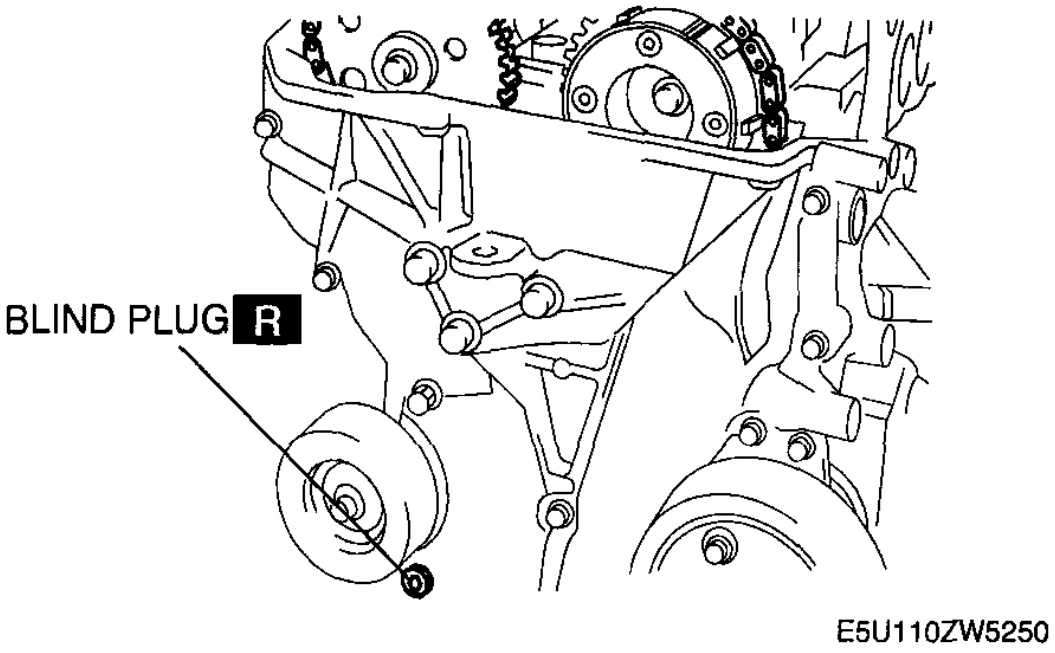


Fig. 13: Removing Engine Front Cover Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

13. Remove the engine front cover upper blind plug.

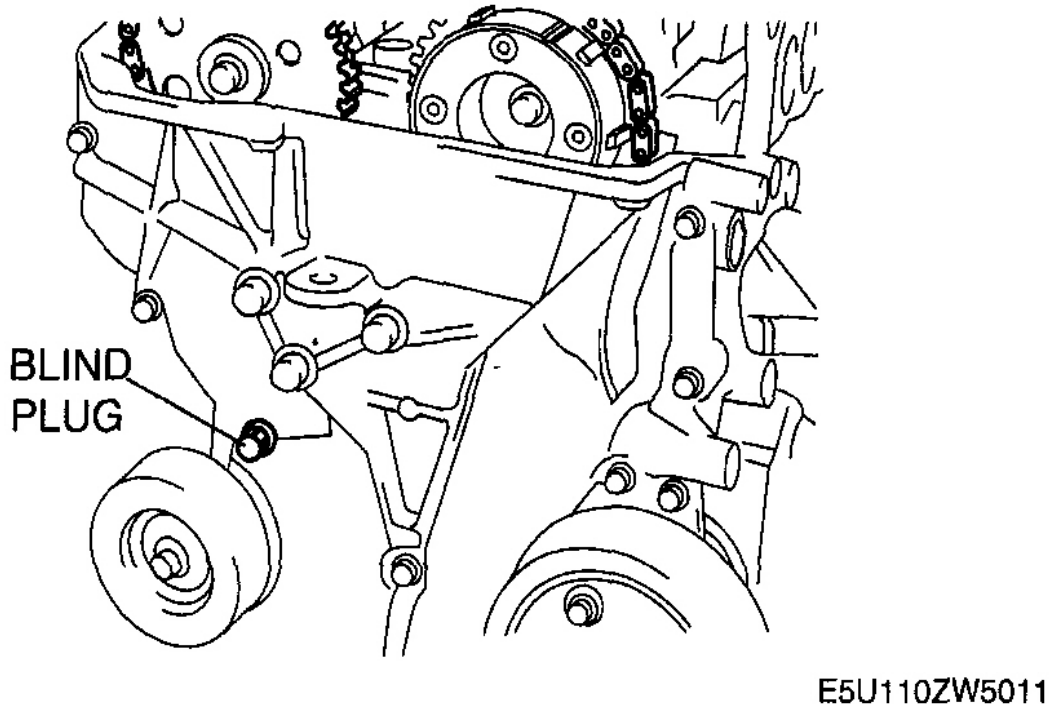


Fig. 14: Removing Engine Front Cover Upper Blind Plug
Courtesy of MAZDA MOTORS CORP.

14. Remove the cylinder block lower blind plug.
15. Install the **SST** as shown in **Fig. 15**.

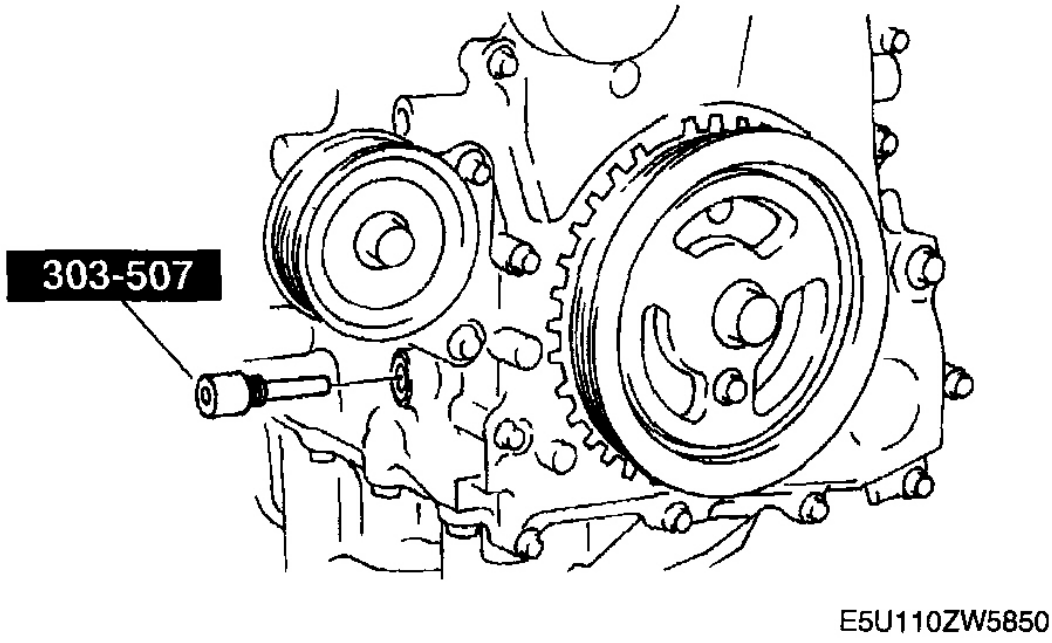


Fig. 15: Installing SST
Courtesy of MAZDA MOTORS CORP.

16. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position.
17. Loosen the timing chain.
    1. Using a suitable screwdriver or equivalent tool, unlock the chain tensioner ratchet.
    2. Turn the exhaust camshaft clockwise using a suitable wrench on the cast hexagon and loosen the timing chain.
    3. Placing the suitable bolt **(M6 X 1.0 length 25 mm-35 mm {0.99 in-1.37 in})** at the engine front cover upper blind plug, secure the chain guide at the position where the tension is released.

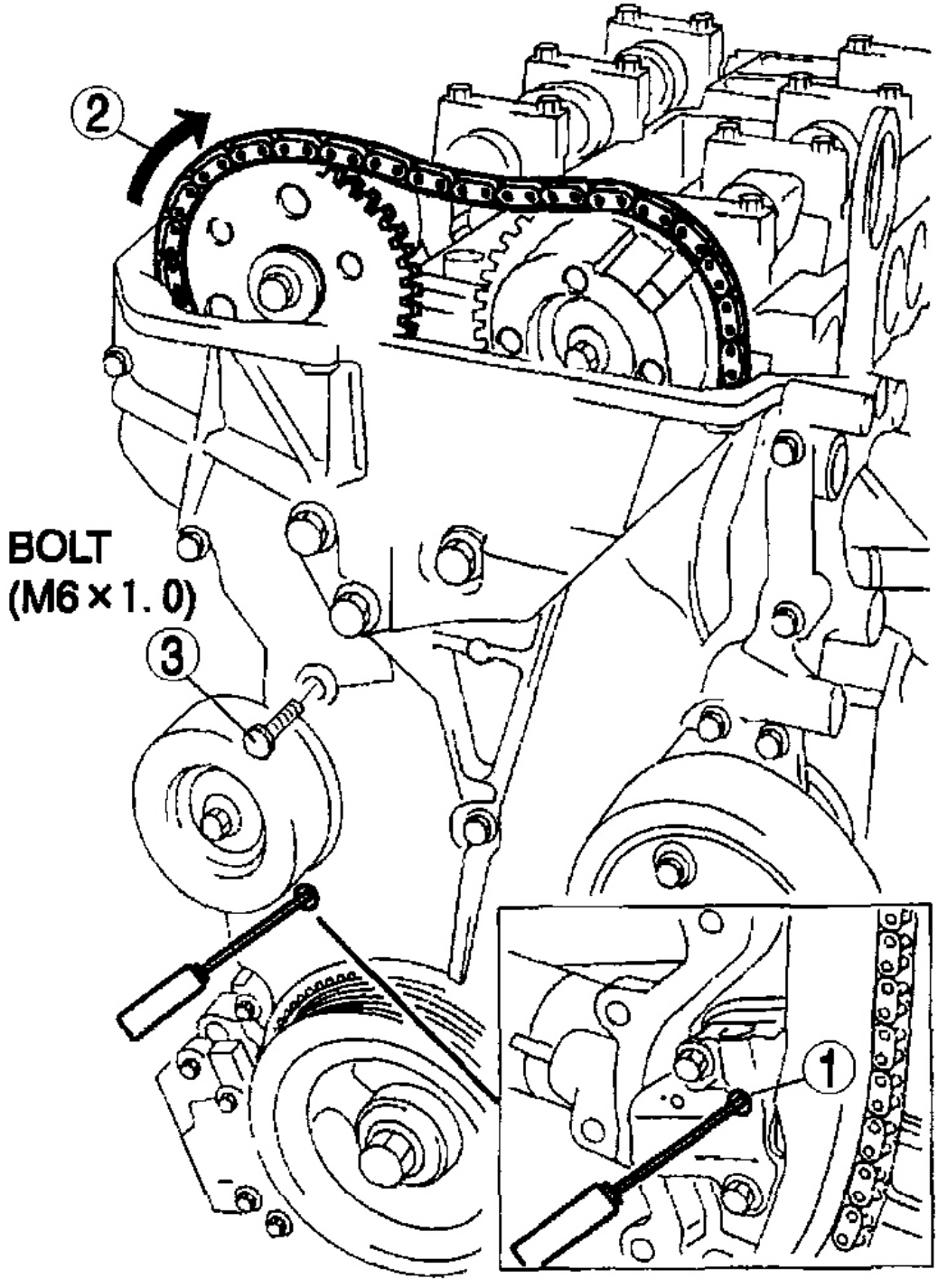


Fig. 16: Loosening Timing Chain
Courtesy of MAZDA MOTORS CORP.

18. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in **Fig. 17**.

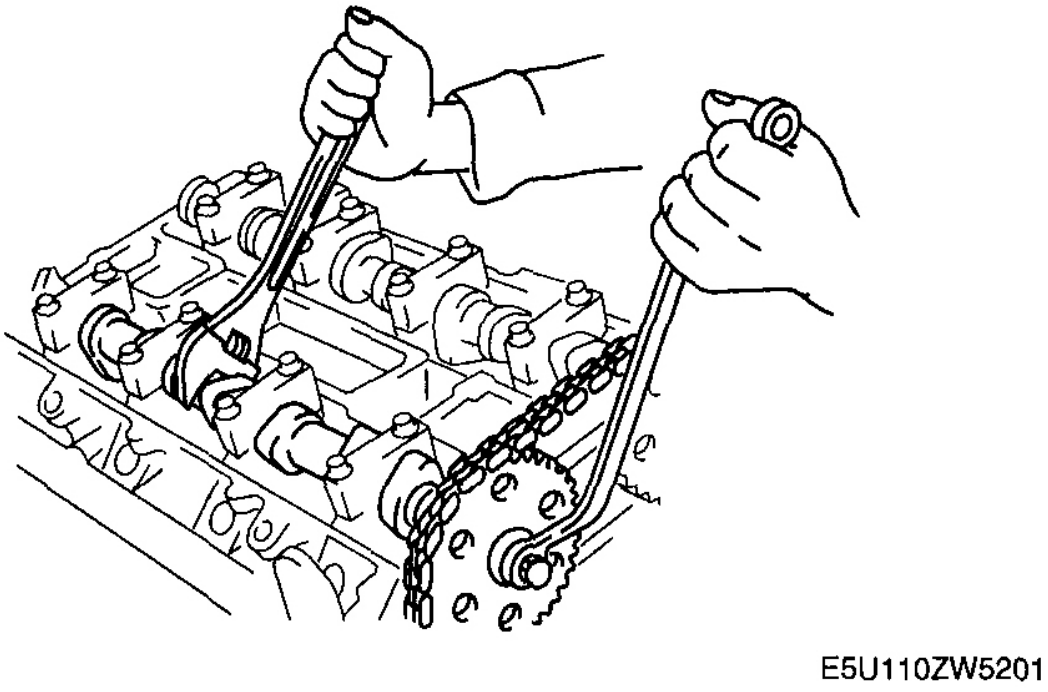


Fig. 17: Holding Exhaust Camshaft Using Wrench On Cast Hexagon
Courtesy of MAZDA MOTORS CORP.

19. Remove the exhaust camshaft sprocket.

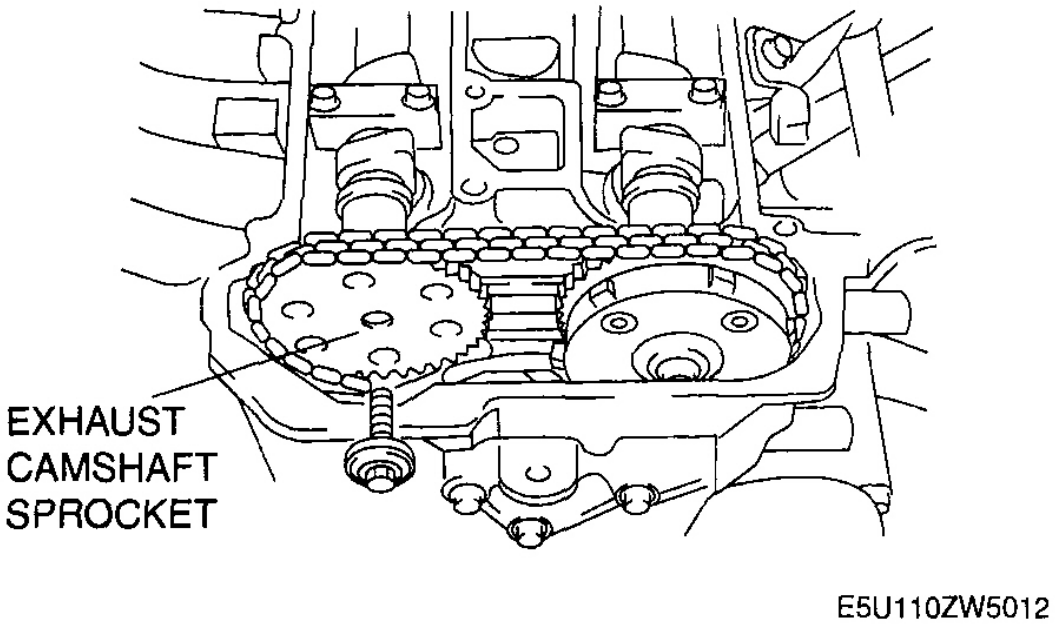


Fig. 18: Removing Exhaust Camshaft Sprocket
Courtesy of MAZDA MOTORS CORP.

20. Loosen the camshaft cap bolts in several passes in the order shown in **Fig. 19**.

NOTE:

- **The cylinder head and the camshaft caps are numbered to make sure they are reassembled in their original position. Do not mix the caps.**

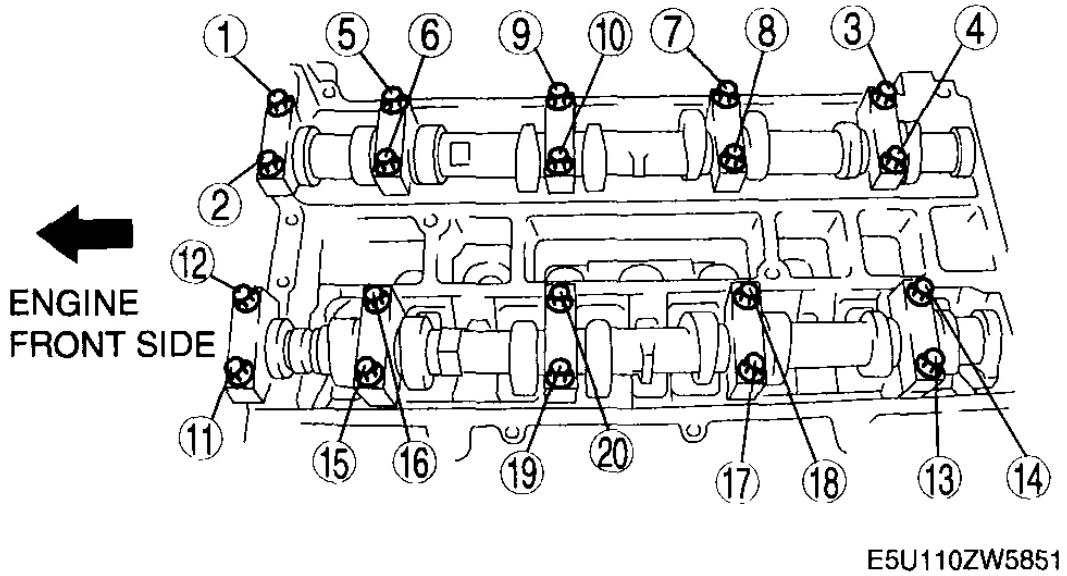


Fig. 19: Identifying Camshaft Cap Bolts Loosening Sequence
Courtesy of MAZDA MOTORS CORP.

21. Remove the camshafts.
22. Remove the tappet.
23. Select proper adjustment tappet.

    New adjustment tappet

    = Removed tappet thickness + Measured valve clearance - Standard valve clearance (IN: 0.25 mm {0.0098 in}, EX: 0.30 mm {0.0118 in})

    Valve clearance [Engine cold]

    IN: 0.22-0.28 mm {0.0087-0.0110 in}

    EX: 0.27-0.33 mm {0.0107-0.0129 in}

24. Install the camshaft with No.1 cylinder camshaft lobes aligned with the TDC position.
25. Tighten the camshaft cap bolt with the following two steps.
    1. Tighten to **5.0-9.0 N.m {51.0-91.7 kgf.cm, 44.3-79.6 in.lbf}.**
    2. Tighten to **14.0-17.0 N.m {1.5-1.7 kgf.m, 10.4-12.5 ft.lbf}.**

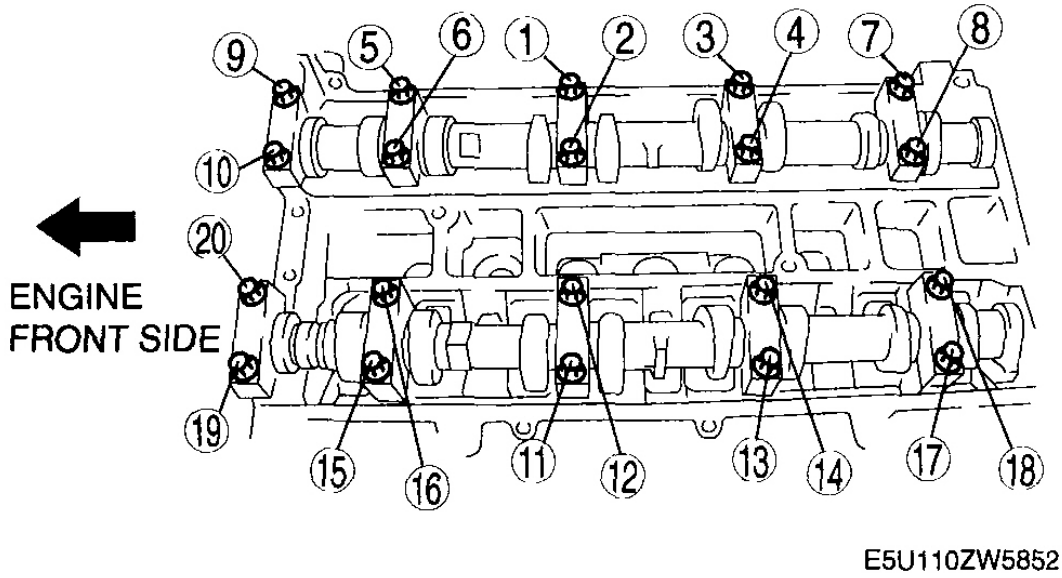


Fig. 20: Camshaft Cap Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

26. Install a new washer.

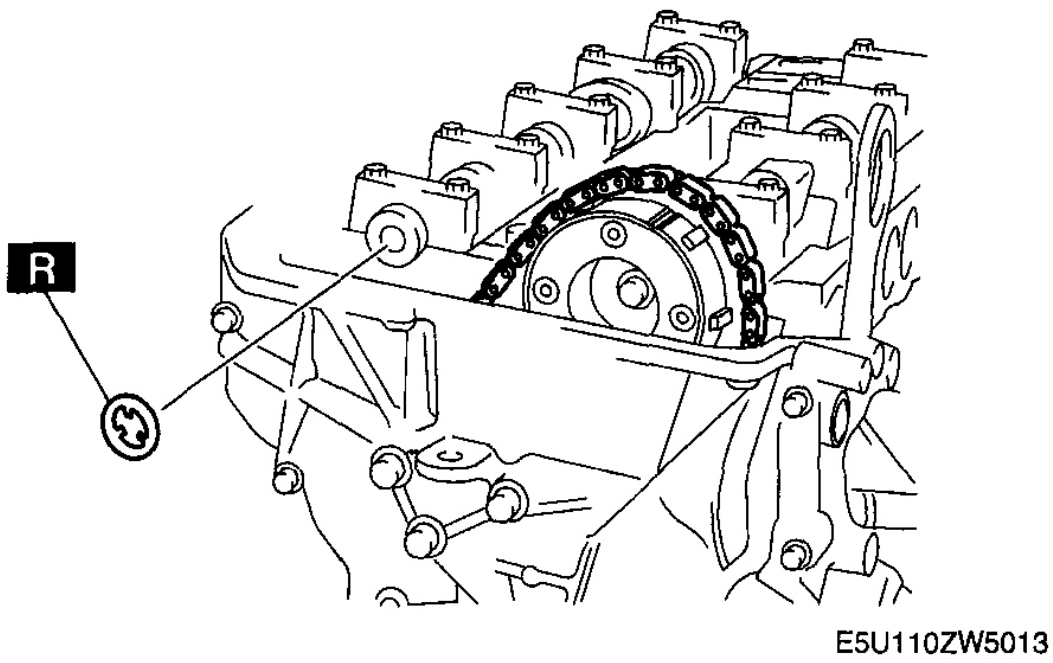


Fig. 21: Installing New Washer
Courtesy of MAZDA MOTORS CORP.

27. Install the exhaust camshaft sprocket.

NOTE:

- **Do not tighten the bolt for the camshaft sprocket during this step. First confirm the valve timing, then tighten the bolt.**

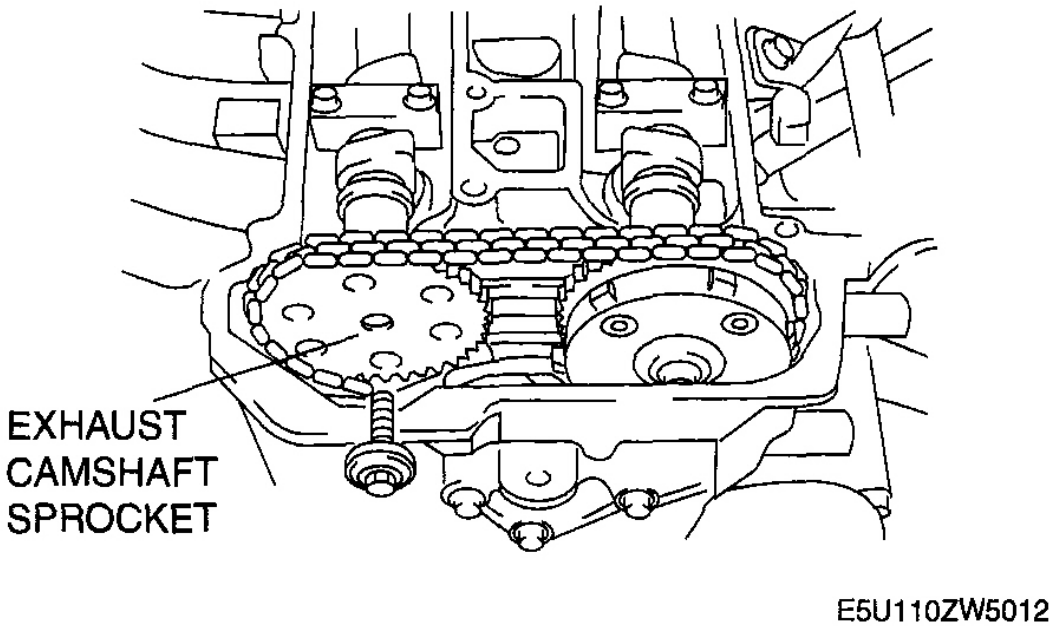


Fig. 22: Installing Exhaust Camshaft Sprocket
Courtesy of MAZDA MOTORS CORP.

28. Install the **SST** to the camshaft as shown in **Fig. 23**.

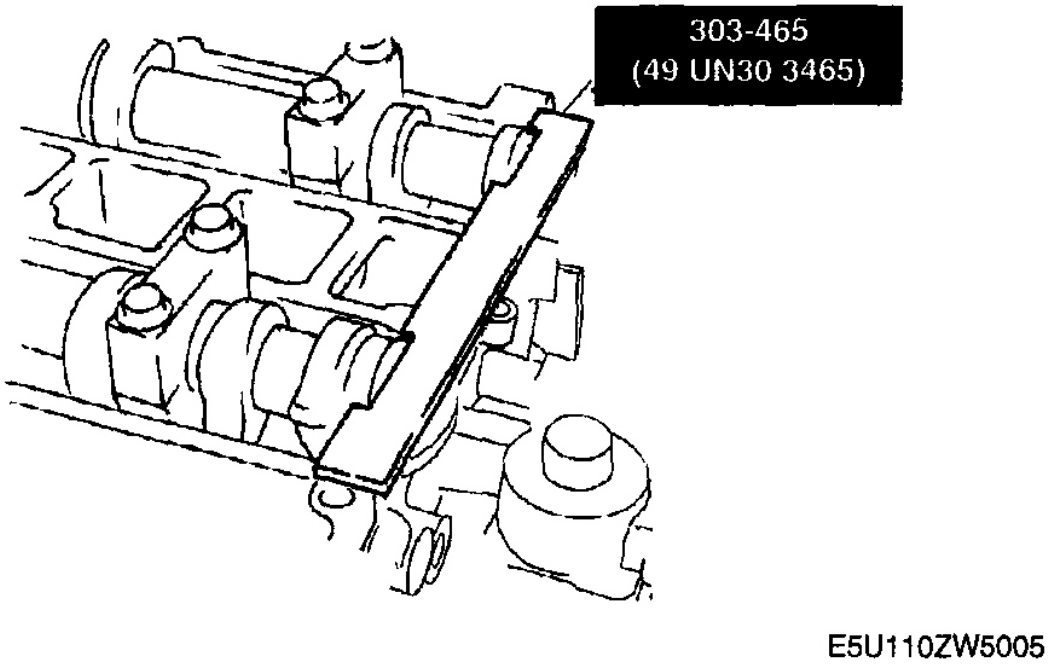


Fig. 23: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

29. Remove the **M6 X 1.0 bolt (length 25 mm - 35 mm {0.99 in - 1.37 in})** from the engine front cover to apply tension to the timing chain.
30. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position.
31. Hold the exhaust camshaft using a suitable wrench on the cast hexagon as shown in **Fig. 24**.

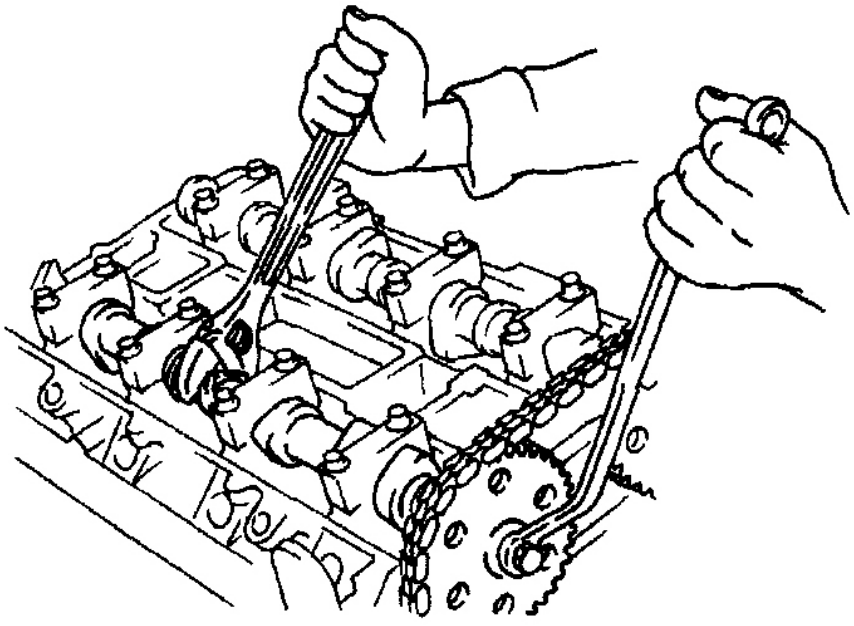


Fig. 24: Holding Exhaust Camshaft Using Wrench On Case Hexagon
Courtesy of MAZDA MOTORS CORP.

32. Tighten the exhaust camshaft sprocket lock bolt.

    Tightening torque

    69-75 N.m {7.1-7.6 kgf.m, 50.9-55.3 ft.lbf}

33. Remove the **SST** from the camshaft.
34. Remove the **SST** from the block lower blind plug.
35. Rotate the crankshaft clockwise two turns until the TDC position.
    - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 16.
36. Apply silicone sealant to the engine front cover upper blind plug.
37. Install the engine front cover upper blind plug.

    Tightening torque

    8.0-11.5 N.m {82-117 kgf.cm, 71-101 ft.lbf}

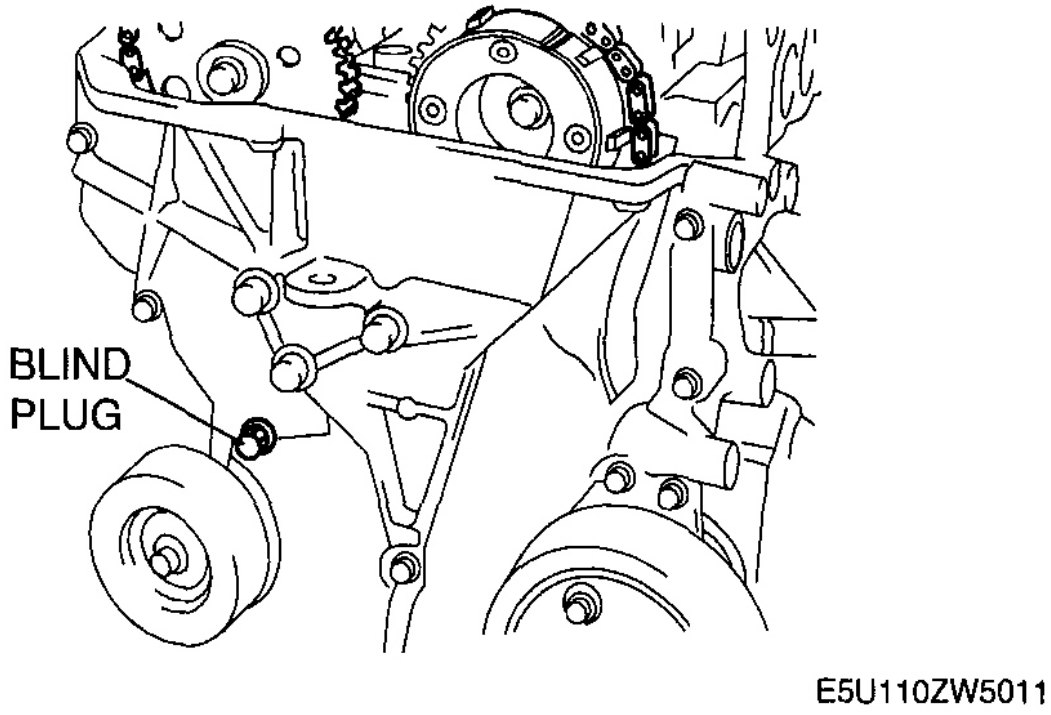


Fig. 25: Installing Engine Front Cover Upper Blind Plug
Courtesy of MAZDA MOTORS CORP.

38. Install the cylinder block lower blind plug.

    Tightening torque:

    18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbf}

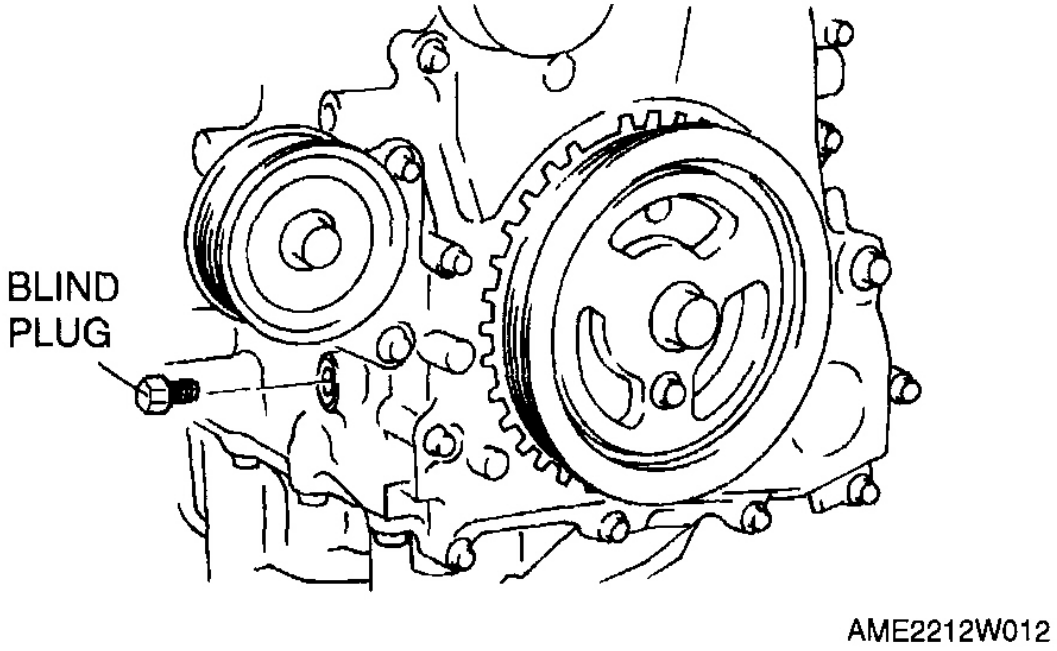


Fig. 26: Installing Cylinder Block Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

39. Install the new engine front cover lower blind plug.

Tightening torque:

10-14 N.m {102-142 kgf.cm, 89-123 in.lbf}

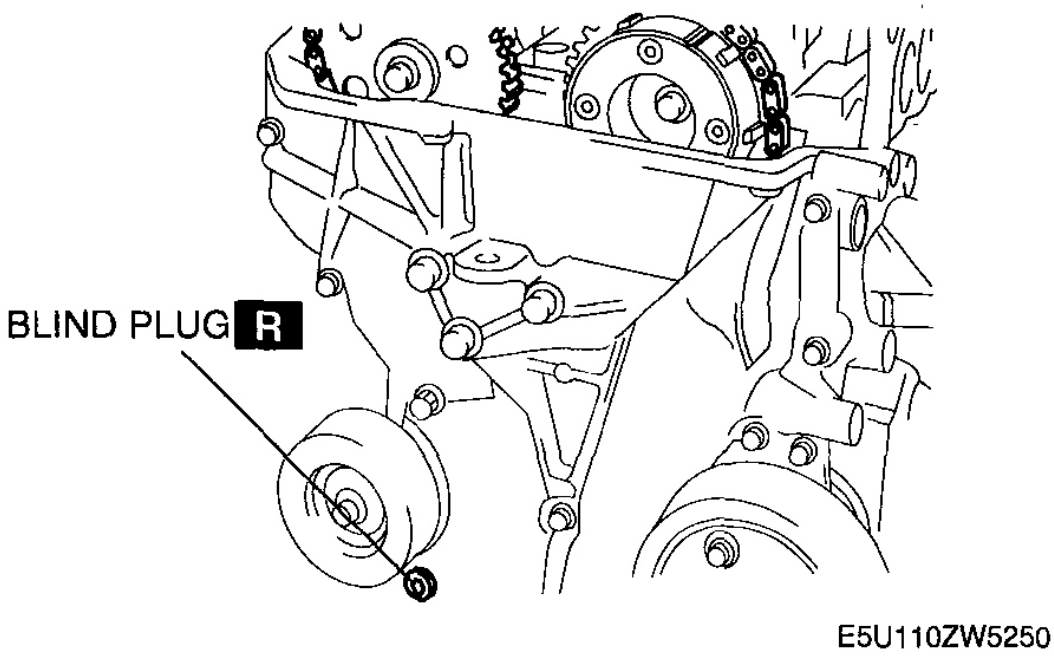


Fig. 27: Installing New Engine Front Cover Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

40. Install the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
41. Measure the valve clearance.
    1. Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.
    2. Measure the valve clearance at A in **Fig. 28** .
        - If the valve clearance is out of the specification, adjust it. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)

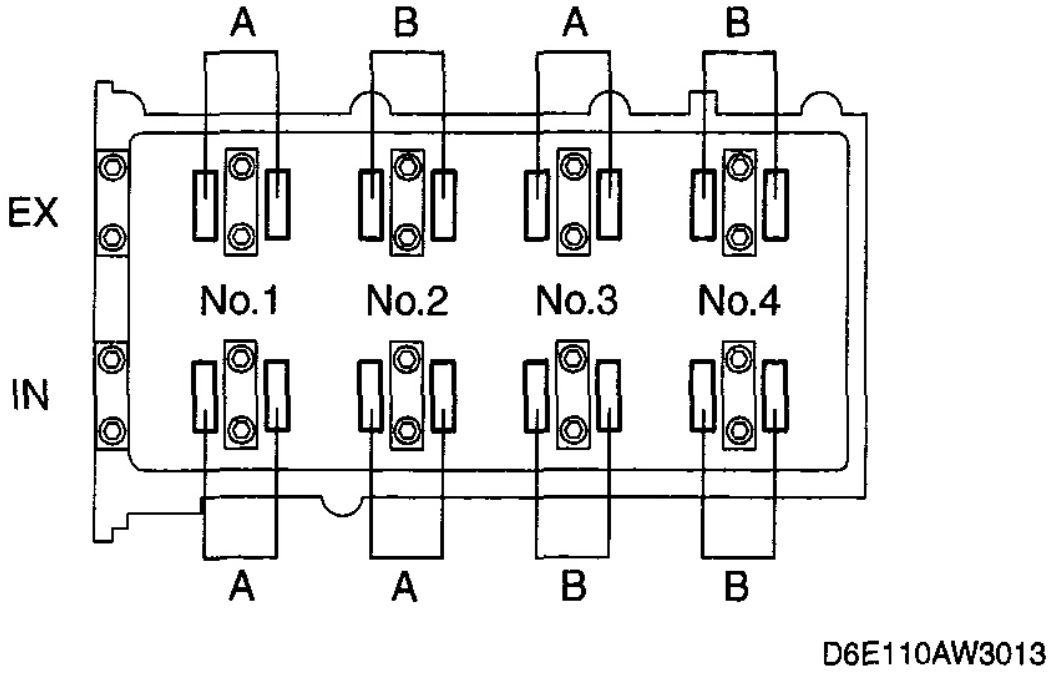


Fig. 28: Identifying Where To Measure Valve Clearance
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **Make sure to note down the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

3. Turn the crankshaft **360°** clockwise so that the No. 4 piston is at TDC of the compression stroke.
4. Measure the valve clearance at B in **Fig. 28** .
   - If the valve clearance is out of the specification, adjust it. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)

NOTE:

- **Make sure to note down the measured values for choosing the suitable replacement tappets.**

Valve clearance [Engine cold]

IN: 0.22-0.28 mm {0.0087-0.0110 in}

EX: 0.27-0.33 mm {0.0107-0.0129 in}

42. Install the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
43. Install the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
44. Connect the OCV connector.
45. Install the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
46. Install the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
47. Connect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
48. Install the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
49. Install the plug hole plate. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
50. Install the battery and battery tray. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)

COMPRESSION INSPECTION [LF]

WARNING:

- **Hot engines and oil can cause severe burns. Be careful not to burn yourself during removal/installation of each component.**

1. Verify that the battery is fully charged.
   - Recharge it if necessary. (See **BATTERY INSPECTION [LF]** .)
2. Warm up the engine to the normal operating temperature.
3. Stop the engine and allow it to cool down for **about 10 min.**
4. Perform "Fuel Line Safety Procedures". Leave the fuel pump relay removed. (See **BEFORE SERVICE PRECAUTION [LF]** .)

WARNING:

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION [LF] .)**

5. Remove the fuel pump relay.
6. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)

7. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
8. Remove the spark plugs. (See **SPARK PLUG REMOVAL/INSTALLATION [LF]** .)
9. Connect a compression gauge into the spark plug hole.
10. Fully depress the accelerator pedal and crank the engine.
11. Note the maximum gauge reading.
12. Inspect each cylinder as above.
    - If the measured value is less than the limited value, or there is a cylinder whose compression value varies from that of other cylinders by **196.1 kPa {2.0 kgf/cm^2 , 28.5 psi}** or more, add a small amount of engine oil through the spark plug hole. Then measure the compression pressure and perform the respective operations for the following cases.
      - If the compression increases, the piston, the piston rings, or cylinder wall may be worn and overhaul is required.
      - If the compression stays low, a valve may be stuck or improperly seated and overhaul is required.
      - If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head distorted and overhaul is required.

    Compression

    Standard: 1,720 kPa {17.5391 kgf/cm^2 , 249.465 psi} [300 rpm]

    Minimum: 1,204 kPa {12.277 kgf/cm^2 , 174.58 psi} [300 rpm]

    Maximum difference between cylinders: 196.1 kPa {2.0 kgf/cm^2 , 28.5 psi}

13. Disconnect the compression gauge.
14. Install the spark plugs. (See **SPARK PLUG REMOVAL/INSTALLATION [LF]** .)
15. Install the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
16. Install the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
17. Install the fuel pump relay.
18. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

TIMING CHAIN REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injures or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION [LF] .)**

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
4. Loosen the water pump pulley bolt and removal the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
5. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
6. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the OCV connector.
8. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
9. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
10. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
11. Remove the CKP sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
12. Remove the P/S oil pump with the oil hose still connected and position the P/S oil pump so that it is out of the way. (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
13. Move the cooler pipe No.3 and heater pipe slightly out of the way.

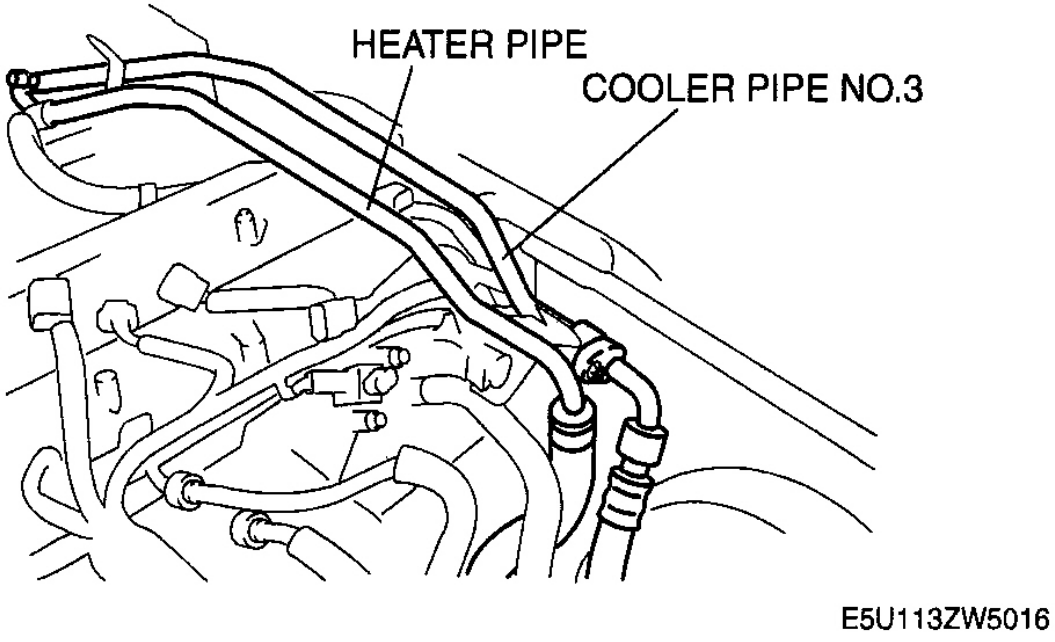
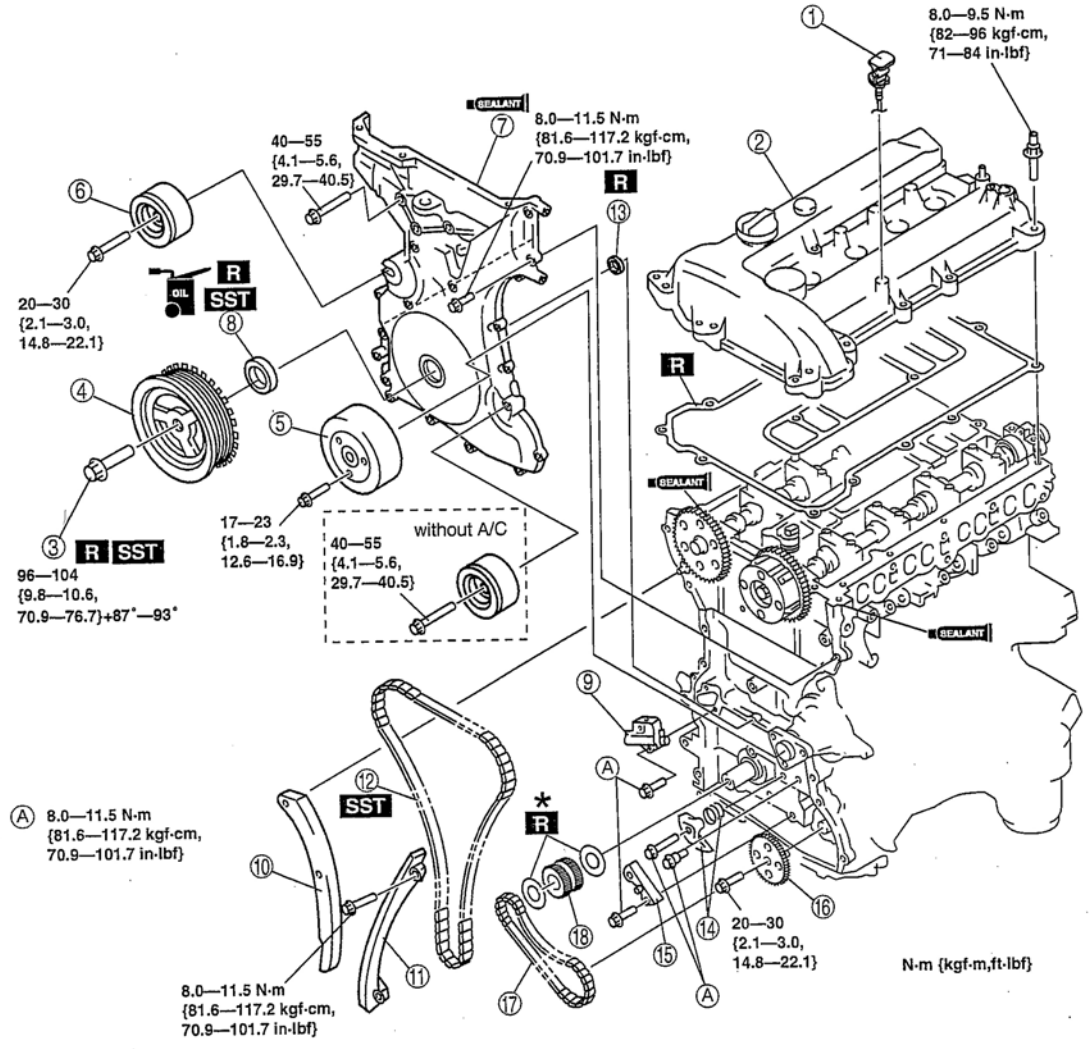


Fig. 29: Moving Cooler Pipe No. 3 & Heater Pipe

Courtesy of MAZDA MOTORS CORP.

14. Remove in the order indicated in **Fig. 30** .
15. Install in the reverse order of removal.
16. Start the engine and:
    - Verify the ignition timing, idle speed and idle mixture. (See **ENGINE TUNE-UP [LF]** .)
17. Perform a road test.



*:IF EQUIPPED

1	Dipstick
2	Cylinder head cover
3	Crankshaft pulley lock bolt
4	Crankshaft pulley
5	Water pump pulley
6	Drive belt idler pulley
7	Engine front cover
8	Front oil seal
9	Chain tensioner
10	Tensioner arm
11	Chain guide
12	Timing chain
13	Seal
14	Oil pump chain tensioner
15	Oil pump chain guide
16	Oil pump sprocket
17	Oil pump chain
18	Crankshaft sprocket

Fig. 30: Exploded View Of Timing Chain Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CRANKSHAFT PULLEY LOCK BOLT REMOVAL NOTE

1. Remove the cylinder block lower blind plug.
2. Install the **SST.**

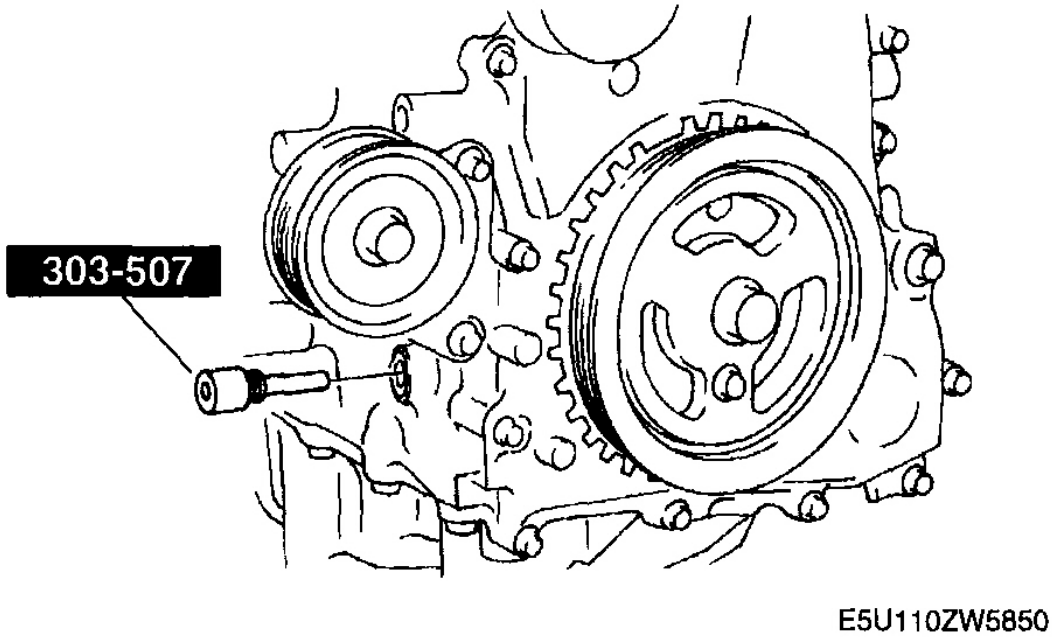


Fig. 31: Installing SST
Courtesy of MAZDA MOTORS CORP.

3. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight contacts the **SST**).
4. Hold the crankshaft pulley by using the **SSTs.**

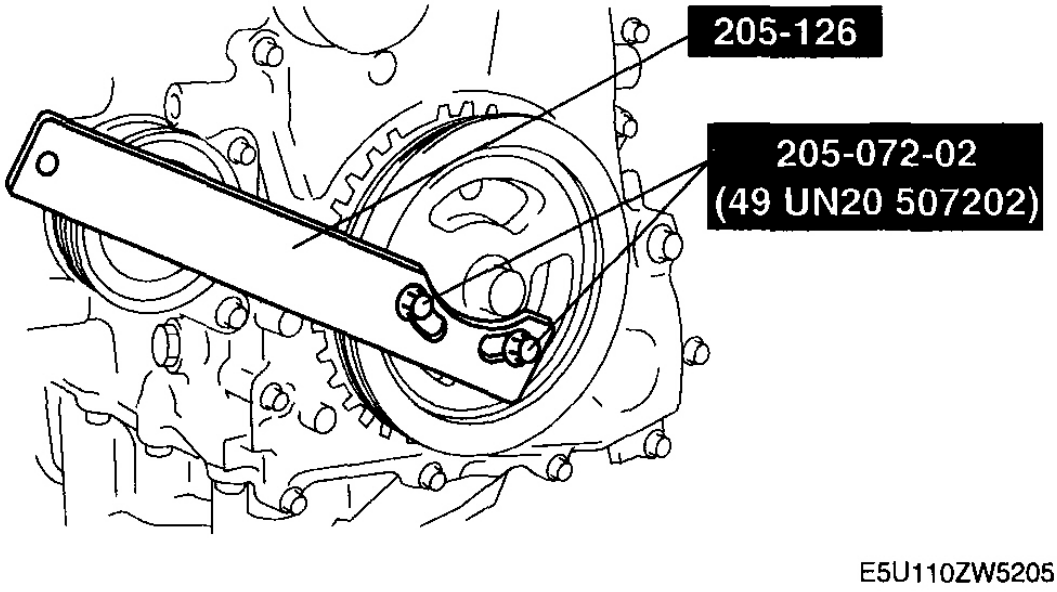


Fig. 32: Holding Crankshaft Pulley By Using SST
Courtesy of MAZDA MOTORS CORP.

5. Remove the crankshaft pulley lock bolt.

FRONT OIL SEAL REMOVAL NOTE

1. Remove the oil seal using a screwdriver as shown in **Fig. 33**.

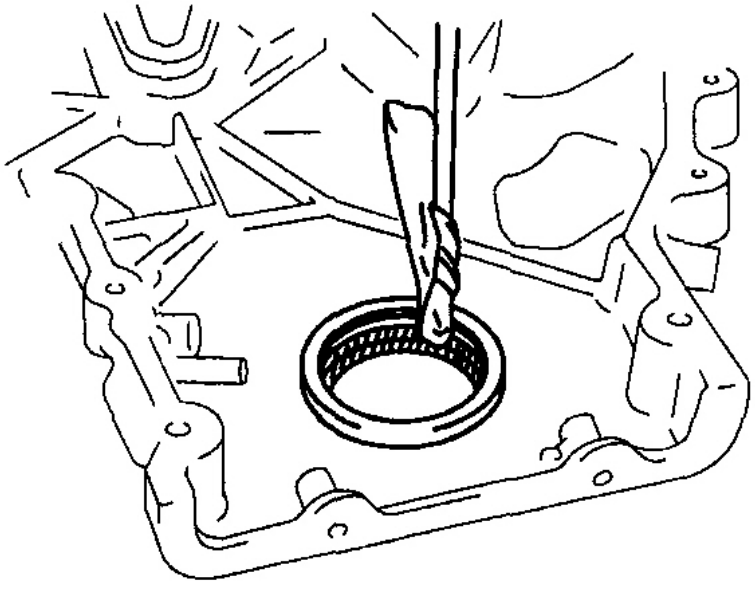


Fig. 33: Removing Oil Seal Using Screwdriver
Courtesy of MAZDA MOTORS CORP.

CHAIN TENSIONER REMOVAL NOTE

1. Using a thin screwdriver, hold the chain tensioner ratchet lock mechanism away from the ratchet stem.
2. Slowly compress the tensioner piston.
3. Hold the tensioner piston using a **1.5 mm {0.059 in}** wire or paper clip.

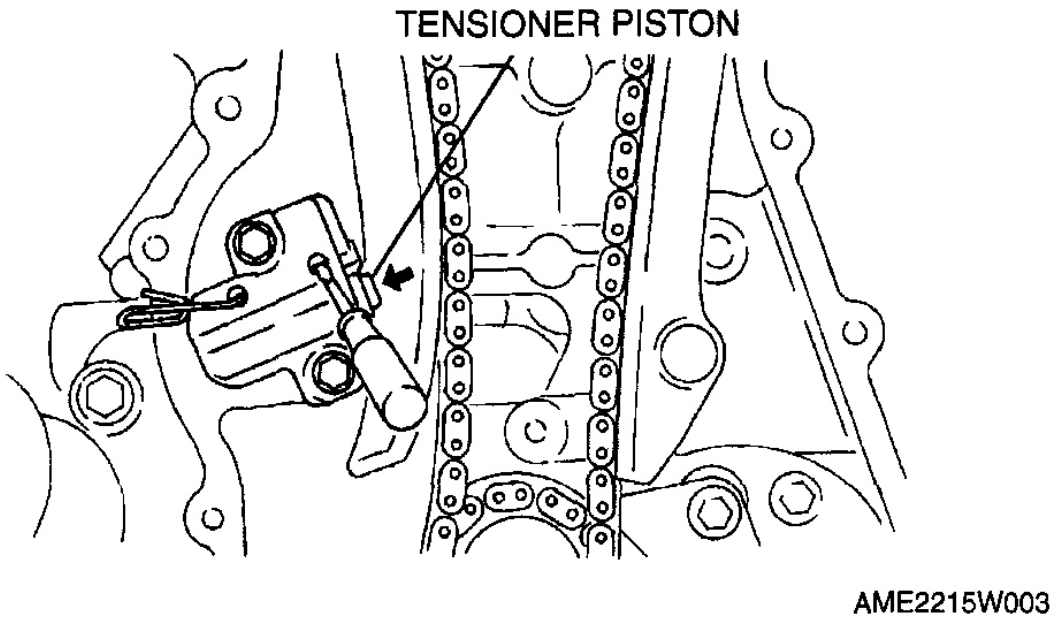


Fig. 34: Holding Chain Tensioner Ratchet Lock Mechanism And Tensioner Piston
Courtesy of MAZDA MOTORS CORP.

OIL PUMP SPROCKET REMOVAL NOTE

1. Temporarily install the crankshaft pulley and crankshaft pulley lock bolt to the crankshaft, and lock the oil pump against rotation as shown in figure.
2. Remove the oil pump sprocket, and then remove the crankshaft pulley and crankshaft pulley lock bolt.

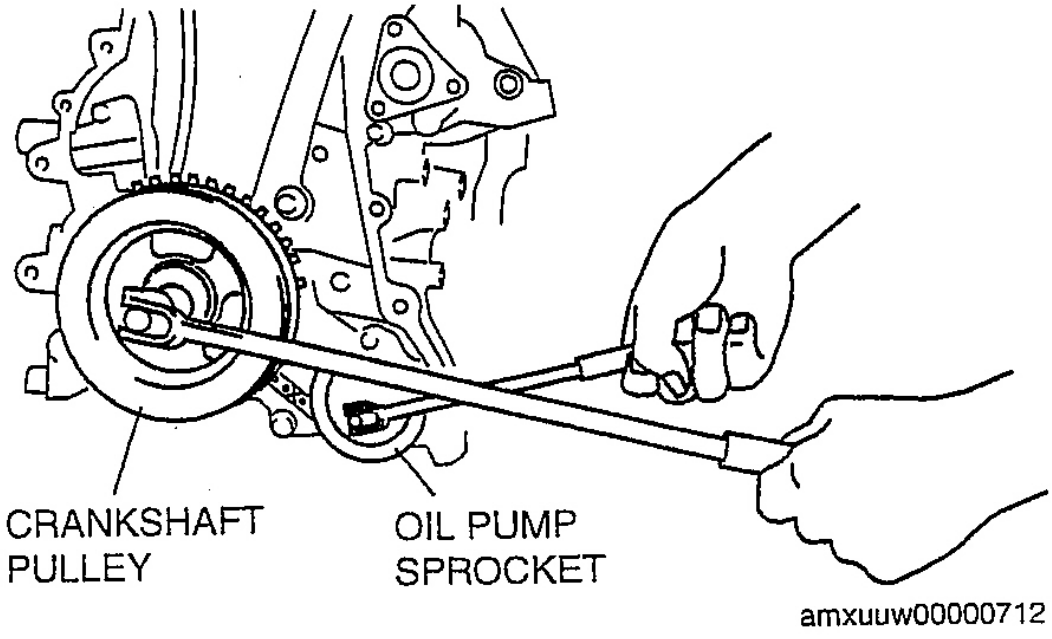


Fig. 35: Removing/Installing Oil Pump Sprocket And Crankshaft Pulley
Courtesy of MAZDA MOTORS CORP.

OIL PUMP SPROCKET INSTALLATION NOTE

1. Temporarily install the crankshaft pulley and crankshaft pulley lock bolt to the crankshaft, and lock the oil pump against rotation as shown in **Fig. 36**

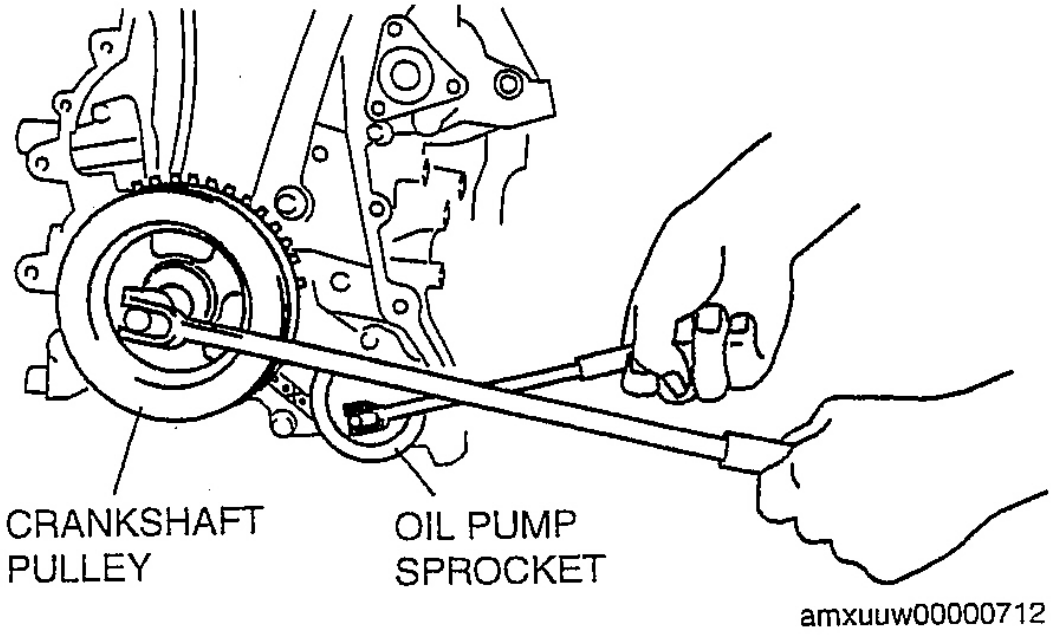


Fig. 36: Removing/Installing Oil Pump Sprocket And Crankshaft Pulley
Courtesy of MAZDA MOTORS CORP.

2. Install the oil pump sprocket, and then remove the crankshaft pulley and crankshaft pulley lock bolt.

   Tightening torque

   20-30 N.m {2.1-3.0 kgf.m, 14.8-22.1 ft.lbf}

TIMING CHAIN INSTALLATION NOTE

1. Install the **SST** to the camshaft as shown in **Fig. 37**.
2. Install the timing chain.

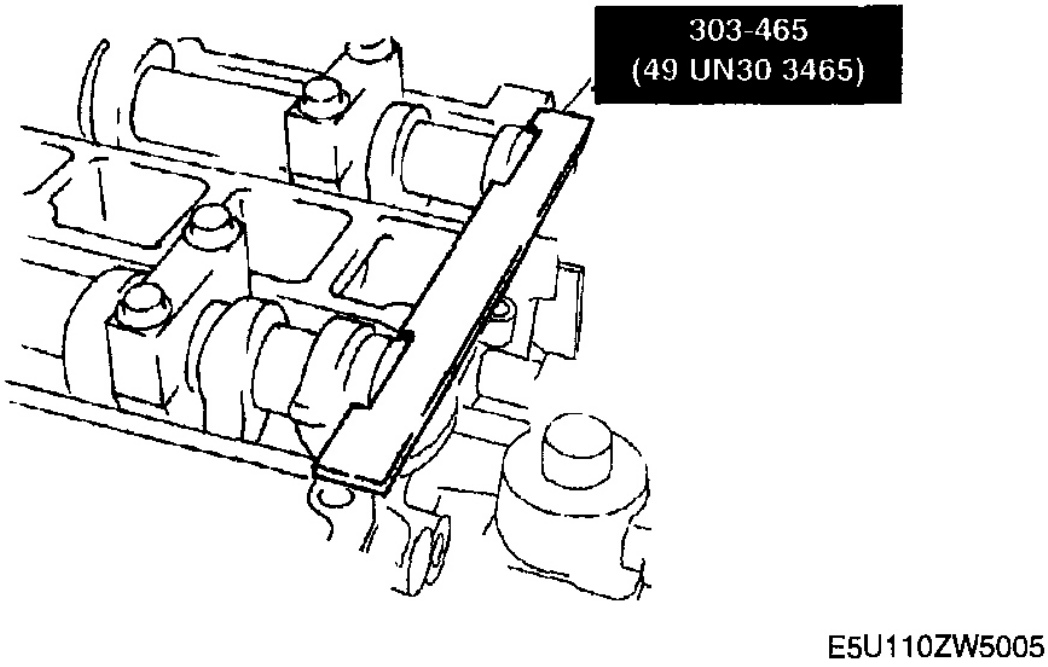


Fig. 37: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

3. Remove the retaining wire or paper clip from the chain tensioner to apply tension to the timing chain.

ENGINE FRONT COVER INSTALLATION NOTE

NOTE:
- **Install the front oil seal before performing the following procedure.**

1. Apply silicone sealant to the engine front cover as shown in **Fig. 38**.

CAUTION:
- **Install the engine front cover within 10 minutes of applying the silicone sealant.**
- **Silicone sealant is not need in area C as indicated below due to an existing.**

Thickness

A: 2.0-3.0 mm {0.079-0.118 in}

B: 1.5-2.5 mm {0.059-0.098 in}

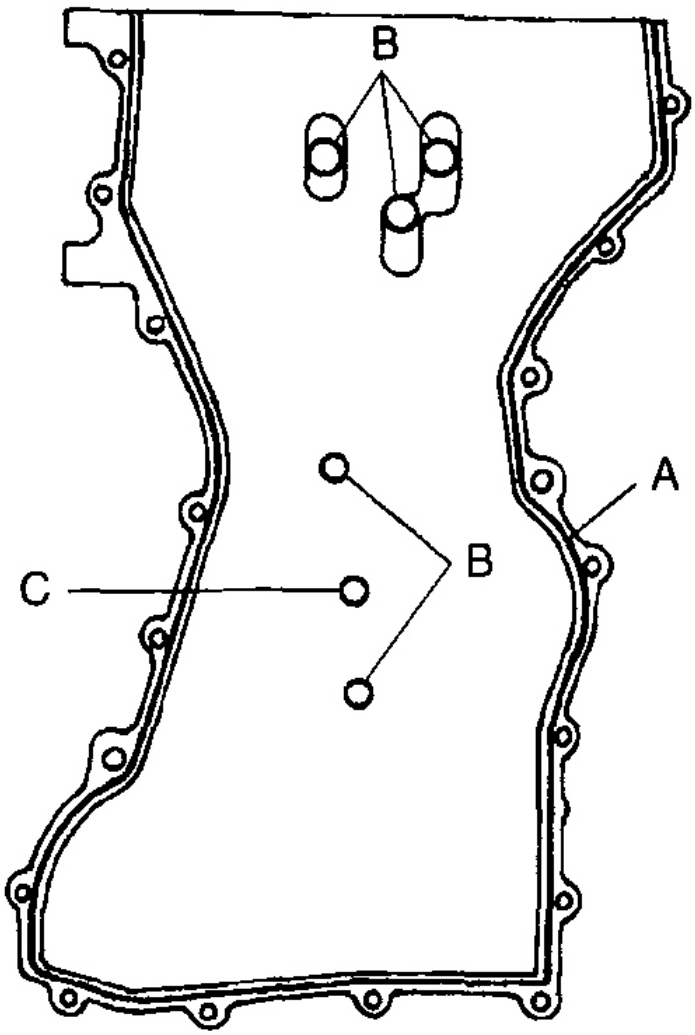


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Fig. 38: Applying Silicone Sealant To Engine Front Cover
Courtesy of MAZDA MOTORS CORP.

2. Install the engine front cover bolts in the order as shown in **Fig. 39**.

ENGINE FRONT COVER BOLTS TIGHTENING TORQUE

Bolt No.	Tightening torque
1-18	**8.0-11.5 N.m {81.6-117.2 kgf.cm, 70.9-101.7 in.lbf}**
19-22	**40-55 N.m {4.1-5.6 kgf.m, 29.7-40.5 ft.lbf}**

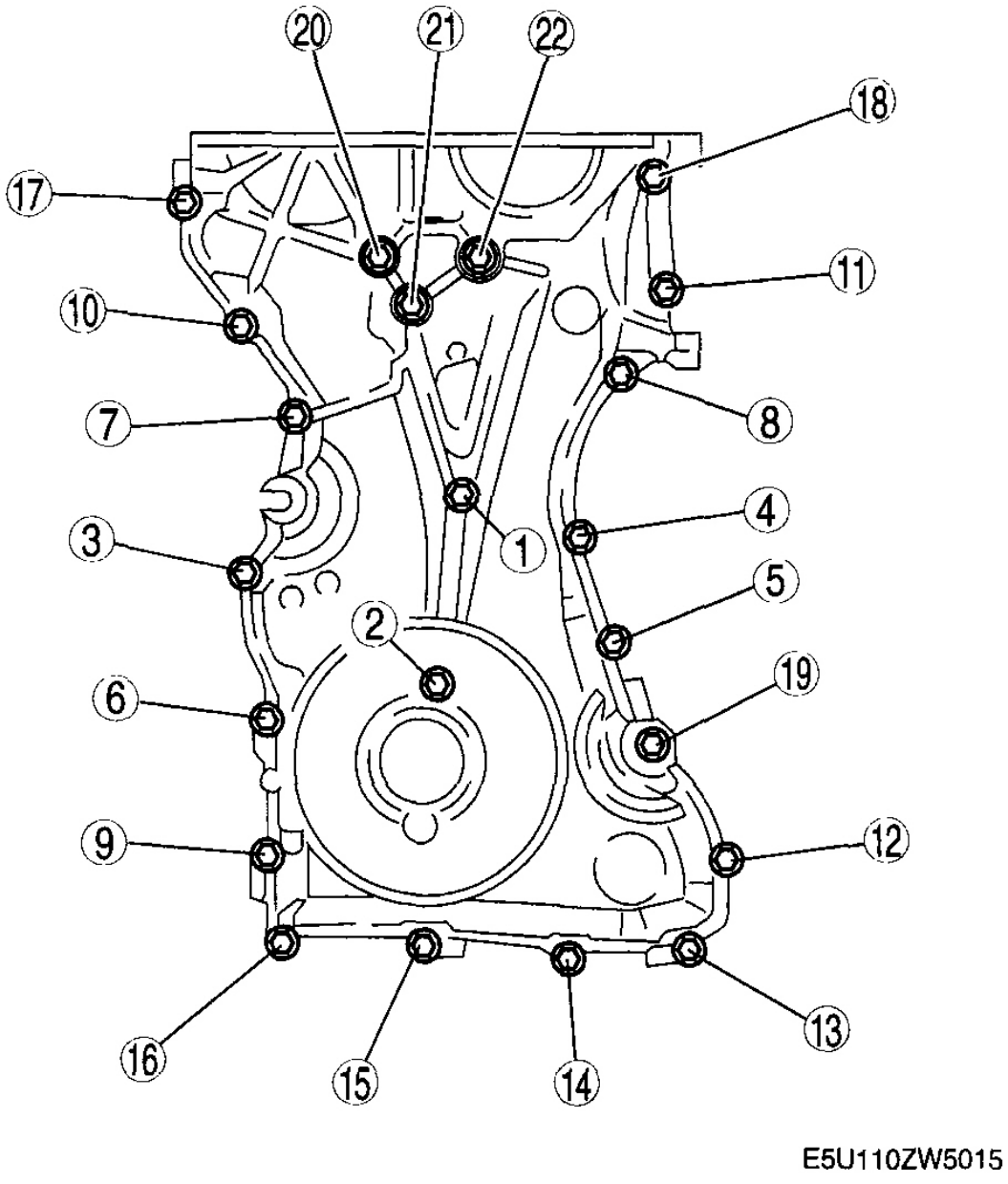


Fig. 39: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

FRONT OIL SEAL INSTALLATION NOTE

1. Apply clean engine oil to a new oil seal.
2. Push the front oil seal in the engine front cover by hand.
3. Compress the oil seal using the **SST** and a hammer.

Front oil seal press-in amount

0-1.0 mm {0-0.039 in}

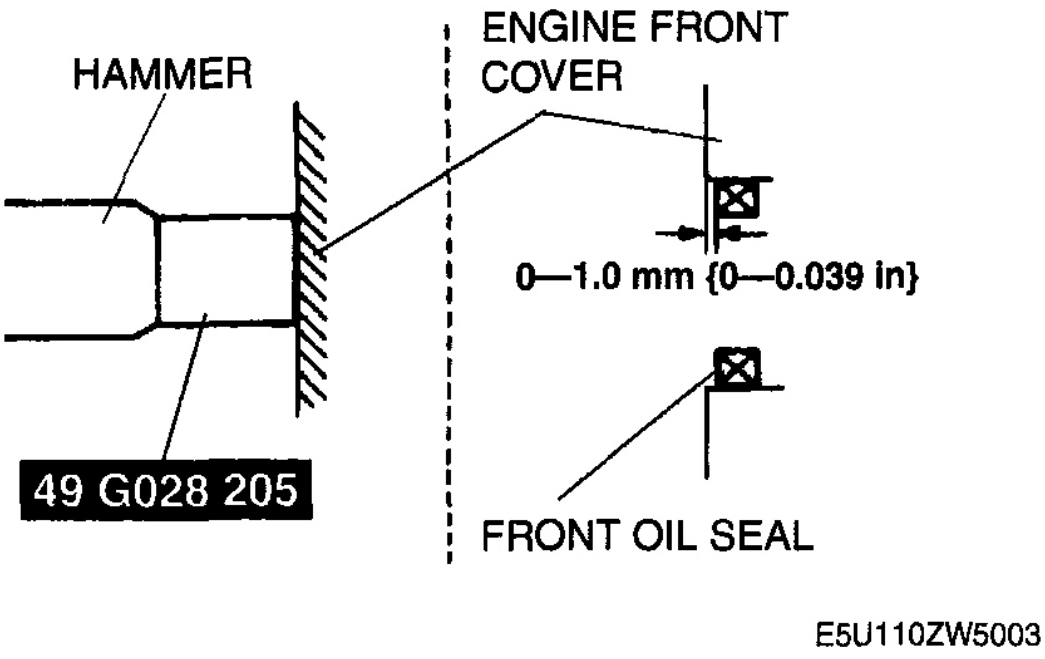


Fig. 40: Compressing Oil Seal Using SST & Hammer
Courtesy of MAZDA MOTORS CORP.

CRANKSHAFT PULLEY LOCK BOLT INSTALLATION NOTE

1. Install the **SST** to the camshaft as shown in **Fig. 41**.

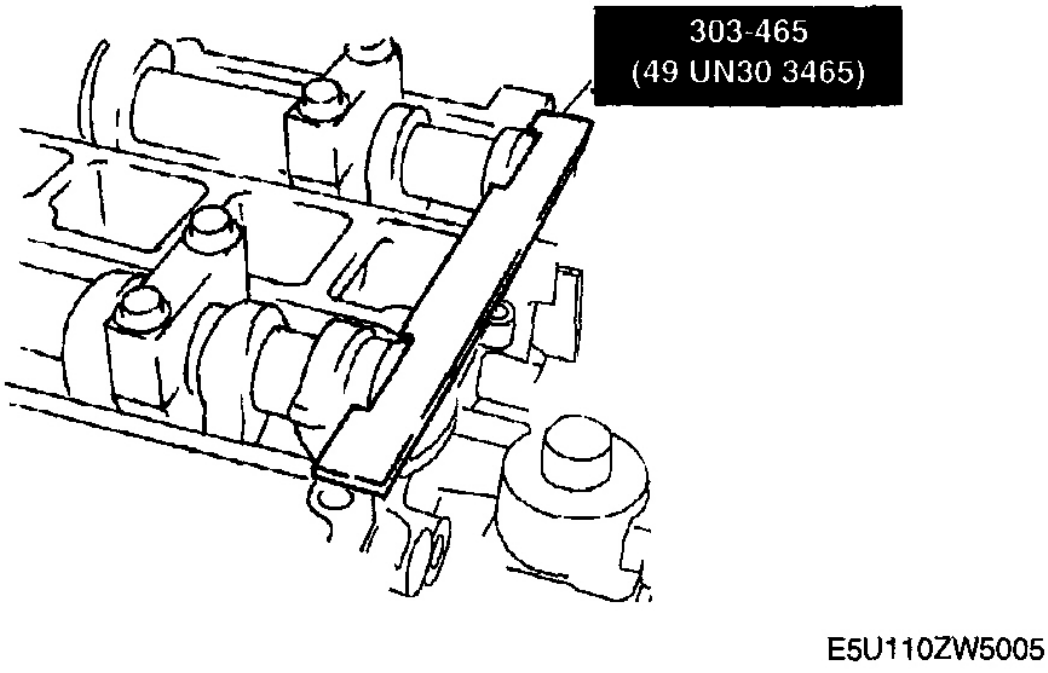


Fig. 41: Installing SST To Camshaft
Courtesy of MAZDA MOTORS CORP.

2. Verify that cylinder No.1 is at TDC of the compression stroke. (Crankshaft balance weight contacts **SST.**)
3. To position the crankshaft pulley, temporarily tighten it and, using a suitable bolt **(M6 X 1.0 length 25 mm-35 mm {0.99 in-1.37 in}),** fix the crankshaft pulley to the engine front cover.

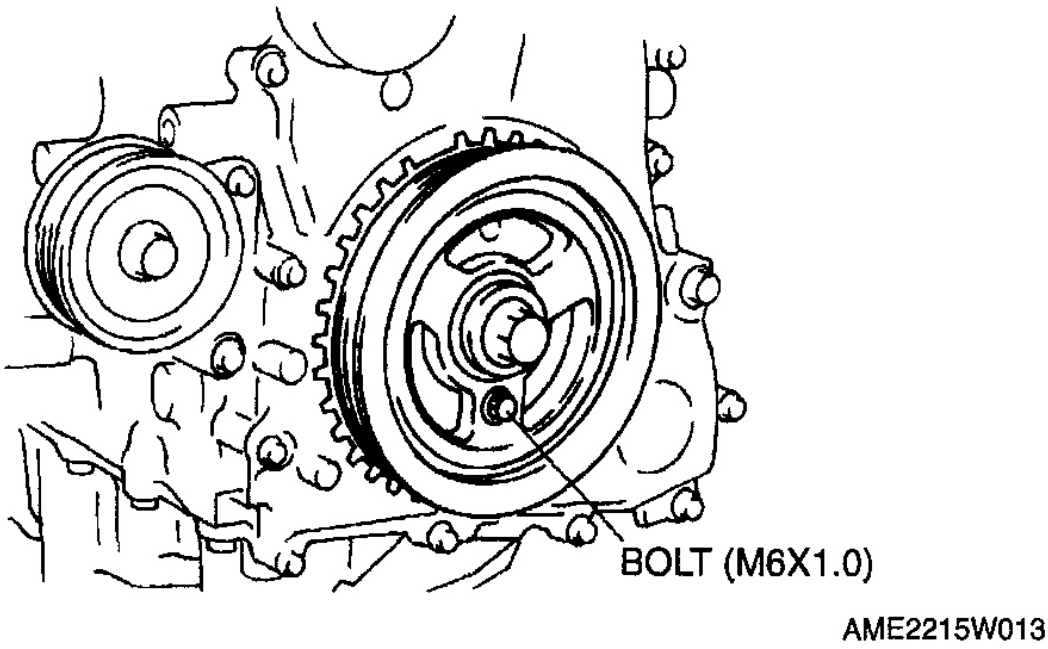


Fig. 42: Identifying Crankshaft Pulley Bolt
Courtesy of MAZDA MOTORS CORP.

4. Install the **SSTs** to the crankshaft pulley, lock the crankshaft against rotation.
5. Tighten the crankshaft pulley lock bolt using the following two steps.

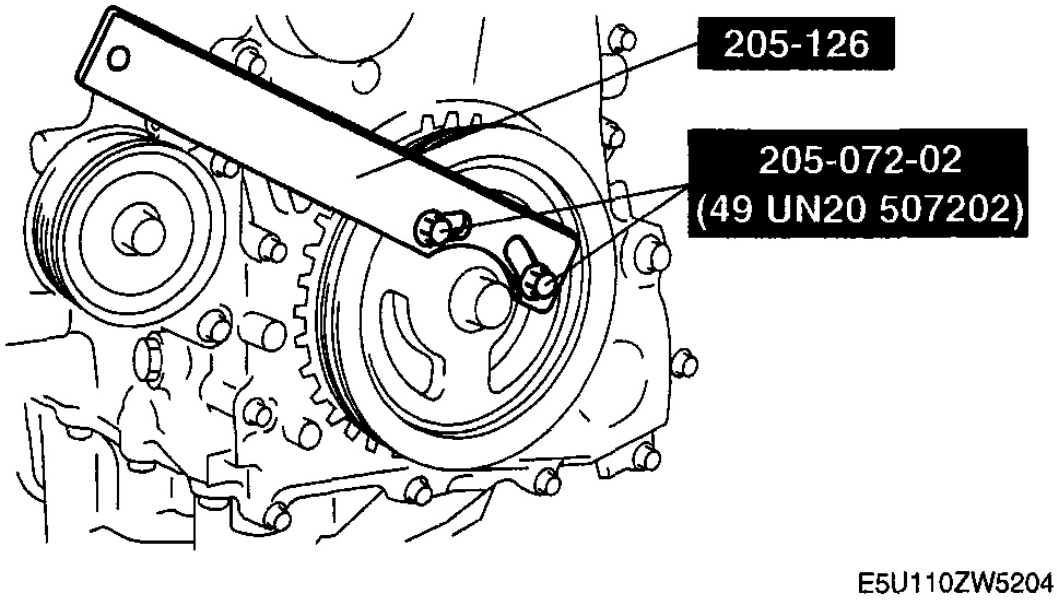


Fig. 43: Installing SSTs To Crankshaft Pulley
Courtesy of MAZDA MOTORS CORP.

1. Tighten to **96-104 N.m {9.8-10.6 kgf.m, 70.9-76.7 ft.lbf}**
2. Tighten **87°- 93°**

6. Remove the **M6 x 1.0 bolt.**
7. Remove the **SST** from the camshaft.
8. Remove the **SST** from the cylinder block lower blind plug.
9. Remove the **SST** from the crankshaft pulley.
10. Rotate the crankshaft clockwise two turns until the TDC position.
    - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 1.
11. Install the cylinder block lower blind plug.

Tightening torque:

18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbf}

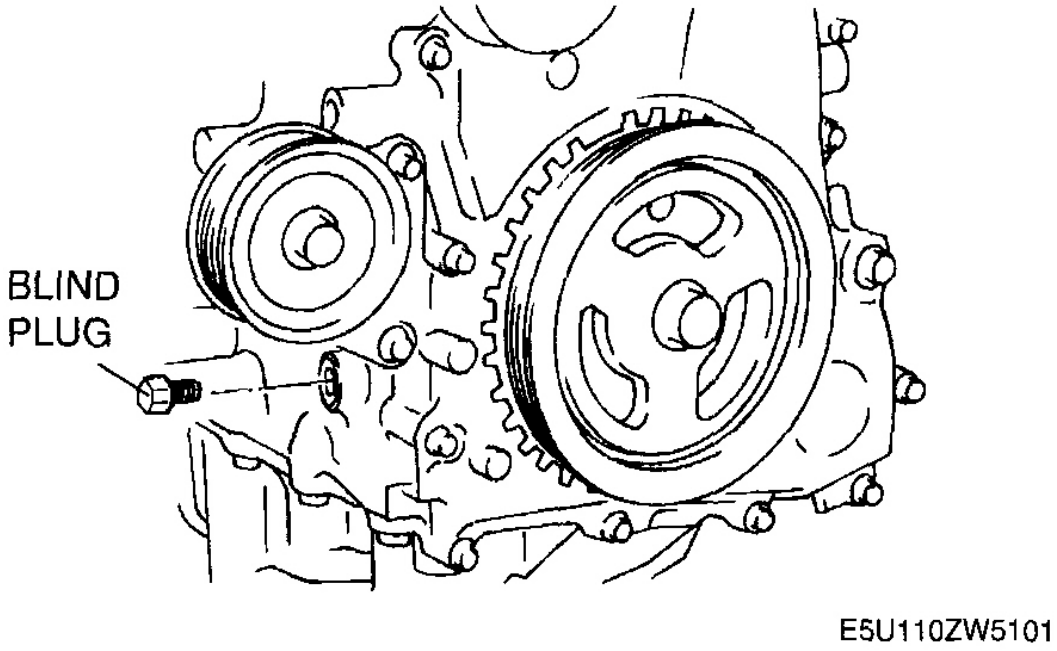


Fig. 44: Identifying Cylinder Block Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD COVER INSTALLATION NOTE

1. Apply silicone sealant to the mating surfaces as shown in **Fig. 45**.

CAUTION:
- **Install the cylinder head cover within 10 minutes of applying the silicone sealant.**

Thickness:

4.0-6.0 mm {0.16-0.23 in}

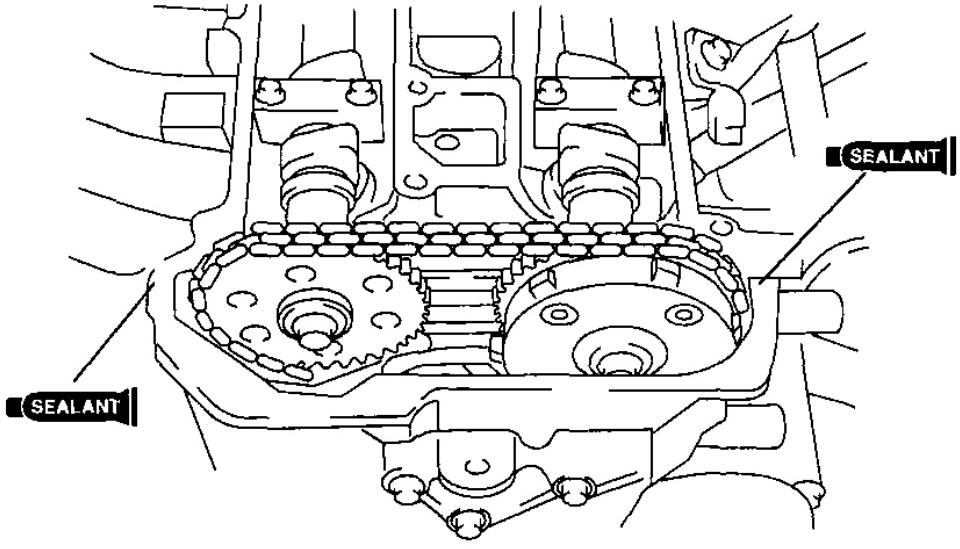


Fig. 45: Applying Silicone Sealant To Mating Surfaces
Courtesy of MAZDA MOTORS CORP.

2. Install the cylinder head cover with a new gasket.
3. Tighten the bolts in the order shown in **Fig. 46**.

Tightening torque:

8.0-10.5 N.m {81.6-107.1 kgf.cm, 70.8-92.9 in.lbf}

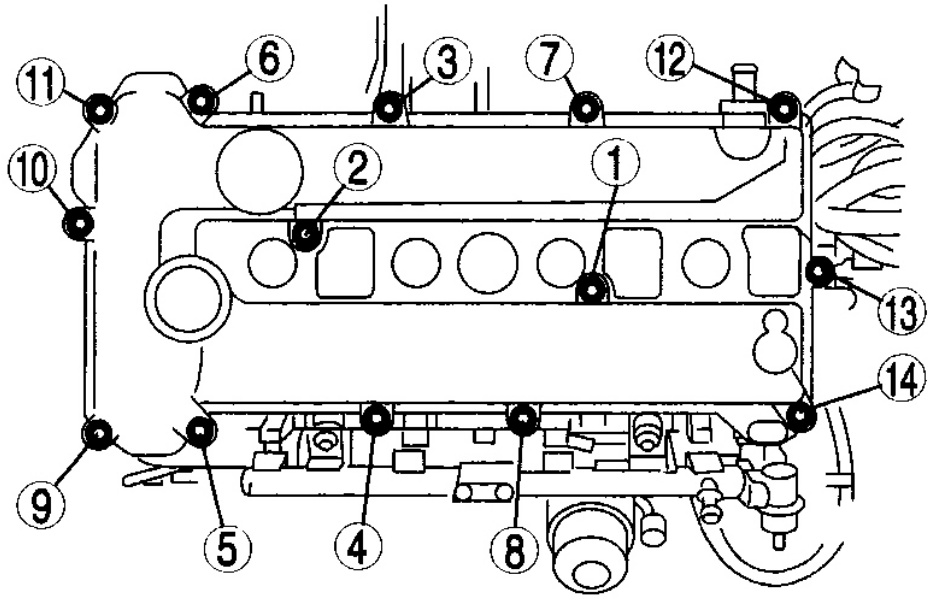


Fig. 46: Cylinder Head Cover Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

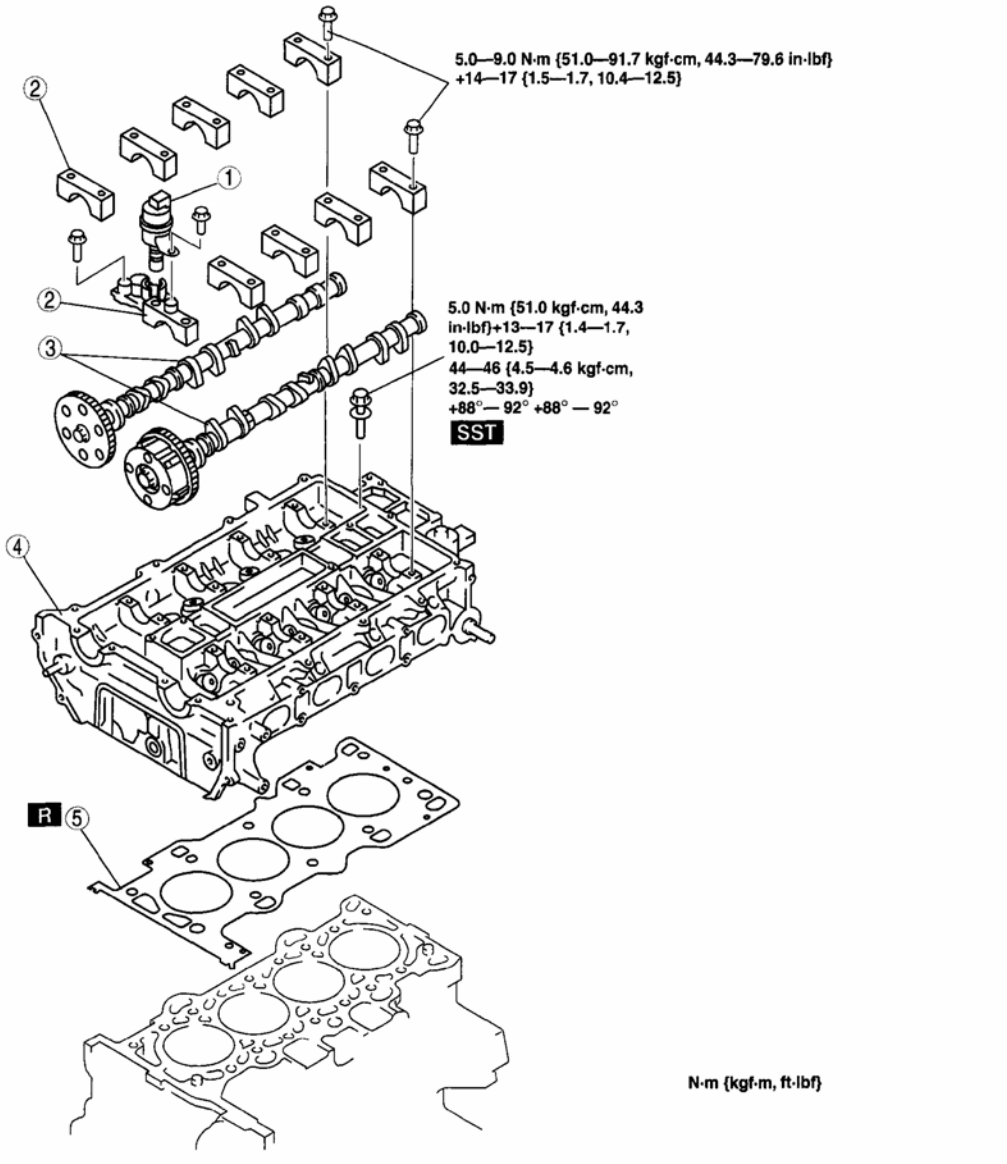
CYLINDER HEAD GASKET REPLACEMENT [LF]

WARNING:

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (See BEFORE SERVICE PRECAUTION [LF] .)**

1. Perform "Fuel Line Safety Procedures". Leave the fuel pump relay removed. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the front suspension tower bar (joint, right side, left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
5. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)

6. Remove the dynamic chamber. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
7. Remove the ignition coil. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
8. Remove the drive belt. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
9. Remove the CKP sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
10. Remove the P/S oil pump with the oil hose still connected and position the P/S oil pump so that it is out of the way. (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
11. Remove the timing chain. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
12. Remove the wiper arm. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
13. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
14. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
15. Remove the service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)
16. Disconnect the generator, but do not remove it from the vehicle. Fix the generator using a rope to prevent it from falling. (See **GENERATOR REMOVAL/INSTALLATION [LF]** .)
17. Remove the exhaust manifold. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
18. Remove in the order indicated in **Fig. 47** .
19. Install in the reverse order of removal.
20. Inspect the compression. (See **COMPRESSION INSPECTION [LF]** .)
21. Start the engine and:
    - Inspect for the engine coolant leakage.
    - Verify the ignition timing, idle speed and idle mixture. (See **ENGINE TUNE-UP [LF]** .)



1	OCV (With variable valve timing mechanism.)
2	Camshaft cap
3	Camshaft
4	Cylinder head
5	Cylinder head gasket

Fig. 47: Identifying Cylinder Head Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CAMSHAFT REMOVAL NOTE

NOTE:

- **The cylinder head and the camshaft caps are numbered to make sure they**

are reassembled in their original position. Do not mix the caps.

1. Loosen the camshaft cap bolts in several passes in the order shown in **Fig. 48**.

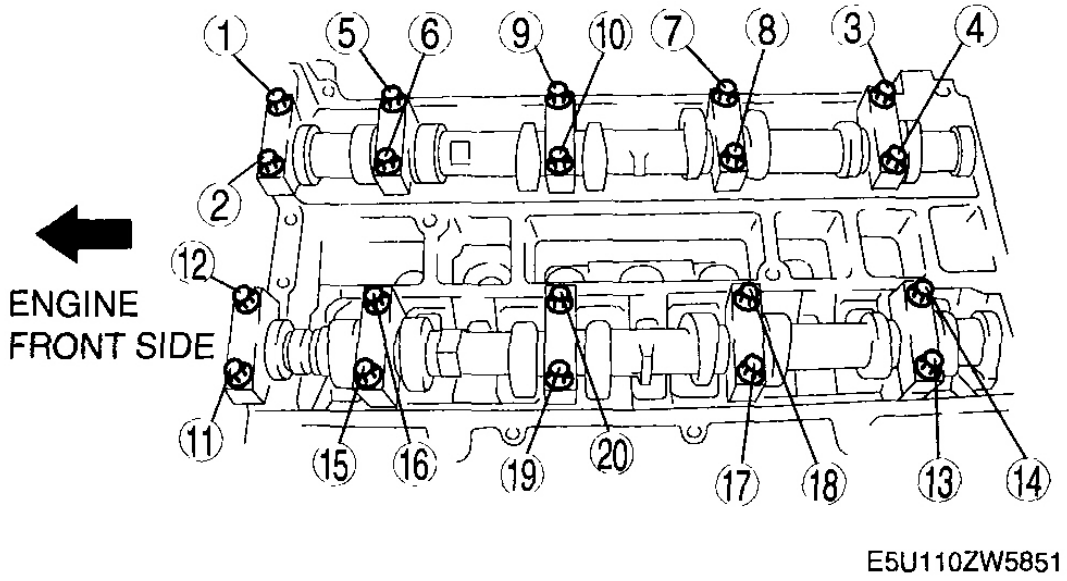


Fig. 48: Loosening Sequence Of Camshaft Cap Bolts
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD REMOVAL NOTE

1. Loosen the cylinder head bolts in two or three steps in the order shown in **Fig. 49**.

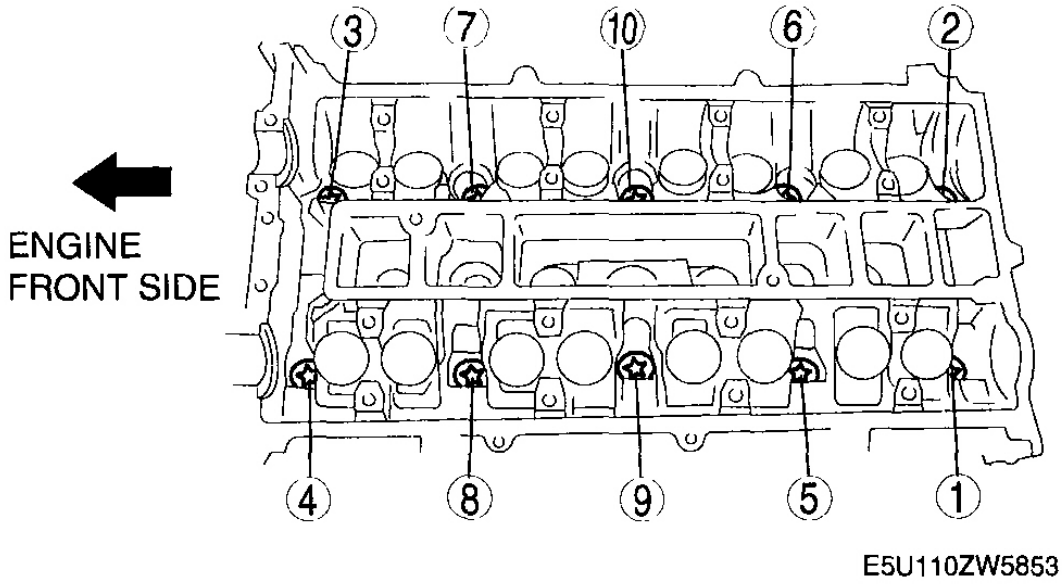


Fig. 49: Loosening Sequence Of Cylinder Head Bolts
Courtesy of MAZDA MOTORS CORP.

CYLINDER HEAD INSTALLATION NOTE

1. Measure the length of each cylinder head bolt.
   - Replace any that exceed the maximum length.

   Cylinder Head Bolt Length L

   145.2-145.8 mm {5.72-5.74 in}

   Cylinder Head Bolt Maximum

   146.5 mm {5.77 in}

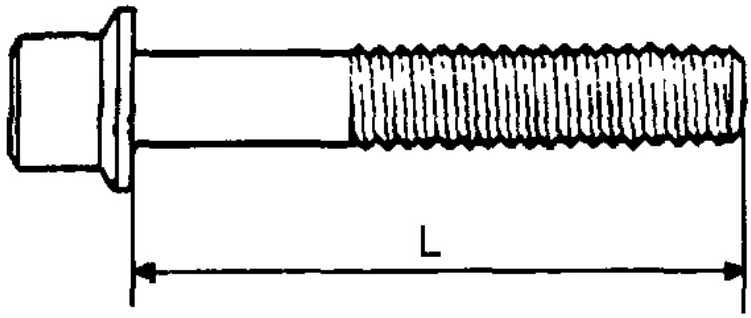


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Fig. 50: Measuring Length Of Cylinder Head Bolt
Courtesy of MAZDA MOTORS CORP.

2. Tighten the cylinder head bolts in the order shown in **Fig. 51** with the following 5 steps using the **SST (49 D032 316).**
    1. Tighten to **5.0 N.m {51.0 kgf.cm, 44.3 in.lbf}**
    2. Tighten **13-17 N.m {1.4-1.7 kgf.m, 10.0-12.5 ft.lbf}**
    3. Tighten **44-46 N.m {4.5-4.6 kgf.m, 32.5-33.9 ft.lbf)**
    4. Tighten **88+/-92°**
    5. Tighten **88+/-92°**

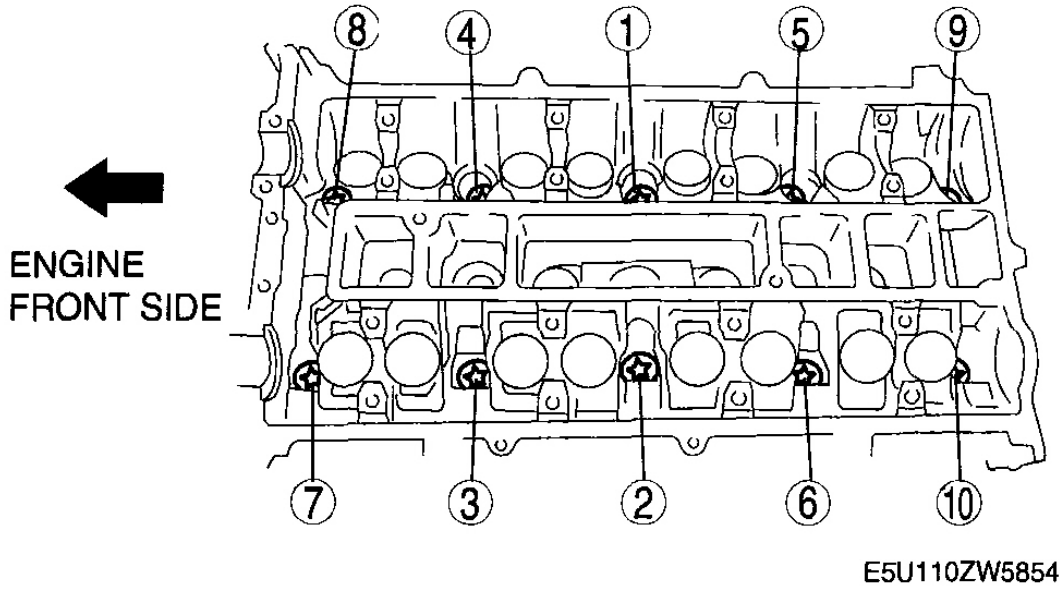


Fig. 51: Cylinder Head Bolt Tightening Sequence
Courtesy of MAZDA MOTORS CORP.

CAMSHAFT INSTALLATION NOTE

1. Set the cam position of No.1 cylinder at the top dead center (TDC) and install the camshaft.
2. Temporarily tighten the camshaft bearing caps evenly in two or three steps.
3. Tighten the camshaft cap bolts in the order shown in **Fig. 52** with the following two steps.
    1. Tighten to **5.0-9.0 N.m {51.0-91.7 kgf.cm, 44.3-79.6 in.lbf}**
    2. Tighten to **14.0-17.0 N.m {1.5-1.7 kgf.m, 10.4-12.5 ft.lbf}**

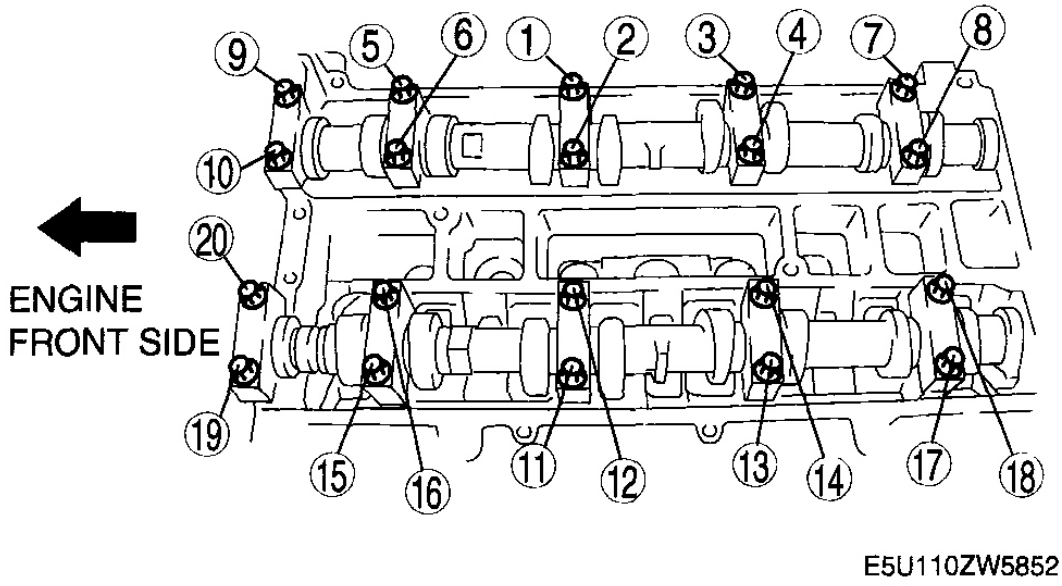
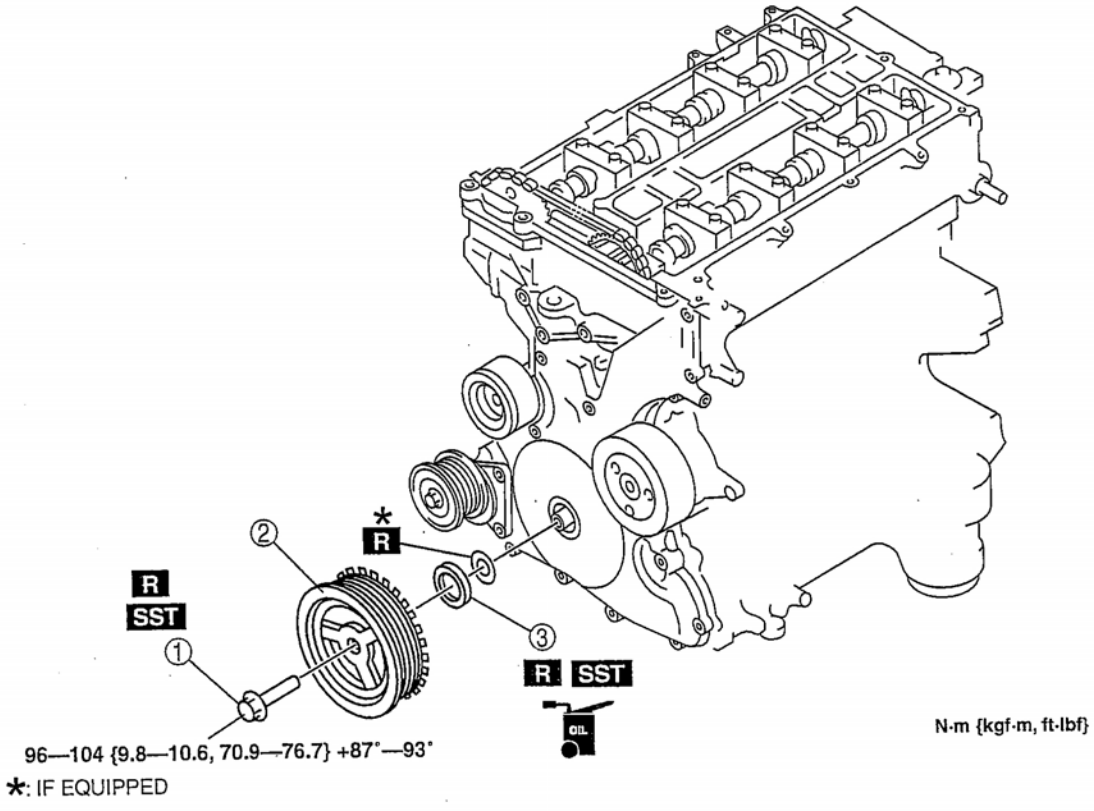


Fig. 52: Tightening Sequence Of Camshaft Cap Bolts
Courtesy of MAZDA MOTORS CORP.

FRONT OIL SEAL REPLACEMENT [LF]

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the air cleaner. (See **AIR CLEANER ELEMENT INSPECTION [LF]** .)
3. Remove the drive belt. (See **DRIVE BELT INSPECTION [LF]** .)
4. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
5. Remove the front suspension tower bar. (joint)
6. Remove the ignition coil. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
7. Remove the OCV connector.
8. Remove the cylinder head cover. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
9. Remove the CKP sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
10. Remove in the order indicated in **Fig. 53** .
11. Install in the reverse order of removal.



1	Crankshaft pulley lock bolt
2	Crankshaft pulley
3	Front oil seal

Fig. 53: Identifying Front Oil Seal Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CRANKSHAFT PULLEY LOCK BOLT REMOVAL NOTE

1. Remove the cylinder block lower blind plug.
2. Install the **SST.**

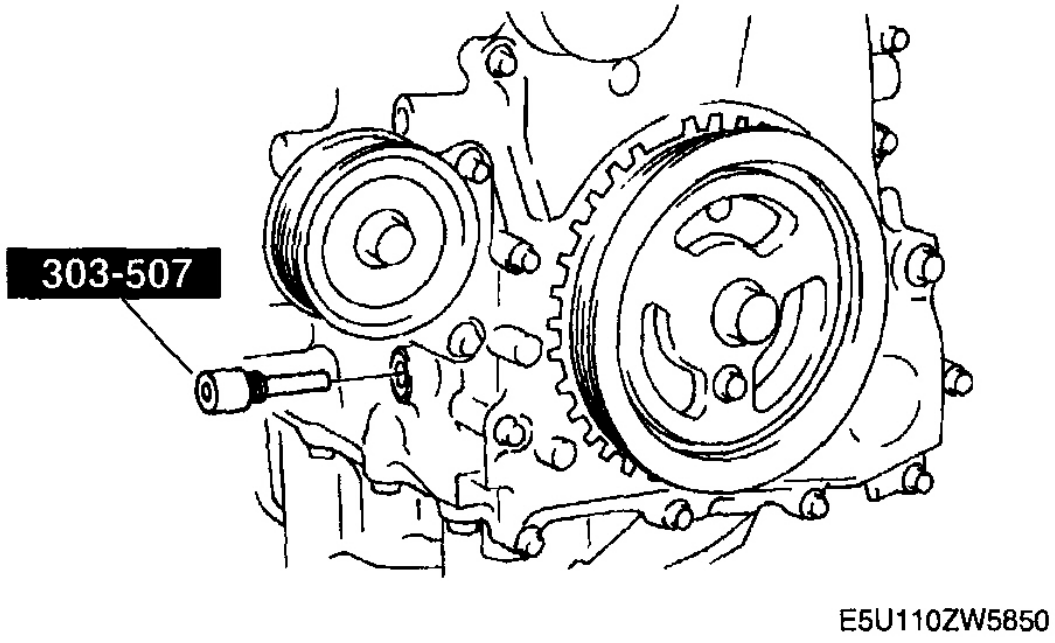


Fig. 54: Installing SST
Courtesy of MAZDA MOTORS CORP.

3. Turn the crankshaft clockwise until the crankshaft is in the No.1 cylinder TDC position (until the balance weight contacts the **SST**).
4. Hold the crankshaft pulley using the **SSTs.**

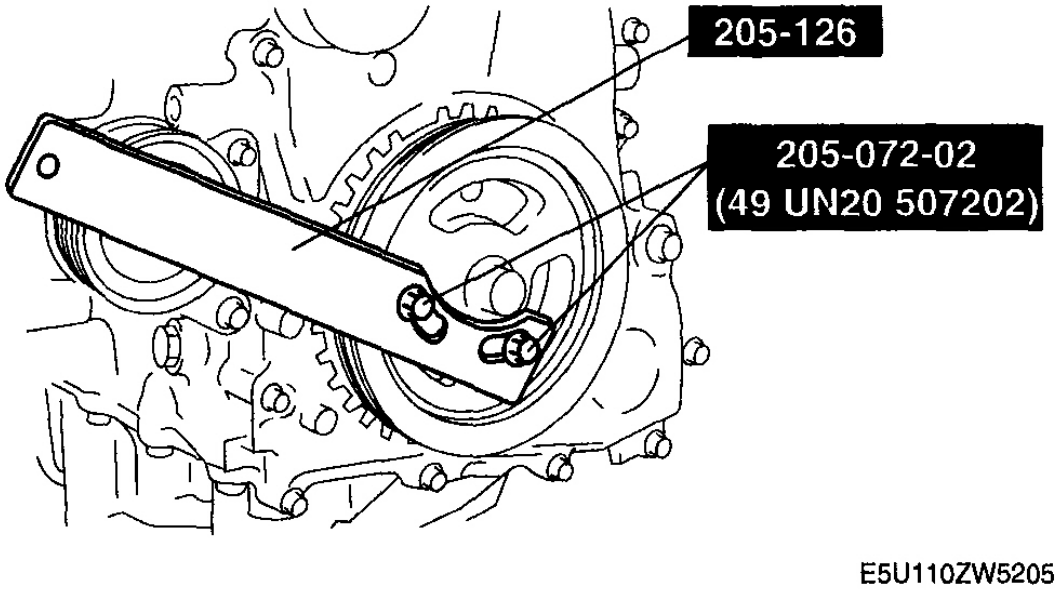


Fig. 55: Holding Crankshaft Pulley Using SST
Courtesy of MAZDA MOTORS CORP.

5. Remove the crankshaft pulley lock bolt.

FRONT OIL SEAL REMOVAL NOTE

1. Cut the oil seal lip using a razor knife.
2. Remove the oil seal using a screwdriver wrapped with a rag.

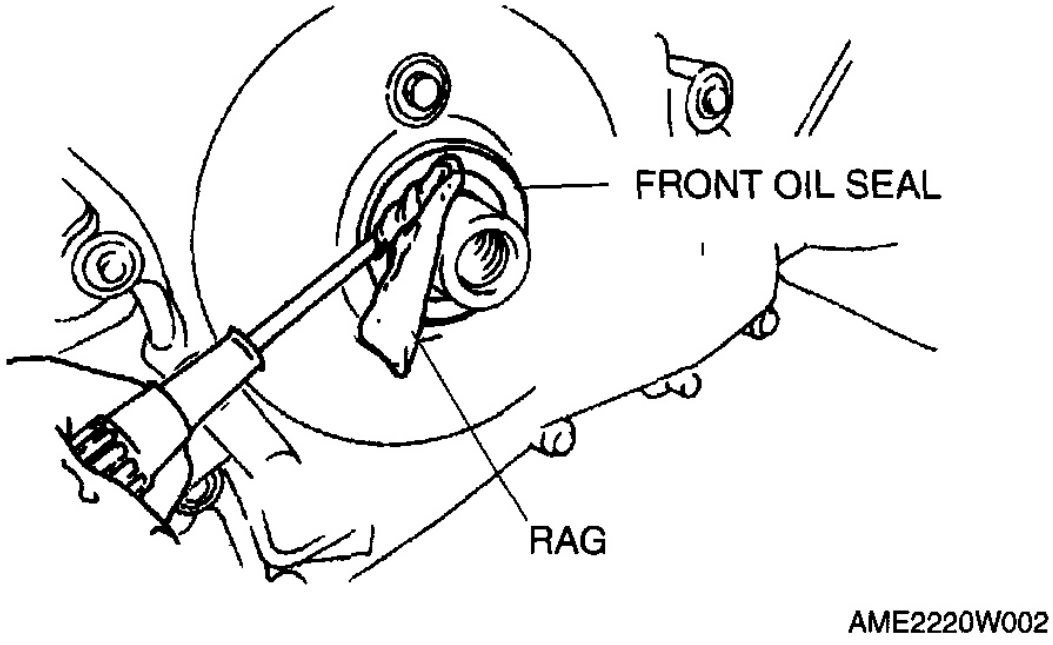


Fig. 56: Removing Front Oil Seal Using Screwdriver Wrapped With Rag
Courtesy of MAZDA MOTORS CORP.

FRONT OIL SEAL INSTALLATION NOTE

1. Apply clean engine oil to a new oil seal.
2. Push the front oil seal in the engine front cover by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.

Front oil seal press-in amount

0-1.0 mm {0-0.039 in}

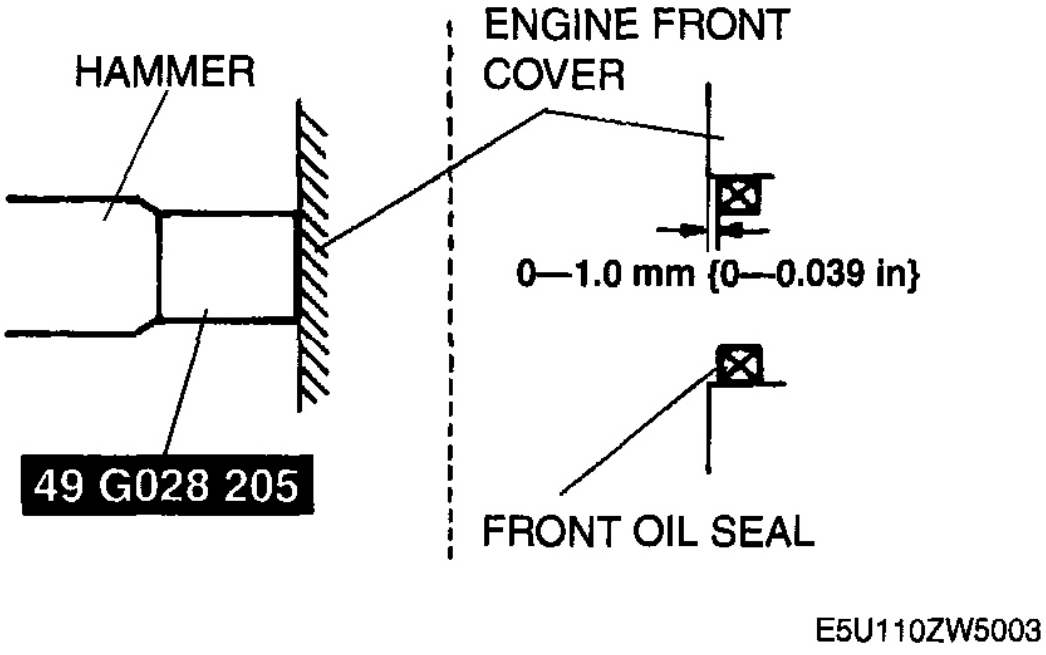


Fig. 57: Tapping Front Oil Seal In Evenly Using SST & Hammer
Courtesy of MAZDA MOTORS CORP.

CRANKSHAFT PULLEY LOCK BOLT INSTALLATION NOTE

1. Install the **SST** on the camshaft as shown in **Fig. 58**.
2. Verify that cylinder No.1 is at TDC of the compression stroke. (Crankshaft balance weight contacts **SST.**)

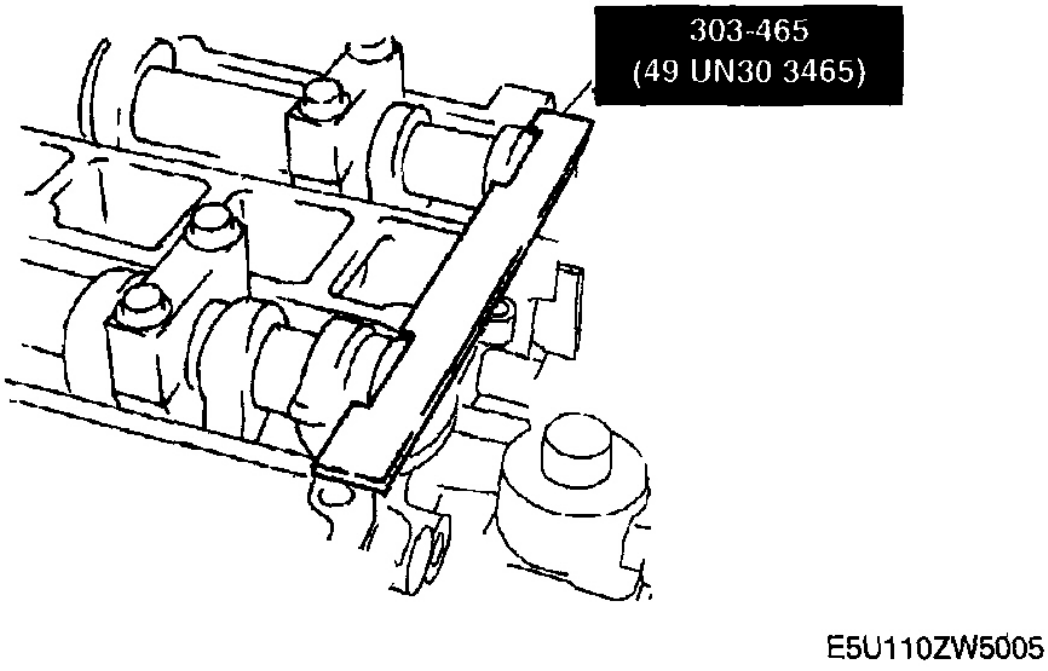


Fig. 58: Installing SST On Camshaft
Courtesy of MAZDA MOTORS CORP.

3. To position the crankshaft pulley, temporarily tighten it and, using a suitable bolt **(M6 X 1.0 length 25 mm - 35 mm {0.99 in - 1.37 in}),** fix the crankshaft pulley to the engine front cover.

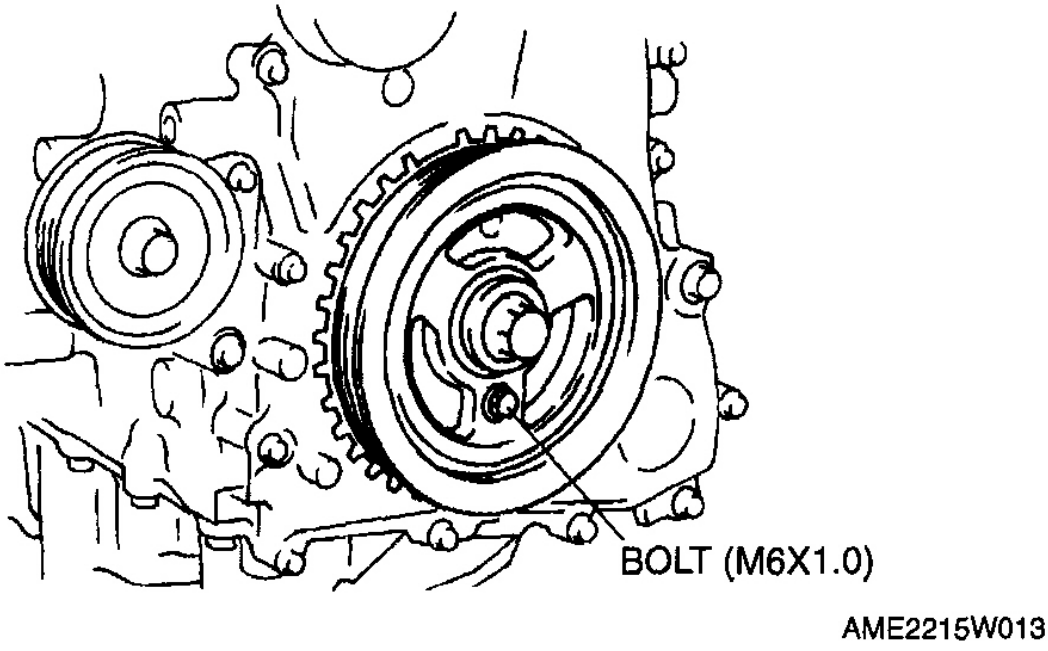


Fig. 59: Identifying Crankshaft Pulley Bolt
Courtesy of MAZDA MOTORS CORP.

4. Install the **SSTs** to the crankshaft pulley, lock the crankshaft against rotation.
5. Tighten the crankshaft pulley lock bolt in the order shown in **Fig. 60** using the following two steps.
    1. Tighten to **96-104 N.m {9.8-10.6 kgf.m, 70.9-76.7 ft.lbf}**
    2. Tighten **87°-93°**

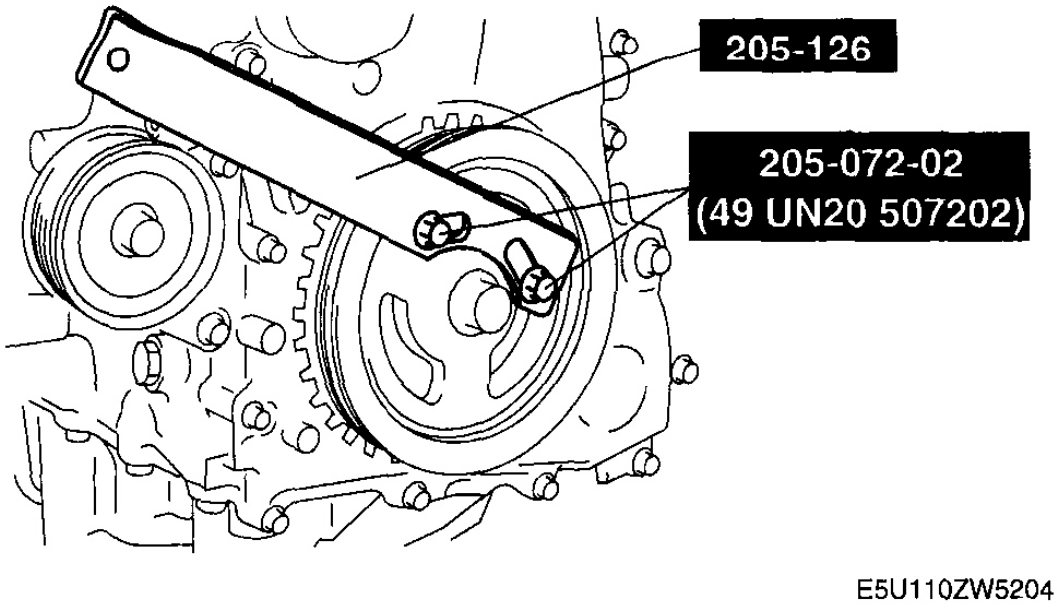


Fig. 60: Installing SSTs To Crankshaft Pulley
Courtesy of MAZDA MOTORS CORP.

6. Remove the **M6 x 1.0** bolt.
7. Remove the **SST** from the camshaft.
8. Remove the **SST** from the cylinder block lower blind plug.
9. Remove the **SST** from the crankshaft pulley.
10. Rotate the crankshaft clockwise two turns until the TDC position.
    - If not aligned, loosen the crankshaft pulley lock bolt and repeat from Step 4.
11. Install the cylinder block lower blind plug.

Tightening torque:

18-22 N.m {1.9-2.2 kgf.m, 13.3-16.2 ft.lbf}

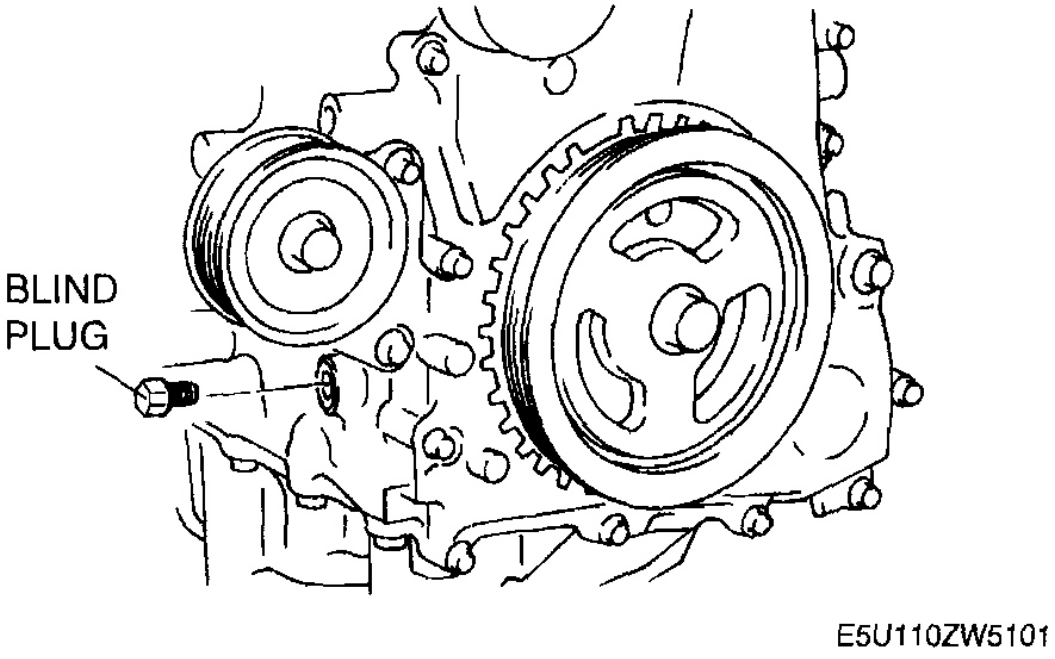
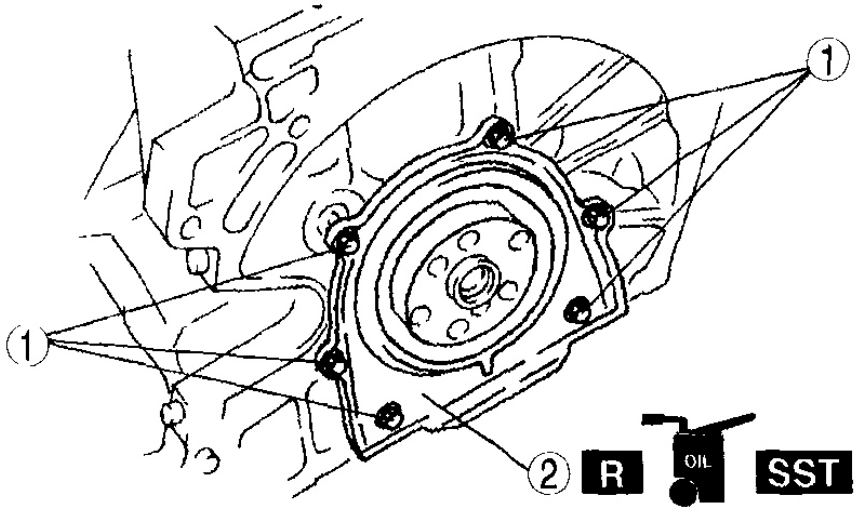


Fig. 61: Installing Cylinder Block Lower Blind Plug
Courtesy of MAZDA MOTORS CORP.

REAR OIL SEAL REPLACEMENT [LF]

1. Remove the flywheel (MT) or Remove the drive plate (AT). (See **CLUTCH UNIT REMOVAL/INSTALLATION** .) (See **DRIVE PLATE REMOVAL/INSTALLATION [SJ6A-EL]** .)
2. Remove in the order indicated in **Fig. 62** .
3. Install in the reverse order of removal.



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1	Bolt
2	Rear oil seal

Fig. 62: Installing Rear Oil Seal With Bolts
Courtesy of MAZDA MOTORS CORP.

REAR OIL SEAL INSTALLATION NOTE

1. Apply silicone sealant to the mating faces as shown in **Fig. 63**.

   Thickness:

   4.0-6.0 mm {0.16-0.23 in}

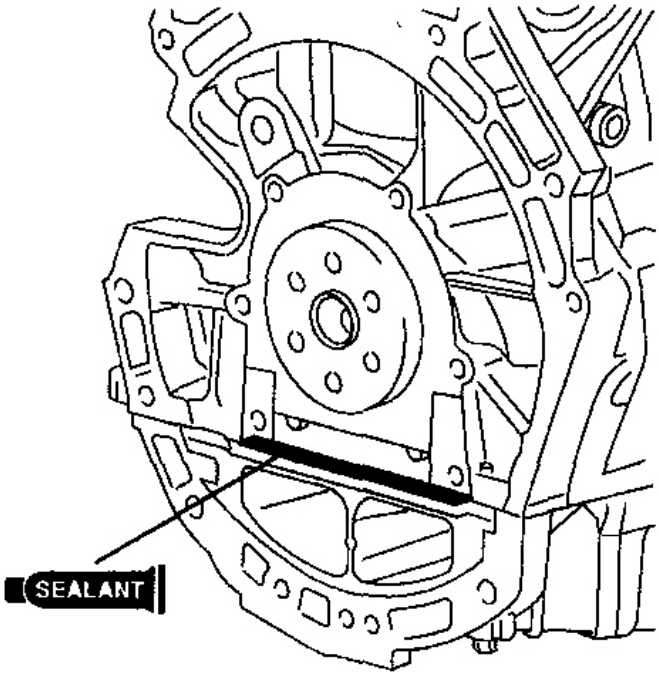


Fig. 63: Applying Silicone Sealant To Mating Faces
Courtesy of MAZDA MOTORS CORP.

2. Apply clean engine oil to the new oil seal lip.
3. Install the **SST** to the non-woven fabric side of the rear oil seal.

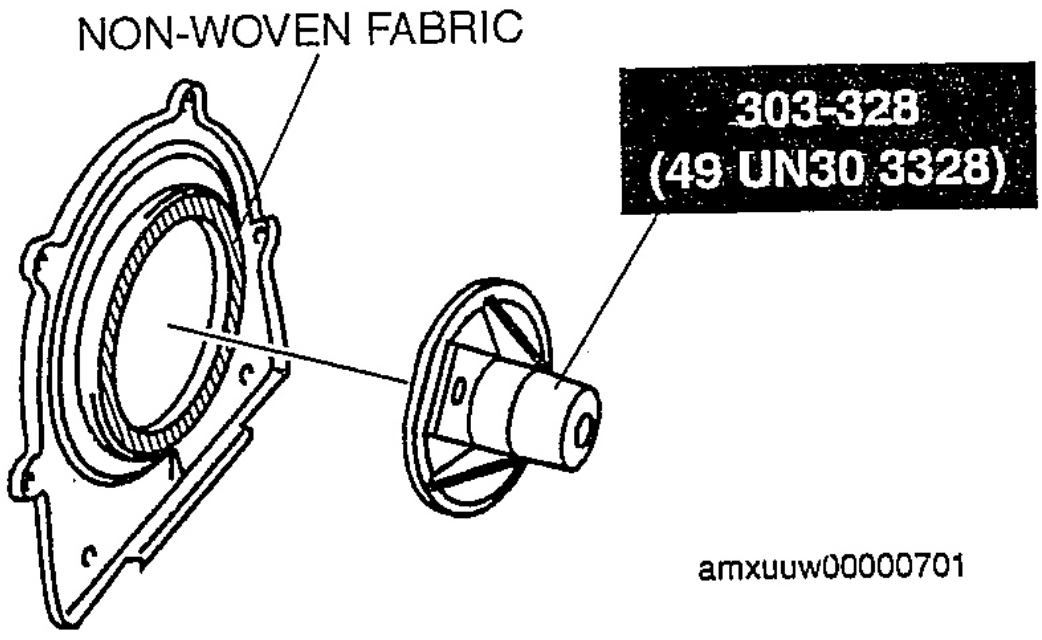


Fig. 64: Installing SST To Non-Woven Fabric Side Of Rear Oil Seal
Courtesy of MAZDA MOTORS CORP.

4. From the back side of the rear oil seal, verify that there is no damage or separation in the lip area of the rear oil seal.

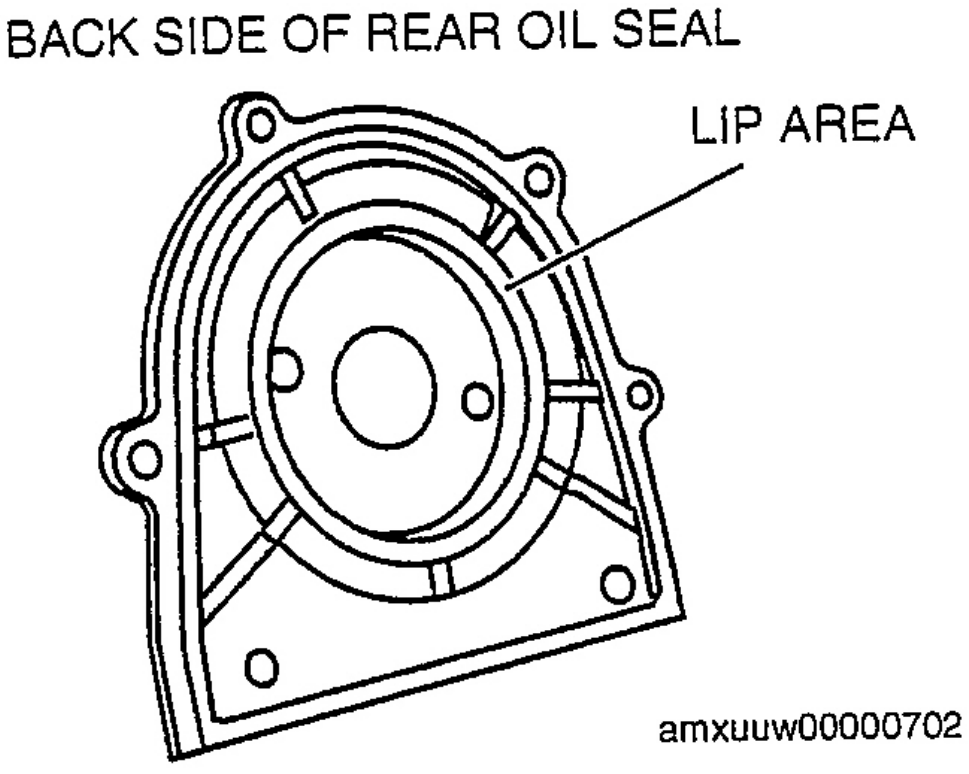


Fig. 65: Identifying Back Side Of Rear Oil Seal And Lip Area
Courtesy of MAZDA MOTORS CORP.

5. Install the rear oil seal to the engine as shown in **Fig. 66**

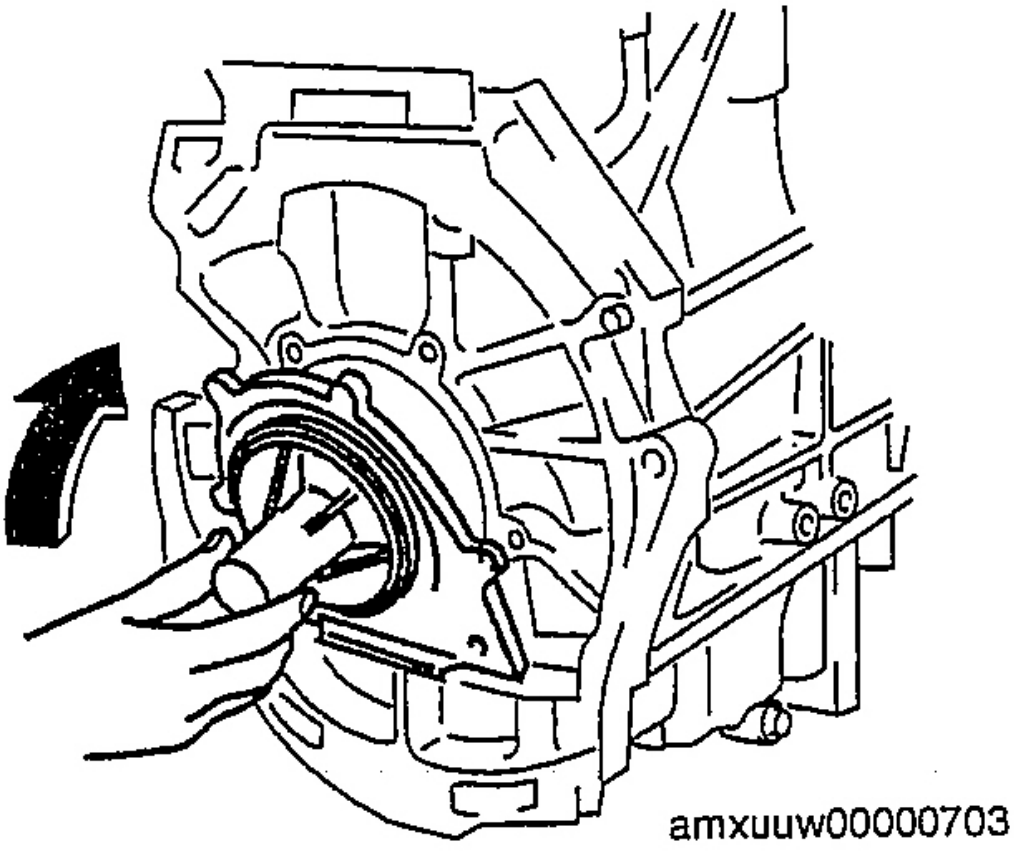


Fig. 66: Installing Rear Oil Seal
Courtesy of MAZDA MOTORS CORP.

6. Tighten the rear oil seal bolts in the order as shown.

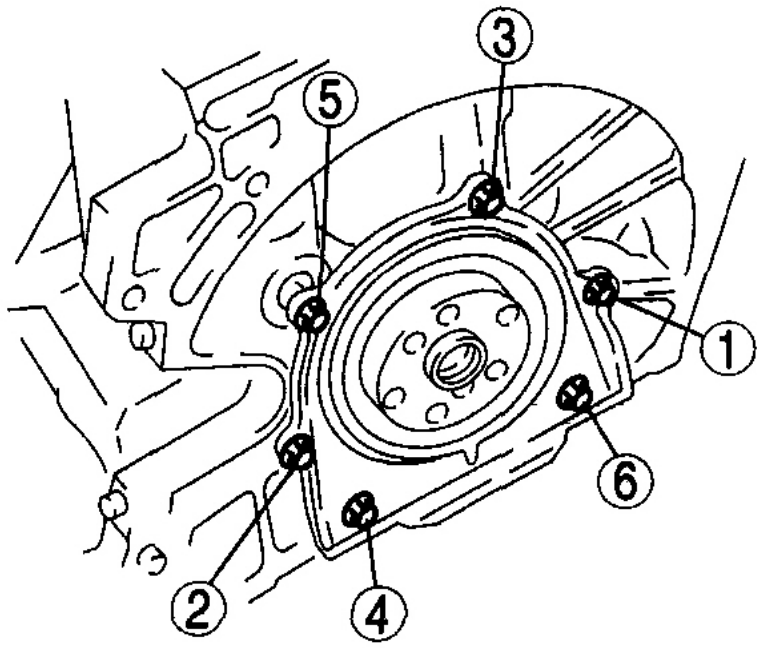


Fig. 67: Installing Rear Oil Seal Bolts

Tightening torque:

8.0-11.5 N.m {81.6-1117.2 kgf.m, 70.9-101.7 in.lbf}

ENGINE REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the BEFORE SERVICE PRECAUTION [LF] .**

NOTE:

- **Remove the engine, transmission, and crossmember component as a single unit from under the vehicle.**

1. Perform "Fuel Line Safety Procedures". Leave the fuel pump relay removed. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)

3. Remove the following parts:
    1. The front wheel and tires (See **GENERAL PROCEDURES (SUSPENSION)** .)
    2. The plug hole plate (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
    3. The battery cover, battery, battery box, battery tray and battery duct (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
    4. The air cleaner (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
    5. The throttle body (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
    6. The PCM, PCM duct and air cleaner insulator (See **PCM REMOVAL/INSTALLATION [LF]** .)
    7. The coolant reserve tank (See **COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]** .)
    8. The console (See **CONSOLE REMOVAL/INSTALLATION** .)
4. Disconnect the P/S oil pump hoses and drain the P/S fluid reservoir. (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
5. Remove the splash shield, under cover and mud guards.
6. Remove the generator duct. (See **GENERATOR REMOVAL/INSTALLATION [LF]** .)
7. Drain the transmission oil (MT) or ATF (AT). (See **TRANSMISSION OIL REPLACEMENT [M15M-D]** .) (See **TRANSMISSION OIL REPLACEMENT [P66M-D]** .) (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT [SJ6A-EL]** .)
8. Disconnect the brake vacuum hose.
9. Disconnect the quick release connector from the dynamic chamber. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
10. Disconnect the quick release connector from the fuel distributor. (See **BEFORE SERVICE PRECAUTION [LF]** .) (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
11. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
12. Remove the A/C compressor with the pipes connected and secure the A/C compressor using wire or rope so that it is out of the way.
13. Disconnect the water hose and heater hose.
14. Secure the caliper (front) using wire or rope so that it is out of the way.
15. Disconnect the wiring harness.
16. Disconnect front ABS wheel-speed sensor connector. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)
17. Remove the radiator. (See **RADIATOR REMOVAL/INSTALLATION [LF]** .)
18. AT
    - Disconnect the manual shaft lever component. (See **AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION [SJ6A-EL]** .)

    MT

    - Remove the clutch release cylinder with the pipes connected and secure the clutch release cylinder

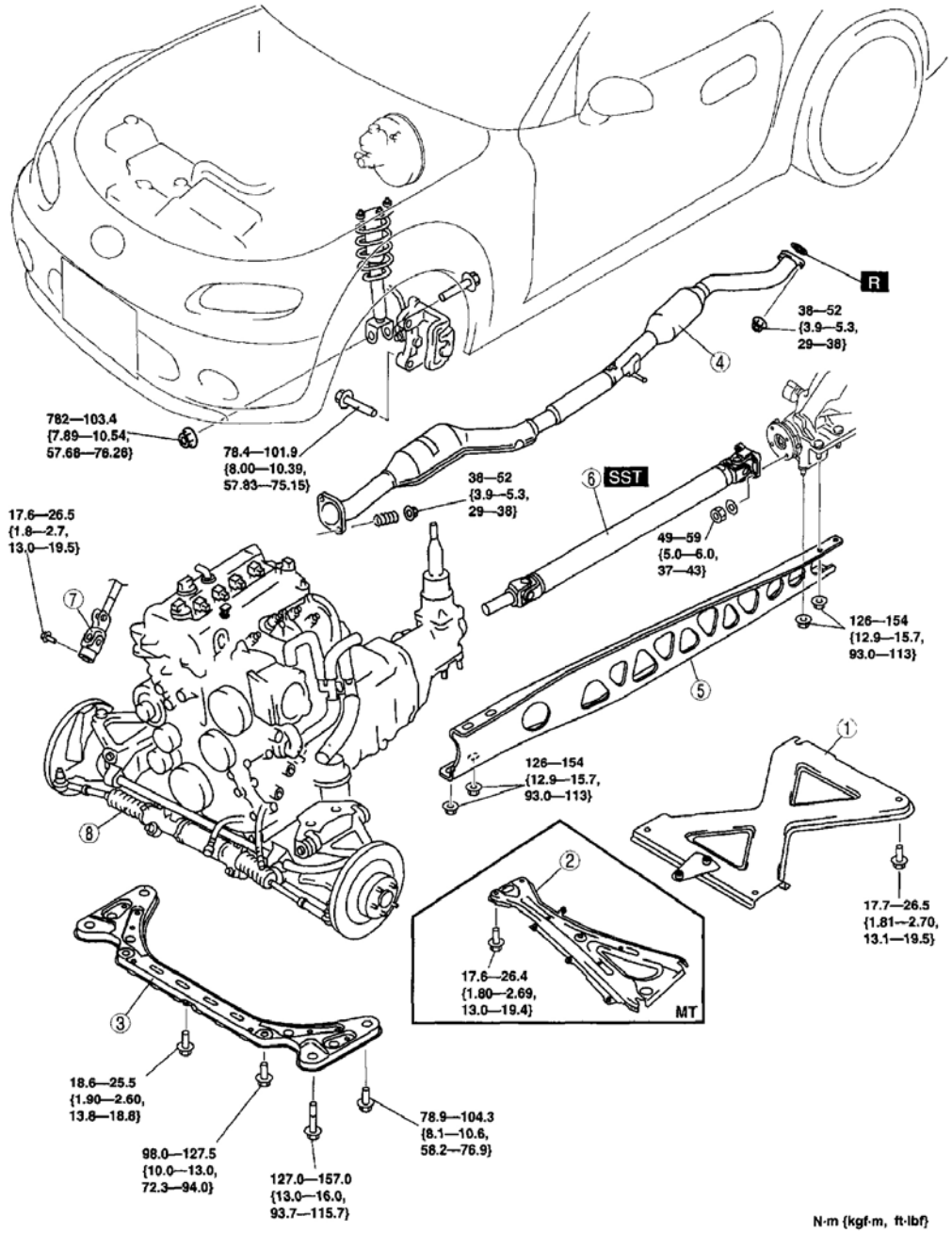
using wire or rope so that it is out of the way. (See **CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION** .)

- Remove the shift lever knob. (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .)

19. Remove the engine, transmission, and crossmember component using an engine lifter in the order indicated in **Fig. 68** .

WARNING:

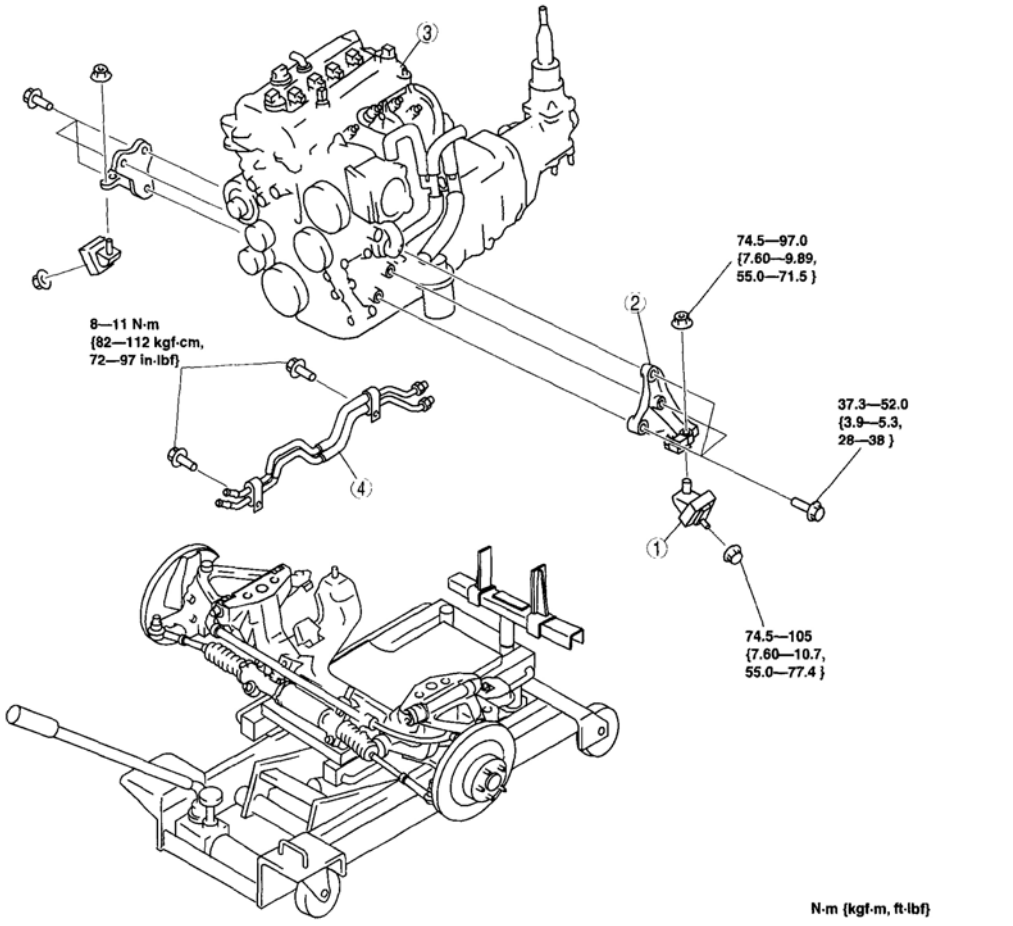
- **Remove the engine, transmission and crossmember carefully, holding it steady. If the transmission falls it could be damaged or cause injury.**



1	Tunnel member
2	Member bracket
3	Transverse member
4	Middle pipe
5	Power plant frame
6	Propeller shaft
7	Bolt (Intermediate Shaft)
8	Engine, transmission, crossmember component

Fig. 68: Identifying Engine, Transmission & Crossmember Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

20. Remove the engine and transmission from the crossmember component lifter in the order indicated in **Fig. 69** by suspending them with a crane.



1	Engine mount rubber
2	Engine mount bracket
3	Engine, transmission
4	Oil pipe, oil hose

Fig. 69: Identifying Engine & Transmission From Crossmember Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

21. Install in the reverse order of removal.
22. Start the engine and inspect and adjust the following:
    - Pulley and belt for runout, tension, and contact

- Leakage of engine oil, engine coolant, ATF, MT oil, and fuel
- Ignition timing, idle speed, and idle mixture (CO and HC) (See **ENGINE TUNE-UP [LF]** .)
- Front wheel alignment (See **FRONT WHEEL ALIGNMENT** .)
- Engine-driven accessories operation

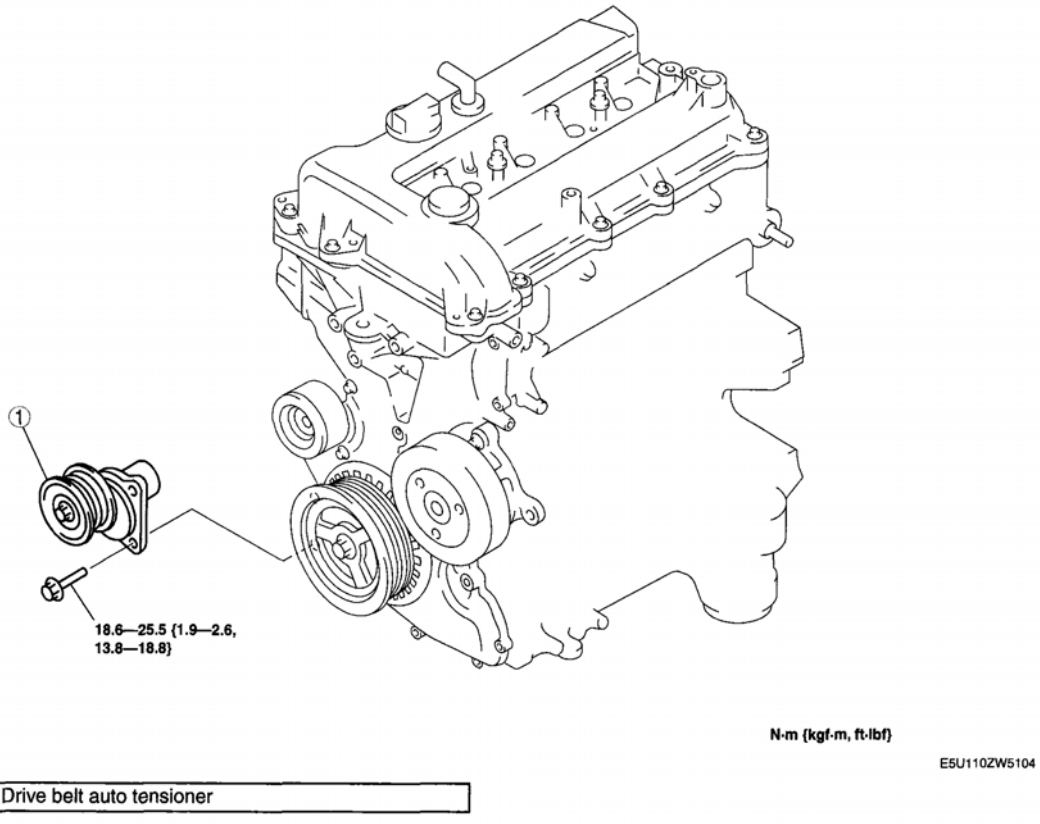
23. Perform the on-road test and verify that there is no vibration or noise.

ENGINE, TRANSMISSION, CROSSMEMBER COMPONENT REMOVAL NOTE

1. Secure the engine, transmission, and crossmember component using an engine lifter.

ENGINE DISASSEMBLY/ASSEMBLY [LF]

1. Remove the transmission from the engine. (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .) (See **AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION [SJ6A-EL]** .)
2. Remove the following parts:
    1. The clutch unit (MT) (See **CLUTCH UNIT REMOVAL/INSTALLATION** .)
    2. The ignition coil (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
    3. The CMP sensor (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
    4. The power steering oil pump (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
    5. The fuel distributor and fuel injector (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
    6. The intake-air system (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
    7. The exhaust system (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
    8. The CKP sensor (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in **Fig. 70** .
4. Install in the reverse order of removal.



1	Drive belt auto tensioner

Fig. 70: Removing/Installing Drive Belt Auto Tensioner [LF] (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF]

CAUTION:
- **Variable valve timing actuator can not be disassembled it is a precision unit.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
4. Disconnect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
5. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
6. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the OCV connector.
8. Disconnect the P/S pressure switch connector.

9. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
10. Remove the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
11. Confirm that notch of the rotor and bump of the cover at the variable valve timing actuator are aligned and fitted.
    - If the notch and the bump are not aligned, turn the crankshaft clockwise two rotations. Verify that the bump and the notch are aligned.

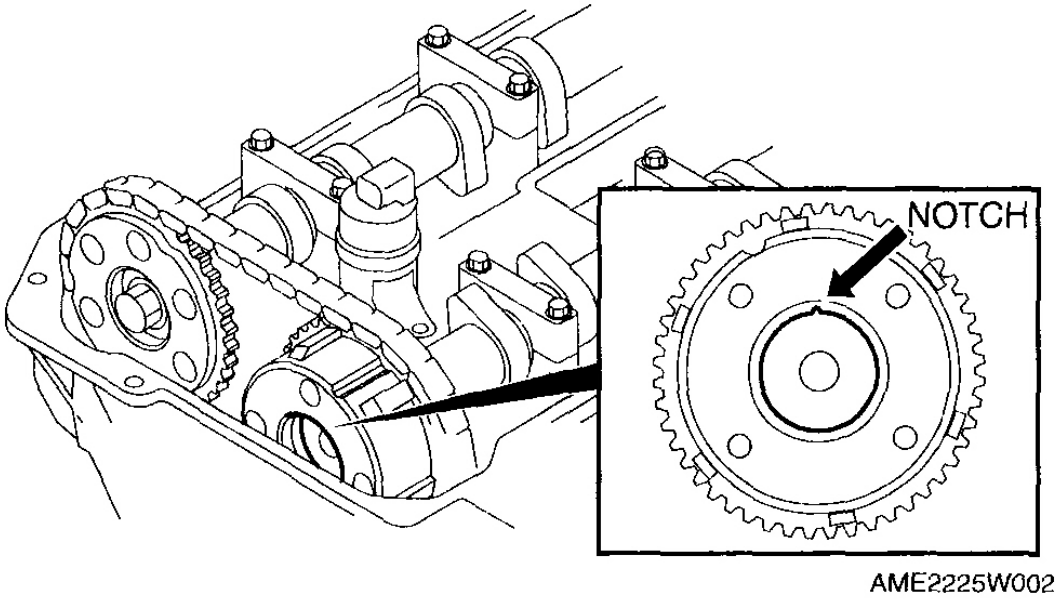


Fig. 71: Verifying Bump & Notch Are Aligned
Courtesy of MAZDA MOTORS CORP.

    - If the bump and notch are still not aligned, replace the variable valve timing actuator.
    - If, when turning the crankshaft, there is a hitting noise from the variable valve timing actuator each time the cam passes the fully lifted position, it means that the actuator is not secured. Replace the actuator.
12. Install the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
13. Install the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
14. Connect the P/S pressure switch connector.
15. Connect the OCV connector.
16. Install the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
17. Install the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
18. Connect the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM)**

REMOVAL/INSTALLATION [LF] .)

19. Install the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
20. Install the battery cover.
21. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [LF]

CAUTION:

- **Variable valve timing actuator can not be disassembled because it is a precision unit.**

NOTE:

- **Intake camshaft sprocket is integrated with the variable valve timing actuator and cannot be disassembled.**

1. Follow the valve clearance adjustment procedure from 1 to 21 and remove the intake camshaft and variable valve timing actuator as a single unit. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)
2. Remove the variable valve timing actuator.
    1. Mark the camshaft and variable valve timing actuator as shown in **Fig. 72** to make sure they are installed in their original position.

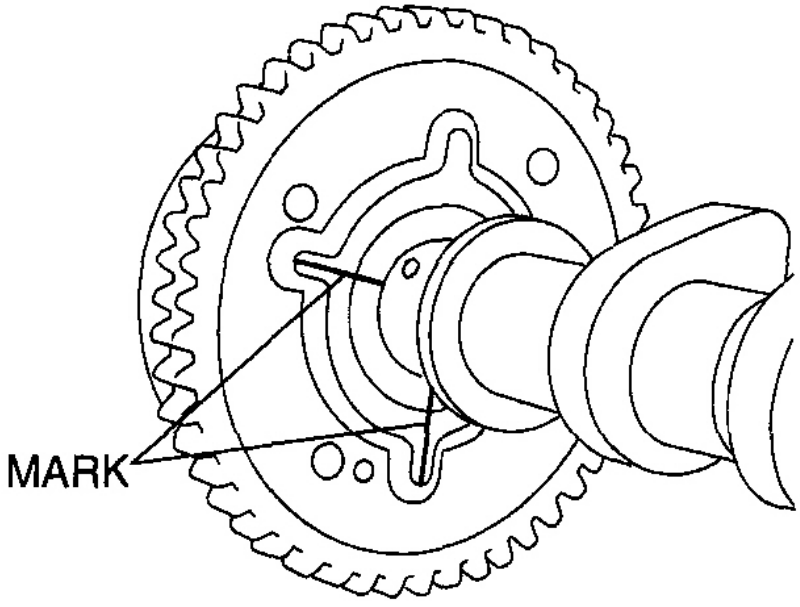


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Fig. 72: Identifying Mark Camshaft & Variable Valve Timing Actuator
Courtesy of MAZDA MOTORS CORP.

2. Secure the camshaft in a vise.
3. Loosen the variable valve timing actuator tightening bolt.

3. Install a new washer.

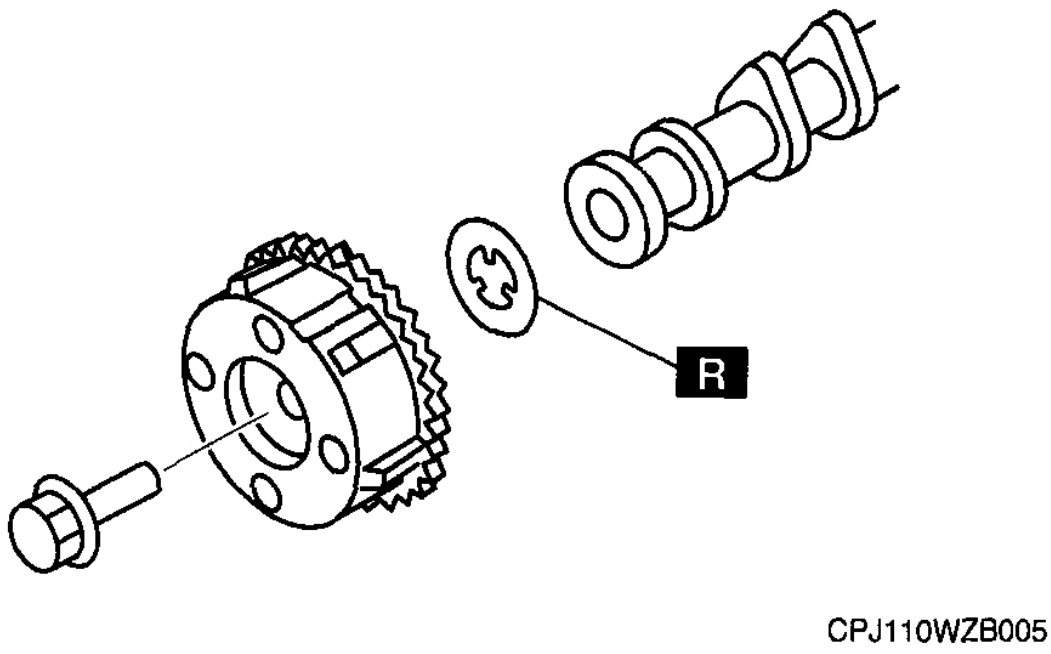


Fig. 73: Installing New Washer
Courtesy of MAZDA MOTORS CORP.

4. Install the variable valve timing actuator.
   1. Secure the camshaft in a vise.
   2. Align the marks of the camshaft and variable valve timing actuator.

CAUTION:
- **When the variable valve timing actuator is replaced with a new one, mark it in the same location as the old one.**

   3. Tighten the variable valve timing actuator tightening bolt.

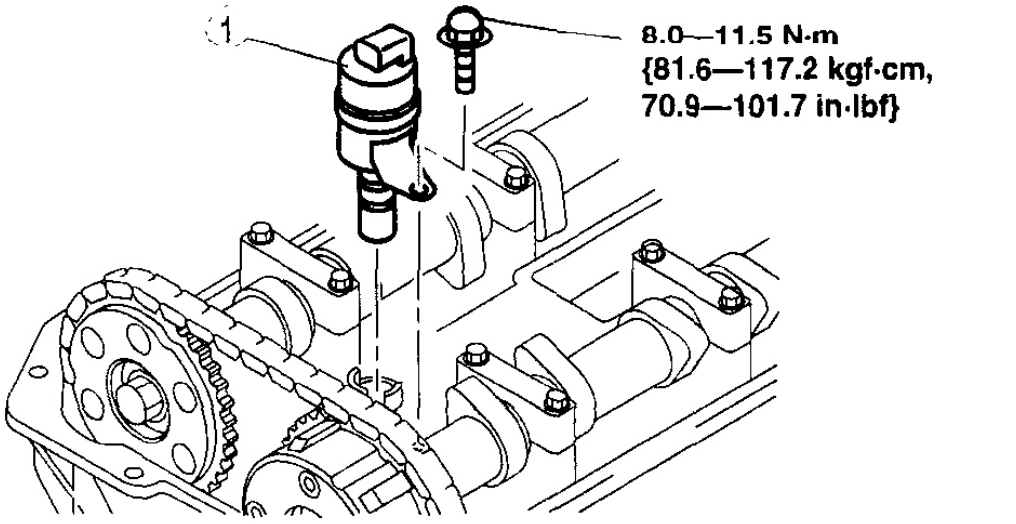
Tightening torque

69-75 N.m {7.1-7.6 kgf.m, 50.9-55.3 ft.lbf}

5. Follow the valve clearance adjustment procedure from 21 to 50 and install the intake camshaft and variable valve timing actuator. (See **VALVE CLEARANCE ADJUSTMENT [LF]** .)

OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
4. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
5. Remove the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [LF]** .)
6. Remove the OCV connector.



1	OCV

Fig. 74: Identifying Oil Control Valve (OCV) [LF] (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Remove the ventilation hose. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
8. Remove the cylinder head cover. (See **CYLINDER HEAD COVER INSTALLATION NOTE** .)
9. Remove in the order indicated in **Fig. 74** .
10. Install in the reverse order of removal.

OIL CONTROL VALVE (OCV) INSPECTION [LF]

COIL RESISTANCE INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the oil control valve connector.
4. Measure the resistance between terminals A and B using an ohmmeter.
   - If not as specified, replace the oil control valve. (See **OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [LF]** .)

   Oil control valve resistance

   6.9-7.9 ohms [20°C {68°F}]

5. Connect the oil control valve connector.

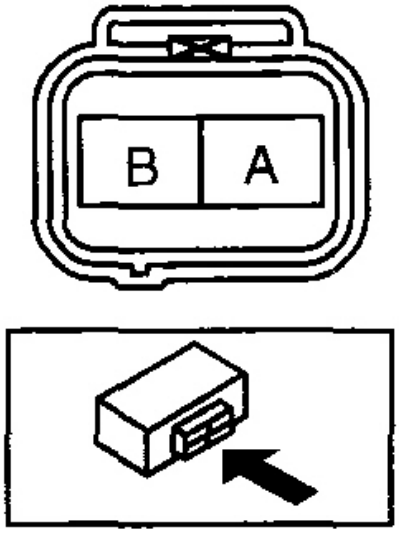


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Fig. 75: Oil Control Valve Connector

Courtesy of MAZDA MOTORS CORP.

SPOOL VALVE OPERATION INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the oil control valve.
4. Verify that the spool valve in the oil control valve is in the maximum valve timing retard position as indicated in **Fig. 76** .
   - If not as specified, replace the oil control valve. (See **OIL CONTROL VALVE (OCV) REMOVAL/INSTALLATION [LF]** .)

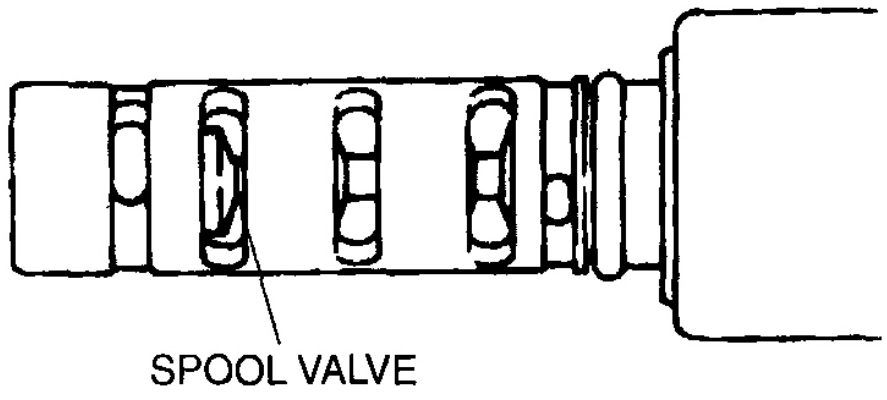


Fig. 76: Identifying Spool Valve
Courtesy of MAZDA MOTORS CORP.

5. Verify that the battery is fully charged.
   - If not as specified, recharge the battery. (See **BATTERY INSPECTION [LF]** .)
6. Apply battery positive voltage between the oil control valve terminals and verify that the spool valve operates and moves to the maximum valve timing advance position.
   - If not as specified, replace the oil control valve.

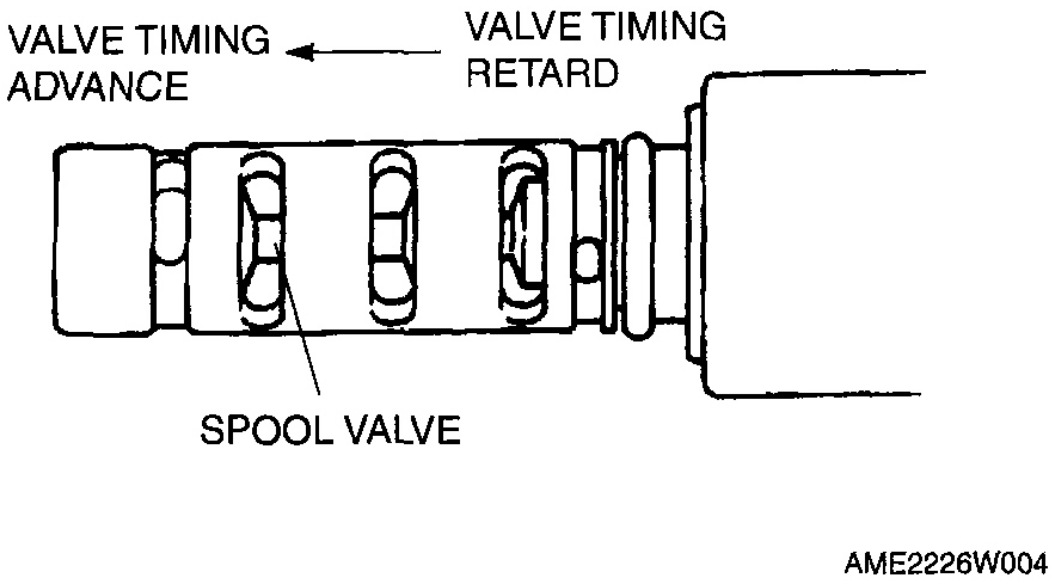


Fig. 77: Verifying Spool Valve Operates & Moves To Maximum Valve Timing Advance Position
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **When applying battery positive voltage between the oil control valve terminals, the connection can be either of the following:**
  - **Positive battery cable to terminal A, negative battery cable to terminal B**
  - **Positive battery cable to terminal B, negative battery cable to terminal A**

7. Stop applying battery positive voltage and verify that the spool valve returns to the maximum valve timing retard position.
   - If not as specified, replace the oil control valve.

ENGINE TUNE-UP [LF]

ENGINE TUNE-UP PREPARATION

1. Verify the following:
   - AT: Selector lever is in P or N position.
   - MT: Shift lever is in neutral position.
2. Verify that no DTCs are available.
3. Warm up the engine (ECT is **approx. 80°C {176°F} or more)** as follows.

1. Start the engine.
2. Racing at the engine speed **2,500-3,000 rpm** for 3 min.

4. Turn off the electrical loads.
5. Wait until the cooling fans stop.
6. Connect the **SST** (M-MDS or equivalent) to the DLC-2.

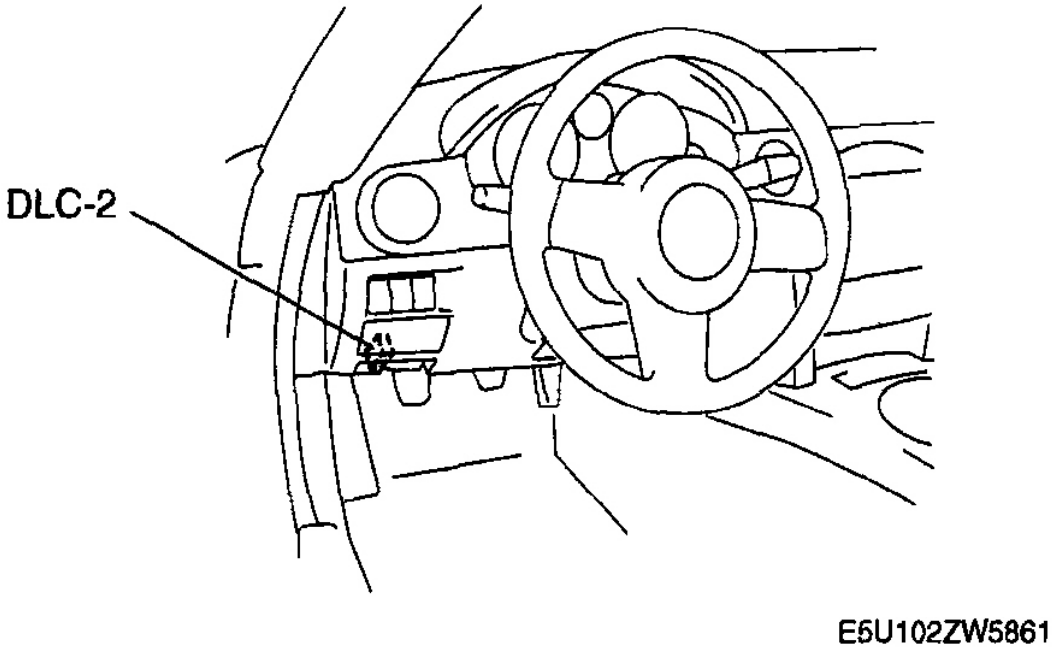


Fig. 78: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

7. Verify that the idling speed (M-MDS: RPM PID) is within the specification using the M-MDS or equivalent function.

Standard

AT: 700-800 rpm

MT: 670-770 rpm

IGNITION TIMING INSPECTION

NOTE:

- **Ignition timing is not adjustable.**
- **Ignition timing verification requires M-MDS or equivalent.**

1. Verify that the ignition timing (M-MDS: SPARKADV PID) is within the specification using M-MDS or equivalent.

   Ignition timing

   Approx. BTDC 8°

2. Verify that ignition timing advances when the engine speed increases gradually.
   - If there is malfunction, refer to "**ENGINE SYMPTOM TROUBLESHOOTING [LF]** ".

IDLE SPEED INSPECTION

NOTE:
- **Idle speed is not adjustable.**
- **Idle speed verification requires M-MDS or equivalent.**

1. Verify that the idle speed (M-MDS: RPM PID) is within the specification using M-MDS or equivalent.
   - If there is malfunction, refer to "**ENGINE SYMPTOM TROUBLESHOOTING [LF]** ".

   Idle speed

   No load: 670-770 rpm (MT), 700-800 rpm (AT)

   Electrical loads (38-48 A): 700-800 rpm

   Electrical loads (more than 48 A): 800-900 rpm

   P/S ON: 700-800 rpm (MT), 750-850 rpm (AT)

   A/C ON: 825-925 rpm (MT), 775-875 rpm (AT)

IDLE MIXTURE INSPECTION

1. Verify that the idle speed and ignition timing are within the specification. (See **IDLE SPEED INSPECTION** .) (See **IGNITION TIMING INSPECTION** .)
2. Insert an exhaust gas analyzer to the tailpipe.
3. Verify that the CO and HC concentrations are within the regulation.
   - If there is malfunction, refer to "**ENGINE SYMPTOM TROUBLESHOOTING [LF]** ".

   Idle mixture

   HC concentration: Within the regulation

   CO concentration: Within the regulation

2007 ENGINE

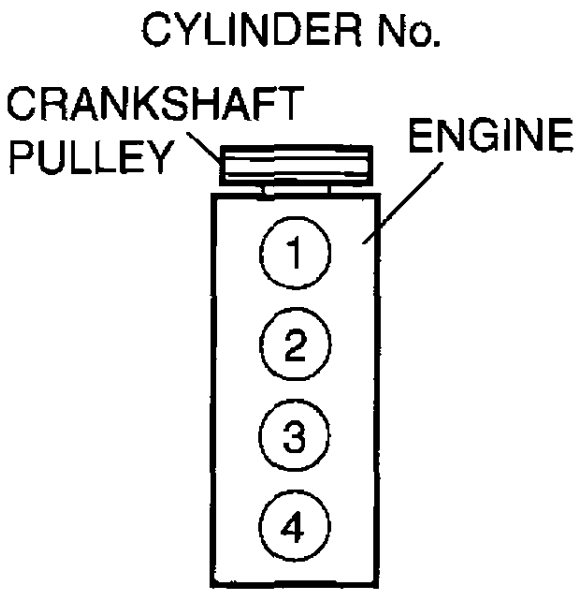
Technical Data - MX-5 Miata

ENGINE TECHNICAL DATA [LF]

ENGINE TECHNICAL DATA SPECIFICATION

Item	Specification
Valve clearance [Engine cold]	IN: 0.22-0.28 mm {0.0087-0.0110 in} EX: 0.27-0.33 mm {0.0107-0.0129 in}
Compression	Standard: 1,720 kPa {17.5391 kgf/cm^2 , 249.465 psi} [300 rpm] Minimum: 1,204 kPa {12.277 kgf/cm^2 , 174.58 psi} [300 rpm] Maximum difference between cylinders: 196.1 kPa {2.0 kgf/cm^2 , 28.5 psi}
Front oil seal press-in amount	0-1.0 mm {0-0.039 in}
Cylinder Head Bolt Length L	145.2-145.8 mm {5.72-5.74 in}
Cylinder Head Bolt Maximum	146.5 mm (5.77 in}
Oil control valve resistance	6.9-7.9 ohms [20°C {68°F}]
Ignition timing	Approx. BTDC 8°
Idle speed	No load: 670-770 rpm (MT), 700-800 rpm (AT) Electrical loads (38-48 A): 00-800 rpm (AT) Electrical loads (more than 48 A): 800-900 rpm P/S ON: 700-800 rpm (MT), 750-850 rpm (AT) A/C ON: 825-925 rpm (MT), 775-875 rpm (AT)
Idle mixture	HC concentration: Within the regulation CO concentration: Within the regulation
Oil pressure (reference value) [oil temperature: 100° C {212°F}]	337-591 kPa {3.44-6.03 kgf/cm^2 , 49.0-85.8 psi} min [3,000 rpm]
Engine oil capacity (approx. quantity) (AT, 5MT)	Oil replacement: 3.9 L {4.1 US qt, 3.4 Imp qt} Oil and oil filter replacement: 4.3 L {4.5 US qt, 3.8 Imp qt} Total (dry engine): 4.6 L {4.9 US qt, 4.0 Imp qt}
Engine oil capacity (approx. quantity) (AT, 5MT)	Oil replacement: 4.05 L {4.28 US qt, 3.56 Imp qt} Oil and oil filter replacement: 4.45 L {4.70 US qt, 3.92 Imp qt} Total (dry engine): 4.75 L {5.02 US qt, 4.18 Imp qt}
Engine oil capacity (approx. quantity) (6MT)	Oil replacement: 4.05 L {4.28 US qt, 3.56 Imp qt} Oil and oil filter replacement: 4.55 L {4.81 US qt, 4.00 Imp qt} Total (dry engine): 4.85 L {5.12 US qt, 4.27 Imp qt}
Engine coolant capacity (approx. quantity)	7.5 L {7.9 US qt, 6.6 Imp qt}

Cooling system cap valve opening pressure	93.2-122.6 kPa {0.95-1.25 kgf/cm^2 , 13.5-17.8 psi}
Thermostat initial-opening temperature	80-84°C {176-183°F}
Thermostat full-open temperature	97°C {207°F}
Thermostat full-open lift	More than 8.0 mm {0.31 in}
Cooling fan motor current	High: 9.0-12.0 A Middle: 6.4-9.4 A Low: 4.8-7.8 A
Fuel line pressure	350-410 kPa {3.57-4.18 kgf/cm^2 , 50.8-59.4 psi}
Fuel hold pressure	250 kPa {2.55 kgf/cm^2 , 36.2 psi} or more
Fuel injector resistance	11.4-12.6 ohms [20°C {68°F}]
Fuel injector leakage amount	Less than 1 drop/2 min
Fuel injection volume	204-216 ml {204-216 cc, 12.5-13.1 cu in}/min
Battery electrolyte specific gravity [20°C {68°F}]	1.22-1.29
Battery load test current	46B24L (36): 135 A
Battery back-up current	Vehicles with immobilizer system: 25-45 mA Vehicles without immobilizer system: 30 mA or less
Battery slow charge current	46B24L (36): 3.5-4.5 A
Battery quick charge current [30 min,]	46B24L (36): 25 A
Generator standard voltage [IG-ON]	Terminal B: B+ Terminal P: Approx. 1 V or less Terminal D: Approx. 0 V
Generator standard voltage [Idle, 20°C {68°F}]	Terminal B: 13-15 V Terminal P: Approx. 3-8 V Terminal D: Turn the electrical loads (headlights, blower motor, rear window defroster) on and verify that the voltage reading increases.
Generator generated current minimum value	70% of the nominal output current (nominal output current: 100 A) [ambient temp. 20°C {68°F}, voltage 13.0-15.0 V, both engine and generator are hot]
Generator rotor resistance (between slip rings) [20° C {68°F}]	2.0-2.3 ohm
Generator brush length	Standard: 22.5 mm {0.89 in} Minimum: 5.0 mm {0.20 in}
Generator brush spring force	Standard: 4.1-5.3 N {0.42-0.54 kgf, 0.92-1.19 lbf} Minimum: 1.7 N {0.17 kgf, 0.38 lbf}
	1-3-4-2 (all cylinders independent firing)

Firing order	
Spark plug type	L3G2 18 110, L3Y1 18 110
Spark plug gap	1.25-1.35 mm {0.050-0.053 in}
Spark plug resistance [25°C {77°F}]	3.0-7.5 ohms
Starter no load test voltage	11 V
Starter no load test current	90 A or less
Starter pinion gap	0.5-2.0 mm {0.02-0.07 in}
Starter armature runout	0.1 mm {0.004 in} max.
Starter commutator diameter	Standard: 29.4 mm {1.16 in} Minimum: 28.8 mm {1.13 in}
Segment groove depth of starter commutator	Standard: 0.5 mm {0.02 in} Minimum: 0.2 mm {0.008 in}
Starter brush length	Standard: 12.3 mm {0.48 in} Minimum: 5.5 mm {0.22 in}
Starter brush spring force	Standard: 15.0-20.4 N {1.53-2.08 kgf, 3.38-4.58 lbf} Minimum: 2.75 N {0.28 kgf, 0.62 lbf}

() Applied VIN (Assumed)

JM1 NC15F*7# 100001-130613

JM1 NC16F*7# 100001-130613

JM1 NC25F*7# 100001-130613

JM1 NC26F*7# 100001-130613

0 Applied VIN (Assumed)

JM1 NC156F*7# 130614-

JM1 NC16F*7# 130614-

JM1 NC25F*7# 130614-

JM1NC26F*7# 130614-

ENGINE OIL SPECIFICATION

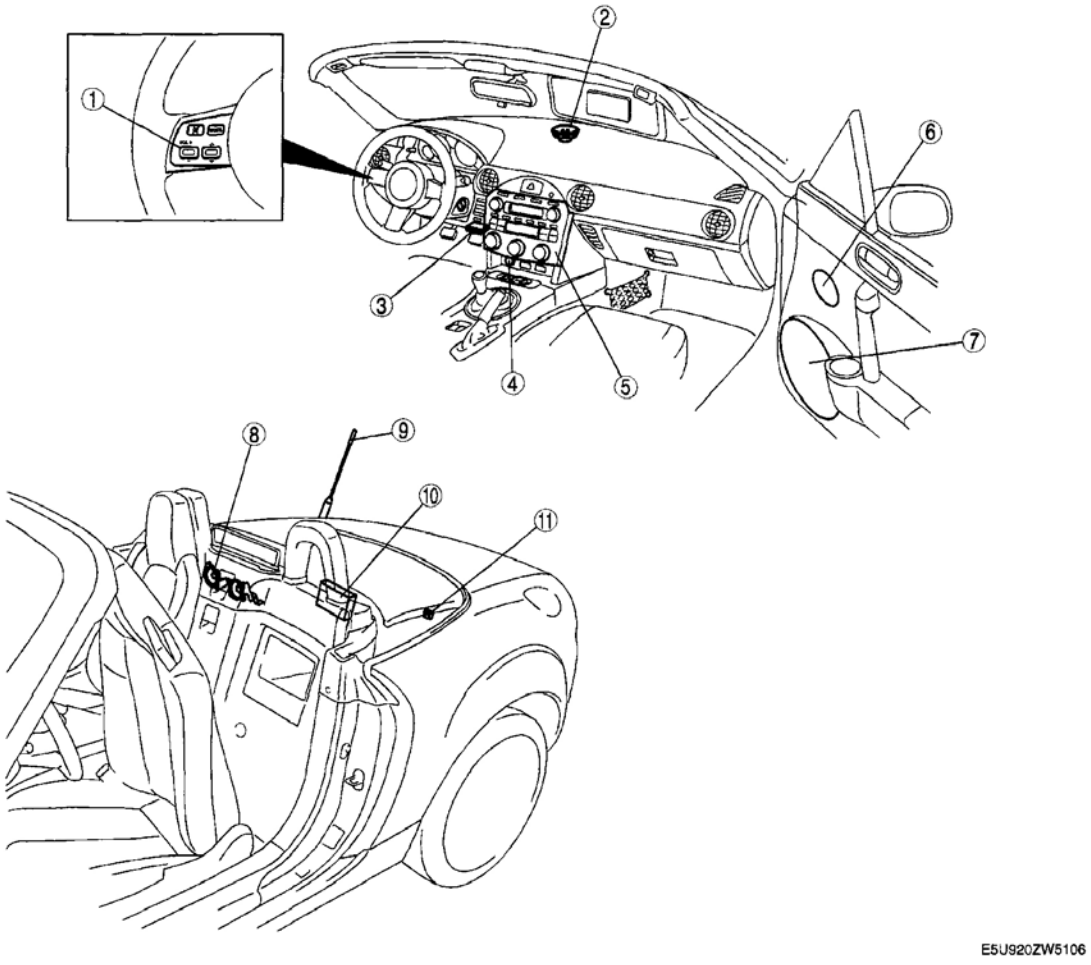
ENGINE OIL SPECIFICATION

Item	U.S.A. and CANADA	Except U.S.A. and CANADA
Engine oil grade	(ILSAC)	(ILSAC) API SL or ILSAC API SL or ILSAC
Engine oil viscosity	5W-20	

2007 ACCESSORIES & BODY, CAB

Entertainment - MX-5 Miata

ENTERTAINMENT LOCATION INDEX



1	Audio control switch
2	Center speaker (Vehicles with BOSE)
3	AUDIOPILOT microphone (Vehicles with BOSE)
4	Accessory socket
5	Center panel unit
6	Tweeter (Vehicles without BOSE) / Door upper speaker (Vehicles with BOSE)
7	Door speaker
8	Rear speaker
9	Manual antenna
10	Audio amplifier (Vehicles with BOSE)
11	Condenser

Fig. 1: Identifying Location Of Entertainment Components
Courtesy of MAZDA MOTORS CORP.

CENTER PANEL UNIT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. See **BATTERY REMOVAL/INSTALLATION [LF]** .
3. Remove the lower panel. See **LOWER PANEL REMOVAL/INSTALLATION** .
4. Remove the knee bolster. See **KNEE BOLSTER REMOVAL/INSTALLATION** .
5. Remove the side wall. See **SIDE WALL REMOVAL/INSTALLATION** .
6. Check if the vehicle has the installation bolt or not at the position shown in the figure from the underside of the driver seat
   - If the installation bolt is equipped, remove it.

CAUTION: The center panel unit may be damaged if it is pulled out with the installation bolt installed. Verify that the installation bolt is removed before pulling out the center panel unit.

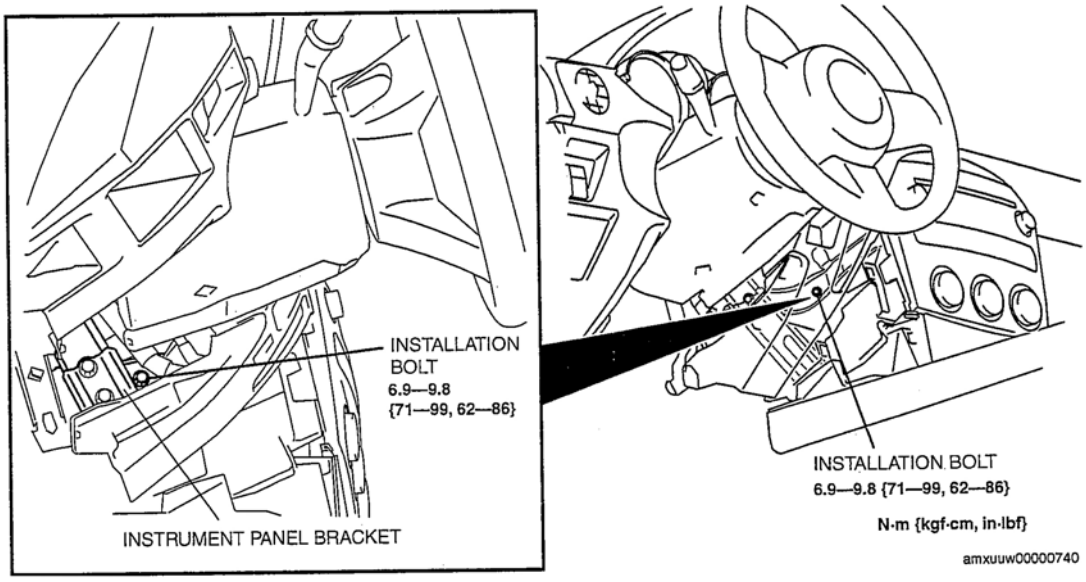
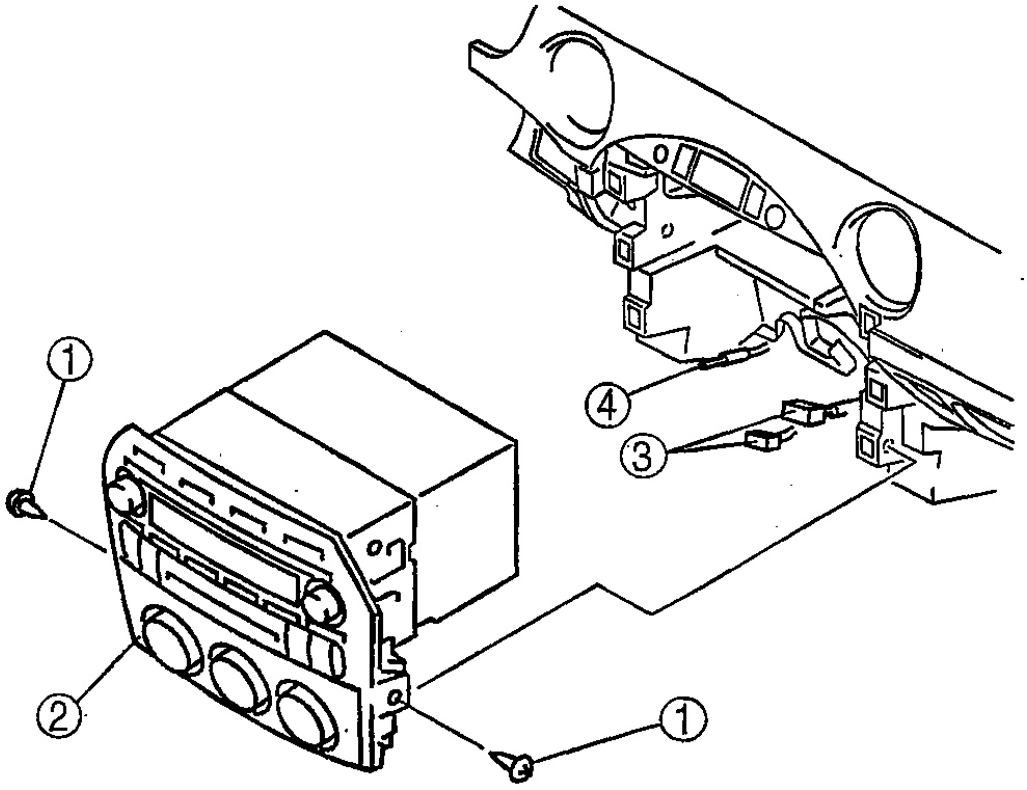


Fig. 2: Identifying Installation Bolt (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

7. Remove in the order indicated in **Fig. 3**.



1	Screw
2	Center panel unit (See Center Panel Unit Removal Note.)
3	Connector Center Panel Unit Removal Note.)
4	Antenna feeder plug

Fig. 3: Identifying Center Panel Unit Assembly
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

CAUTION:

- **When installing the center panel unit, make sure that the wiring harness and antenna feeder are not caught between the unit and dashboard. If the wiring harness or the antenna feeder is caught between the unit and dashboard, it may cause malfunctions.**

CENTER PANEL UNIT REMOVAL NOTE

1. Pull the center panel unit outward, detach clip A from the dashboard, and then remove the center panel unit.

CAUTION:
- **Verify that bolt has been removed when pulling the center panel unit outward. If the center panel unit is pulled with bolt installed, stress will be applied to the connectors inside the panel which may cause a malfunction.**

2. When removing the center panel unit, disconnect the audio unit connector (24-pin) first to aid in disconnecting other connectors and the antenna plug.

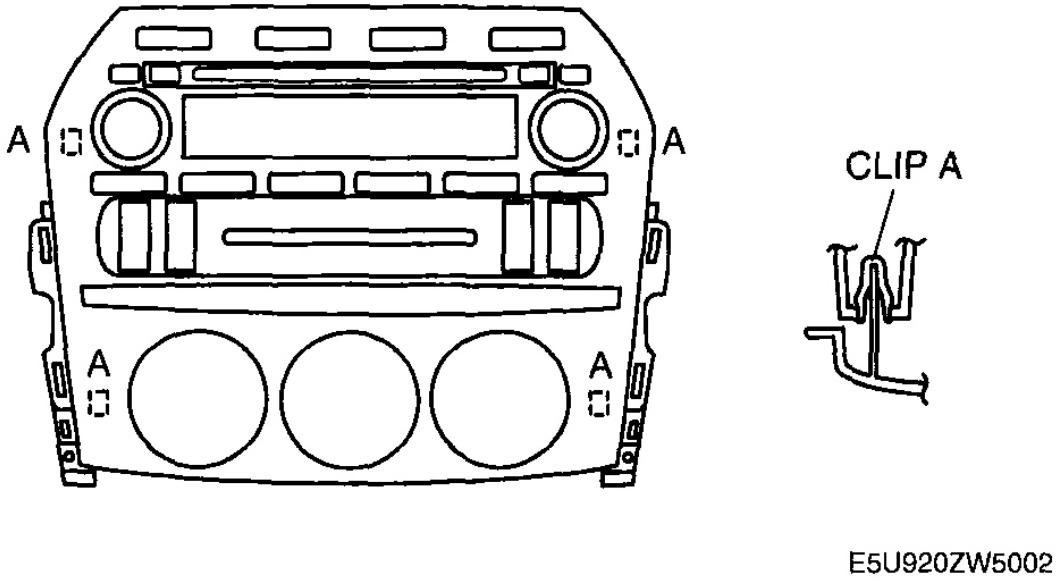
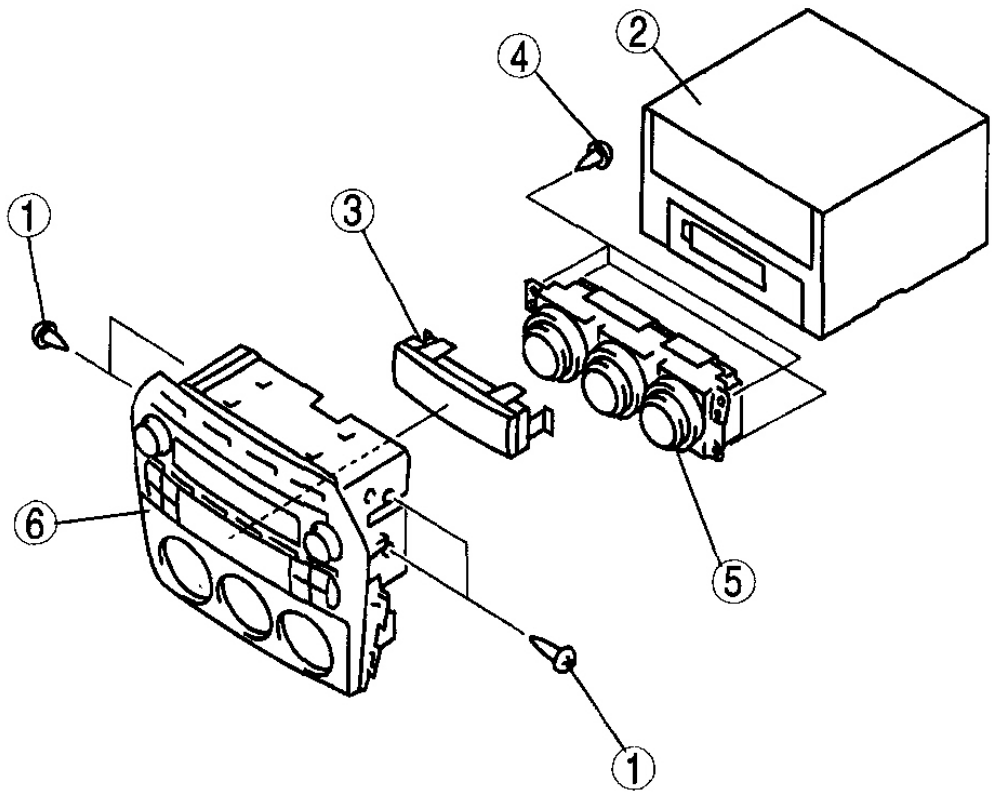


Fig. 4: Identifying Clip A
Courtesy of MAZDA MOTORS CORP.

CENTER PANEL UNIT DISASSEMBLY/ASSEMBLY

CAUTION:
- **Before disassembling the center panel unit, spread a cloth on the floor to put the disassembled parts on. This protects the surface of the panel from scratches or dirt.**

1. Disassemble in the order indicated in **Fig. 5** .



1	Screw A
2	Audio unit
3	Cover
4	Screw B
5	Climate control unit
6	Center panel

Fig. 5: Exploded View Of Center Panel Unit Components
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

SCREW A ASSEMBLE NOTE

1. Tighten screws A at the position shown in **Fig. 6** .

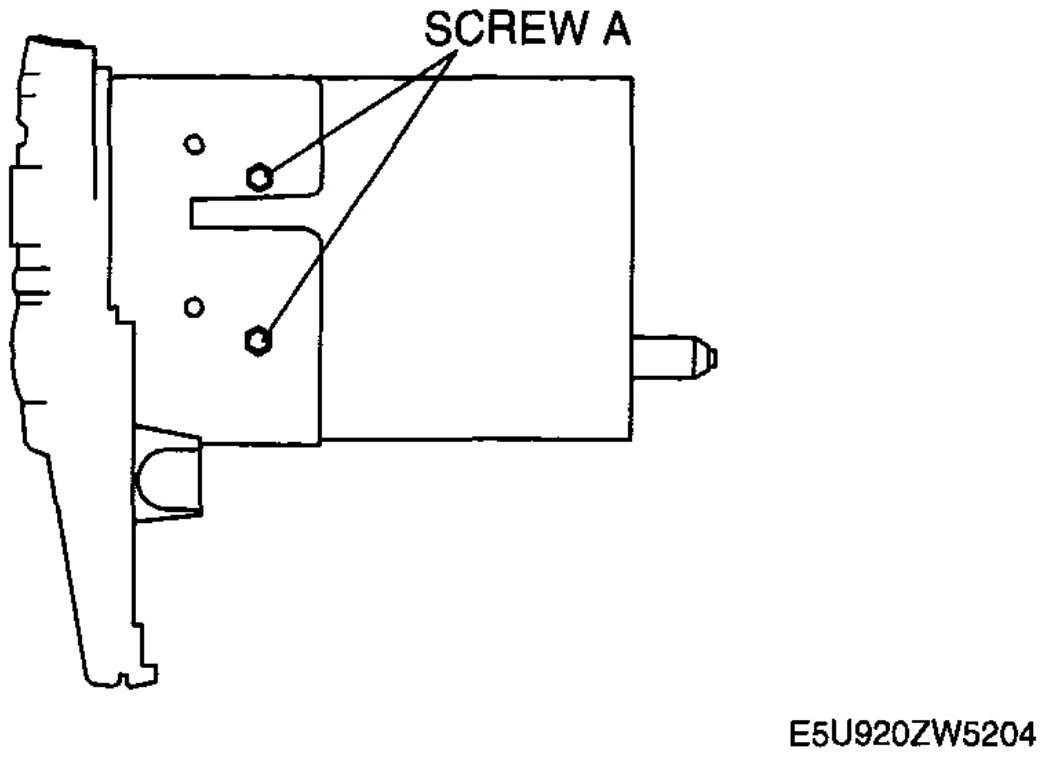
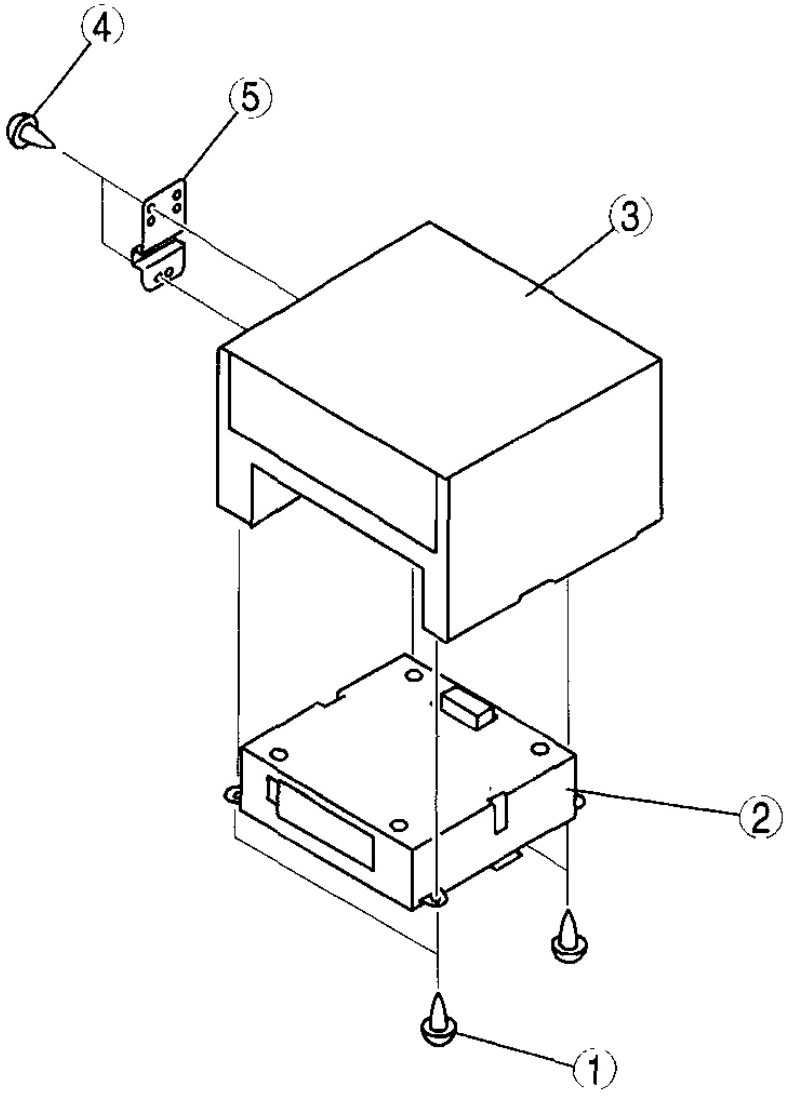


Fig. 6: Tightening Screws A
Courtesy of MAZDA MOTORS CORP.

AUDIO UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 7** .



1	Screw
2	Lower module
3	Base unit
4	Screw
5	Bracket

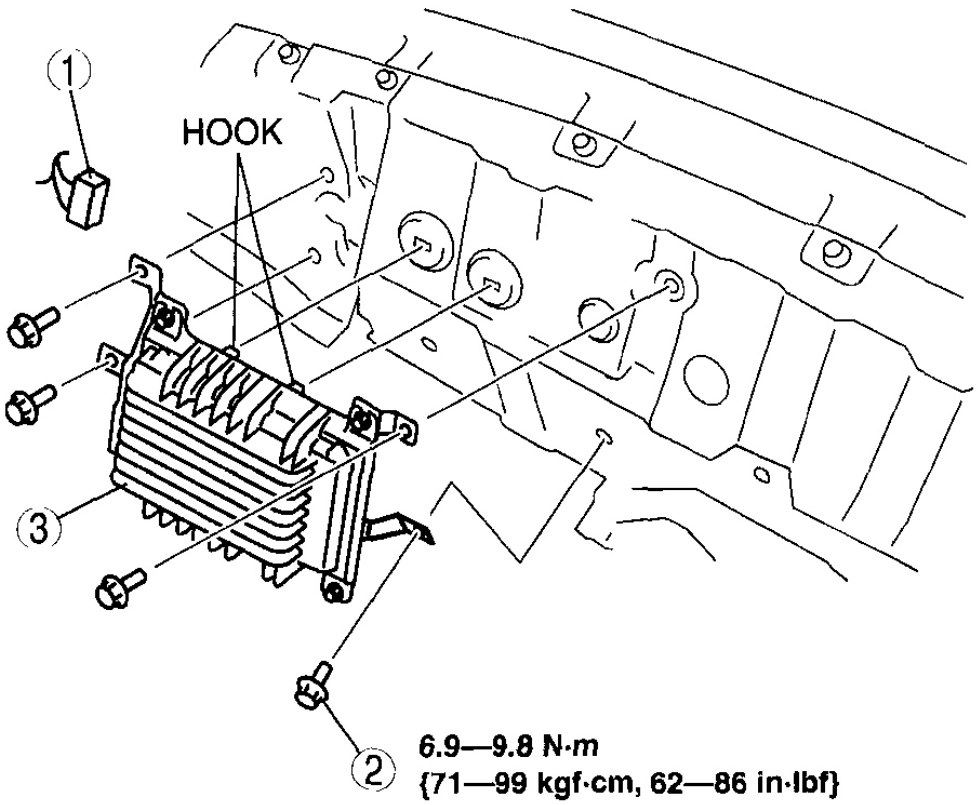
Fig. 7: Exploded View Of Audio Unit Components
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

AUDIO AMPLIFIER REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE HARDTOP

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in the table.



1	Connector
2	Bolt
3	Audio amplifier

Fig. 8: Identifying Audio Amplifier (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

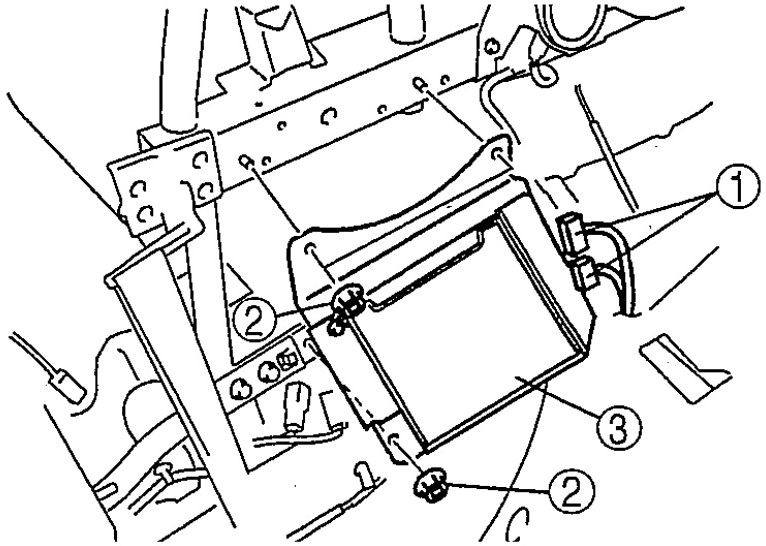
5. Install in the reverse order of removal.

POWER RETRACTABLE HARDTOP

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)

3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)

4. Remove in the order indicated in the table.



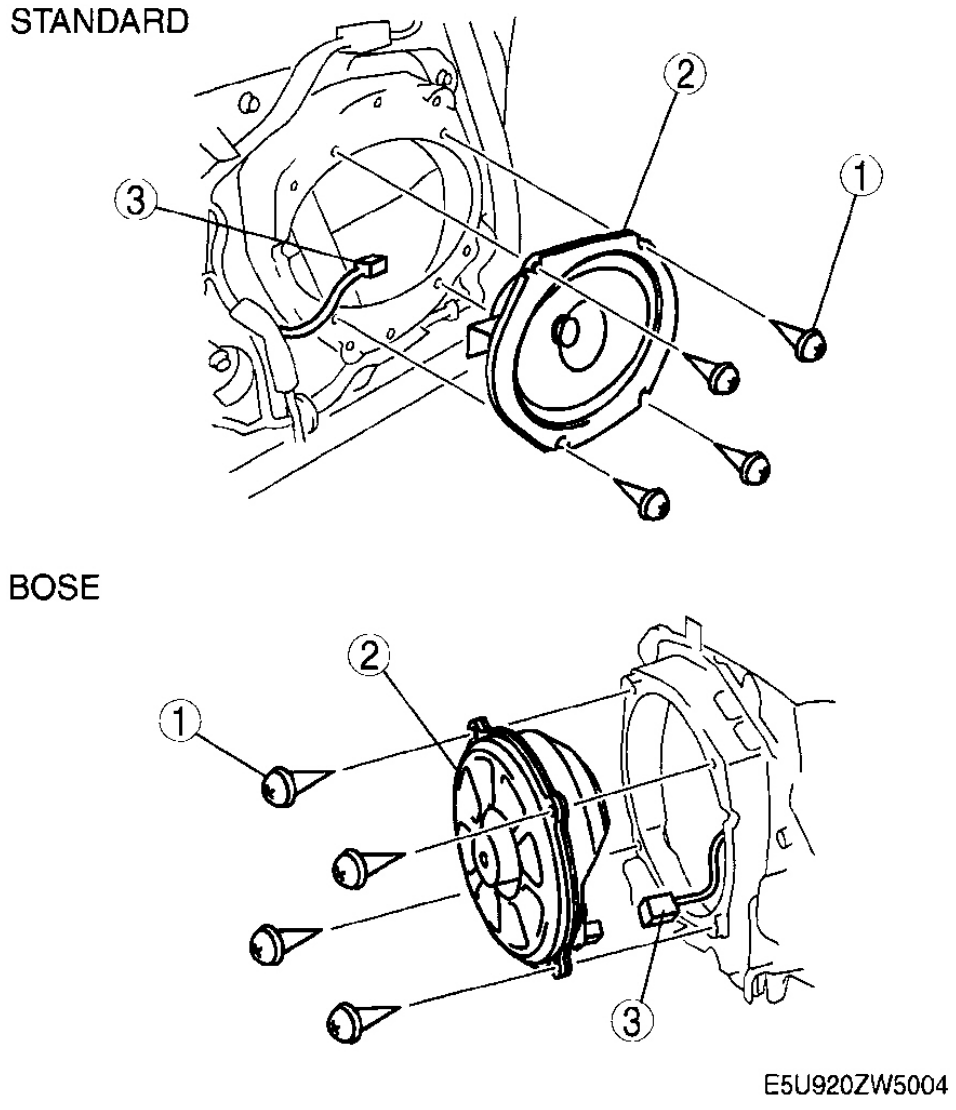
1	Connector
2	Nut
3	Audio amplifier

Fig. 9: Identifying Audio Amplifier
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

DOOR SPEAKER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 10** .



1	Screw
2	Door speaker
3	Connector

Fig. 10: Identifying Door Speaker
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

DOOR SPEAKER INSTALLATION NOTE

1. Remove the speaker with the wiring harness passing through the groove of the front door module.

CAUTION:

- **If the speaker is installed with the wiring harness out of the groove, an open circuit in the wiring harness could occur.**

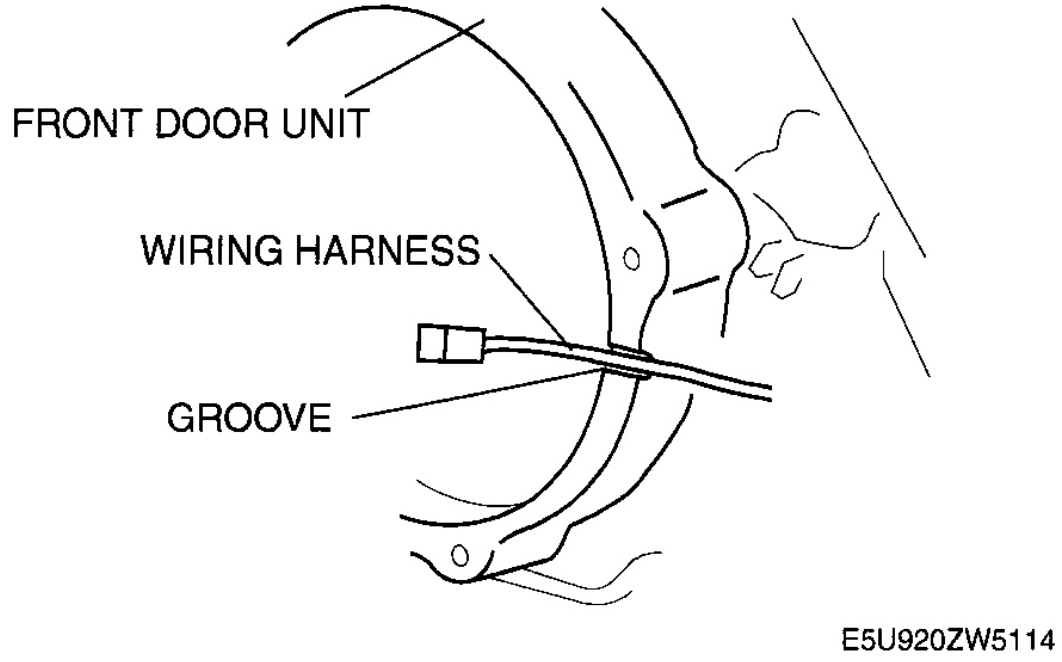


Fig. 11: Removing Speaker With Wiring Harness Passing Groove Of Front Door Module
Courtesy of MAZDA MOTORS CORP.

DOOR SPEAKER INSPECTION

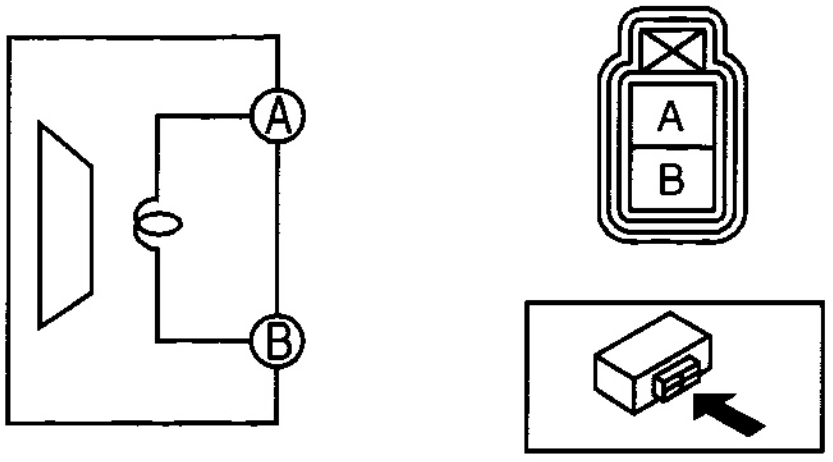
1. Verify the resistance between door speaker terminals.
   - If the resistance is not within the specification, replace the door speaker.

   Resistance

   Standard: 4 ohms

   BOSE: 1 ohm

2. Connect a **1.5 V** battery to the door speaker and verify that noise is heard from the door speaker.
   - If no noise is heard, replace the door speaker.

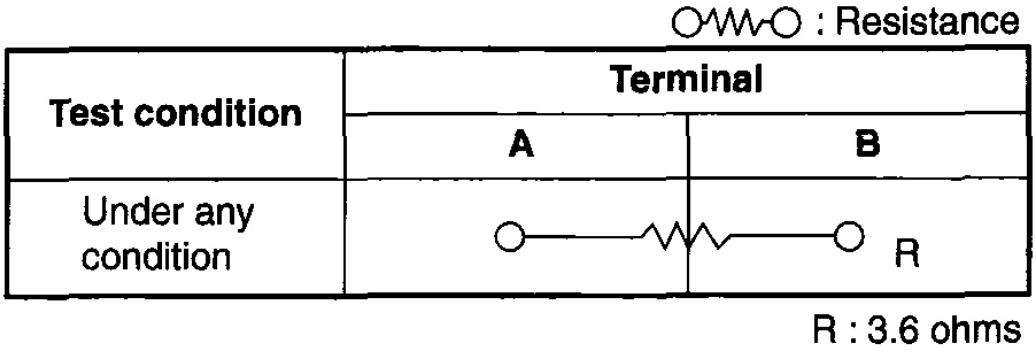


BHJ0920W040

Fig. 12: Identifying Door Speaker Connector & Terminals
Courtesy of MAZDA MOTORS CORP.

DOOR UPPER SPEAKER INSPECTION

1. Inspect for resistance between the door upper speaker terminals using an ohmmeter.
   - If the resistance is not within the specification, replace the door upper speaker.



E5U920ZW5116

Fig. 13: Door Upper Speaker Continuity Table

Courtesy of MAZDA MOTORS CORP.

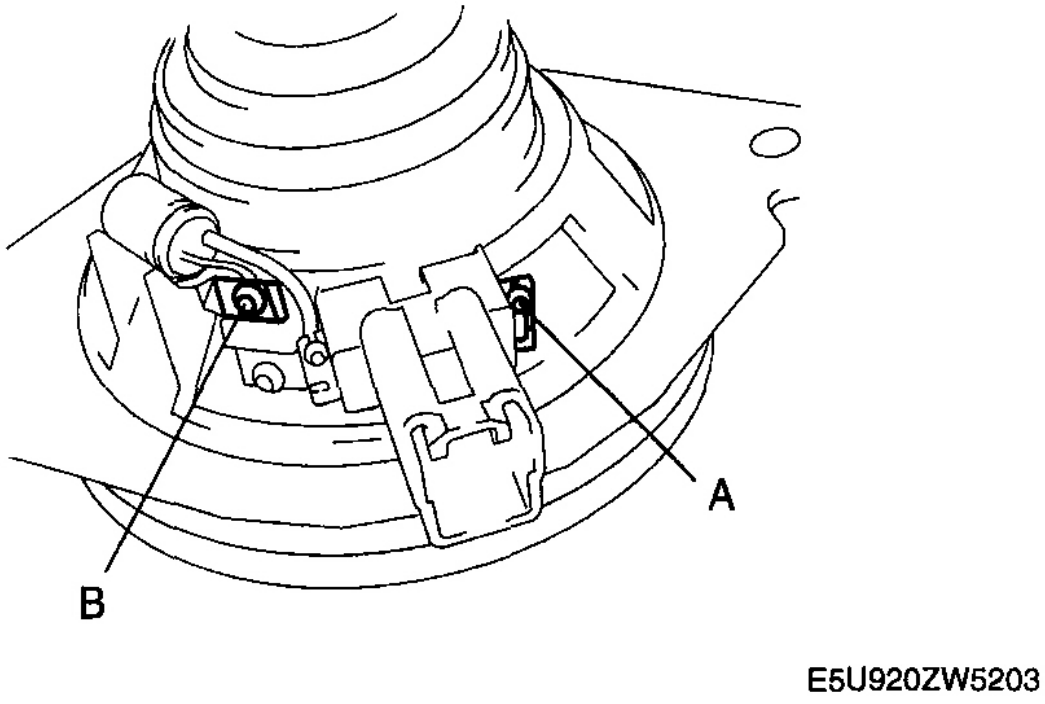
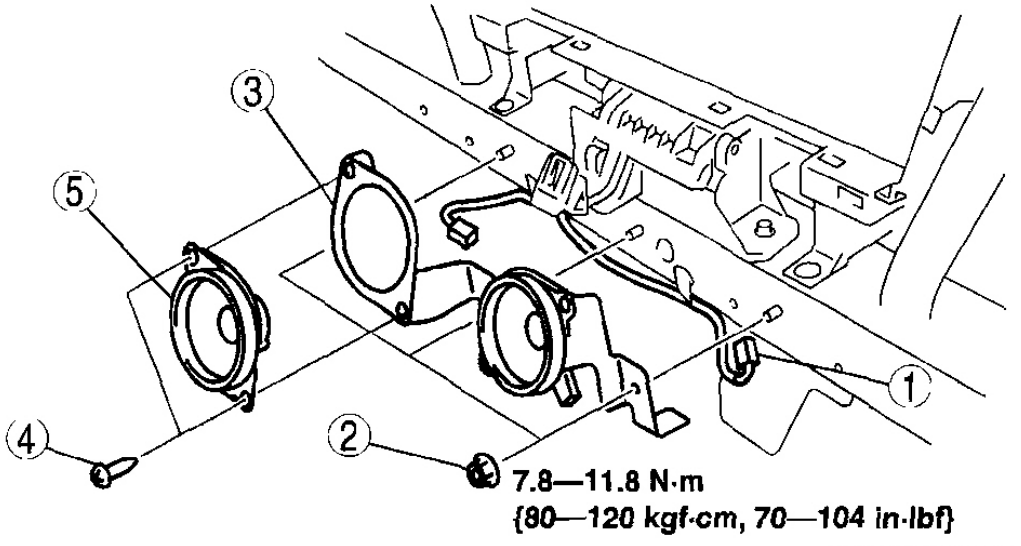


Fig. 14: Identifying Door Upper Speaker Terminals
Courtesy of MAZDA MOTORS CORP.

REAR SPEAKER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 15** .



1	Connector
2	Nut
3	Bracket (with BOSE) Bracket and rear speaker (without BOSE)
4	Screw
5	Rear speaker (with BOSE)

Fig. 15: Identifying Rear Speaker (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

REAR SPEAKER INSPECTION

1. Inspect for resistance between the rear speaker terminals using an ohmmeter.
    - If the resistance is not within the specification, replace the rear speaker.

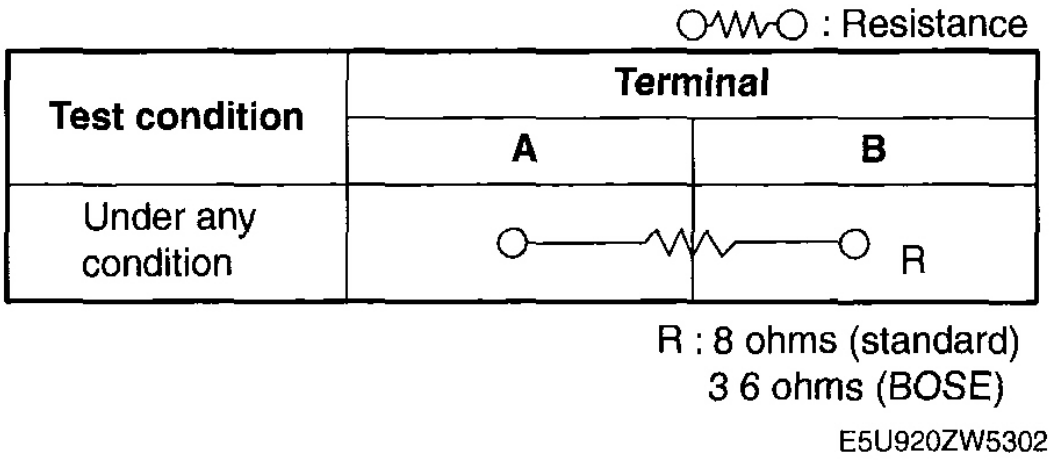


Fig. 16: Rear Speaker Continuity Table
Courtesy of MAZDA MOTORS CORP.

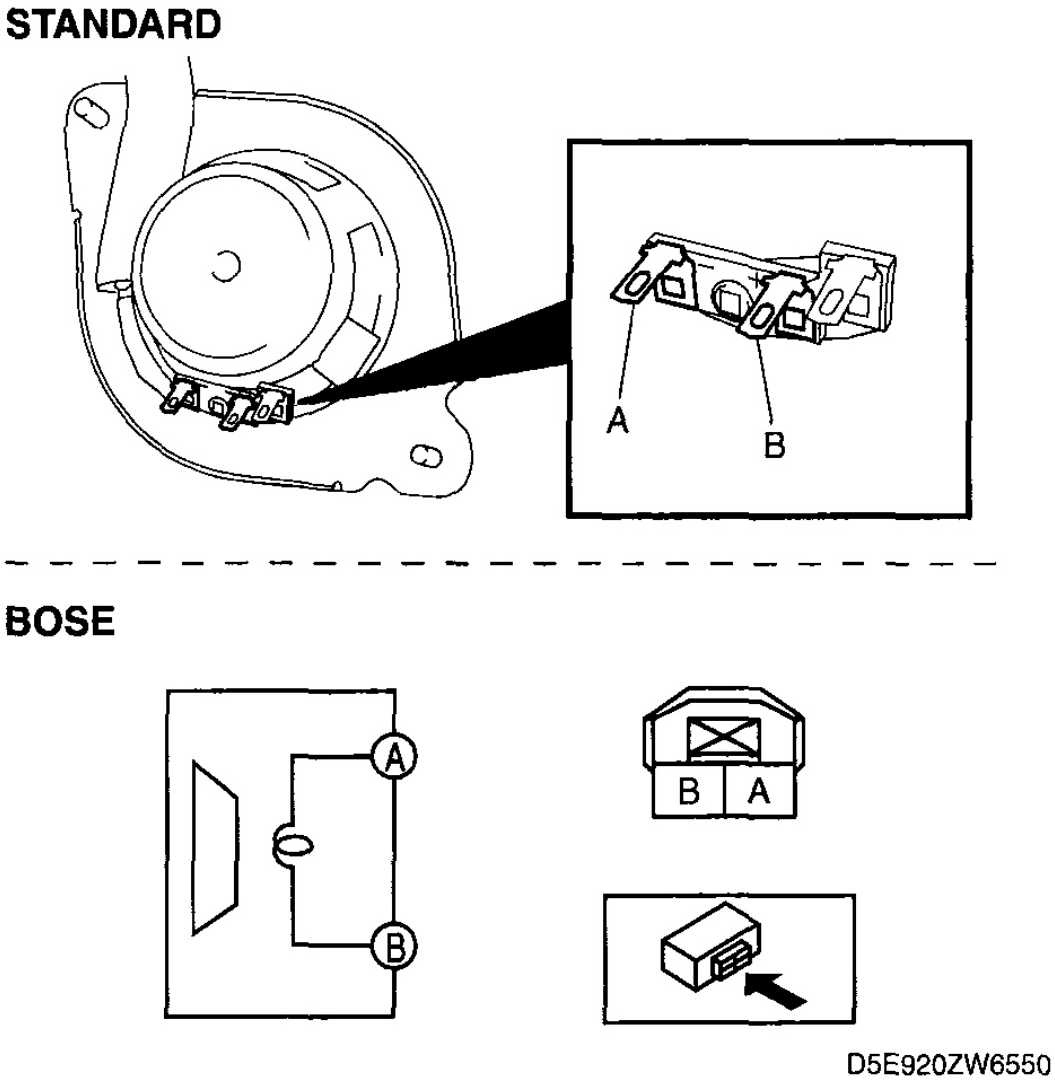
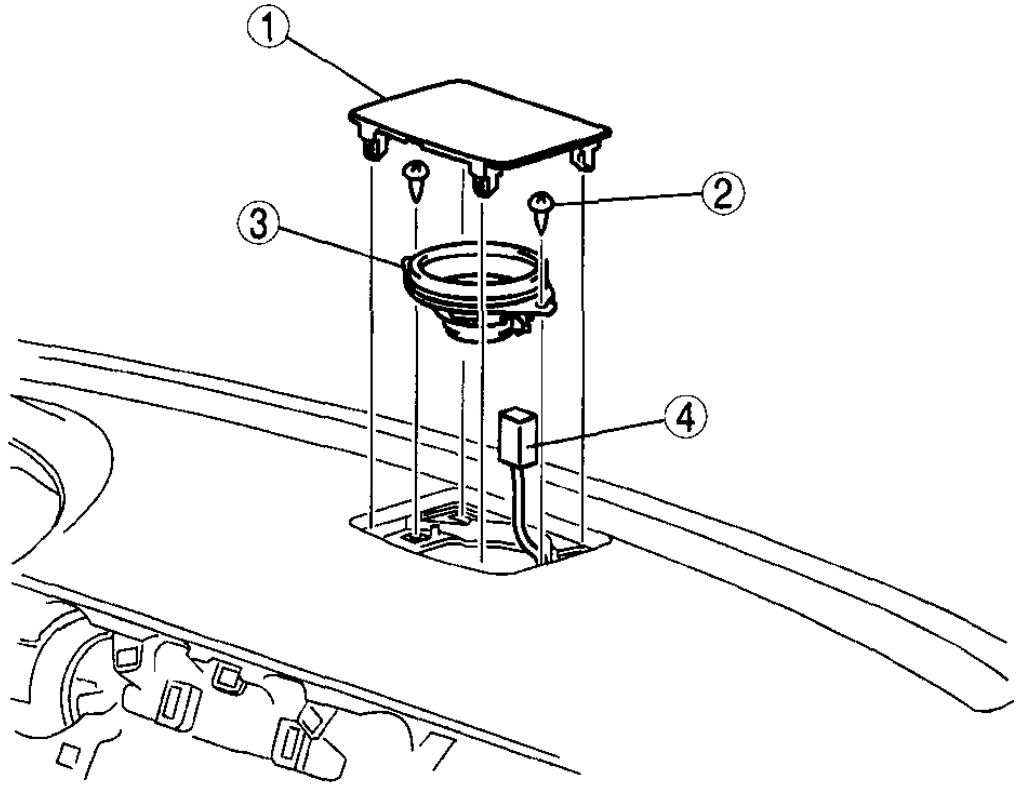


Fig. 17: Identifying Rear Speaker Terminals
Courtesy of MAZDA MOTORS CORP.

CENTER SPEAKER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in **Fig. 18** .



1	Center speaker cover
2	Screw
3	Center speaker
4	Connector

Fig. 18: Identifying Center Speaker
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

CENTER SPEAKER COVER REMOVAL NOTE

1. Insert a tape-wrapped flathead screwdriver into the service hole.
2. Pry with the screwdriver in the direction shown by the arrow to remove the center speaker cover.

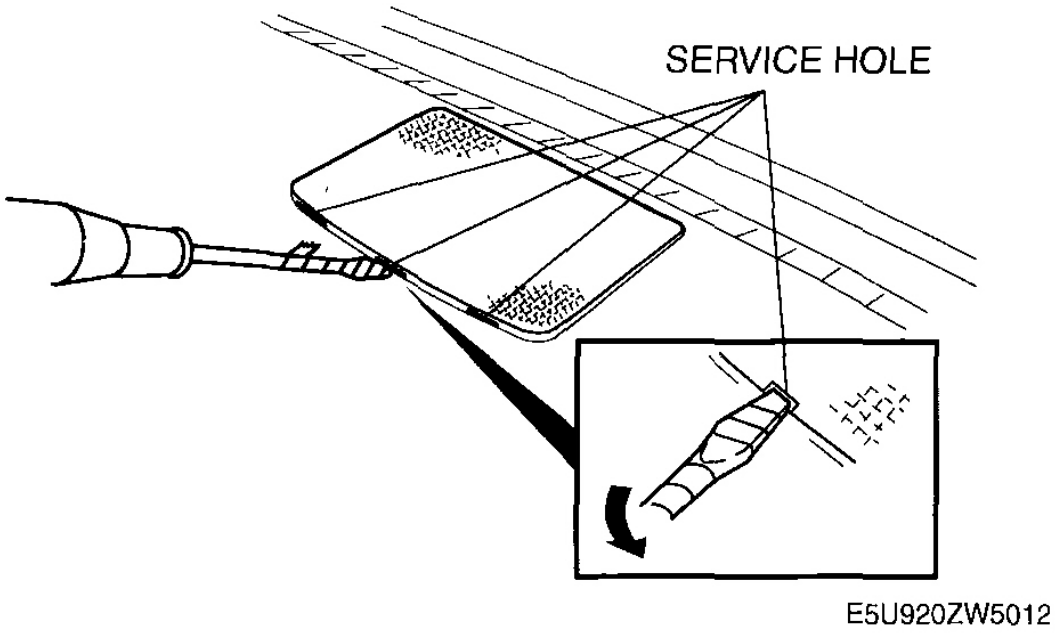


Fig. 19: Inserting Tape-Wrapped Flathead Screwdriver Into Service Hole
Courtesy of MAZDA MOTORS CORP.

CENTER SPEAKER INSPECTION

1. Verify the resistance between center speaker terminals.
   - If the resistance is not within the specification, replace the center speaker.

   Resistance

   3.6 ohms

2. Connect a **1.5 V** battery to the center speaker and verify that noise is heard from the center speaker.
   - If no noise is heard, replace the center speaker.

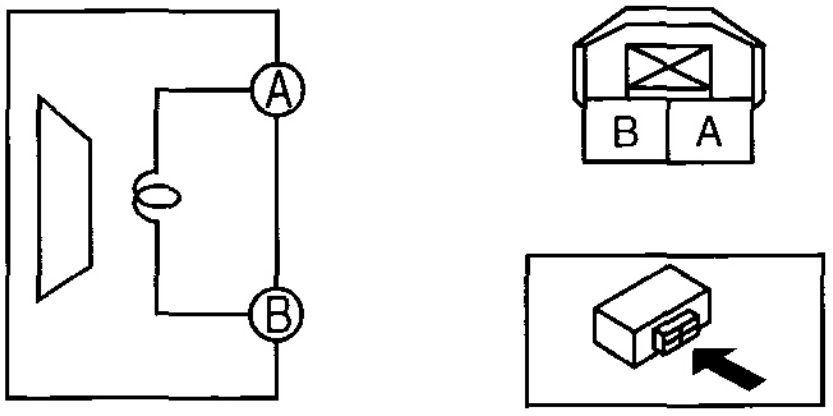


Fig. 20: Identifying Center Speaker Terminals & Connector
Courtesy of MAZDA MOTORS CORP.

TWEETER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
4. Disconnect the connector.
5. Remove the screws.
6. Remove the tweeter/door upper speaker.
7. Install in the reverse order of removal.

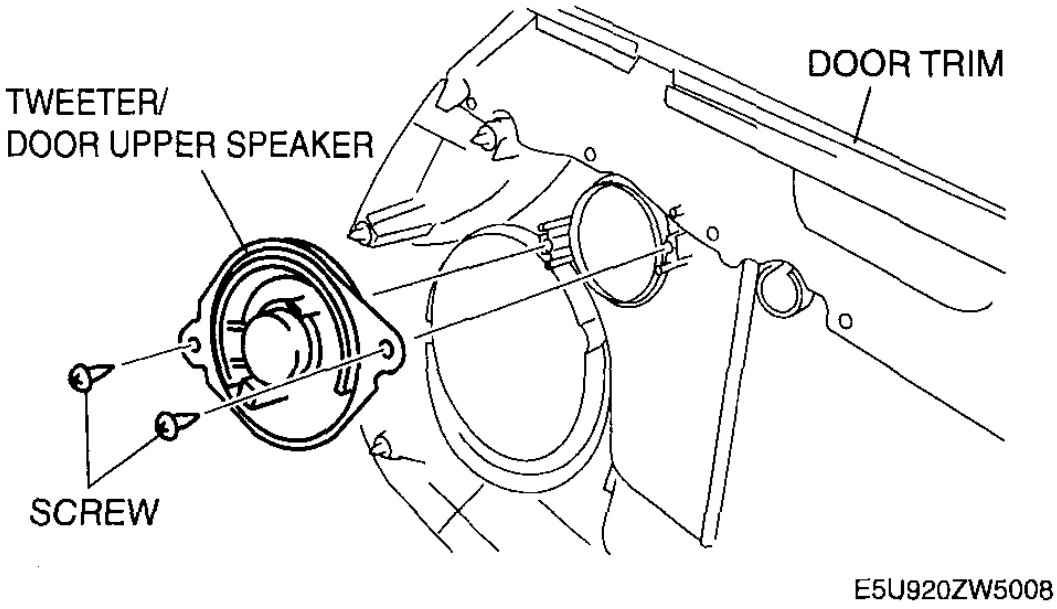


Fig. 21: Identifying Tweeter/Door Upper Speaker
Courtesy of MAZDA MOTORS CORP.

TWEETER INSPECTION

1. Inspect for resistance between the tweeter terminals using an ohmmeter.
    - If the resistance is not within the specification, replace the tweeter.

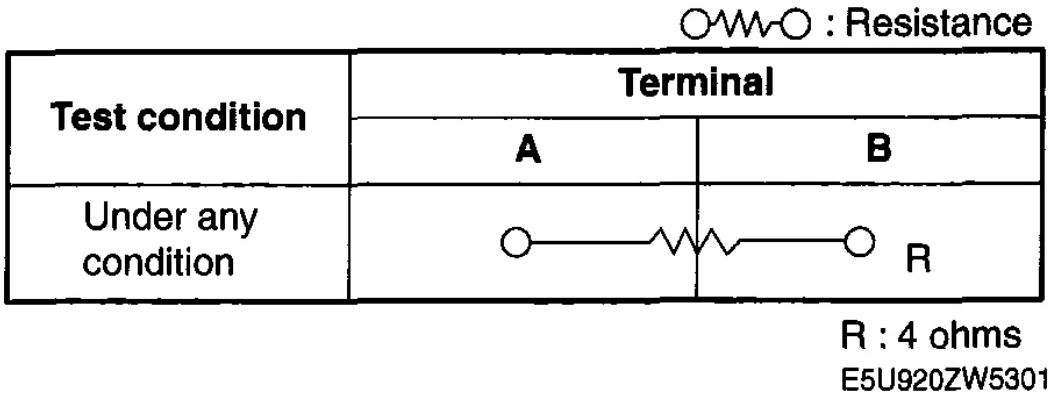


Fig. 22: Tweeter Continuity Table

Courtesy of MAZDA MOTORS CORP.

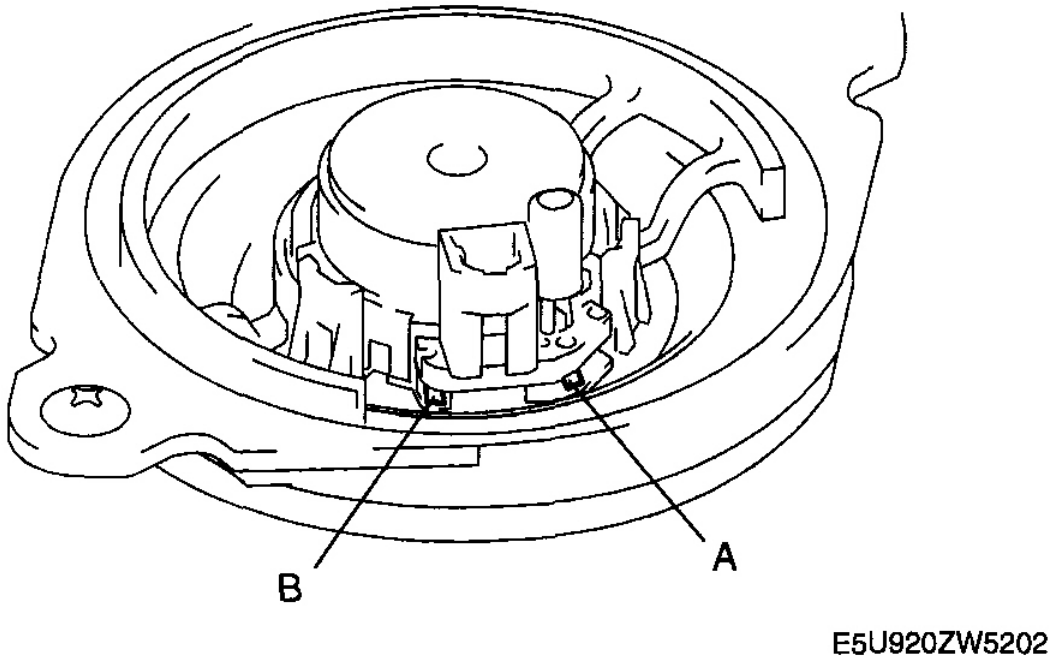


Fig. 23: Identifying Tweeter Terminals
Courtesy of MAZDA MOTORS CORP.

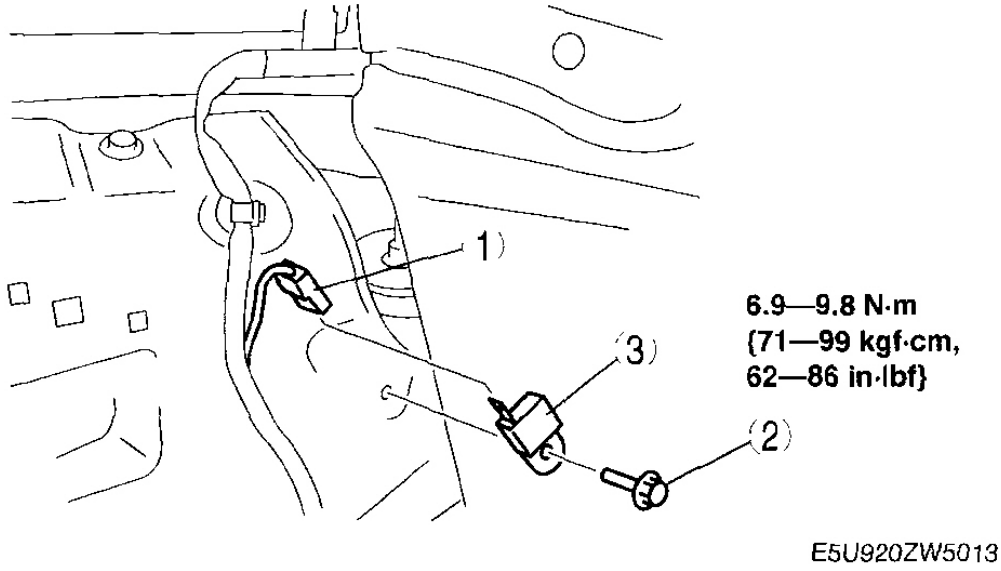
CONDENSER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY**

REMOVAL/INSTALLATION .)

10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)

4. Remove in the order indicated in **Fig. 24** .



1	Connector
2	Bolt
3	Condenser

Fig. 24: Identifying Condenser (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

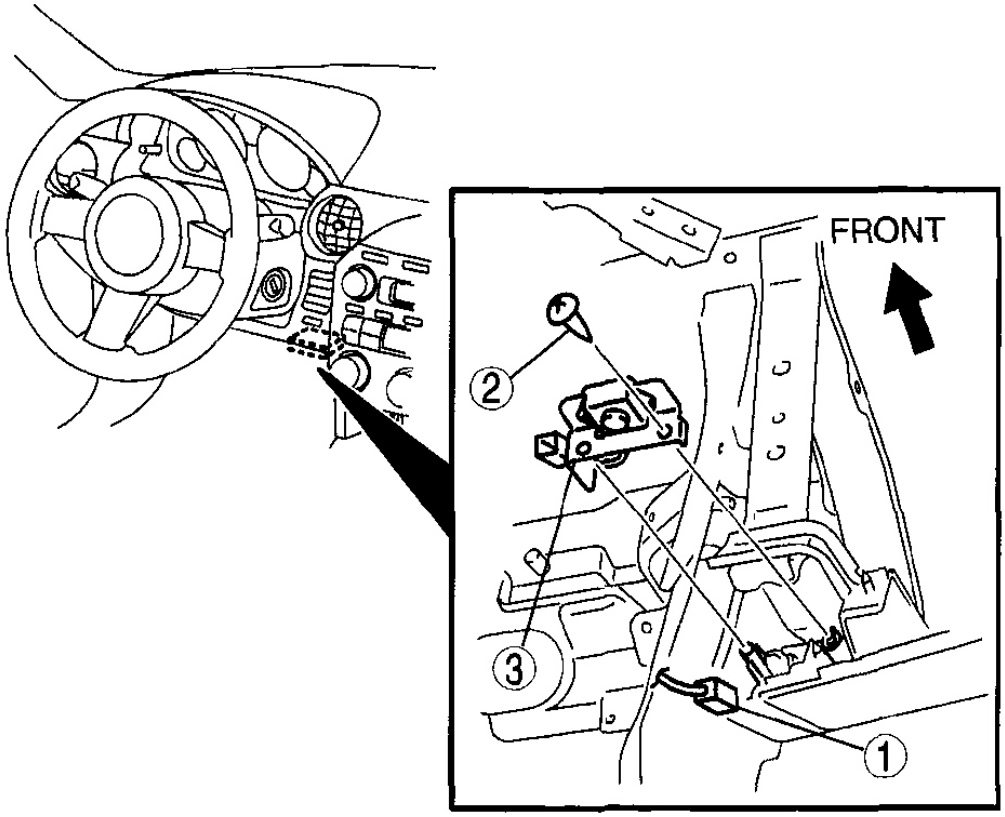
5. Install in the reverse order of removal.

AUDIOPILOT MICROPHONE REMOVAL/INSTALLATION

NOTE:

- **"AudioPilot" is a registered trademark of Bose Corporation.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in **Fig. 25** .



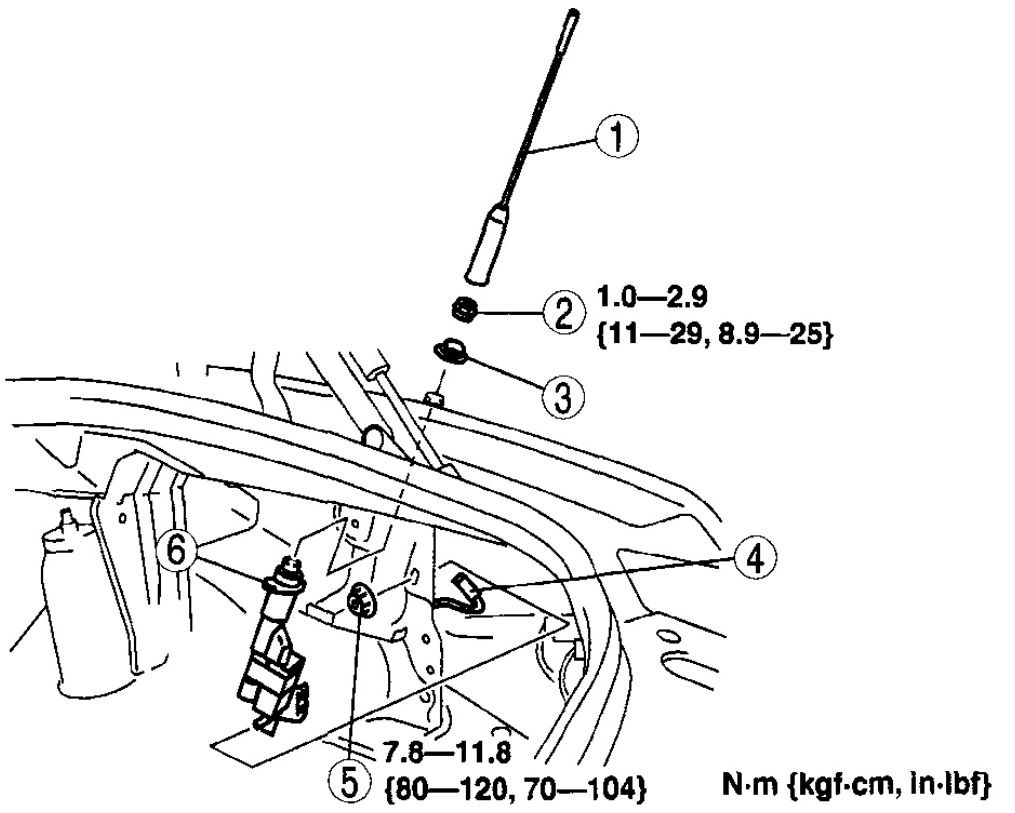
1	Connector
2	Screw
3	AUDIOPILOT microphone

Fig. 25: Identifying Audiopilot Microphone
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

MANUAL ANTENNA REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the jack.
4. Remove in the order indicated in **Fig. 26** .



1	Antenna rod
2	Mounting nut
3	Spacer
4	Connector
5	Nut
6	Manual antenna

Fig. 26: Identifying Manual Antenna (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

MOUNTING NUT REMOVAL NOTE

1. Use snap-ring pliers to remove the mounting nut.

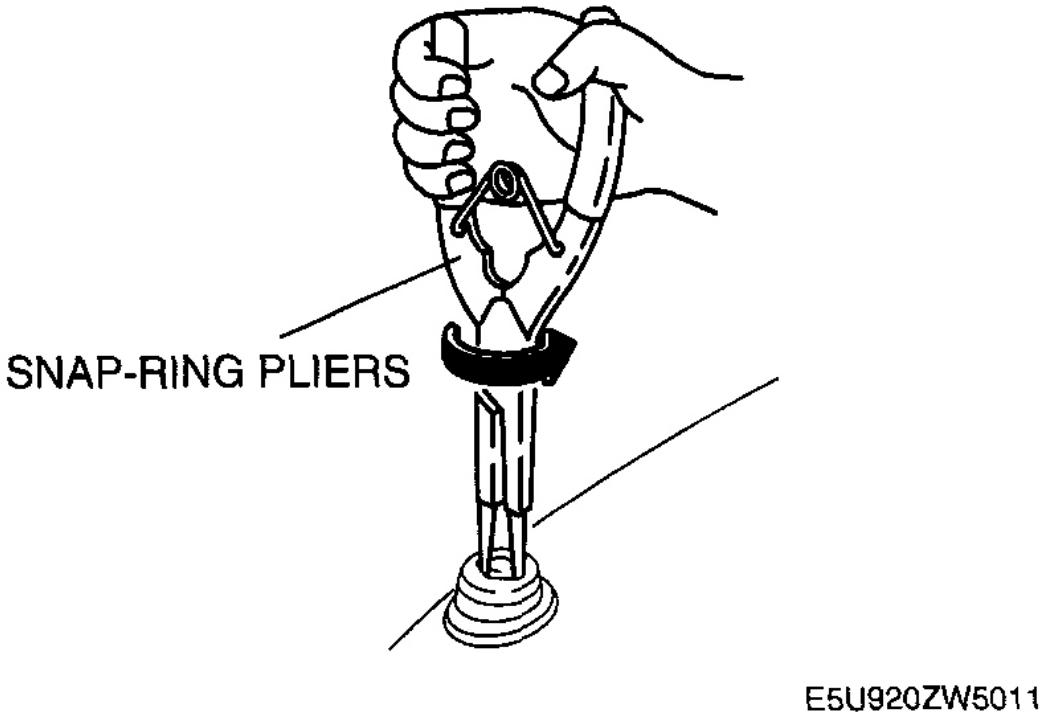


Fig. 27: Removing Mounting Nut Using Snap Ring Pliers
Courtesy of MAZDA MOTORS CORP.

MANUAL ANTENNA INSPECTION

NOTE:

- **A amplifier is built into the manual antenna.**

ANTENNA AMPLIFIER

1. Turn on the audio unit and radio, and measure the voltage at manual antenna connector terminal C.
   - If the voltage is B+, go to the next step.
   - If the voltage is not B+, inspect the audio unit or the antenna feeder.

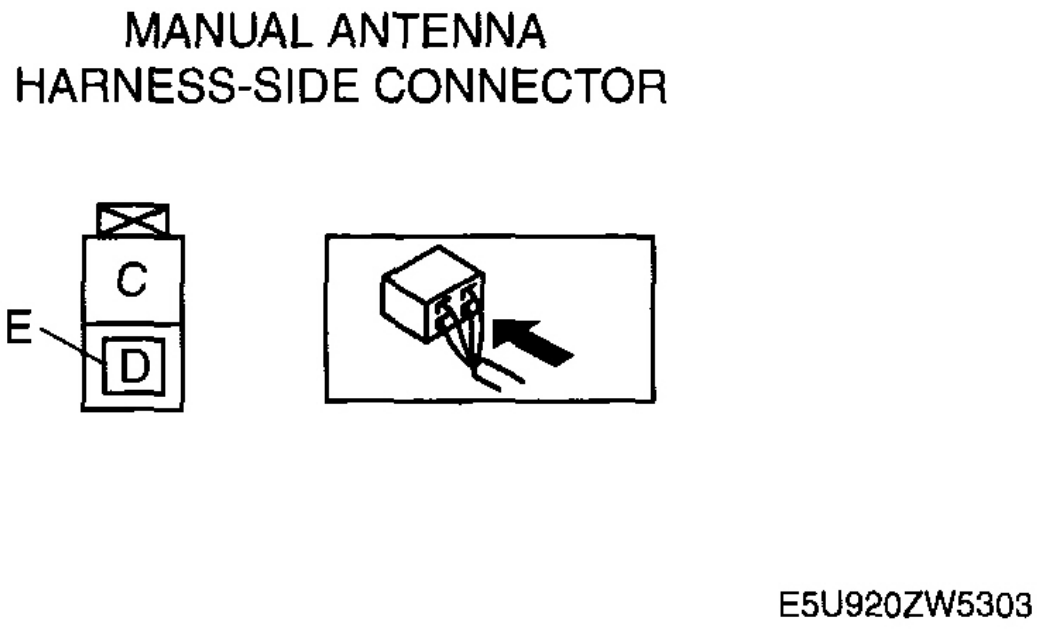


Fig. 28: Identifying Manual Antenna Connector Terminal
Courtesy of MAZDA MOTORS CORP.

FEEDER

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the manual antenna connector.
4. Inspect for continuity between the manual antenna terminals using an ohmmeter.
    - If not as specified, replace the manual antenna.

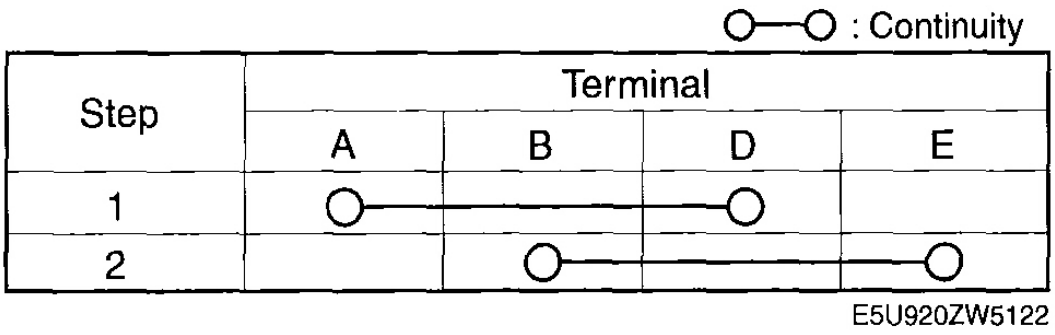


Fig. 29: Feeder Continuity Table
Courtesy of MAZDA MOTORS CORP.

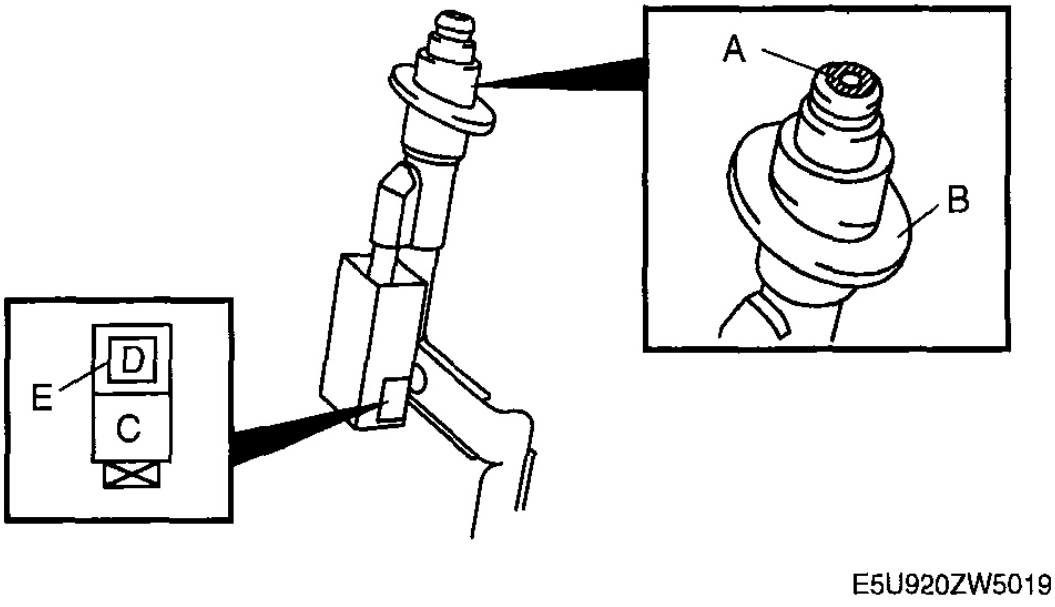
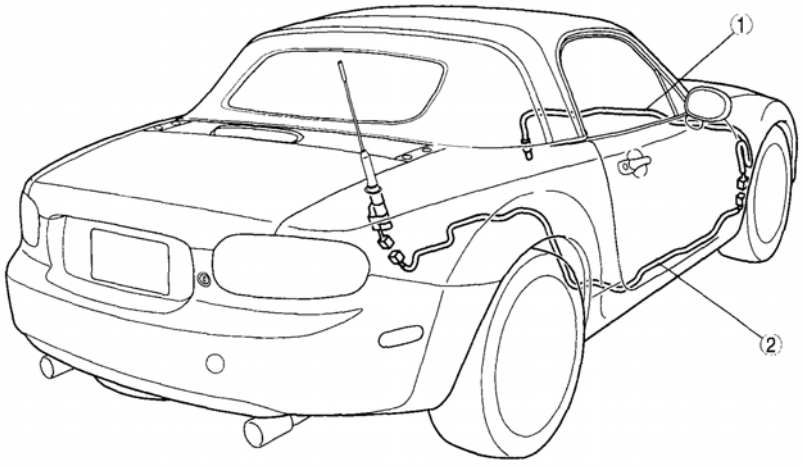


Fig. 30: Identifying Manual Antenna Terminals
Courtesy of MAZDA MOTORS CORP.

ANTENNA FEEDER LOCATION



1	AM/FM antenna feeder No.1
2	AM/FM antenna feeder No.2

Fig. 31: Identifying Antenna Feeder
Courtesy of MAZDA MOTORS CORP.

AM/FM ANTENNA FEEDER NO.1 INSPECTION

1. Verify that the continuity is as indicated in **Fig. 32** .
    - If not as indicated in the table, replace the AM/FM antenna feeder No.1.

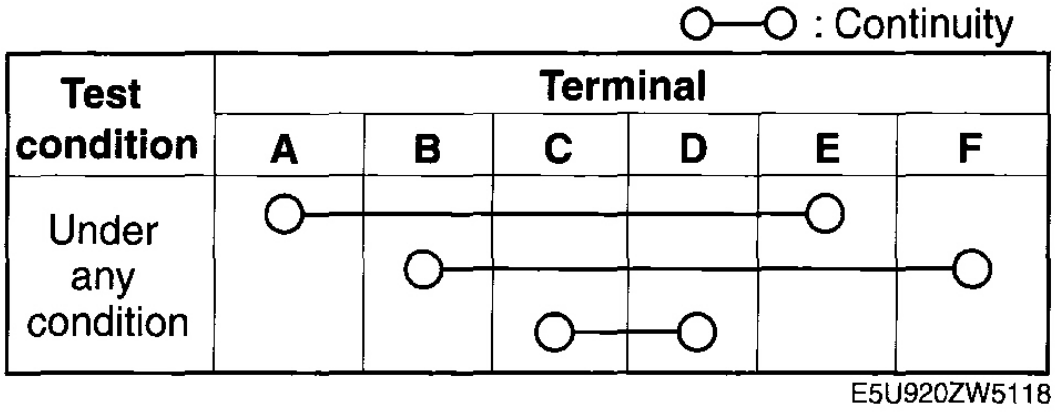


Fig. 32: AM/FM Antenna Feeder No. 1 Continuity Table
Courtesy of MAZDA MOTORS CORP.

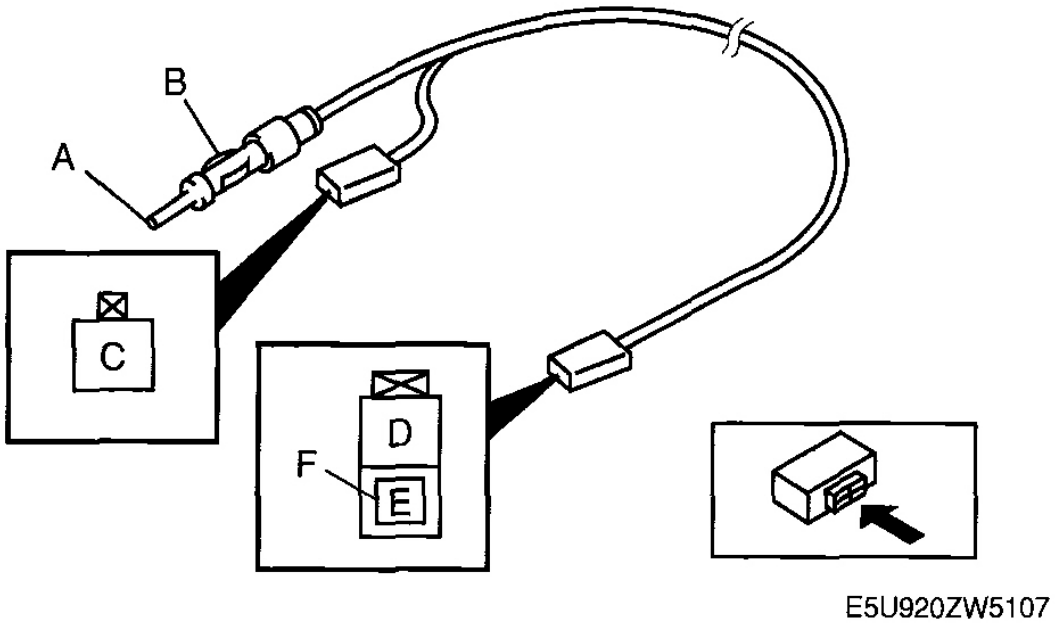


Fig. 33: Identifying AM/FM Antenna Feeder No. 1 Terminals & Connectors
Courtesy of MAZDA MOTORS CORP.

AM/FM ANTENNA FEEDER NO.2 INSPECTION

1. Verify that the continuity is as indicated in the table.
   - If not as indicated in **Fig. 34** , replace the AM/FM antenna feeder No.2.

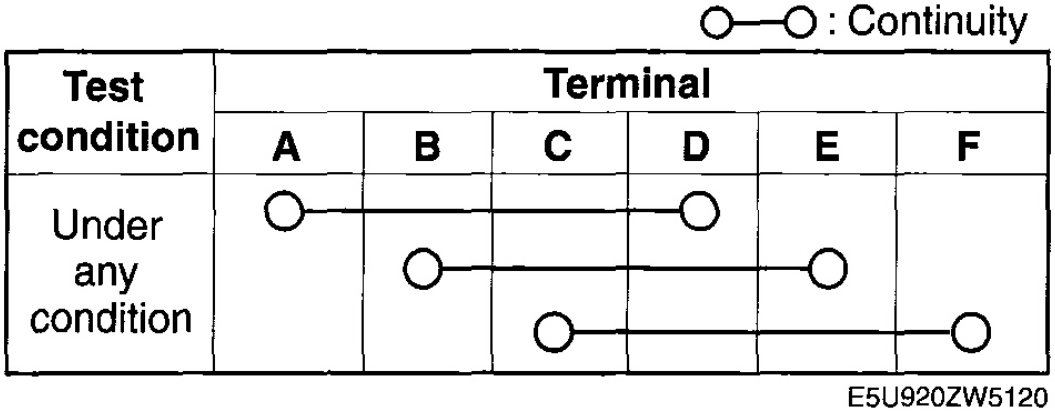


Fig. 34: AM/FM Antenna Feeder No. 2 Continuity Table
Courtesy of MAZDA MOTORS CORP.

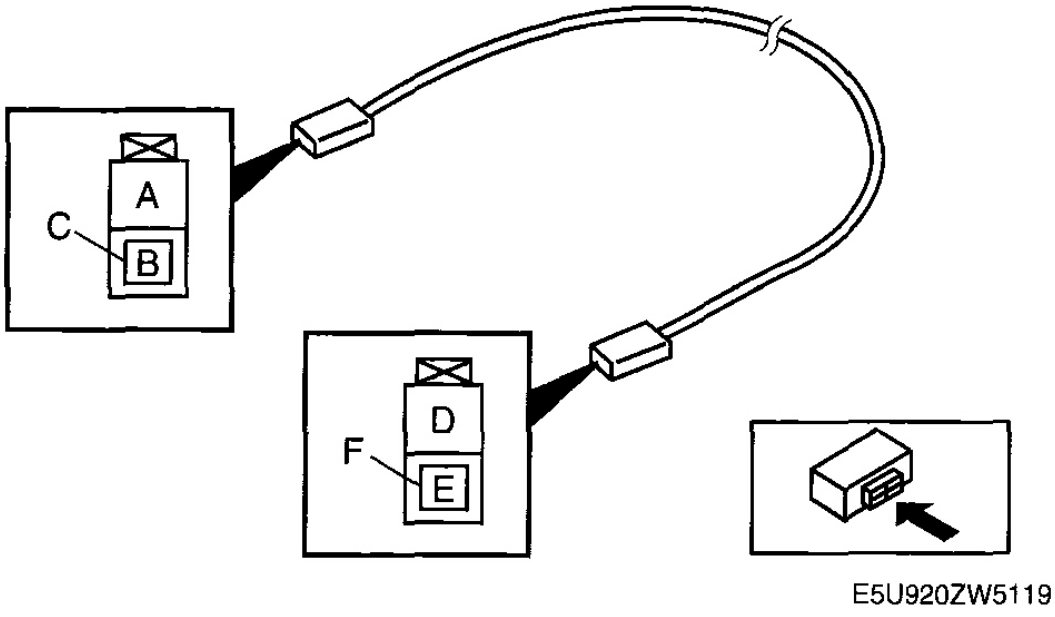


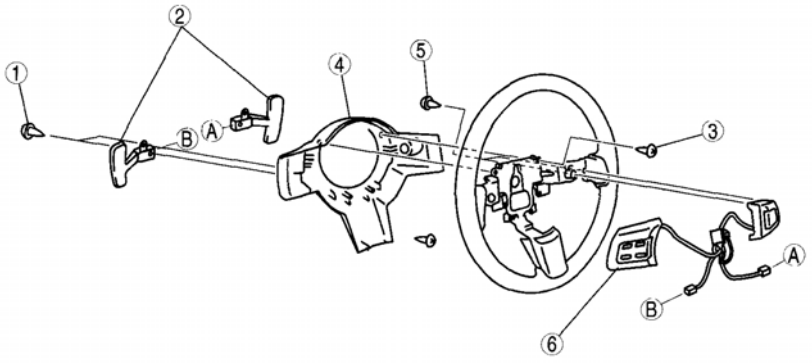
Fig. 35: Identifying AM/FM Antenna Feeder No. 2 Terminals & Connectors
Courtesy of MAZDA MOTORS CORP.

AUDIO CONTROL SWITCH REMOVAL/INSTALLATION

NOTE:

- **For vehicles with the cruise control system, the audio control switch harness and the cruise control switch harness are united, therefore they cannot be separated.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the driver-side air bag module. (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
4. Remove the steering wheel. (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
5. Remove in the order indicated in **Fig. 36** .



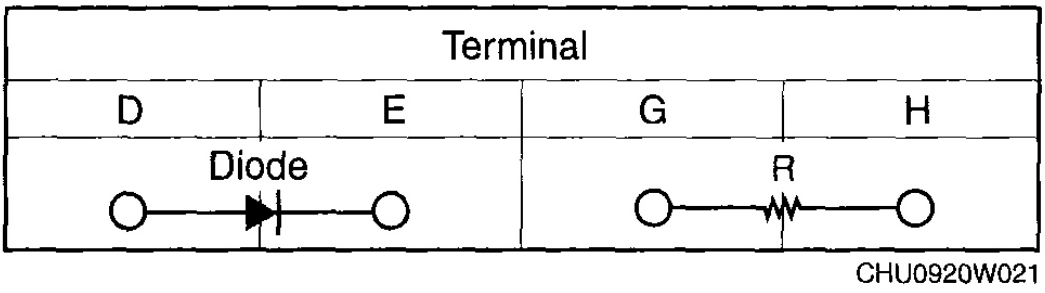
1	Screw A	4	Cover
2	Steering shift switch (AT vehicles)	5	Screw C
3	Screw B	6	Audio control switch

Fig. 36: Removing Driver-Side Air Bag Module
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

AUDIO CONTROL SWITCH INSPECTION

1. Verify the resistance and continuity between the audio control switch terminals.
   - If the resistance and continuity are not as indicated in the tables, replace the audio control switch.



R : Resistance. See the table.

Fig. 37: Audio Control Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

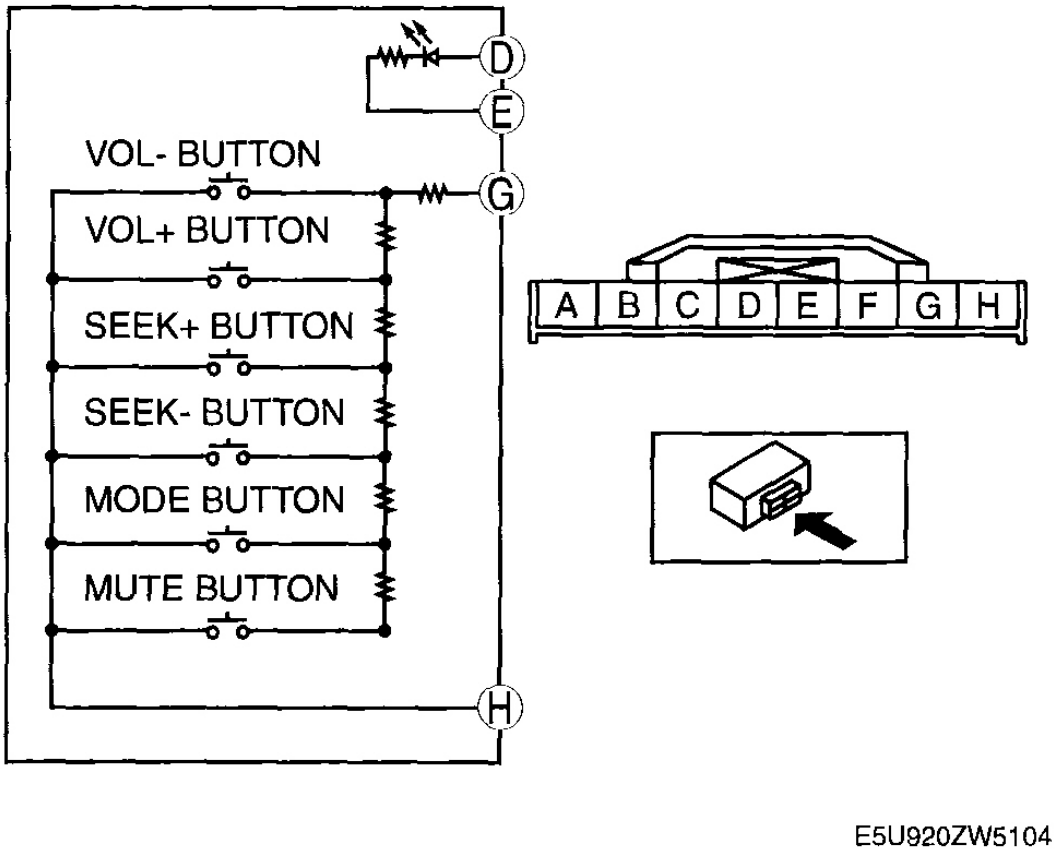


Fig. 38: Identifying Audio Control Switch Terminals & Connector
Courtesy of MAZDA MOTORS CORP.

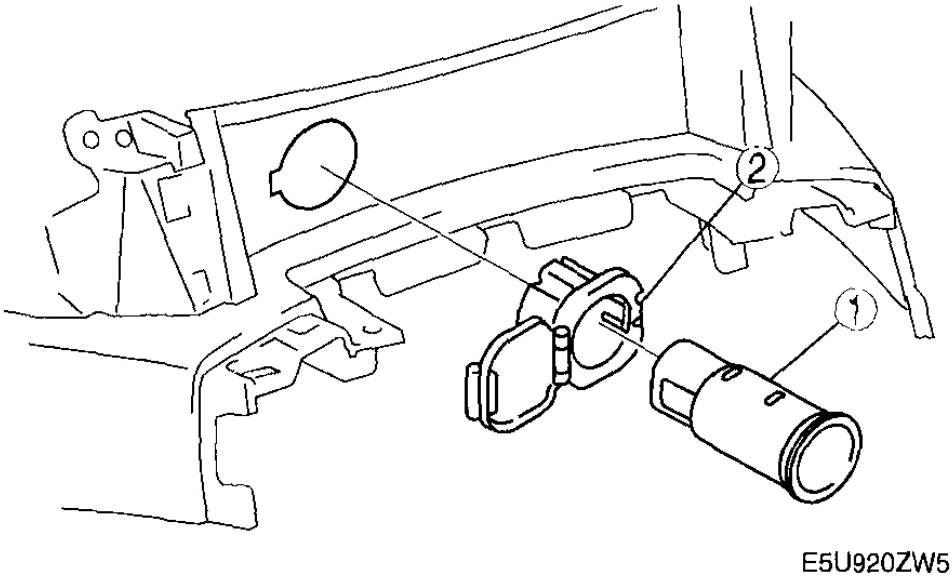
AUDIO CONTROL SWITCH POSITION RESISTANCE

Switch position	Resistance (ohm)
VOL- switch ON	51-56
VOL+ switch ON	140-154
SEEK-switch ON	286-315
SEEK- switch ON	534-589
MODE switch ON	985-1,080
MUTE switch ON	1,940-2,130
OFF	4,800-5,290

ACCESSORY SOCKET REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

3. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
4. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
5. Remove the console panel. (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
6. Remove in the order indicated in **Fig. 39** .
7. Install in the reverse order of removal.



1	Accessory socket
2	Cap

Fig. 39: Identifying Accessory Socket
Courtesy of MAZDA MOTORS CORP.

ACCESSORY SOCKET REMOVAL NOTE

1. While pressing a tape-wrapped flathead screwdriver against the cap projection, pull the accessory socket outward.

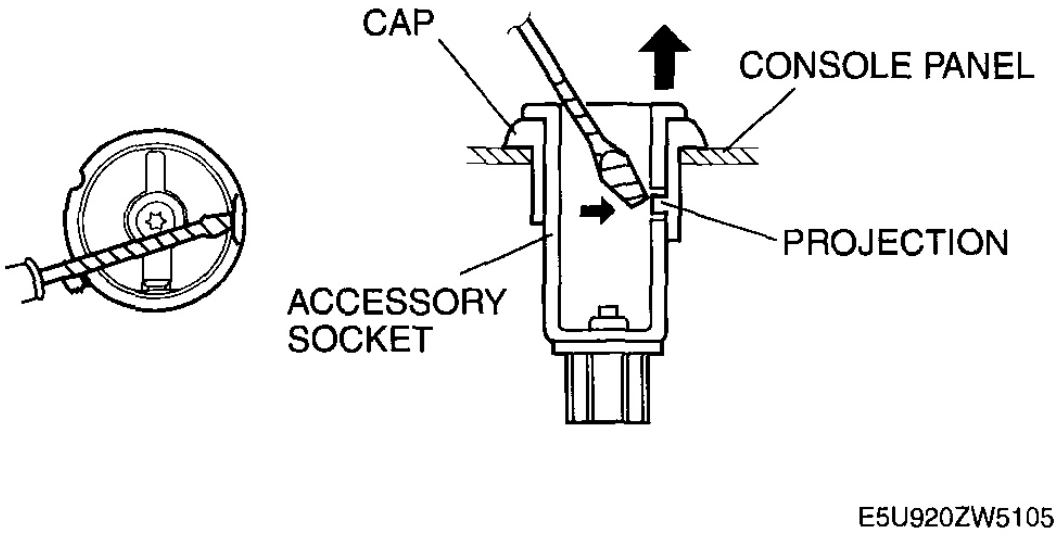


Fig. 40: Removing Accessory Socket
Courtesy of MAZDA MOTORS CORP.

CAP REMOVAL NOTE

1. While pressing the tabs, pull the cap outwards.

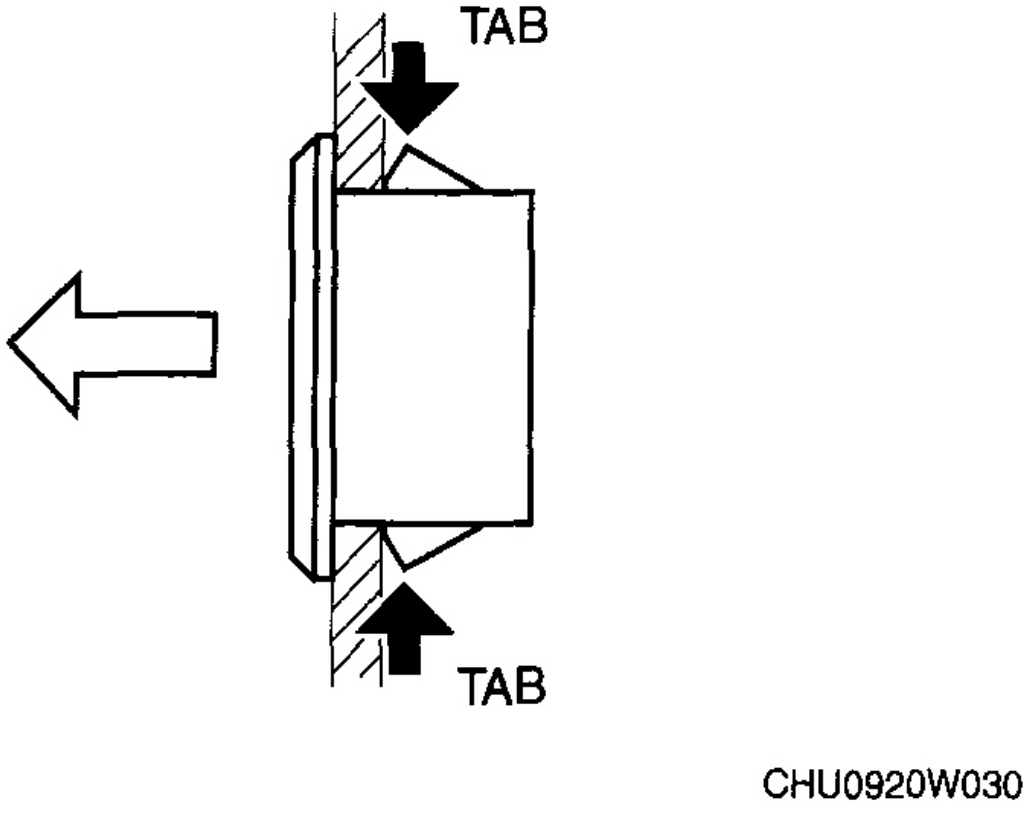


Fig. 41: Pulling Cap Outwards When Pressing Tabs
Courtesy of MAZDA MOTORS CORP.

ACCESSORY SOCKET INSPECTION

1. Connect a tester as shown in **Fig. 42** and verify that there is continuity.
    - If the continuity cannot be verified, replace the accessory socket.

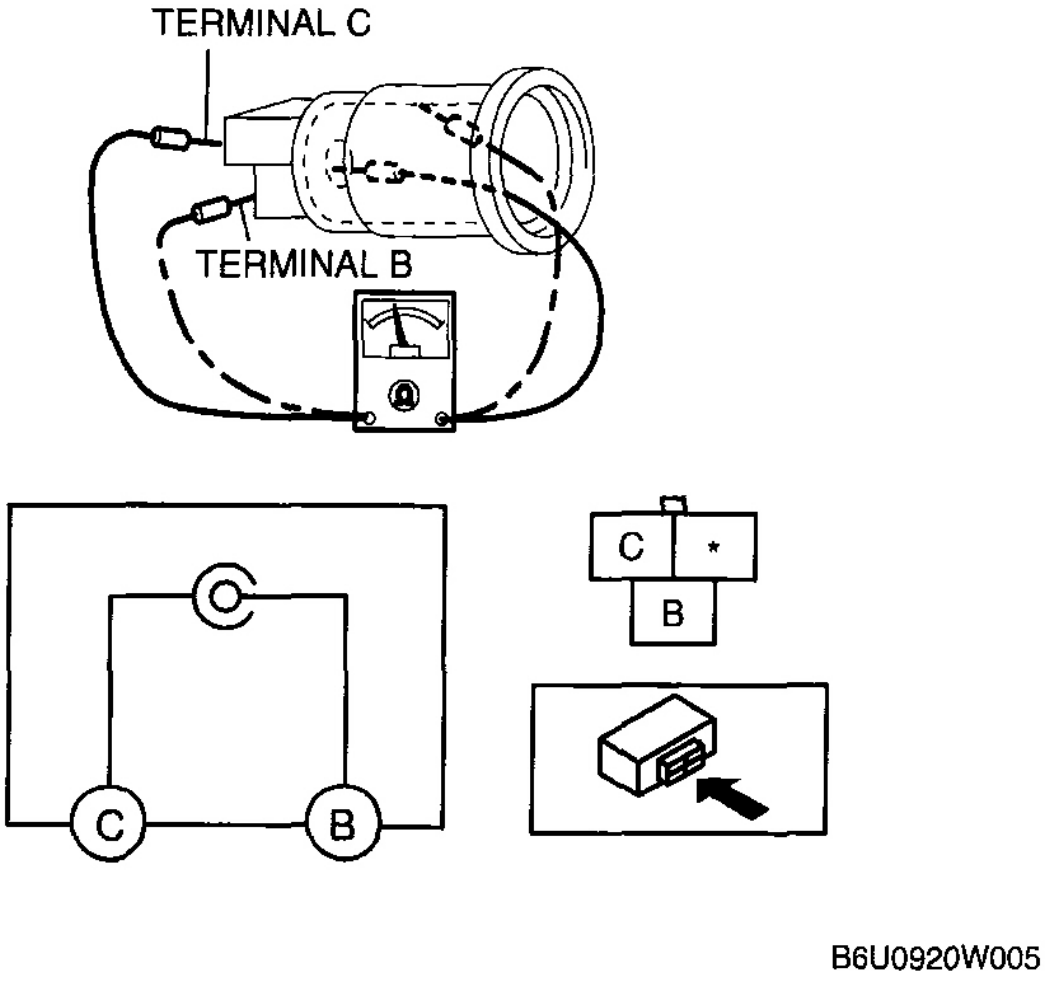


Fig. 42: Identifying Accessory Socket Terminals & Connector
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Exhaust System - MX-5 Miata

EXHAUST SYSTEM INSPECTION [LF]

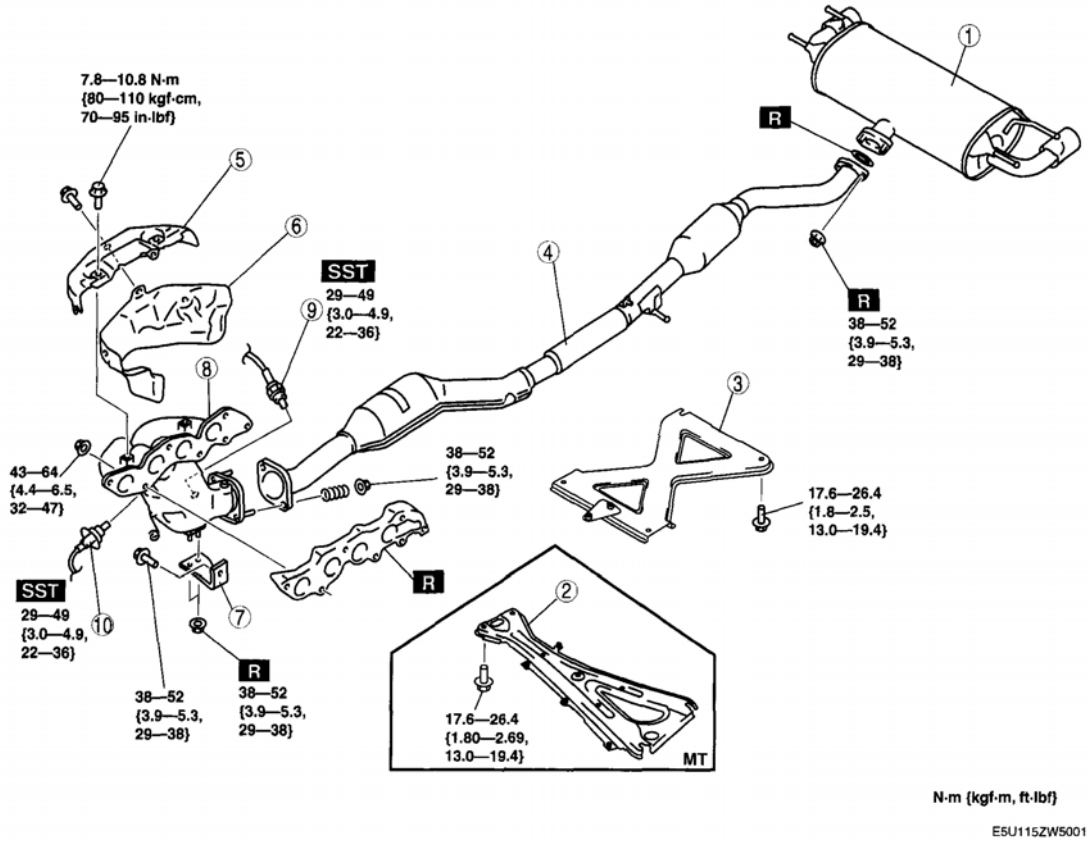
1. Start the engine and inspect each exhaust system component for exhaust gas leakage.
    - If there is leakage, repair or replace the appropriate component.

EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]

WARNING:

- **A hot engine and exhaust system can cause severe burns. Turn off the engine and wait until they are cool before servicing the exhaust system.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Main silencer
2	Member bracket (MT)
3	Tunnel member
4	Middle pipe
5	Exhaust manifold insulator (upper)

6	Exhaust manifold insulator (lower)
7	Exhaust manifold bracket
8	Exhaust manifold
9	Rear HO2S
10	Front HO2S

Fig. 1: Identifying Exhaust System (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

EXHAUST MANIFOLD INSULATOR (UPPER) REMOVAL NOTE

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
3. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
4. Remove the suspension tower bar (joint) and (right side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
5. Remove the generator. (See **GENERATOR REMOVAL/INSTALLATION [LF]** .)
6. Remove the insulator.

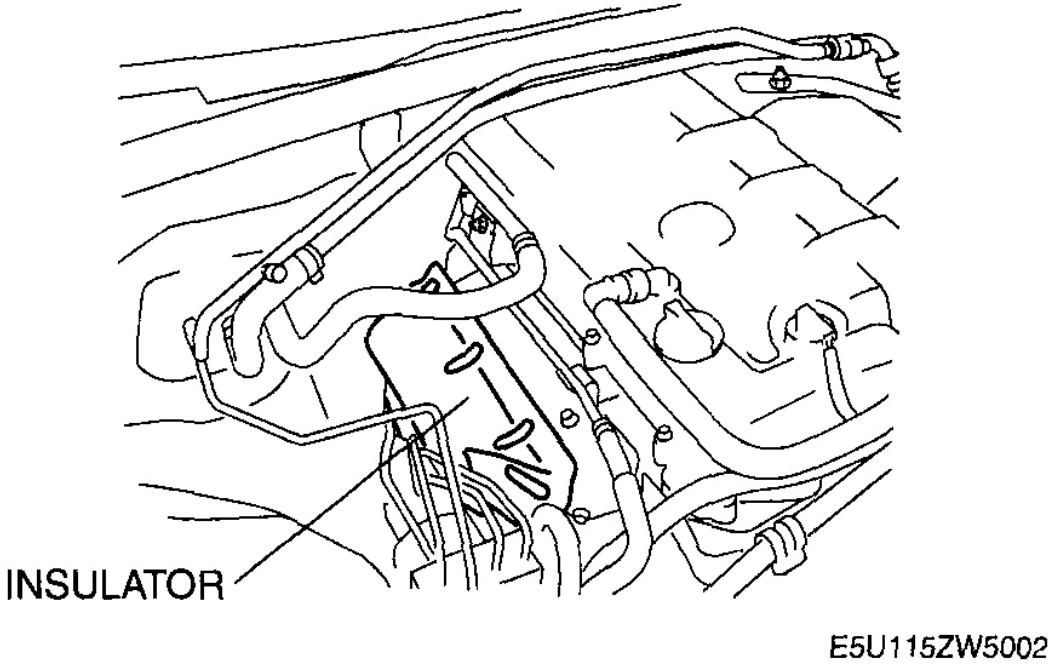


Fig. 2: Removing Insulator
Courtesy of MAZDA MOTORS CORP.

EXHAUST MANIFOLD REMOVAL NOTE

1. Disconnect the front HO2S connector and rear HO2S connector.
2. Move the water pipe and heater hose slightly out of the way.
3. Disconnect the ventilation hose from the cylinder head. (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)

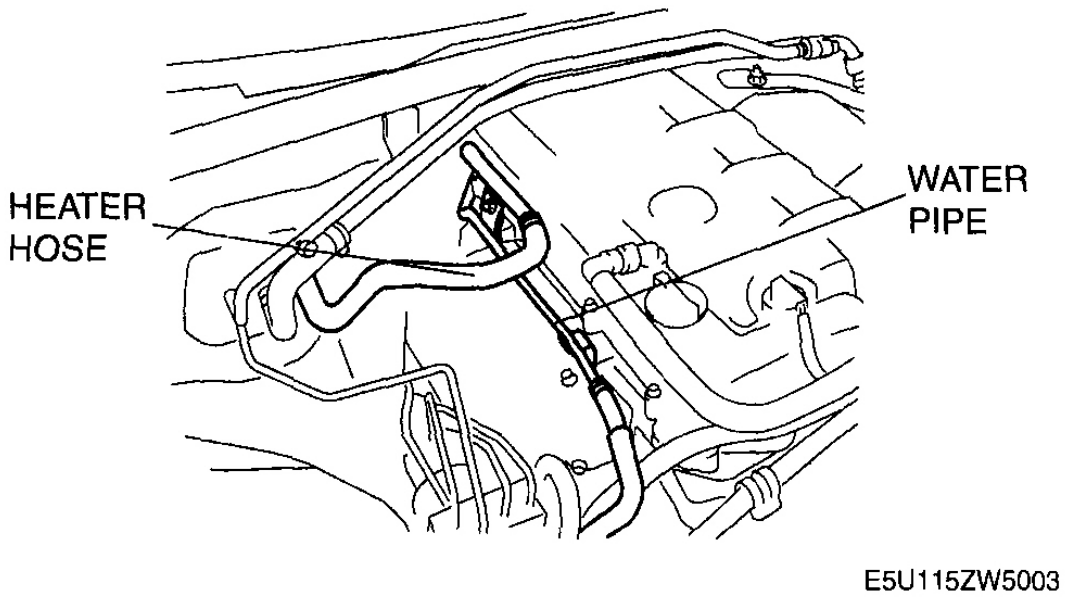


Fig. 3: Identifying Heater Hose & Water Pipe
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Exterior Trim - MX-5 Miata

EXTERIOR TRIM LOCATION INDEX

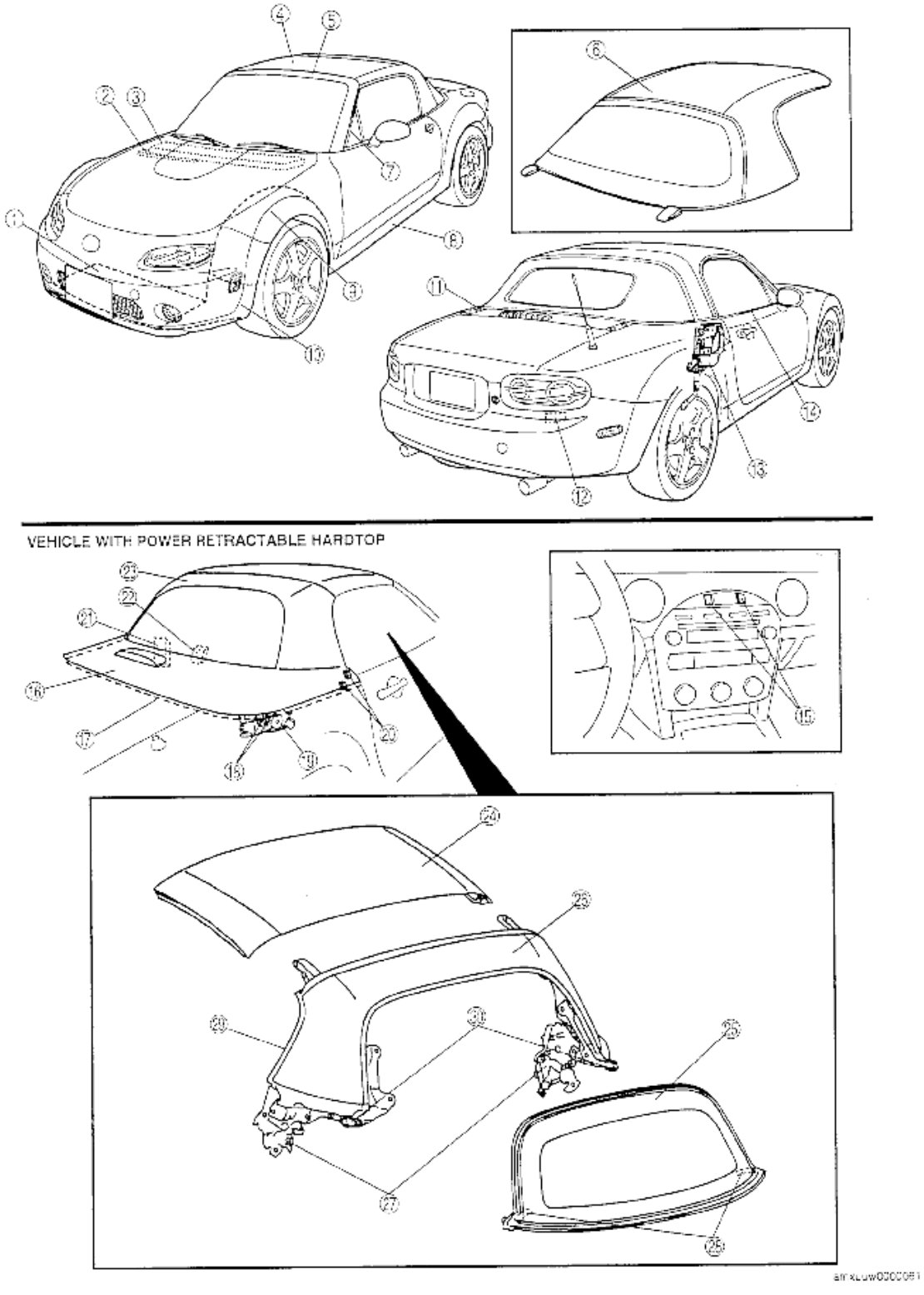


Fig. 1: Identifying Exterior Trim Components
Courtesy of MAZDA MOTORS CORP.

1	Mudguard (See 09-16-23 FRONT UNDER COVER REMOVAL/ INSTALLATION.)
2	Side cowl grille (See 09-16-6 SIDE COWL GRILLE REMOVAL/ INSTALLATION.)
3	Cowl grille (See 09-16-5 COWL GRILLE REMOVAL/ INSTALLATION.)
4	Convertible top (See 09-16-8 CONVERTIBLE TOP REMOVAL/ INSTALLATION.) (See 09-16-10 CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY.) (See 09-16-15 CONVERTIBLE TOP ADJUSTMENT.)
5	Windshield garnish (See 09-16-16 WINDSHIELD GARNISH REMOVAL.) (See 09-16-16 WINDSHIELD GARNISH INSTALLATION.)
6	Detachable hardtop (See 09-16-18 DETACHABLE HARDTOP DISASSEMBLY/ASSEMBLY.) (See 09-16-19 DETACHABLE HARDTOP ADJUSTMENT.)
7	Drip molding (See 09-16-7 DRIP MOLDING REMOVAL/ INSTALLATION.)
8	Side step molding (See 09-16-22 SIDE STEP MOLDING REMOVAL.) (See 09-16-22 SIDE STEP MOLDING INSTALLATION.)
9	splash board A (See 09-16-23 SPLASH SHIELD REMOVAL/ INSTALLATION.)
10	splash board B (See 09-16-23 SPLASH SHIELD REMOVAL/ INSTALLATION.)
11	Beltline molding (See 09-16-6 BELTLINE MOLDING REMOVAL/ INSTALLATION.)
12	Extractor chamber (See 09-16-21 EXTRACTOR CHAMBER REMOVAL/INSTALLATION.)
13	Drain cover (See 09-16-20 DRAIN COVER REMOVAL/ INSTALLATION.)
14	Front beltline molding (See 09-16-5 FRONT BELTLINE MOLDING REMOVAL/INSTALLATION.)
15	Retractable hardtop switch (See 09-16-28 POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION.) (See 09-16-28 POWER RETRACTABLE HARDTOP SWITCH INSPECTION.)
16	Deck panel (See 09-16-37 DECK PANEL REMOVAL/ INSTALLATION.) (See 09-16-39 DECK PANEL DISASSEMBLY/ ASSEMBLY.) (See 09-16-40 DECK PANEL ADJUSTMENT.)
17	Rear deck weatherstrip (See 09-16-43 REAR DECK WEATHERSTRIP REMOVAL.) (See 09-16-43 REAR DECK WEATHERSTRIP INSTALLATION.)
18	Deck panel limit switch (See 09-16-42 DECK PANEL LIMIT SWITCH REMOVAL/INSTALLATION.) (See 09-16-42 DECK PANEL LIMIT SWITCH INSPECTION.)
19	Deck panel motor (See 09-16-41 DECK PANEL MOTOR REMOVAL/ INSTALLATION.) (See 09-16-41 DECK PANEL MOTOR INSPECTION.)
20	Power retractable hardtop limit switch (See 09-16-35 POWER RETRACTABLE HARDTOP LIMIT SWITCH REMOVAL/INSTALLATION.) (See 09-16-37 POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION.)
21	Power retractable hardtop control module (See 09-16-29 POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION.) (See 09-16-30 POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION.) (See 09-16-29 POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION.)
22	Roof hook (See 09-16-43 ROOF HOOK REMOVAL/ INSTALLATION.) (See 09-16-45 ROOF HOOK CABLE REMOVAL/ INSTALLATION.)
23	Power retractable hardtop (See 09-16-24 POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION.) (See 09-16-26 POWER RETRACTABLE HARDTOP ADJUSTMENT.)
24	Front roof panel (See 09-16-48 FRONT ROOF PANEL REMOVAL/ INSTALLATION.) (See 09-16-49 FRONT ROOF PANEL DISASSEMBLY/ASSEMBLY.)
25	Rear window glass (See 09-12-22 REAR WINDOW GLASS REMOVAL/ INSTALLATION[POWER RETRACTABLE HARDTOP].)
26	Middle roof panel (See 09-16-50 MIDDLE ROOF PANEL REMOVAL/ INSTALLATION.) (See 09-16-50 MIDDLE ROOF PANEL DISASSEMBLY/ASSEMBLY.)
27	Roof motor (See 09-16-34 ROOF MOTOR REMOVAL/ INSTALLATION.) (See 09-16-35 ROOF MOTOR INSPECTION.)
28	Power retractable hardtop drain hose (See 09-16-56 POWER RETRACTABLE HARDTOP DRAIN HOSE REMOVAL/INSTALLATION.)
29	Middle roof panel weatherstrip (See 09-16-51 MIDDLE ROOF PANEL WEATHERSTRIP REMOVAL/INSTALLATION.)
30	Roof link lock (See 09-16-52 ROOF LINK LOCK REMOVAL/ INSTALLATION.)

Fig. 2: Exterior Trim Legends
Courtesy of MAZDA MOTORS CORP.

FRONT BELTLINE MOLDING REMOVAL/INSTALLATION

1. Fully open the door glass.
2. Remove clip A using a protective tape-wrapped flathead screwdriver.
3. Lift (partially peeling back) the front beltline molding in the direction of the arrow and remove it.
4. Install in the reverse order of removal.

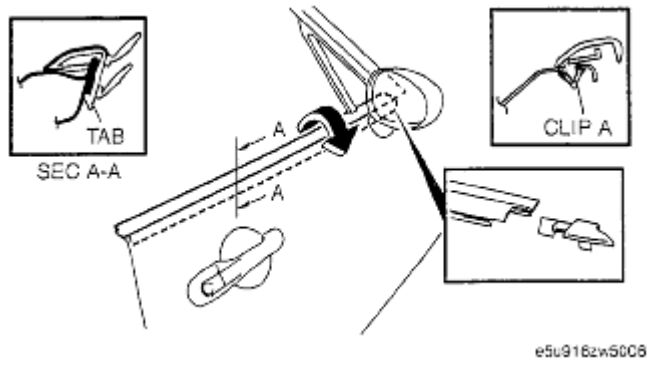


Fig. 3: Removing/Installing Front Beltline Molding
Courtesy of MAZDA MOTORS CORP.

COWL GRILLE REMOVAL/INSTALLATION

1. Remove the windshield wiper arm and blade. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
2. Remove the covers.

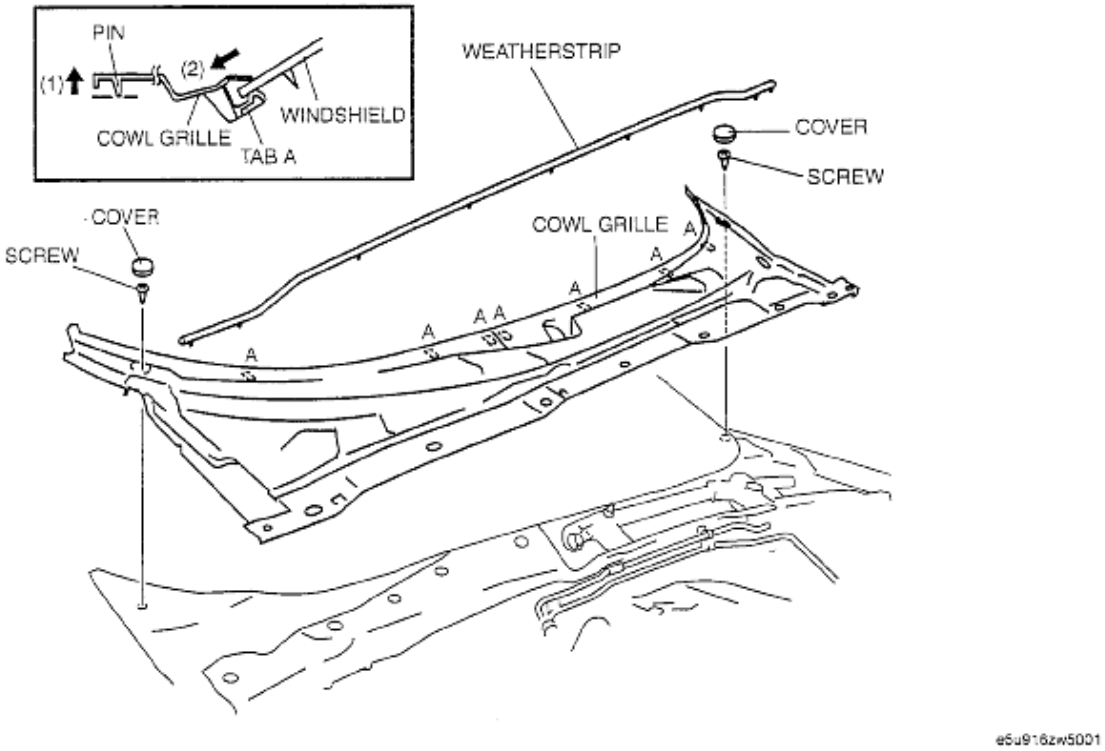


Fig. 4: Identifying Cowl Grill Components
Courtesy of MAZDA MOTORS CORP.

3. Remove the screws.
4. Remove windshield washer hose from cowl grille.
5. Remove the weatherstrip.
6. Pull the cowl grille in the direction of arrow (1) so that it is free from the pins, pull tabs A in the direction of arrow (2), and then remove the front window glass.
7. Remove the cowl grille.
8. Install in the reverse order of removal.

SIDE COWL GRILLE REMOVAL/INSTALLATION

1. Remove the windshield wiper arm and blade. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
2. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION**.)
3. Remove the fasteners.
4. Remove the side cowl grill.
5. Install in the reverse order of removal.

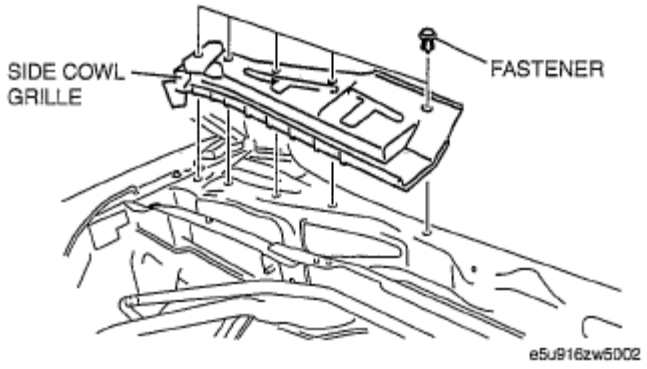


Fig. 5: Identifying Side Cowl Grille And Fastener
Courtesy of MAZDA MOTORS CORP.

BELTLINE MOLDING REMOVAL/INSTALLATION

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)
    12. Side shelf (See **SIDE SHELF REMOVAL/INSTALLATION** .)
    13. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    14. Convertible top (See **CONVERTIBLE TOP REMOVAL/INSTALLATION**.)
2. Remove the fasteners.

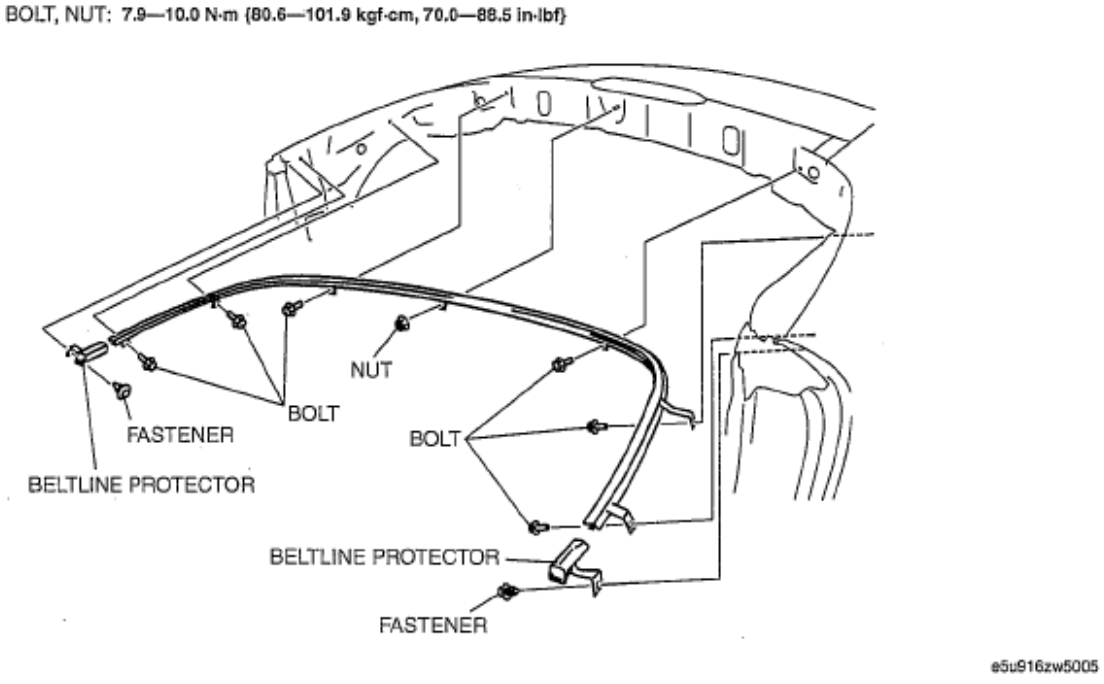


Fig. 6: Identifying Beltline Molding Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

3. Remove the beltline protector.
4. Remove the nut and bolts.
5. Remove the beltline molding.
6. Install in the reverse order of removal.

DRIP MOLDING REMOVAL/INSTALLATION

1. Partially peel back the seaming welt.
2. Remove the screws.
3. Remove the drip molding.
4. Install in the reverse order of removal.

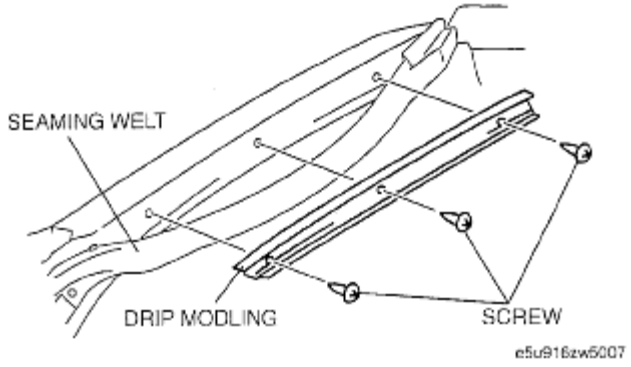
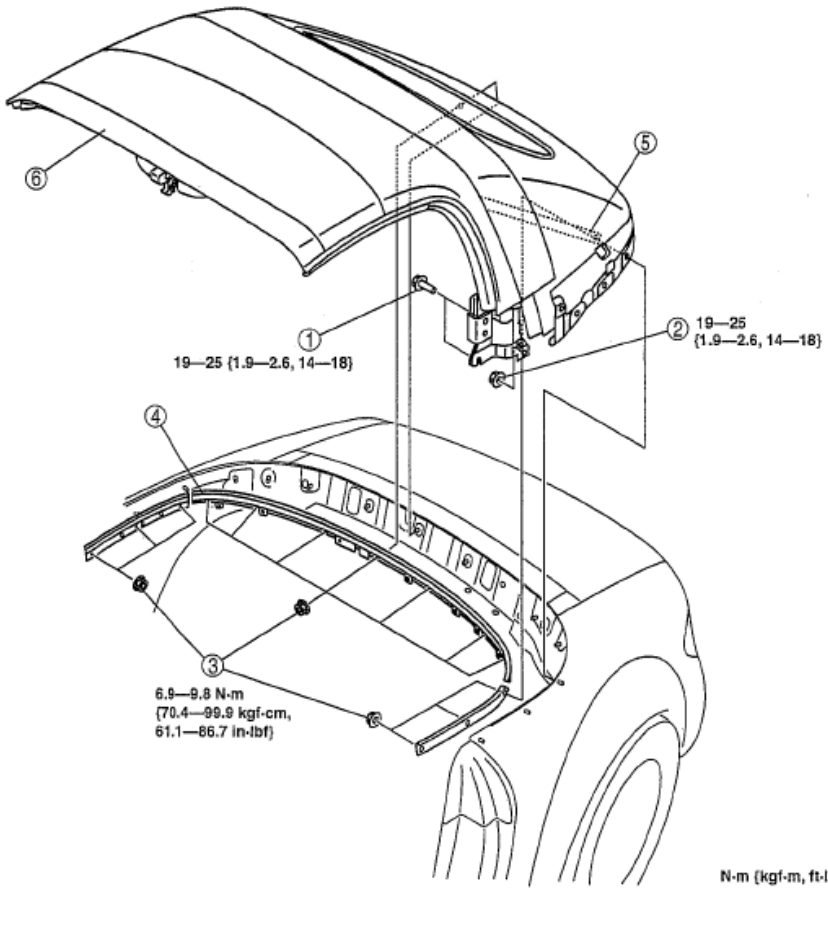


Fig. 7: Identifying Drip Molding Components
Courtesy of MAZDA MOTORS CORP.

CONVERTIBLE TOP REMOVAL/INSTALLATION

1. Cover both sides of the rear window glass with thick cloth to protect the window.
2. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See .)
    11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)
    12. Side shelf (See .)
    13. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
3. Disconnect the rear window defroster connector.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Bolt A
2	Nut A
3	Nut B
4	Set plate

5	Band
6	Convertible top (See 09-16-9 Convertible Top Removal Note) (See 09-16-9 Convertible Top Installation Note)

Fig. 8: Identifying Convertible Top Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

CONVERTIBLE TOP REMOVAL NOTE

1. Unlock the top lock.

CONVERTIBLE TOP INSTALLATION NOTE

1. Insert the rain rail into the beltline molding lip, and install it over the studs.

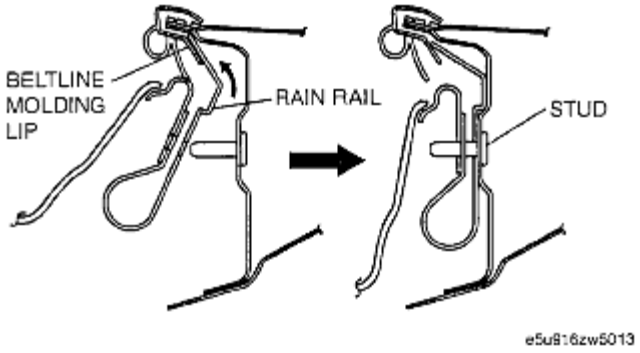


Fig. 9: Inserting Rain Rail Into Beltline Molding Lip
Courtesy of MAZDA MOTORS CORP.

2. Install the link bracket to the stud bolts with no gaps (a) on the mating surfaces, then tighten the bolts and nut.

Tightening torque

19-25 N.m {1.9-2.6 kgf.m, 14-18 ft.lbf}

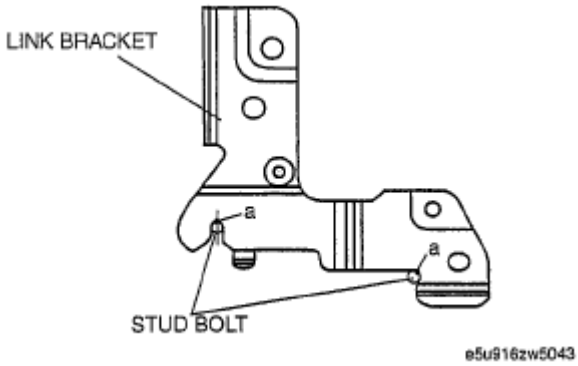
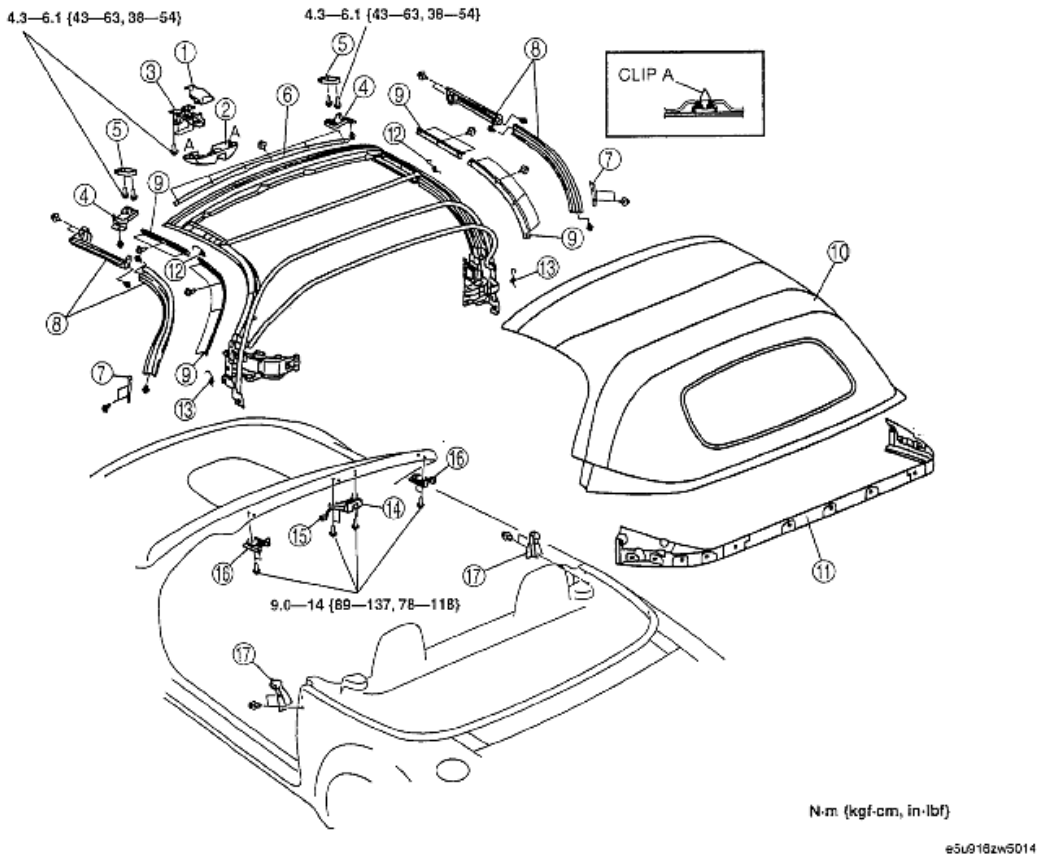


Fig. 10: Identifying Link Bracket And Stud Bolt
Courtesy of MAZDA MOTORS CORP.

CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. To remove the striker, remove the following parts:
    1. Female wedge (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
    2. Map light (See **MAP LIGHT REMOVAL/INSTALLATION** .)
    3. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
    4. Front header trim (See **FRONT HEADER TRIM REMOVAL/INSTALLATION** .)
3. Assemble in the reverse order of disassembly.



1	Top lock lever cover
2	Top lock cover
3	Top lock
4	Male wedge cover
5	Male wedge
6	Set plate
7	Slider
8	Weatherstrip
9	Retainer (See 09-16-11 Retainer Disassembly Note.) (See 09-16-15 Retainer Assembly Note.)

10	Top fabric (See 09-16-11 Top Fabric Disassembly Note.) (See 09-16-13 Top Fabric Assembly Note.)
11	Rain rail (See 09-16-12 Rain Rail Disassembly Note.) (See 09-16-13 Rain Rail Assembly Note.)
12	Spring A (See 09-16-12 Spring A Disassembly Note.)
13	Spring B (See 09-16-13 Spring B Disassembly Note.)
14	Striker
15	Connector
16	Female wedge
17	Cab-side weatherstrip

Fig. 11: Disassembly/Assembly View Of Convertible Top With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

RETAINER DISASSEMBLY NOTE

1. Mark around the retainer installation screws with paint before removing them.

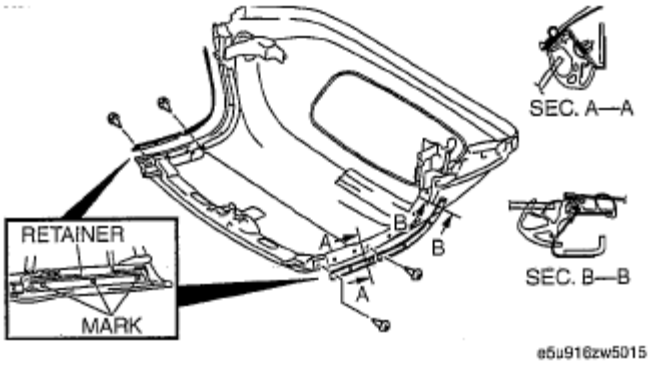


Fig. 12: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

TOP FABRIC DISASSEMBLY NOTE

1. Remove the top fabric from the front bow retainer.

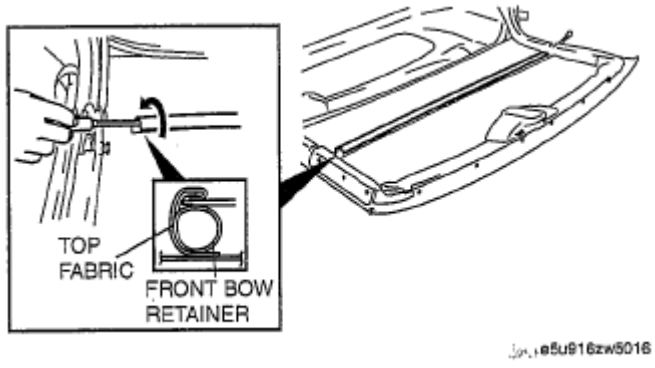


Fig. 13: Removing Top Fabric From Front Bow Retainer
Courtesy of MAZDA MOTORS CORP.

2. Pull out the top fabric from the front header.

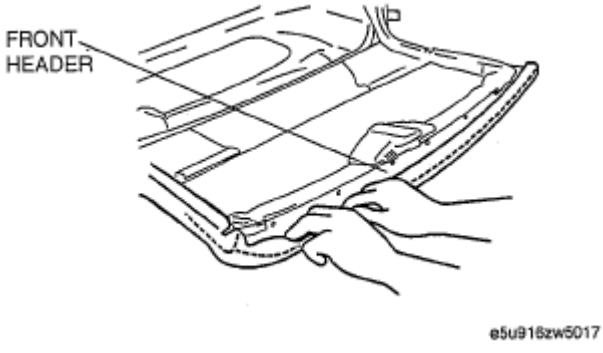


Fig. 14: Pulling Out Top Fabric From Front Header
Courtesy of MAZDA MOTORS CORP.

3. Remove the covers.

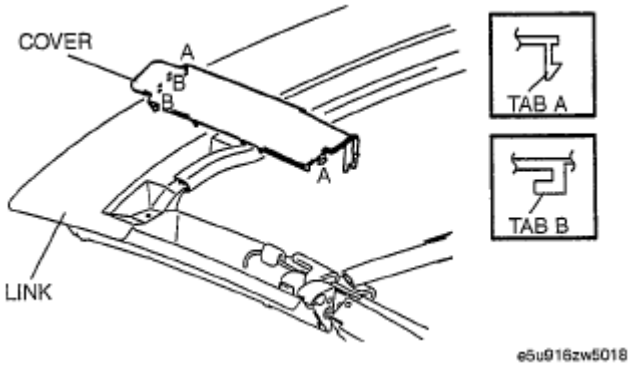


Fig. 15: Identifying Cover
Courtesy of MAZDA MOTORS CORP.

4. Remove the cable installation rivet using a drill.
5. Remove the cables from the cable guide.

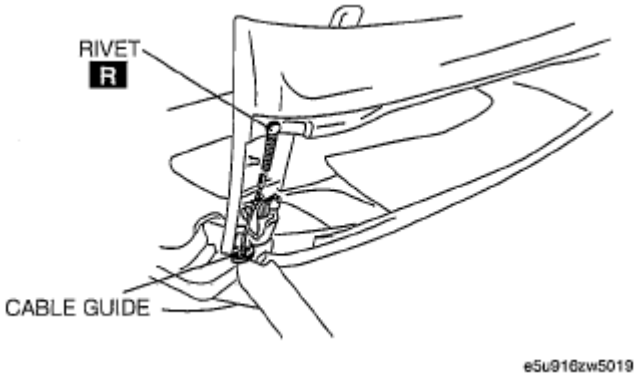


Fig. 16: Identifying Rivet And Cable Guide
Courtesy of MAZDA MOTORS CORP.

6. Remove the band installation rivet using a drill.

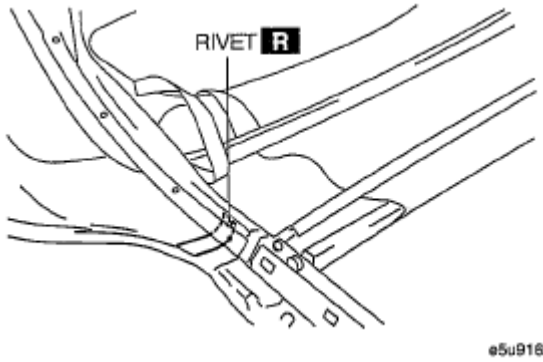


Fig. 17: Identifying Rivet
Courtesy of MAZDA MOTORS CORP.

7. Remove the nut, then remove the cable end bracket.

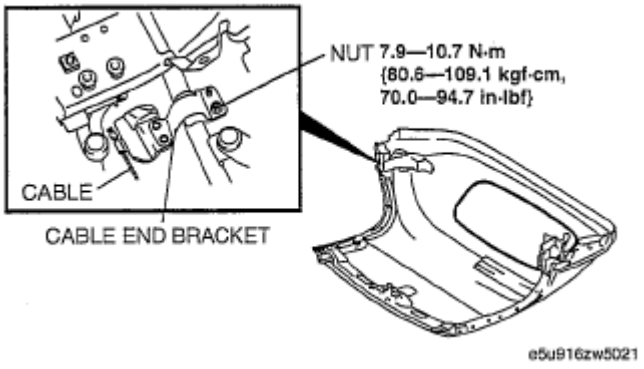


Fig. 18: Identifying Cable End Bracket & Nut With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

RAIN RAIL DISASSEMBLY NOTE

1. Remove the rivets from the top fabric using a drill.

SPRING A DISASSEMBLY NOTE

1. Remove the bolt.
2. Remove the spacers, spring and collars from the link.

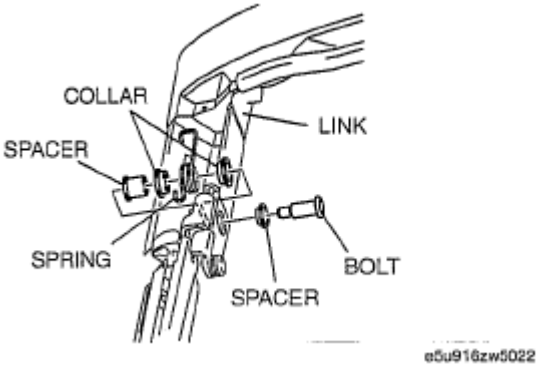


Fig. 19: Identifying Spacers, Spring & Collars
Courtesy of MAZDA MOTORS CORP.

SPRING B DISASSEMBLY NOTE

1. Remove the bolt.
2. Pull the link in the direction of the arrow to remove the spacer and spring.

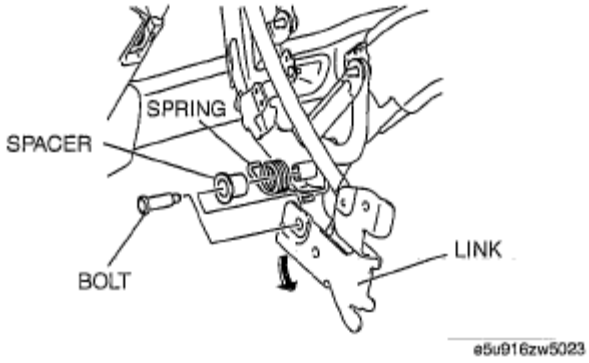


Fig. 20: Identifying Spacer & Spring
Courtesy of MAZDA MOTORS CORP.

RAIN RAIL ASSEMBLY NOTE

1. Degrease the rain rail using white gasoline.
2. Install the insulation tape to the rivet installation hole of the rain rail.
3. Secure the top fabric and rain rail with the rivet.
4. Flatten the stem using hammer.

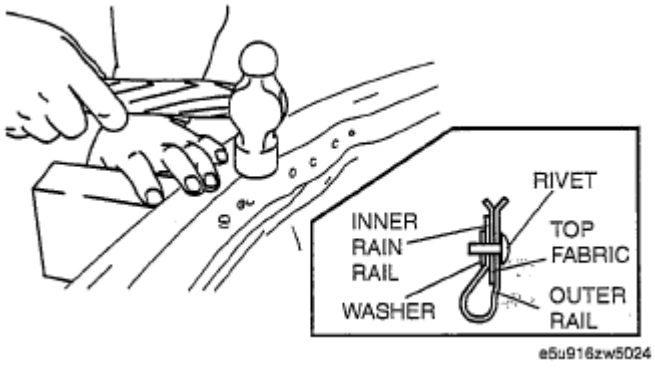


Fig. 21: Securing Top Fabric & Rain Rail With Rivet
Courtesy of MAZDA MOTORS CORP.

TOP FABRIC ASSEMBLY NOTE

1. Place the link onto the top fabric.
2. Align the link with the set plate installation hole of the top fabric, and install the top fabric to the front header.

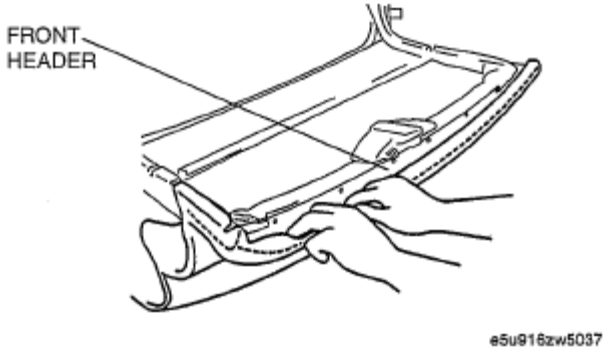


Fig. 22: Installing Top Fabric To Front Header
Courtesy of MAZDA MOTORS CORP.

3. Thread the cable into the cable guide.
4. Set the aluminum rivet to the riveter, and then secure the cable to the link with the rivet.

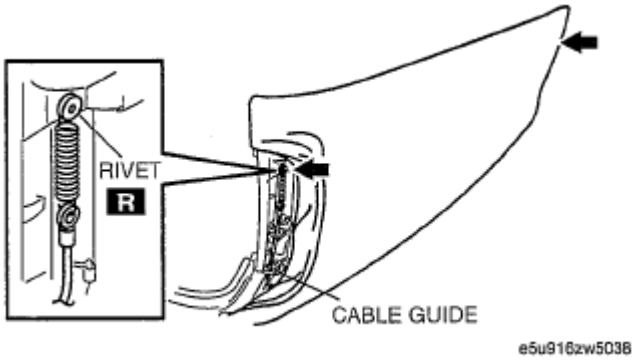


Fig. 23: Identifying Cable Guide And Rivet
Courtesy of MAZDA MOTORS CORP.

RETAINER ASSEMBLY NOTE

1. Install the retainers to the link, aligning the retainer marks with the retainer installation screws.

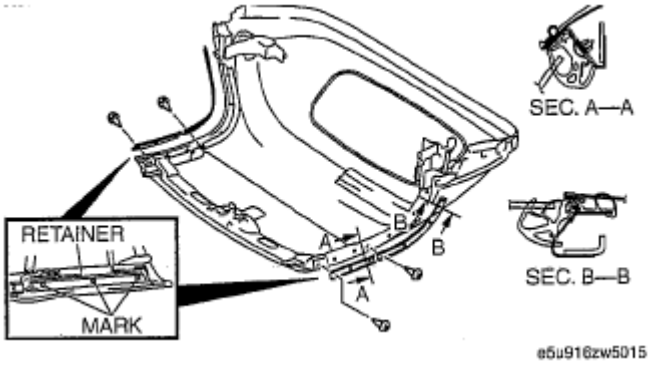


Fig. 24: Identifying Mark Around Retainer Installation Screws

Courtesy of MAZDA MOTORS CORP.

CONVERTIBLE TOP ADJUSTMENT

1. Remove the spring.
2. Remove the snap ring. (See **SNAP RING REMOVAL NOTE**.) (See **SNAP RING INSTALLATION NOTE**.)
3. Remove the pin.
4. Remove the screws.
5. Remove the cover.
6. Adjust the clearance of part A by rotating the adjustment nut.

NOTE:

- **Turn the adjustment nut to the right to narrow the part A clearance, left to widen it.**

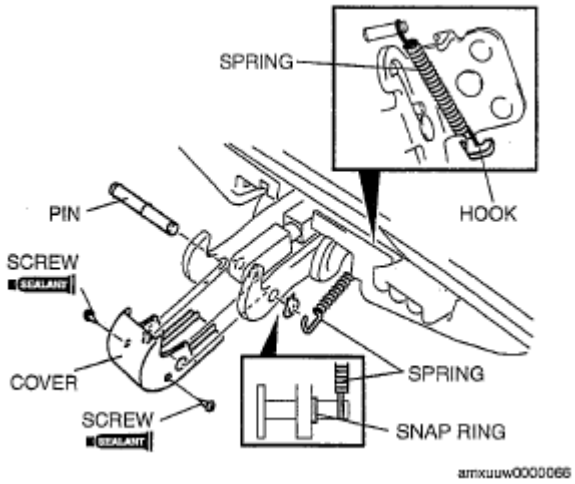


Fig. 25: Identifying Convertible Top Adjustment Components
Courtesy of MAZDA MOTORS CORP.

Clearance

A: 4-8 mm {0.16-0.31 in}

7. Install in the reverse order of removal.

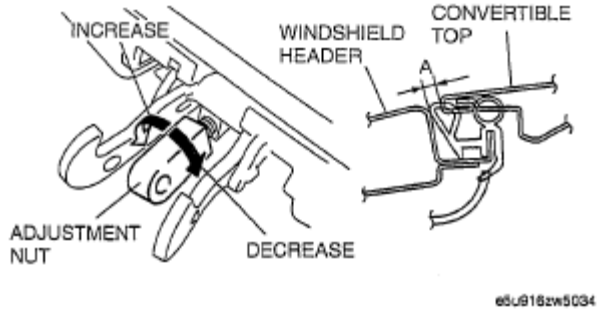


Fig. 26: Turning Adjusting Nut
Courtesy of MAZDA MOTORS CORP.

SNAP RING REMOVAL NOTE

CAUTION:

- **Remove the snap ring such that the dimension is maintained as indicated in the figure.**
- **Because the snap ring is to be reused, remove it carefully so that the ring is not expanded.**

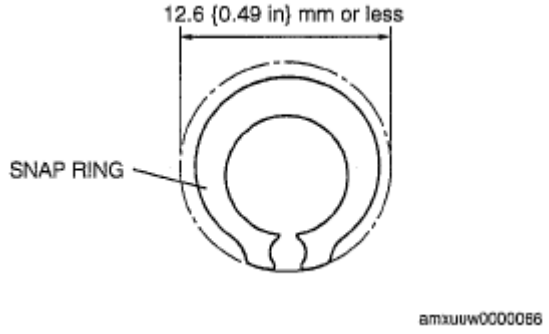


Fig. 27: Identifying Snap Ring With Dimension
Courtesy of MAZDA MOTORS CORP.

1. Insert a tape-wrapped flathead screwdriver between the cover and snap ring, and remove the snap ring by prying along the perimeter so as not to damage the snap ring.

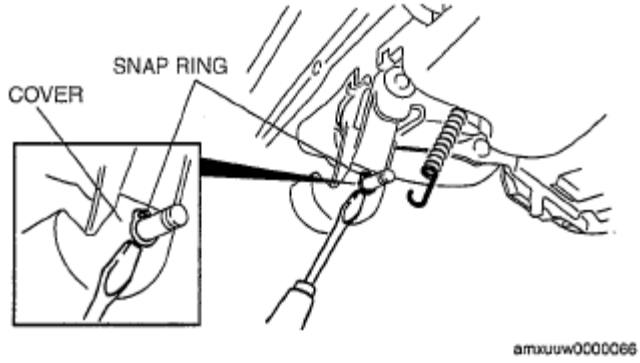


Fig. 28: Identifying Snap Ring And Cover
Courtesy of MAZDA MOTORS CORP.

SNAP RING INSTALLATION NOTE

1. Insert the snap ring to the pin while slightly expanding the snap ring end using snap ring pliers.
2. After securing the snap ring, verify that there is no excessive play between the snap ring and pin.

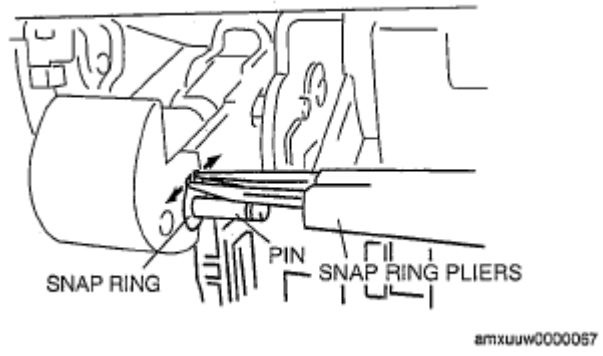


Fig. 29: Expanding Snap Ring End Using Snap Ring Pliers
Courtesy of MAZDA MOTORS CORP.

WINDSHIELD GARNISH REMOVAL

1. Cut the double-sided adhesive tape on the windshield garnish using a flathead screwdriver or razor while warming it using a hot air blower.

WARNING:
- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

2. Remove the windshield garnish.

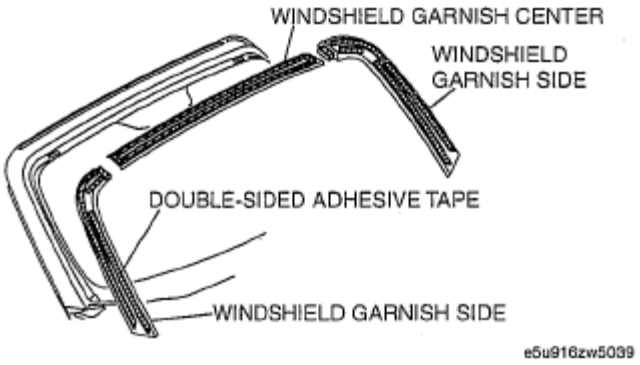


Fig. 30: Identifying Adhesive Tape On Windshield Garnish
Courtesy of MAZDA MOTORS CORP.

WINDSHIELD GARNISH INSTALLATION

WARNING:

- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

NOTE:

- **Double-sided adhesive tape has already been attached to the new windshield garnish**

1. When installing a new windshield garnish, follow the procedure below:
    1. Remove the adhesive remaining on the body using razor.
    2. Remove any grease or dirt from the adhesion surface of the body.
2. When reusing the windshield garnish, follow the procedure below:
    1. Remove the adhesive remaining on the windshield garnish and the body using a razor.
    2. Remove any grease or dirt from the adhesion surface of the windshield garnish and body.
    3. Apply primer to the bonding area of the windshield garnish.
    4. Attach double-sided adhesive tape to the windshield garnish as shown in the figure.

Clearance

a. **16 mm {0.62 in}**
b. **2.0 mm {0.07 in}**
c. **1.5 mm {0.05 in}**
d. **2.0 mm {0.07 in}**
e. **16 mm {0.62 in}**

NOTE:

- **Use 3M GT7116, GT7116FR and GT7104 double-sided adhesive tape or equivalent.**

3. Peel off the end of the double-sided adhesive tape (1), (2), and (3), and attach the windshield garnish side to the position shown in the figure.

   Clearance

   a: 0.3-1.7 mm {0.012-0.066 in}

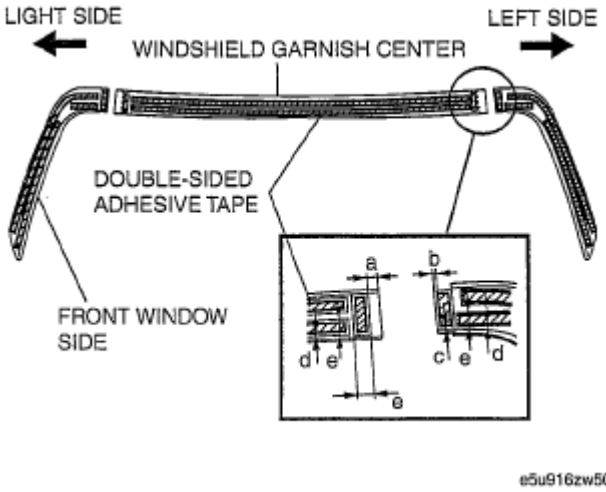


Fig. 31: Position For Attaching Double-Sided Adhesive Tape On Windshield Garnish
Courtesy of MAZDA MOTORS CORP.

4. Peel off the tape backing from the double-sided adhesive tape (1), (2), and (3), and attach it to the vehicle.
5. Peel off the end of the double-sided adhesive tape (4) and (5), and attach it to the position shown in the figure.
6. Peel off the tape backing from the double-sided adhesive tape (4) and (5), and then adhere the windshield garnish side.
7. Peel off the end of the double-sided adhesive tape (6) and attach the windshield garnish center to the position shown in the figure.

   Clearance

   a. **a: 0.3-1.7 mm {0.012-0.06 in}**
   b. **b: -0.3-2.3 mm {-0.012-0.090 in}**
   c. **c: 0.0-0.7 mm {0.00-0.027 in}**

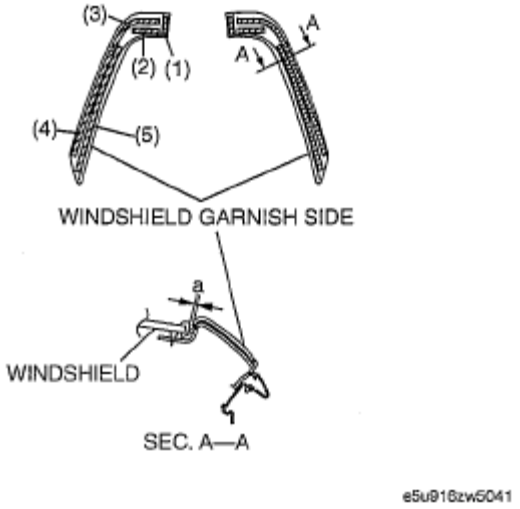


Fig. 32: Position For Attaching Adhesive Tape On Windshield Garnish
Courtesy of MAZDA MOTORS CORP.

8. Peel off the end of the double-sided adhesive tape (7) and attach it to the position shown in the figure.
9. Peel off the backing paper from the double-sided adhesive tape (6) and (7), and then attach the windshield garnish center by applying pressure.
10. Peel off the tape backing from the double-sided adhesive tape (8) and (9), and then adhere the windshield garnish center.

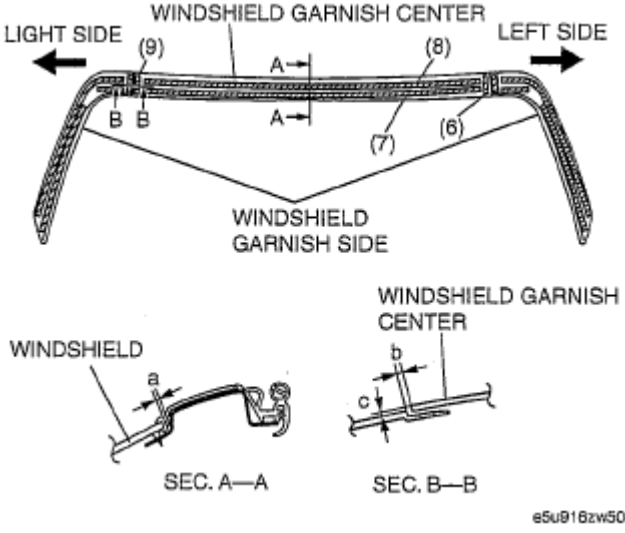


Fig. 33: Position For Attaching Double-Sided Adhesive Tape On Windshield Garnish
Courtesy of MAZDA MOTORS CORP.

RETAINER DISASSEMBLY NOTE

1. Mark around the retainer installation screws with paint before removing them.

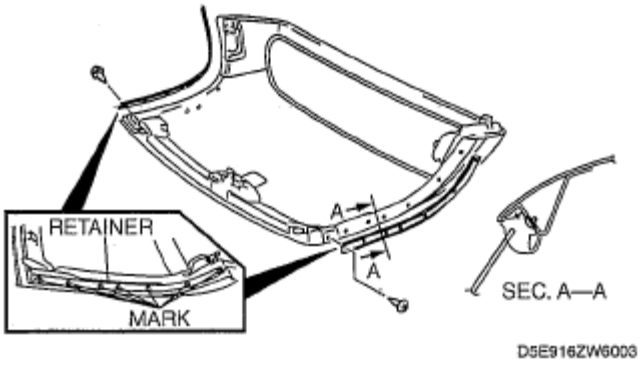


Fig. 34: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

RETAINER ASSEMBLY NOTE

1. Install the retainers to the link, aligning the retainer marks with the retainer installation screws.

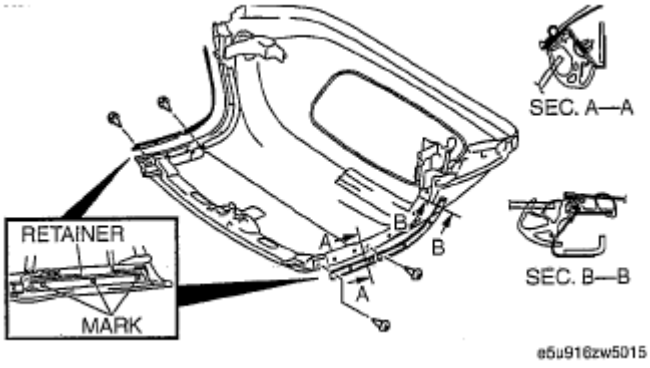


Fig. 35: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

DETACHABLE HARDTOP ADJUSTMENT

TOP LOCK

1. Remove the spring.
2. Remove the snap ring. (See **SNAP RING REMOVAL NOTE**.) (See **SNAP RING INSTALLATION NOTE**.)
3. Remove the pin.
4. Remove the screws.
5. Remove the cover.
6. Adjust the clearance of part A by rotating the adjustment nut.

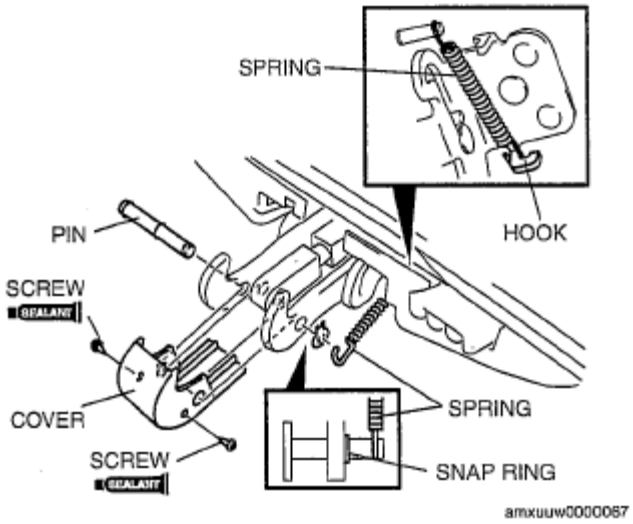


Fig. 36: Identifying Detachable Hardtop Adjustment Components
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **Turn the adjustment nut to the right to narrow the part A clearance, left to widen it.**

Clearance

A: 4-8 mm {0.16-0.31 in}

7. Install in the reverse order of removal.

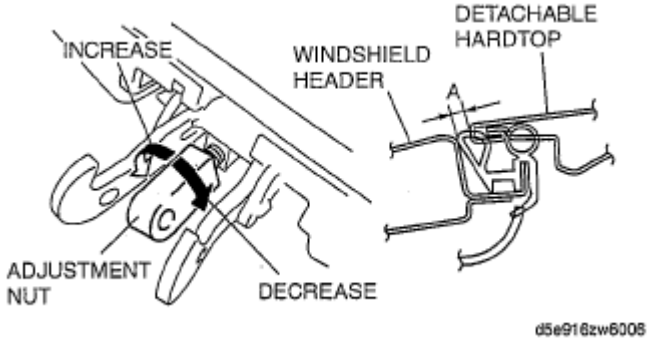


Fig. 37: Turning Adjusting Nut
Courtesy of MAZDA MOTORS CORP.

SNAP RING INSTALLATION NOTE

1. Insert the snap ring to the pin while slightly expanding the snap ring end using snap ring pliers.
2. After securing the snap ring, verify that there is no excessive play between the snap ring and pin.

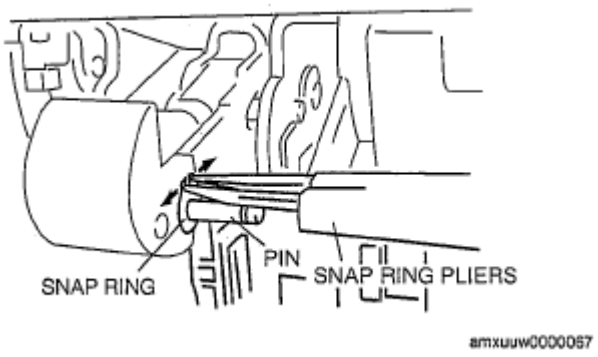


Fig. 38: Expanding Snap Ring End Using Snap Ring Pliers
Courtesy of MAZDA MOTORS CORP.

SNAP RING REMOVAL NOTE

CAUTION:
- **Remove the snap ring such that the dimension is maintained as indicated in the figure.**
- **Because the snap ring is to be reused, remove it carefully so that the ring is not expanded.**

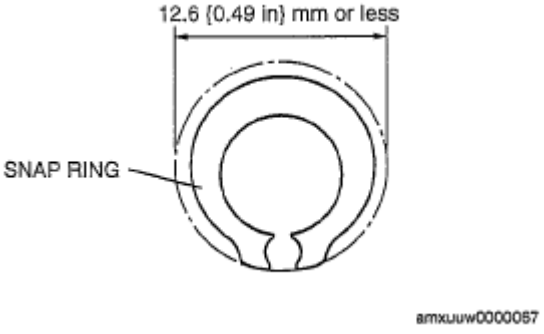


Fig. 39: Identifying Snap Ring With Dimension
Courtesy of MAZDA MOTORS CORP.

1. Insert a tape-wrapped flathead screwdriver between the cover and snap ring, and remove the snap ring by prying along the perimeter so as not to damage the snap ring.

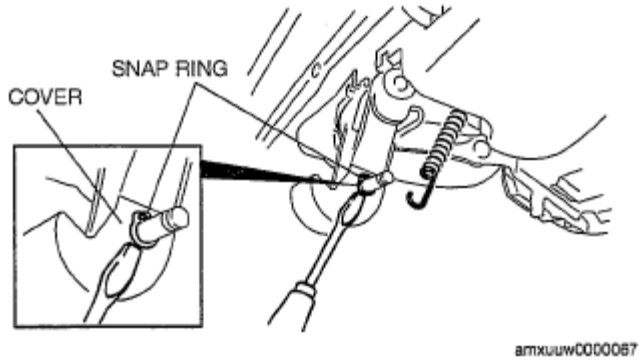


Fig. 40: Identifying Snap Ring And Cover
Courtesy of MAZDA MOTORS CORP.

REAR DECK LOCK

1. Remove the screw.
2. Remove the rear deck lock cover.
3. Loosen the plate installation bolts.
4. Install the detachable hardtop to the body.

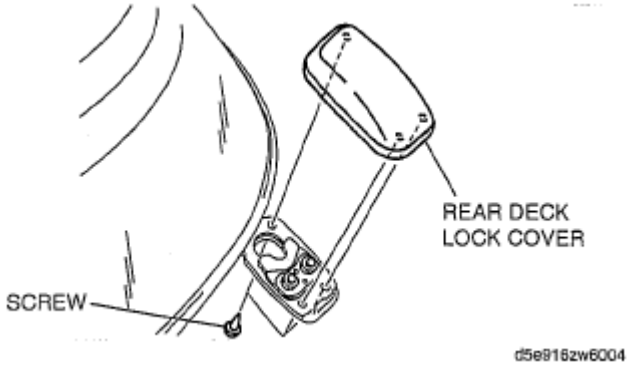


Fig. 41: Identifying Rear Deck Lock Cover And Screw
Courtesy of MAZDA MOTORS CORP.

5. Move the plate right, left, fore, or aft until it is tight.
6. Tighten the plate installation bolts.

   Tightening torque

   17.7-26.4 N.m {1.8-2.6 kgf.m, 13.1-19.4 ft.lbf}

7. Install the rear deck lock cover.

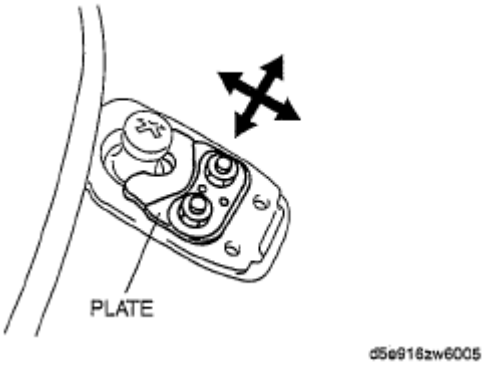


Fig. 42: Moving Plate
Courtesy of MAZDA MOTORS CORP.

DRAIN COVER REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE HARDTOP

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)
    12. Side shelf (See **SIDE SHELF REMOVAL/INSTALLATION** .)
    13. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    14. Convertible top (See **CONVERTIBLE TOP REMOVAL/INSTALLATION**.)
    15. Beltline protector (See **BELTLINE MOLDING REMOVAL/INSTALLATION**.)
    16. Retractor screen (See **SEAT BELT REMOVAL/INSTALLATION** .)
2. Remove the fasteners.
3. Pull the drain cover upward and detach from the drain valve.
4. Remove the drain cover.
5. Detach the tabs of the drain valve from below the vehicle.

6. Remove the drain valve.
7. Install in the reverse order of removal.

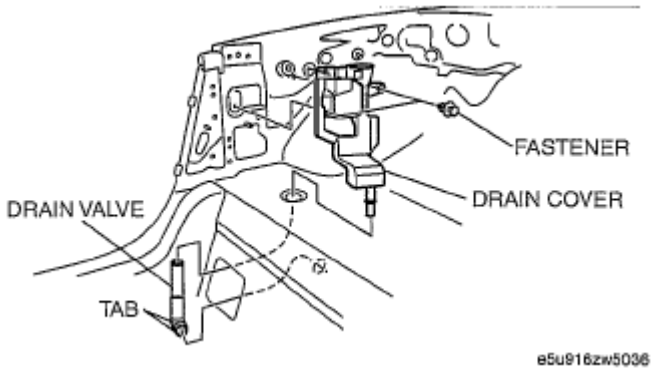


Fig. 43: Identifying Drain Valve Components - Except Power Retractable Hardtop
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP

1. Fully open the deck panel.
2. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Side shelf (See **SIDE SHELF REMOVAL/INSTALLATION** .)
    12. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)
    13. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
    14. Power retractable hardtop (See **POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION**.)
3. Remove the fastener and clip A.
4. Pull the drain cover upward and detach from the drain valve.
5. Remove the upper drain cover and lower drain cover.

6. Detach the tabs of the drain valve from below the vehicle.
7. Remove the drain valve.
8. Install in the reverse order of removal.

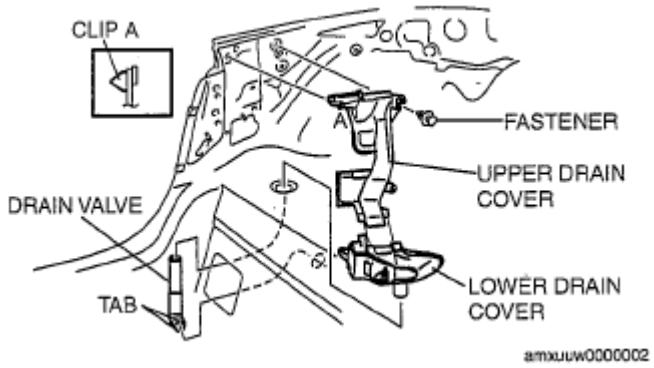


Fig. 44: Identifying Drain Valve Components - Power Retractable Hardtop
Courtesy of MAZDA MOTORS CORP.

EXTRACTOR CHAMBER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the rear combination light. (See **REAR COMBINATION LIGHT REMOVAL/INSTALLATION** .)
4. Remove clip A using a fastener remover and then remove the extractor chamber from the vehicle.
5. Install in the reverse order of removal.

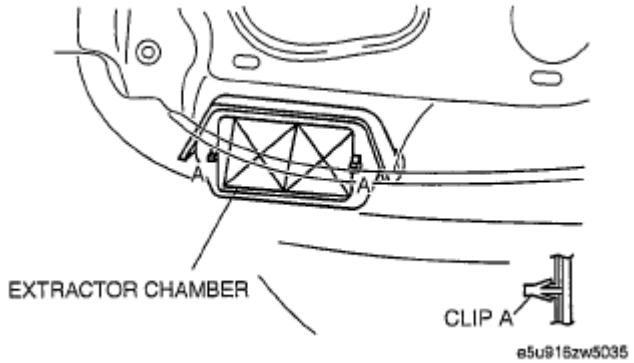


Fig. 45: Identifying Extractor Chamber And Clip
Courtesy of MAZDA MOTORS CORP.

SIDE STEP MOLDING REMOVAL

1. Remove the fasteners.

2. Pull the side step molding and remove clips A from the vehicle body.
3. Slide the side step molding to the vehicle rear and remove clips B and C from the side step molding.
4. Remove the side step molding.
5. Remove clips B and C from the body, then install it to the side step molding.

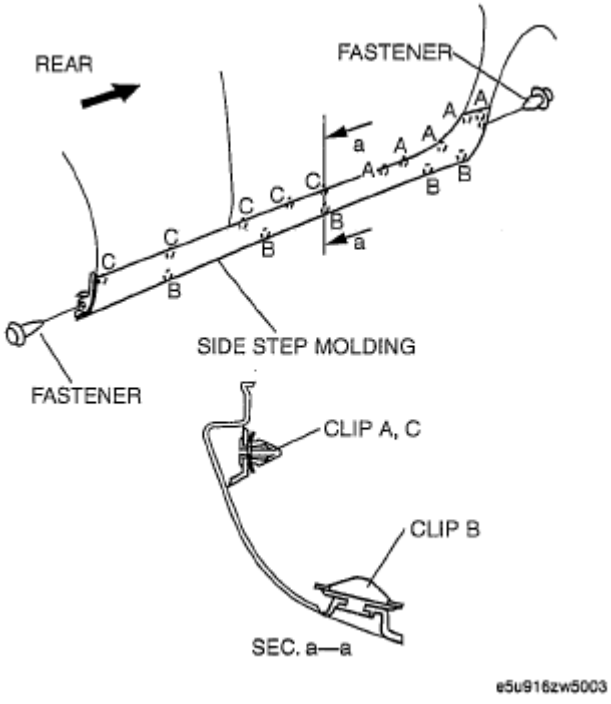


Fig. 46: Identifying Side Step Molding Components
Courtesy of MAZDA MOTORS CORP.

SIDE STEP MOLDING INSTALLATION

1. Install clips A and then C to the vehicle from the rear side.
2. Install the clips B.
3. Install the fasteners.

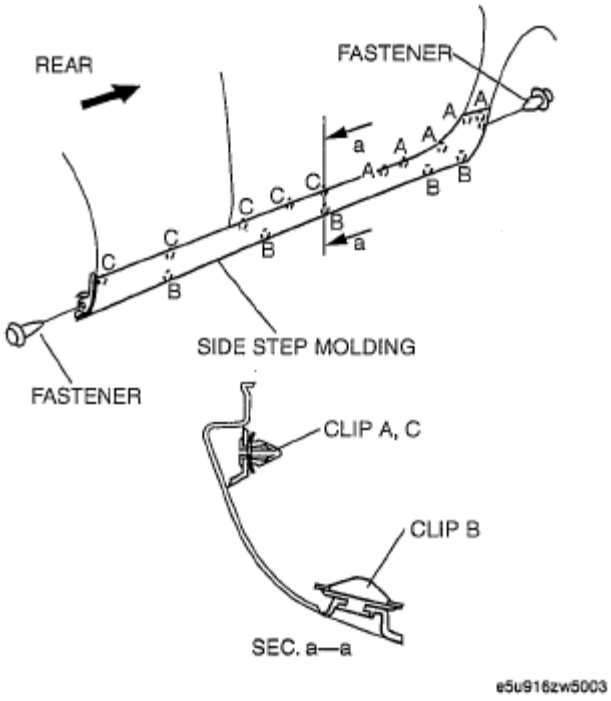


Fig. 47: Identifying Side Step Molding Components
Courtesy of MAZDA MOTORS CORP.

FRONT UNDER COVER REMOVAL/INSTALLATION

1. Remove the splash shield A. (See **SPLASH SHIELD REMOVAL/INSTALLATION**.)
2. Remove the bolts A at section A shown in the figure.
3. Remove the bolts B at section B shown in the figure.
4. Remove the fasteners C at section C shown in the figure.
5. Remove the front under cover.
6. Install in the reverse order of removal.

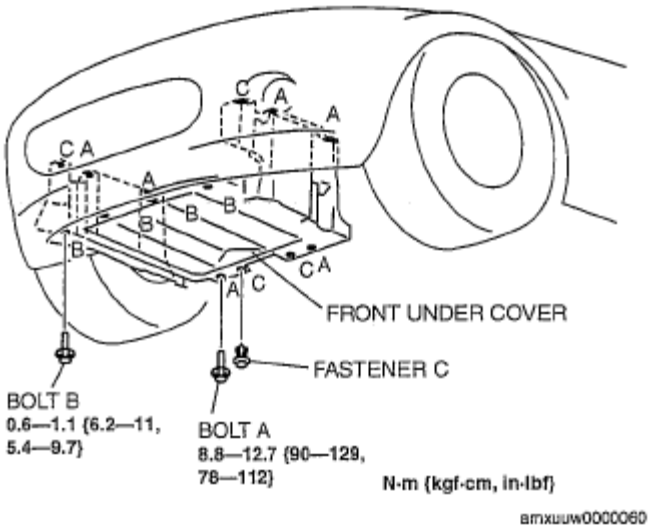


Fig. 48: Identifying Front Under Cover Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

SPLASH SHIELD REMOVAL/INSTALLATION

SPLASH SHIELD A

1. Remove the bolts.
2. Remove the fasteners at section A shown in the figure.
3. Install in the reverse order of removal.

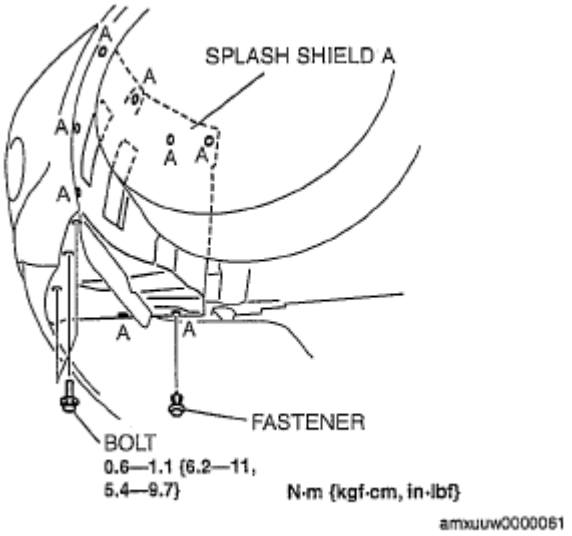


Fig. 49: Identifying Fasteners Section With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

SPLASH SHIELD B

1. Remove the front suspension tower bar. (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
2. Remove the splash shield A. (See **SPLASH SHIELD A**.)
3. Remove the front shock absorber and coil spring. (See **FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION** .)
4. Remove the fasteners at section A shown in the figure.
5. Remove the splash shield B.
6. Install in the reverse order of removal.

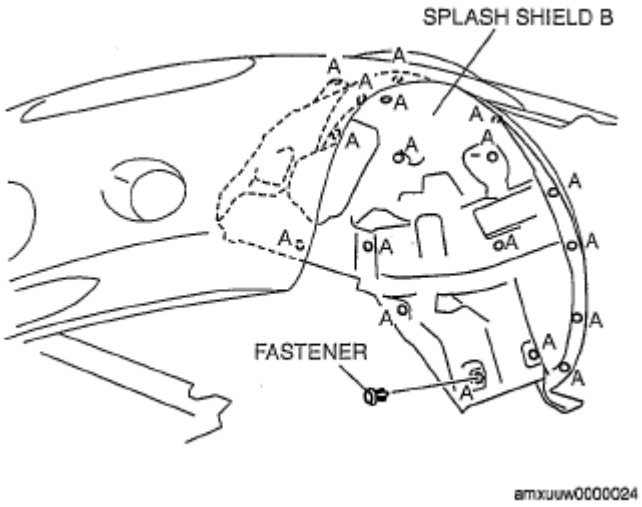


Fig. 50: Identifying Fasteners Section
Courtesy of MAZDA MOTORS CORP.

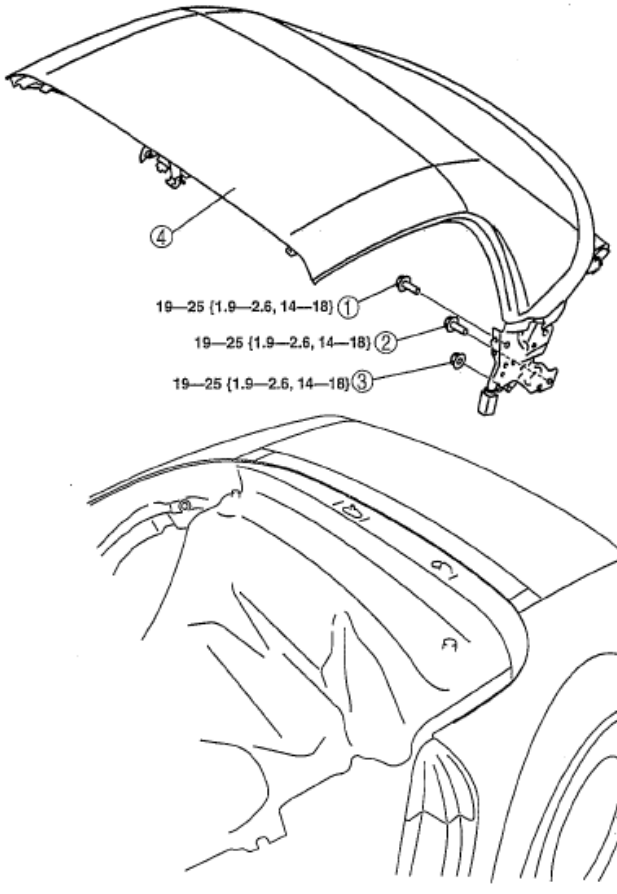
POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION

CAUTION:
- **If the deck panel does not operate electrically, see "DECK PANEL MANUAL OPEN/CLOSE PROCEDURE" to open/close the deck panel.**

1. Unlock the top lock.
2. Fully open the deck panel.
3. Cover both sides of the rear window glass with thick cloth to protect the window.
4. Remove the battery cover.
5. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
6. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)

5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)
10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
11. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)

7. Disconnect the roof motor connectors.
8. Disconnect the rear window defroster connector.
9. Disconnect the roof motor limit switch connector.
10. Disconnect the power retractable hardtop drain hose. (See **POWER RETRACTABLE HARDTOP DRAIN HOSE REMOVAL/INSTALLATION**.)
11. Remove in the order indicated in the table.
12. Install in the reverse order of removal.



1	Bolt A
2	Bolt B (See 09-16-26 Bolt B Removal/Installation Note.)
3	Nut
4	Power retractable hardtop (See 09-16-26 Power Retractable hardtop Installation Note)

Fig. 51: Identifying Power Retractable Hardtop With Bolts Torque Specifications
Courtesy of MAZDA MOTORS CORP.

BOLT B REMOVAL/INSTALLATION NOTE

1. Remove or install bolt B shown in the figure by inserting a hand from the deck panel opening.

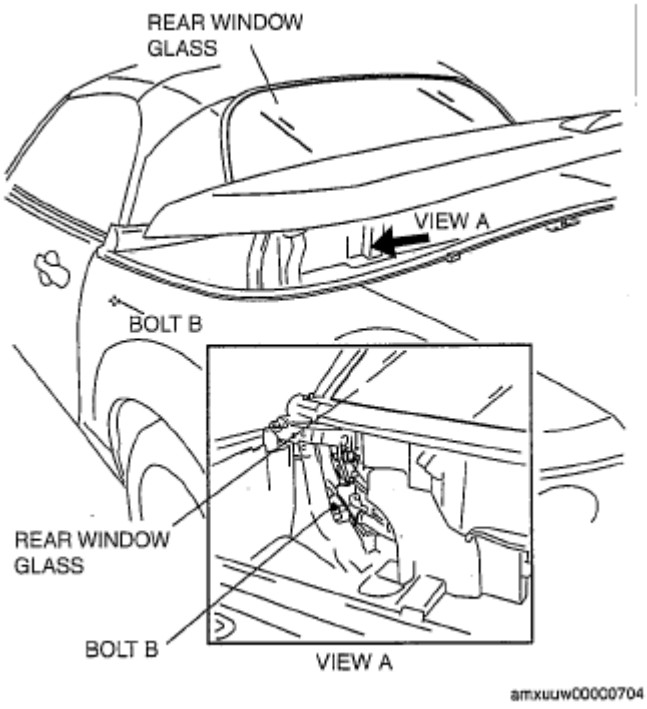


Fig. 52: Bolt B Removal/Installation View
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP INSTALLATION NOTE

1. Place the main bracket on the stud bolt so that the power retractable hardtop top lock is locked.
2. Install the power retractable hardtop without any gap (a) between the positioning surface of the main bracket and stud bolt, and tighten the bolt and nut.

Tightening torque

19-25 N.m {1.9-2.6 kgf.m, 14-18 ft.lbf}

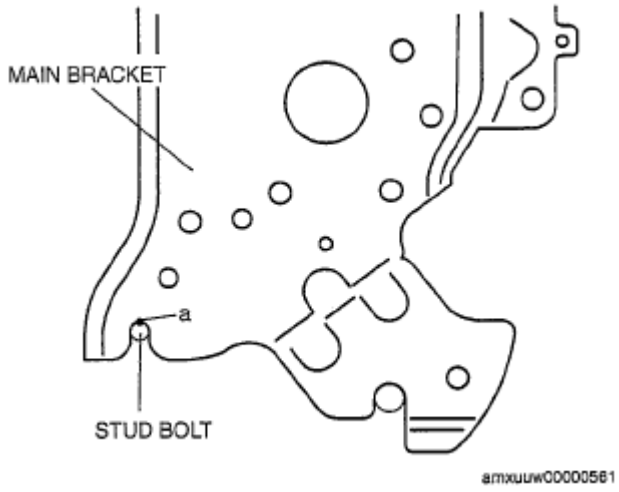


Fig. 53: Identifying Gap Between Positioning Surface Of Main Bracket And Stud Bolt
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP ADJUSTMENT

TOP LOCK

1. Remove the spring.
2. Remove the snap ring. (See **SNAP RING REMOVAL NOTE**.) (See **SNAP RING INSTALLATION NOTE**.)
3. Remove the pin.
4. Remove the screws.
5. Remove the cover.

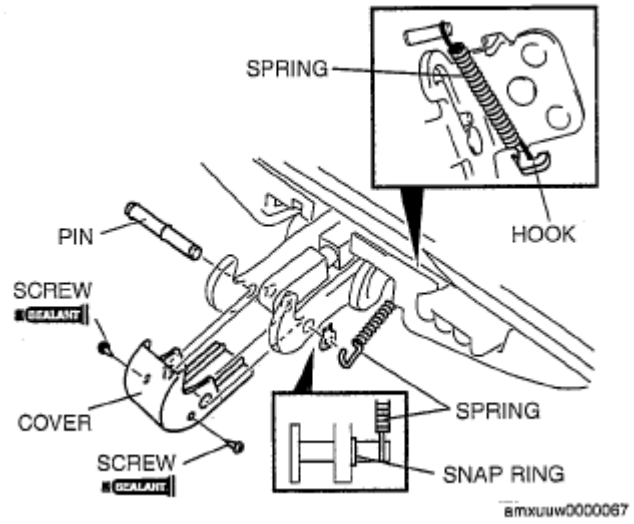


Fig. 54: Identifying Power Retractable Hardtop Adjustment Components
Courtesy of MAZDA MOTORS CORP.

SNAP RING REMOVAL NOTE

CAUTION:

- **Remove the snap ring such that the dimension is maintained as indicated in the figure.**
- **Because the snap ring is to be reused, remove it carefully so that the ring is not expanded.**

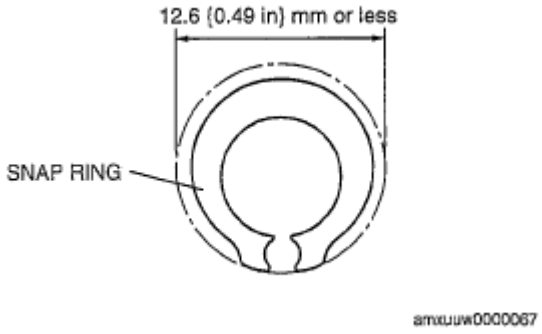


Fig. 55: Identifying Snap Ring With Dimension
Courtesy of MAZDA MOTORS CORP.

1. Insert a tape-wrapped flathead screwdriver between the cover and snap ring, and remove the snap ring by prying along the perimeter so as not to damage the snap ring.

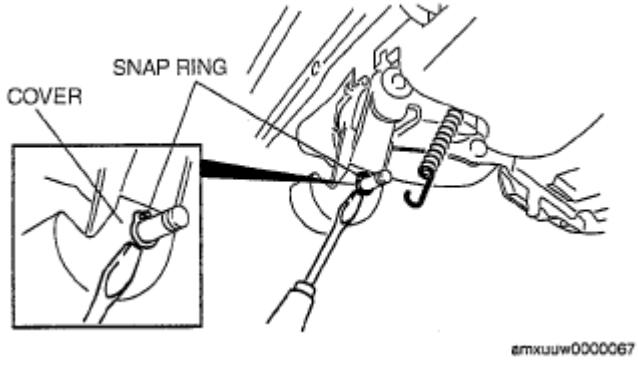


Fig. 56: Identifying Cover And Snap Ring
Courtesy of MAZDA MOTORS CORP.

SNAP RING INSTALLATION NOTE

1. Insert the snap ring to the pin while slightly expanding the snap ring end using snap ring pliers.
2. After securing the snap ring, verify that there is no excessive play between the snap ring and pin.

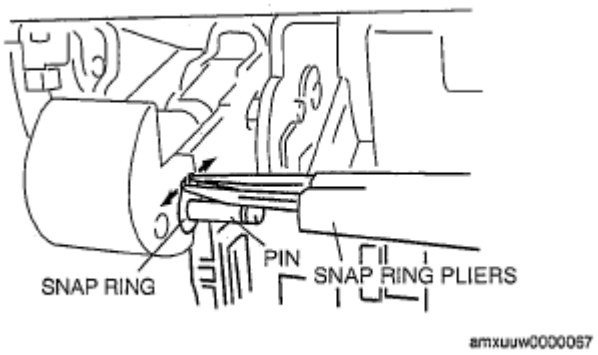


Fig. 57: Expanding Snap Ring
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP ASSEMBLY ADJUSTMENT

1. Loosen the installation bolts and nut for each link.

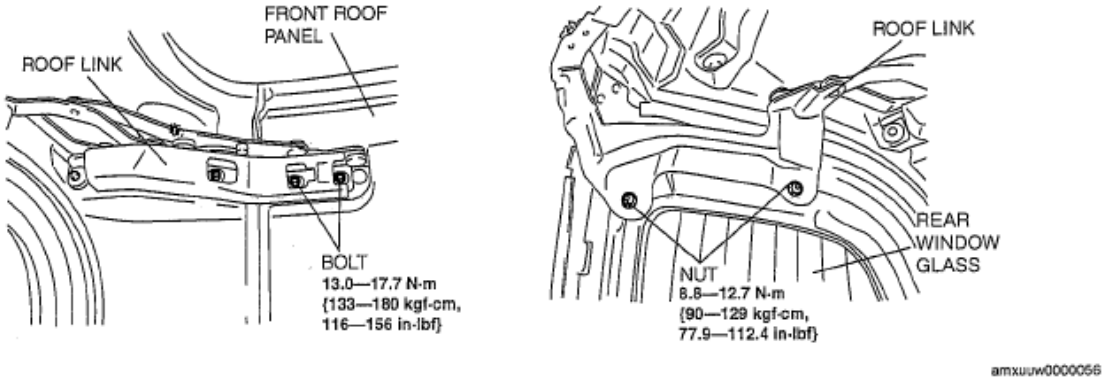


Fig. 58: Identifying Roof Link Nut And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

2. Adjust the gap and height difference between the front roof panel and rear window glass within the specification by moving them back and forth, left and right, and by adjusting the number of shims if necessary.

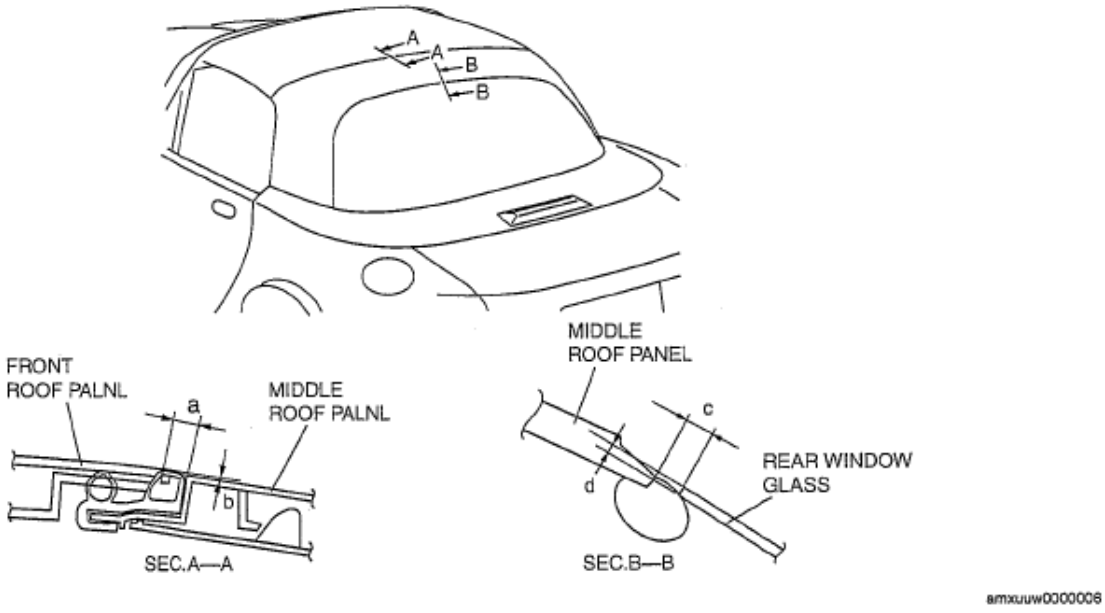


Fig. 59: Identifying Gap And Height Difference Section Between Front Roof Panel And Rear Window Glass
Courtesy of MAZDA MOTORS CORP.

Clearance

a: 5.0 - 9.0 mm {0.20 - 0.35 in}

b: -2.0 - 2.0 mm {-0.07 - 0.07 in}

c: 5.0 - 9.0 mm {0.20 - 0.35 in}

d: -2.0 - 2.0 mm {-0.07 - 0.07 in}

3. Tighten the bolts and nuts.

POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION

NOTE:

- **The power retractable hardtop switch is integrated with the hazard warning switch. (See HAZARD WARNING SWITCH REMOVAL/INSTALLATION .)**

POWER RETRACTABLE HARDTOP SWITCH INSPECTION

1. Verify that the continuity between the power retractable hardtop switch terminals is as indicated in the table.
    - If not as indicated in the table, replace the hazard warning switch.

2. Apply battery voltage to power retractable hardtop switch terminal L, and connect terminal C to ground.

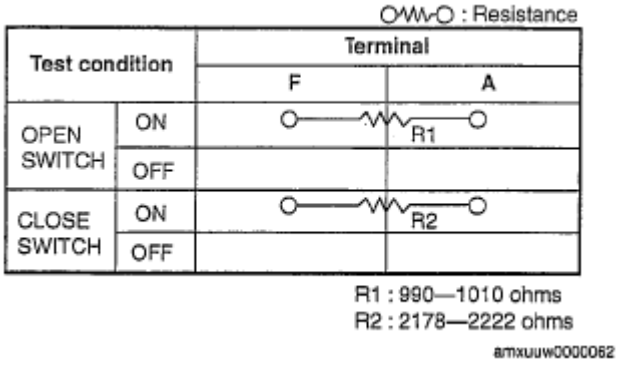


Fig. 60: Power Retractable Hardtop Switch Continuity Chart
Courtesy of MAZDA MOTORS CORP.

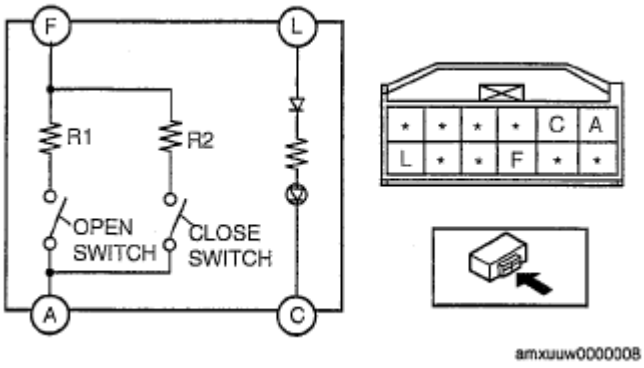


Fig. 61: Identifying Power Retractable Hardtop Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

3. Verify that the LED illuminates.

- If there is any malfunction, replace the hazard warning switch.

POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the service hole cover (LH) of the back trim.
4. Partially peel back the power retractable hardtop cover.
5. Remove the roof hook cable case.

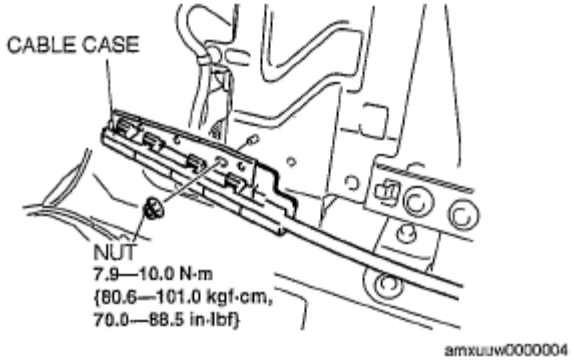
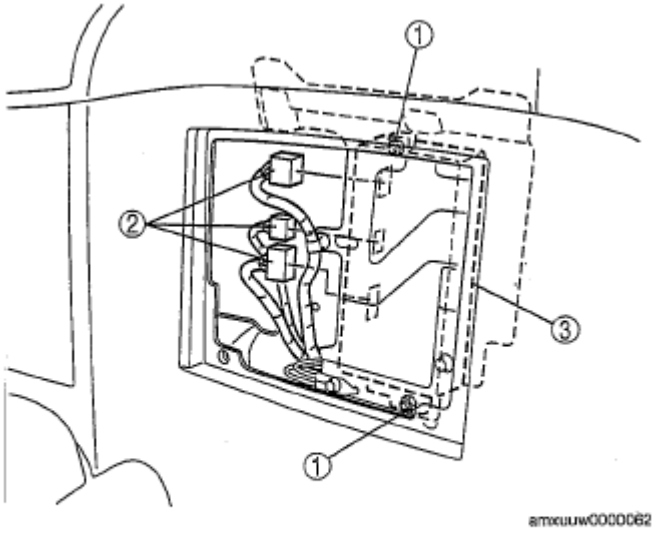


Fig. 62: Identifying Cable Case And Nut With Torque Specification
Courtesy of MAZDA MOTORS CORP.

6. Remove in the order indicated in the table.



1	Nut
2	Connector
3	Power retractable hardtop control module

Fig. 63: Identifying Power Retractable Hardtop Control Module Components
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.

POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)

3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)

2. Attach the tester lead to the power retractable hardtop control module wiring harness-side connector and inspect voltage, continuity, or resistance according to the standard (reference) on the table.

STANDARD (REFERENCE)

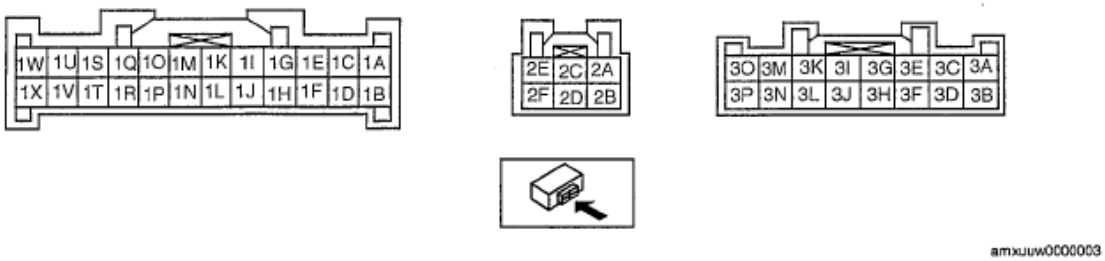


Fig. 64: Identifying Power Retractable Hardtop Control Module Connector Terminals
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP CONTROL MODULE CONNECTOR TERMINALS REFERENCE

Terminal	Signal	Connected to	Test condition		Standard	Inspection item
1A	Trunk lid opener relay output signal	Trunk lid opener relay	The deck panel is in the fully closed position.		B+	• Deck panel limit switch • Trunk lid opener relay • Related wiring harness
			The deck panel is not in the fully closed position.		1.0 or less	
1B	-	-	-		-	-
1C	Power window input signal	Power window main switch	Under any condition: Inspect for continuity to power window main switch.		Continuity detected	• Power window main switch • Related wiring harness
1D	Top lock input signal	Top lock switch	Ignition switch is turned to the ON	When the top lock is locked.	1.0 or less	• Top lock switch • Related wiring
				When the top lock is	B+	

			position	unlocked.		harness
1E	Power window full open request signal (Output)	Power window main switch.	Under any condition: Inspect for continuity to power window main switch.		Continuity detected	• Power window main switch • Related wiring harness
1F	Trunk lid latch switch signal	Trunk lid latch switch	When the trunk lid is open.		1.0 or less	• Trunk lid latch switch • Related wiring harness
			When the trunk lid is closed.		B+	
1G	Hall effect sensor power supply	• Roof Motor • Deck panel motor	Ignition switch is turned to the ON position	When the roof panel or deck panel is not moving.	1.0 or less	• Roof Motor • Deck panel Motor • Related wiring harness
				When the roof panel or deck panel is moving.	B+	
1H	Input signal of the roof panel open/close switch	Power retractable hardtop switch (hazard warning switch)	Ignition switch is turned to the ON position	Opening switch on	approx. 2.5	• Power retractable hardtop switch • Related wiring harness
				Closing switch on	approx. 3.4	
				Other	approx. 5.0	
1I	Roof motor hall sensor input signal (RH)	Roof motor (RH)	When the roof is moving.	Pulse is output. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)**.)		• Roof motor (RH) • Related wiring harness
1J	Power supply	ROOM 15 A fuse	Under any condition		B+	• ROOM 15 A fuse • Related wiring harness
1K	Deck panel motor hall sensor input signal (RH)	Deck panel motor (RH)	When the deck panel is moving.	Pulse is output. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)**.)		• Deck panel motor (RH) • Related wiring harness
1L	-	-	-		-	-

1M	Roof motor hall sensor input signal (LH)	Roof motor (LH)	When the roof is moving.	Pulse is output. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)**.)		• Roof motor (LH) • Related wiring harness
1N	-	-	-		-	-
1O	Deck panel motor hall sensor input signal (LH)	Deck panel motor (LH)	When the deck panel is moving.	Pulse is output. (See **INSPECTION USING AN OSCILLOSCOPE (REFERENCE)**.)		• Deck panel motor (LH) • Related wiring harness
1P	-	-	-		-	-
1Q	Hall effect sensor GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	• Related wiring harness
1R	Roof close position switch input signal	Power retractable hardtop limit switch	Ignition switch is turned to the ON position	When the roof panel is fully closed.	1.0 or less	• Power retractable hardtop limit switch • Related wiring harness
				When the roof panel is not fully closed.	B+	
1S	CAN-H	-	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.		-	• Related wiring harnesses
1T	Roof open position switch input signal	Power retractable hardtop limit switch	Ignition switch is turned to the ON position	When the roof panel is fully open.	1.0 or less	• Power retractable hardtop limit switch • Related wiring harness
				When the roof panel is not fully open.	B+	
1U	CAN-L	-	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.		-	• Related wiring harnesses
1V	Signal GND	Power retractable hardtop limit switch/deck panel limit switch	Ignition switch is turned to the ON position	Under any condition	1.0 or less	• Related wiring harness
						• Related

1W	Signal GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	wiring harness
1X	IG1	ENGINE 15 A fuse	IG ON		B+	• Related wiring harness
			When the ignition switch is not in the ON position.		1.0 or less	
2A	Power supply	Main fuse block	Under any condition		B+	• Related wiring harness
2B	Power supply	Main fuse block	Under any condition		B+	• Related wiring harness
2C	Indicator light output signal	Power retractable hardtop Indicator light (hazard warning switch)	Ignition switch is turned to the ON position	Illuminated	1.0 or less	• Hazard switch • Related wiring harness
				Not illuminated	B+	
2D	-	-	-		-	-
2E	Power GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	• Related wiring harness
2F	Power GND	GND	Under any condition: Inspect for continuity to GND.		Continuity detected	• Related wiring harness
3A	Roof motor control (open)	Roof motor (RH)	Ignition switch is turned to the ON position	Roof panel open operation	B+	• Roof motor (RH) • Related wiring harness
				Roof panel close operation	1.0 or less (1)	
				Other	approx. 2	-
3B	-	-	-		-	-
3C	-	-	-		-	-
3D	Roof motor control (close)	Roof motor (LH)	Ignition switch is turned to the ON position	Roof panel open operation	1.0 or less (1)	
				Roof panel close operation	B+	
				Other	approx. 2	-
3E	Deck panel motor control (close)	Deck panel motor (RH)	Ignition switch is turned to the ON position	Deck panel open operation	1.0 or less (1)	• Deck panel motor (RH) • Related wiring harness
				Deck panel close operation	B+	
				Other	approx. 2	

3F	Deck panel open position sensor input signal	Deck panel limit switch	Ignition switch is turned to the ON position	When the deck panel is fully open.	1.0 or less	• Deck panel limit switch • Related wiring harness
				When the deck panel is not fully open.	B+	
3G	-	-	-		-	-
3H	Deck panel motor control (open)	Deck panel motor (LH)	Ignition switch is turned to the ON position	Deck panel open operation	B+	• Deck panel motor (LH) • Related wiring harness
				Deck panel close operation	1.0 or less (1)	
				Other	approx. 2	
3I	Roof motor control (close)	Roof motor (RH)	Ignition switch is turned to the ON position	Roof panel open operation	1.0 or less (1)	• Roof motor (RH) • Related wiring harness
				Roof panel close operation	B+	
				Other	approx. 2	
3J	-	-	-		-	-
3K	-	-	-		-	-
3L	Roof motor control (open)	Roof motor (LH)	Ignition switch is turned to the ON position	Roof panel open operation	B+	• Roof motor (LH) • Related wiring harness
				Roof panel close operation	1.0 or less (1)	
				Other	approx. 2	
3M	Deck panel motor control (open)	Deck panel motor (RH)	Ignition switch is turned to the ON position	Deck panel open operation	B+	• Deck panel motor (RH) • Related wiring harness
				Deck panel close operation	1.0 or less (1)	
				Other	approx. 2	
3N	-	-	-		-	-
3O	Deck panel close position sensor input signal	Deck panel limit switch	Ignition switch is turned to the ON position	Except closed position	1.0 or less	• Deck panel limit switch • Related wiring harness
				Closed position	B+	
3P	Deck panel motor control (close)	Deck panel motor (LH)	Ignition switch is turned to the ON position	Deck panel open operation	1.0 or less (1)	• Deck panel motor (LH) • Related wiring harness
				Deck panel close operation	B+	
				Other	approx. 2	

(1) (1) :The voltage increases during operation speed control of the roof and deck panel.

INSPECTION USING AN OSCILLOSCOPE (REFERENCE)

Roof motor hall sensor

- Terminal connected: power retractable hardtop control module 1I (RH), 1M (LH) - Negative battery terminal
- Oscilloscope setting: 2 V/DIV (Y): 5 ms/DIV (X), DC range
- Measurement condition: When the roof is moving.

NOTE:

- **Pulse interval varies with the roof operation speed.**

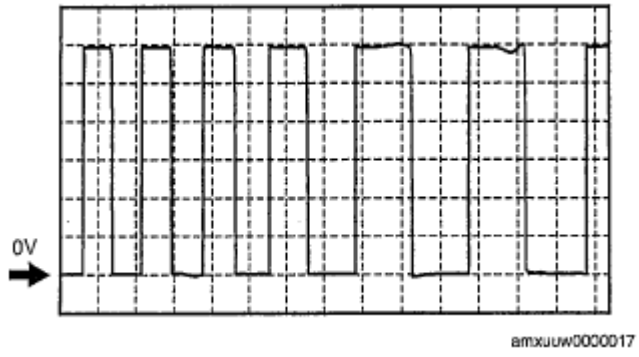


Fig. 65: Roof Motor Hall Sensor Pulse Signal
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MOTOR HALL SENSOR

- Terminal connected: power retractable hardtop control module 1K (RH), 1O (LH) - Negative battery terminal
- Oscilloscope setting: 2 V/DIV (Y): 5 ms/DIV (X), DC range
- Measurement condition: When the deck panel is moving.

NOTE:

- **Pulse interval varies with the deck panel operation speed.**

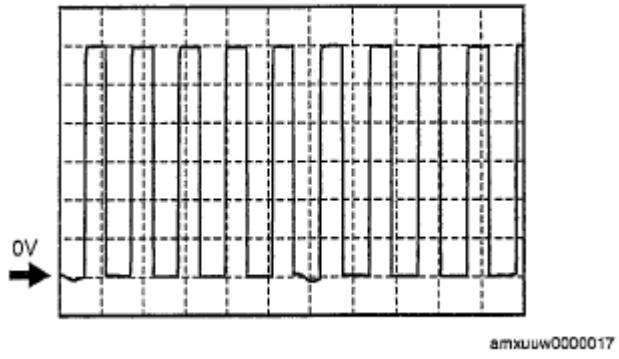


Fig. 66: Deck Panel Motor Hall Sensor Pulse Signal
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP CONTROL MODULE BRACKET REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
4. Remove the roof hook cable case.

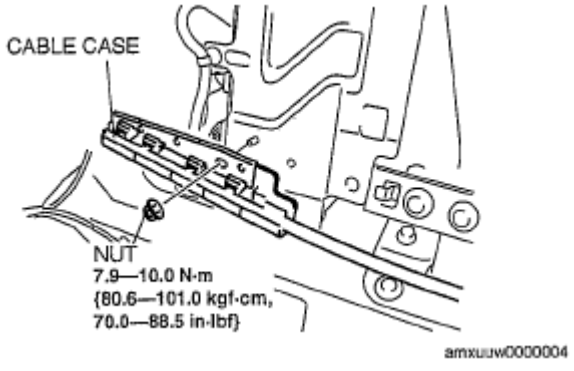


Fig. 67: Identifying Cable Case And Nut With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

5. Remove in the order indicated in the table.

1	Connector
2	Nut
3	Bolt
4	Power retractable hardtop control module assembly

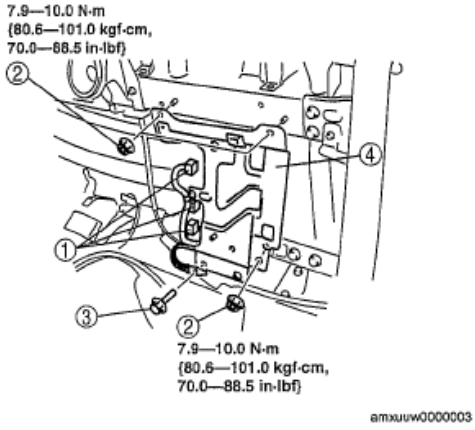


Fig. 68: Identifying Power Retractable Hardtop Control Module Bracket Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

6. Remove the nuts.
7. Remove the power retractable hardtop control module bracket.
8. Install in the reverse order of removal.

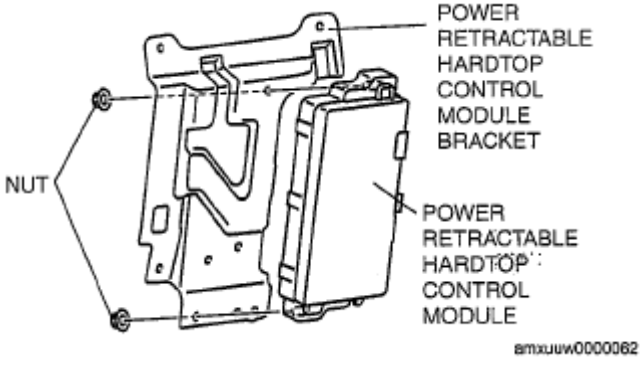


Fig. 69: Identifying Power Retractable Hardtop Control Module And Bracket
Courtesy of MAZDA MOTORS CORP.

ROOF MOTOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)

6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)

4. Disconnect the roof motor connector.
5. Remove the bolts A and washers.
6. Remove the roof motor bracket.
7. Remove the bolts B and C.
8. Remove the roof motor.
9. Install in the reverse order of removal.

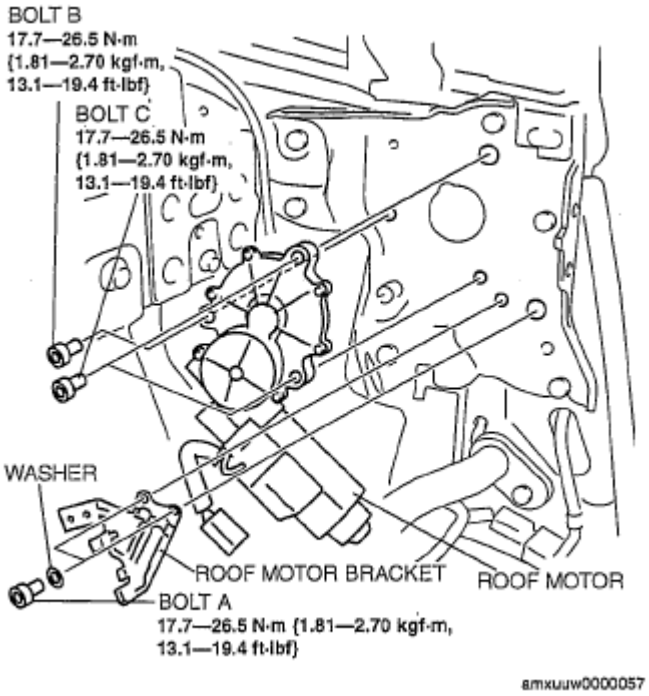


Fig. 70: Identifying Roof Motor Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

ROOF MOTOR INSPECTION

1. Apply battery positive voltage and connect the ground to roof motor terminals A and E, and then inspect the roof motor operation.
   - If the roof motor does not operate as indicated in the table, replace it.

CAUTION:
- **If the roof motor temperature is high, the motor may not rotate**

due to the motor internal PTC function. Leave it untouched for about 3 min to cool it down, then reinspect.

ROOF MOTOR OPERATION REFERENCE

Operation	Terminal	
	E	A
Open	B+	Ground
Close	Ground	B+

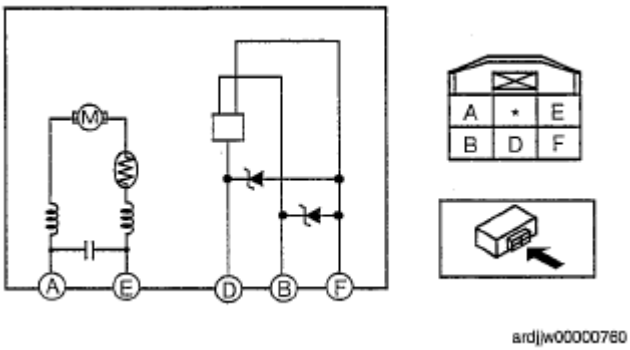


Fig. 71: Identifying Roof Motor Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

2. Connect the battery positive voltage to roof motor terminal B and connect terminal F to ground.
3. Operate the roof motor and measure the voltage at terminal D.

- If there is any malfunction, replace the roof motor.

Voltage

- **Pulse: max. 13 V/min. 0 V**

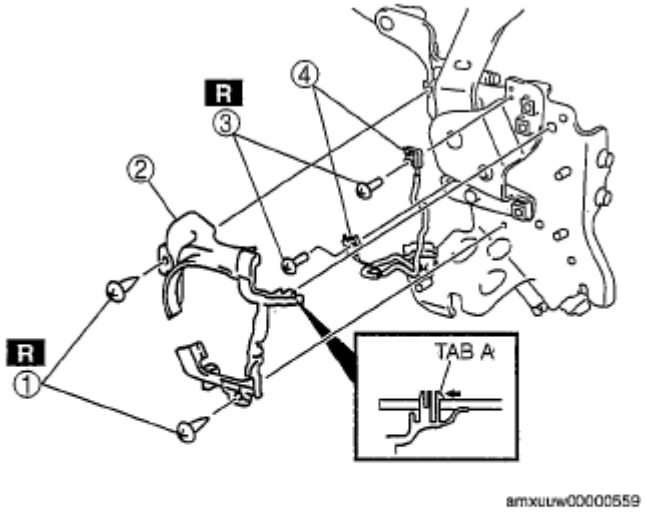
POWER RETRACTABLE HARDTOP LIMIT SWITCH REMOVAL/INSTALLATION

NOTE:
- **The power retractable hardtop limit switch is installed on the RH side.**

1. Fully open the deck panel.
2. Cover both sides of the rear window glass with thick cloth to protect the window.
3. Remove the battery cover.
4. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)

2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)
10. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)

6. Disconnect the roof motor limit switch connector.
7. Disconnect the power retractable hardtop drain hose. (See **POWER RETRACTABLE HARDTOP DRAIN HOSE REMOVAL/INSTALLATION**.)
8. Remove the power retractable hardtop. (See **POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION**.)
9. Remove in the order indicated in the table.



1	Screw A
2	Cover (See 09-16-36 Cover Installation Note.)
3	Screw B
4	Power retractable hardtop limit switch

Fig. 72: Identifying Power Retractable Hardtop Limit Switch Components
Courtesy of MAZDA MOTORS CORP.

10. Install in the reverse order of removal.

COVER INSTALLATION NOTE

1. Install the power retractable hardtop limit switch wiring harness to the cover hook and groove shown in the figure.

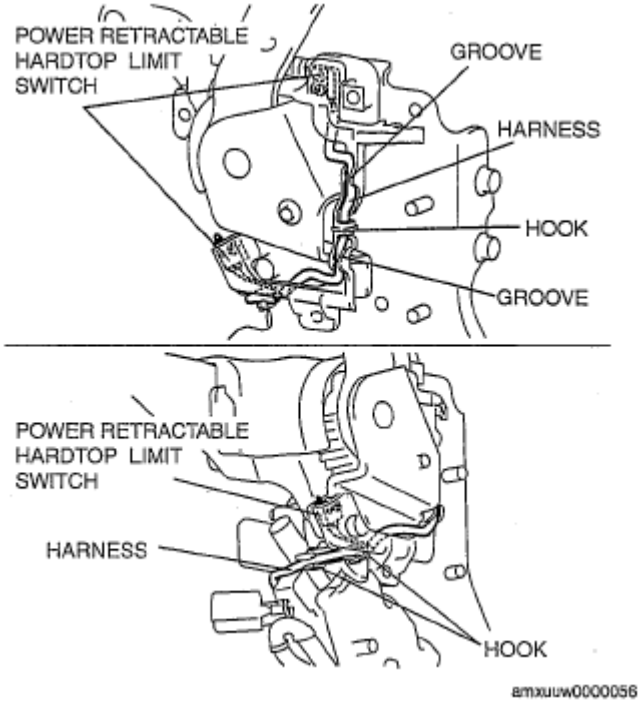


Fig. 73: Identifying Power Retractable Hardtop Limit Switch With Associated Components
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION

1. Verify that the continuity between the power retractable hardtop limit switch terminals is as indicated in the table.
    - If not as indicated in the table, replace the roof motor link (RH). (The power retractable hardtop limit switch is integrated with the roof motor link (RH).)

O—O : Continuity

Switch position		Terminal			
		A	B	C	D
POWER RETRACTABLE HARDTOP CLOSE POSITION SWITCH	ROD PUSHED	O—O			
	NORMAL CONDITIUION				
POWER RETRACTABLE HARDTOP OPEN POSITION SWITCH	ROD PUSHED			O—O	
	NORMAL CONDITIUION				

amxuuw0000063

Fig. 74: Power Retractable Hardtop Limit Switch Continuity Chart
Courtesy of MAZDA MOTORS CORP.

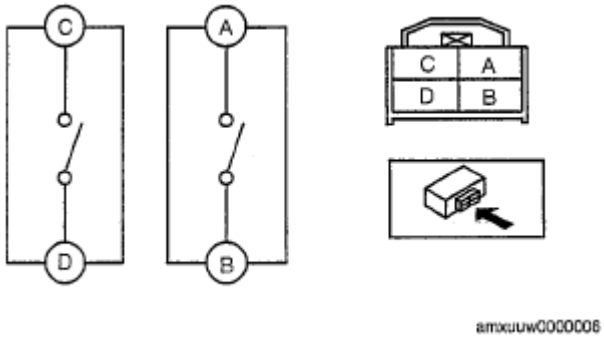


Fig. 75: Identifying Power Retractable Hardtop Limit Switch Terminals With Circuit
Courtesy of MAZDA MOTORS CORP.

DECK PANEL REMOVAL/INSTALLATION

CAUTION:
- **If the deck panel does not operate electrically, see "DECK PANEL MANUAL OPEN/CLOSE PROCEDURE" to open/close the deck panel.**

1. Fully open the deck panel.
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Set the side shelf out of the way. (See **SIDE SHELF REMOVAL/INSTALLATION** .)
5. Insert a Phillips screwdriver with no wear securely into each screw groove and remove the screws.

CAUTION:
- **The screws are engaged firmly because thread-locking compound has been applied to them. When removing the screws, be careful not to deform the screw groove.**

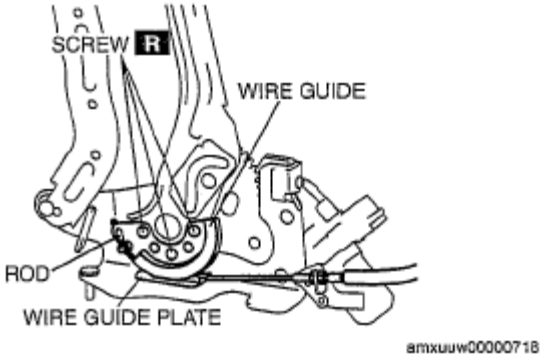


Fig. 76: Identifying Wire Guide Plate, Wire Guide And Screw
Courtesy of MAZDA MOTORS CORP.

6. Remove the rod from the wire guide.
7. Remove tabs A using a tape-wrapped flathead screwdriver, and then remove the wire guide plate.
8. Loosen the nut, then pull the roof hook cable in the direction shown by the arrow and remove it.

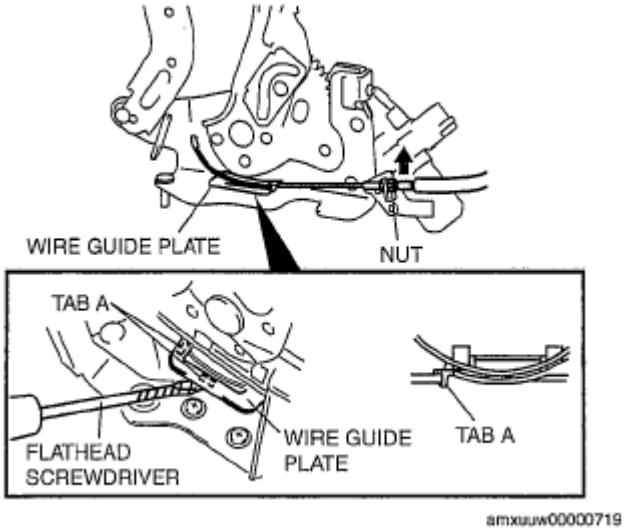


Fig. 77: Removing Tabs A
Courtesy of MAZDA MOTORS CORP.

9. Remove the bolts.

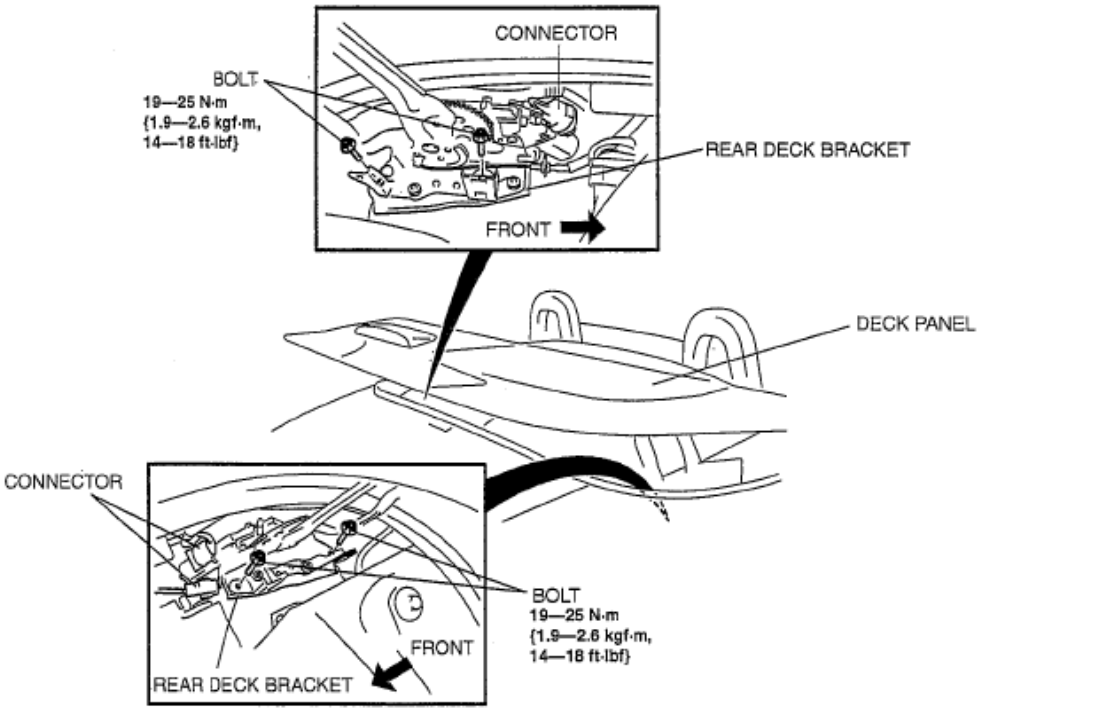


Fig. 78: Identifying Rear Deck Bracket Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

10. Disconnect the deck panel motor connectors.
11. Disconnect the high-mount brake light connector.
12. Disconnect the deck panel limit switch connector.
13. Remove the deck panel.
14. Install in the reverse order of removal.

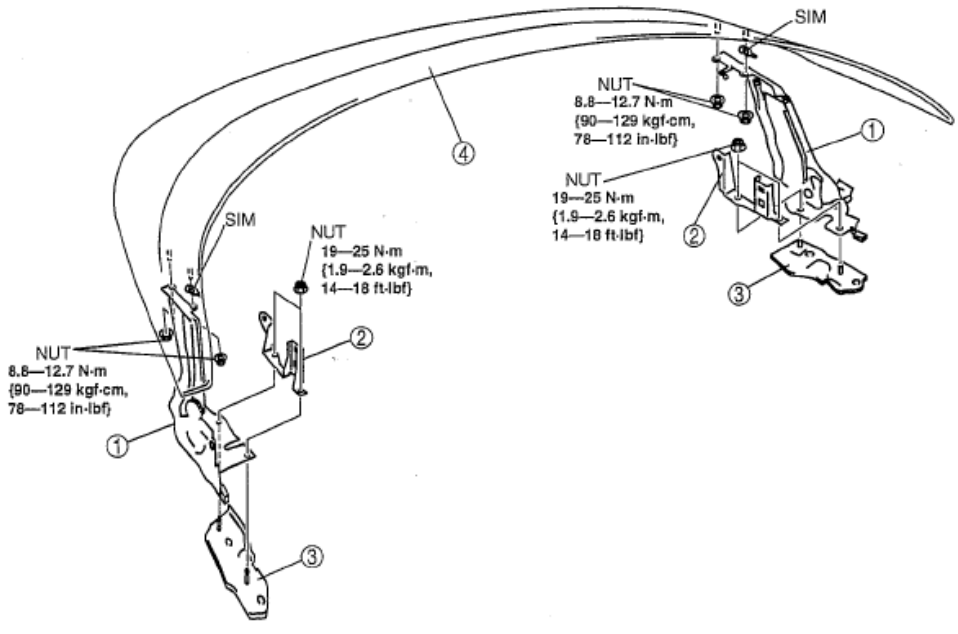
DECK PANEL DISASSEMBLY/ASSEMBLY

1. Remove the deck panel motors. (See **DECK PANEL MOTOR REMOVAL/INSTALLATION**.)
2. Remove the high-mount brake light. (See **HIGH-MOUNT BRAKE LIGHT REMOVAL/INSTALLATION** .)

NOTE:

- **Verify the number of shims because it differs depending on the installation position.**

3. Disassemble in the order indicated in the table.
4. Assemble in the reverse order of disassembly.



1	Deck panel link
2	Deck panel link upper bracket
3	Deck panel link lower bracket

4	Deck panel (See 09-16-39 Deck Panel Link Removal Note.) (See 09-16-39 Deck Panel Link Installation Note.)

Fig. 79: Identifying Deck Panel Disassemble/Assemble Components With Torque Specifications

Courtesy of MAZDA MOTORS CORP.

DECK PANEL LINK REMOVAL NOTE

1. When removing the deck panel link, place the positioning mark by affixing masking tape on the deck panel link and deck panel.

DECK PANEL LINK INSTALLATION NOTE

1. Install the shim according to the number verified prior to removal.
2. Align the alignment marks placed before the deck panel link removal and install the deck panel link.
3. Refer to **DECK PANEL ADJUSTMENT** and verify that the gap and height difference between the deck panel, trunk lid, and back window glass are within the specifications. Adjust the power retractable hardtop if necessary.

DECK PANEL ADJUSTMENT

1. Loosen the installation nuts for deck panel.
2. Adjust the gap and height difference between the deck panel and trunk lid within the specification by moving the deck panel back and forth, left and right, and by adjusting the number of shims if necessary.

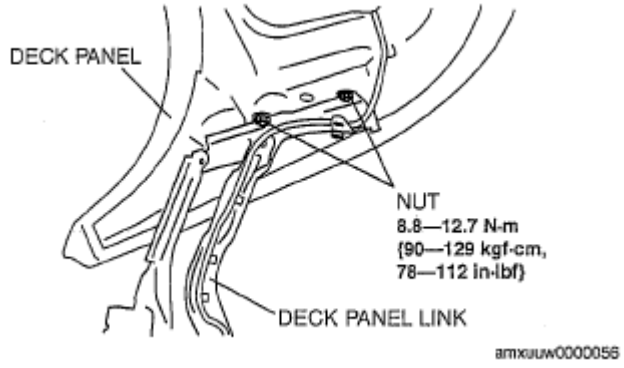


Fig. 80: Identifying Deck Panel, Deck Panel Link And Nut With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

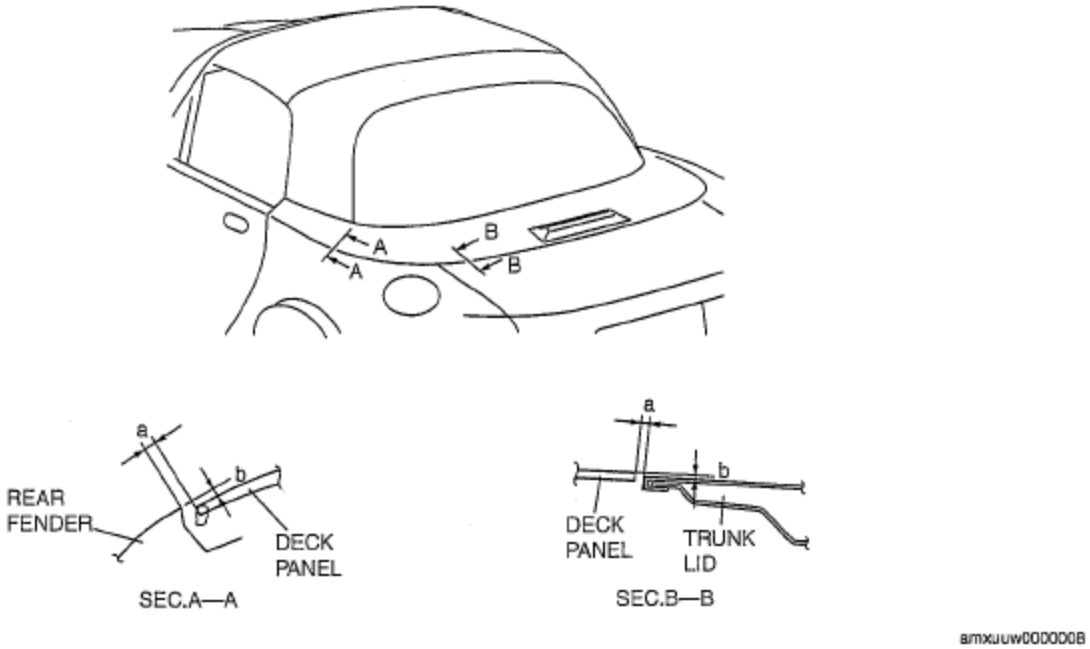


Fig. 81: Identifying Deck Panel Clearances
Courtesy of MAZDA MOTORS CORP.

Clearance

a: 4 - 6 mm {0.16 - 0.23 in}

b: -2 - 2 mm {-0.07 - 0.07 in}

3. Tighten the nuts.

DECK PANEL MOTOR REMOVAL/INSTALLATION

CAUTION:
- **If the deck panel does not operate electrically, see "DECK PANEL MANUAL OPEN/CLOSE PROCEDURE" to open/close the deck panel.**

1. Fully open the deck panel.
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Set the side shelf out of the way. (See **SIDE SHELF REMOVAL/INSTALLATION** .)
5. Remove the deck panel. (See **DECK PANEL REMOVAL/INSTALLATION**.)
6. Remove the screws indicated in the figure.
7. Remove the deck panel motor.
8. Install in the reverse order of removal.

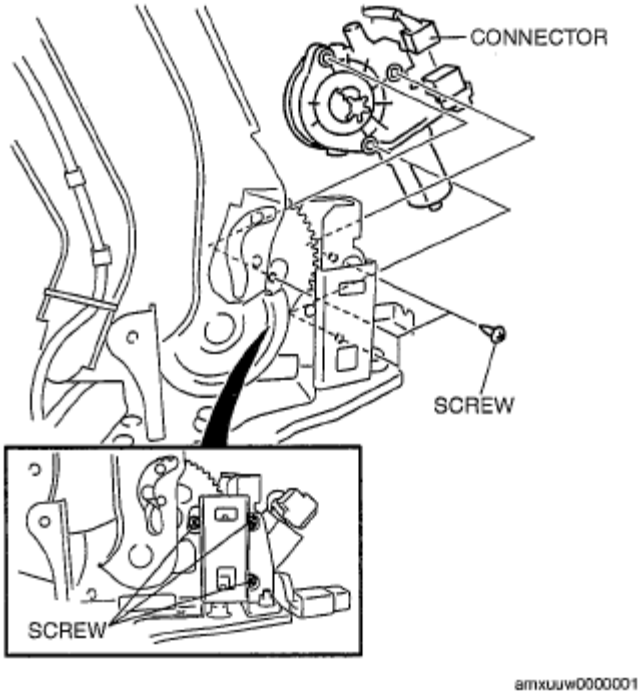


Fig. 82: Identifying Deck Panel Motor Components
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MOTOR INSPECTION

1. Apply battery positive voltage and connect the ground to deck panel motor terminals A and E, and then inspect the deck panel motor operation.
    - If the deck panel motor does not operate as indicated in the table, replace it.

CAUTION:

- **If the deck panel motor temperature is high, the motor may not rotate due to the motor internal PTC function. Leave it untouched for about 3 min to cool it down, then reinspect.**

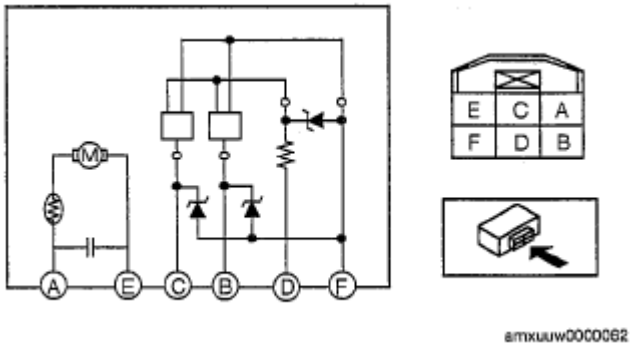


Fig. 83: Identifying Deck Panel Motor Terminals With Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MOTOR OPERATION REFERENCE

Operation	Terminal	
	E	A
Open	Ground	B+
Close	B+	Ground

2. Connect the battery positive voltage to deck panel motor terminal D and connect terminal F to ground.
3. Operate the deck panel motor and measure the voltage at terminal B.
   - If there is any malfunction, replace the deck panel motor.

NOTE:
- **Terminal C is not used for the system control.**

Voltage

- **Pulse: max. 13 V/min. 0 V**

DECK PANEL LIMIT SWITCH REMOVAL/INSTALLATION

CAUTION:
- **If the deck panel does not operate electrically, see "DECK PANEL MANUAL OPEN/CLOSE PROCEDURE" to open/close the deck panel.**

1. Fully open the deck panel.
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Set the side shelf out of the way. (See **SIDE SHELF REMOVAL/INSTALLATION** .)
5. Remove the deck panel. (See **DECK PANEL REMOVAL/INSTALLATION**.)
6. Remove the deck panel motor. (RH) (See **DECK PANEL MOTOR REMOVAL/INSTALLATION**.)
7. Remove the screws A and B.
8. Remove the deck panel limit switch prate.
9. Remove the screws C.
10. Remove the deck panel limit switch.
11. Install in the reverse order of removal.

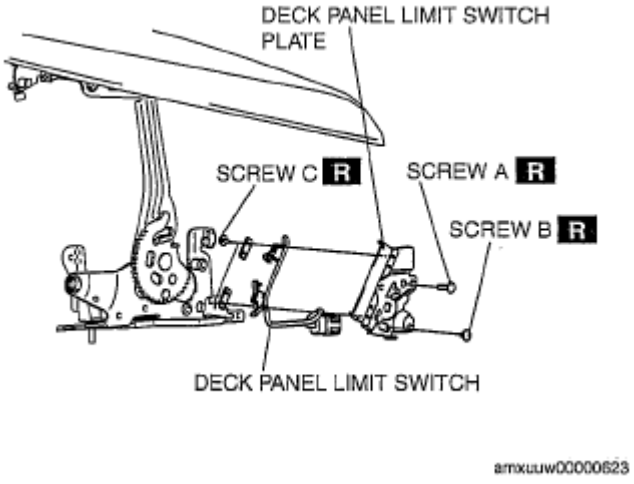


Fig. 84: Identifying Deck Panel Limit Switch Components
Courtesy of MAZDA MOTORS CORP.

DECK PANEL LIMIT SWITCH INSPECTION

1. Verify that the continuity between the deck panel limit switch terminals is as indicated in the table.

- If not as indicated in the table, replace the deck panel link (RH).

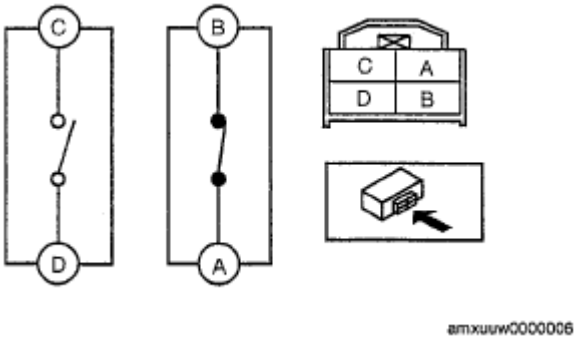


Fig. 85: Deck Panel Limit Switch Continuity Chart
Courtesy of MAZDA MOTORS CORP.

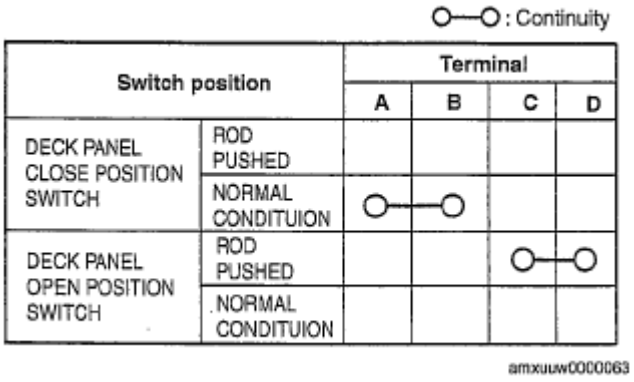


Fig. 86: Identifying Deck Panel Limit Switch Terminals With Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

REAR DECK WEATHERSTRIP REMOVAL

1. Fully open the deck panel.
2. Remove the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
3. Remove the cab-side weatherstrip. (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
4. Remove the fasteners.
5. Remove the rear deck weatherstrip.

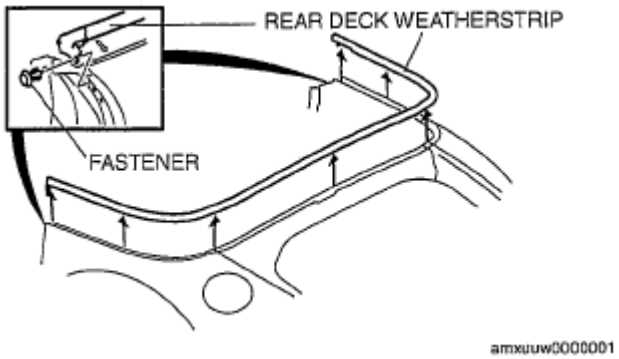


Fig. 87: Identifying Rear Deck Weatherstrip And Fastener
Courtesy of MAZDA MOTORS CORP.

REAR DECK WEATHERSTRIP INSTALLATION

1. Align the deck flange with the weatherstrip marking, and insert. (1)
2. Peel off the tape backing of the butylene tape, align it to the molded part at the tip of the rear deck weatherstrip and press, then attach the fasteners. (2)
3. Install the rear deck weatherstrip. (3)
4. Install the cab-side weatherstrip. (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
5. Install the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)

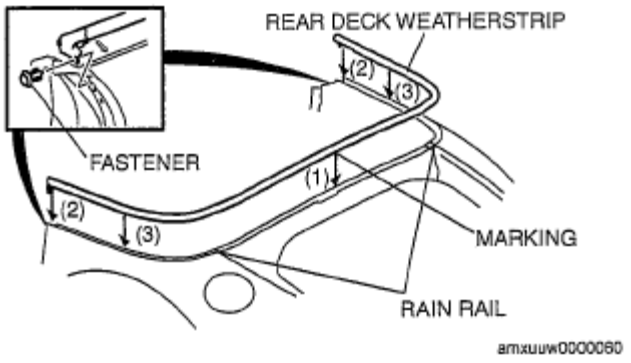


Fig. 88: Rear Deck Weatherstrip Installation View
Courtesy of MAZDA MOTORS CORP.

ROOF HOOK REMOVAL/INSTALLATION

1. Fully close the power retractable hardtop.
2. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
3. Open the cable case cover and disconnect the cable while pressing the cable in the direction of the arrow. (See **ROOF HOOK INSTALL NOTE**.)

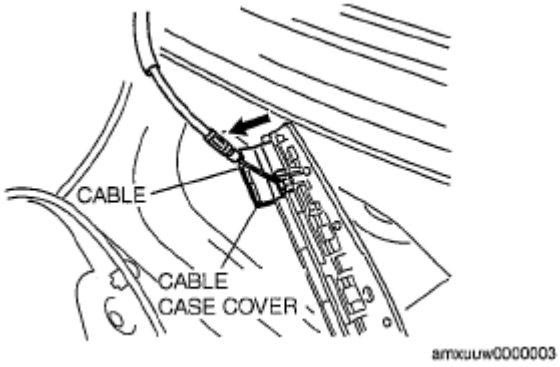


Fig. 89: Direction For Pressing Cable
Courtesy of MAZDA MOTORS CORP.

4. Remove the bolts.

5. Remove the roof hook.

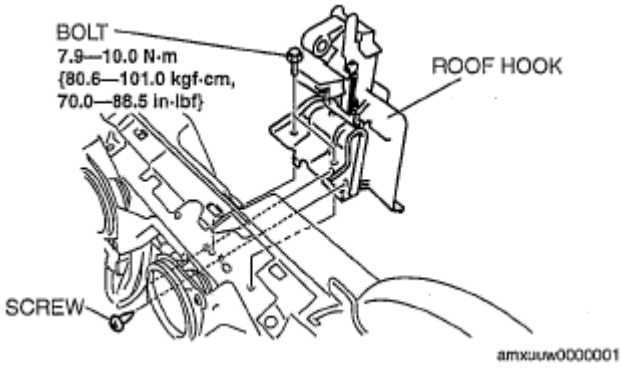


Fig. 90: Identifying Roof Hook, Screw And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

6. Remove the screws.
7. Pull up the cover and remove the hook.
8. Remove the cover.
9. Install in the reverse order of removal.

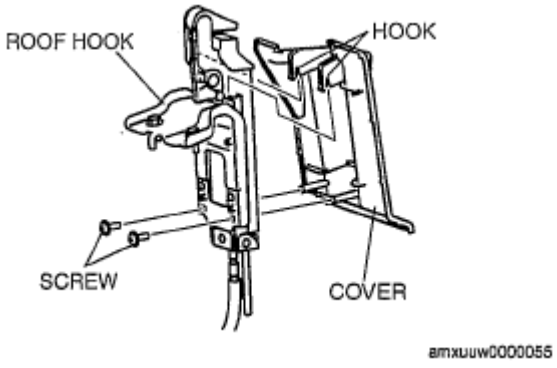


Fig. 91: Identifying Roof Hook, Screw And Cover
Courtesy of MAZDA MOTORS CORP.

ROOF HOOK INSTALL NOTE

1. Securely fix the 3 grooves to the cable case.

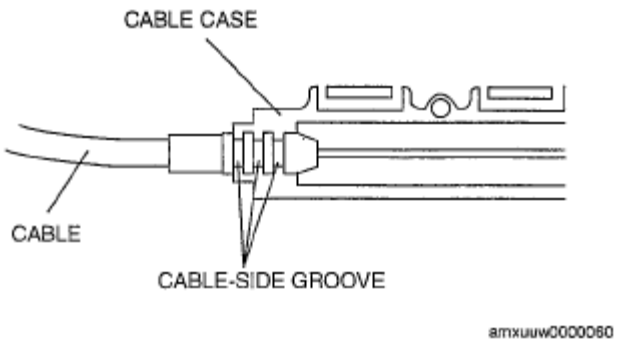


Fig. 92: Identifying Cable Case, Cable And Cable-Side Groove
Courtesy of MAZDA MOTORS CORP.

ROOF HOOK CABLE REMOVAL/INSTALLATION

1. Fully open the deck panel.
2. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
3. Open the cable case cover and disconnect the cable while pressing the cable in the direction of the arrow. (See **ROOF HOOK INSTALL NOTE**.)
4. Set the side shelf out of the way. (See **SIDE SHELF REMOVAL/INSTALLATION** .)

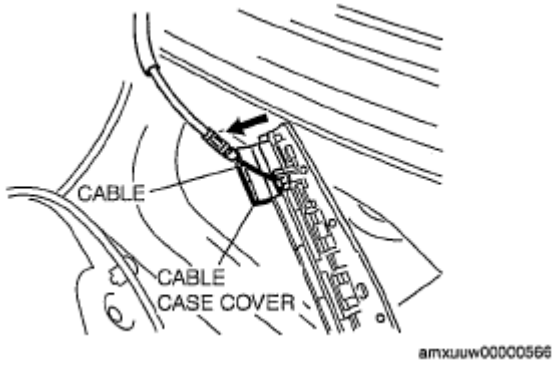


Fig. 93: Direction For Pressing Cable
Courtesy of MAZDA MOTORS CORP.

5. Insert a Phillips screwdriver with no wear securely into each screw groove and remove the screws.

CAUTION:

- **The screws are engaged firmly because thread-locking compound has been applied to them. When removing the screws, be careful not to deform the screw groove.**

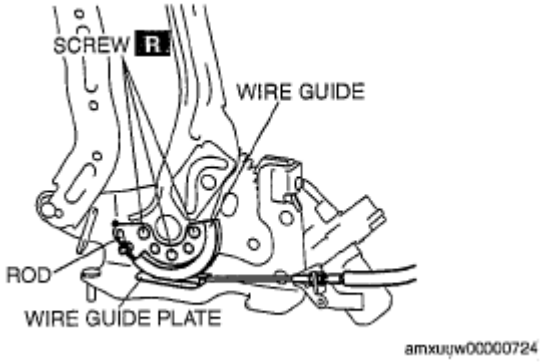


Fig. 94: Identifying Wire Guide, Guide Plate With Screw
Courtesy of MAZDA MOTORS CORP.

6. Remove the rod from the wire guide.
7. Remove tabs A using a tape-wrapped flathead screwdriver, and then remove the wire guide plate.

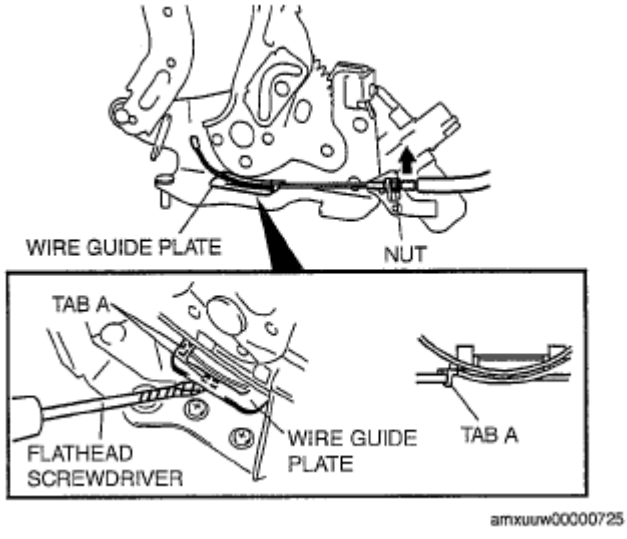


Fig. 95: Removing Tabs A
Courtesy of MAZDA MOTORS CORP.

8. Loosen the nut, then pull the roof hook cable in the direction shown by the arrow and remove it.
9. Remove the nut.
10. Remove the cable case.

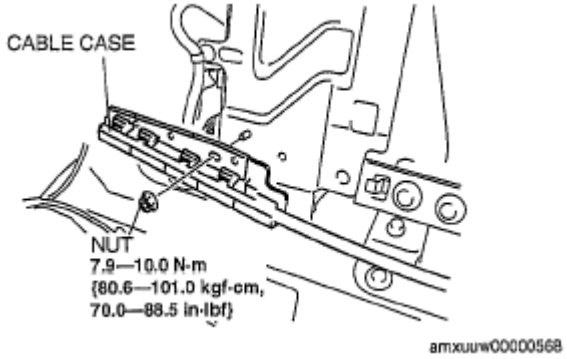


Fig. 96: Identifying Cable Case And Nut With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

11. Remove the roof hook cable from the hook and clip shown in the figure.

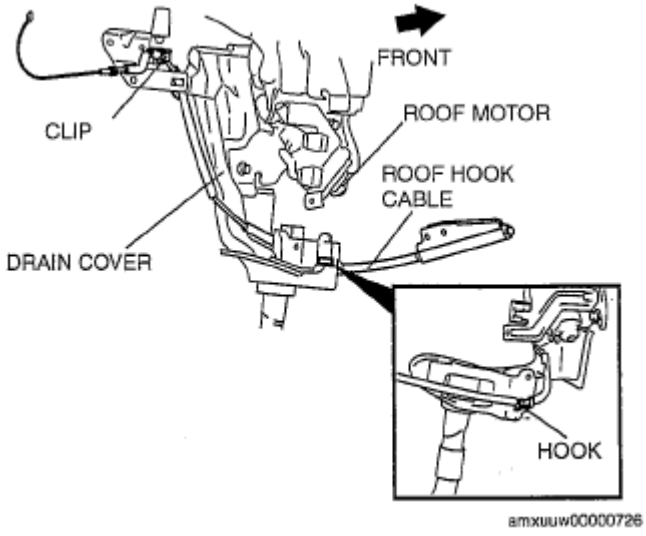


Fig. 97: Identifying Roof Hook Cable And Hook
Courtesy of MAZDA MOTORS CORP.

12. Install in the reverse order of removal.

CAUTION:

- **If the roof hook cable is installed to the installation groove on the drain cover, it may become a source of noise during deck panel operation. Do not install it even if there is an installation groove on the drain cover.**

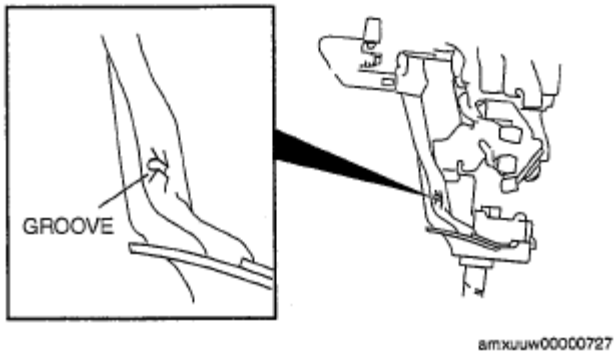


Fig. 98: Identifying Groove
Courtesy of MAZDA MOTORS CORP.

ROOF HOOK INSTALL NOTE

1. Securely fix the 3 grooves to the cable case.

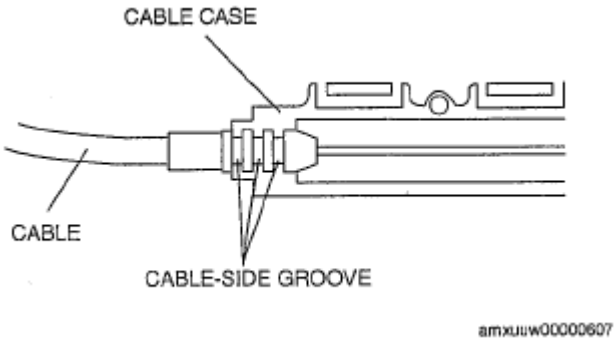


Fig. 99: Identifying Cable Case, Cable And Cable-Side Groove
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION

1. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)

2. Remove the bolts A, B and C. (See **BOLT B, C INSTALL NOTE**.)
3. Remove the junction. (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
4. Loosen the installation bolts and nuts of the seat back crossmember component, and tilt the seat back crossmember component towards the vehicle front. (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)

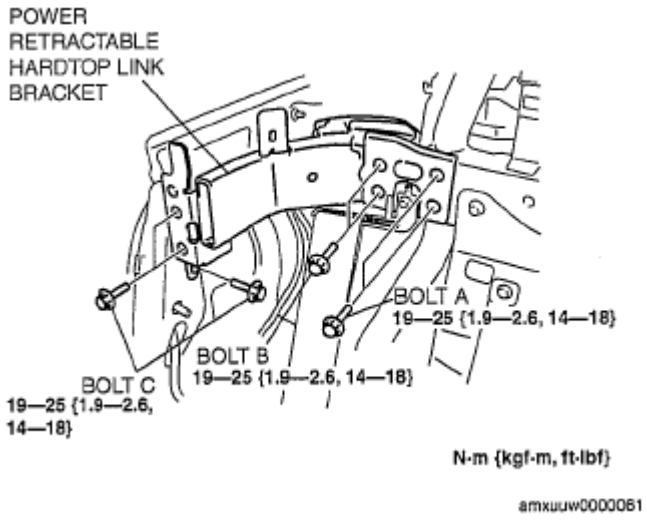


Fig. 100: Identifying Power Retractable Hardtop Link Bracket And Bolts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

5. Rotate the power retractable hardtop link bracket in the direction shown by the arrow at the pivot fulcrum of pin A and set the hook out of the way.
6. Remove the power retractable hardtop link bracket.
7. Install in the reverse order of removal.

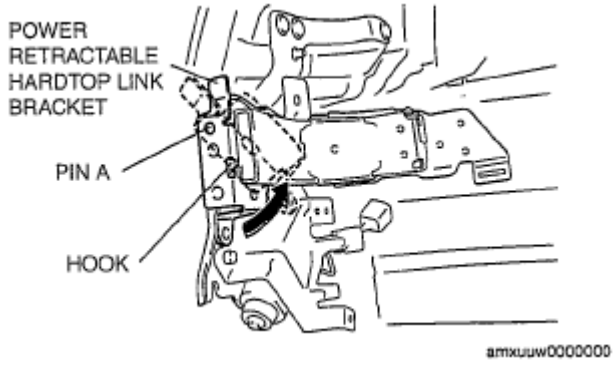


Fig. 101: Rotating Power Retractable Hardtop Link Bracket
Courtesy of MAZDA MOTORS CORP.

BOLT B, C INSTALL NOTE

1. Temporarily tighten all the bolts, then tighten the bolts in the order indicated in the figure.

Tightening torque

19-25 N.m {1.9-2.6 kgf.m, 14-18 ft.lbf}

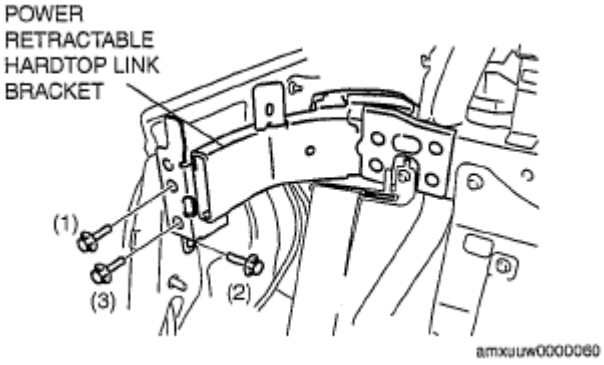


Fig. 102: Power Retractable Hardtop Link Bracket Bolts Tightening Order
Courtesy of MAZDA MOTORS CORP.

FRONT ROOF PANEL REMOVAL/INSTALLATION

1. Fully open the deck panel.
2. Cover both sides of the rear window glass with thick cloth to protect the window.
3. Remove the battery cover.
4. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)
    10. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
    11. Power retractable hardtop (See **POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION**.)

NOTE:

- **Verify the number of shims because it differs depending on the installation position.**

6. When removing the front roof panel, place the positioning mark by affixing masking tape on the roof link and front roof panel.

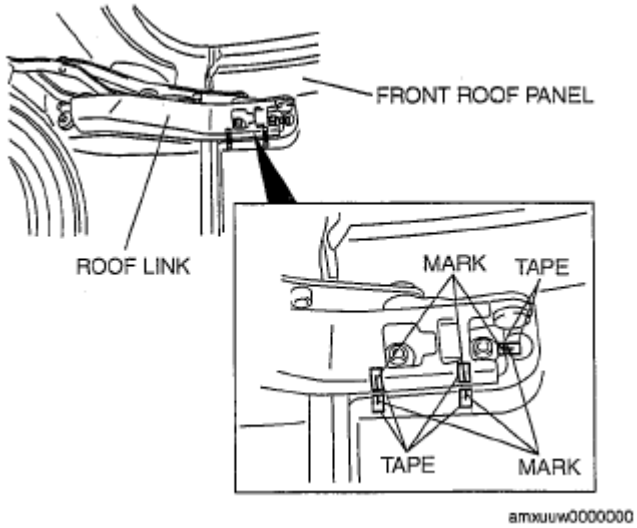


Fig. 103: Identifying Mark And Tape
Courtesy of MAZDA MOTORS CORP.

7. Remove the tabs A and hook B.
8. Remove the cover.
9. Remove the bolts and washers.
10. Remove the sims.
11. Remove the front roof panel.
12. Install in the reverse order of removal.

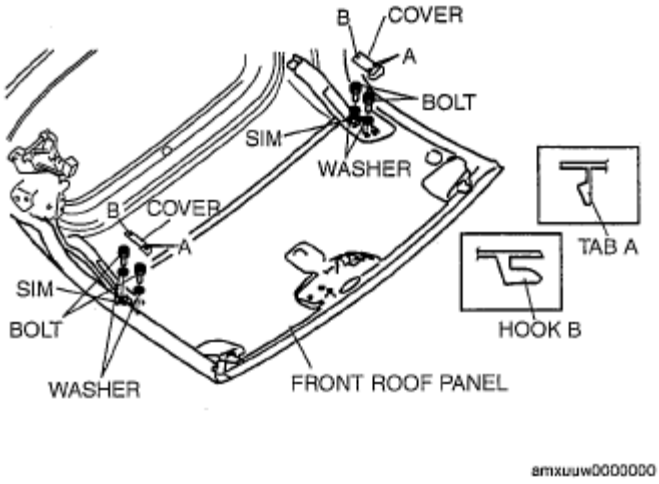


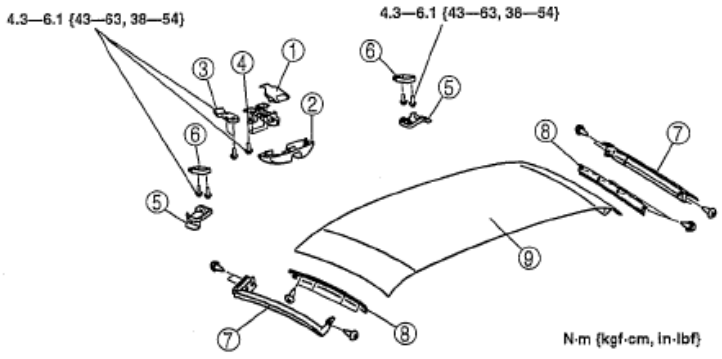
Fig. 104: Identifying Front Roof Panel Components
Courtesy of MAZDA MOTORS CORP.

FRONT ROOF PANEL INSTALLATION NOTE

1. Install the shim according to the number verified prior to removal.
2. Align the alignment marks placed before the front roof panel removal and install the front roof panel.
3. Refer to **POWER RETRACTABLE HARDTOP ADJUSTMENT** and verify that the gap and height difference between the front roof panel and middle roof panel are within the specifications. Adjust the power retractable hardtop if necessary.

FRONT ROOF PANEL DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Top lock lever cover
2	Top lock cover
3	Roof hook wedge
4	Top lock
5	Male wedge cover

6	Male wedge
7	Weatherstrip
8	Retainer (See 09-16-49 Retainer Disassembly Note.) (See 09-16-49 Retainer Assembly Note.)
9	Front roof panel

Fig. 105: Disassemble/Assemble View Of Front Roof Panel With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

RETAINER DISASSEMBLY NOTE

1. Mark around the retainer installation screws with paint before removing them.

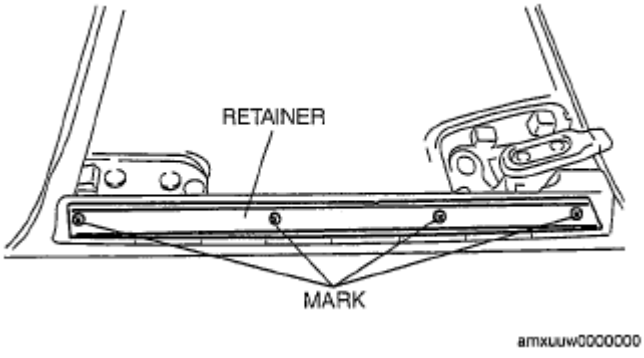


Fig. 106: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

RETAINER ASSEMBLY NOTE

1. Install the retainers to the link, aligning the retainer marks with the retainer installation screws.

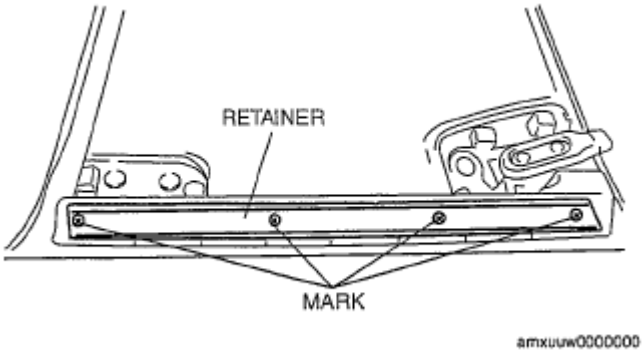


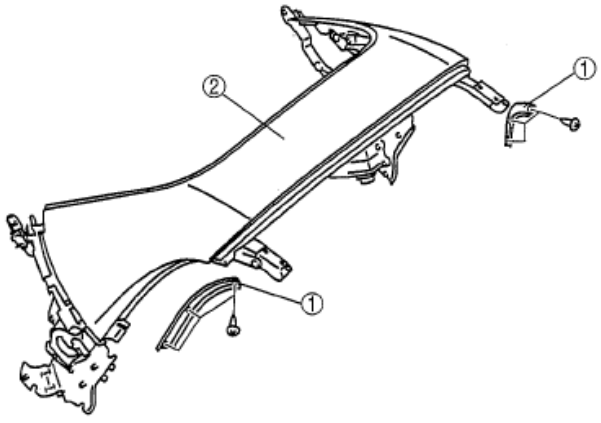
Fig. 107: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

MIDDLE ROOF PANEL REMOVAL/INSTALLATION

1. Fully open the deck panel.
2. Cover both sides of the rear window glass with thick cloth to protect the window.
3. Remove the battery cover.
4. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION**.)
    10. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY**.)
    11. Power retractable hardtop (See **POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION**.)
6. Remove the front roof panel from the middle roof panel. (See **FRONT ROOF PANEL REMOVAL/INSTALLATION**.)
7. Remove the rear window glass from the middle roof panel. (See **REAR WINDOW GLASS REMOVAL/INSTALLATION[POWER RETRACTABLE HARDTOP]** .)
8. Remove the roof motor from the middle roof panel. (See **ROOF MOTOR REMOVAL/INSTALLATION**.)
9. Install in the reverse order of removal.

MIDDLE ROOF PANEL DISASSEMBLY/ASSEMBLY

1. Remove the middle roof panel weatherstrip. (See **MIDDLE ROOF PANEL WEATHERSTRIP REMOVAL/INSTALLATION**.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



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1	Retainer (See 09-16-51 Retainer Disassembly Note.) (See 09-16-51 Retainer Assembly Note.)	2	Middle roof panel

Fig. 108: Disassemble/Assemble View Of Middle Roof Panel
Courtesy of MAZDA MOTORS CORP.

RETAINER DISASSEMBLY NOTE

1. Mark around the retainer installation screws with paint before removing them.

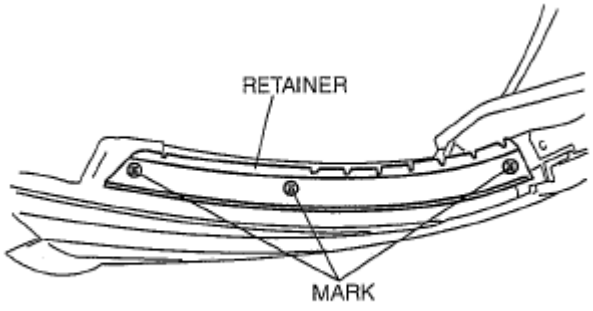

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Fig. 109: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

RETAINER ASSEMBLY NOTE

1. Install the retainers to the link, aligning the retainer marks with the retainer installation screws.

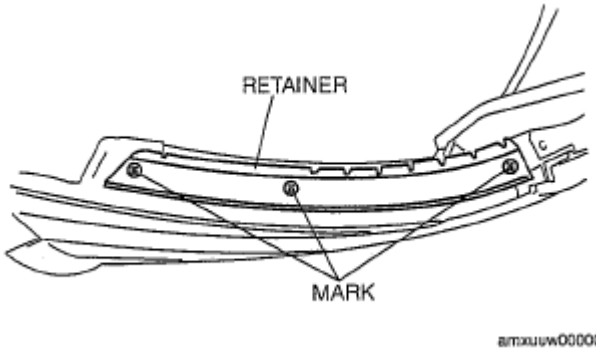


Fig. 110: Identifying Mark Around Retainer Installation Screws
Courtesy of MAZDA MOTORS CORP.

MIDDLE ROOF PANEL WEATHERSTRIP REMOVAL/INSTALLATION

REMOVAL

1. Remove the fasteners.

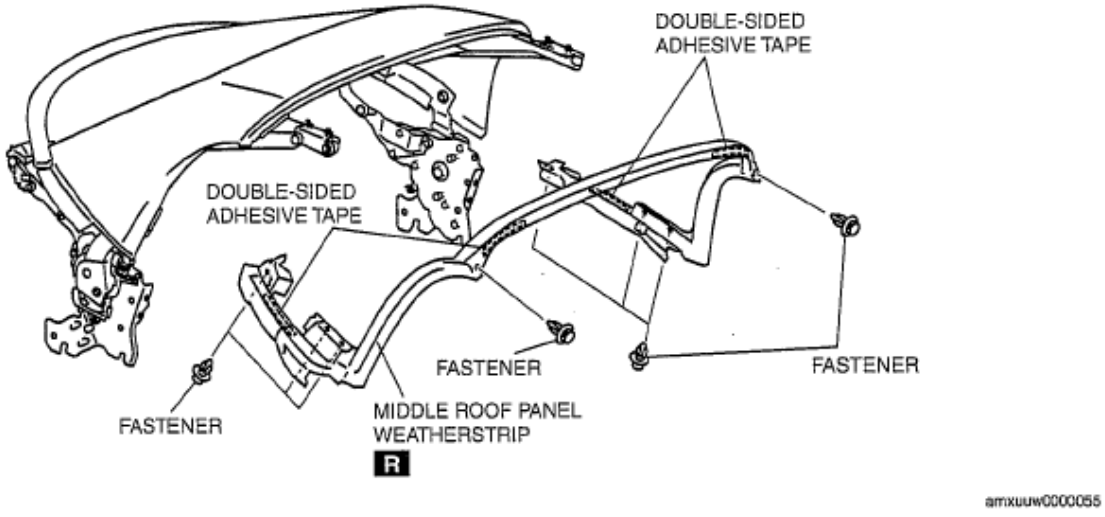


Fig. 111: Identifying Middle Roof Panel Weatherstrip Components
Courtesy of MAZDA MOTORS CORP.

2. Peel off the double-sided adhesive tape.
3. Remove the middle roof panel weatherstrip.

INSTALLATION

WARNING:

- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

NOTE:

- **Double-sided adhesive tape has already been attached to the new middle roof panel weatherstrip.**

1. Remove the double-sided adhesive tape on the middle roof panel using a utility knife.
2. Remove any grease or dirt from the adhesion surface of the middle roof panel.
3. Install the fasteners.

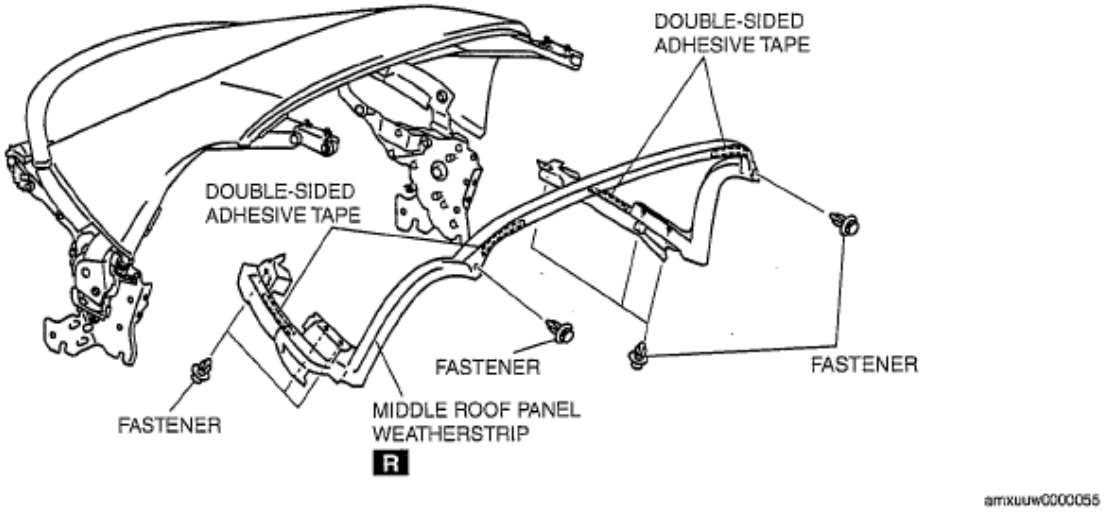


Fig. 112: Identifying Middle Roof Panel Weatherstrip Components
Courtesy of MAZDA MOTORS CORP.

4. Peel off the tape backings and attach the weatherstrip by applying pressure.

ROOF LINK LOCK REMOVAL/INSTALLATION

1. Fully open the deck panel.
2. Remove the rear defroster harness from the roof link lock (LH). (See **REAR WINDOW GLASS REMOVAL/INSTALLATION[POWER RETRACTABLE HARDTOP]** .)
3. Remove the bolt.
4. Remove the pin A.
5. Remove the roof link lock.
6. Install in the reverse order of removal.

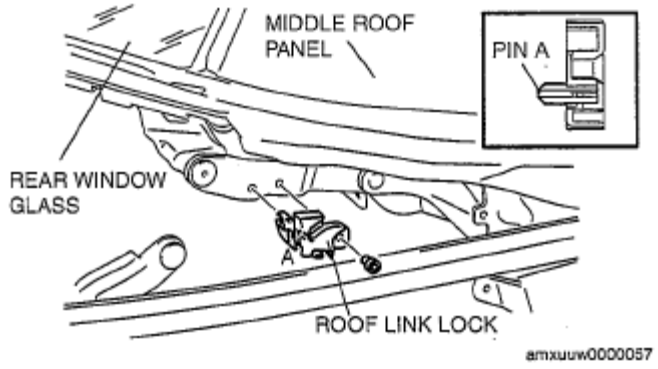


Fig. 113: Identifying Roof Link Lock Components
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP CONTROL MODULE BRACKET REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
4. Remove the roof hook cable case.

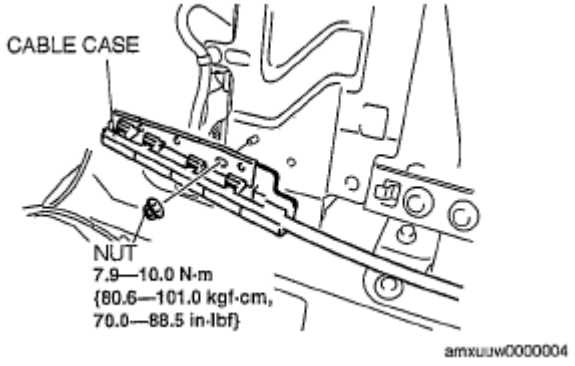


Fig. 114: Identifying Cable Case And Nut With Torque Specification
Courtesy of MAZDA MOTORS CORP.

5. Remove in the order indicated in the table.

1	Connector
2	Nut
3	Bolt
4	Power retractable hardtop control module assembly

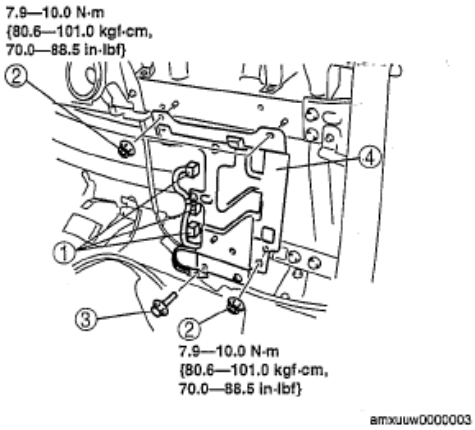


Fig. 115: Removing View Of Power Retractable Hardtop Control Module Bracket With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

6. Remove the nuts.
7. Remove the power retractable hardtop control module bracket.
8. Install in the reverse order of removal.

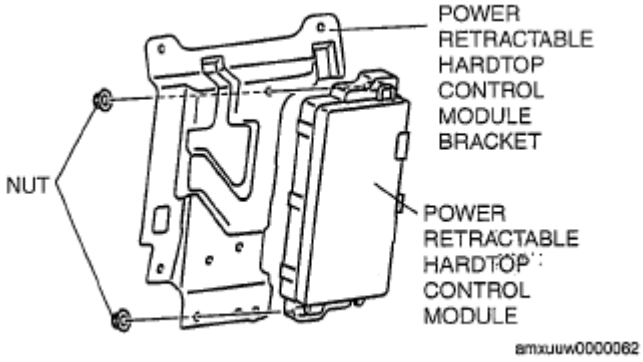


Fig. 116: Identifying Power Retractable Hardtop Control Module Bracket And Nut
Courtesy of MAZDA MOTORS CORP.

BLACK-OUT FILM REMOVAL

FRONT

1. Partially peel back the middle roof weatherstrip.
2. Peel off the black-out film by pulling it outward from one end.

NOTE:

- **Slowly remove the black-out film since it may tear easily.**

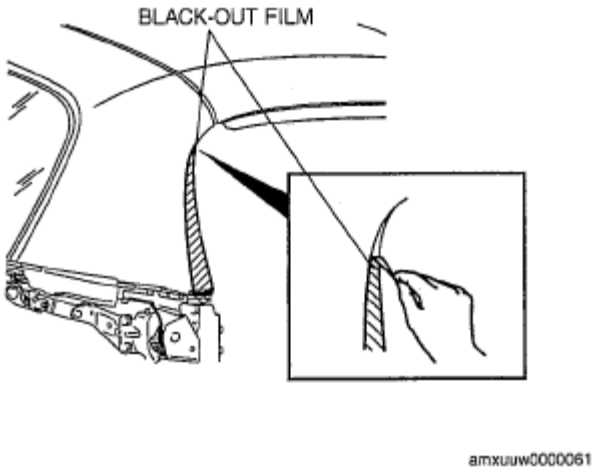


Fig. 117: Removing Black-Out Film
Courtesy of MAZDA MOTORS CORP.

REAR

1. Move the power retractable hardtop in the open direction as shown in the figure until it is separated from the middle roof panel.

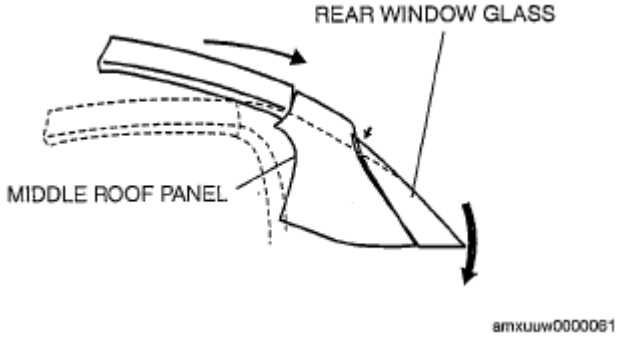


Fig. 118: Moving Power Retractable Hardtop
Courtesy of MAZDA MOTORS CORP.

2. Peel off the black-out film by pulling it outward from one end.

NOTE:

- **Slowly remove the black-out film since it may tear easily.**

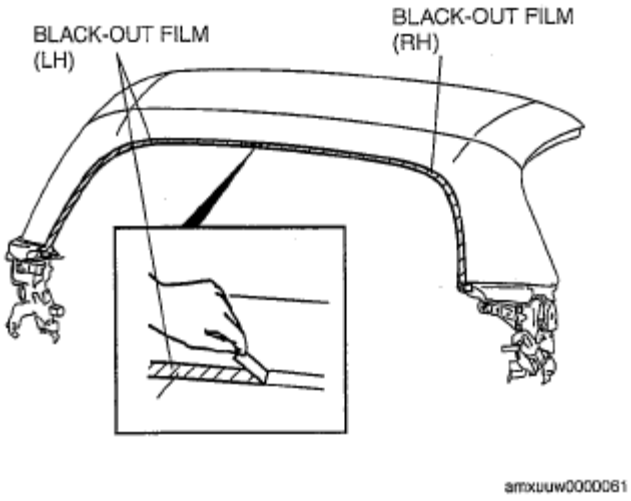


Fig. 119: Removing Black-Out Film
Courtesy of MAZDA MOTORS CORP.

BLACK-OUT FILM INSTALLATION

FRONT

1. Remove any grease or dirt from the affixing surface of the middle roof panel.
2. Peel off the tape backing from the upper area 50-100 mm, and adhere the black-out film to the positioning point shown in the figure.

   Clearance

   a: 0-2.0 mm {0-0.078 in}

3. Peel off the tape backing, and after verifying that the bottom edge is positioned within **2 mm** from the line shown in the figure, adhere the surface of the black-out film.
4. Peel off the transparent protective film on the black-out film.
5. Apply pressure to the black-out film in the order of side and back side.
6. Grasp edges b, c and pull in the direction shown by the arrow making sure there are no wrinkles in the corner area, and adhere.
7. Install the middle roof panel weatherstrip. (See **MIDDLE ROOF PANEL WEATHERSTRIP REMOVAL/INSTALLATION**.)

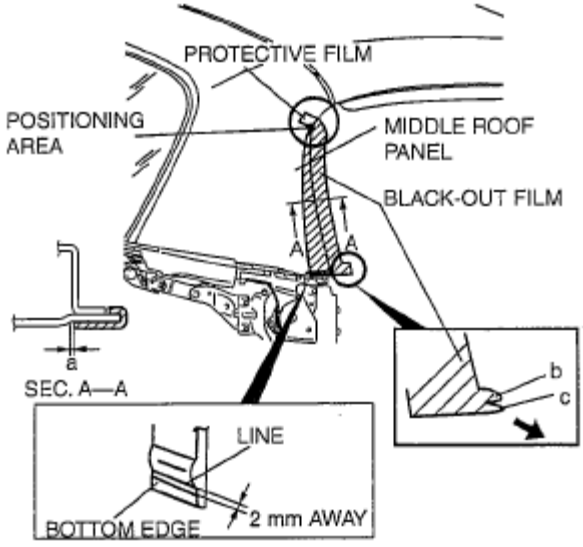


Fig. 120: Installation View Of Black-Out Film (Front)
Courtesy of MAZDA MOTORS CORP.

REAR

1. Remove any grease or dirt from the affixing surface of the middle roof panel.
2. Peel off the tape backing from the upper area **50-100 mm,** and adhere the black-out film to the positioning point shown in the figure.

   Clearance

   a: 0-3.0 mm {0-0.118 in}

3. Peel off the tape backing and adhere the black-out film surface.
4. Peel off the transparent protective film on the black-out film.
5. Apply pressure to the black-out film in the order of side and back side.

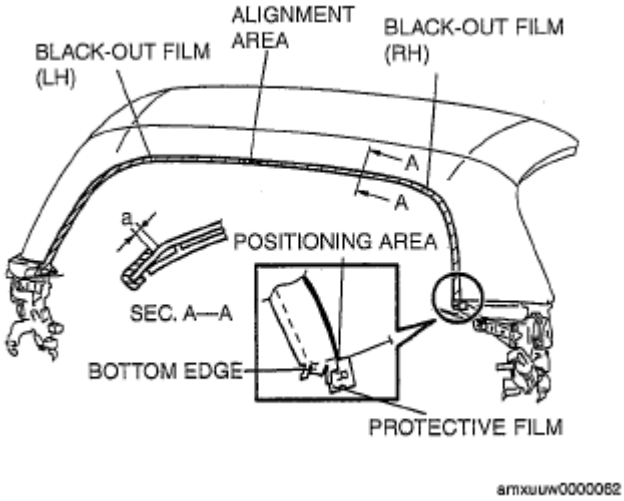


Fig. 121: Installation View Of Black-Out Film (Rear)
Courtesy of MAZDA MOTORS CORP.

6. Fold in the edges in the order shown in the figure.
7. Attach the black out film (LH) using the same procedure as the black out film (RH).

CAUTION:

- **Adhere so that the center edge of the black-out film (RH) is underneath the center edge of the black-out film (LH) in the center alignment area, with no deviation.**

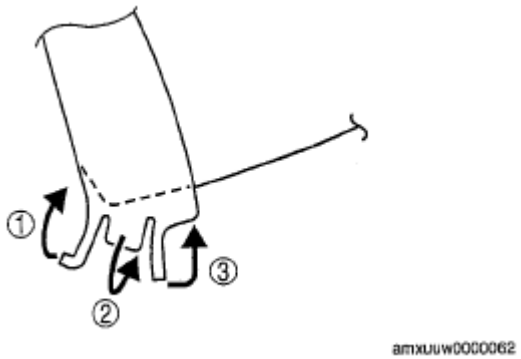


Fig. 122: Order Of Folding Edges
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP DRAIN HOSE REMOVAL/INSTALLATION

1. Fully close the power retractable hardtop.
2. Fully open the deck panel.
3. Remove clip A, and remove the power retractable hardtop drain hose from the rear window glass.

4. Insert your hand from the fully opened deck panel and remove clip B, and remove the power retractable hardtop drain hose from the rear side trim.
5. Install in the reverse order of removal.

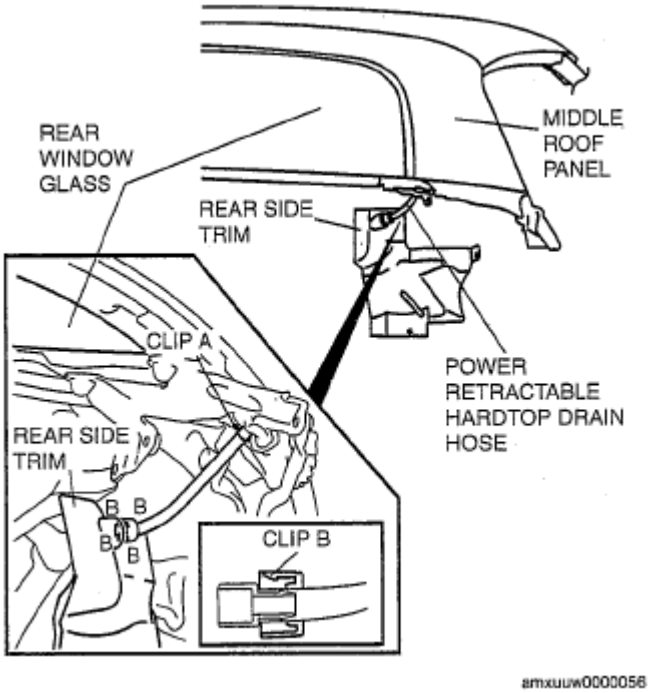


Fig. 123: Identifying Power Retractable Hardtop Drain Hose Components
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MANUAL OPEN/CLOSE PROCEDURE

CAUTION:

- **Because the pinion gear (deck panel motor) and sector gear are disengaged when the manual open/close procedure is performed, the deck panel does not operate electrically after a repair. It is necessary to perform the recovery procedure to engage the pinion gear (deck panel motor) and sector gear. (See RECOVERY PROCEDURE.)**

DECK PANEL MANUAL OPEN/CLOSE PROCEDURE AND TEMPORARY MEASURE PROCEDURE

NOTE:

- **The temporary measure is for releasing the lock using a rope if the deck panel needs to be opened/closed again or to drive the vehicle after the deck panel manual open/close procedure has been performed. To open/close the deck panel manually on the vehicle where the temporary measure has already been performed, open/close the deck panel manually referring to "Deck panel manual open/close procedure after temporary measure". (See CLOSE THE DECK PANEL (TEMPORARY MEASURE).)**

- **To perform the following procedure, use the tools that comes with the vehicle.**
- **To free the deck panel, both the motors need to be unlocked.**
- **The following procedure is only for the left side. Perform the same procedure on the right side to free the deck panel.**

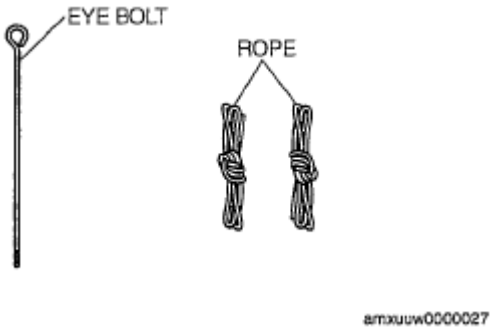


Fig. 124: Identifying Eye Bolt And Rope
Courtesy of MAZDA MOTORS CORP.

OPEN THE DECK PANEL

1. Remove the bolts.

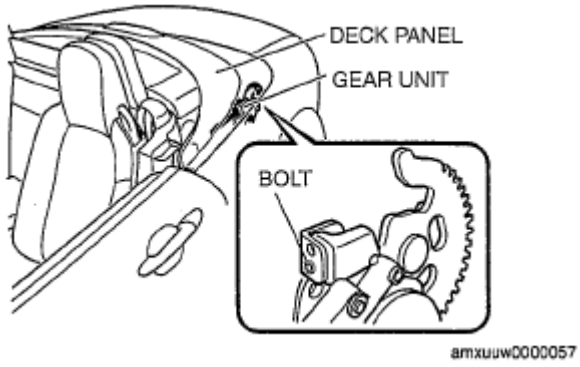


Fig. 125: Identifying Bolts
Courtesy of MAZDA MOTORS CORP.

2. Insert the eye bolt into the thread hole above the removed bolt.

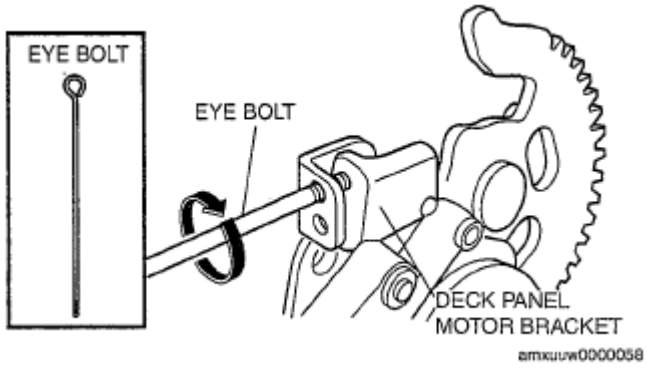


Fig. 126: Inserting Eye Bolt Into Thread Hole
Courtesy of MAZDA MOTORS CORP.

3. Rotate the eye bolt in the tightening direction seven times to press the deck panel motor bracket.

NOTE:

- **When the deck panel motor bracket is pressed, the deck panel motor bracket rotates, and the pinion gear (deck panel motor) and sector gear are disengaged.**

4. Remove the eye bolt.

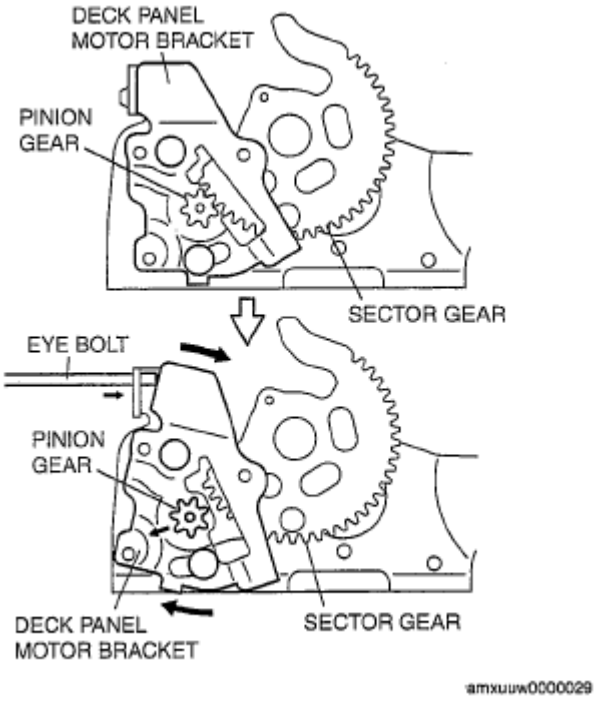


Fig. 127: Removing Eye Bolt
Courtesy of MAZDA MOTORS CORP.

5. Insert the eye bolt into the guide pipe shown in the figure.

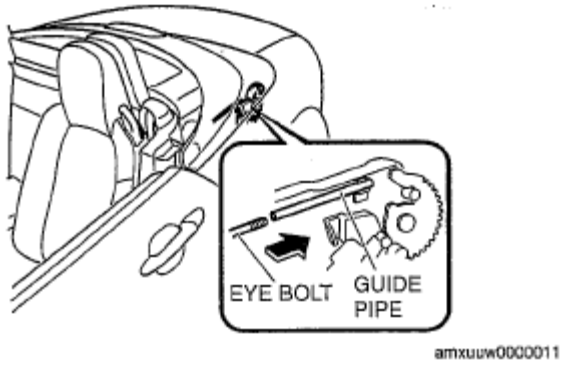


Fig. 128: Inserting Eye Bolt Into Guide Pipe
Courtesy of MAZDA MOTORS CORP.

6. Press the eye bolt towards the vehicle rear and disengage the sector gear and the lock pin of the deck panel base link.
7. Lift up the deck panel from the both the left and right sides of the vehicle, one person on each side, to open the deck panel.

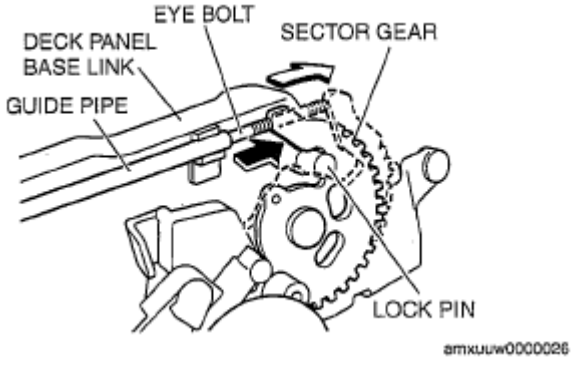


Fig. 129: Disengaging Sector Gear And Lock Pin Of Deck Panel Base Link
Courtesy of MAZDA MOTORS CORP.

Close the deck panel (Temporary measure)

NOTE:
- **If the deck panel needs to be opened/closed again or to drive the vehicle, perform the following temporary measure procedure.**

1. Double tie the rope to the deck panel link screw as shown in the figure.

CAUTION:
- **Tie the rope securely around the knob so that it does not loosen.**

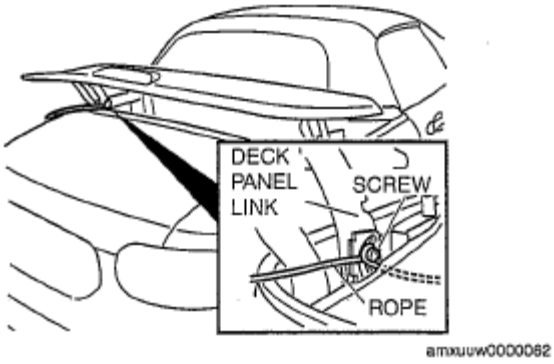


Fig. 130: Identifying Deck Panel Link, Screw And Rope
Courtesy of MAZDA MOTORS CORP.

2. Route the rope on the vehicle's front side to the inside of the vehicle, passing it through the gap in the side shelf.

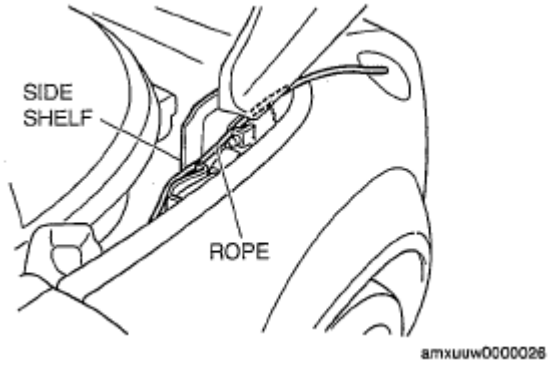


Fig. 131: Rope Routing On Vehicle Front Side
Courtesy of MAZDA MOTORS CORP.

3. Route the rope on the vehicle's rear side to the outside of the vehicle, passing it between the deck panel links.
4. After doing the same procedure on the right side, close the deck panel from both the left and sides of the vehicle, one person on each side.

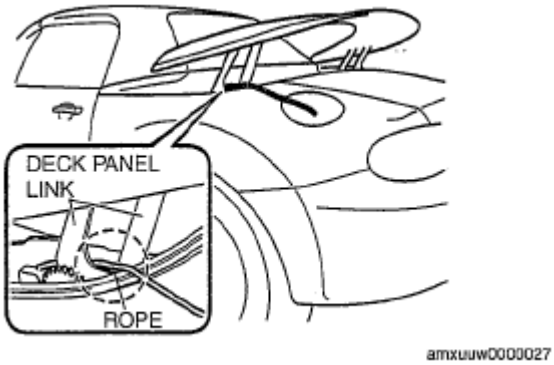


Fig. 132: Rope Routing On Vehicle Rear Side
Courtesy of MAZDA MOTORS CORP.

5. Pull the rope on the vehicle's rear (rope is outside of vehicle) along the trunk lid to engage and lock the sector gear and the lock pin of the deck panel base link.

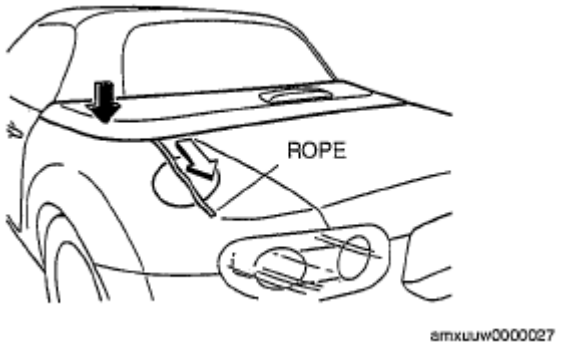


Fig. 133: Direction Of Pulling Rope
Courtesy of MAZDA MOTORS CORP.

6. Double tie the rope on the vehicle's rear side (rope is outside of vehicle) to the trunk lid hinge as shown in the figure.

CAUTION:
- **Tie the rope on the trunk lid hinge to prevent the lock from releasing while driving. Tie the rope securely on the trunk lid hinge so that it does not loosen.**

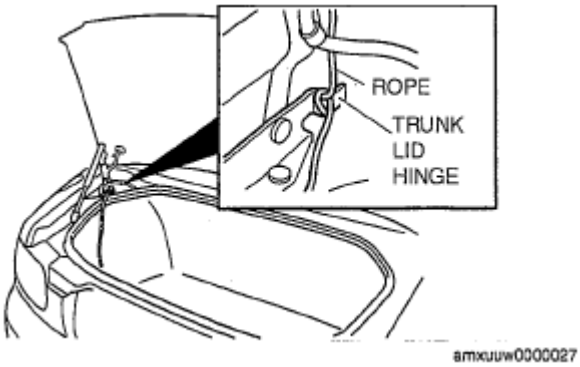


Fig. 134: Identifying Trunk Lid Hinge
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MANUAL OPEN/CLOSE PROCEDURE AFTER TEMPORARILY MEASURE

NOTE:
- **The temporary measure is for releasing the lock using a rope if the deck panel needs to be opened/closed again or to drive-the vehicle after the deck panel manual open/close procedure has been performed. To**

open/close the deck panel manually on a vehicle where the temporary measure has already been performed, perform the following procedure and open/close the deck panel manually.

Open the deck panel

1. Pull the rope on the vehicle's front (rope is inside of vehicle) to disengage the sector gear and the lock pin of the deck panel base link.
2. Lift up the deck panel from the both the left and right sides of the vehicle, one person on each side, to open the deck panel.

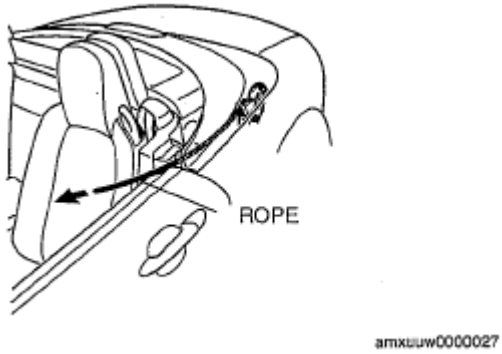


Fig. 135: Pulling Rope From Vehicle Front
Courtesy of MAZDA MOTORS CORP.

Close the deck panel

NOTE:

- **If the deck panel needs to be opened/closed again or to drive the vehicle, perform the following procedure to close the deck panel.**

1. Close the deck panel from both the left and right sides of the vehicle, one person on each side.
2. Pull the rope on the vehicle's rear (rope is outside of vehicle) along the trunk lid to engage and lock the sector gear and the lock pin of the deck panel base link.

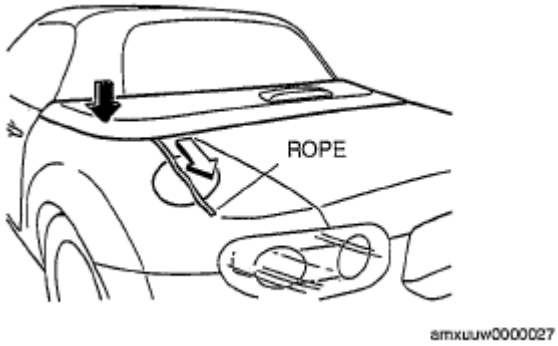


Fig. 136: Pulling Rope From Vehicle Rear Side

Courtesy of MAZDA MOTORS CORP.

3. Double tie the rope on the vehicle's rear side (rope is outside of vehicle) to the trunk lid hinge as shown in the figure.

CAUTION:

- **Tie the rope on the trunk lid hinge to prevent the lock from releasing while driving. Tie the rope securely on the trunk lid hinge so that it does not loosen.**

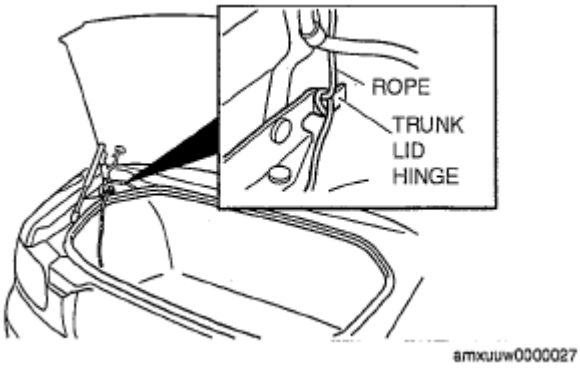


Fig. 137: Identifying Trunk Lid Hinge
Courtesy of MAZDA MOTORS CORP.

RECOVERY PROCEDURE

1. Fully open the deck panel.
2. Rotate the deck panel motor bracket in the direction of the arrow to engage the pinion gear (deck panel motor) and the sector gear.
3. Install the bolt.

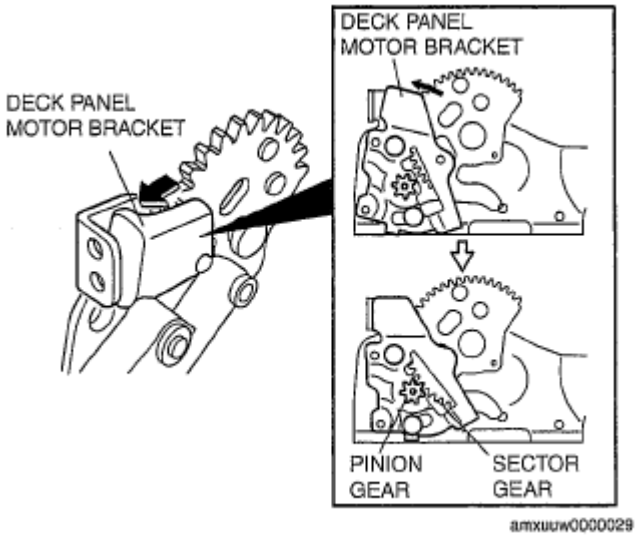


Fig. 138: Rotating Deck Panel Motor Bracket
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **If the temporary measure is performed, remove the ropes.**

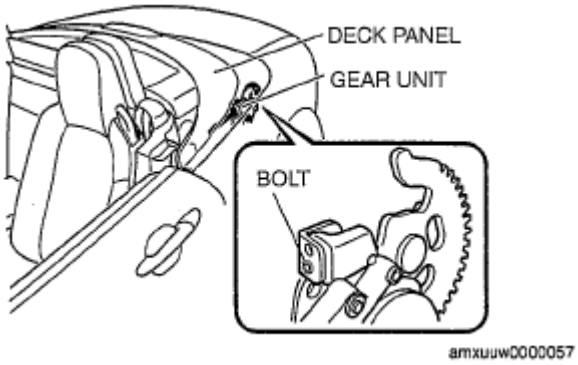


Fig. 139: Identifying Deck Panel Bolt
Courtesy of MAZDA MOTORS CORP.

DECK PANEL MANUAL OPEN/CLOSE PROCEDURE WITH THE ROOF PANEL FULLY CLOSED

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the aeroboard. (See **AEROBOARD REMOVAL/INSTALLATION** .)
3. Peering from the space where the wind blocker was removed, remove both sides of the nuts shown in the figure.

NOTE:

- **The number of shims varies depending on the location of the deck panel installation nuts. Adjustment will be easier by verifying the number of shims to be used before removing the deck panel.**

4. Lift up the deck panel with one other person.
5. Disconnect the high-mount brake light connector on the left side by pulling it in the direction of (2) while pressing it in the direction of (1).
6. Remove the deck panel.

Nut Removal Note

1. Insert a spanner into the clearance between the deck panel and side shelf, and remove the nuts.

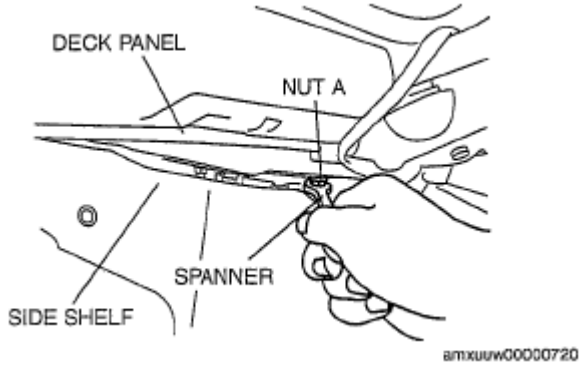


Fig. 140: Removing Nut A
Courtesy of MAZDA MOTORS CORP.

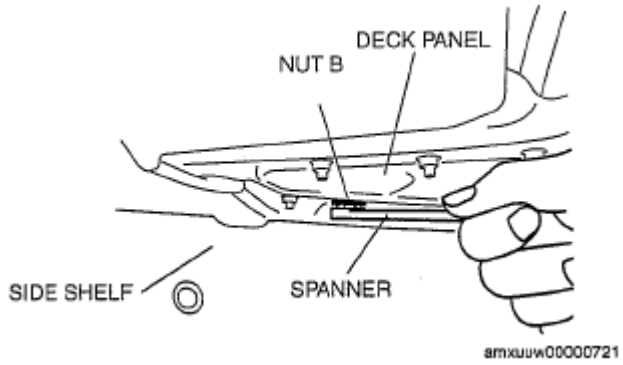


Fig. 141: Removing Nut B
Courtesy of MAZDA MOTORS CORP.

DECK PANEL RECOVERY PROCEDURE

1. Connect the negative battery cable.
2. Fully open the deck panel.
3. Install the deck panel. (See **DECK PANEL REMOVAL/INSTALLATION**.)
4. Verify the deck panel clearance. (See **POWER RETRACTABLE HARDTOP ADJUSTMENT**.)

POWER RETRACTABLE HARDTOP OPEN/CLOSE WARNING BEEP ON/OFF SWITCHING

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        1. Select "Module Programming".
    - When using the PDS (Pocket PC)
    1. Select "Programming".

2. Select "Module programming".

3. Then, select items from the screen menu in the following order.
   1. Select "Programmable Parameters".
   2. Select "Warning Lamps/Chimes".
4. Select the RHT buzzer (IC) on the M-MDS to set on/off.

Item

- RHT Buzzer - (IC)

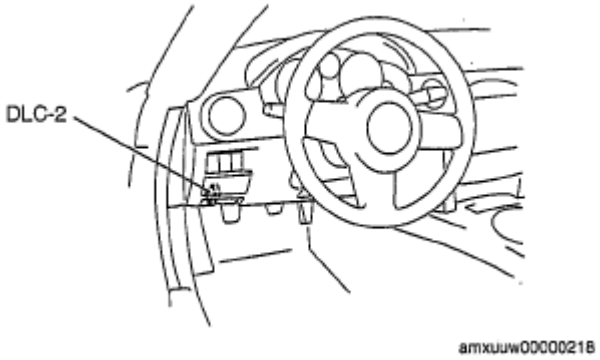
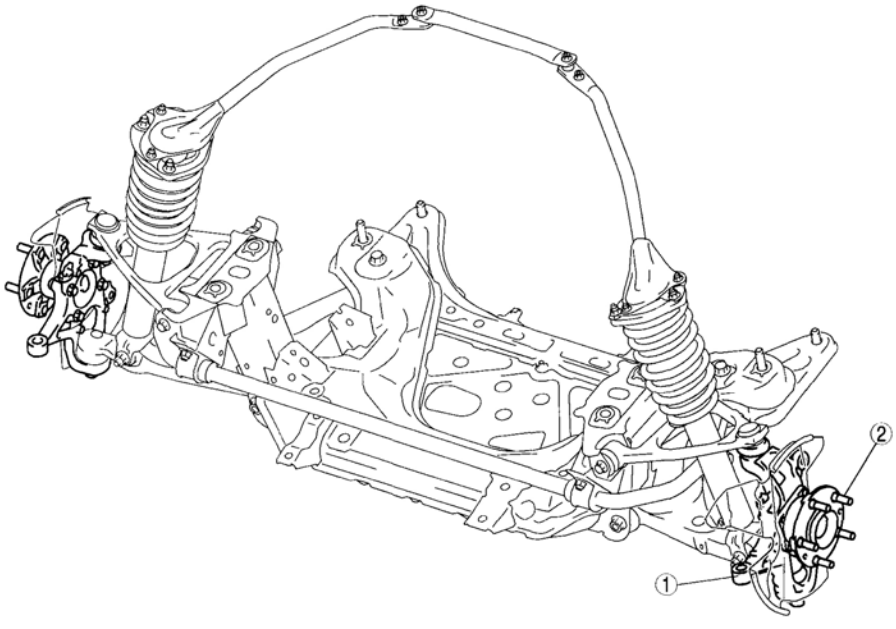


Fig. 142: Identifying DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2007 DRIVELINE/AXLES

Front Axle - MX-5 Miata

FRONT AXLE LOCATION INDEX



1	Wheel hub, steering knuckle	2	Wheel hub bolt

Fig. 1: Identifying Front Axle Assembly
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB, STEERING KNUCKLE INSPECTION

WHEEL BEARING LOOSENESS INSPECTION

1. Install the magnetic vase and dial gauge as shown in **Fig. 2** , and inspect the wheel bearing for axial looseness.
   - If it exceeds the maximum specification, replace the wheel hub component.

   Maximum front wheel bearing play

   0.05 mm {0.002 in}

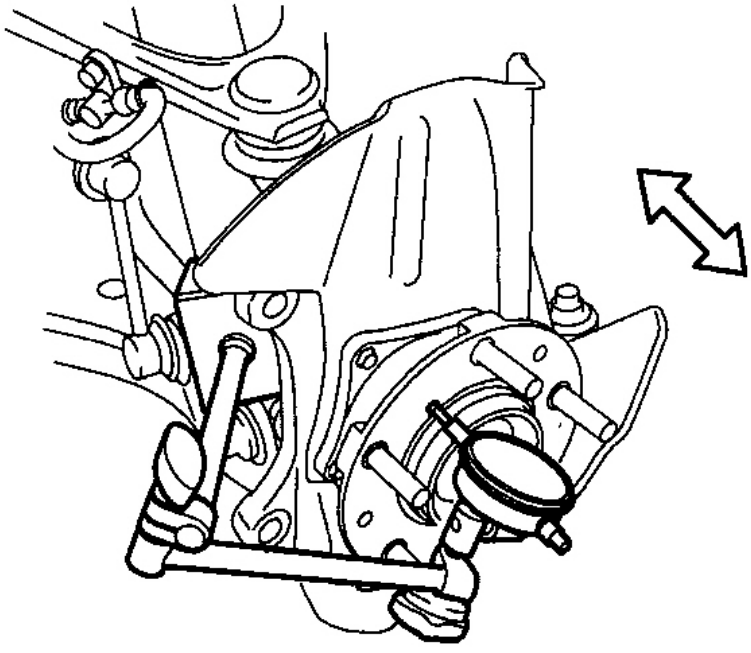


Fig. 2: Inspect Wheel Bearing For Axial Looseness
Courtesy of MAZDA MOTORS CORP.

FRONT WHEEL HUB BOLT REPLACEMENT

1. Remove the brake caliper component and disc plate.
2. Remove the wheel hub bolt using the **SST** as shown in **Fig. 3** .

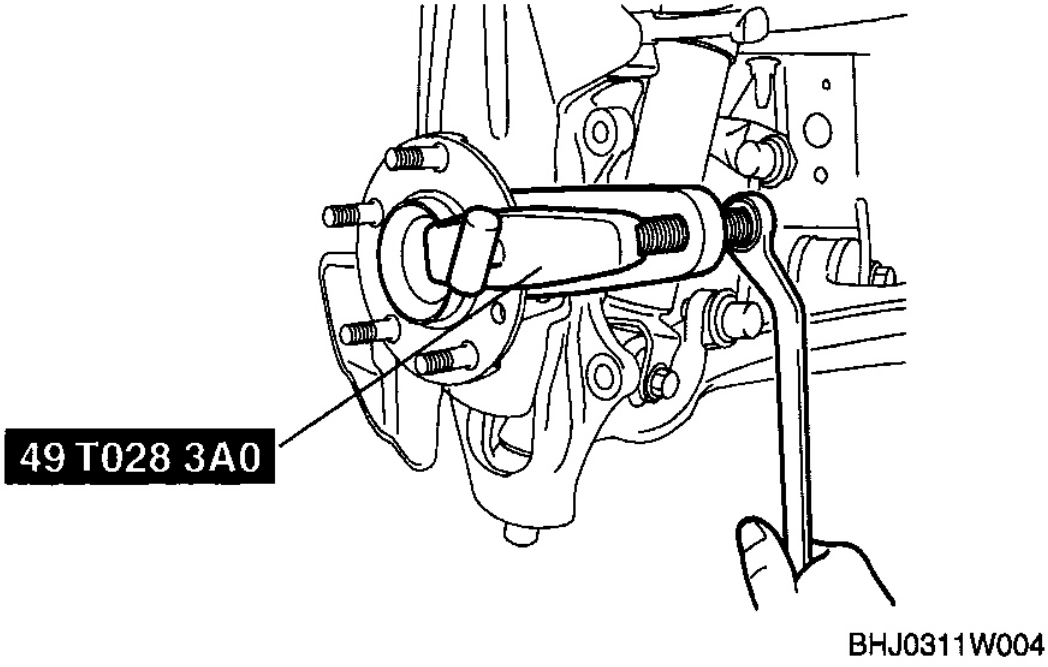


Fig. 3: Removing Wheel Hub Bolt Using SST
Courtesy of MAZDA MOTORS CORP.

3. Place a new wheel hub bolt in the wheel hub.
4. Install the wheel hub bolt by placing a proper sized washer on the hub, and tightening the nut as shown in **Fig. 4** .

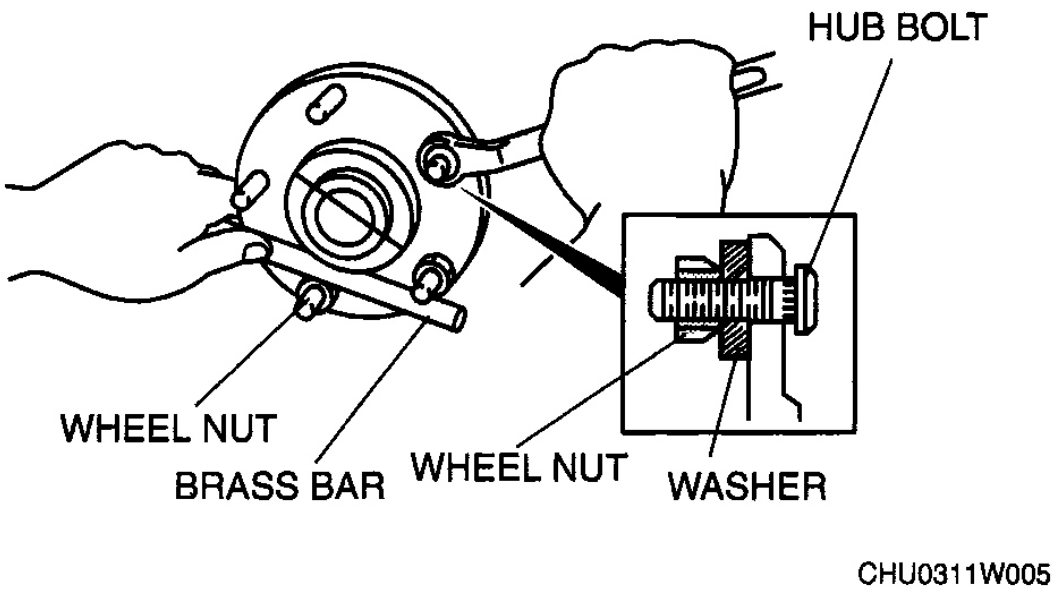


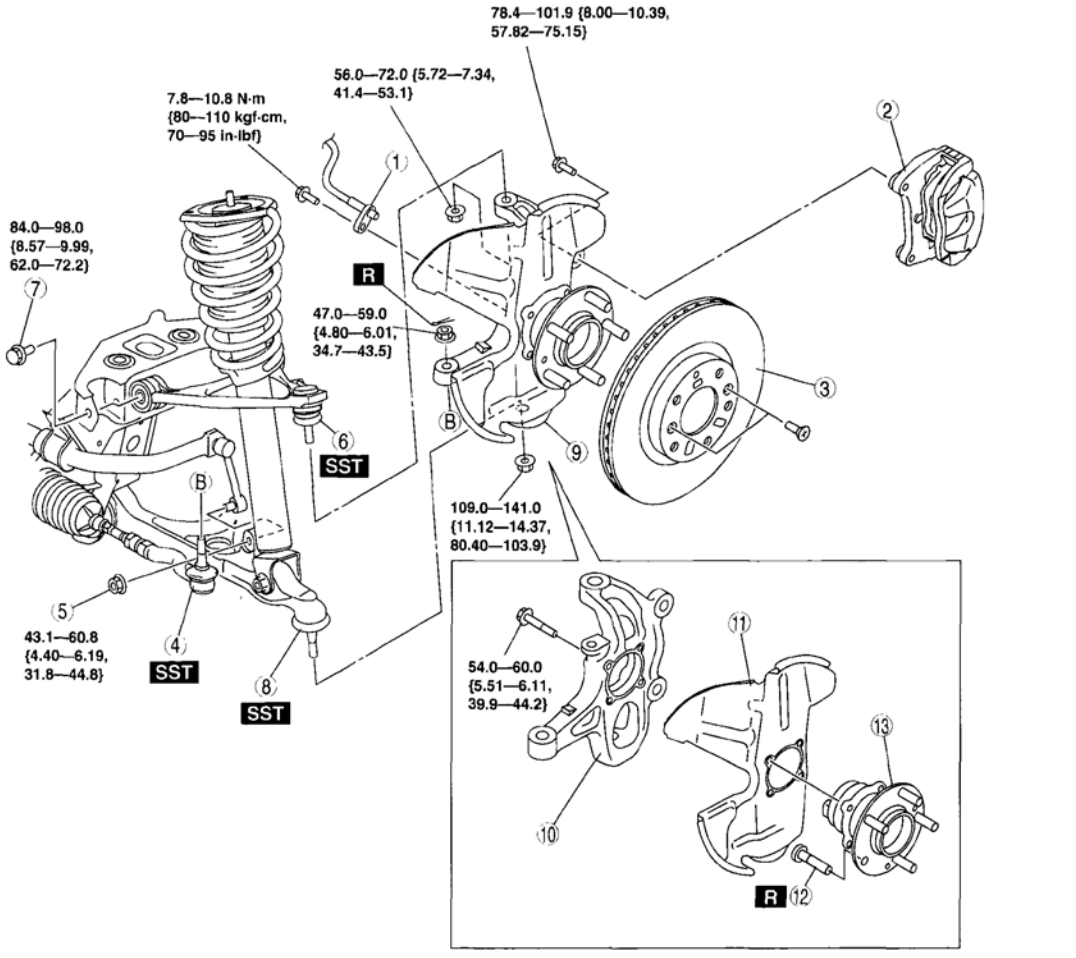
Fig. 4: Installing Wheel Hub Bolt By Placing Proper Sized Washer On Hub & Tightening Nut
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, disconnect the ABS wheel-speed sensor harness connector (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.**

1. Remove in the order indicated in **Fig. 5** .
2. Install in the reverse order of removal.
3. After installation, inspect front wheel alignment. (See **FRONT WHEEL ALIGNMENT** .)



1	ABS wheel-speed sensor
2	Brake caliper component
3	Disc plate
4	Tie-rod end
5	Stabilizer control link nut (lower)
6	Front upper arm ball joint
7	Front upper arm bolt

8	Front lower arm ball joint
9	Steering knuckle component
10	Steering knuckle
11	Dust cover
12	Wheel hub bolt
13	Wheel hub component

Fig. 5: Identifying Wheel Hub, Steering Knuckle Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

BRAKE CALIPER COMPONENT REMOVAL NOTE

1. Suspend the brake caliper component using a cable or equivalent.

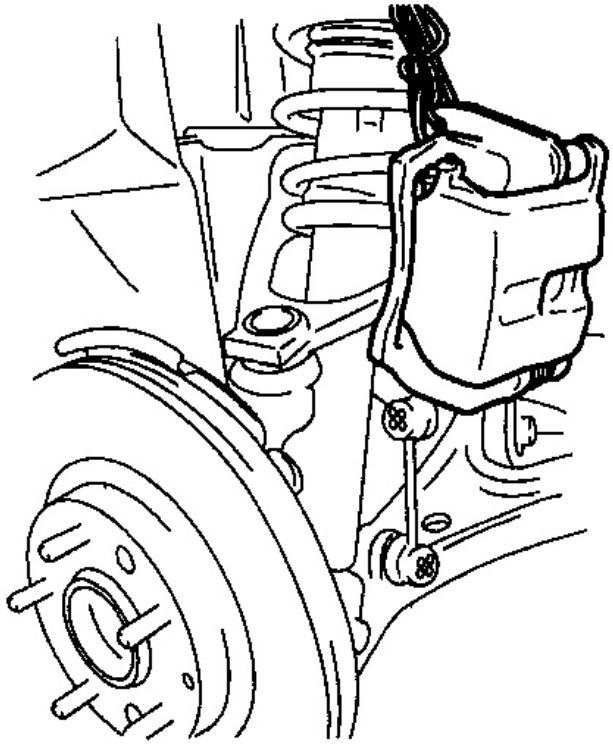


Fig. 6: Suspending Brake Caliper
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT REMOVAL NOTE

NOTE:

- **Remove the wheel hub bolt only if there is an abnormality.**

1. Remove the wheel hub bolts from the wheel hub using a press.

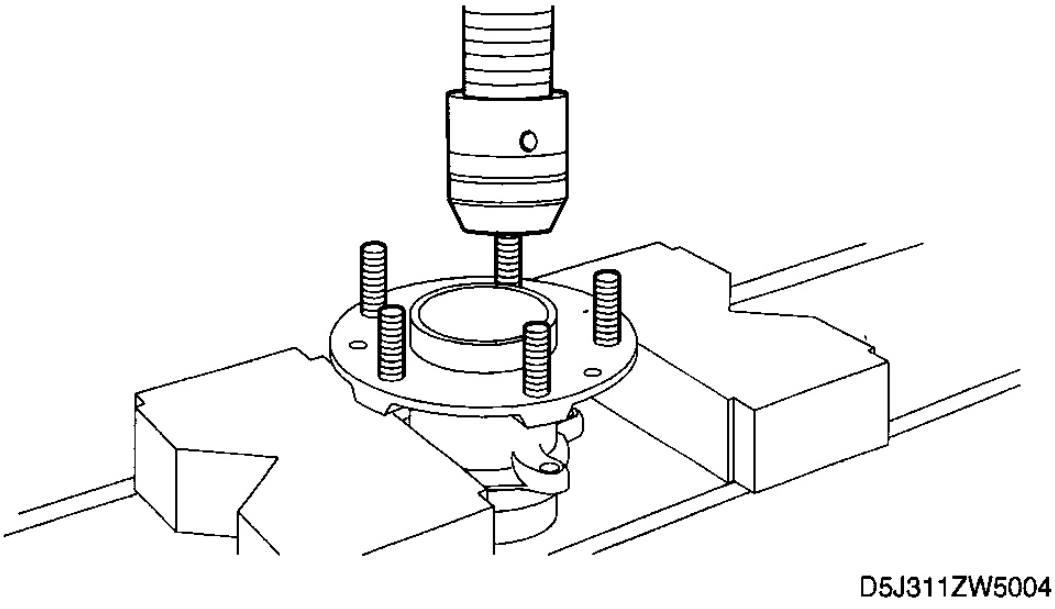


Fig. 7: Removing Wheel Hub Bolts From Wheel Hub Using Press
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT INSTALLATION NOTE

1. Press in new wheel hub bolts into the wheel hub using a press.

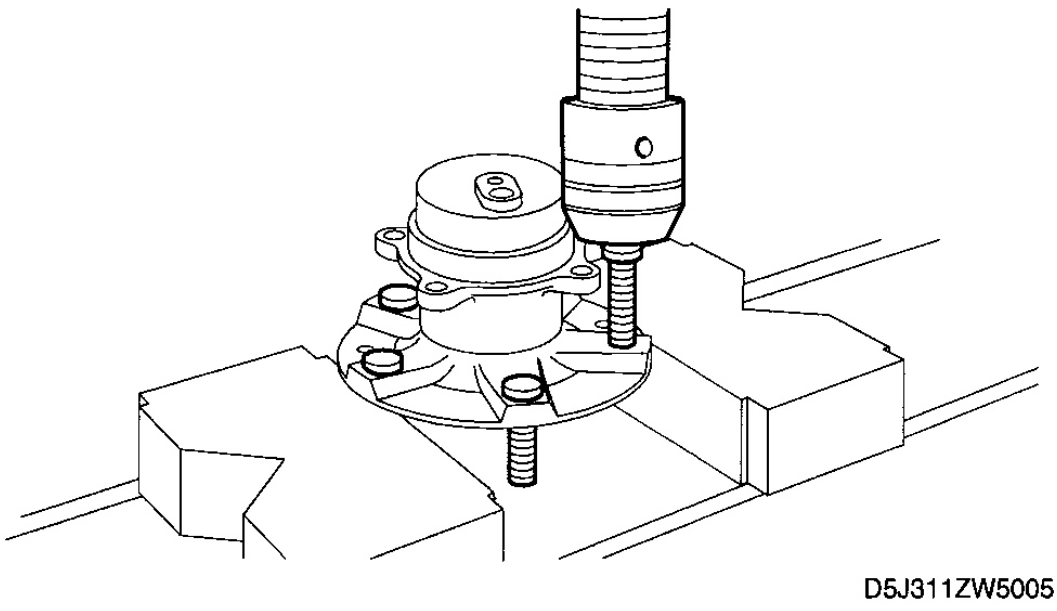
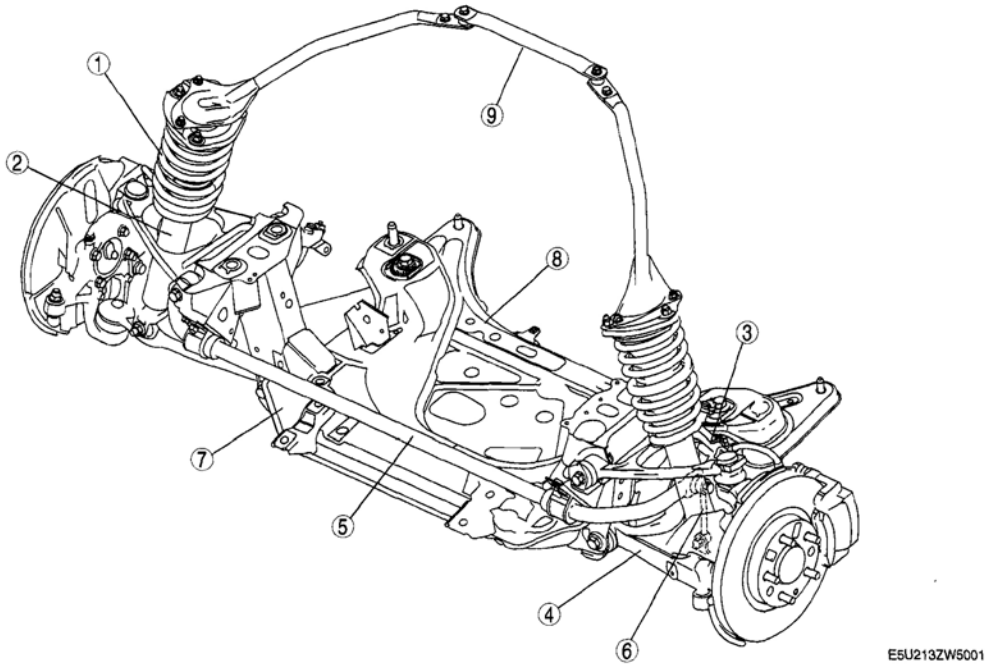


Fig. 8: Pressing In New Wheel Hub Bolts Into Wheel Hub Using Press
Courtesy of MAZDA MOTORS CORP.

2007 SUSPENSION

Front Suspension - MX-5 Miata

FRONT SUSPENSION LOCATION INDEX



1	Front shock absorber and coil spring
2	Front shock absorber
3	Front upper arm
4	Front lower arm

5	Front stabilizer
6	Stabilizer control link
7	Front crossmember
8	Transverse member
9	Front suspension tower bar

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Fig. 1: Identifying Location Of Front Suspension Components
Courtesy of MAZDA MOTORS CORP.

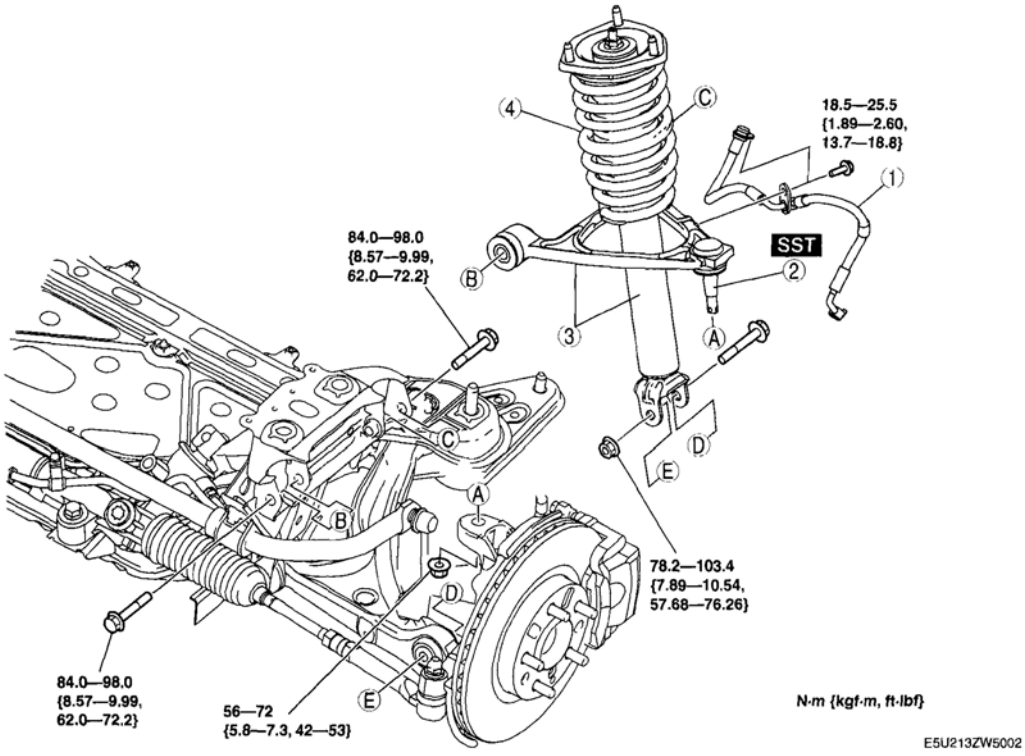
FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled while servicing the vehicle.**

1. Remove the front suspension tower bar. (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)

2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Inspect the front wheel alignment, and adjust it if necessary. (See **FRONT WHEEL ALIGNMENT** .)



1	Brake hose bracket
2	Front upper arm ball joint
3	Front shock absorber, coil spring and front upper arm
4	Front shock absorber and coil spring

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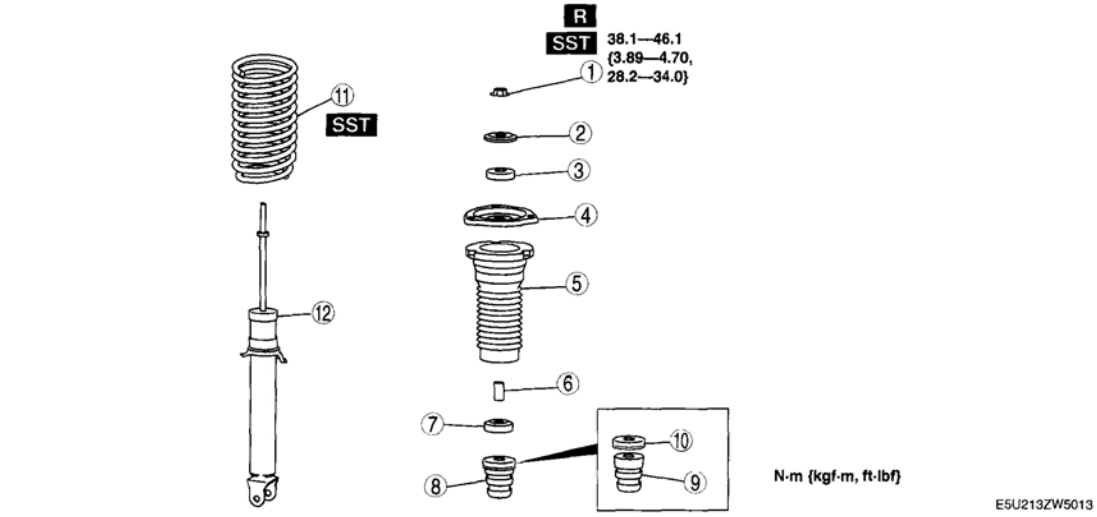
Fig. 2: Identifying Front Shock Absorber & Coil Spring Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

FRONT SHOCK ABSORBER AND COIL SPRING DISASSEMBLY/ASSEMBLY

WARNING:

- **Removing/installing the shock absorber and coil spring is dangerous. The shock absorber and coil spring could fly off and cause serious injury or death, and damage the vehicle.**

1. Remove the front shock absorber and coil spring. (See **FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION** .)
2. Remove in the order indicated in **Fig. 3** .
3. Install in the reverse order of removal.



1	Piston rod nut	7	Bushing
2	Retainer	8	Stopper casing and bound stopper
3	Bushing	9	Bound stopper
4	Upper spring seat	10	Stopper casing
5	Dust boot	11	Coil spring
6	Spacer	12	Front shock absorber

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Fig. 3: Identifying Front Shock Absorber & Coil Spring Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

PISTON ROD NUT REMOVAL NOTE

WARNING:

- **Before removing the piston rod nut, secure the shock absorber and spring in the SSTs. Otherwise, the shock absorber and spring could fly off under tremendous pressure and cause serious injury or death, or damage to vehicle parts.**

1. Protect the coil spring from scratches using a piece of cloth and install the **SSTs** .
2. Compress the coil spring using the **SSTs** and remove the piston rod nut.

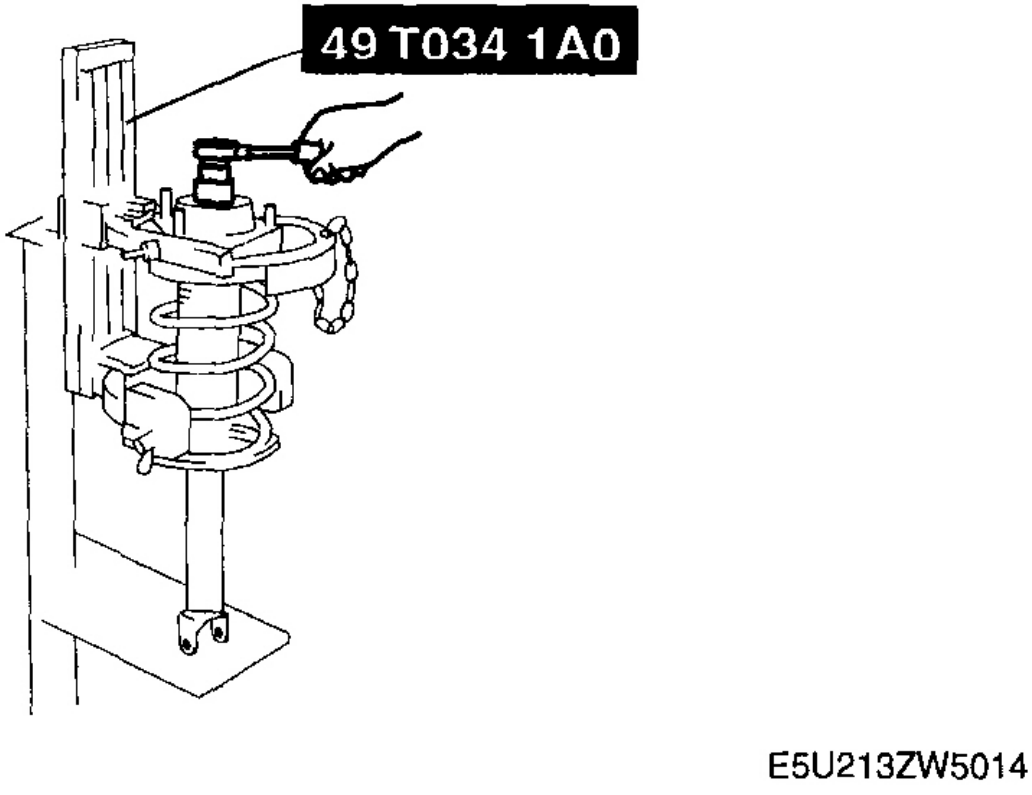


Fig. 4: Compressing Coil Spring Using SST's & Removing Piston Rod Nut
Courtesy of MAZDA MOTORS CORP.

COIL SPRING INSTALLATION NOTE

1. Protect the coil spring from scratches using a piece of cloth and install the **SSTs** .
2. Compress the coil spring using the **SSTs** .
3. Install the shock absorber so that the lower end of the coil spring is seated on the step of the lower spring seat.

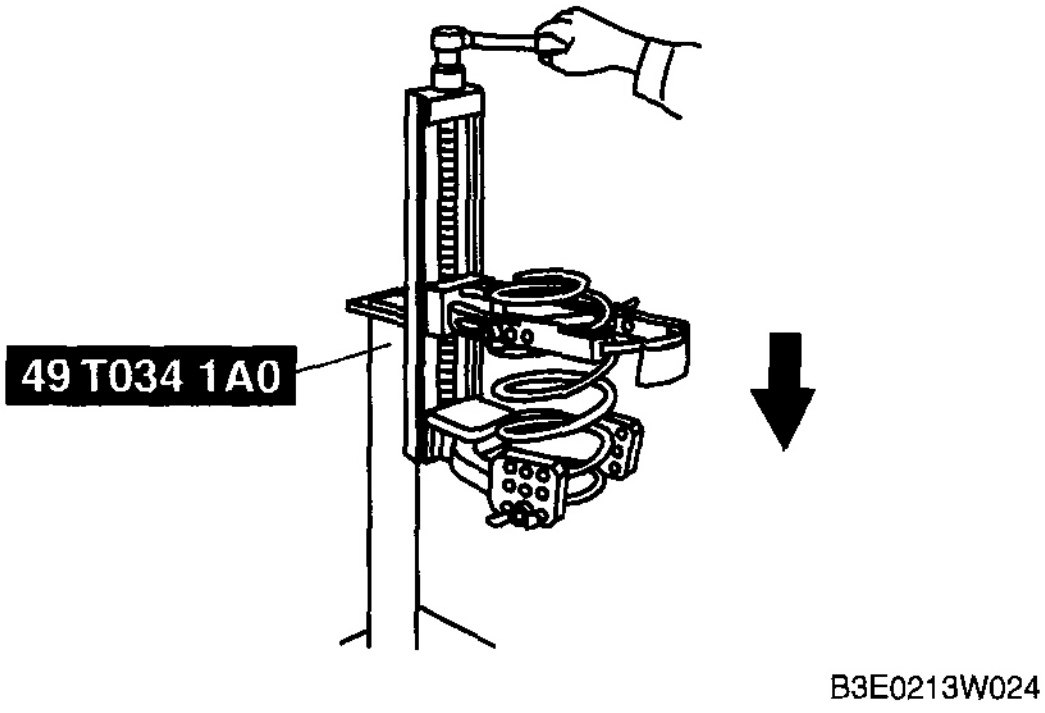


Fig. 5: Compressing Coil Spring Using SSTs
Courtesy of MAZDA MOTORS CORP.

UPPER SPRING SEAT INSTALLATION NOTE

1. Align the mark on the upper spring seat with the dust boot projection.

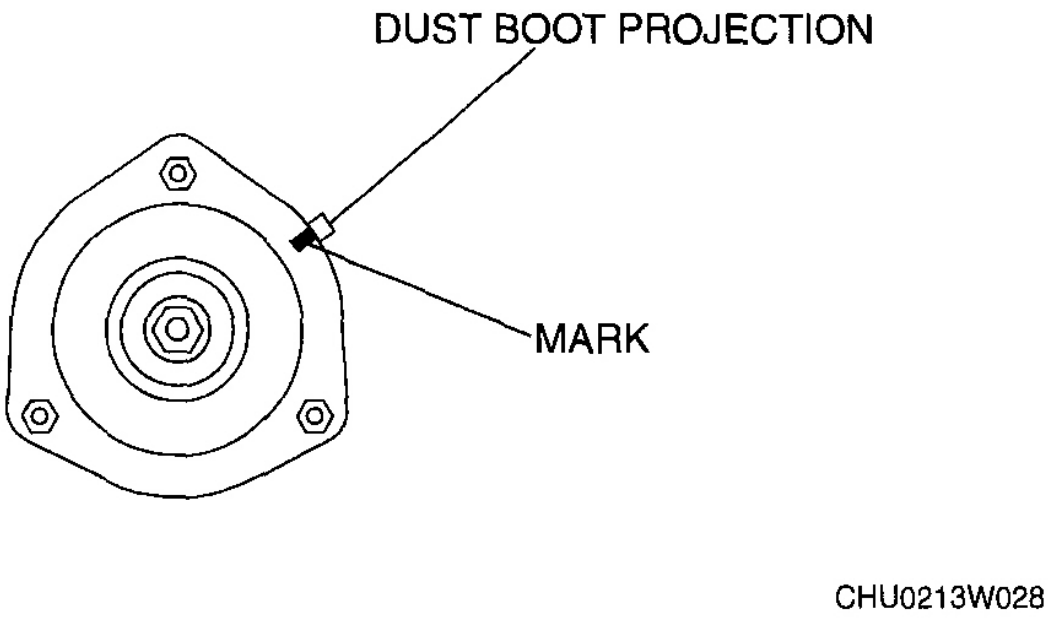


Fig. 6: Aligning Mark On Upper Spring Seat With Dust Boot Projection
Courtesy of MAZDA MOTORS CORP.

2. Install the upper spring seat so that the upper spring seat stud is at a **27°-33°** angle to the shock absorber installation shaft (lower side).

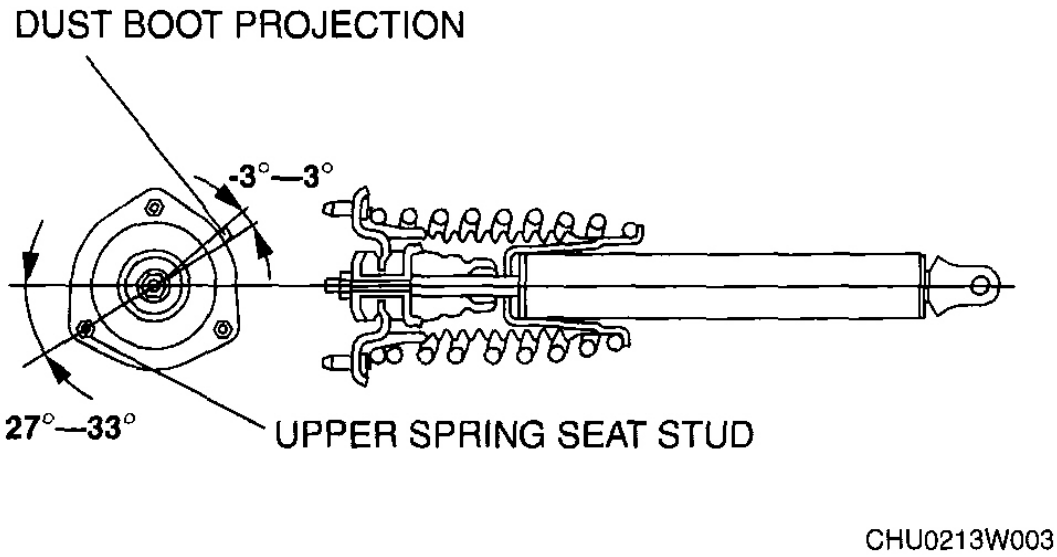


Fig. 7: Identifying Upper Spring Seat Stud Angle
Courtesy of MAZDA MOTORS CORP.

FRONT SHOCK ABSORBER INSPECTION

1. Remove the front shock absorber.
2. Inspect for damage and oil leakage.
3. Compress and extend the shock absorber piston rod at least three times at a steady speed. From the fourth compression stroke, verify that the operational force does not change and that there is no unusual noise.
   - If there is any malfunction, replace the shock absorber.

FRONT SHOCK ABSORBER DISPOSAL

WARNING:

- **Whenever drilling into a shock absorber, wear protective eye wear. The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling.**

1. Clamp the shock absorber on a flat surface.
2. Drill a **2-3 mm {0.08-0.12 in}** hole at a point **25 mm {0.98 in}** from the bottom of the tube, so that the gas can escape.
3. Turn the hole downwards.
4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of waste oil according to local waste disposal law.

NOTE:

- **Shock absorber gas contains nitrogen gas.**
- **Shock absorber oil contains mineral oil.**

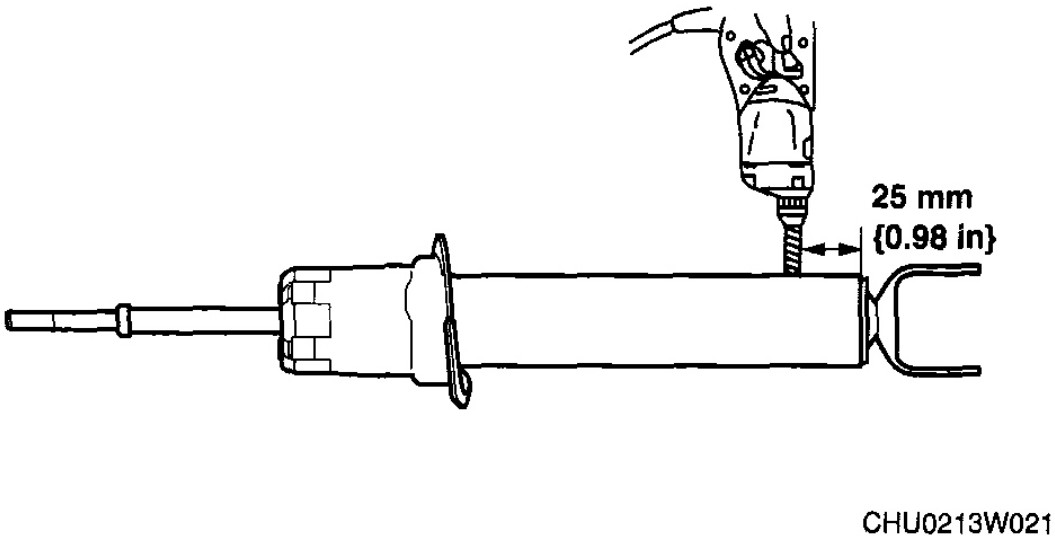


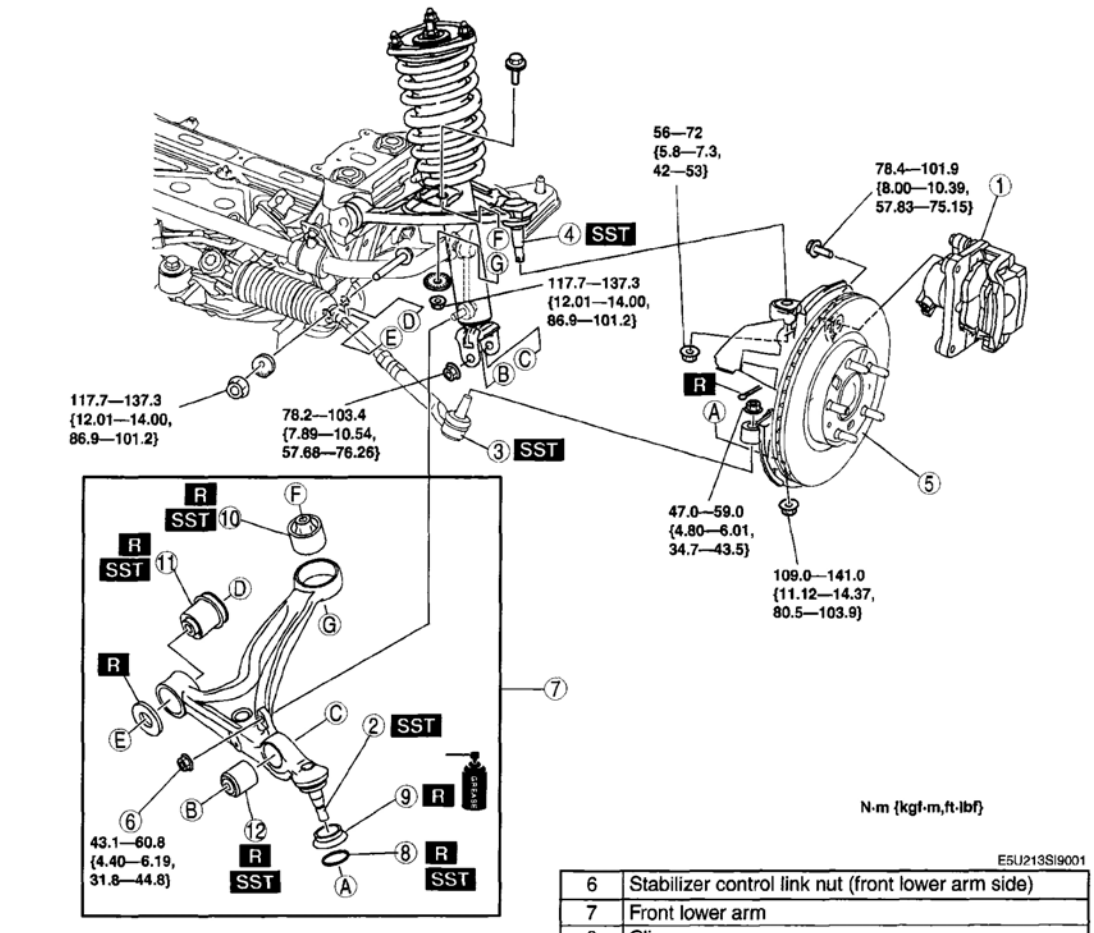
Fig. 8: Drilling Hole From Bottom Of Tube
Courtesy of MAZDA MOTORS CORP.

FRONT LOWER ARM REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled while servicing the vehicle.**

1. Remove in the order indicated in **Fig. 9** .
2. Install in the reverse order of removal.



1	Caliper and mounting support
2	Front lower arm ball joint
3	Tie-rod end
4	Front upper arm ball joint
5	Front hub and steering knuckle component
6	Stabilizer control link nut (front lower arm side)
7	Front lower arm
8	Clip
9	Dust boot
10	Bushing (rear side)
11	Bushing (front side)
12	Bushing (shock absorber lower side connecting part)

Fig. 9: Identifying Front Lower Arm Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CALIPER AND MOUNTING SUPPORT REMOVAL NOTE

1. Remove the caliper and mounting support from the steering knuckle and suspend it with a cable in a location out of the way.

FRONT LOWER ARM BALL JOINT REMOVAL NOTE

1. Disconnect the front lower arm ball joint from the steering knuckle using the **SST** .

NOTE:

- **When removing the front lower arm ball joint, the steering knuckle**

bushing may also come off. If it comes off, replace the steering knuckle.

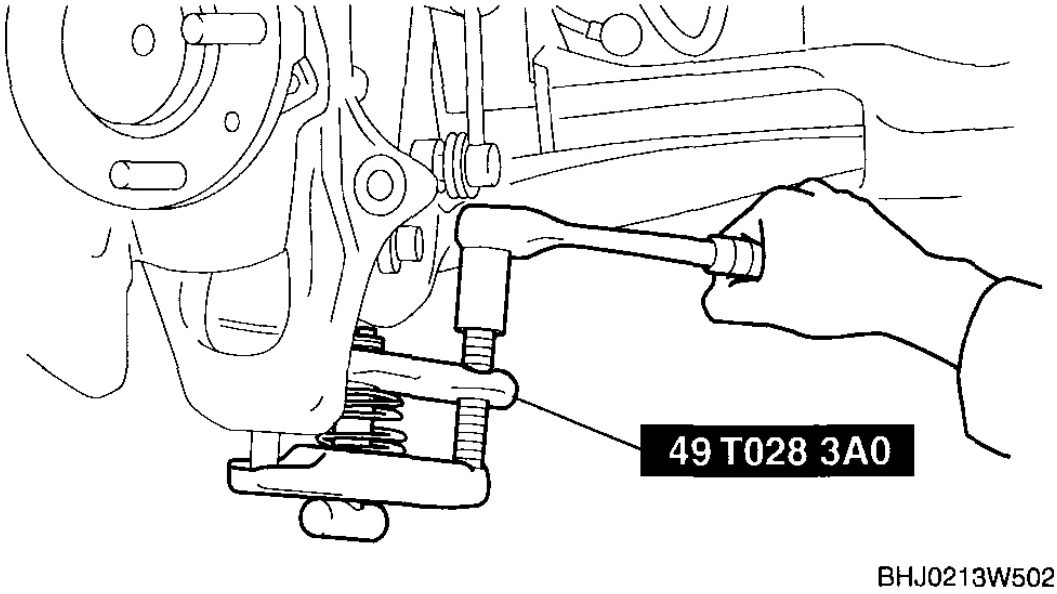


Fig. 10: Disconnecting Front Lower Arm Ball Joint From Steering Knuckle Using SST
Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM BALL JOINT REMOVAL NOTE

1. Loosen the bolts on the vehicle side.
2. Disconnect the upper arm ball joint using the **SST** .

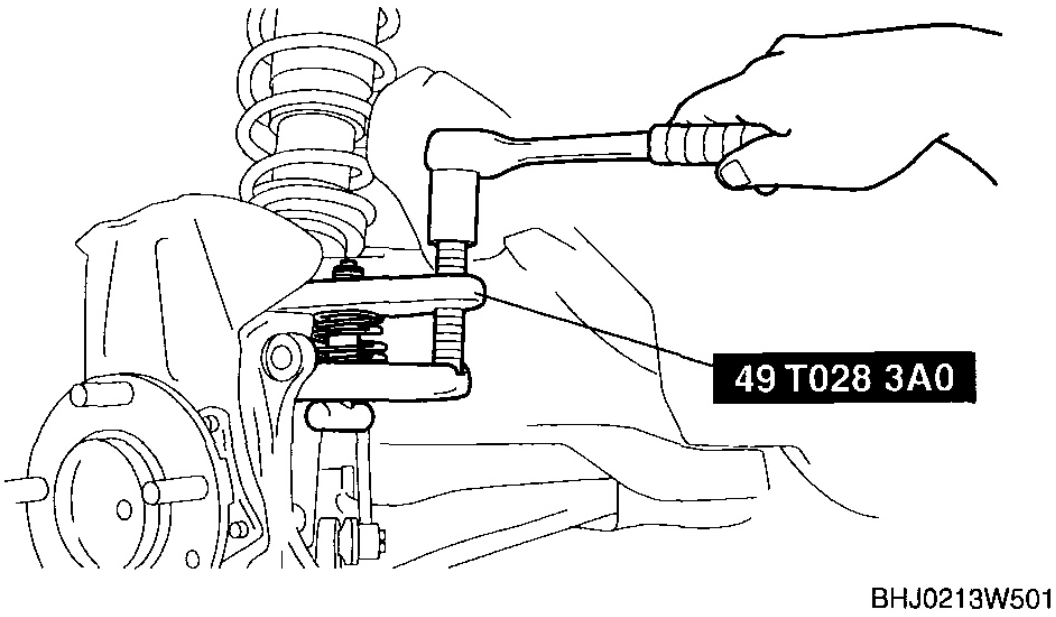


Fig. 11: Disconnecting Front Upper Arm Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

BUSHING (REAR SIDE) REMOVAL NOTE

CAUTION:
- **Be careful not to damage the front lower arm. If it is damaged, replace it.**

1. Mark the front upper arm as shown in **Fig. 12** .

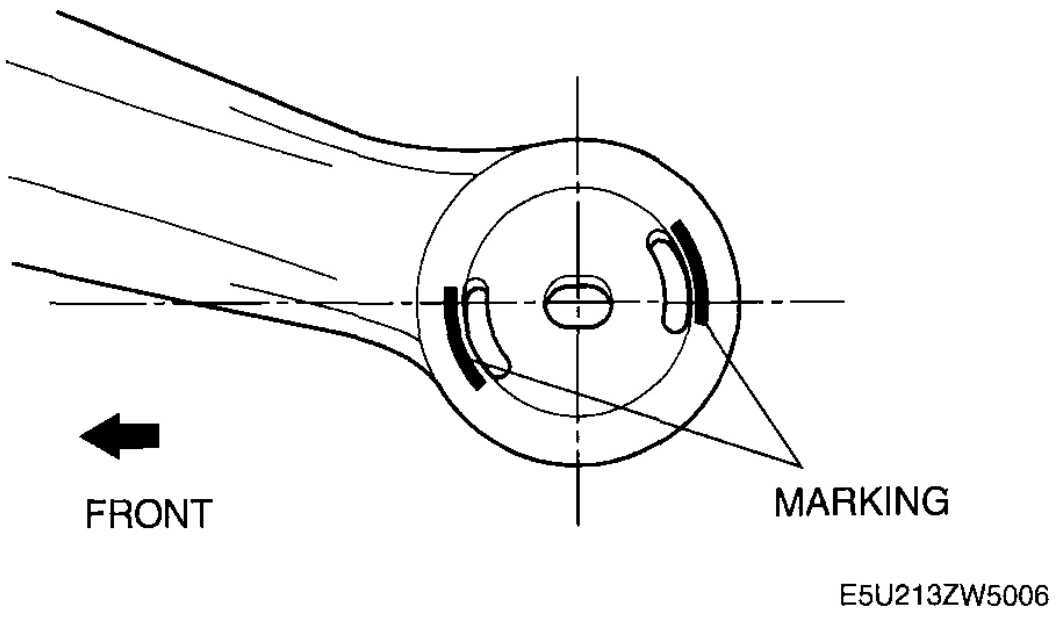


Fig. 12: Identifying Mark On Front Upper Arm
Courtesy of MAZDA MOTORS CORP.

2. Remove the bushing using the **SSTs** .

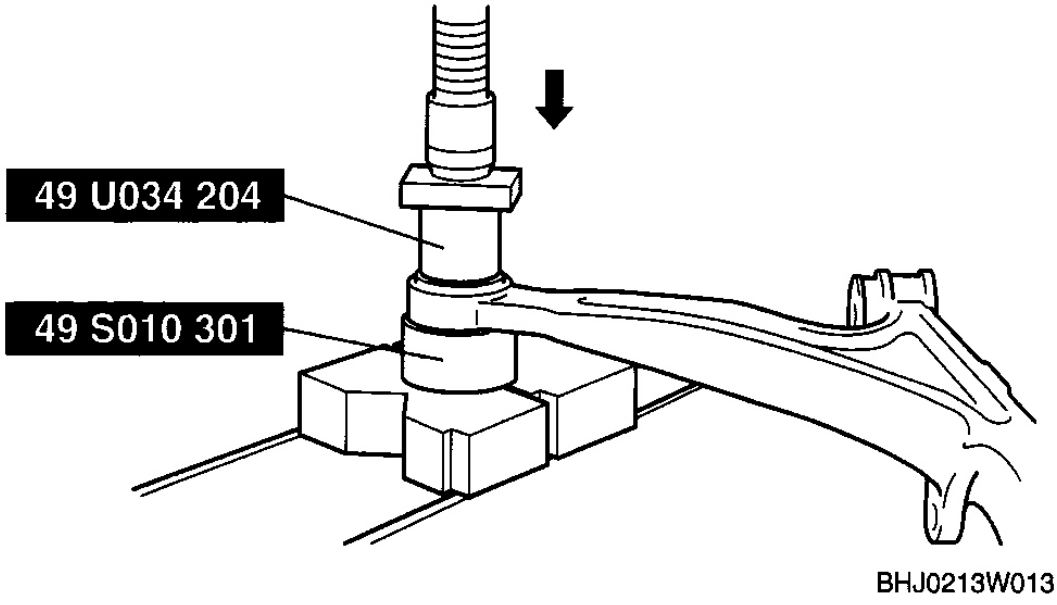


Fig. 13: Removing Bushing Using SST's
Courtesy of MAZDA MOTORS CORP.

BUSHING (FRONT SIDE) REMOVAL NOTE

CAUTION:
- **Be careful not to damage the front lower arm. If it is damaged, replace it.**

1. Cut off the stopper plate rubber using a razor.

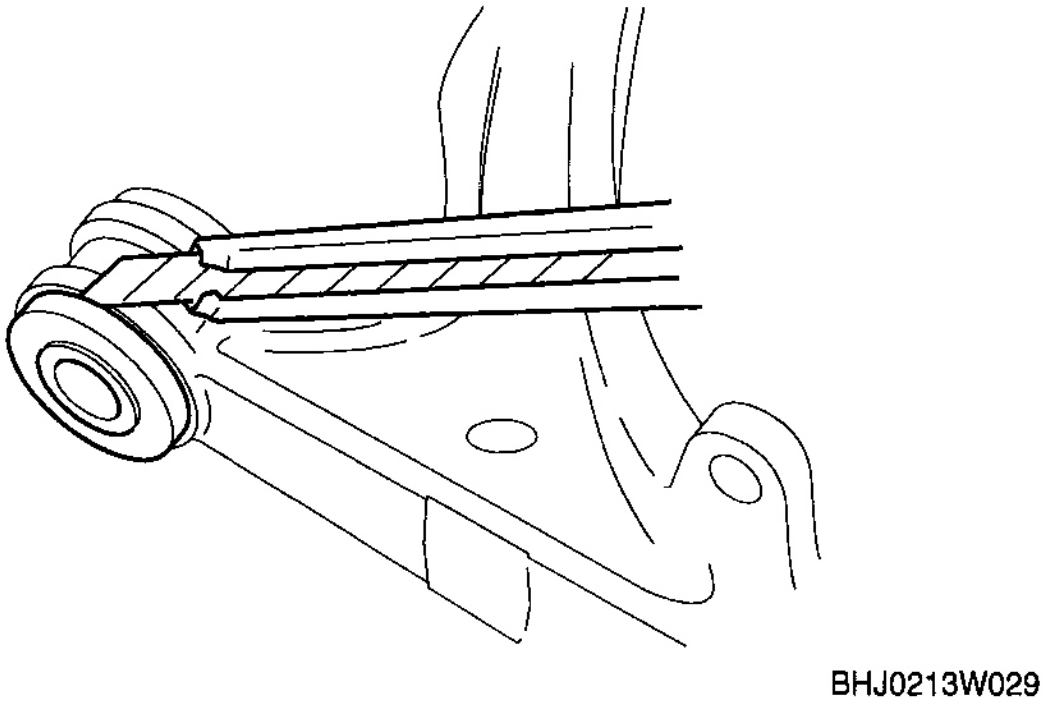


Fig. 14: Cutting Off Stopper Plate Rubber Using Razor
Courtesy of MAZDA MOTORS CORP.

2. Cut off **5-6 mm {0.20-0.23 in}** from each side of the knob end of the bushing using a hacksaw.

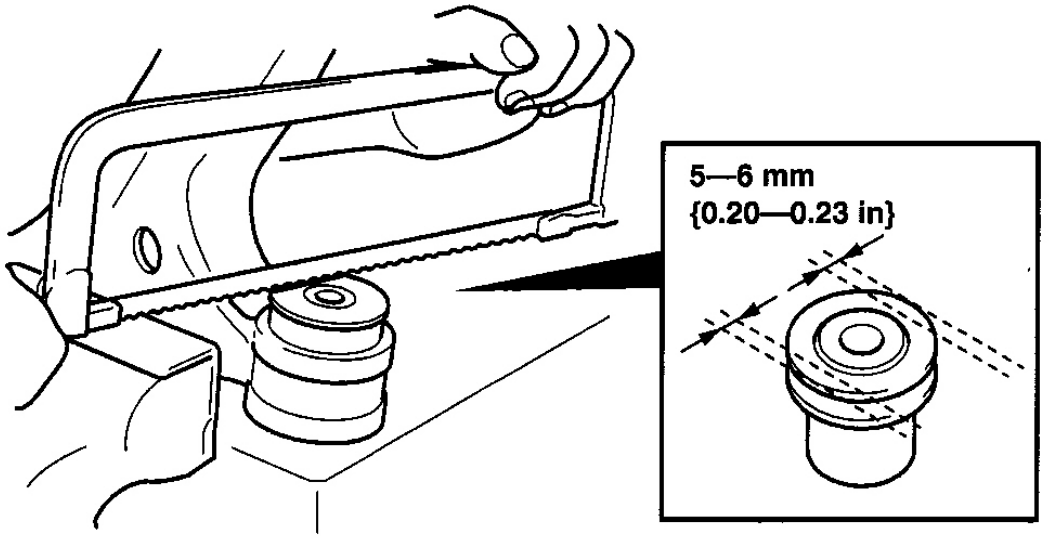


Fig. 15: Cutting Off From Each Side Of Knob End Of Bushing Using Hacksaw
Courtesy of MAZDA MOTORS CORP.

3. Remove the bushing using the **SSTs** .

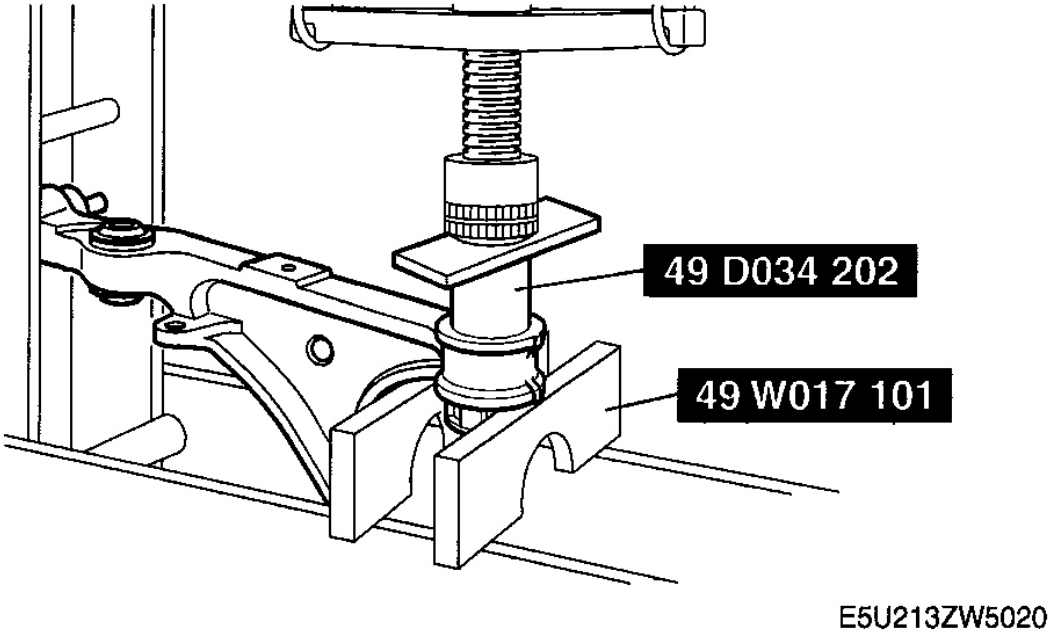


Fig. 16: Removing Bushing Using SST's
Courtesy of MAZDA MOTORS CORP.

BUSHING (SHOCK ABSORBER LOWER SIDE CONNECTING PART) REMOVAL NOTE

CAUTION:
- **Be careful not to damage the front lower arm. If it is damaged, replace it.**

1. Remove the bushing using the **SSTs** .

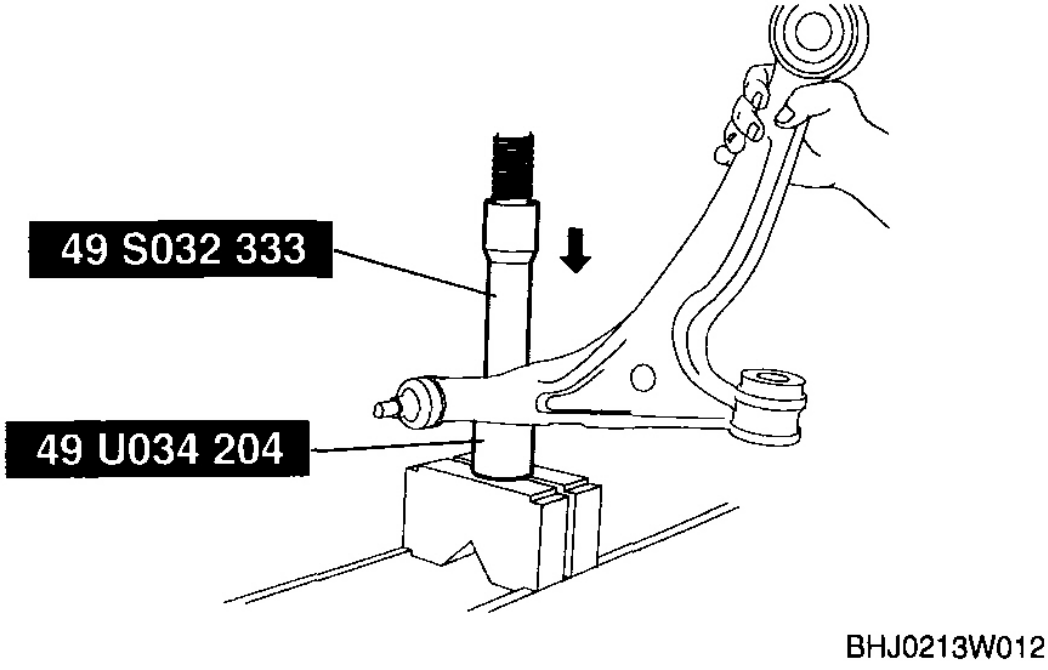


Fig. 17: Removing Bushing Using SSTs
Courtesy of MAZDA MOTORS CORP.

BUSHING (SHOCK ABSORBER LOWER SIDE CONNECTING PART) INSTALLATION NOTE

1. Compress the bushing using the **SSTs** .

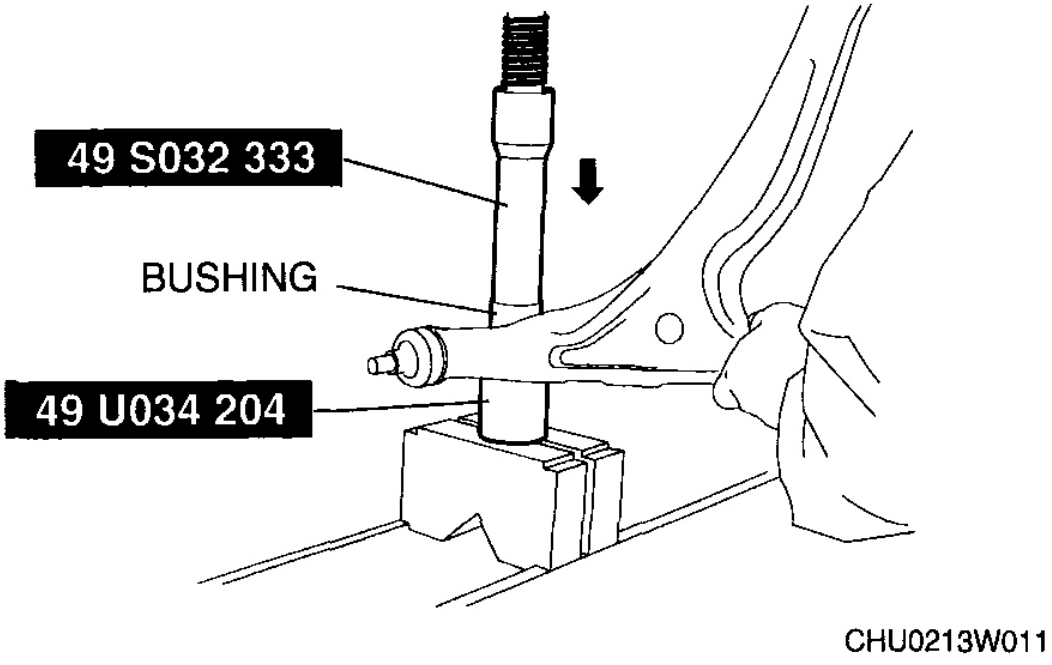


Fig. 18: Compressing Bushing Using SSTs
Courtesy of MAZDA MOTORS CORP.

BUSHING (FRONT SIDE) INSTALLATION NOTE

1. Press the bushing in using the **SSTs** .

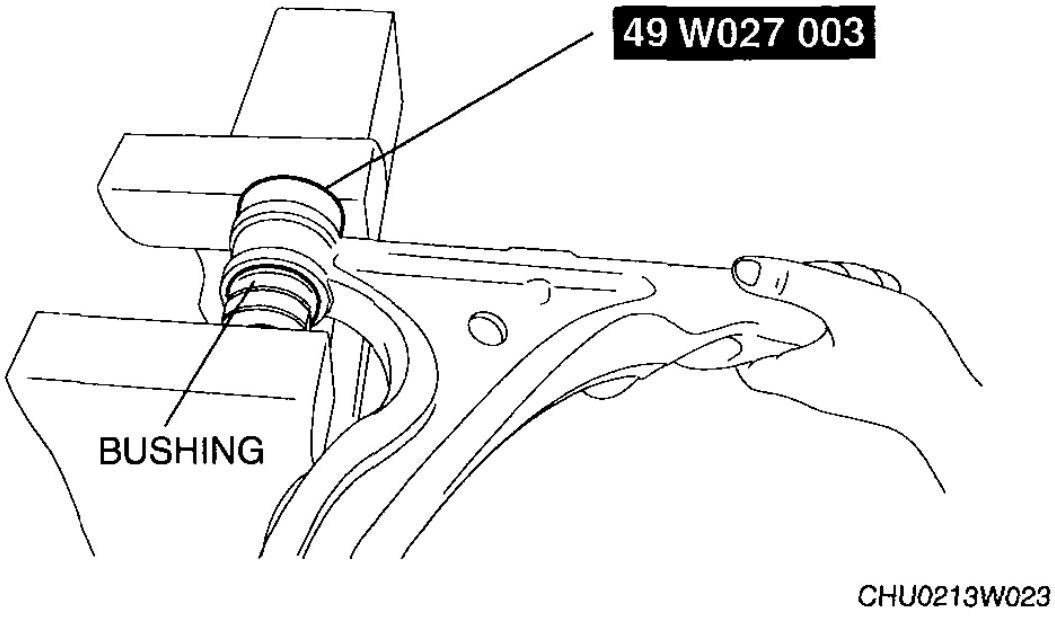


Fig. 19: Pressing Bushing In Using SSTs
Courtesy of MAZDA MOTORS CORP.

2. Insert the stopper plate rubber into the inner pipe of the bushing (front side).

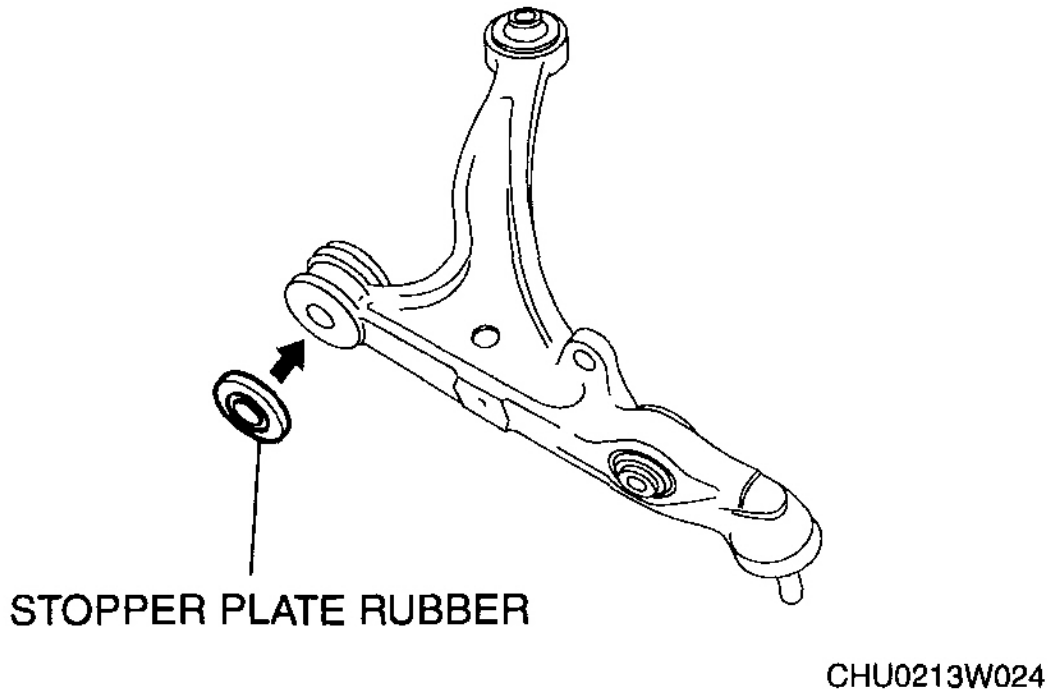


Fig. 20: Inserting Stopper Plate Rubber Into Inner Pipe Of Bushing (Front Side)
Courtesy of MAZDA MOTORS CORP.

BUSHING (REAR SIDE) INSTALLATION NOTE

1. Align the marks placed during removal and install the bushing.

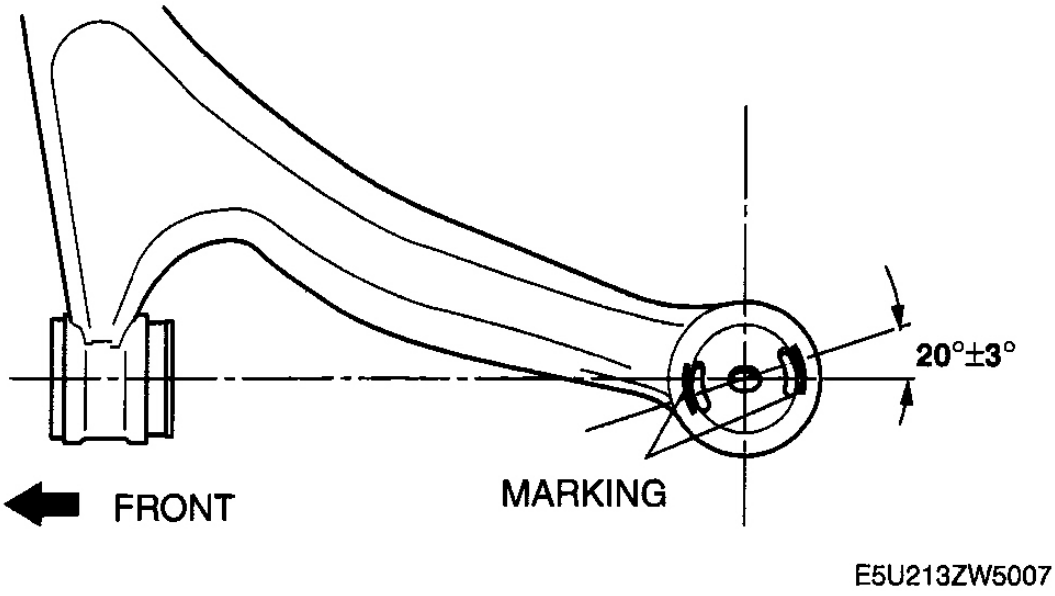


Fig. 21: Aligning Match Marks
Courtesy of MAZDA MOTORS CORP.

2. Press the bushing in using the **SSTs** .

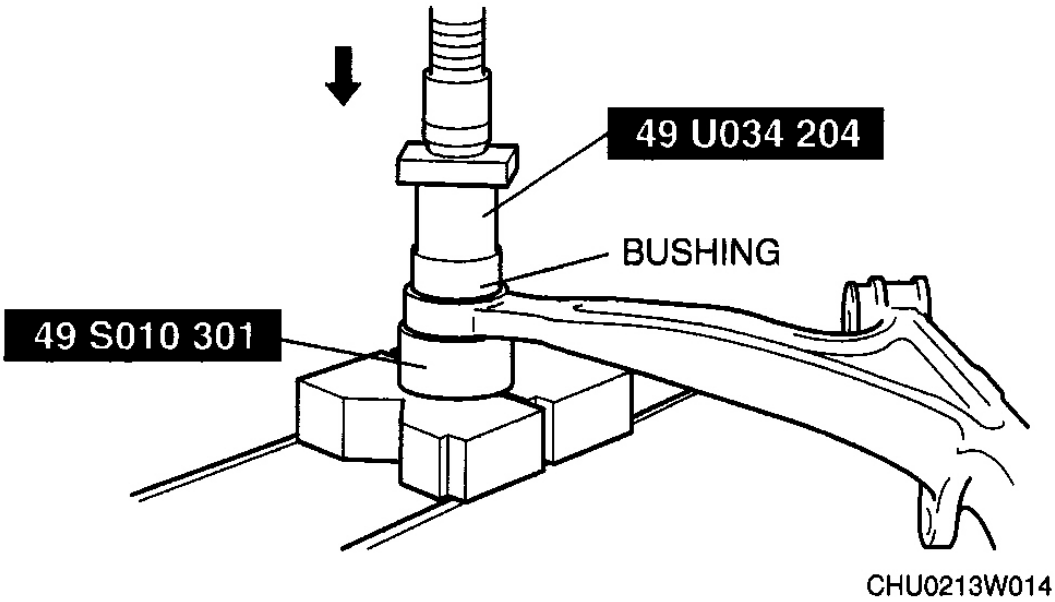


Fig. 22: Pressing Bushing In Using SSTs
Courtesy of MAZDA MOTORS CORP.

CLIP INSTALLATION NOTE

1. Wipe the grease off the ball joint stud.
2. Fill the inside of the new dust boot with grease.
3. Install the dust boot to the ball joint.
4. Install the clip using the **SST** .
5. Verify that the clip is installed securely to the groove.

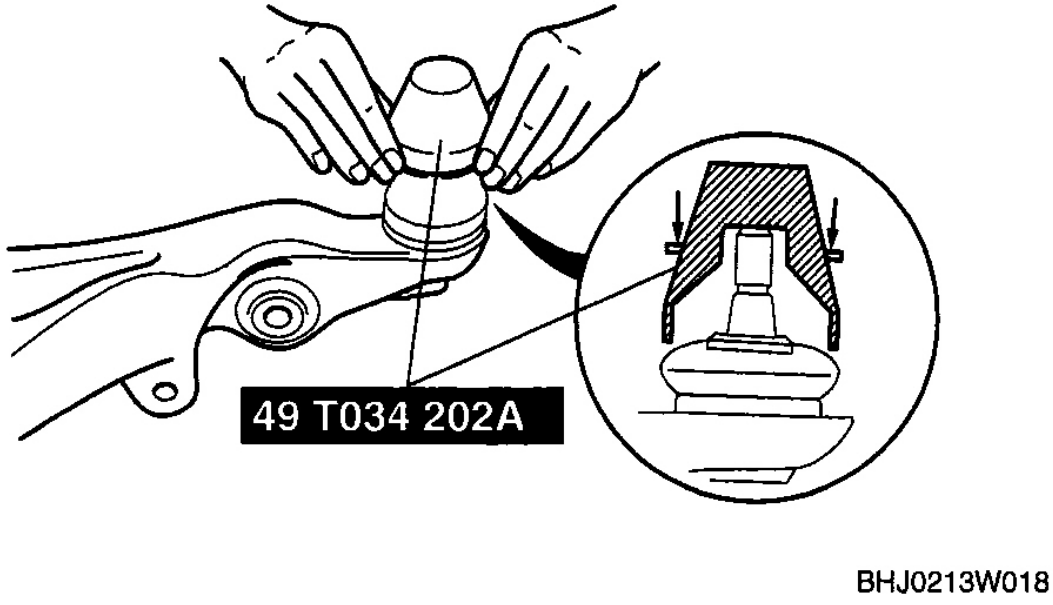


Fig. 23: Installing Dust Boot To Ball Joint
Courtesy of MAZDA MOTORS CORP.

6. Wipe off any excess grease.

FRONT LOWER ARM INSTALLATION NOTE

1. Install the front lower arm rear side bushing part horizontally.
2. Install the front lower arm front side bushing part.

FRONT LOWER ARM INSPECTION

1. Remove the front lower arm from the vehicle. (See **FRONT LOWER ARM**

REMOVAL/INSTALLATION .)

2. Inspect the front lower arm for bending or damage. If there is any malfunction, replace it.
3. Inspect the ball joint for excessive play. If there is any malfunction, replace the front lower arm.
4. Rotate the ball joint **5 times** .
5. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Front lower arm ball joint rotational torque

   0.4-2.9 N.m {5-29 kgf.cm, 4-25 in.lbf}

   - If not within the specification, replace the front lower arm. (See **FRONT LOWER ARM REMOVAL/INSTALLATION** .)

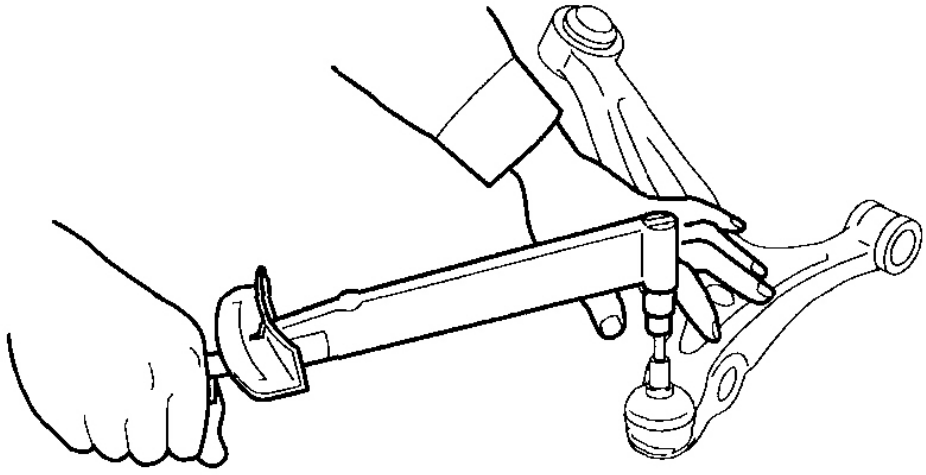


Fig. 24: Measuring Ball-Joint Rotational Torque
Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM INSPECTION

1. Remove the front upper arm from the vehicle. (See **FRONT UPPER ARM REMOVAL/INSTALLATION** .)
2. Inspect the front upper arm for bending or damage. If there is any malfunction, replace it.
3. Inspect the ball joint for excessive play, and if there is any malfunction, replace the front upper arm.
4. Rotate the ball joint **5 times** .

5. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Front upper arm ball joint rotational torque

   0.3-2.2 N.m {4-22 kgf.cm, 3-19 in.lbf}

   - If not within the specification, replace the front upper arm. (See **FRONT UPPER ARM REMOVAL/INSTALLATION** .)

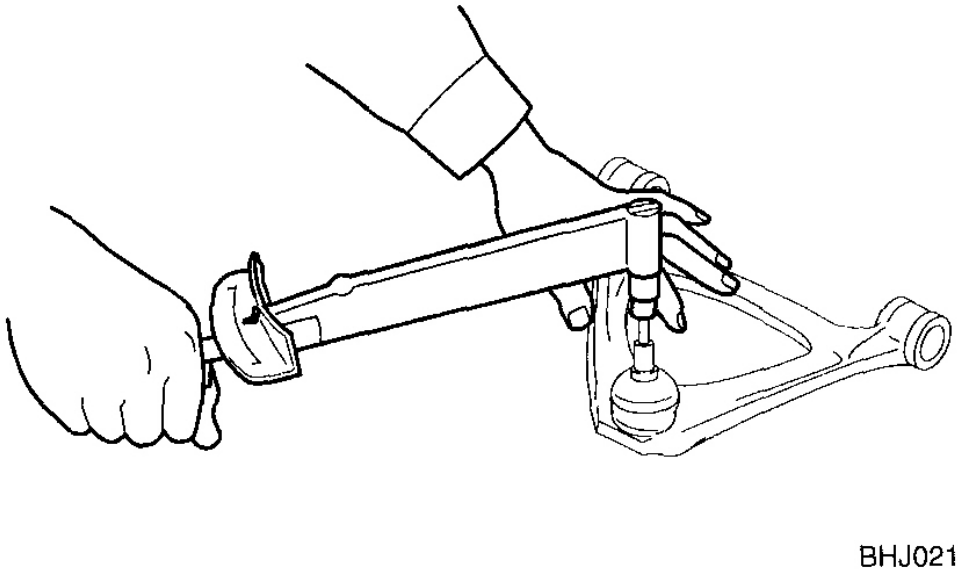
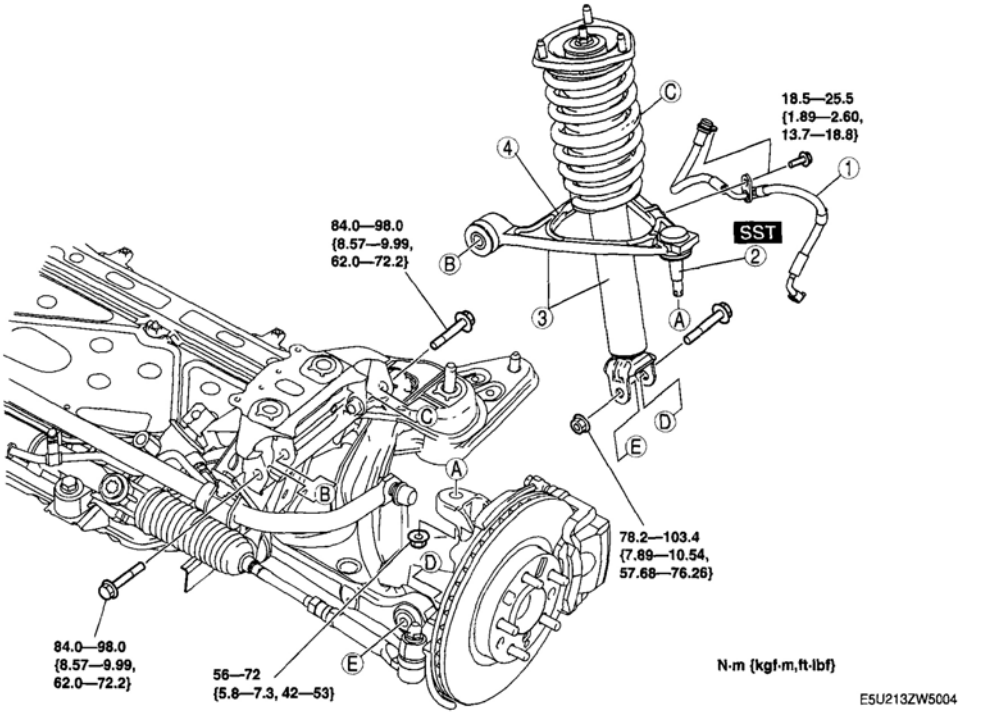


Fig. 25: Measuring Ball-Joint Rotational Torque Using Allen Wrench & Torque Wrench
Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM REMOVAL/INSTALLATION

CAUTION:
- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled while servicing the vehicle.**

1. Remove in the order indicated in **Fig. 26** .
2. Install in the reverse order of removal.
3. Inspect the front wheel alignment and adjust it if necessary. (See **FRONT WHEEL ALIGNMENT** .)



1	Brake hose bracket	3	Front shock absorber, coil spring and front upper arm
2	Front upper arm ball joint	4	Front upper arm

G04318117

Fig. 26: Identifying Front Upper Arm Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

FRONT UPPER ARM BALL JOINT REMOVAL NOTE

1. Remove the front upper arm ball joint from the steering knuckle using the **SST** .

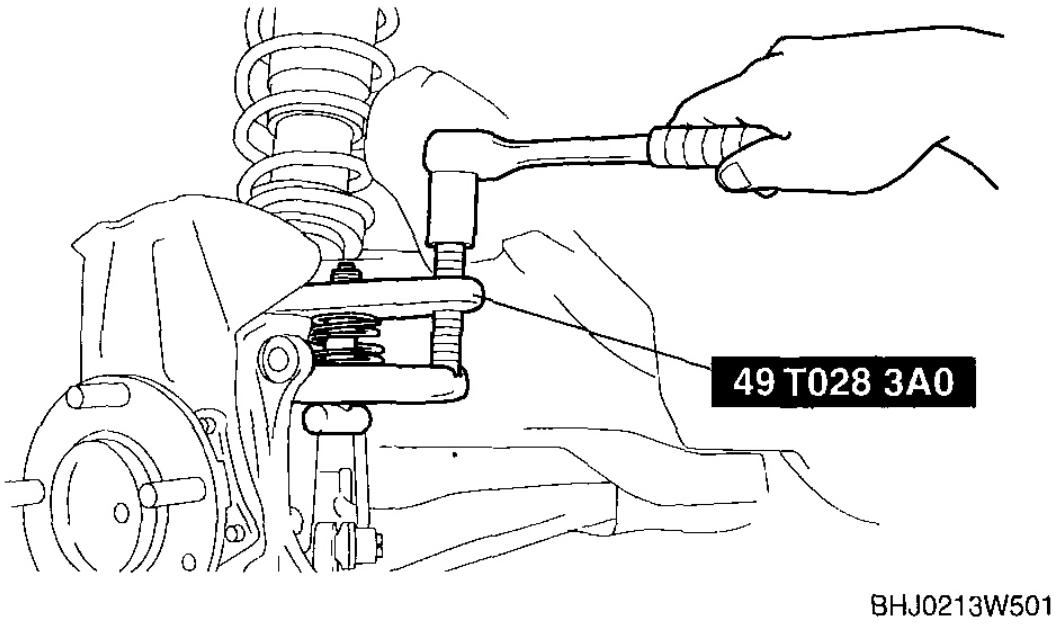


Fig. 27: Removing Front Upper Arm Ball Joint From Steering Knuckle Using SST
Courtesy of MAZDA MOTORS CORP.

FRONT SHOCK ABSORBER, COIL SPRING AND FRONT UPPER ARM REMOVAL NOTE

1. Loosen the shock absorber upper nuts.
2. Remove the front shock absorber lower bolt and nut.

FRONT UPPER ARM REMOVAL NOTE

1. Remove the front upper arm bolts.
2. Push down the front lower arm, and then remove the front upper arm from the gap between the shock absorber lower end and the front lower arm.

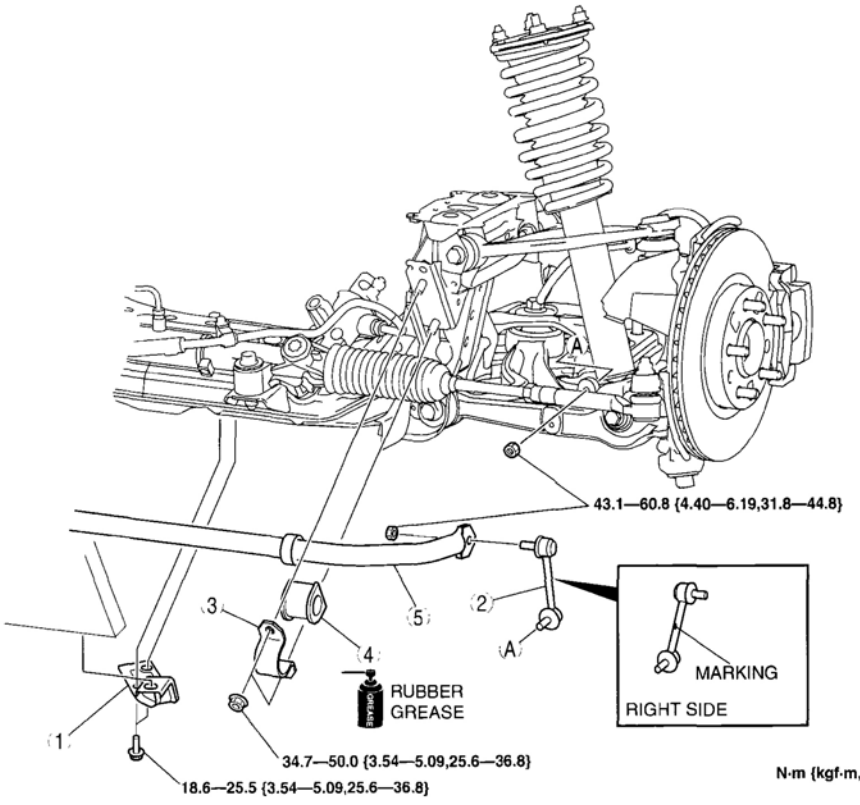
FRONT STABILIZER REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled while servicing the vehicle.**

1. Remove in the order indicated in the table.

2. Install in the reverse order of removal.



1	Radiator mount bracket
2	Stabilizer control link
3	Stabilizer bracket
4	Stabilizer bushing
5	Front stabilizer

G04318136

Fig. 28: Identifying Front Stabilizer Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

STABILIZER BRACKET INSTALLATION NOTE

1. Apply rubber grease to the inner side of the stabilizer bushing.
2. Align the outer side of the stabilizer slide stopper with the stabilizer bushing.

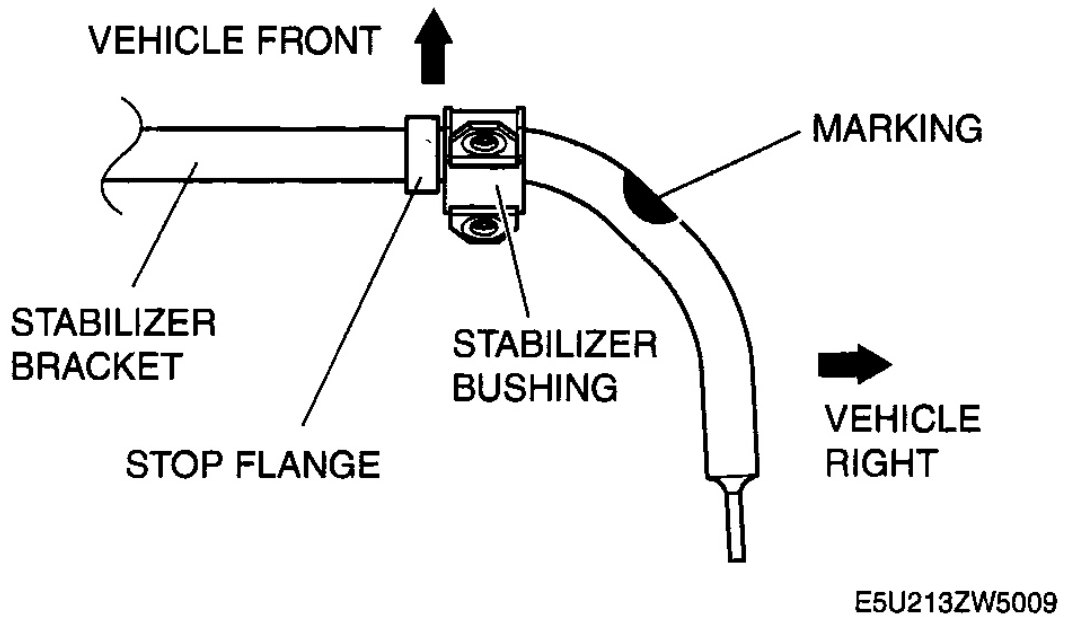


Fig. 29: Aligning Outer Side Of Stabilizer Slide Stopper With Stabilizer Bushing
Courtesy of MAZDA MOTORS CORP.

3. Install the stabilizer bracket.

FRONT STABILIZER CONTROL LINK INSPECTION

1. Remove the stabilizer control link from the vehicle. (See **FRONT STABILIZER REMOVAL/INSTALLATION** .)
2. Inspect the stabilizer control link for bending or damage. If there is any malfunction, replace it.
3. Rotate the ball joint stud **10 times** , and then rock it side to side **10 times** .
4. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

Stabilizer control link ball joint rotational torque

0.2-2.0 N.m {3-20 kgf.cm, 2-17 in.lbf}

- If not within the specification, replace the stabilizer control link. (See **FRONT STABILIZER REMOVAL/INSTALLATION** .)

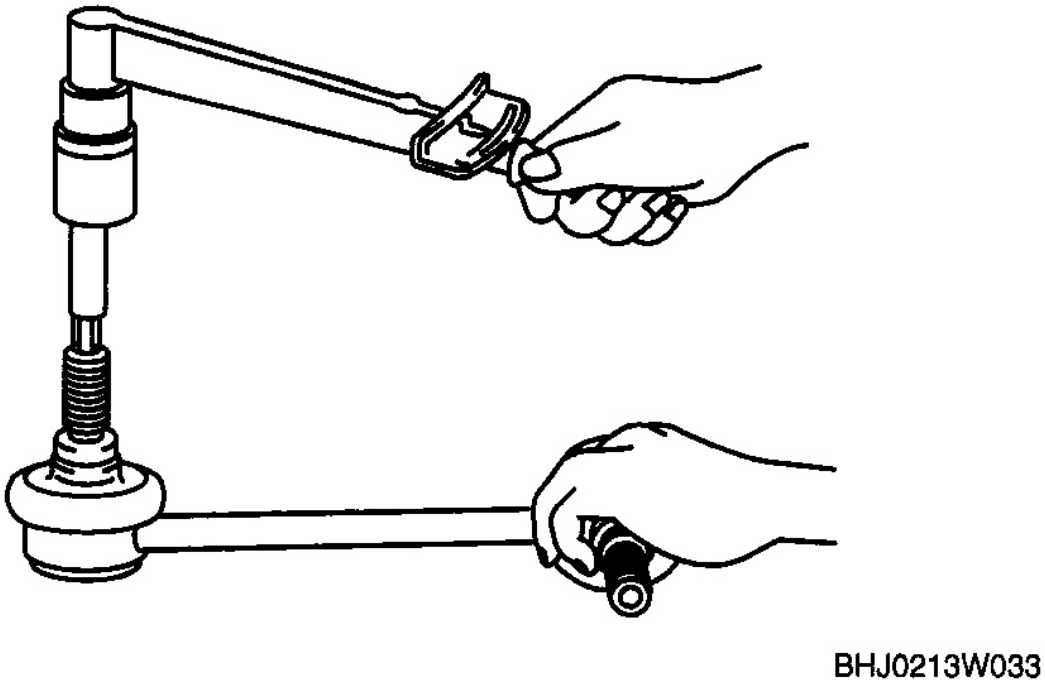


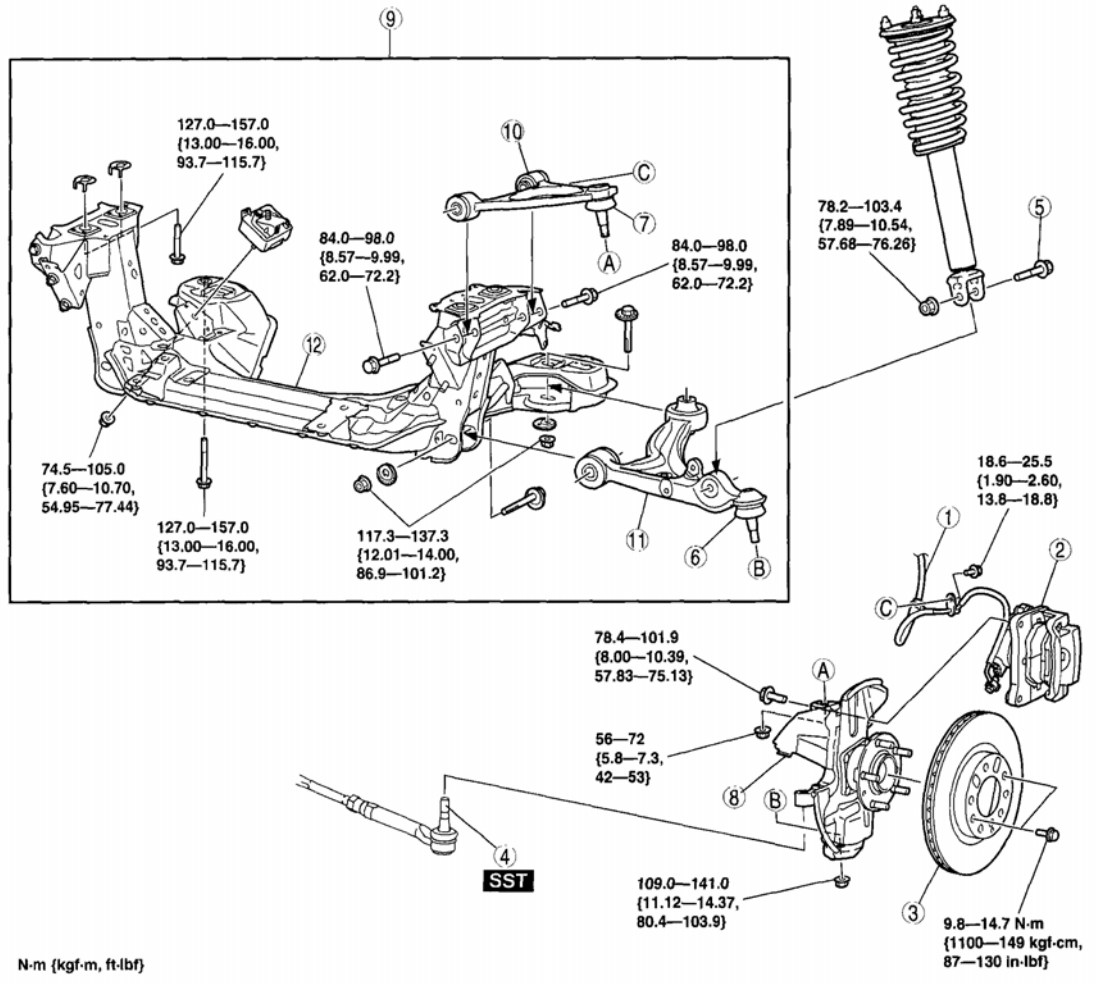
Fig. 30: Measuring Ball-Joint Rotational Torque
Courtesy of MAZDA MOTORS CORP.

FRONT CROSSMEMBER REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled while servicing the vehicle.**

1. Remove the front suspension tower bar. (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
2. Remove the front stabilizer (See **FRONT STABILIZER REMOVAL/INSTALLATION** .)
3. Remove the transverse members (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
4. Remove the steering gear and linkage, and suspend it using a cable.
5. Remove in the order indicated in **Fig. 31** .
6. Install in the reverse order of removal.
7. Inspect the front wheel alignment. (See **FRONT WHEEL ALIGNMENT** .)



1	Brake hose	7	Front upper arm ball joint
2	Caliper and mounting support	8	Axle and hub component
3	Disc plate	9	Front crossmember component
4	Tie-rod end	10	Front upper arm
5	Shock absorber bolt (lower)	11	Front lower arm
6	Front lower arm bolt joint	12	Front crossmember

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Fig. 31: Identifying Front Crossmember Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

AXLE AND HUB COMPONENT REMOVAL NOTE

1. Loosen the front upper arm inner bolts.
2. Remove the axle and hub component.

FRONT CROSSMEMBER COMPONENT REMOVAL NOTE

1. Secure the chain to install the **SST** to the position shown in **Fig. 32** using the bolts (**M10 x 1.5** , length **30 mm {1.18 in}**).

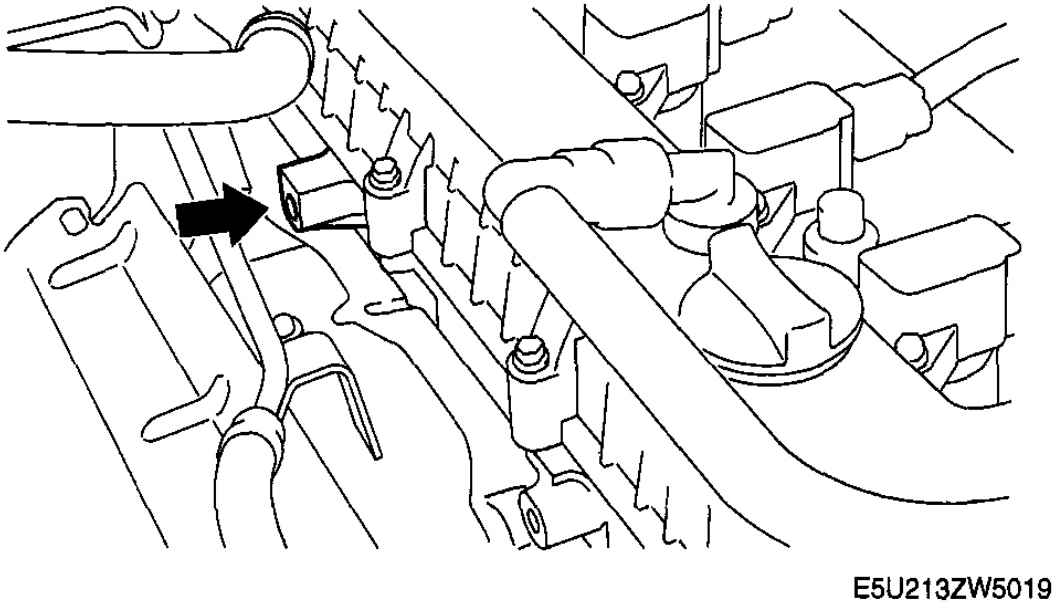


Fig. 32: Identifying Chain Bolt Location
Courtesy of MAZDA MOTORS CORP.

2. Suspend the engine.

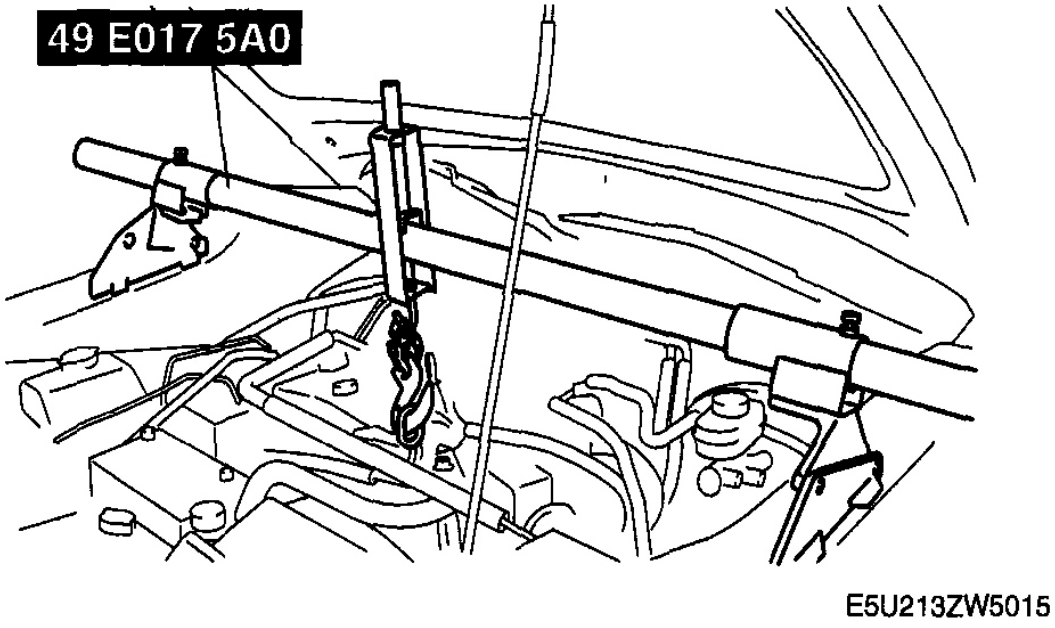


Fig. 33: Suspending Engine
Courtesy of MAZDA MOTORS CORP.

3. Support the front crossmember using a jack.

WARNING:

- **Verify that the crossmember component is securely supported by a jack. If the crossmember component falls, it could cause serious injury or death, or damage to the vehicle.**

4. Lower the front crossmember component slightly.
5. Remove the engine mounting rubber, pipes and hoses installed to the front crossmember.
6. Remove the front crossmember component.

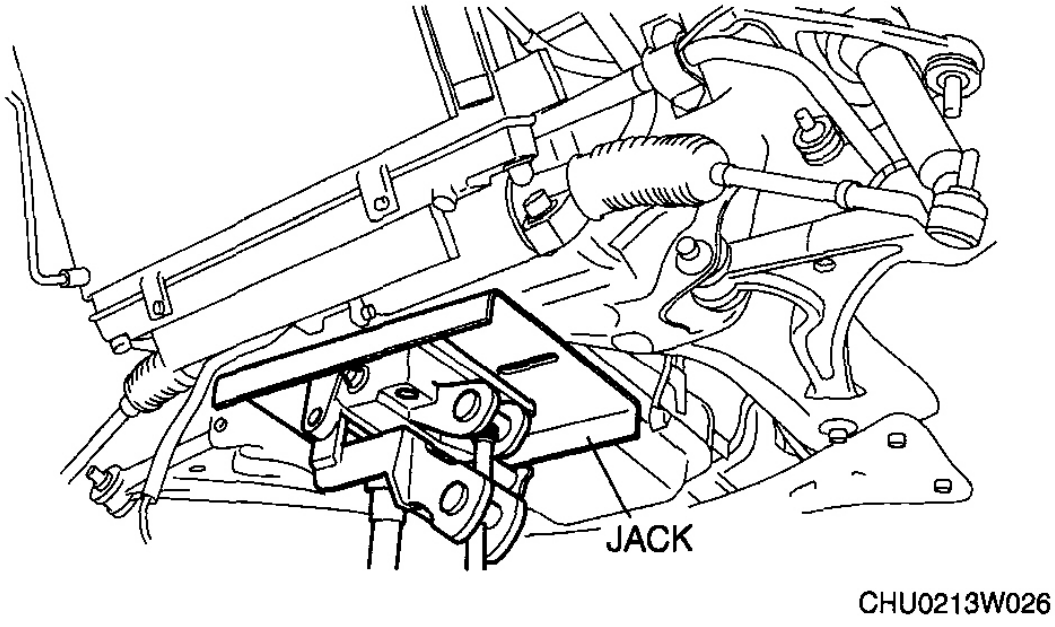


Fig. 34: Supporting Front Crossmember Using Jack
Courtesy of MAZDA MOTORS CORP.

TRANSVERSE MEMBER REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 35** .
2. Install in the reverse order of removal.

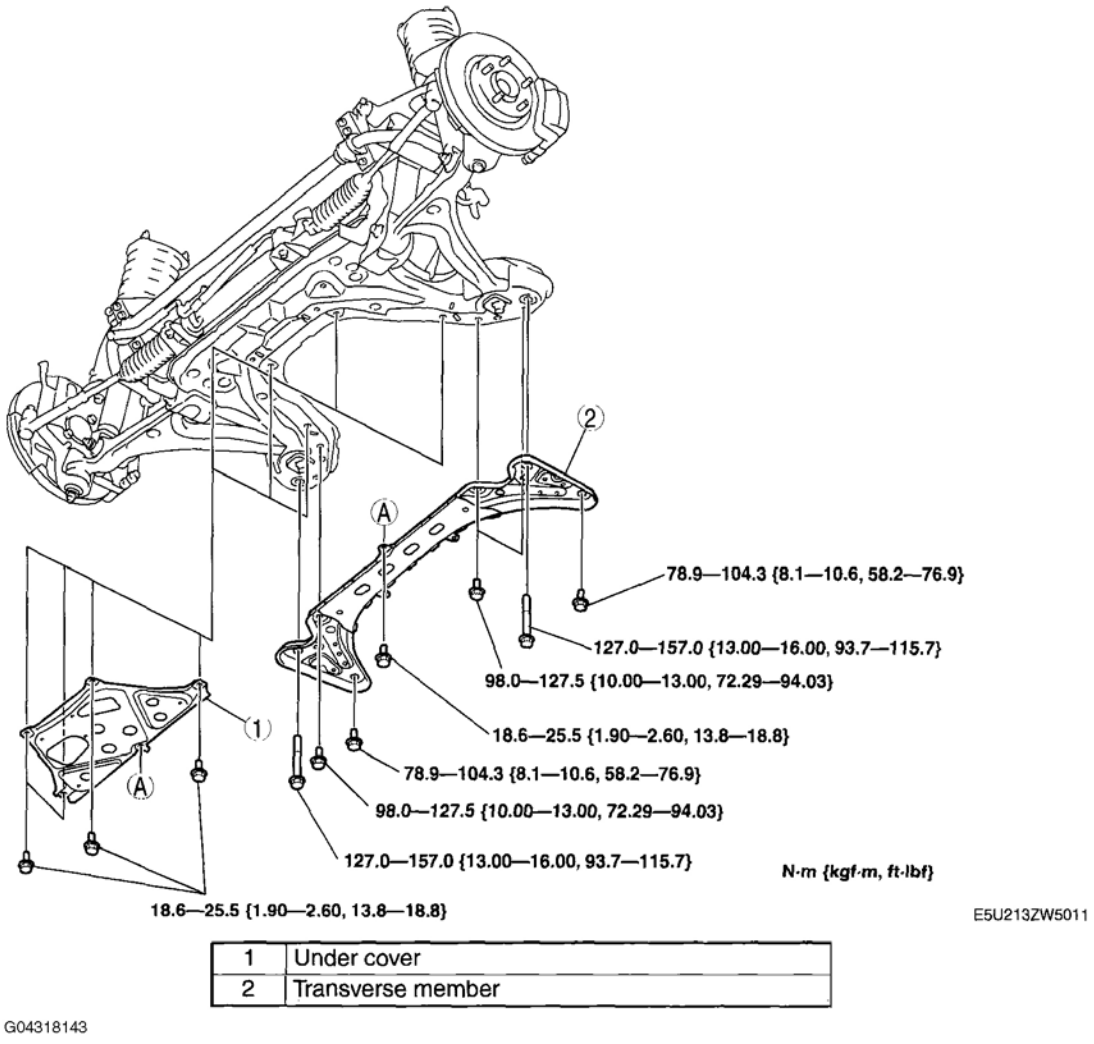


Fig. 35: Identifying Transverse Member And Under Cover (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

TRANSVERSE MEMBER REMOVAL NOTE

1. Support the crossmember using a jack.
2. Remove the transverse member.

UNDER COVER INSTALLATION NOTE

1. Align projection A with the transverse member opening to temporarily support the under cover.

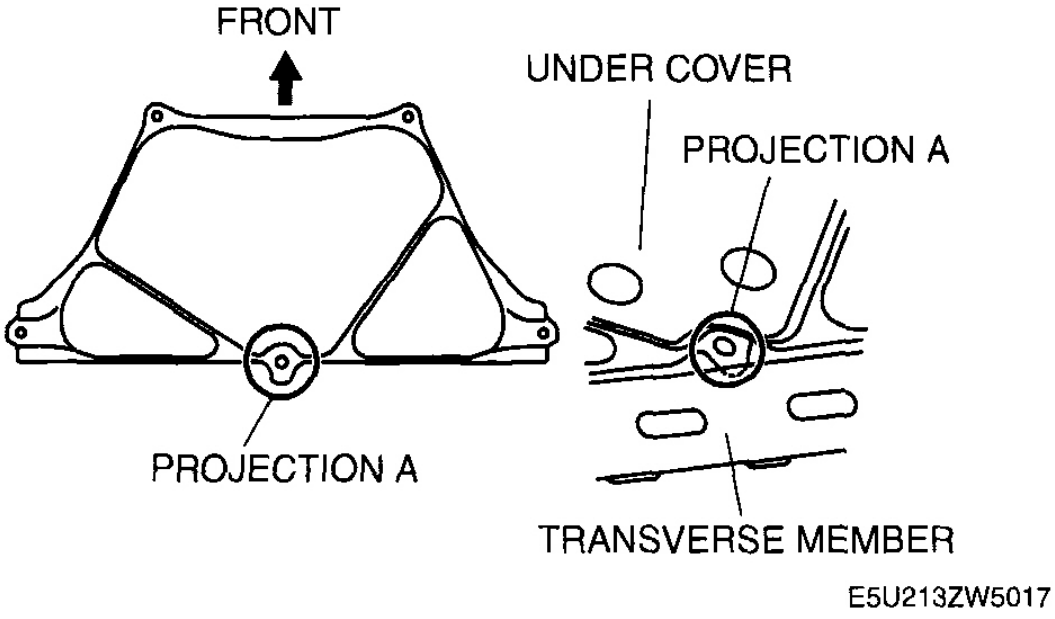


Fig. 36: Aligning Projection A With Transverse Member
Courtesy of MAZDA MOTORS CORP.

2. Tighten the bolts in the order of A, B and C.

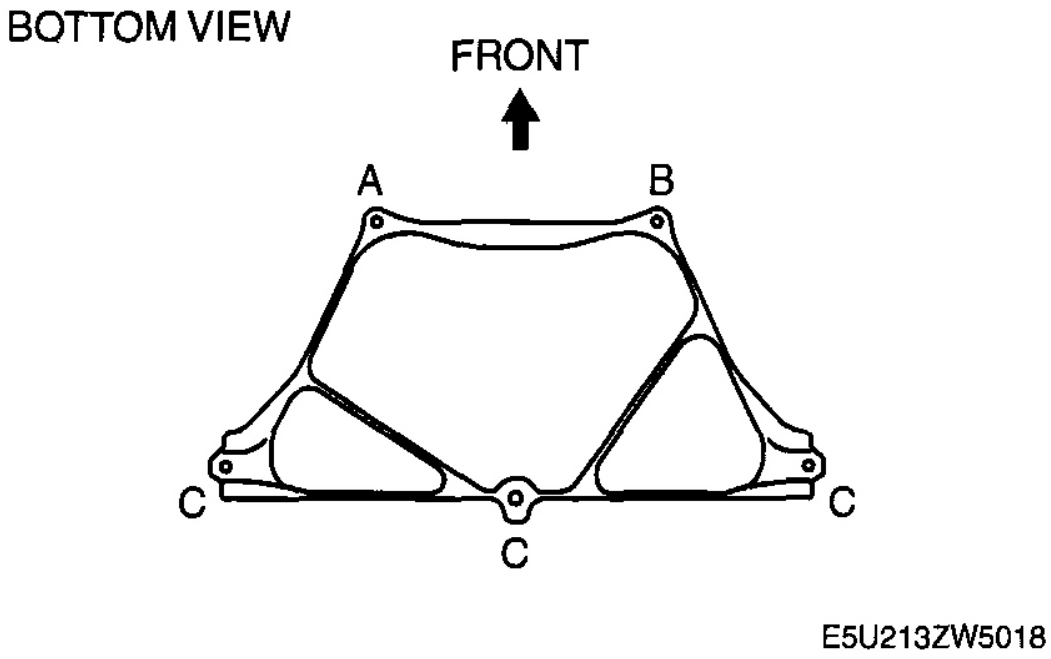
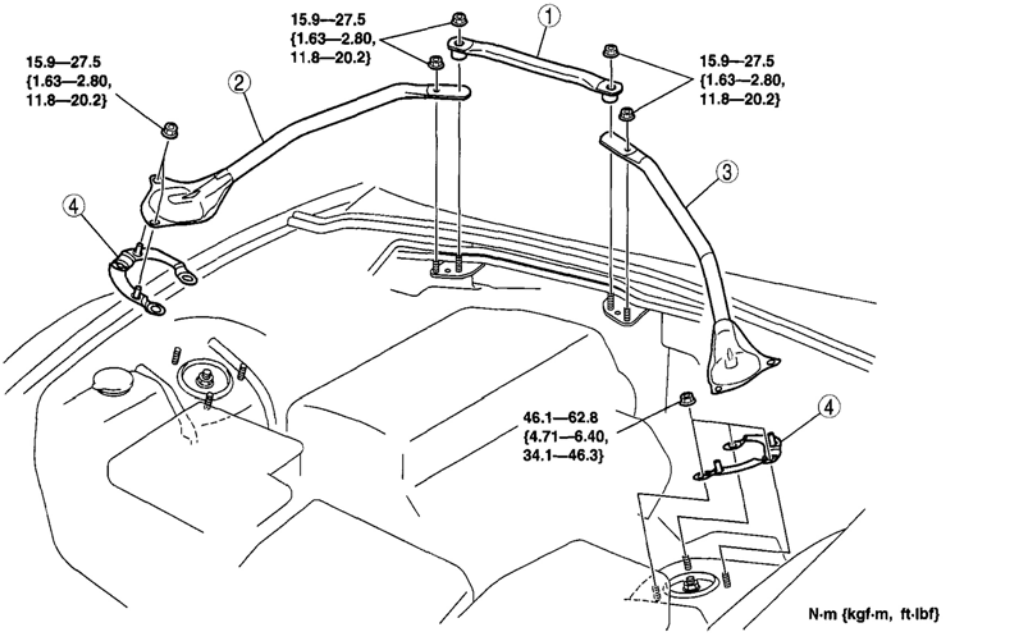


Fig. 37: Tightening Transverse Member Bolts In Sequence
Courtesy of MAZDA MOTORS CORP.

FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 38** .
2. Install in the reverse order of removal.



1	Front suspension tower bar (joint)	3	Front suspension tower bar (left side)
2	Front suspension tower bar (right side)	4	Plate

Fig. 38: Identifying Front Suspension Tower Bar Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

PLATE INSTALLATION NOTE

1. Install the plates with the identification marks facing upward.

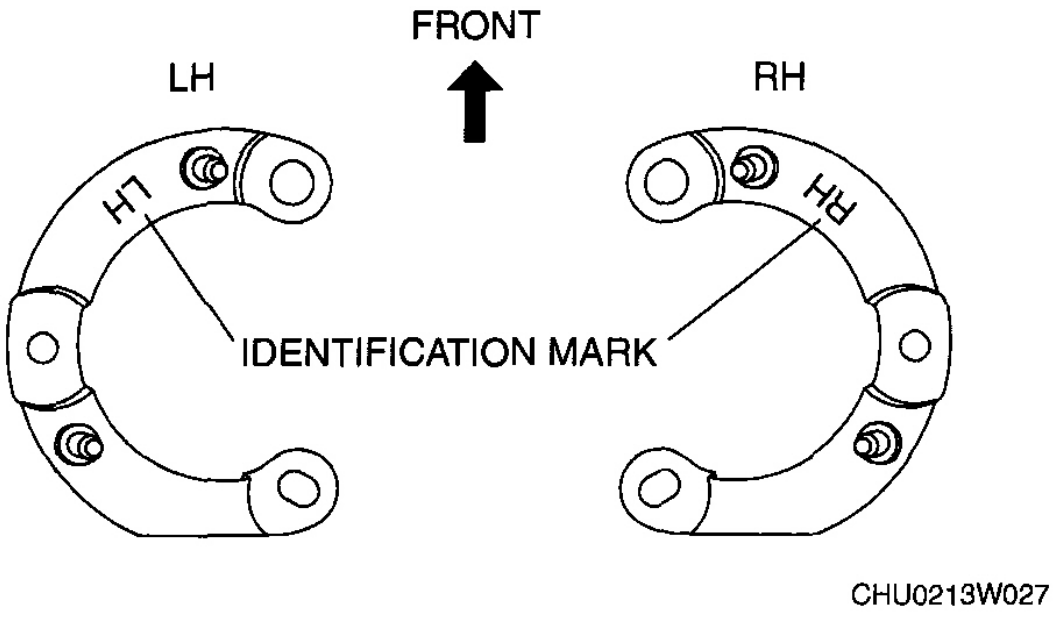


Fig. 39: Identifying Plate Identification Marks
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Fuel System - MX-5 Miata

FUEL SYSTEM FLOW DIAGRAM [LF]

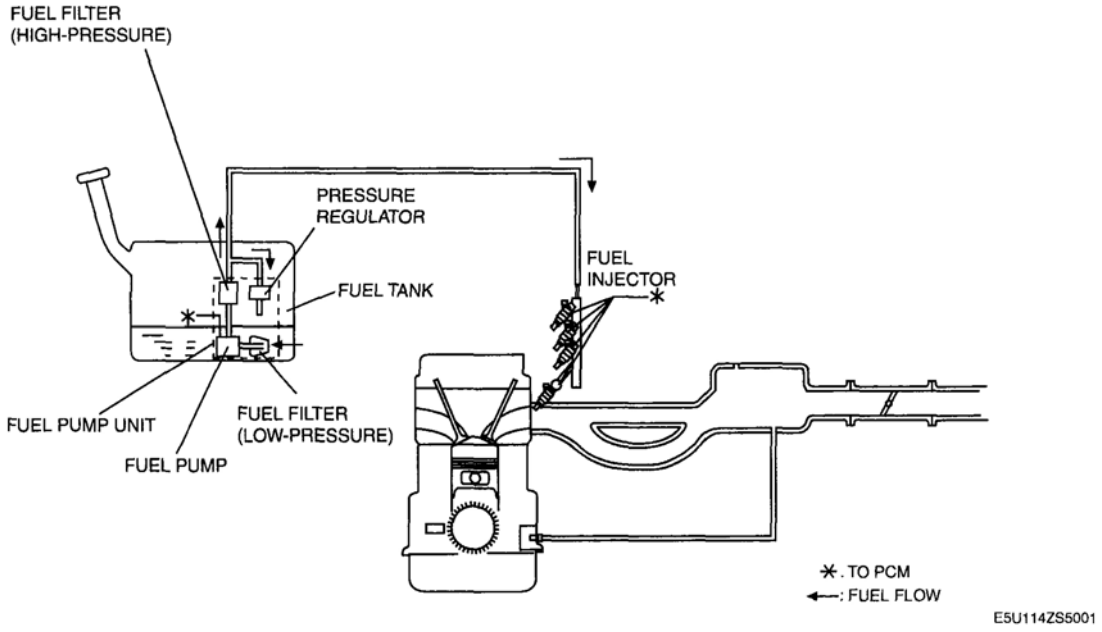
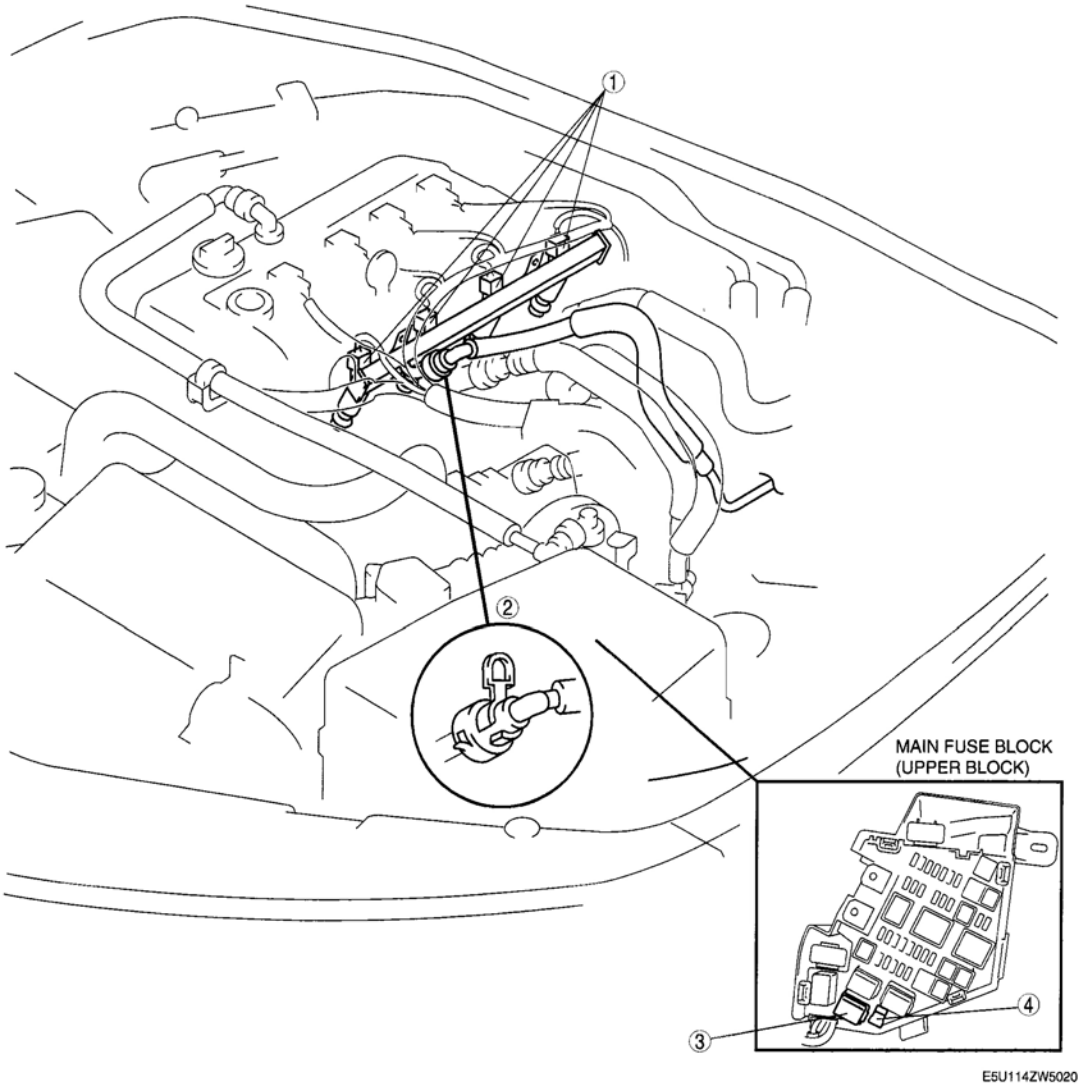


Fig. 1: Fuel System - Flow Diagram
Courtesy of MAZDA MOTORS CORP.

FUEL SYSTEM LOCATION INDEX [LF]

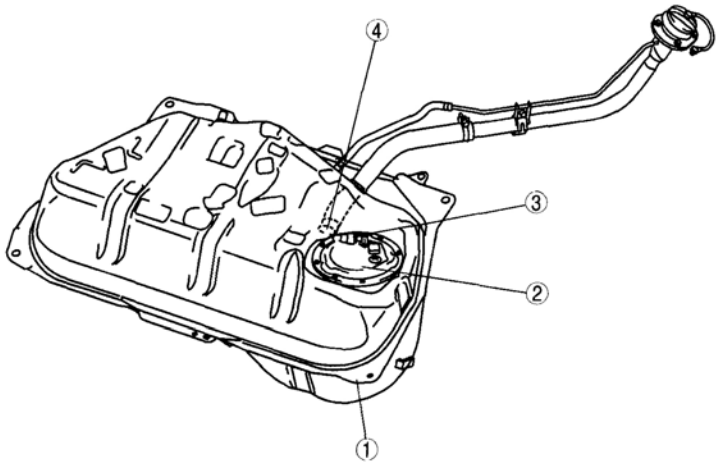
ENGINE COMPARTMENT SIDE



1	Fuel injector
2	Quick release connector (Type A)
3	Fuel pump relay
4	Check connector

Fig. 2: Identifying Location Of Fuel System Components (LF)
Courtesy of MAZDA MOTORS CORP.

FUEL TANK SIDE



E5U114ZW5007

1	Fuel tank
2	Fuel pump unit
3	Quick release connector (Type B)
4	Nonreturn valve

Fig. 3: Identifying Location Of Fuel Tank Side Components
Courtesy of MAZDA MOTORS CORP.

BEFORE SERVICE PRECAUTION [LF]

WARNING:

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure".**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before performing work on the fuel system, discharge static electricity by touching the vehicle body.**

CAUTION:

- **If there is foreign material on the connecting area of the quick release connector, it might damage the connector or fuel pipe. To prevent this, disconnect the connector and clean the connecting area before connecting.**

FUEL LINE SAFETY PROCEDURE

1. Remove the fuel-filler cap to release the pressure inside the fuel tank.
2. Remove the fuel pump relay.

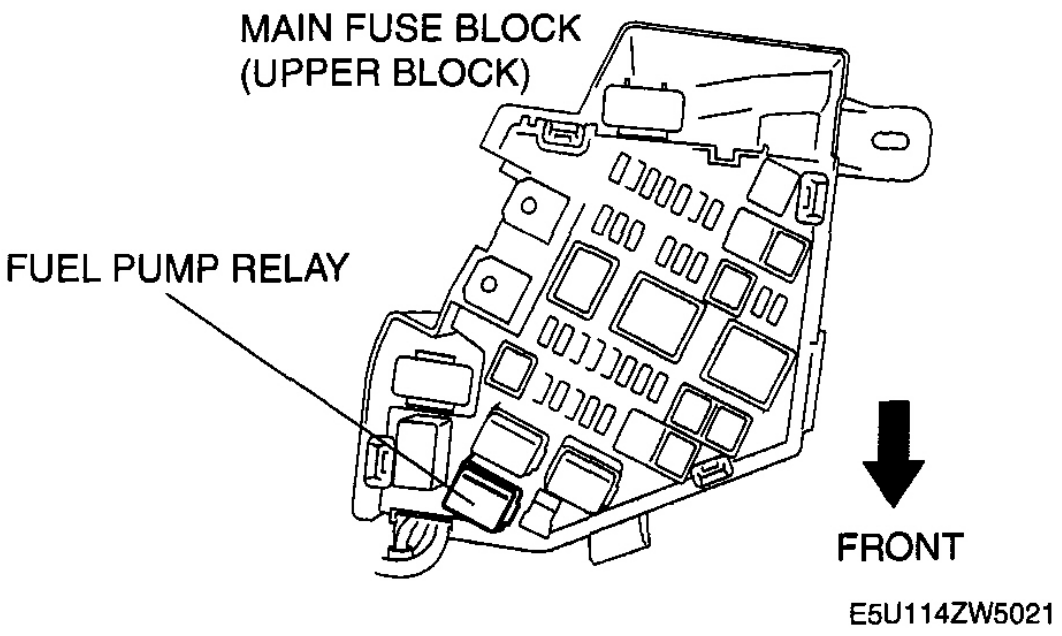


Fig. 4: Removing Fuel Pump Relay
Courtesy of MAZDA MOTORS CORP.

3. Start the engine.
4. After the engine stalls, crank the engine **several times** .
5. Turn the ignition switch to the LOCK position.
6. Install the fuel pump relay.

AFTER SERVICE PRECAUTION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the Fuel Leakage Inspection.**

FUEL LEAKAGE INSPECTION

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, complete the following inspection with the engine stopped.**

Using M-MDS or Equivalent

1. Connect the M-MDS or equivalent to the DLC-2.

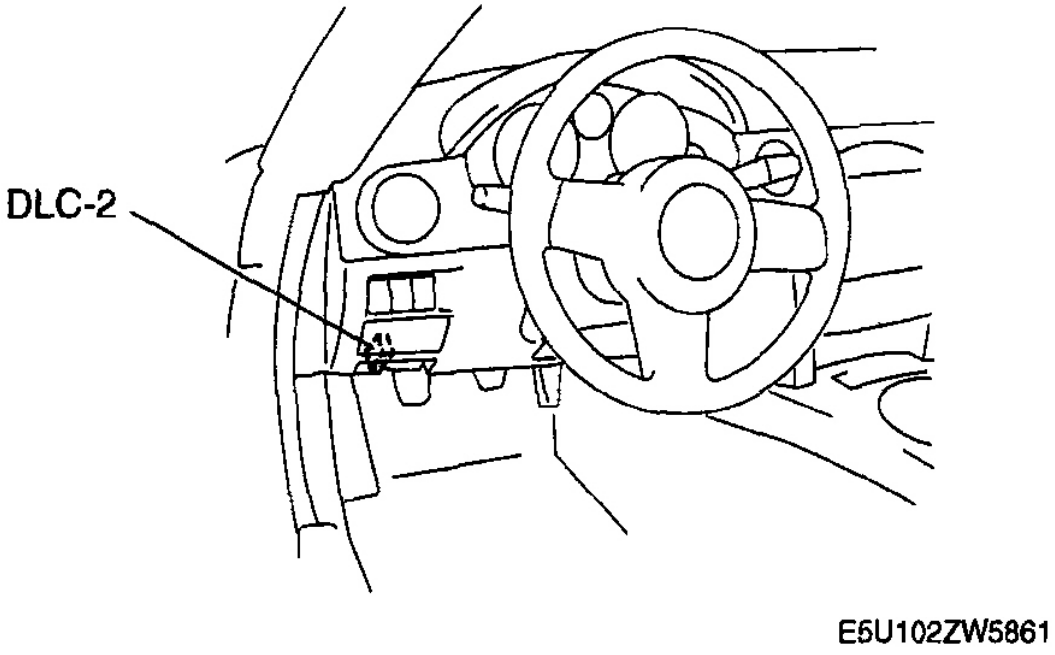


Fig. 5: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Start the fuel pump using the "FP" simulation function.
3. Verify that there is no fuel leakage from the pressurized parts.
   - If there is leakage, replace the fuel hoses and clips.
   - If there is damage on the seal on the fuel pipe side, replace the fuel pipe.

   Standard

   There shall be no leakage after 5 min.

4. After reinstallation, repeat step 2-3 in the fuel leakage inspection.

Not Using SST (M-MDS or Equivalent)

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Short the check connector terminal F/P to ground using a jumper wire.

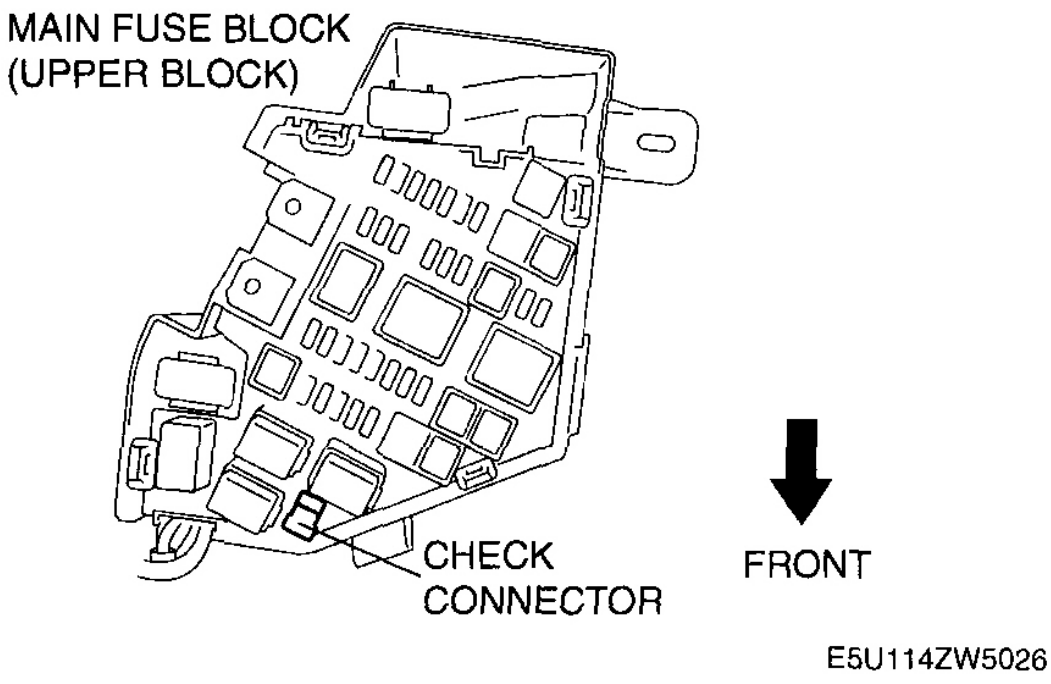


Fig. 6: Checking Connector Terminal F/P To Ground
Courtesy of MAZDA MOTORS CORP.

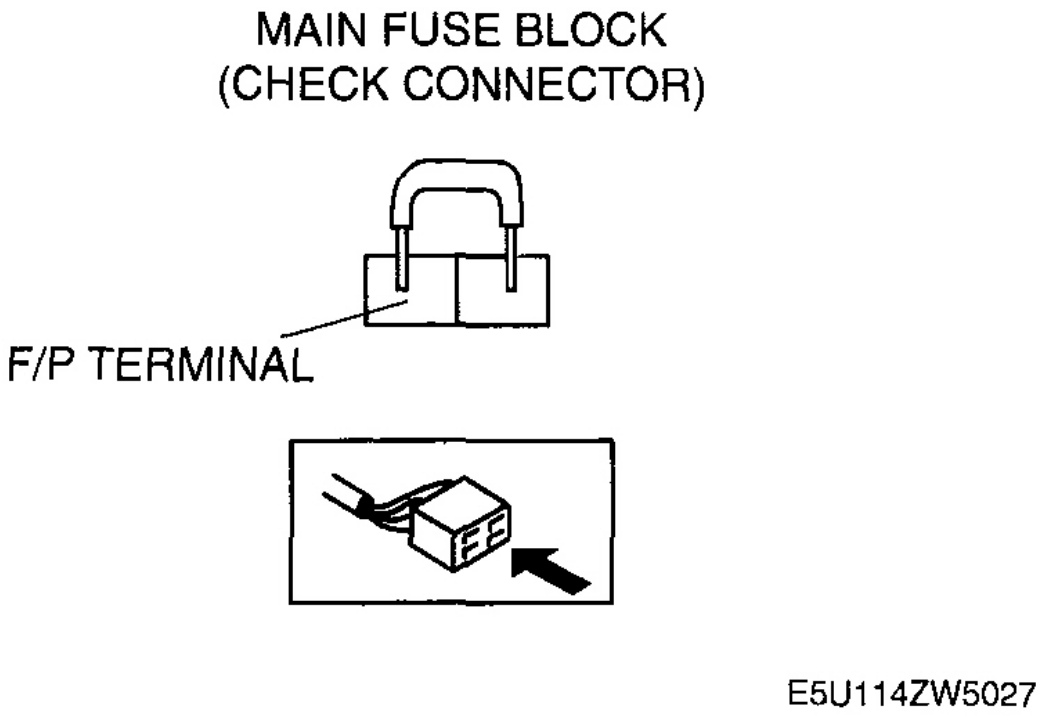


Fig. 7: Identifying F/P Connector Terminal
Courtesy of MAZDA MOTORS CORP.

4. Connect the negative battery cable.
5. Turn the ignition switch to the ON position to operate the fuel pump.
6. Verify that there is no fuel leakage from the pressurized parts.
   - If there is leakage, replace the fuel hoses and clips.
   - If there is damage on the seal on the fuel pipe side, replace the fuel pipe.

   Standard

   There shall be no leakage after 5 min.

7. After reinstallation, repeat step 5 thru 6 in the fuel leakage inspection.

FUEL LINE PRESSURE INSPECTION [LF]

WARNING:

- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the**

engine stopped.

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery cover. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the negative battery cable.
4. Disconnect the quick release connector (in the engine compartment). (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
5. Turn the lever of the **SST** parallel to the hose as shown in **Fig. 8** .
6. Insert the **SST** quick release connector into the fuel pipe until a click is heard.

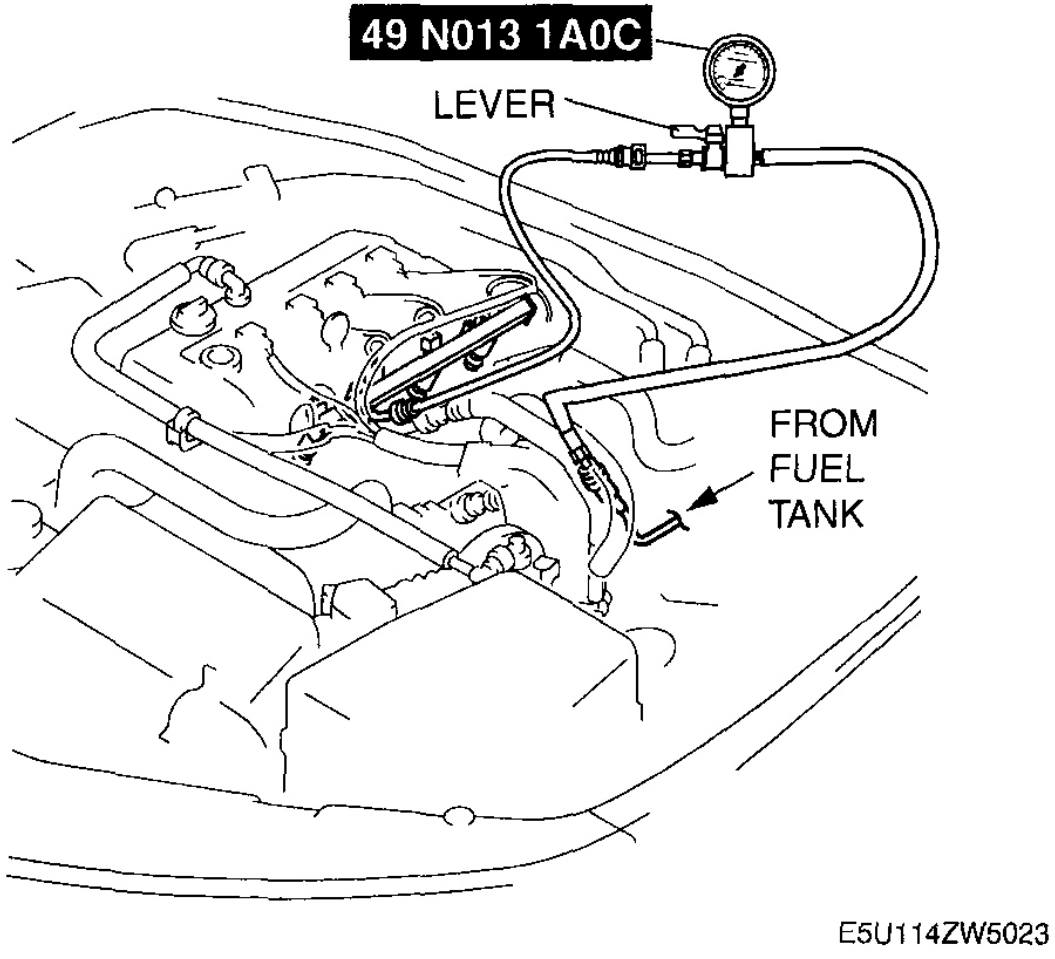


Fig. 8: Inserting SST Quick Release Connector Into Fuel Pipe Until Click Is Heard
Courtesy of MAZDA MOTORS CORP.

7. Verify that the quick release connector is firmly connected by pulling it by hand.
8. Start the fuel pump using the following procedure:

Using M-MDS or equivalent

1. Connect the negative battery cable.
2. Connect the M-MDS or equivalent to the DLC-2.

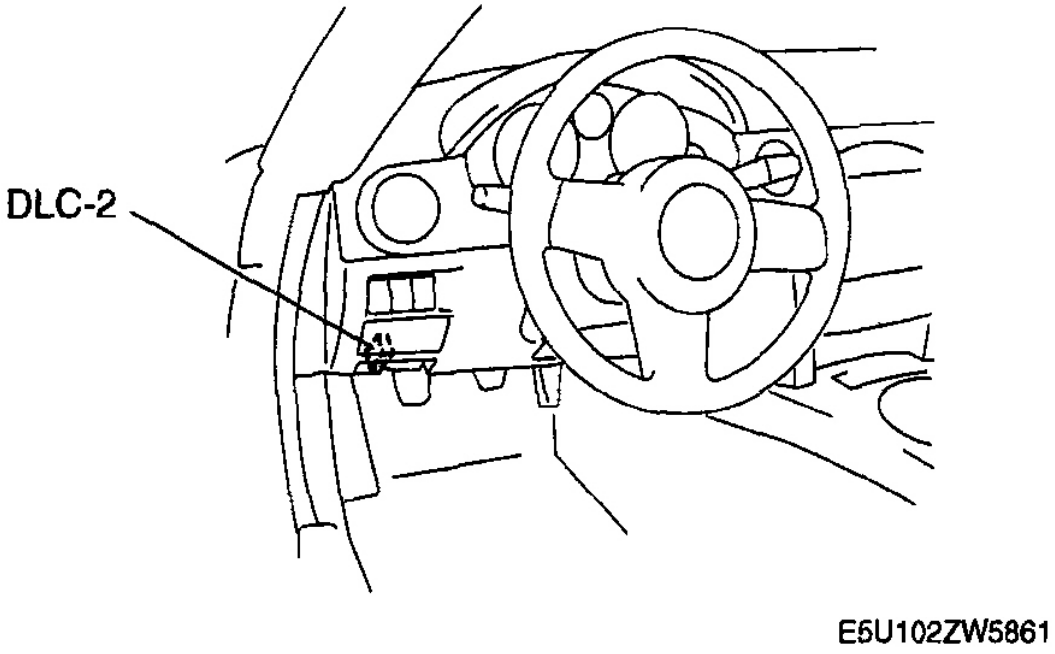


Fig. 9: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Start the fuel pump using the "FP" simulation function.

Not using M-MDS or equivalent

1. Short the check connector terminal F/P to ground using a jumper wire.

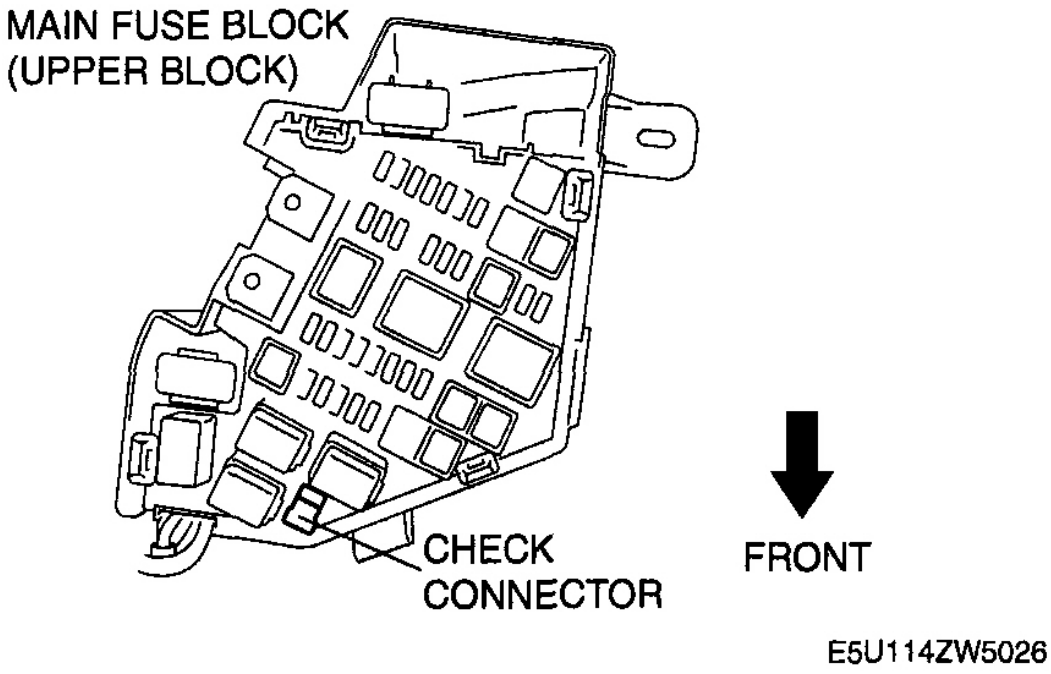


Fig. 10: Checking Connector Terminal F/P To Ground Using Jumper Wire
Courtesy of MAZDA MOTORS CORP.

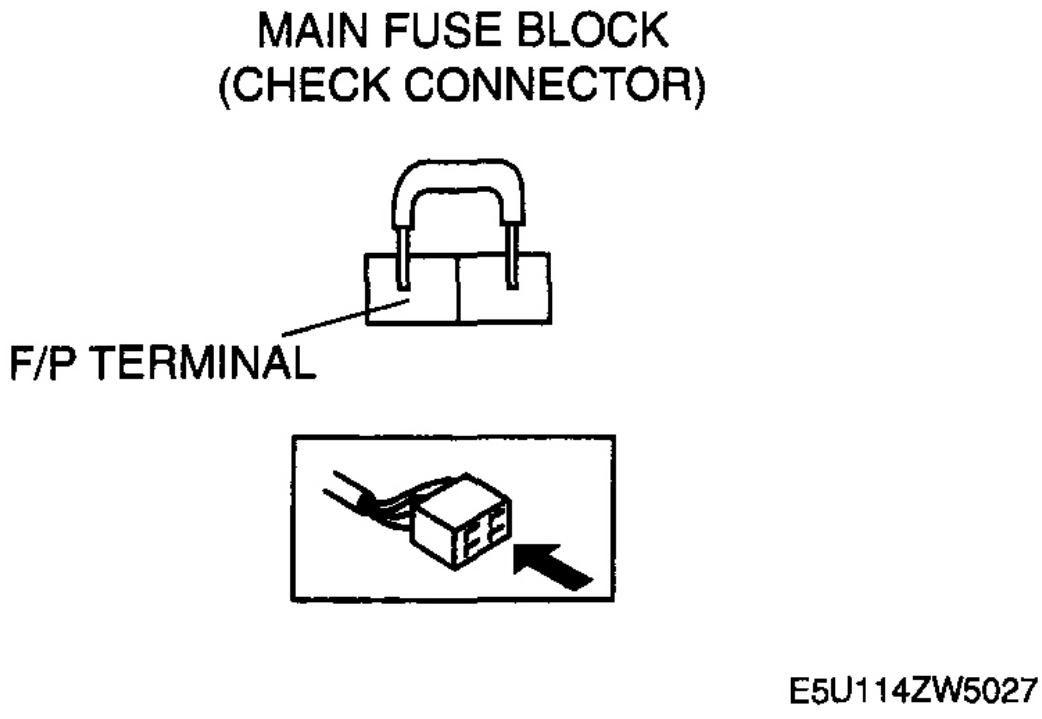


Fig. 11: Identifying F/P Connector Terminal
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position to operate the fuel pump.

9. Operate the fuel pump for **10 s** .
10. Measure the fuel line pressure.
    - If not within the specification, inspect the following:

      If it less than the specification:

      - Fuel pump unit
      - Fuel line leakage

      If it exceeds the specification:

      - Fuel line clogging

Fuel pressure (Reference)

350-410 kPa {3.57-4.18 kgf/cm^2 , 50.8-59.4 psi}

11. Stop the fuel pump using the following procedure:

    Using M-MDS or equivalent

    1. Stop the fuel pump using the "FP" simulation function.

    Not using M-MDS or equivalent

    1. Turn the ignition switch to off to stop the fuel pump.
12. Measure the fuel hold pressure **after 5 min** .
    - If not within the specification, inspect the following:
      - Fuel line for clogging or leakage

    Fuel hold pressure (Reference)

    250 kPa {2.55 kgf/cm^2 ,36.2 psi} or more

13. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
14. Disconnect the **SST** .
15. Connect the quick release connector to the fuel distributor. (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
16. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

FUEL TANK REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to BEFORE SERVICE PRECAUTION [LF] .**
- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, before performing the fuel pump unit removal/installation, always complete the "Fuel Leak Inspection After Fuel Pump Unit Installation".**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before draining fuel, make sure to discharge static electricity by touching the vehicle body.**

1. Park the vehicle on a level surface.

2. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
3. Remove the battery cover.
4. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Remove the following parts.
    1. Middle pipe (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
    2. Propeller shaft (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
    3. Power plant frame (See **POWER PLANT FRAME REMOVAL NOTE** .) (See **POWER PLANT FRAME REMOVAL NOTE** .) (See **POWER PLANT FRAME REMOVAL NOTE** .)
    4. Rear drive shaft (See **REAR DRIVE SHAFT REMOVAL/INSTALLATION** .)
    5. Rear differential (See **REAR DIFFERENTIAL REMOVAL/INSTALLATION** .)
    6. Rear crossmember component (See **REAR CROSSMEMBER REMOVAL/INSTALLATION** .)
6. Perform the following procedure to remove the service hole cover.
    1. To remove the back trim, remove the following parts:
        1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
        2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
        3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
        4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
        5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
        6. Front seat bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    2. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
    3. Remove the service hole cover.

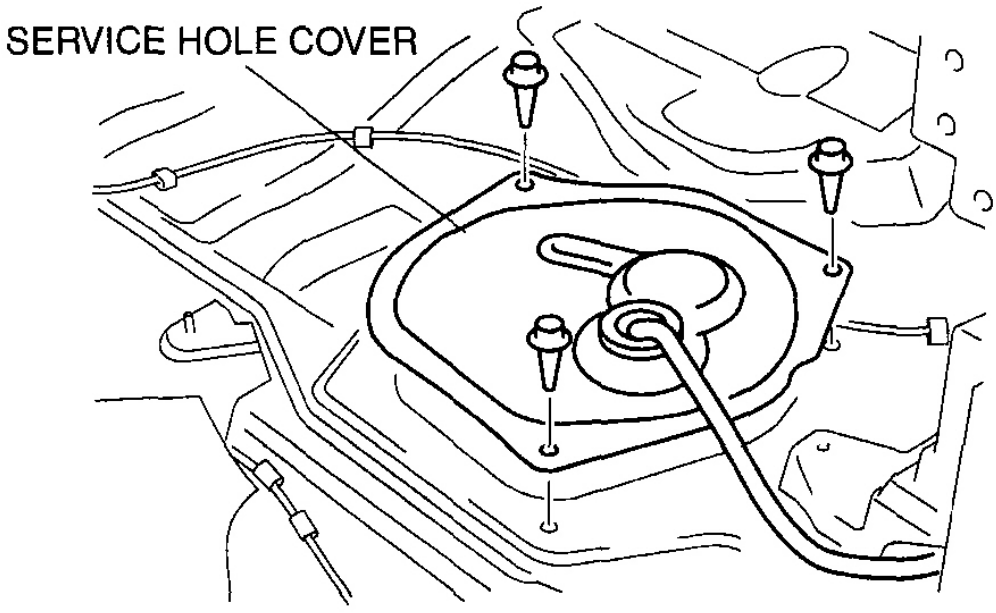
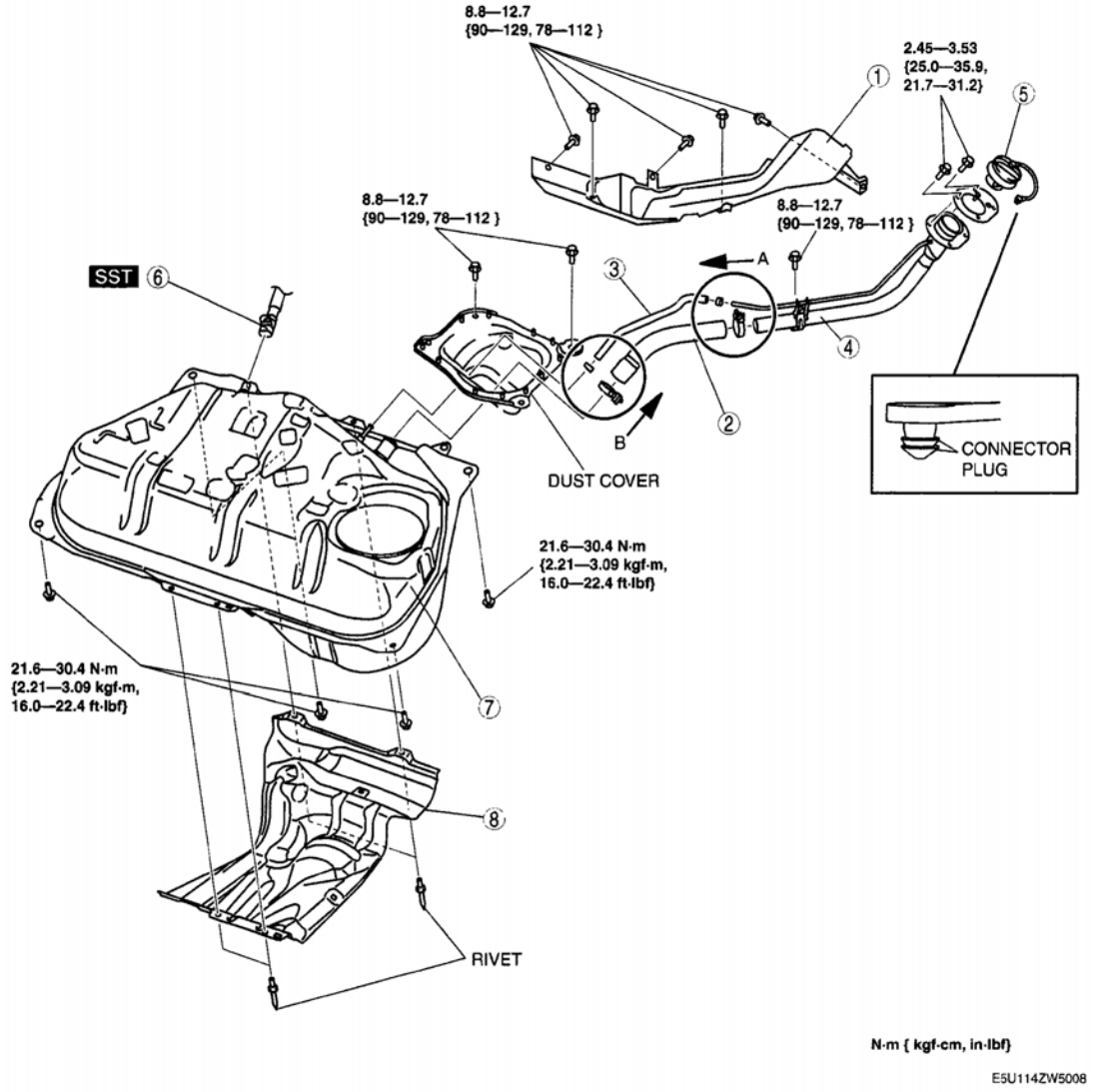


Fig. 12: Identifying Service Hole Cover
Courtesy of MAZDA MOTORS CORP.

7. Disconnect the quick release connector using the **SST** from the fuel pump unit. (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
8. Remove the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
9. Siphon the fuel from the fuel tank.
10. Remove in the order indicated in **Fig. 13** .
11. Install in the reverse order of removal.
12. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)



1	Protector
2	Joint hose
3	Breather hose
4	Fuel-filler pipe
5	Fuel-filler cap
6	Quick release connector (Type C)
7	Fuel tank
8	Insulator

Fig. 13: Identifying Fuel System Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

PROTECTOR REMOVAL NOTE

1. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)

FUEL TANK REMOVAL NOTE

1. Move the dust cover slightly out of the way.
2. Move the charcoal canister slightly out of the way. (See **CHARCOAL CANISTER REMOVAL/INSTALLATION [LF]** .)

INSULATOR REMOVAL NOTE

CAUTION:
- **Be careful not to damage the fuel tank when removing the rivet. If the fuel tank is damaged, it may cause fuel leakage.**

NOTE:
- **The insulator is installed using rivets.**
- **When reinstalling the rivet, install the same rivet or M5 bolt and nut.**

1. Push out the mandrel using a hammer and punch (**2-2.8 mm {0.08-0.11 in}** diameter).

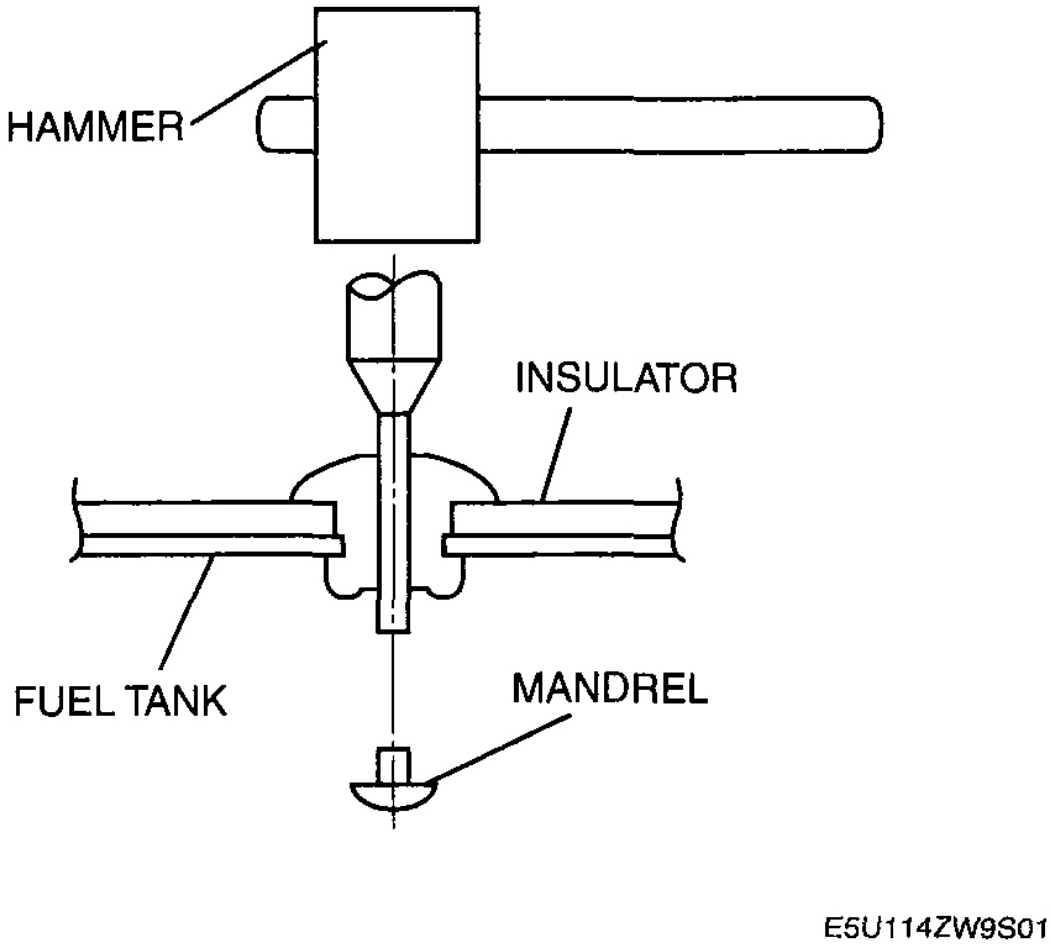


Fig. 14: Pushing Out Mandrel Using Hammer & Punch
Courtesy of MAZDA MOTORS CORP.

2. Remove the flange using a drill (**5 mm {0.20 in}** drill bit).

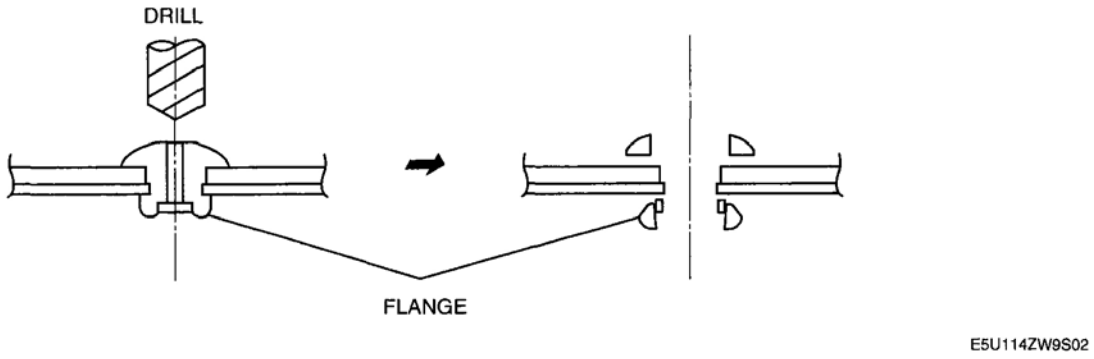


Fig. 15: Removing Flange Using Drill
Courtesy of MAZDA MOTORS CORP.

BREATHER HOSE INSTALLATION NOTE

1. Install the breather hose and clamp as shown in **Fig. 16** .

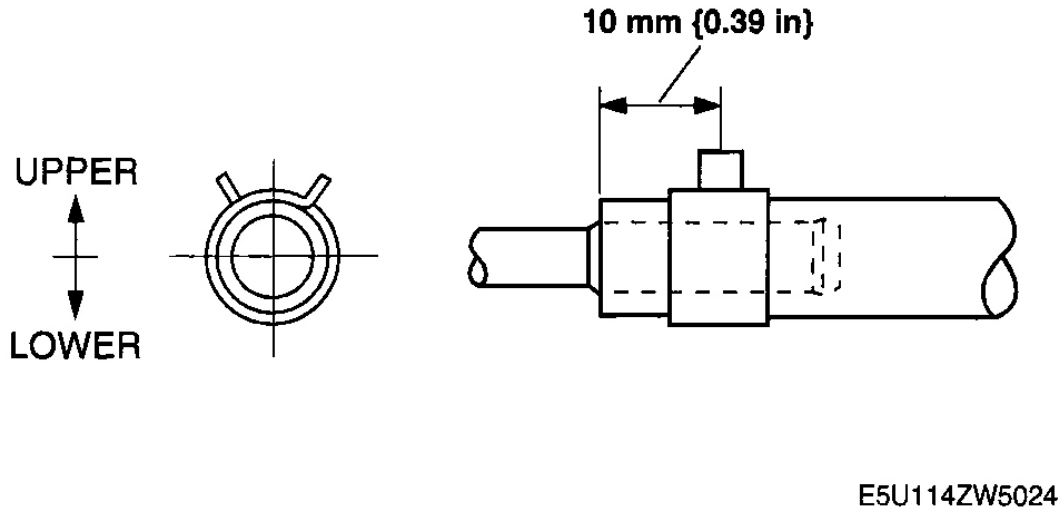


Fig. 16: Installing Breather Hose & Clamp
Courtesy of MAZDA MOTORS CORP.

JOINT HOSE INSTALLATION NOTE

1. Install the joint hose and clamp as shown in **Fig. 17** .

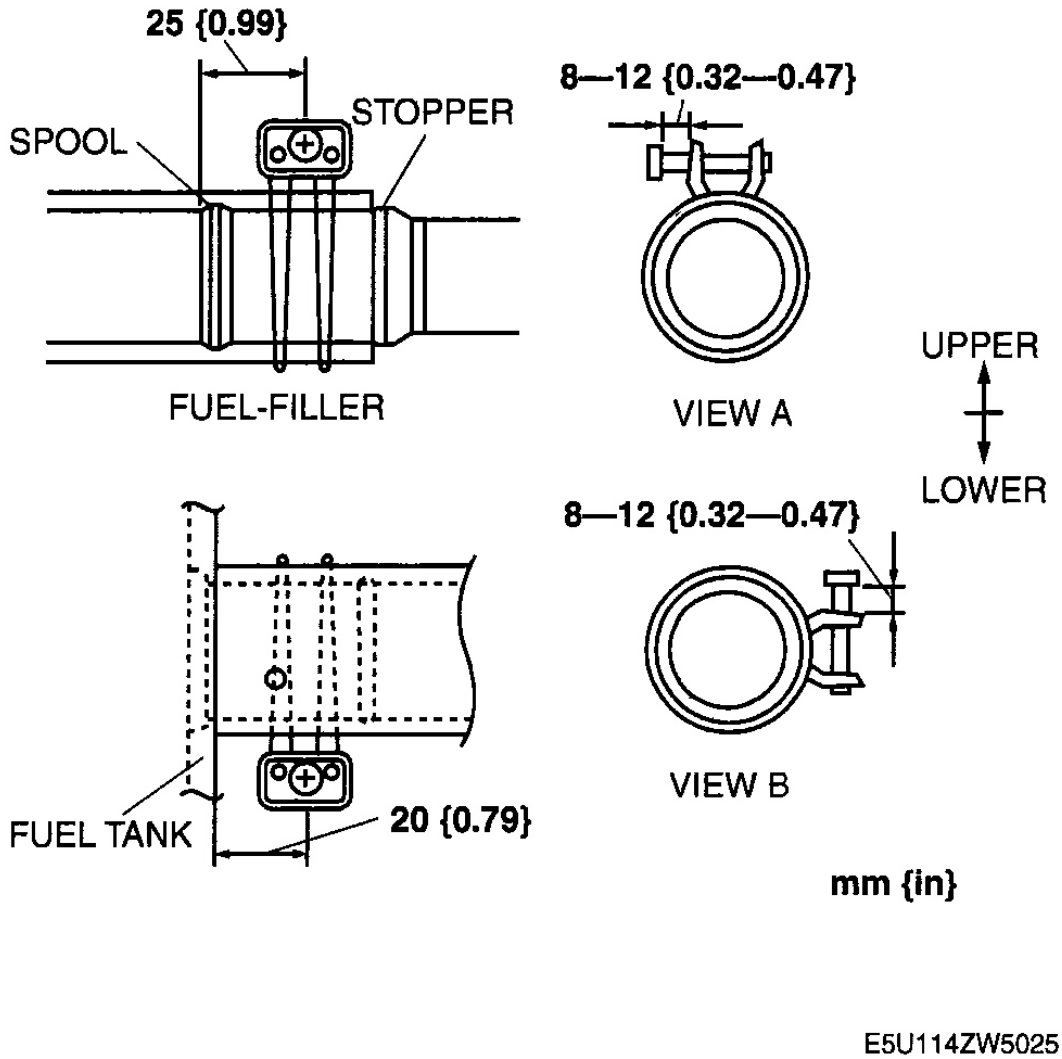


Fig. 17: Installing Joint Hose & Clamp
Courtesy of MAZDA MOTORS CORP.

2. Install the clamp between the spool and stopper without overlapping the stopper.

FUEL TANK INSPECTION [LF]

NOTE:

- **The two rollover valves built into the fuel tank and check valves (two-way) built into the rollover valves are inspected in this inspection.**

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)

2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the fuel tank with the fuel pump unit. (See **FUEL TANK REMOVAL/INSTALLATION [LF]** .)
5. Perform the following procedure to verify the fuel tank airtightness.
    1. Plug the fuel pump unit pipe, port B and port C.

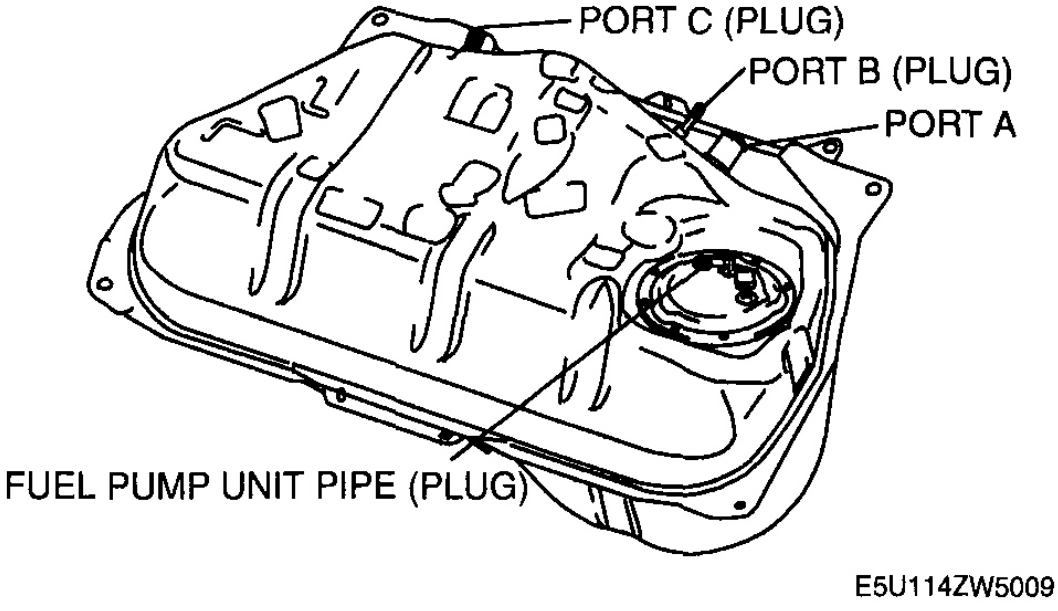


Fig. 18: Identifying Plug Fuel Pump Unit Pipe & Ports
Courtesy of MAZDA MOTORS CORP.

    2. Apply a pressure of **3 kPa {23 mmHg, 0.9 inHg}** to port A and wait for a while.
    3. Verify that there is no air leakage from the fuel tank.
        - If there is airflow, replace the fuel tank.
6. Plug the fuel pump unit pipe and port B.

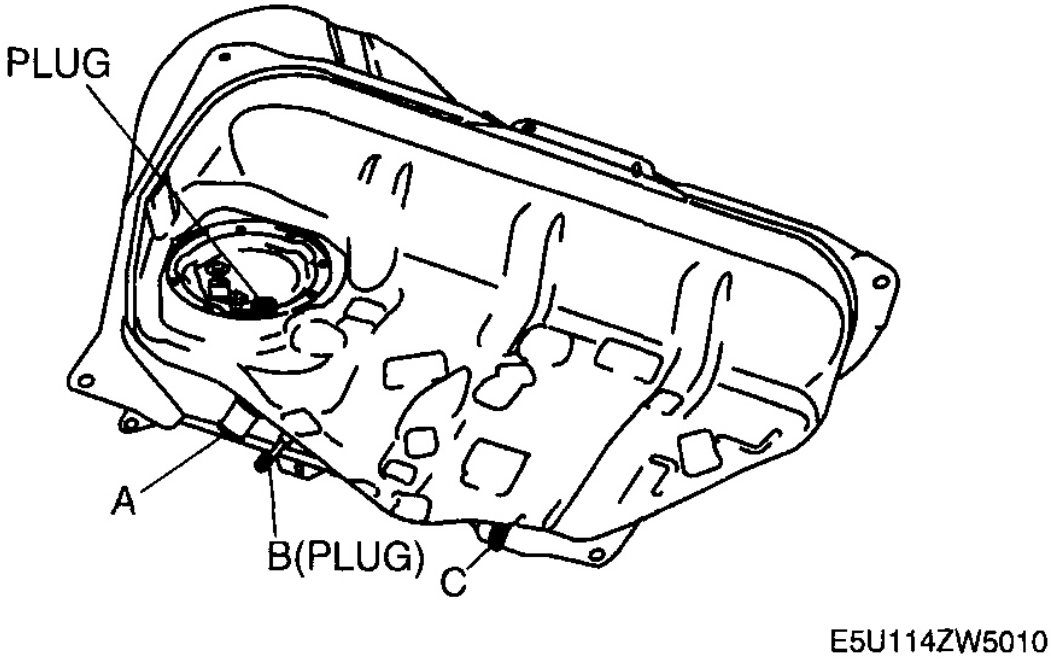


Fig. 19: Identifying Plug
Courtesy of MAZDA MOTORS CORP.

7. Level the fuel tank.
8. Apply a pressure of **3 kPa {23 mmHg, 0.9 inHg}** to port C and wait for a while.
9. With the pressure still applied, verify that there is airflow from port A and the pressure is **0- 3 kPa {0-22 mmHg, 0- 0.8 inHg}** .
   - If there is no airflow, replace the fuel tank.
10. Apply a pressure of **-0.5 kPa {-3.8 mmHg, -0.1 inHg}** to port C and wait for a while.
11. With the pressure still applied, verify that there is airflow from port A and the pressure is **-0.5- 0 kPa {-3.8- 0 mmHg, -0.2- 0 inHg}** .
    - If there is no airflow, replace the fuel tank.
    - If there is airflow, place the fuel tank upside down.
12. Apply a pressure of **3 kPa {23 mmHg, 0.9 inHg}** to port C and wait for a while.
13. With the pressure still applied, verify that there is no airflow from port A.
    - If there is airflow, replace the fuel tank.

NON-RETURN VALVE INSPECTION [LF]

WARNING:
- **Fuel is very flammable liquid. If fuel spills or leaks from the**

pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to the "BEFORE SERVICE PRECAUTION [LF]".

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
5. Siphon the fuel from the fuel tank.

NOTE:

- **Non-return valve is integrated in the fuel tank.**
- **The non-return valve is normally closed by the spring force.**

6. Verify that the non-return valve is closed.
   - If the non-return valve is stuck open and dose not open even when pulled up by a finger, replace the fuel tank. (See **FUEL TANK REMOVAL/INSTALLATION [LF]** .)

FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to BEFORE SERVICE PRECAUTION [LF] .**
- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, before performing the fuel pump unit removal/installation, always complete the "Fuel Leak Inspection After Fuel Pump Unit Installation".**

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Perform the following procedure to remove the service hole cover.
   1. To remove the back trim, remove the following parts:
      1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
      2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)

3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)

2. Remove the back trim. (See **BACK TRIM REMOVAL/INSTALLATION** .)
3. Remove the service hole cover.

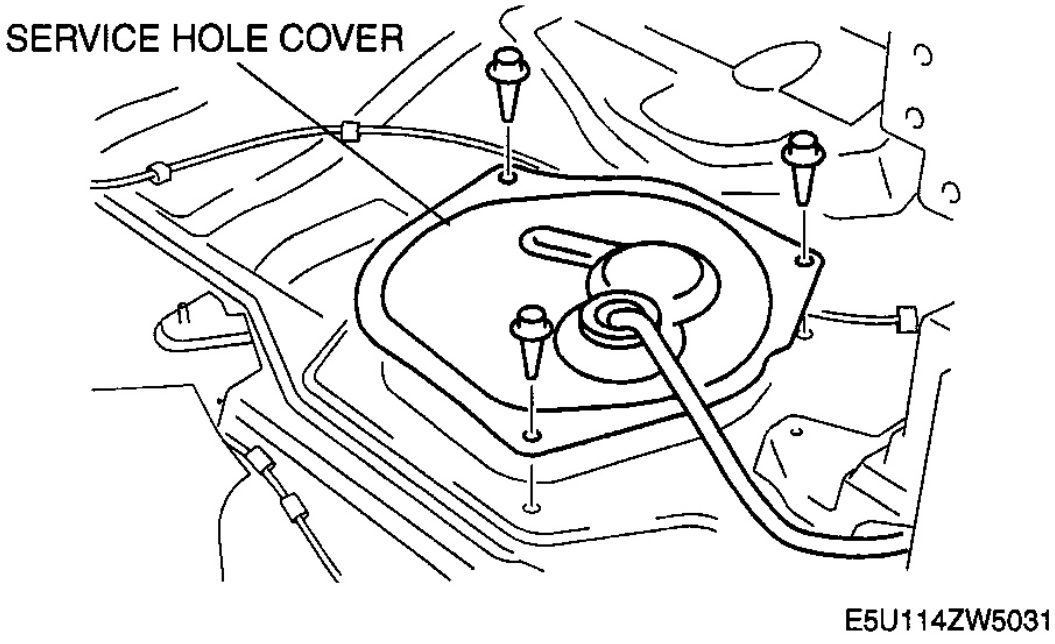
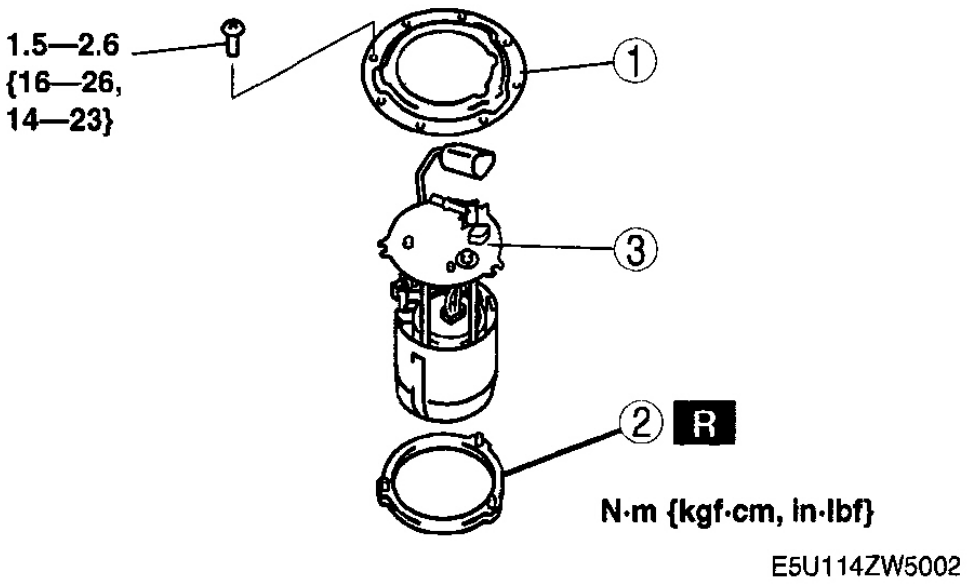


Fig. 20: Identifying Service Hole Cover
Courtesy of MAZDA MOTORS CORP.

5. Disconnect the quick release connector from the fuel pump unit. (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
6. Disconnect the fuel pump unit connector.
7. Remove in the order indicated in **Fig. 21** .



1	Plate
2	Packing
3	Fuel pump unit

Fig. 21: Identifying Fuel Pump Unit (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Complete the "AFTER SERVICE PRECAUTION" (See **AFTER SERVICE PRECAUTION [LF]** .)

FUEL LEAKAGE INSPECTION AFTER PUMP UNIT INSTALLATION

1. Before installing the fuel tank, verify that there is no leakage when a pressure of **5.9 kPa {44 mmHg, 1.7 inHg}** is applied to the fuel tank.
2. Install the fuel tank. (See **FUEL TANK REMOVAL/INSTALLATION [LF]** .)
3. Drive the vehicle starting from a standstill and brake suddenly **five to six times** at a low speed.
4. Stop the vehicle and verify from outside the vehicle that there is no fuel leakage around the fuel pump unit.

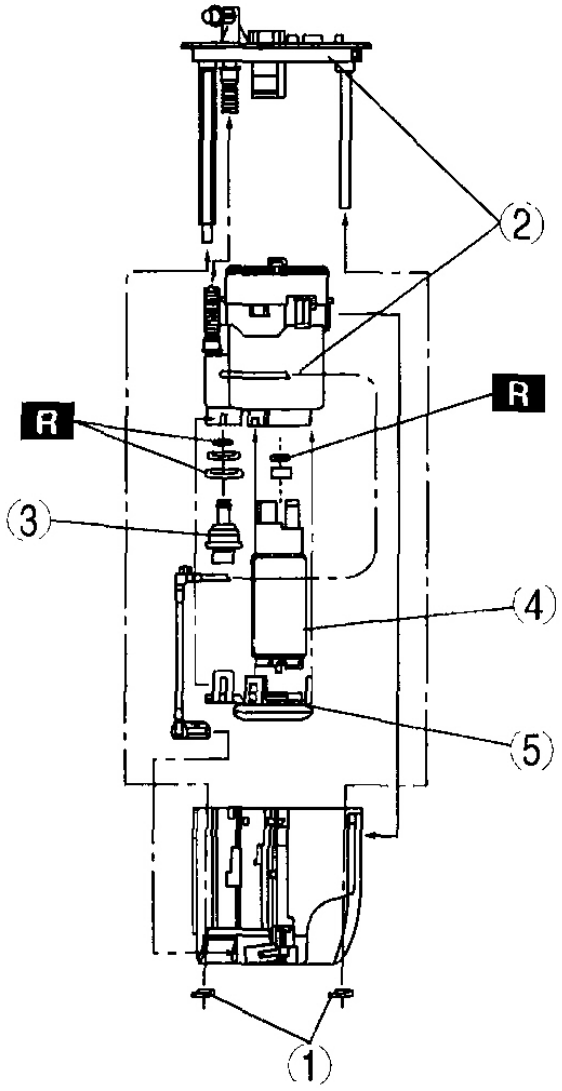
FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY [LF]

WARNING:

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate**

skin and eyes. To prevent this, do not damage the sealing surface of the fuel pump unit when removing or installing.

1. Disassemble in the order indicated in **Fig. 22** .
2. Assemble in the reverse order of disassembly.



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1	E-ring
2	Fuel filter body
3	Fuel pressure regulator
4	Fuel pump
5	Fuel filter (low-pressure)

Fig. 22: Identifying Disassemble/Assemble Order Fuel Pump Unit
Courtesy of MAZDA MOTORS CORP.

FUEL PUMP UNIT INSPECTION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to BEFORE SERVICE PRECAUTION [LF] .**
- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, before performing the fuel pump unit removal/installation, always complete the "Fuel Leak Inspection After Fuel Pump Unit Installation".**
- **A person charged with static electricity could cause a fire or explosion, resulting in death or serious injury. Before draining fuel, make sure to discharge static electricity by touching the vehicle body.**

FUEL PUMP OPERATION INSPECTION

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the fuel-filler cap.
3. Start the fuel pump using the following procedure:

Using M-MDS

1. Connect the M-MDS to the DLC-2.

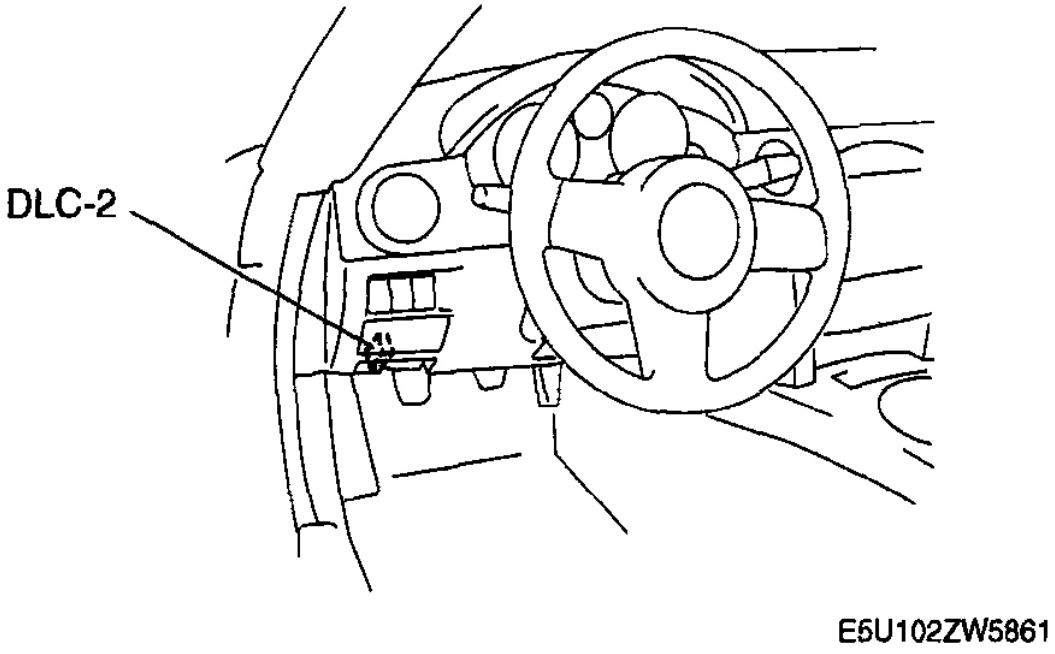

Fig. 23: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. Start the fuel pump using the "FP" simulation function.

Not using M-MDS or equivalent

1. Short the check connector terminal F/P to ground using a jumper wire.

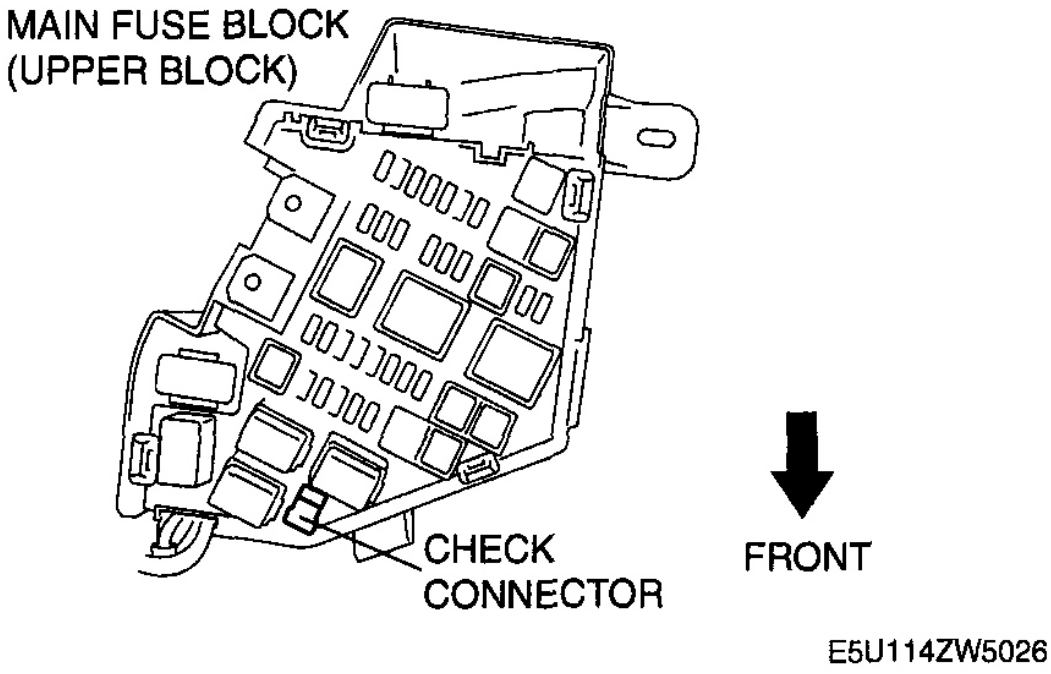

Fig. 24: Checking Connector Terminal F/P To Ground Using Jumper Wire
Courtesy of MAZDA MOTORS CORP.

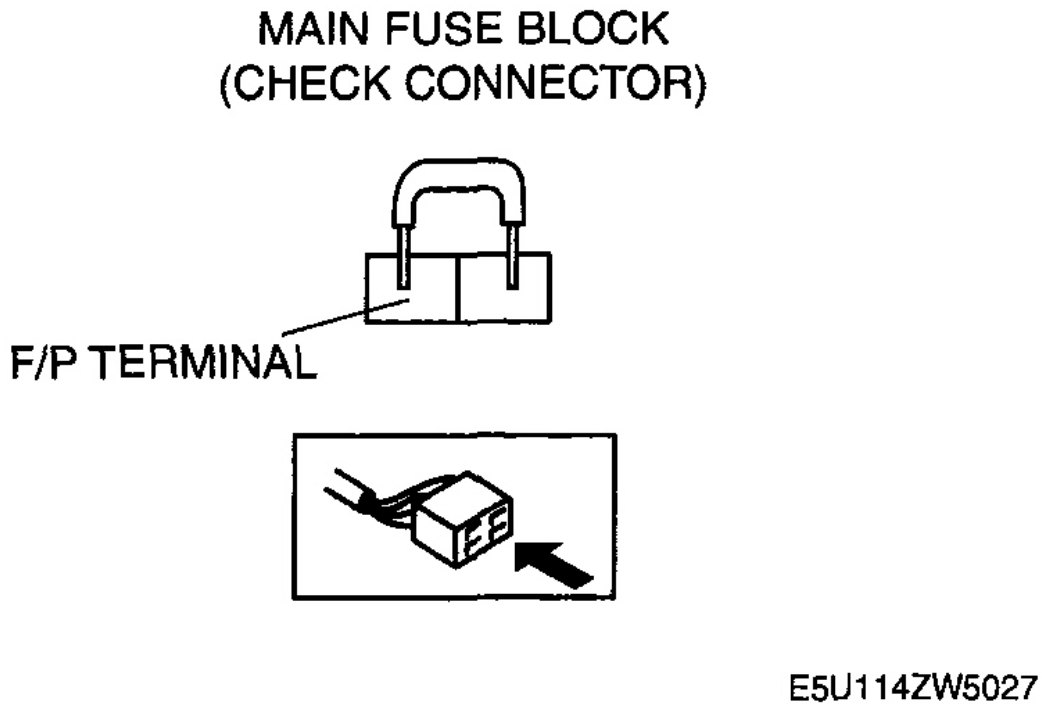

Fig. 25: Identifying F/P Connector Terminal
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position to operate the fuel pump.

4. Verify that operation sound is heard from the fuel pump.
   - If the operation sound cannot be verified, measure the voltage at fuel pump unit wiring harness-side connector terminal B.
     - If as specified, inspect the following:
       - Fuel pump unit continuity
     - If not within the specification, inspect the following:
       - Fuel pump unit relay
       - Wiring harnesses and connectors between main relay and fuel pump relay
       - Wiring harnesses and connectors between fuel pump relay and PCM
       - Wiring harnesses and connectors between battery and fuel pump relay
       - Wiring harnesses and connectors between fuel pump relay and fuel pump unit

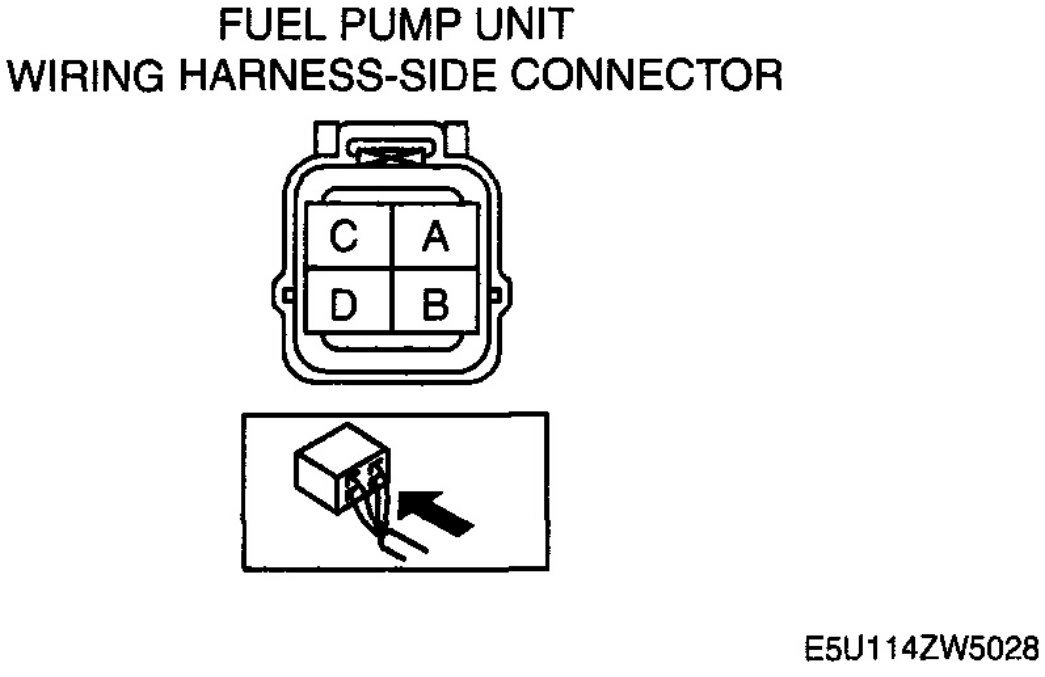

Fig. 26: Identifying Fuel Pump Unit Connector Terminal
Courtesy of MAZDA MOTORS CORP.

Standard

B+ (Ignition switch at ON)

CONTINUITY INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the fuel pump unit connector. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)

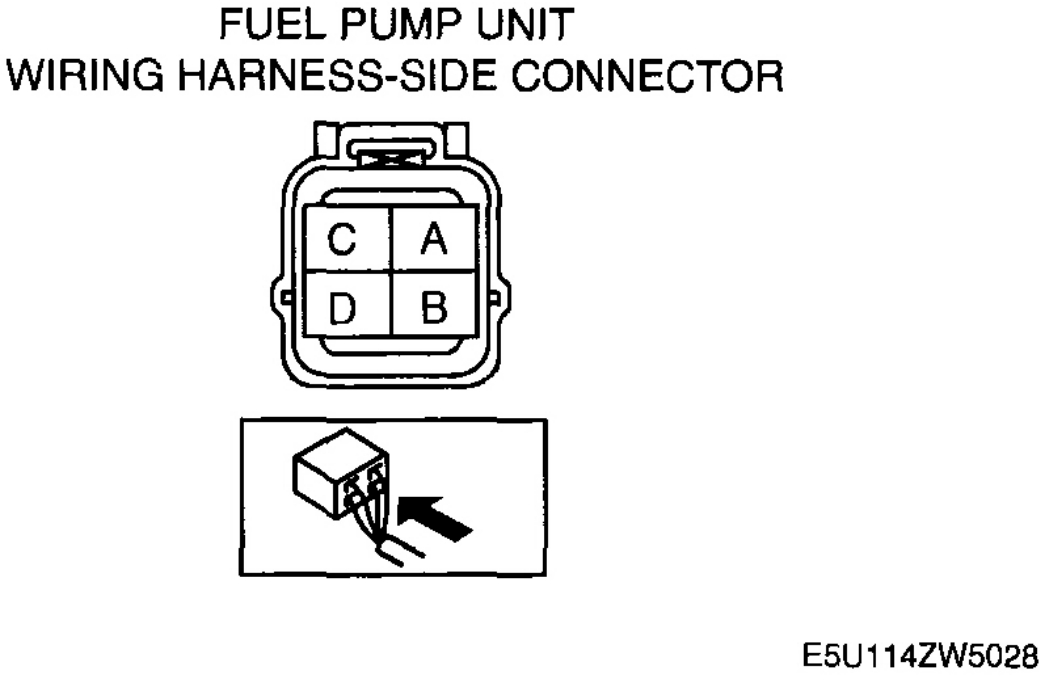

Fig. 27: Disconnecting Fuel Pump Unit Connector
Courtesy of MAZDA MOTORS CORP.

4. Inspect for continuity between fuel pump unit terminals B and D.
   - If there is continuity, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
   - If there is no continuity, replace the fuel pump. (See **FUEL PUMP UNIT DISASSEMBLY/ASSEMBLY [LF1]** .)

CIRCUIT OPEN/SHORT INSPECTION

1. Inspect the following wiring harnesses for an open or short circuit (continuity check).

   Open circuit

   - If there is no continuity, the circuit is open. Repair or replace the harness.
     - Fuel pump unit terminal D and body ground

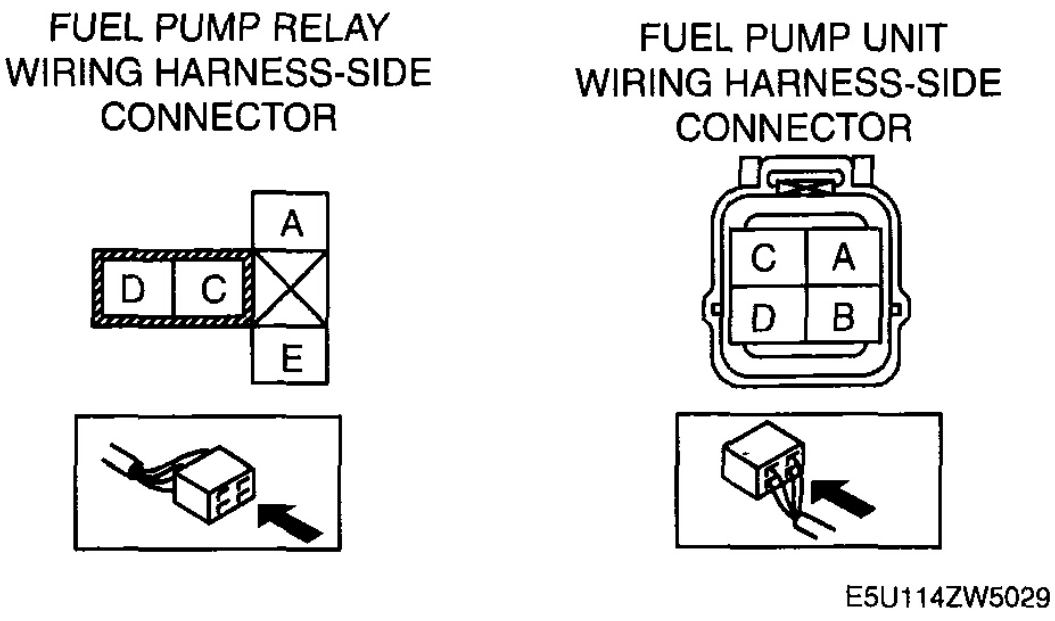

Fig. 28: Identifying Fuel Pump Unit Terminal
Courtesy of MAZDA MOTORS CORP.

FUEL STATIC PRESSURE INSPECTION

NOTE:

- **The fuel static pressure inspection cannot be performed because the pressure regulator is integrated with the fuel pump unit.**

QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to the BEFORE SERVICE PRECAUTION [LF] .**

QUICK RELEASE CONNECTOR TYPE

CAUTION:

- **There are two types of quick release connectors. Verify the type and location, and install/remove properly.**

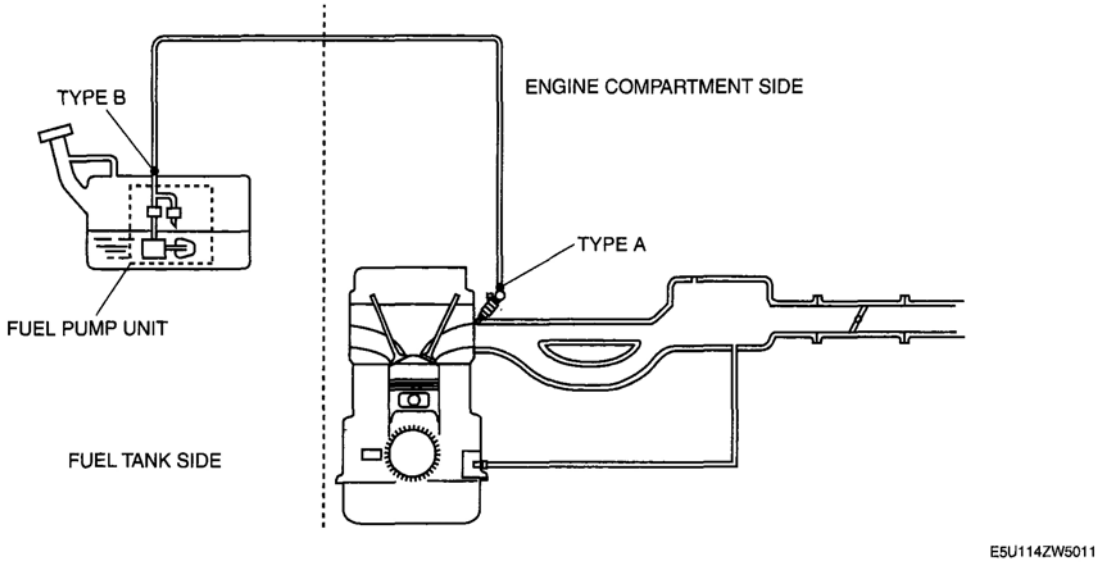

Fig. 29: Identifying Quick Release Connector (Fuel System)
Courtesy of MAZDA MOTORS CORP.

TYPE A REMOVAL

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)

CAUTION:
- **The quick release connector may be damaged if the release tab is bent excessively. Do not expand the release tab over the stopper.**

NOTE:
- **The fuel hose can be removed by pushing it to the pipe side to release the lock.**

2. Rotate the release tab on the quick release connector to the stopper position.

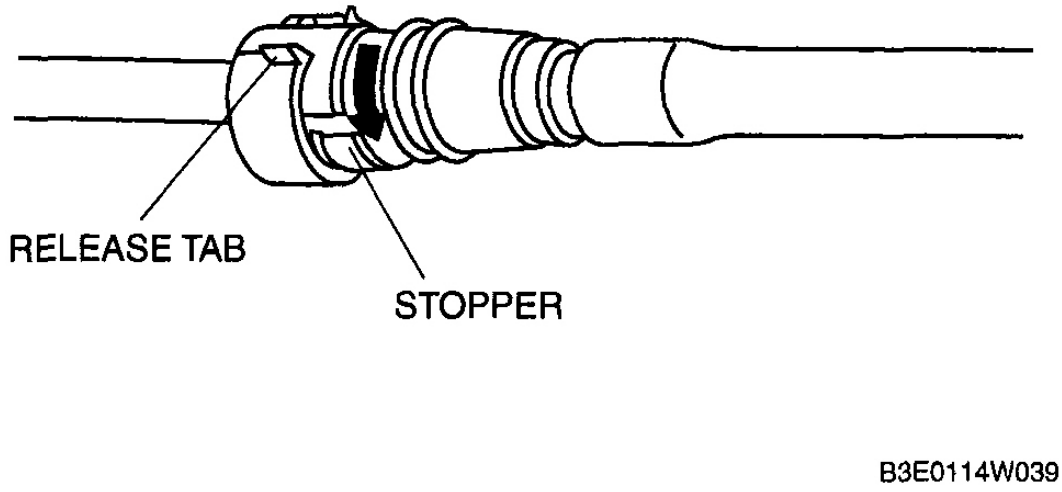

Fig. 30: Releasing Tab On Quick Release Connector To Stopper Position
Courtesy of MAZDA MOTORS CORP.

3. Pull out the fuel hose straight from the fuel pipe and disconnect it.

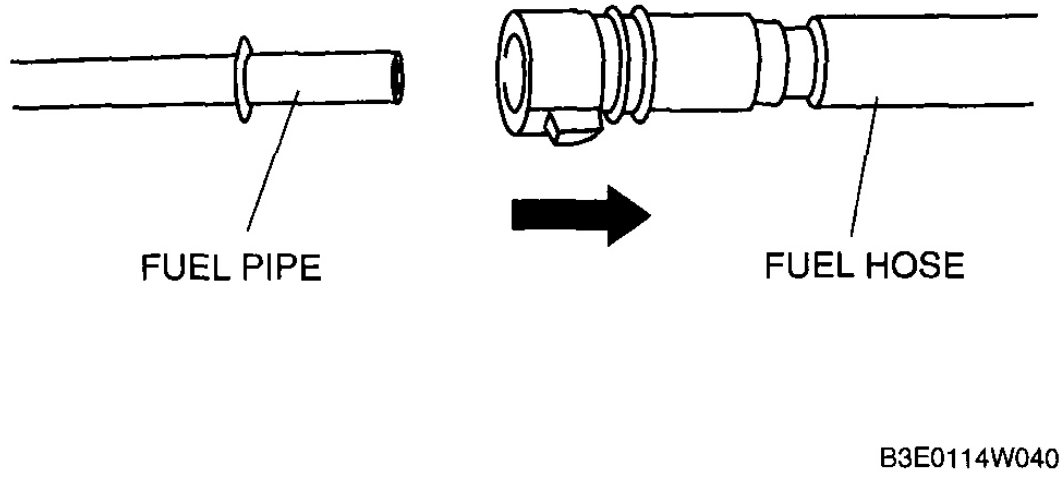

Fig. 31: Pulling Out Fuel Hose Straight From Fuel Pipe
Courtesy of MAZDA MOTORS CORP.

4. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from becoming scratched or dirty.

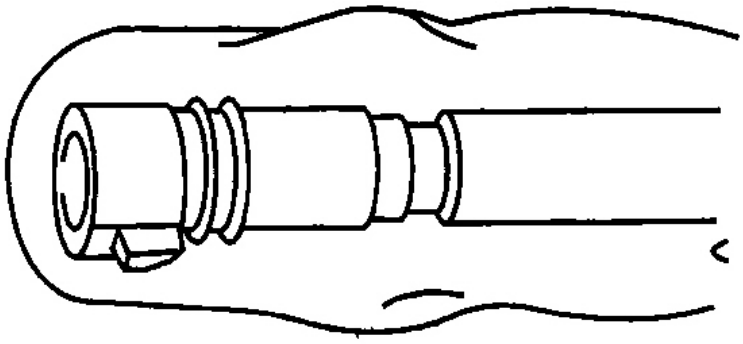

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Fig. 32: Covering Disconnected Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

TYPE B REMOVAL

CAUTION:
- **Be careful not to damage the pipe when unlocking the retainer.**

NOTE:
- **If the quick release connector is removed, replace the retainer with a new one.**

1. Follow "BEFORE SERVICE PRECAUTION" and remove dirt from the connecting surfaces before performing any work operations. (See **BEFORE SERVICE PRECAUTION [LF]** .)

NOTE:
- **The retainer is attached to the pipe even after the connector is disconnected.**

2. Set the **SST** parallel to the quick release connector.

NOTE:
- **The quick release connector can be removed by pushing the center of the retainer tabs.**

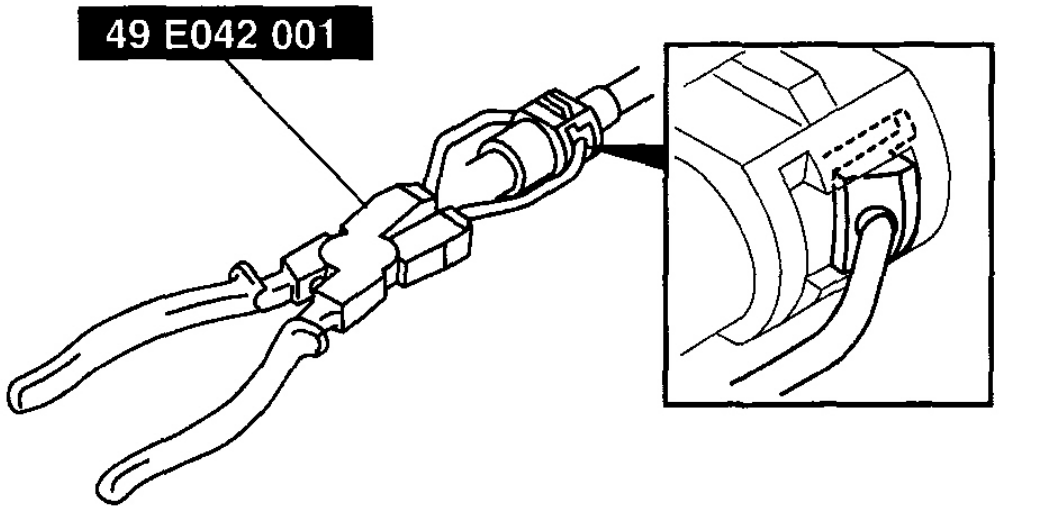


Fig. 33: Setting SST Parallel To Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

3. Hold the center of the retainer tabs with the **SST** ends and press the retainer.
4. Pull the connector side and disconnect the quick release connector.
5. Raise a retainer tab using the **SST** and remove the retainer.

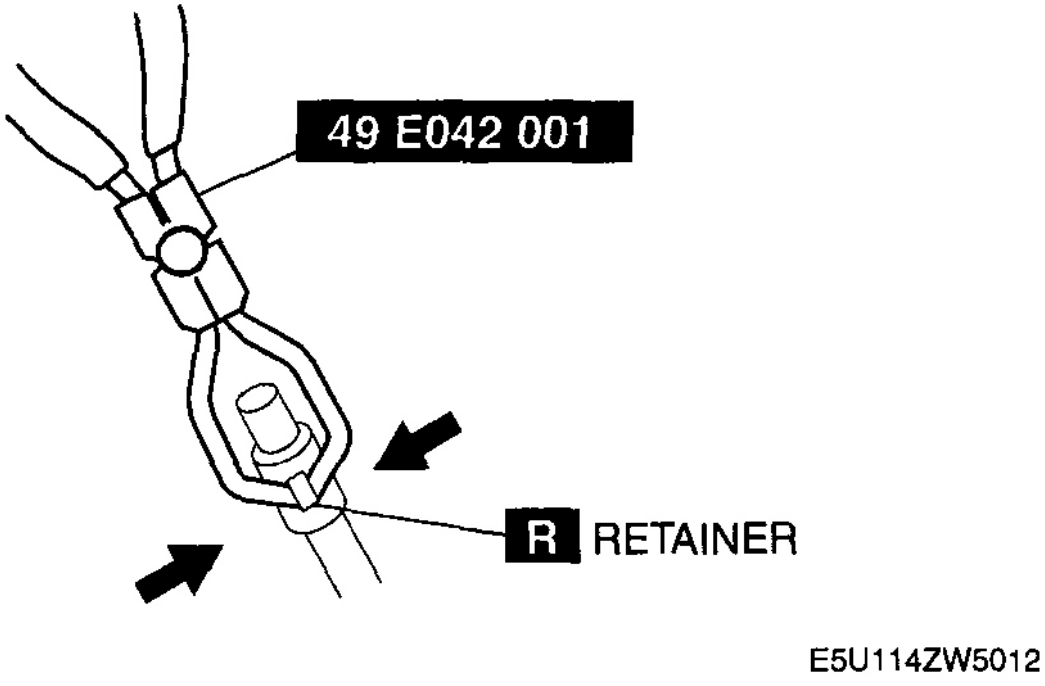


Fig. 34: Raising Retainer Tab Using SST & Removing Retainer
Courtesy of MAZDA MOTORS CORP.

6. Cover the disconnected quick release connector and fuel pipe with vinyl sheeting or a similar material to prevent it from scratches or dirt.

TYPE A INSTALLATION

NOTE:

- **If the quick release connector O-ring is damaged or has slipped, replace the fuel hose.**
- **A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.**

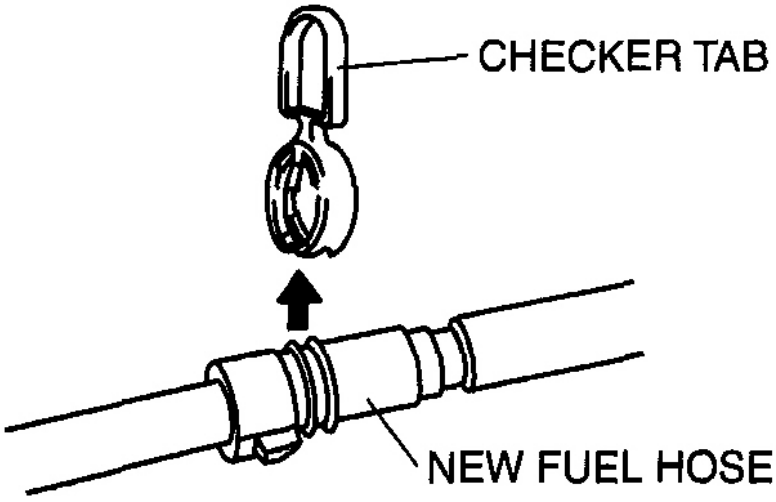


Fig. 35: Identifying Checker Tab
Courtesy of MAZDA MOTORS CORP.

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
2. Apply a small amount of clean engine oil to the sealing surface of the fuel pipe.
3. Reconnect the fuel hose straight to the fuel pipe until a click is heard.

NOTE:
- **If the quick release connector does not move at all, disconnect it, verify that the O-ring is not damaged or has not slipped, and then reconnect the quick release connector.**

4. Lightly pull and push the quick release connector a few times by hand, and then verify that it can move **2.0-3.0 mm {0.08-0.12 in}** and is connected securely.
5. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

TYPE B INSTALLATION

CAUTION:
- **Always replace the retainer with a new one when using SST 49 E042 001, otherwise, fuel leakage could result.**

NOTE:

- **If the quick release connector O-ring is damaged or has slipped, replace the piping component.**
- **A checker tab is integrated with the quick release connector for new fuel hoses and evaporative hoses. Remove the checker tab from the quick release connector after the connector is completely engaged with the fuel pipe.**

1. Inspect the fuel hose and fuel pipe sealing surface for damage and deformation.
   - If there is any malfunction, replace it with a new one.
2. Apply a small amount of clean engine oil to the sealing surface of the fuel pipe.
3. Install a new retainer to the quick release connector.

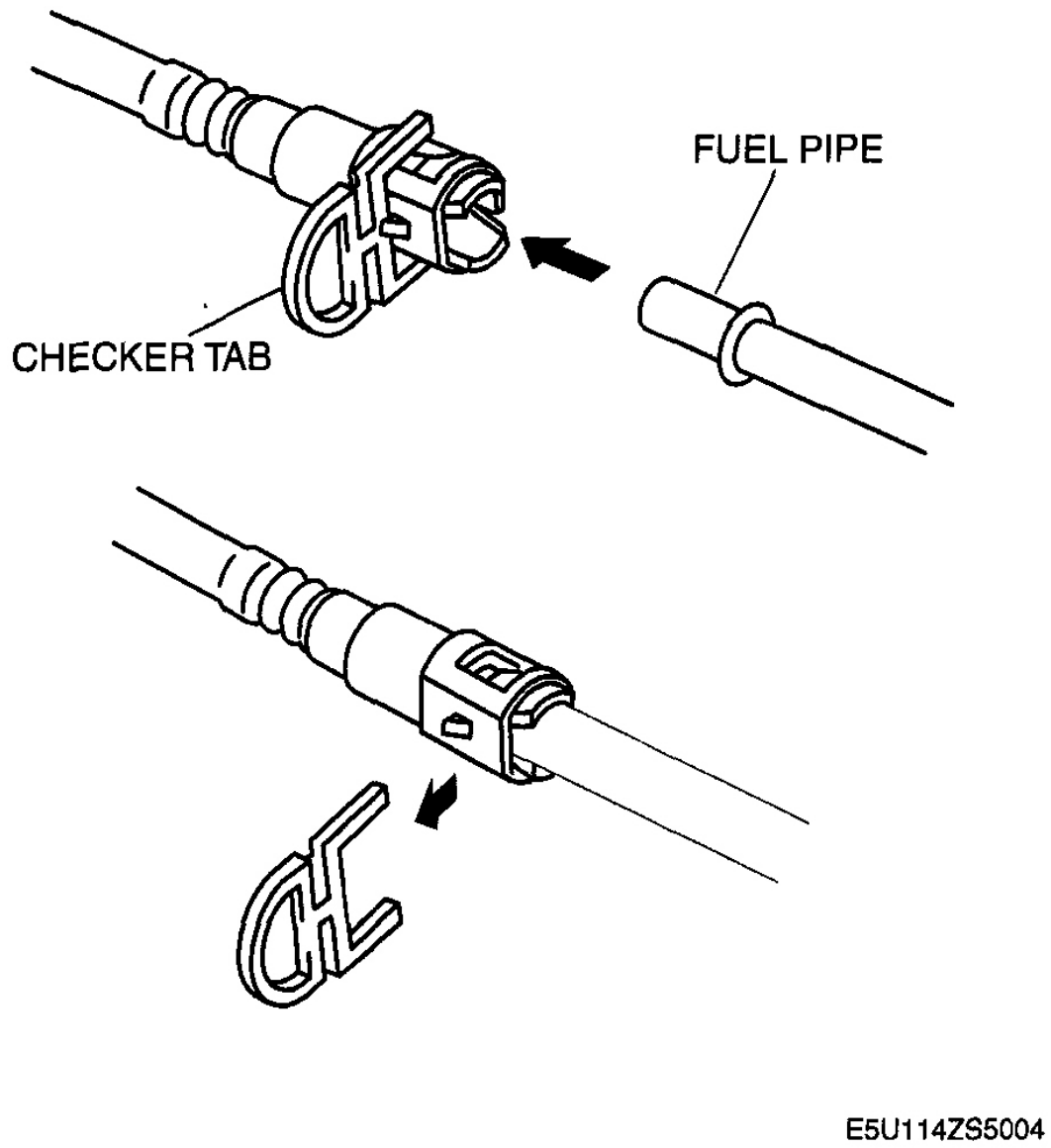


Fig. 36: Identifying Quick Release Connector
Courtesy of MAZDA MOTORS CORP.

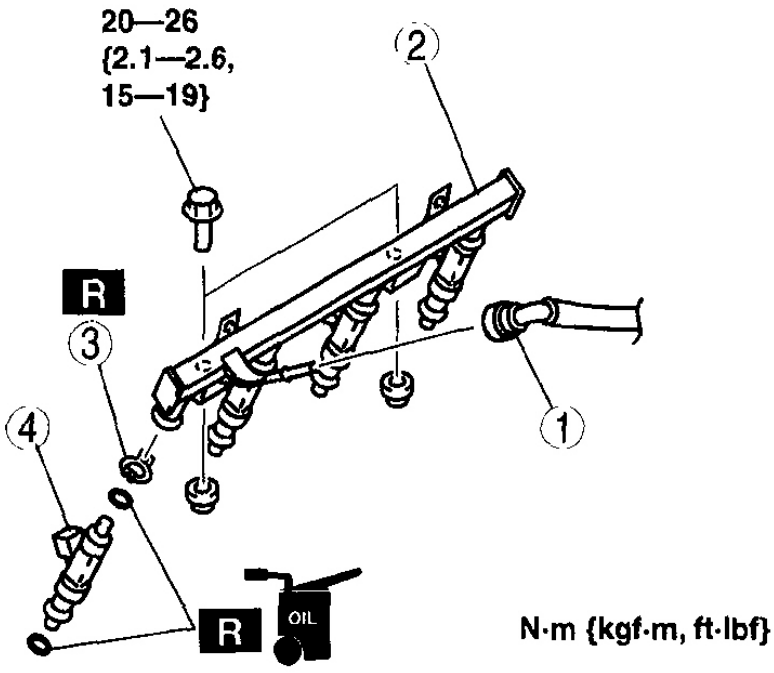
4. Reconnect the hose straight to the pipe until a click is heard.
5. Lightly pull and push the quick release connector a few times by hand, and then verify that it is connected securely.
6. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

FUEL INJECTOR REMOVAL/INSTALLATION [LF]

WARNING:

- **Fuel is very flammable liquid. If fuel spills or leaks from the pressurized fuel system, it will cause serious injury or death and facility breakage. Fuel can also irritate skin and eyes. To prevent this, always complete the "FUEL LINE SAFETY PROCEDURE", while referring to the BEFORE SERVICE PRECAUTION [LF] .**

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
3. Remove the battery cover.
4. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
5. Disconnect the fuel injector connector and move the harness slightly out of the way.
6. Remove in the order indicated in **Fig. 37** .



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1	Quick release connector (Type A)
2	Fuel distributor
3	Injector clip
4	Fuel injector

Fig. 37: Identifying Removing/Installing Order Of Fuel Injector (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

FUEL INJECTOR REMOVAL NOTE

CAUTION:
- **Use of a deformed injector clip will cause the fuel injector to be connected incorrectly and could result in fuel leakage. It will also cause the injector to rotate. Therefore, always replace the clip when the injector is removed.**

1. Insert a flathead screwdriver between the injector cup and clip finger.

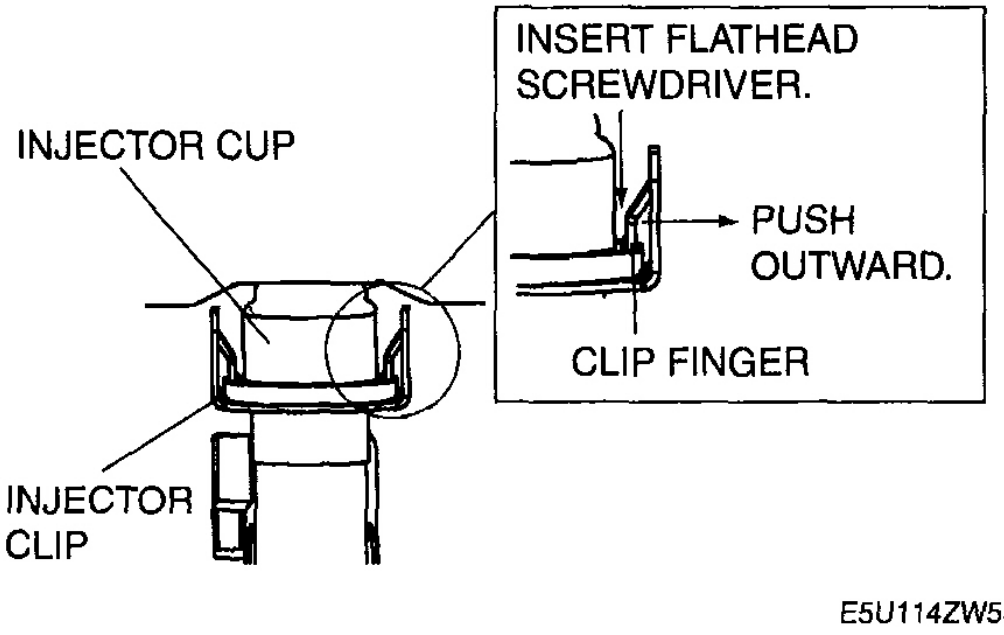


Fig. 38: Inserting Flathead Screwdriver Between Injector Cup & Clip Finger
Courtesy of MAZDA MOTORS CORP.

NOTE:
- **When pushing the clip finger outward, deform the finger until it is removed completely from the cup notch.**

2. Push the clip finger outward using a flathead screwdriver.
3. Remove the injector with the clip.
4. Remove the clip from the fuel injector using the following procedure:

NOTE:
- **The clip will not be reused.**

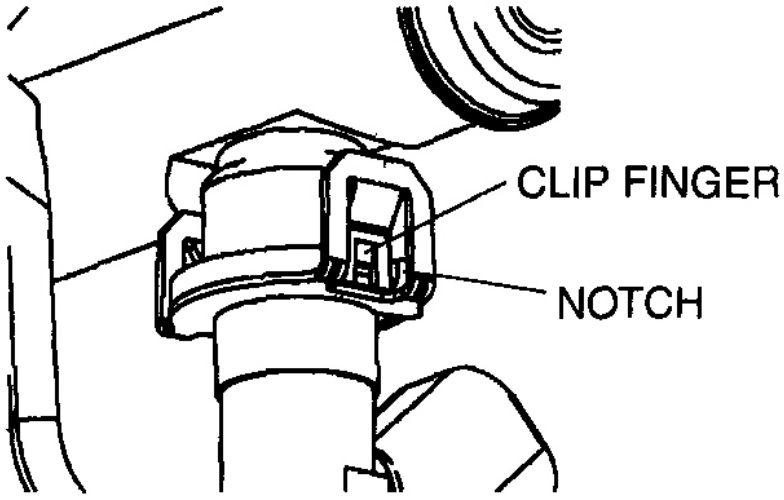


Fig. 39: Identifying Clip Finger And Notch
Courtesy of MAZDA MOTORS CORP.

1. Hold the clip using pliers.
2. Pull the clip parallel to the injector groove and remove it from the injector.

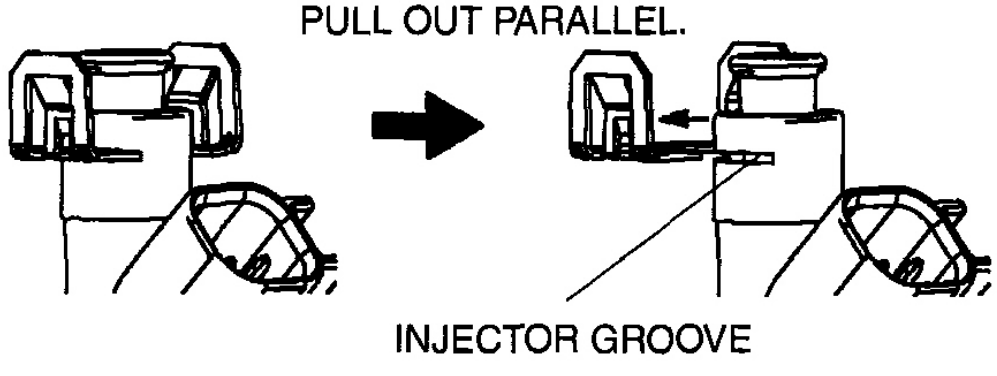


Fig. 40: Pulling Clip Parallel To Injector Groove
Courtesy of MAZDA MOTORS CORP.

FUEL INJECTOR INSTALLATION NOTE

1. Apply a small amount of clean oil to the injector groove and the O-ring.
2. Temporarily attach a new clip to the injector groove.

NOTE:
- **When the clip is attached correctly, the central area of the injector and the clip finger positions are aligned.**

3. Hold the injector firmly and push the clip into the injector until the clip stops sliding.
4. Verify that the injector connector position is correct.
5. Press the injector into the injector cup. Continue pressing until the clip contacts the lower surface of the injector cup.
6. Verify that the injector and clip are correctly installed with the clip locked onto the injector cup notch.

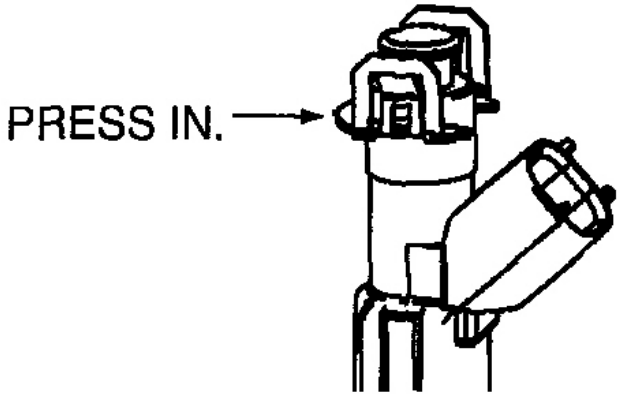


Fig. 41: Installing Fuel Injector
Courtesy of MAZDA MOTORS CORP.

FUEL INJECTOR INSPECTION [LF]

NOTE:

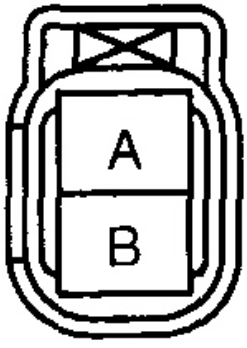
- **Perform the following inspection only when directed.**

RESISTANCE INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the fuel injector connector.
4. Inspect the resistance between fuel injector terminals A and B using a tester.
   - If within the specification, perform the **CIRCUIT OPEN/SHORT INSPECTION**.
   - If not within the specification, replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)

   Fuel injector resistance

   11.4-12.6 ohms [20°C {68°F}]



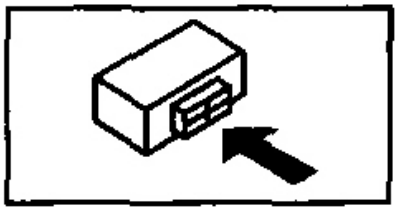


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Fig. 42: Identifying Fuel Injector Terminals A & B Using Tester
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for open or short circuit (continuity check).

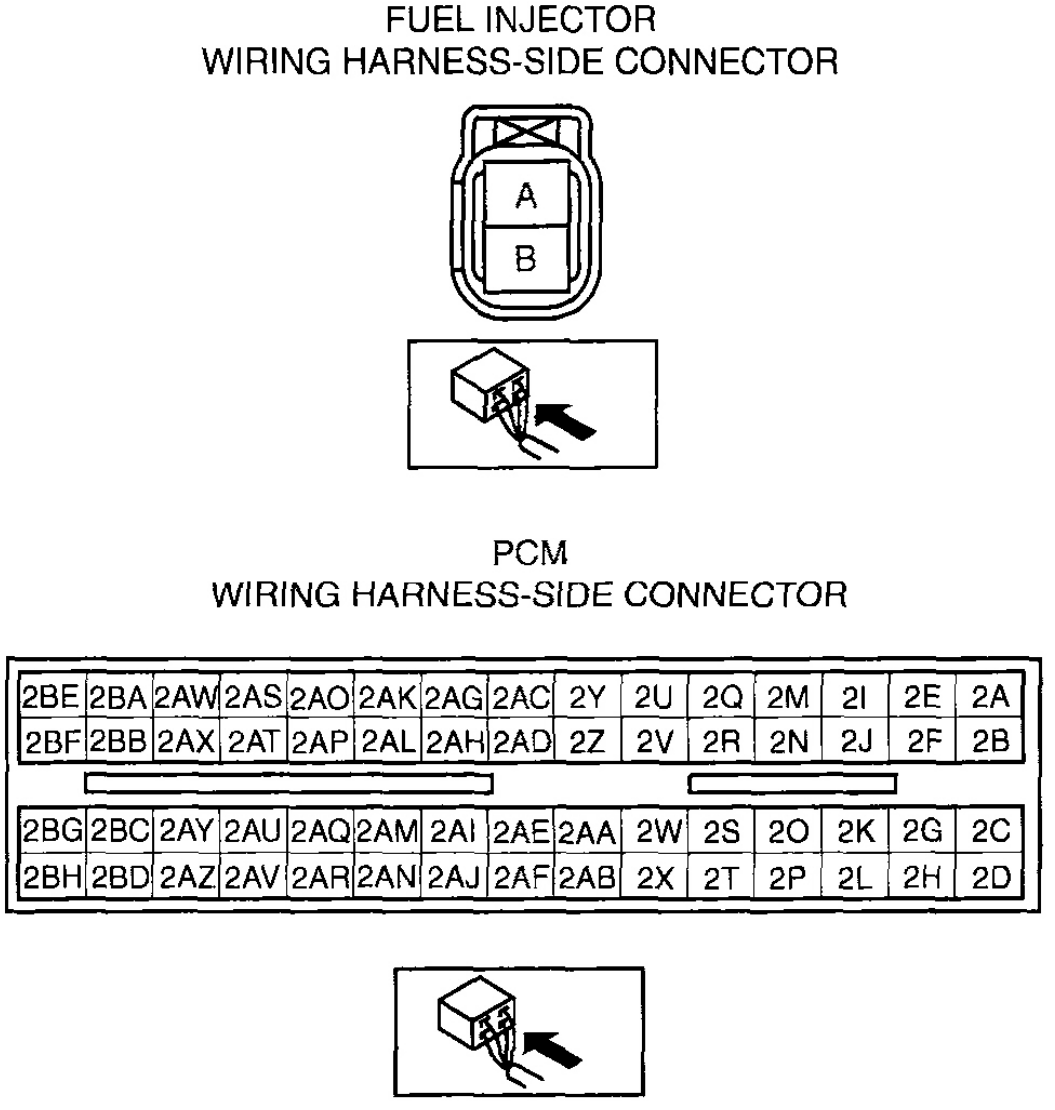

Fig. 43: Identifying Fuel Injector Connector & PCM Connector Terminal
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, there is an open circuit. Repair or replace the wiring harness.
  - Fuel injector No.1 terminal B and PCM terminal 2BB
  - Fuel injector No.2 terminal B and PCM terminal 2BC
  - Fuel injector No.3 terminal B and PCM terminal 2BD
  - Fuel injector No.4 terminal B and PCM terminal 2AZ
  - Fuel injector No.1 terminal A and main relay
  - Fuel injector No.2 terminal A and main relay
  - Fuel injector No.3 terminal A and main relay
  - Fuel injector No.4 terminal A and main relay

Short Circuit

- If there is continuity, there is a short circuit. Repair or replace the wiring harness.
  - Fuel injector No.1 terminal B and body ground
  - Fuel injector No.1 terminal B and power supply
  - Fuel injector No.2 terminal B and body ground
  - Fuel injector No.2 terminal B and power supply
  - Fuel injector No.3 terminal B and body ground
  - Fuel injector No.3 terminal B and power supply
  - Fuel injector No.4 terminal B and body ground
  - Fuel injector No.4 terminal B and power supply
  - Fuel injector No.1 terminal A and body ground
  - Fuel injector No.2 terminal A and body ground
  - Fuel injector No.3 terminal A and body ground
  - Fuel injector No.4 terminal A and body ground

LEAKAGE INSPECTION

WARNING:

- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.**

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the fuel injector and fuel distributor as a single unit. (See **FUEL INJECTOR**

REMOVAL/INSTALLATION [LF] .)

5. Fix the fuel injector to the fuel distributor with a wire or the equivalent.

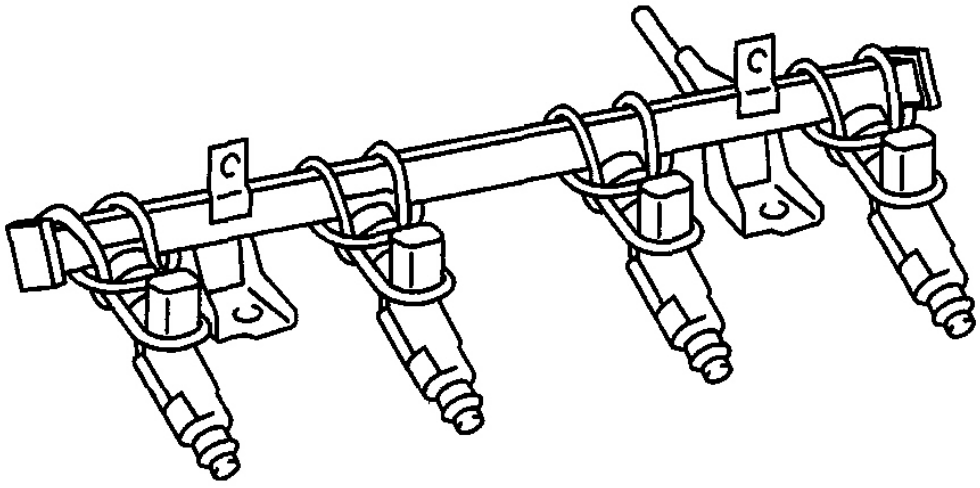

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Fig. 44: Fixing Fuel Injector To Fuel Distributor With Wire
Courtesy of MAZDA MOTORS CORP.

6. Connect the fuel hose.
7. Start the fuel pump using the following procedure:

Using M-MDS

1. Connect the negative battery cable.
2. Connect the M-MDS to the DLC-2.

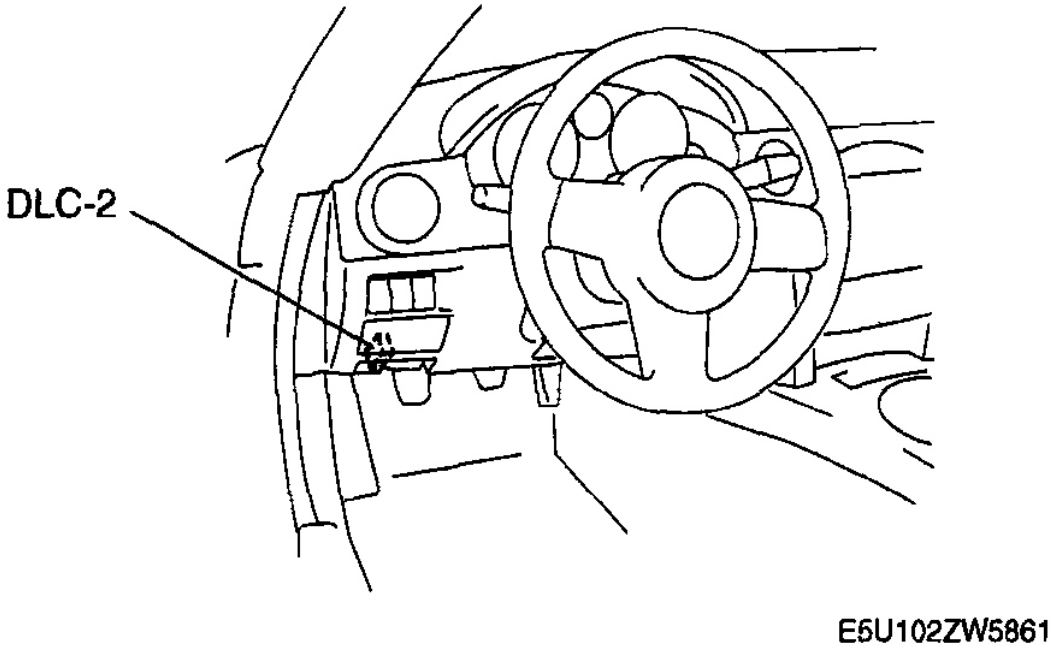


Fig. 45: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Start the fuel pump using the "FP" simulation function.

Not using M-MDS

1. Short the check connector terminal F/P to ground using a jumper wire.

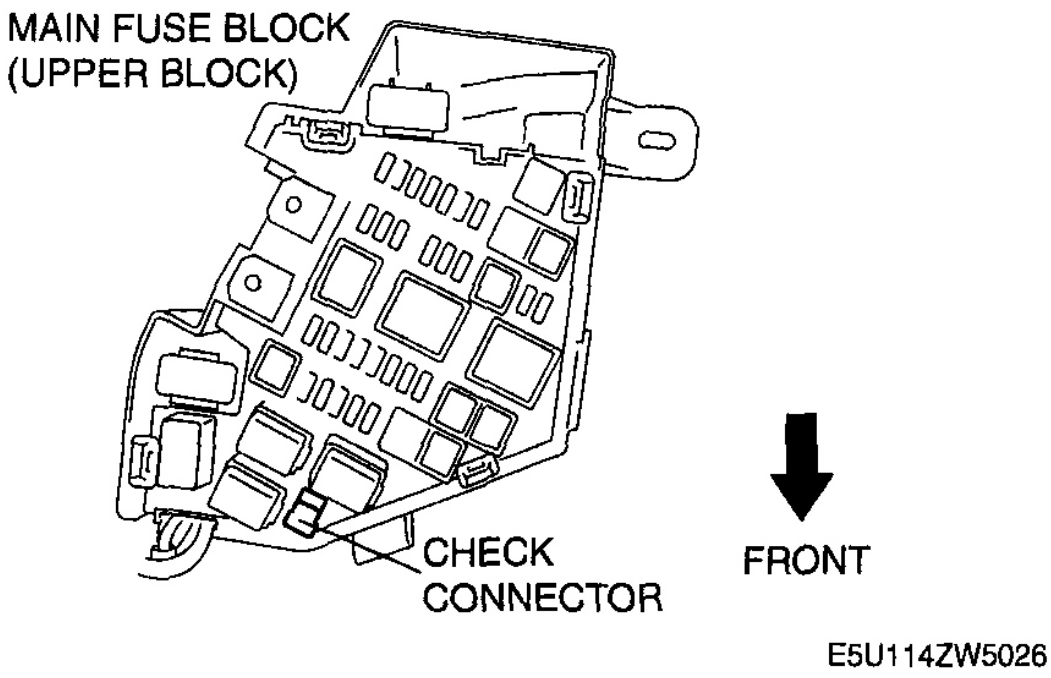


Fig. 46: Checking Connector Terminal F/P To Ground Using Jumper Wire
Courtesy of MAZDA MOTORS CORP.

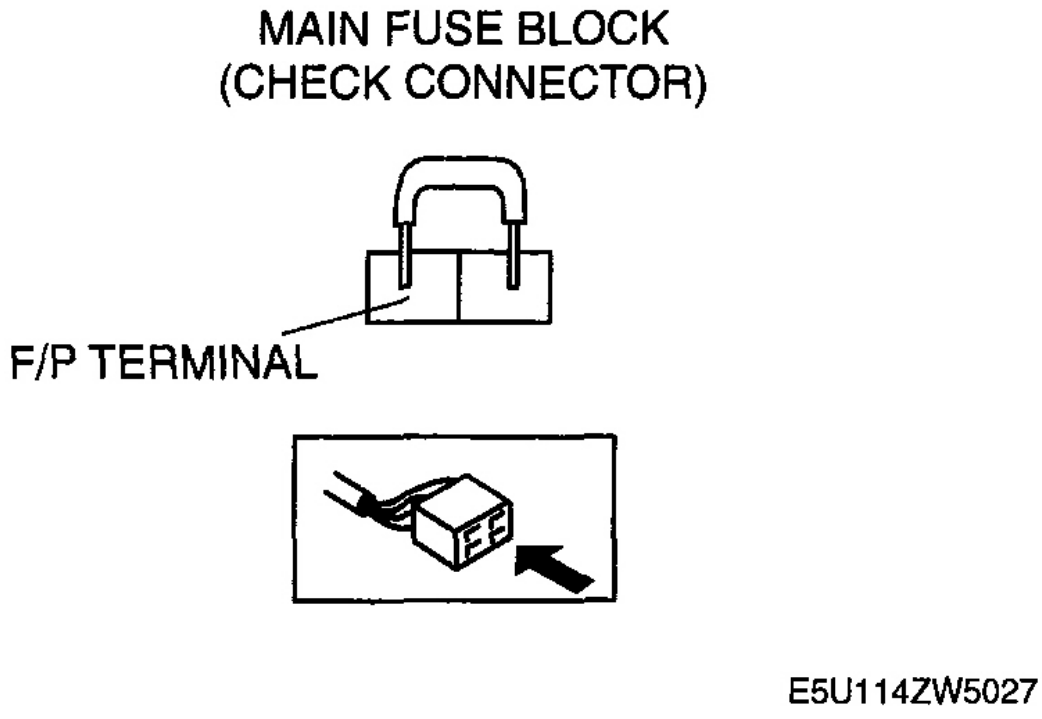


Fig. 47: Identifying F/P Connector Terminal
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position to operate the fuel pump.

NOTE:
- **Prepare a container to collect the gasoline.**

8. Tilt the fuel injector at an angle of **24°** to inspect for leakage.
   - If not within the specification, replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .

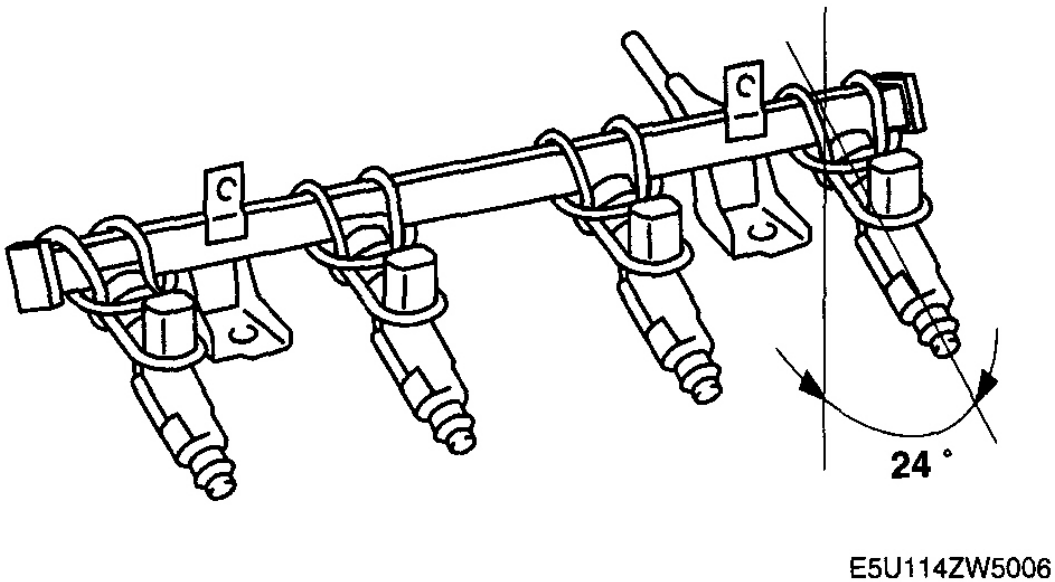


Fig. 48: Tilting Fuel Injector
Courtesy of MAZDA MOTORS CORP.

Fuel injector leakage amount

Less than 1 drop/2 min

9. Stop the fuel pump using the following procedure:

Using M-MDS

1. Stop the fuel pump using the "FP" simulation function.

Not using M-MDS

1. Turn the ignition switch to off to stop the fuel pump.

10. Remove the battery cover.
11. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
12. Remove the wire or equivalent securing the fuel injector.
13. Install the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
14. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

INJECTION VOLUME INSPECTION

WARNING:

- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. To prevent this, complete the following inspection with the engine stopped.**

1. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
5. Connect the fuel injector to the fuel injector tester.
6. Start the fuel pump using the following procedure:

Using M-MDS

1. Connect the negative battery cable.
2. Connect the M-MDS or equivalent to the DLC-2.

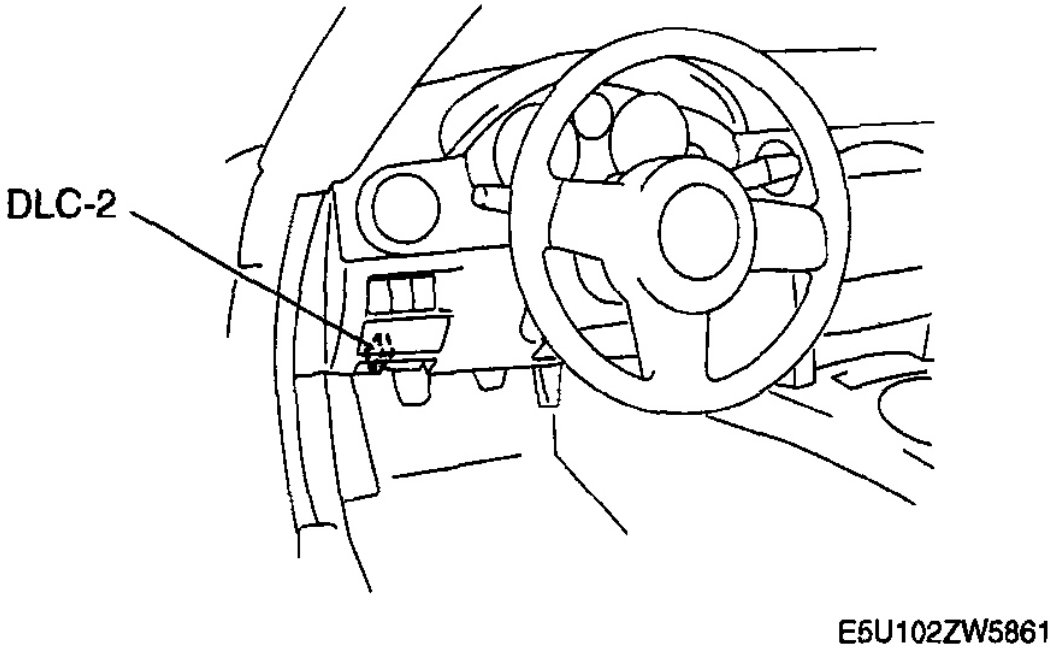


Fig. 49: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Start the fuel pump using the "FP" simulation function.

Not using M-MDS

1. Short the check connector terminal F/P to ground using a jumper wire.

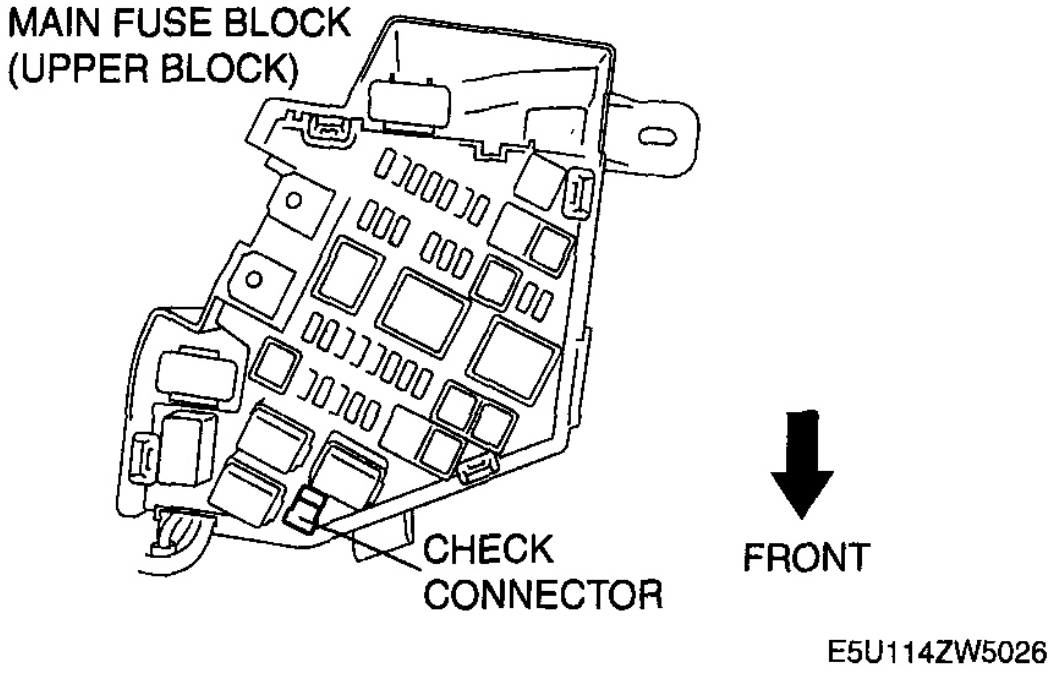


Fig. 50: Checking Connector Terminal F/P To Ground Using Jumper Wire
Courtesy of MAZDA MOTORS CORP.

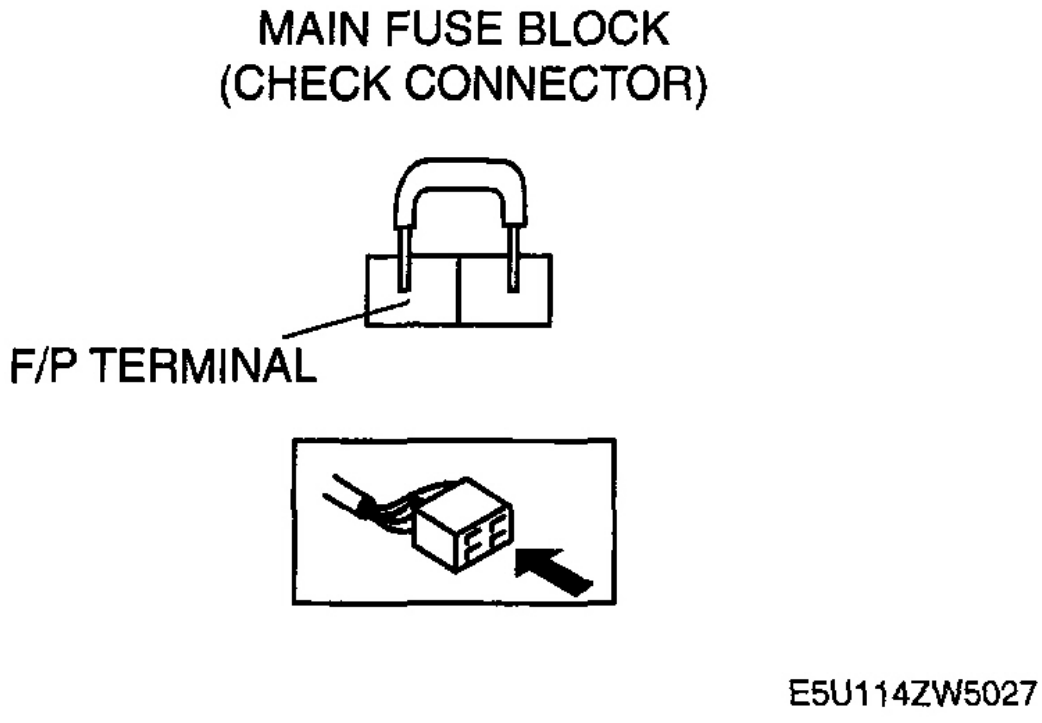


Fig. 51: Identifying F/P Connector Terminal
Courtesy of MAZDA MOTORS CORP.

2. Turn the ignition switch to the ON position to operate the fuel pump.

7. Measure the injection volume of each fuel injector.
   - If not within the specification, replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)

   Fuel injection volume

   204-216 ml {204-216 cc, 12.5-13.1 cu in}/min

8. Turn the ignition switch to off to stop the fuel pump.
9. Install the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
10. Complete the "AFTER SERVICE PRECAUTION". (See **AFTER SERVICE PRECAUTION [LF]** .)

ATOMIZATION INSPECTION

1. Inspect the atomization status.
   - If not normal, replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION**

[LF] .)

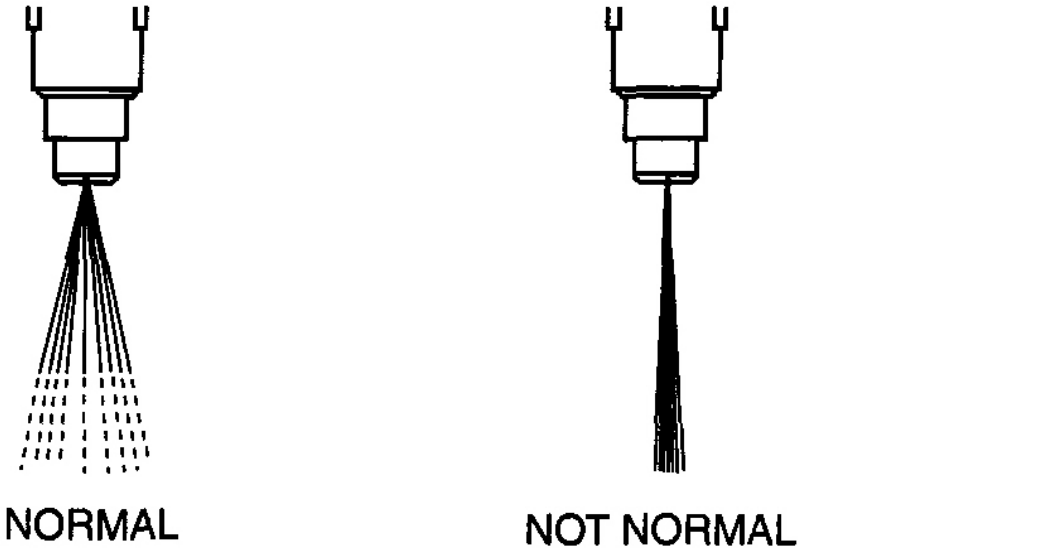
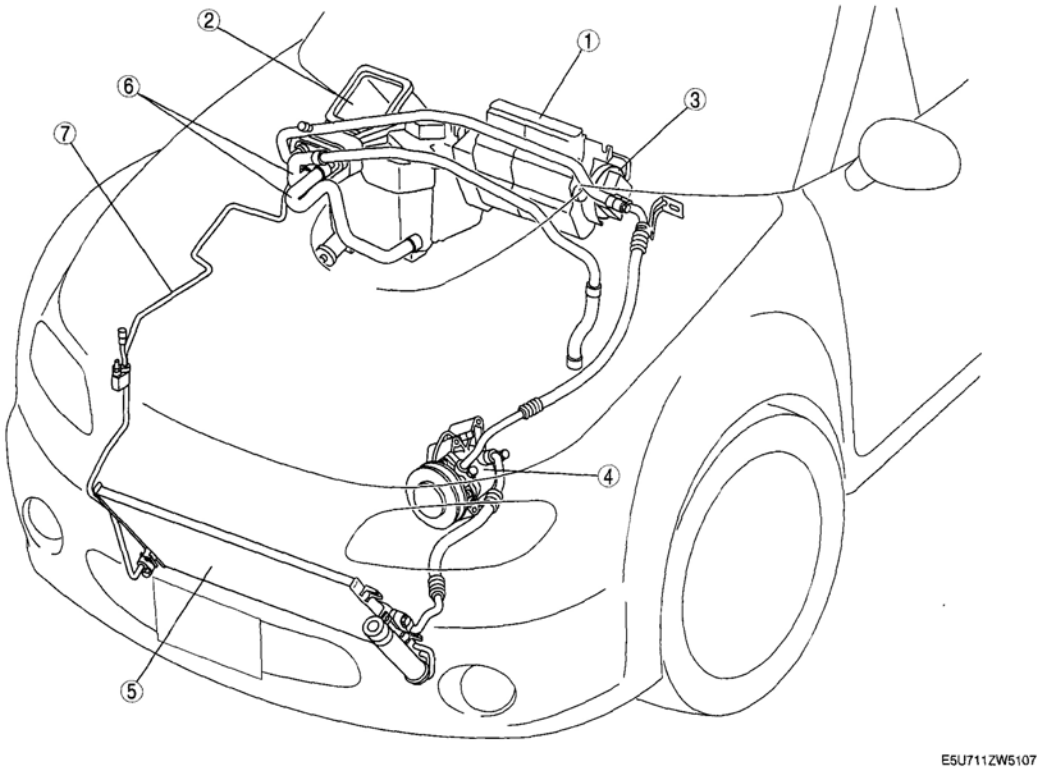


Fig. 52: Inspecting Atomization Status
Courtesy of MAZDA MOTORS CORP.

2007 HVAC

Basic System - MX-5 Miata

HVAC BASIC SYSTEM



1	Air dist unit
2	A/C unit
3	Airflow mode main link
4	A/C compressor
5	Condenser
6	Heater hose
7	Refrigerant line

Fig. 1: Identifying Location Of HVAC Basic System Components
Courtesy of MAZDA MOTORS CORP.

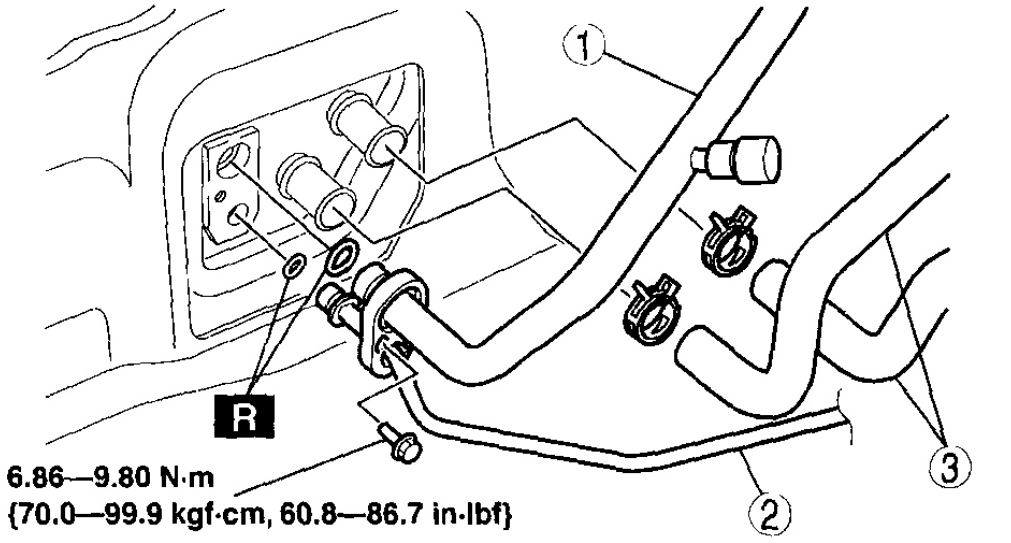
AIR DISTRIBUTION UNIT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]**)
3. Discharge the refrigerant from the system. (See **REFRIGERANT RECOVERY** .) (See **REFRIGERANT CHARGING** .)
4. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)

5. Disconnect from A/C unit in the order in **Fig. 2** .

CAUTION:

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other malfunction could occur. Always plug open fittings immediately after removing any refrigeration cycle parts.**



1	Cooler pipe No.3 (LO)
2	Cooler pipe No.2 (HI)
3	Heater hose

Fig. 2: Disconnect A/C Unit Pipe Lines (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Glove compartment (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
    3. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    4. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    5. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
    6. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
    7. Knee bolster

8. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
9. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
10. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
11. Combination switch (See **COMBINATION SWITCH REMOVAL/INSTALLATION** .)
12. Steering shaft (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
13. Meter hood (See **METER HOOD REMOVAL/INSTALLATION** .)
14. Instrument cluster (See **INSTRUMENT CLUSTER REMOVAL/INSTALLATION** .)
15. Side panel (See **SIDE PANEL REMOVAL/INSTALLATION** .)
16. Hood release lever (See **HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
17. Female bracket (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
18. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
19. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
20. Front side trim (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
21. Fuse box No.1
22. Dashboard (See **DASHBOARD REMOVAL/INSTALLATION** .)

7. Remove the air distribution unit and A/C unit.

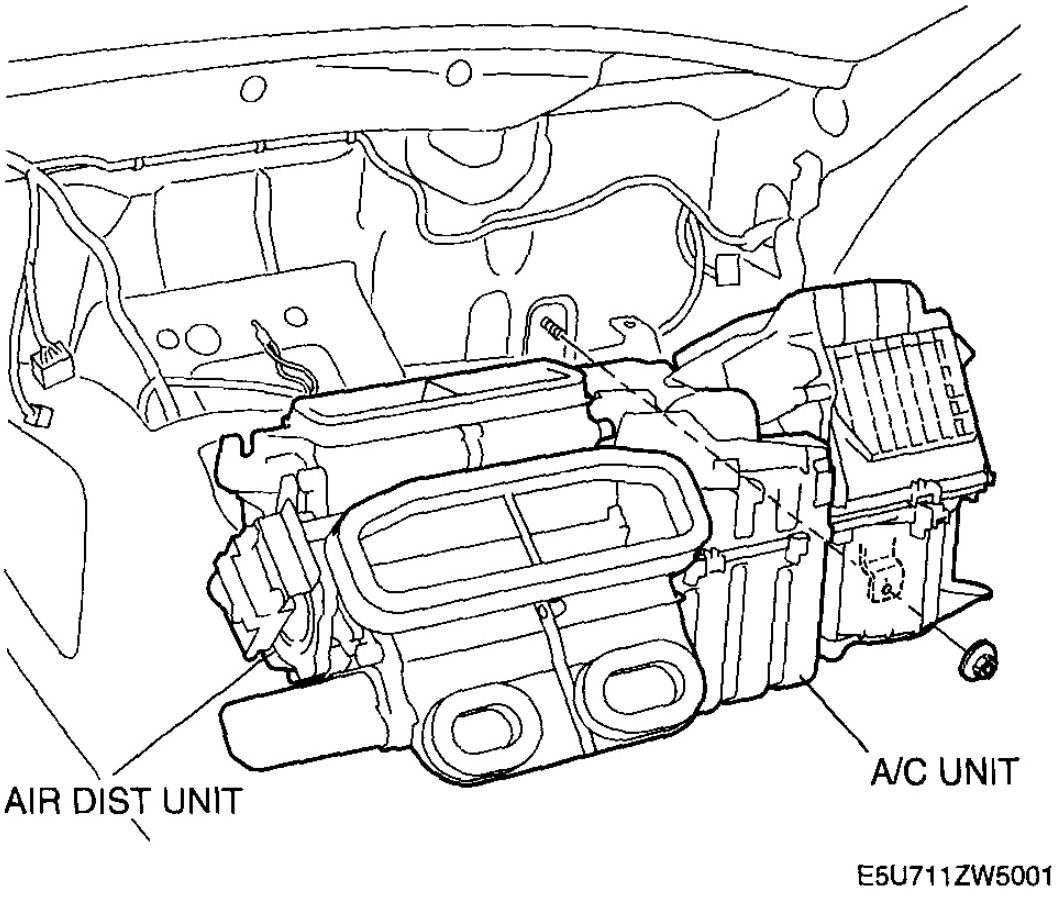


Fig. 3: Removing Air Distribution Unit & A/C Unit
Courtesy of MAZDA MOTORS CORP.

8. Disassemble the air distribution unit as shown in **Fig. 4** .
9. Install in the reverse order of removal.
10. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

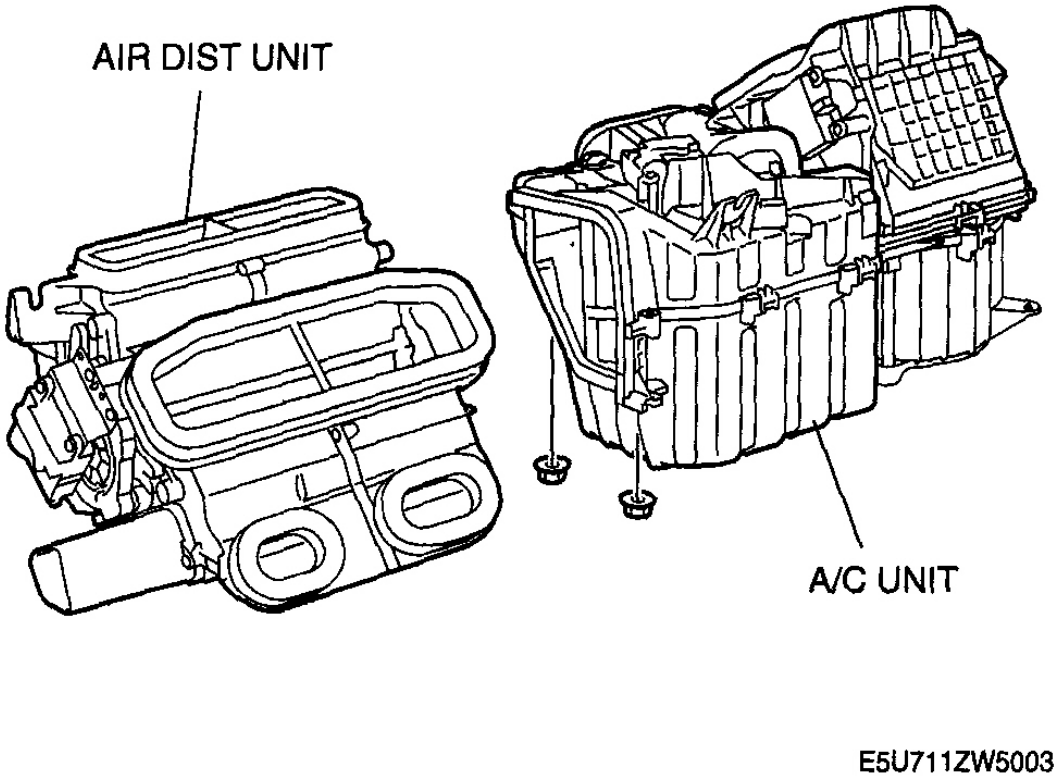


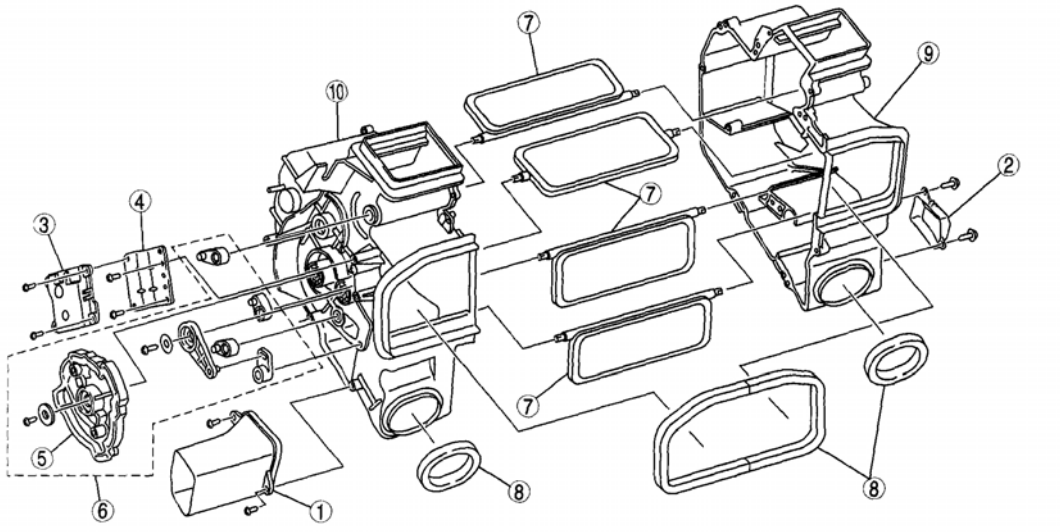
Fig. 4: Identifying Air Distribution Unit
Courtesy of MAZDA MOTORS CORP.

AIR DISTRIBUTION UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 5** .

CAUTION:

- **If a non-specified grease is used, it may result in abnormal noise or improper operation of the links. Apply only the specified grease to each link.**



1	Duct (1)
2	Duct (2)
3	Airflow mode actuator
4	Bracket
5	Airflow mode main link

6	Airflow mode link set
7	Airflow mode door
8	Polyurethane form
9	Case (1)
10	Case (2)

Fig. 5: Exploded View Of Air Distribution Unit Components
Courtesy of MAZDA MOTORS CORP.

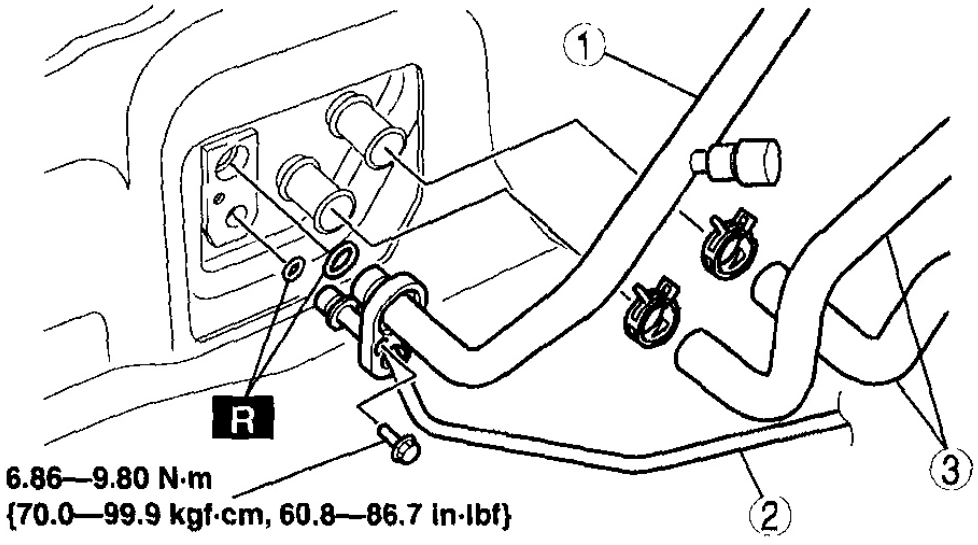
2. Assemble in the reverse order of disassembly.

A/C UNIT REMOVAL/INSTALLATION

1. Remove battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Discharge the refrigerant from the system. (See **REFRIGERANT RECOVERY** .) (See **REFRIGERANT CHARGING** .)
4. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
5. Disconnect from A/C unit in the order in **Fig. 6** .

CAUTION:

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other malfunction could occur. Always plug open fittings immediately after removing any refrigeration cycle parts.**



1	Cooler pipe No.3 (LO)
2	Cooler pipe No.2 (HI)
3	Heater hose

Fig. 6: Removing Refrigerant Line From A/C Unit (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Remove the A/C unit and air distribution unit. (See **AIR DISTRIBUTION UNIT REMOVAL/INSTALLATION** .)
7. Disassembly the A/C unit as shown in **Fig. 7** .
8. Install in the reverse order of removal.
9. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

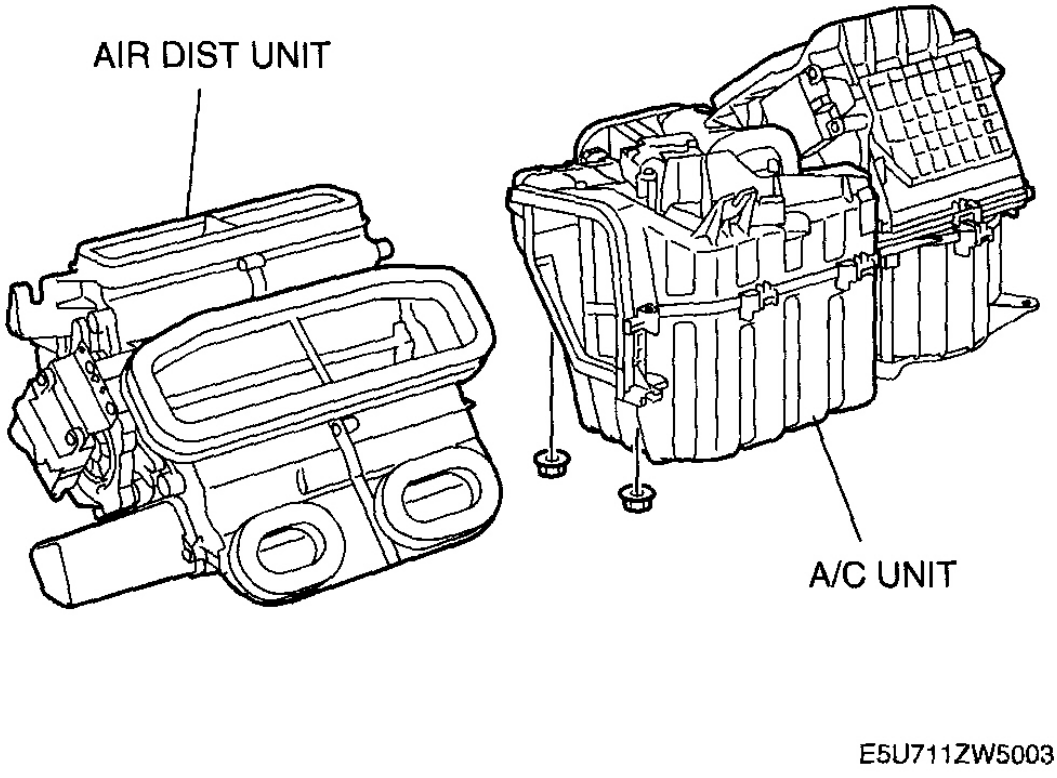


Fig. 7: Identifying A/C Unit
Courtesy of MAZDA MOTORS CORP.

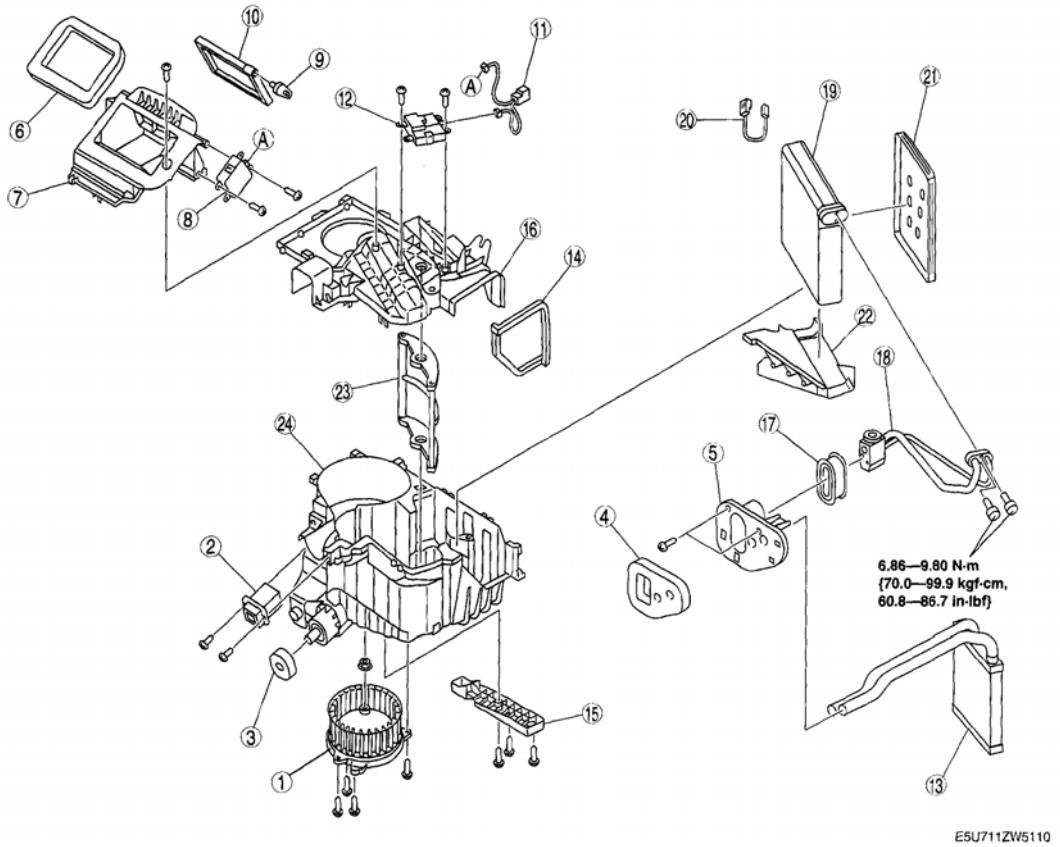
A/C UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 8** .

CAUTION:

- **If a non-specified grease is used, it may result in abnormal noise or improper operation of the links. Apply only the specified grease to each link.**
- **If the air mix damper is removed and reinstalled improperly because the original installation position cannot be specified, the air mix damper and air mix actuator may be damaged when it is operated. Therefore, set the air mix to the middle position before disassembling so that the installation position can be specified.**

2. Assemble in the reverse order of disassembly.



1	Blower motor
2	Power MOS FET
3	Polyurethane foam (1)
4	Polyurethane foam (2)
5	Cover (1)
6	Adhesive polyurethane (1)
7	Air intake box
8	Air intake actuator
9	Air intake crank
10	Air intake door
11	Harness
12	Air mix actuator
13	Heater core

14	Adhesive polyurethane (2)
15	Cover (2)
16	A/C case (1)
17	Cover (3)
18	Expansion valve
19	Evaporator
20	Evaporator temperature sensor
21	Cover (4)
22	Insulator
23	Air mix damper
24	A/C case (2)

Fig. 8: Exploded View Of A/C Unit Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

EVAPORATOR TEMPERATURE SENSOR ASSEMBLY NOTE

1. Assemble the evaporator temperature sensor as shown in **Fig. 9** .

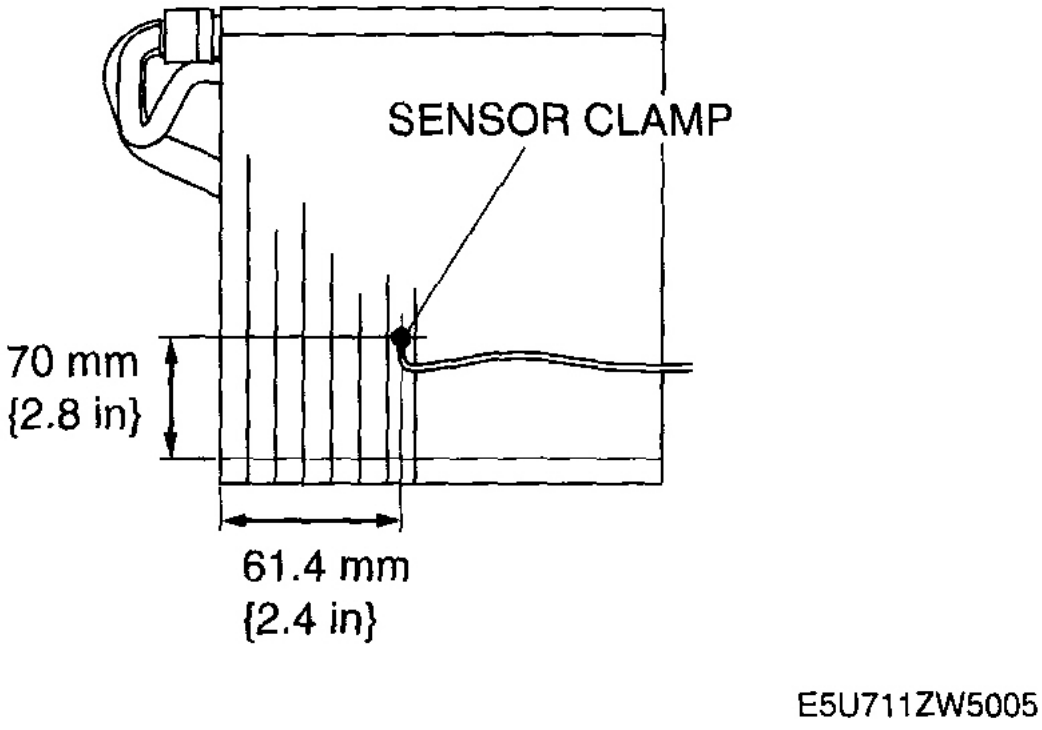


Fig. 9: Assembling Evaporator Temperature Sensor
Courtesy of MAZDA MOTORS CORP.

EVAPORATOR INSPECTION

1. Inspect the evaporator for damage, cracks and oil leakage.
   - If there is any malfunction, replace the evaporator.
2. Visually inspect the fins for bending.
   - If there is any bending, use the end of a flathead screwdriver to straighten the fins.

HEATER CORE INSPECTION

1. Inspect the heater core for damage, cracks and water leakage.
   - If there is any malfunction, replace the heater core.
2. Visually inspect the fins for bending.
   - If there is any bending, use the end of a flathead screwdriver to straighten the fins.
3. Visually inspect the heater hose for deformation.
   - Repair with pliers if there is deformation. If there is any malfunction, replace the heater core.

AIRFLOW MODE MAIN LINK REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the airflow mode actuator. (See **AIRFLOW MODE ACTUATOR REMOVAL/INSTALLATION** .)
4. Remove the airflow mode main link as shown in **Fig. 10** .
5. Install in the reverse order of removal.

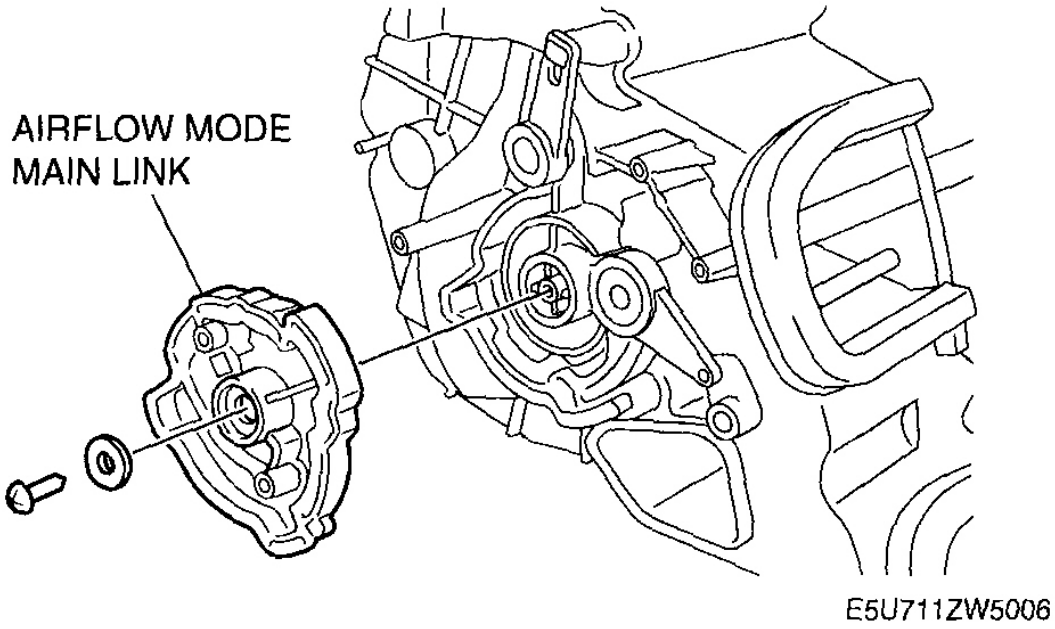


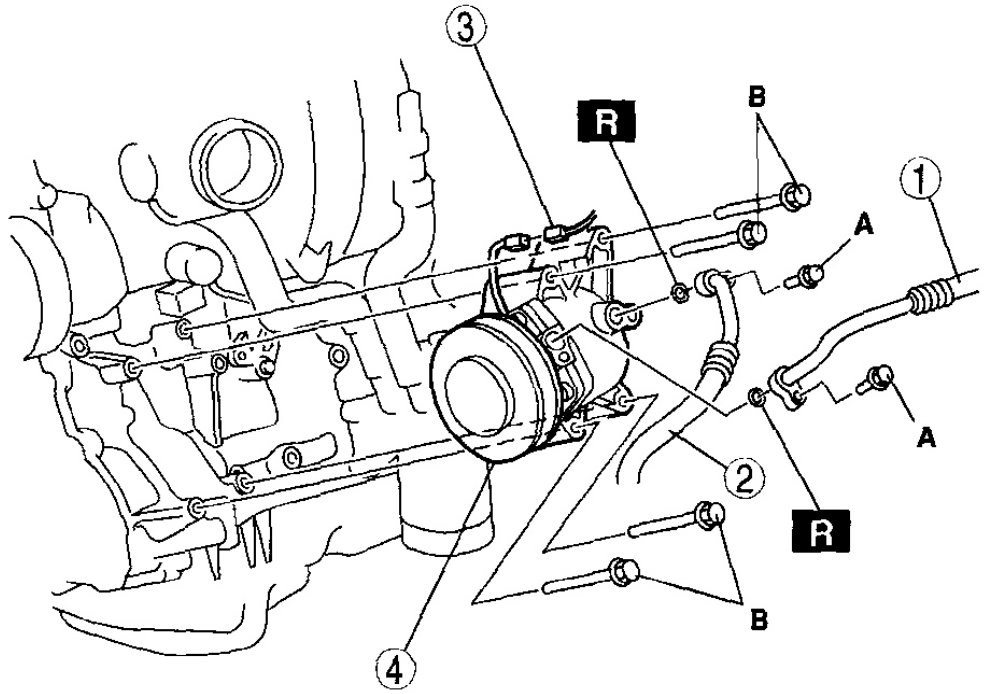
Fig. 10: Removing Airflow Mode Main Link
Courtesy of MAZDA MOTORS CORP.

A/C COMPRESSOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Discharge the refrigerant from the system. (See **REFRIGERANT CHARGING** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)
6. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
7. Do not allow remaining compressor oil in the A/C compressor and pipes to spill, and remove in the order indicated in **Fig. 11** .

CAUTION:

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other malfunction could occur. Always plug open fittings immediately after removing any refrigeration cycle parts.**



A: 6.86—9.80 N·m {70.0—99.9 kgf·cm, 60.8—86.7 in·lbf}
B:17.6—26.5 N·m {1.80—2.70 kgf·m, 13.0—19.5 ft·lbf}

E5U711ZW5007

1	Cooler hose (LO)
2	Cooler hose (HI)
3	A/C compressor connector
4	A/C compressor

Fig. 11: Removing A/C Compressor Pipe Hose & Lines (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

A/C COMPRESSOR INSTALLATION NOTE

CAUTION:

- **Due to the high moisture-absorption characteristics of the compressor oil, it may absorb moisture if left over a long period of time thereby negatively affecting A/C operation. Drain the compressor oil and refill within 10 min. of each other.**

1. Rotate new A/C compressor shaft six to eight revolutions while draining new refrigerant oil in a clean measuring device. Use this refrigerant oil to refill new compressor. Do not allow refrigerant oil to become contaminated.
2. Rotate old A/C compressor shaft six to eight revolutions while draining old refrigerant oil in a separate, clean measuring device.
3. Compare those oil amounts. The amount of the oil drained from the new A/C compressor should be greater than the old one.
4. Pour the same amount oil of drained from the old A/C compressor back into the new A/C compressor.

A/C compressor oil type

DH-PR

A/C compressor oil sealed volume (approx. quantity)

130 ml {130 cc, 4.39 fl oz}

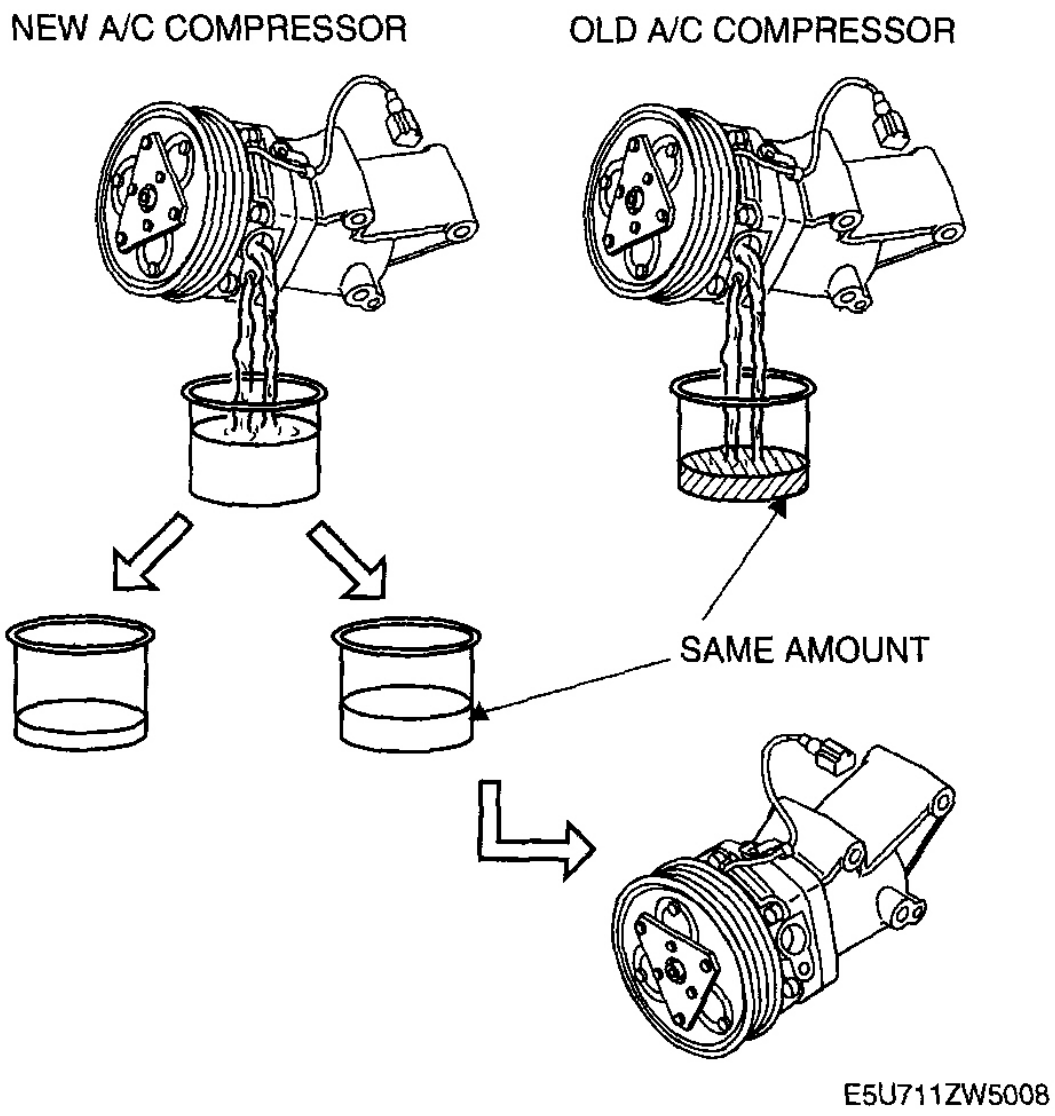


Fig. 12: Pouring Drained Oil From Old A/C Compressor Into New A/C Compressor
Courtesy of MAZDA MOTORS CORP.

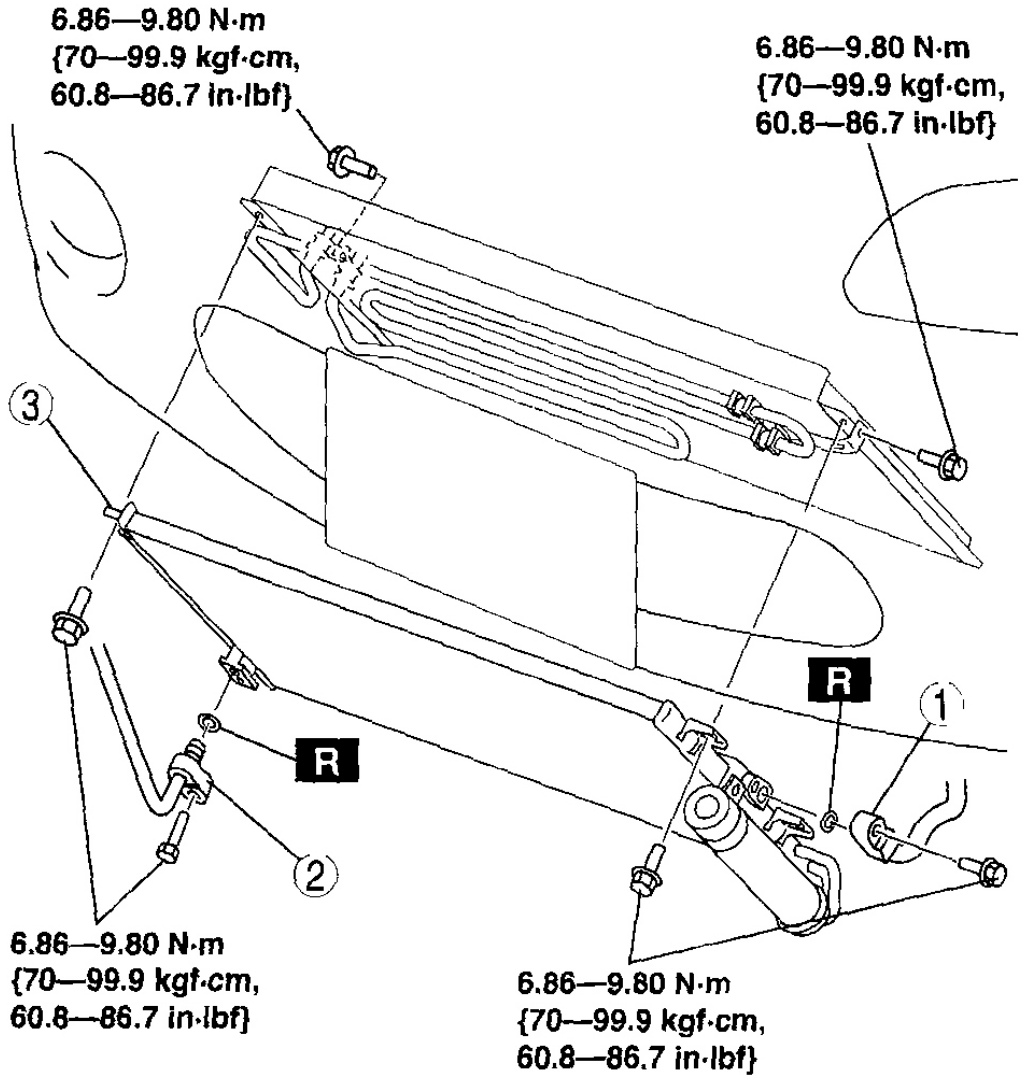
CONDENSER REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Discharge the refrigerant from the system. (See **REFRIGERANT CHARGING** .)
4. Remove the splash shields.
5. Remove the under cover.

6. Remove the cooling pipe installation bolts.
7. Do not allow remaining compressor oil in the condenser and pipes to spill, and remove in the order indicated in **Fig. 13** .

CAUTION:

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other malfunction could occur. Always plug open fittings immediately after removing any refrigeration cycle parts.**



1	Cooler hose (HI)
2	Cooler pipe No.1 (HI)
3	Condenser

Fig. 13: Removing Cooling Pipe (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

9. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

CONDENSER INSTALLATION NOTE

1. When replacing the new condenser, add compressor oil to the refrigeration cycle.

   Supplemental amount (approx. quantity)

   20 ml {20 cc, 0.7 fl oz}

CONDENSER INSPECTION

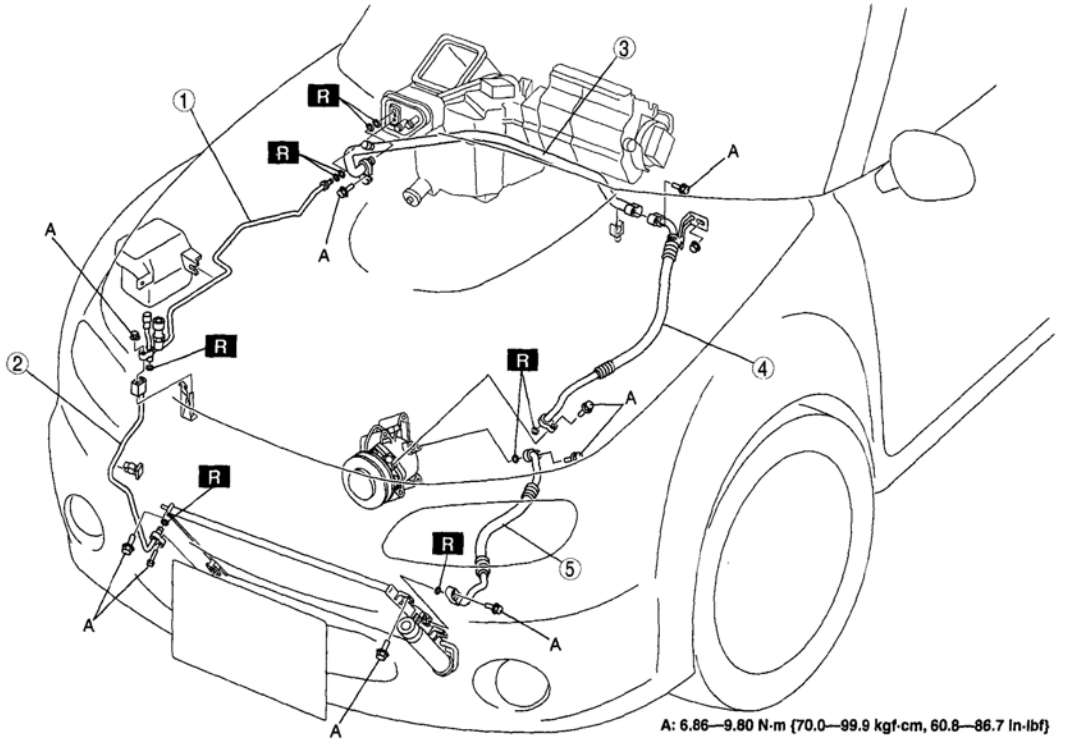
1. Inspect the condenser for cracks, damage, and oil leakage.
   - If there is any malfunction, replace the condenser.
2. Visually inspect the fins for clogging of foreign material.
   - If any fins are clogged, remove the foreign material.
3. Visually inspect the fins for bending.
   - If there is any bending, use the end of a flathead screwdriver to straighten fins.

REFRIGERANT LINES REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Discharge the refrigerant from the system. (See **REFRIGERANT CHARGING** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the splash shield.
6. Remove the under cover.
7. Do not allow remaining compressor oil in the piping and connecting parts to spill, and remove in the order indicated in **Fig. 14** .

CAUTION:

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise or other malfunction could occur. Always plug open fittings immediately after removing any refrigeration cycle parts.**



1	Cooler pipe No.2 (HI)
2	Cooler pipe No.1 (HI)
3	Cooler pipe No.3 (LO)
4	Cooler hose (LO)
5	Cooler hose (HI)

Fig. 14: Removing/Installing Refrigerant Lines (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

REFRIGERANT LINE REMOVAL NOTE

1. Disconnect the block joint type pipes by grasping the female side of the block with pliers or similar tool and holding firmly, and then remove the connection bolt or nut.

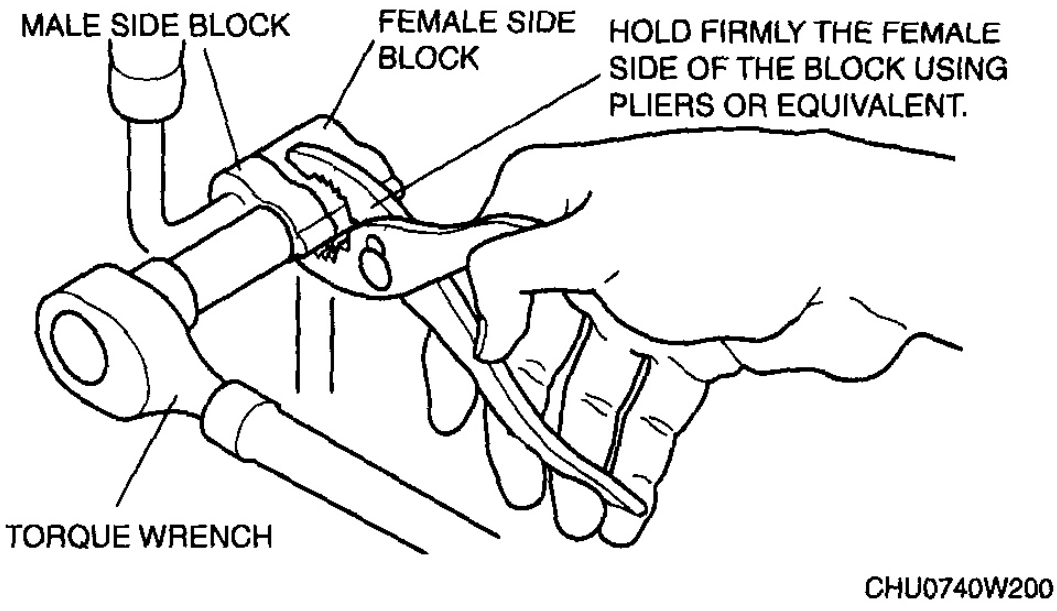


Fig. 15: Disconnecting Block Joint Type Pipes
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT LINE INSTALLATION NOTE

1. Temporarily tighten the joint bolt by hand.
2. Connect the block joint type pipes by grasping the female side of the block with pliers or similar tool and holding firmly, and then tighten the connection bolt or nut with a torque wrench.

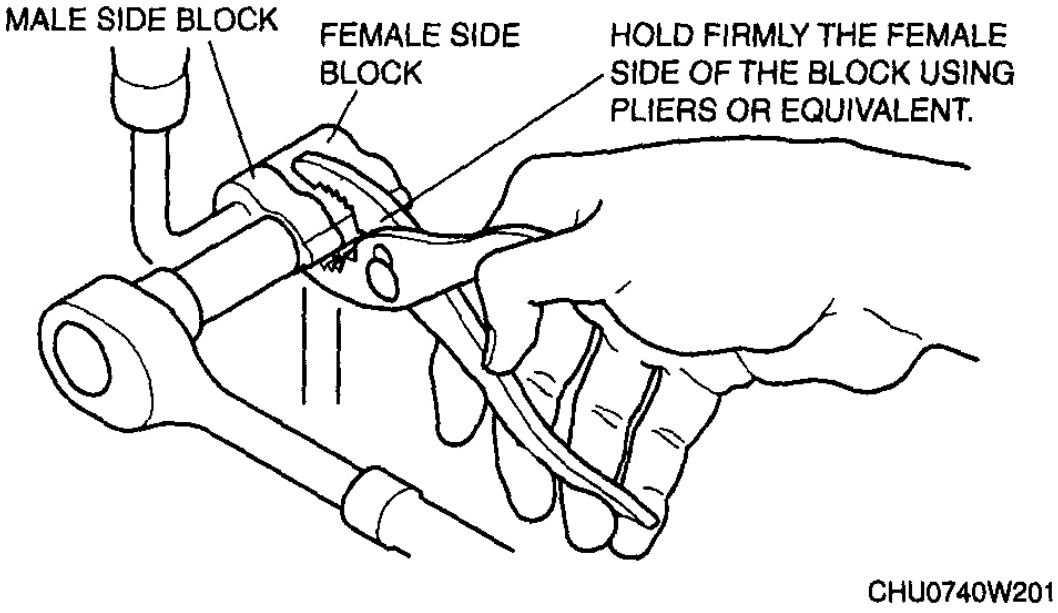


Fig. 16: Connecting Block Joint Type Pipes
Courtesy of MAZDA MOTORS CORP.

2007 HVAC

Refrigerant System - MX-5 Miata

REFRIGERANT SYSTEM SERVICE WARNINGS

USING/HANDLING UNAPPROVED REFRIGERANT

- **Using a flammable refrigerant, such as OZ-12, in this vehicle is dangerous. In an accident, the refrigerant may catch fire, resulting in serious injury or death. When servicing this vehicle, use only R-134a.**
- **Checking for system leakage on a vehicle that has been serviced with flammable refrigerant, such as OZ-12, is dangerous. Conventional leak detectors use an electronically generated arc which can ignite the refrigerant, causing serious injury or death. If a flammable refrigerant may have been used to service the system, or if you suspect a flammable refrigerant has been used, contact the local fire marshal or EPA office for information on handling the refrigerant.**

HANDLING REFRIGERANT

- **Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.**
- **Do not pressure test or leak test R-134a service equipment and/or vehicle air conditioning system with compressed air. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.**
- **Do not allow the refrigerant to leak near fire or any kind of heat. A poisonous gas may be generated if the refrigerant gas contacts fire or heat such as from cigarettes and heaters. When carrying out any operation that can cause refrigerant leakage, extinguish or remove the above-mentioned heat sources and maintain adequate ventilation.**
- **Handling liquid refrigerant is dangerous. A drop of it on the skin can result in localized frostbite. When handling the refrigerant, wear gloves and safety goggles. If refrigerant splashes into the eyes, immediately wash them with clean water and consult a doctor.**

STORING REFRIGERANT

- **The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Store the refrigerant at temperatures below 40°C {104°F}.**

REFRIGERANT SYSTEM SERVICE CAUTIONS

HANDLING COMPRESSOR OIL

- **Use only DH-PR compressor oil for this vehicle. Using PAG oil other than DH-PR compressor oil can damage the A/C compressor.**
- **Do not spill DH-PR compressor oil on the vehicle. A drop of compressor oil on the vehicle surface can eat away at the paint. If oil gets on the vehicle, wipe it off immediately.**
- **DH-PR compressor oil (PAG oil) has a higher moisture absorption efficiency than the previously used mineral oil. If moisture mixes with the compressor oil, the refrigerant system could be damaged.**

  Therefore, install caps immediately after using the compressor oil or removing refrigerant system parts to prevent moisture absorption.

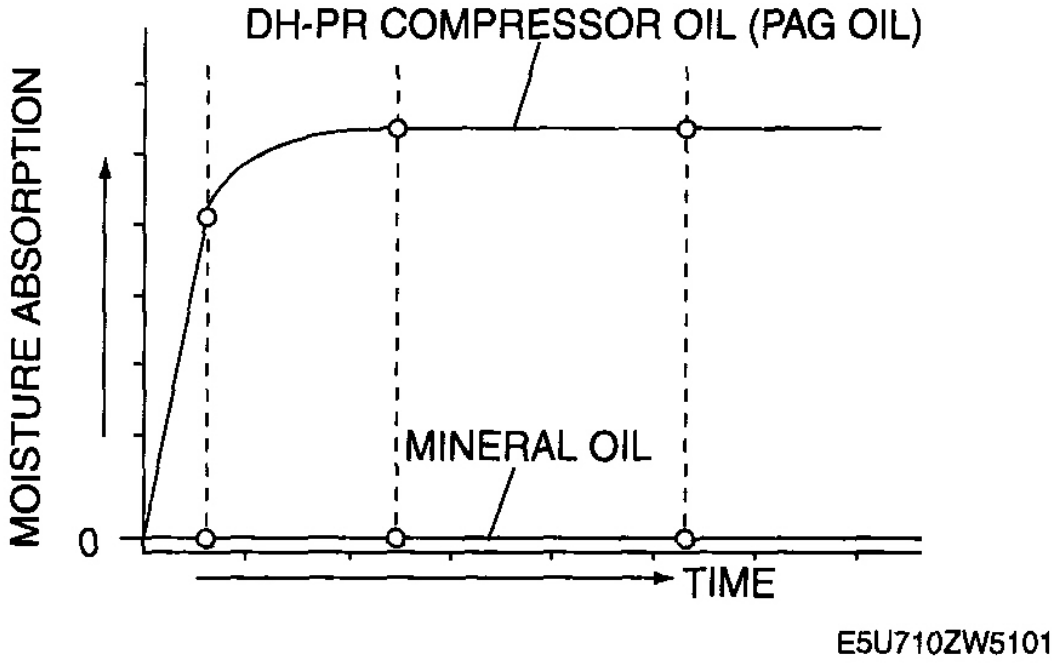


Fig. 1: Moisture Absorption Efficiency Graph
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT SYSTEM GENERAL PROCEDURES

MANIFOLD GAUGE SET INSTALLATION

1. Fully close the valves of the manifold gauge.
2. Connect the charging hoses to the high/low pressure side joints of the manifold gauge.
3. Connect the quick couplers to the ends of the charging hoses.
4. Connect the quick couplers to the charging valves.

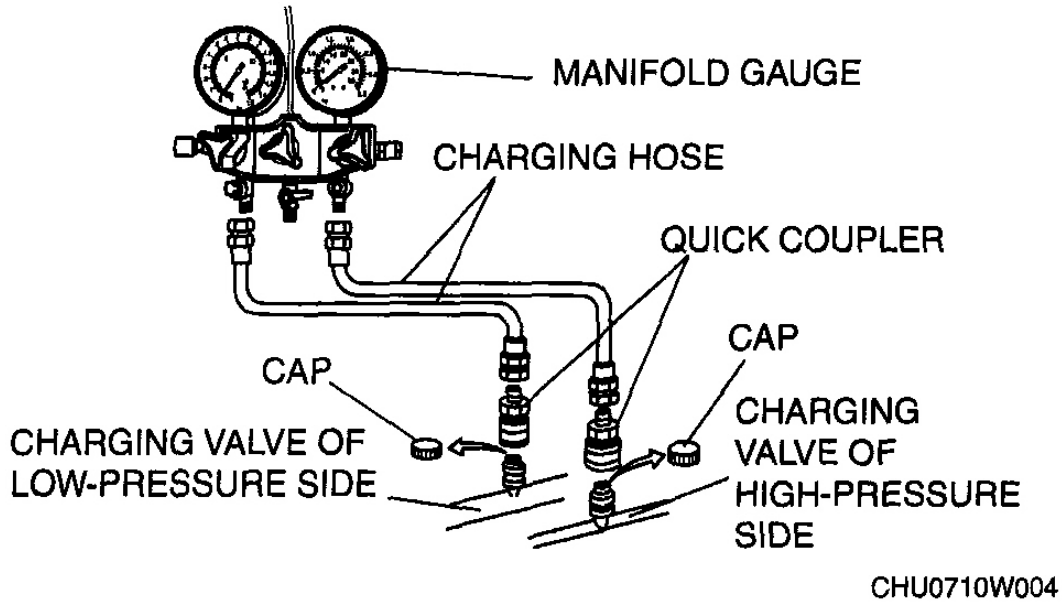


Fig. 2: Connecting Charging Hoses To High/Low Pressure Side Joints Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT CHARGING

WARNING:

- **Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.**

CAUTION:

- **Do not exceed the specification when charging the system with refrigerant. Doing so will decrease the efficiency of the air conditioner or damage the refrigeration cycle parts.**

CHARGING RECYCLED R-134A REFRIGERANT

1. Connect an R-134a recovery/recycling/recharging device to the vehicle and follow the device manufacturer's instructions.

CHARGING NEW R-134A REFRIGERANT

1. Install the manifold gauge set.
2. Connect the tap pin side of the charging hose to the air purge valve of the manifold gauge.
3. Connect the vacuum pump hose to the center joint of the manifold gauge.
4. Connect the vacuum pump hose to the vacuum pump.
5. Connect the charging hose to the refrigerant tank.
6. Place the refrigerant tank on the scale.

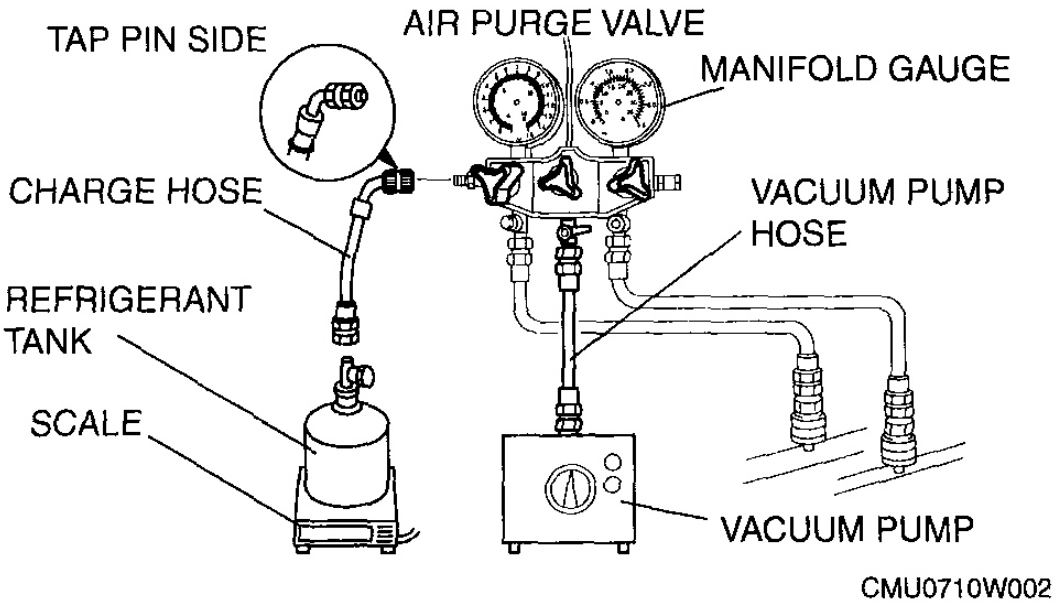


Fig. 3: Connecting Vacuum Pump Hose To Center Joint Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

7. Open all the valves of the manifold gauge.

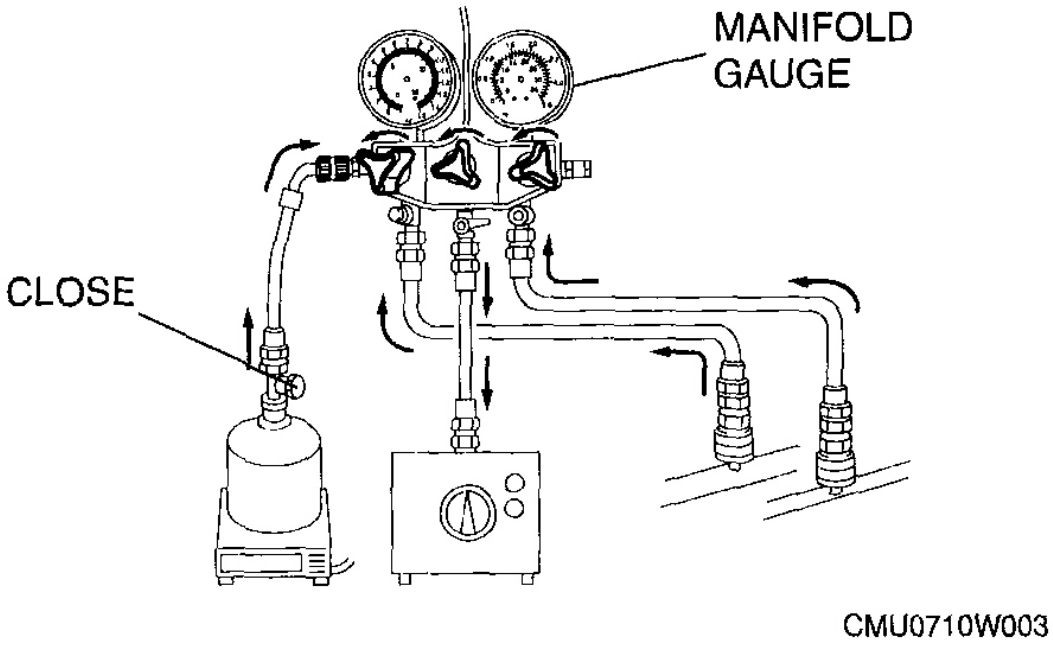


Fig. 4: Identifying Manifold Valves Gauge Closed
Courtesy of MAZDA MOTORS CORP.

CAUTION:
- **Close the manifold gauge valve immediately after stopping the vacuum pump. If the valve is left open, the vacuum pump oil will back flow into the refrigeration cycle and cause a decrease in the efficiency of the air conditioner.**

8. Start the vacuum pump and let it operate for **15 min** .
9. Verify that high- and low-pressure side readings of the manifold gauge are at **-101 kPa {-760 mmHg, -29.9 inHg}** . Close each valve of the manifold gauge.
10. Stop the vacuum pump and wait for **5 min** .
11. Inspect the high- and low-pressure side readings of the manifold gauge.
    - If the reading has changed, inspect for leakage and then repeat from Step 7.
    - If the reading has not changed, go to next step.
12. Open the valve of the refrigerant tank.
13. Weigh the refrigerant tank to charge the suitable amount of refrigerant.

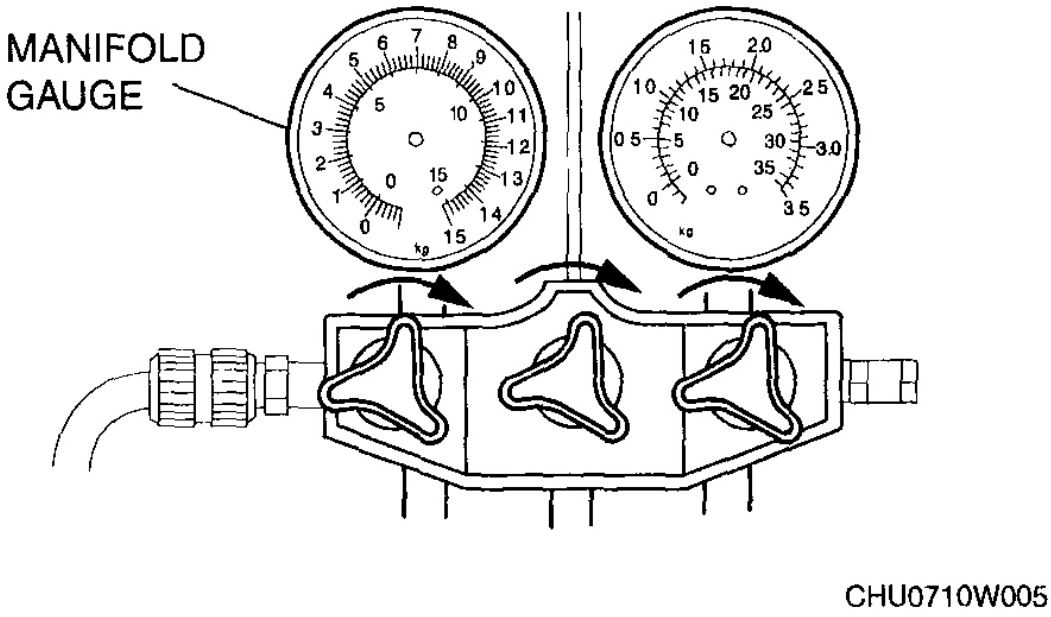


Fig. 5: View Of High & Low-Pressure Side Manifold Gauge Set
Courtesy of MAZDA MOTORS CORP.

Refrigerant type

R-134a

Regular amount of refrigerant (approx. quantity)

450 g {15.9 oz}

WARNING:

- **If the refrigerant system is charged with a large amount of refrigerant when checking for gas leakage, and if any leakage should occur, the refrigerant will be released into the atmosphere. In order to prevent the accidental release of refrigerant which can destroy the ozone layer in the stratosphere, follow the proper procedures and charge with only a small amount of refrigerant when checking for gas leakage.**
- **If charging the system with refrigerant by service cans or refrigerant tank, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant tank will increase and they could explode, scattering metal fragments and liquid refrigerant that can**

seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.

14. Open the low-pressure side valve of the manifold gauge.

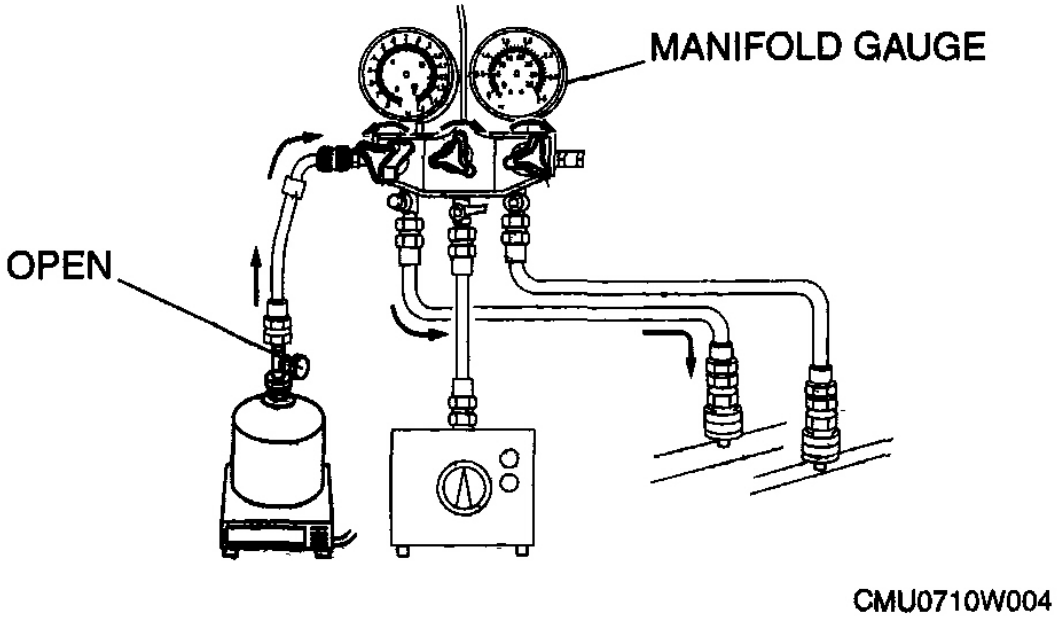


Fig. 6: Connecting Manifold Gauge Set
Courtesy of MAZDA MOTORS CORP.

15. When the high-pressure side reading increases to **98 kPa {1.0 kgf/cm^2 , 14 psi}** , close the low-pressure side valve of the manifold gauge.
16. Inspect for leakage from the cooler pipe/hose connections using a gas leak tester.
    - If there is no leakage, go to Step 18.
    - If leakage is found at a loose joint, tighten the joint, go to next step.
17. Inspect for leakage again.
    - If there is no leakage after tightening the joint, go to next step.
    - If there is still a leakage at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.

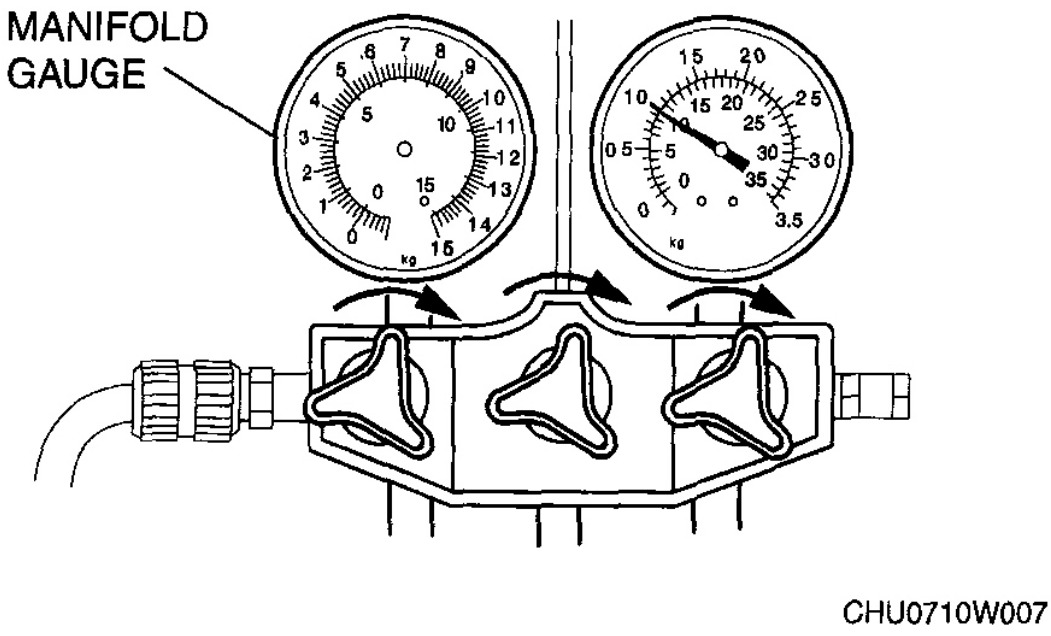


Fig. 7: Identifying High & Low-Pressure Side Readings Of Manifold Gauge
Courtesy of MAZDA MOTORS CORP.

WARNING:

- **If charging the system with refrigerant by service cans or refrigerant tank, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant tank will increase and they could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

18. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of refrigerant tank has decreased **200 g {7.06 oz}** from the amount in Step 13.

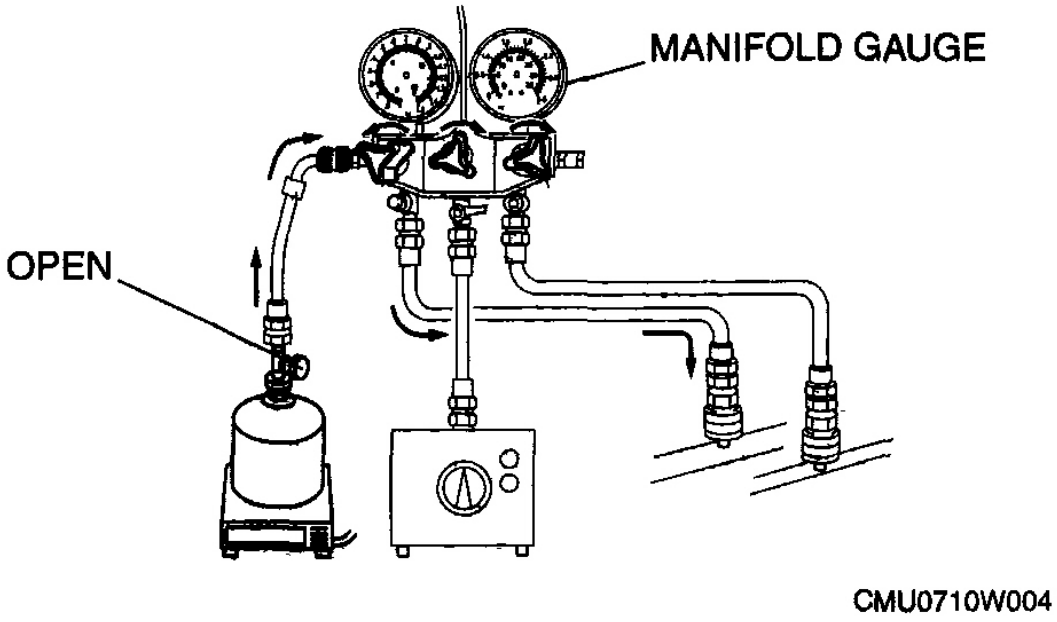


Fig. 8: Connecting Manifold Gauge Set
Courtesy of MAZDA MOTORS CORP.

19. Close the low-pressure side valve of the manifold gauge.

WARNING:

- **If charging the system with refrigerant by service cans or refrigerant tank, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant tank will increase and they could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

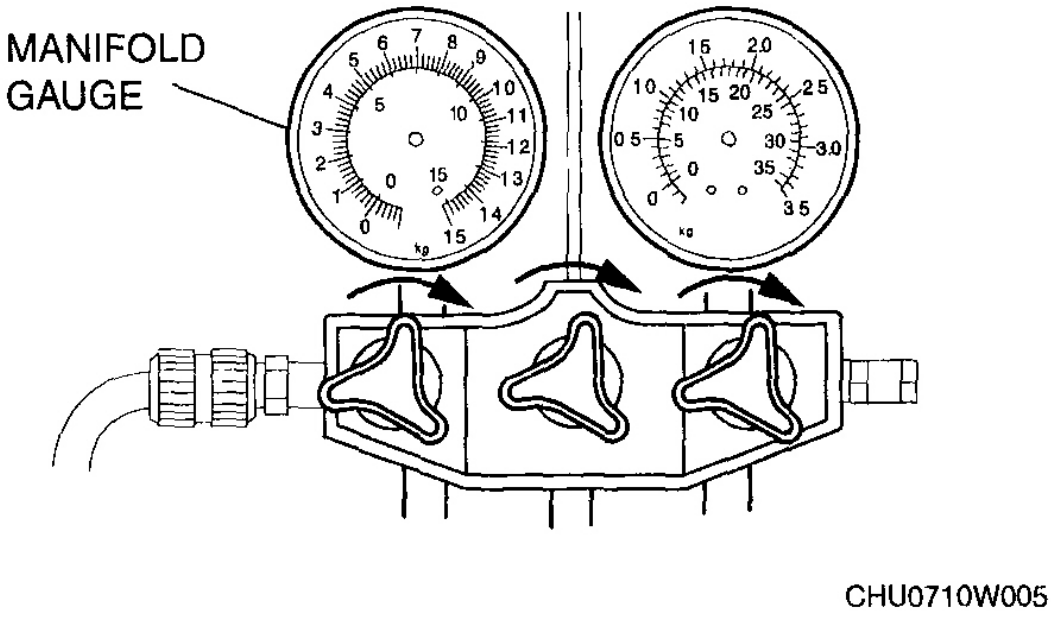


Fig. 9: View Of High & Low-Pressure Side Manifold Gauge Set
Courtesy of MAZDA MOTORS CORP.

20. Start the engine and actuate the A/C compressor.
21. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased **450 g {15.9 oz}** from the amount in Step 13.
22. Close the low-pressure side valve of the manifold gauge and the valve of the refrigerant tank.
23. Stop the engine and A/C compressor.
24. Inspect for leakage using a gas leak tester.
    - If there is no leakage, go to Step 26.
    - If leakage is found at a loose joint, tighten the joint, then go to next step.

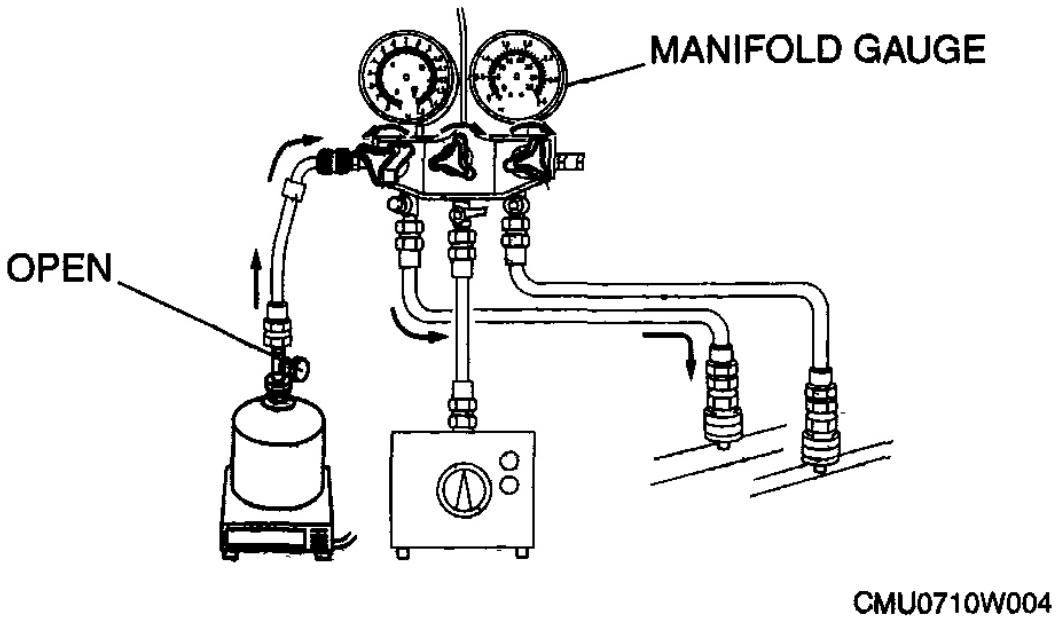


Fig. 10: Connecting Manifold Gauge Set
Courtesy of MAZDA MOTORS CORP.

25. Inspect for leakage again.
    - If there is still leakage after tightening the joint, go to next step.
    - If there is still leakage at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from Step 7.
26. Remove the manifold gauge set.
27. Install the caps to the charging valves.

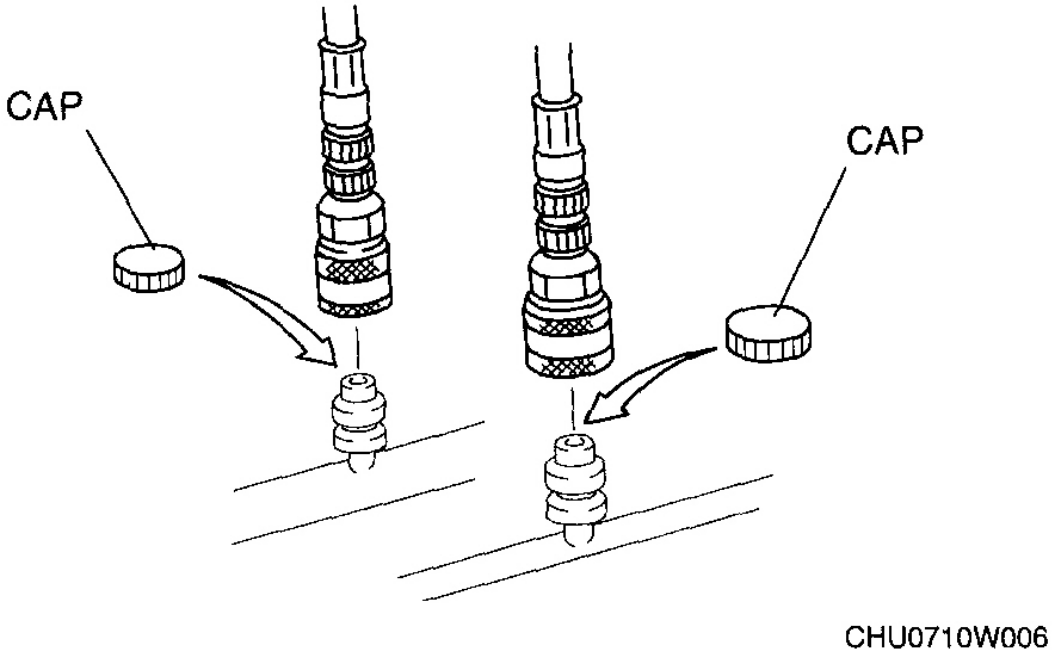


Fig. 11: Installing Caps To Charging Valves
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT RECOVERY

WARNING:

- **Avoid breathing air conditioning refrigerant or lubricant vapor. Exposure may irritate eyes, nose and throat. Also, due to environmental concerns, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) when draining R-134a from the air conditioning system. If accidental system discharge occurs, ventilate work area before resuming service.**

1. Connect an R-134a recovery/recycling/recharging device to the vehicle and follow the device manufacturer's instructions.

REFRIGERANT PRESSURE CHECK

1. Connect the manifold gauge.
2. Start the engine and arrow it to reach operating temperature.
3. During pressure check, run the engine at a constant **1,500 rpm** .
4. Set the fan speed MAX-HI.

5. Turn the A/C switch on.
6. Set to RECIRCULATE mode.
7. Set the temperature control to MAX COLD.
8. Set to VENT mode.
9. Close all the doors and all the windows.
10. Measure the manifold gauge reading and ambient temperature.
11. Verify that the high and low pressure readings are within each shaded zone.
    - If there is any malfunction, inspect the refrigerant system according to the troubleshooting chart. See **SYMPTOM TROUBLESHOOTING** .

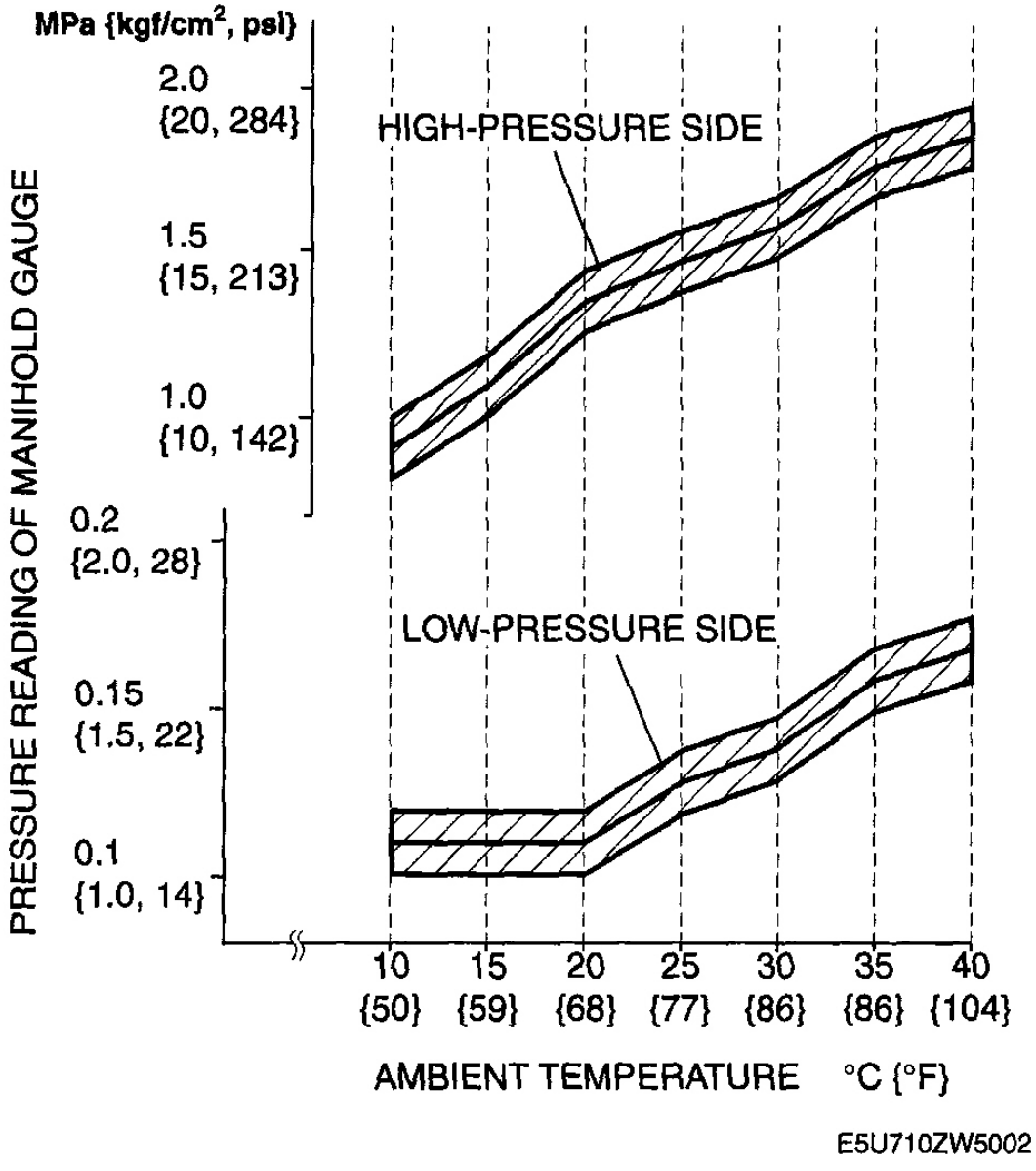


Fig. 12: Pressure Readings Of Manifold Gauge & Ambient Temperature Graph
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT SYSTEM PERFORMANCE TEST

1. Inspect the refrigerant pressure. (See **REFRIGERANT PRESSURE CHECK** .)
2. Place a dry-bulb thermometer in the driver-side center ventilator outlet.
3. Start the engine and arrow it to reach operating temperature.

4. During pressure check, run the engine at a constant **1,500 rpm** .
5. Set the fan speed MAX-HI.
6. Turn the A/C switch on.
7. Set to RECIRCULATE mode.
8. Set the temperature control to MAX COLD.
9. Set to VENT mode.
10. Close all the doors and windows.
11. Wait until the air conditioner output temperature stabilizes.

Stabilized condition

- The A/C compressor repeatedly turns on and off at regular intervals.

12. After the blower air is stabilized, read the dry-bulb thermometer.
13. Verify the ambient temperature.
14. Verify that the temperature reading is in the shaded zone.
    - If the there is any malfunction, inspect the refrigerant system according to the troubleshooting chart. See **SYMPTOM TROUBLESHOOTING** .

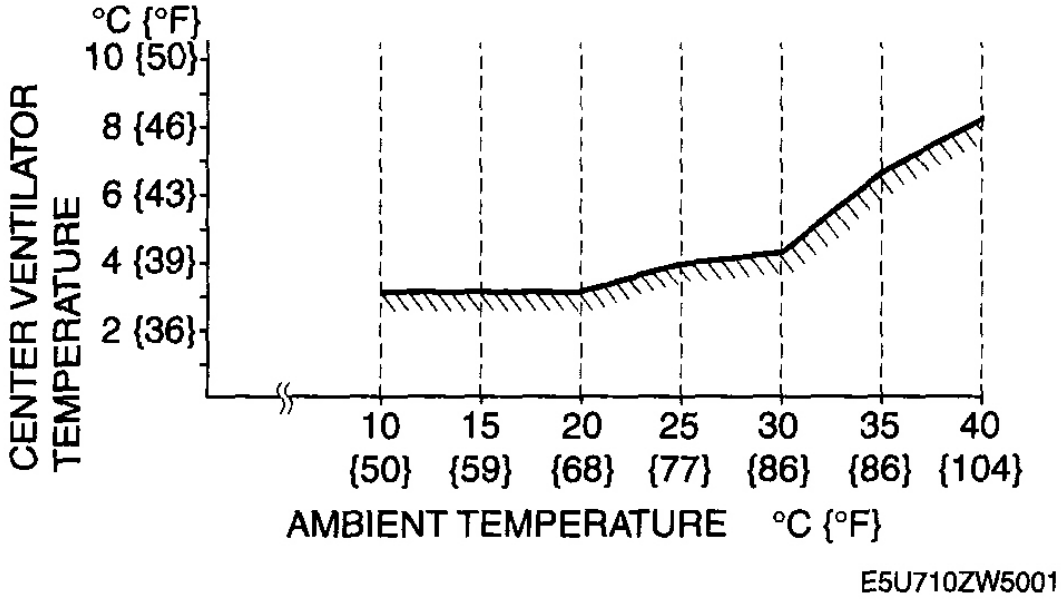
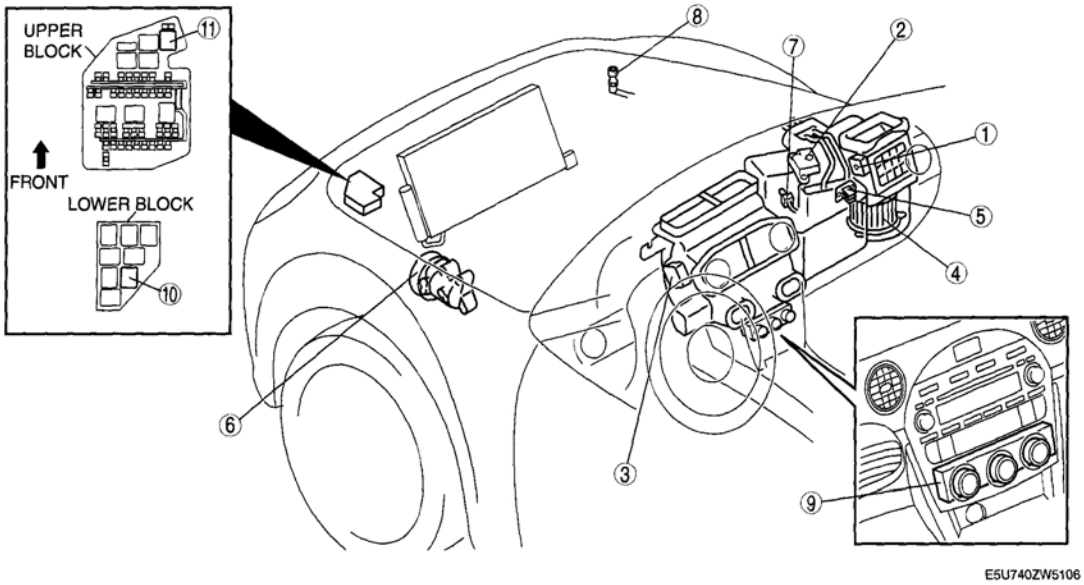


Fig. 13: Center Ventilation Temperature Graph
Courtesy of MAZDA MOTORS CORP.

2007 HVAC

Control System - MX-5 Miata

HVAC CONTROL SYSTEM



1	Air intake actuator
2	Air mix actuator
3	Airflow mode actuator
4	Blower motor
5	Power MOS FET
6	Magnetic clutch
7	Evaporator temperature sensor
8	Refrigerant pressure switch
9	Climate control unit
10	A/C relay
11	Blower relay

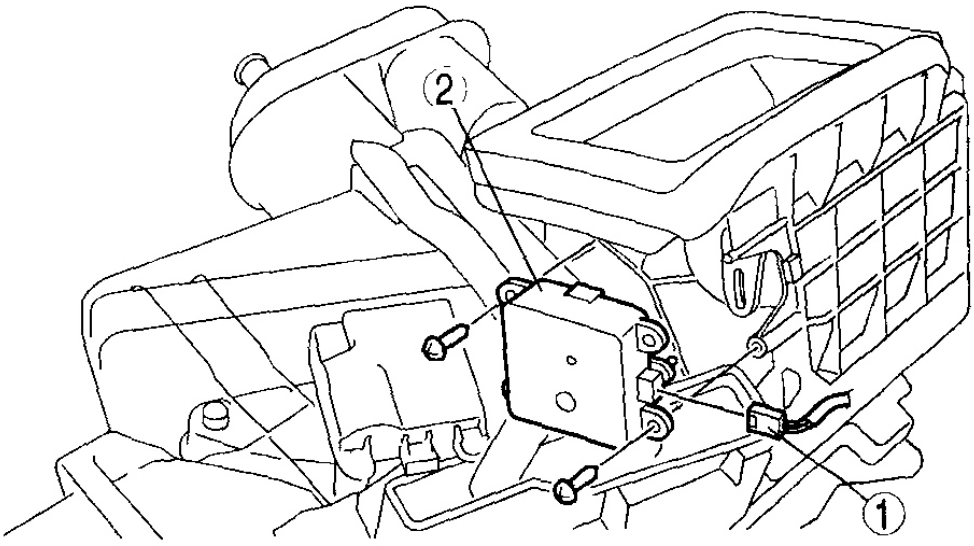
Fig. 1: Identifying Location Of HVAC Control System Components
Courtesy of MAZDA MOTORS CORP.

AIR INTAKE ACTUATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Glove compartment (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)

3. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
5. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
6. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
7. Knee bolster
8. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
9. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
10. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
11. Combination switch (See **COMBINATION SWITCH REMOVAL/INSTALLATION** .)
12. Steering shaft (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
13. Meter hood (See **METER HOOD REMOVAL/INSTALLATION** .)
14. Instrument cluster (See **INSTRUMENT CLUSTER REMOVAL/INSTALLATION** .)
15. Side panel (See **SIDE PANEL REMOVAL/INSTALLATION** .)
16. Hood release lever (See **HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
17. Female bracket (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
18. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
19. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
20. Front side trim (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
21. Fuse box No. 1
22. Dashboard (See **DASHBOARD REMOVAL/INSTALLATION** .)

4. Remove in the order indicated in **Fig. 2** .



1	Air intake actuator connector
2	Air intake actuator

Fig. 2: Removing Air Intake Actuator
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

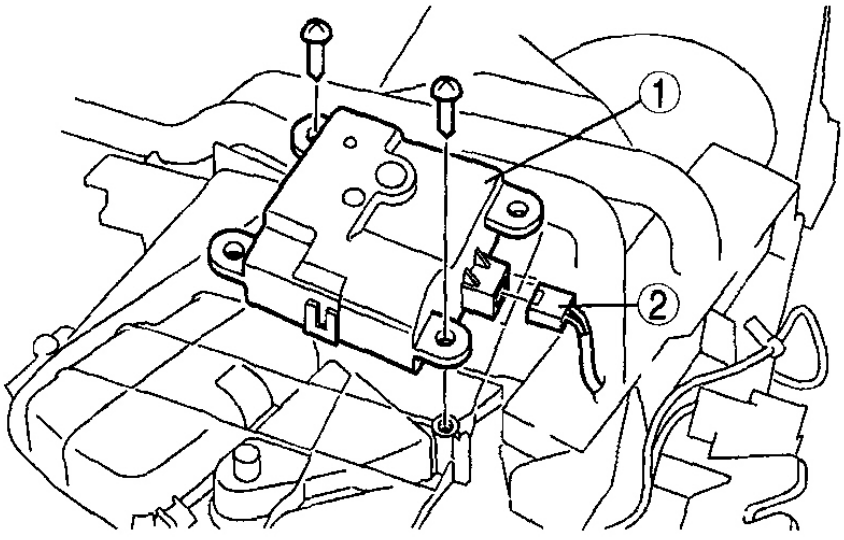
AIR MIX ACTUATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Glove compartment (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
    3. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    4. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    5. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
    6. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
    7. Knee bolster
    8. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
    9. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE**

REMOVAL/INSTALLATION .)

10. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
11. Combination switch (See **COMBINATION SWITCH REMOVAL/INSTALLATION** .)
12. Steering shaft (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
13. Meter hood (See **METER HOOD REMOVAL/INSTALLATION** .)
14. Instrument cluster (See **INSTRUMENT CLUSTER REMOVAL/INSTALLATION** .)
15. Side panel (See **SIDE PANEL REMOVAL/INSTALLATION** .)
16. Hood release lever (See **HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
17. Female bracket (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
18. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
19. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
20. Front side trim (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
21. Fuse box No. 1
22. Dashboard (See **DASHBOARD REMOVAL/INSTALLATION** .)

4. Remove in the order indicated in **Fig. 3** .



E5U740ZW5003

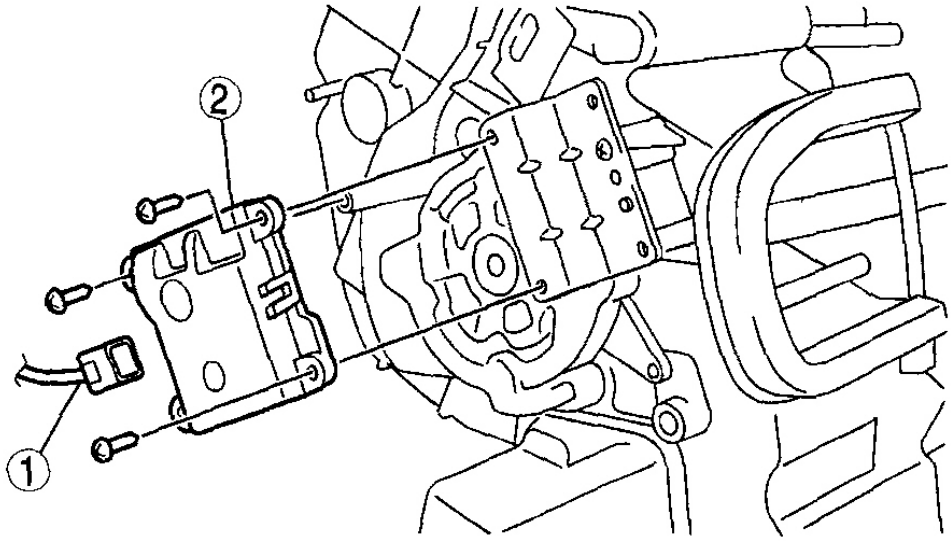
1	Air mix actuator
2	Air mix actuator connector

Fig. 3: Removing Air Mix Actuator & Connector
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

AIRFLOW MODE ACTUATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
    2. Knee bolster
4. Remove in the order indicated in **Fig. 4** .



1	Airflow mode actuator connector
2	Airflow mode actuator

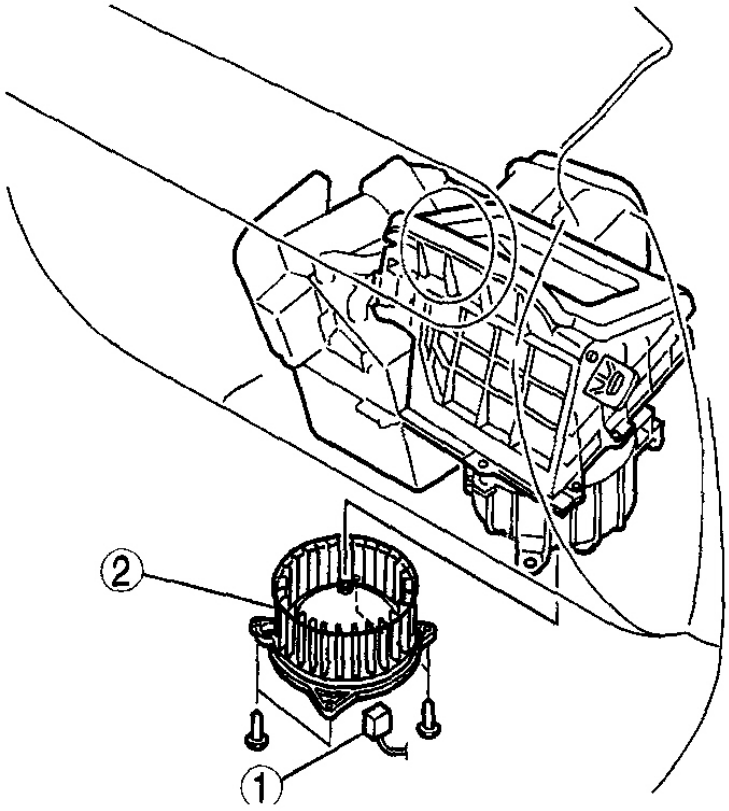
Fig. 4: Removing Airflow Mode Actuator
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

BLOWER MOTOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

3. Remove in the order indicated in **Fig. 5** .



1	Blower motor connector
2	Blower motor

Fig. 5: Removing Blower Motor Connector & Motor
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

BLOWER MOTOR INSPECTION

1. Connect battery positive voltage to blower motor terminal A, ground to terminal B, and then verify that the blower motor operates smoothly.
   - If the operation condition is not normal, replace the blower motor.

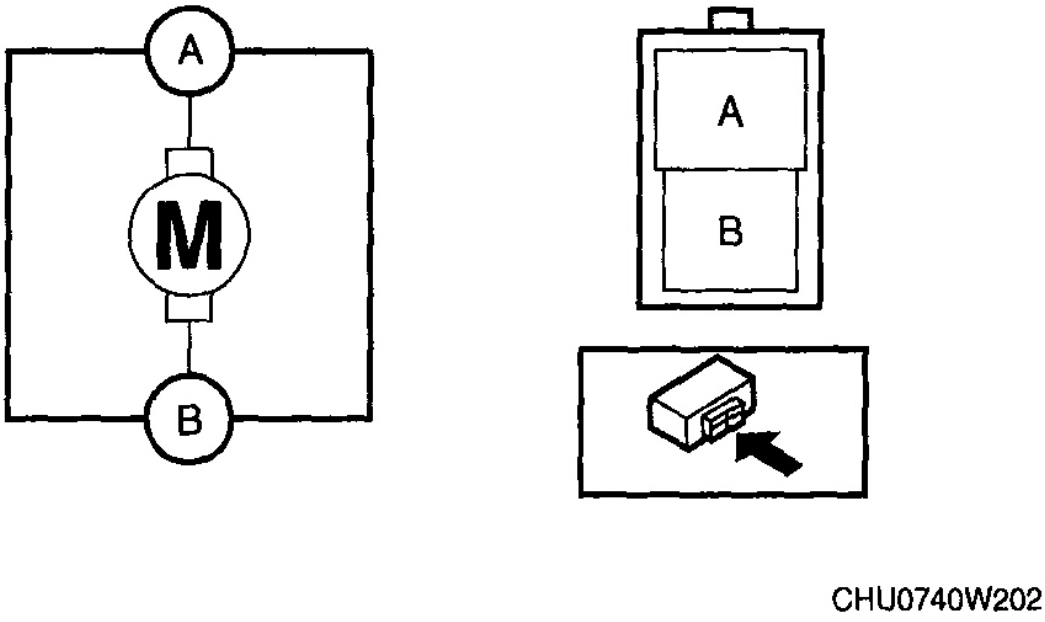


Fig. 6: Identifying Blower Motor Terminals
Courtesy of MAZDA MOTORS CORP.

POWER METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR (POWER MOS FET) REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the power MOS FET connector.
4. Remove the power MOS FET as shown in **Fig. 7** .
5. Install in the reverse order of removal.
6. Perform the refrigerant system performance test. (See **REFRIGERANT SYSTEM PERFORMANCE TEST** .)

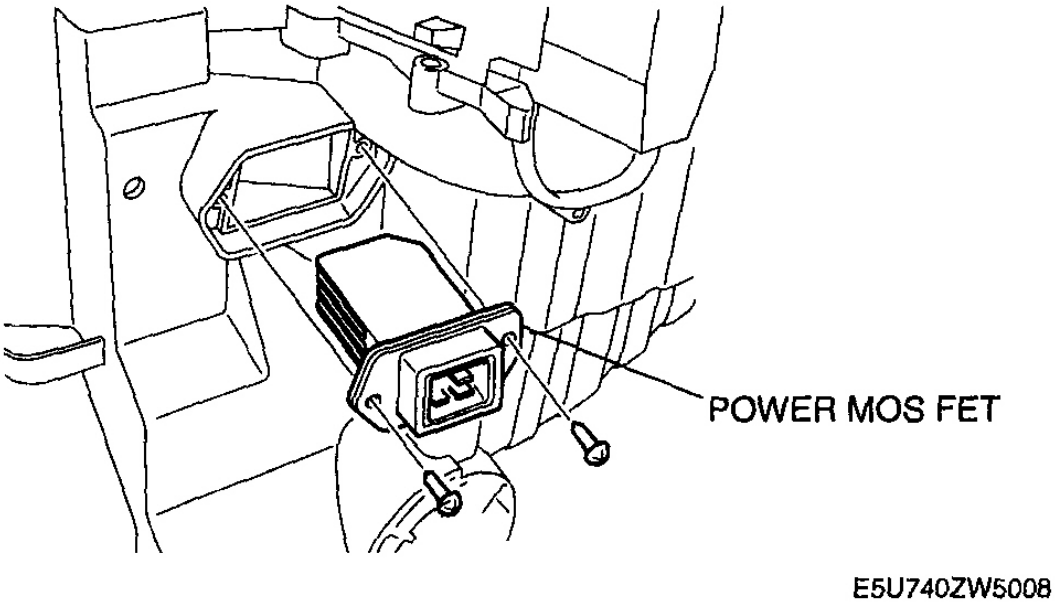


Fig. 7: Removing Power MOS FET
Courtesy of MAZDA MOTORS CORP.

POWER METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR (POWER MOS FET) INSPECTION

1. Verify that the resistance between the terminals of the power MOS FET is as shown in **TERMINALS RESISTANCE TABLE** .
    - If there is any malfunction, replace the power MOS FET.

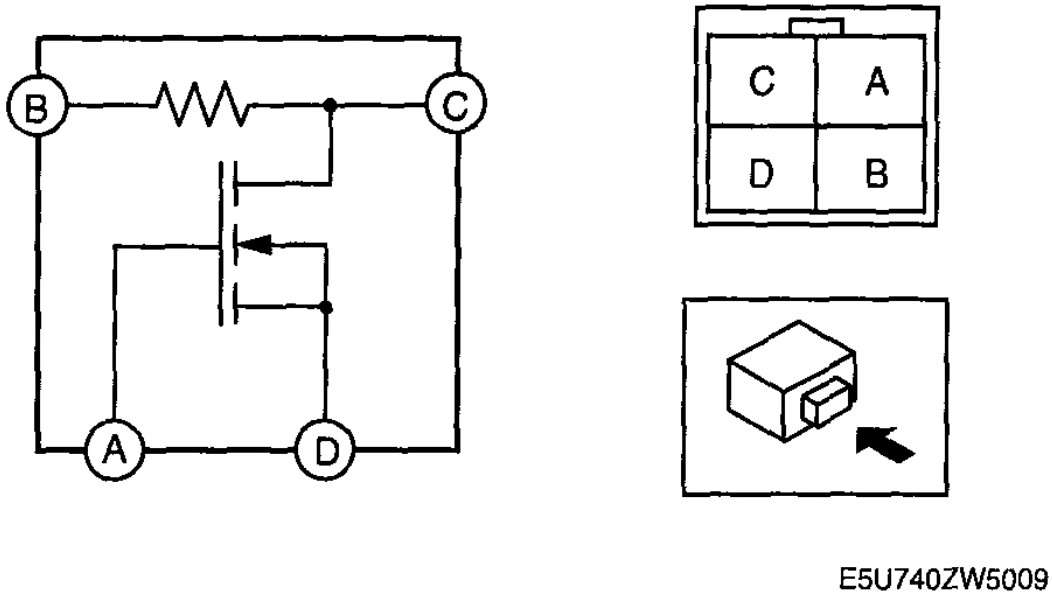


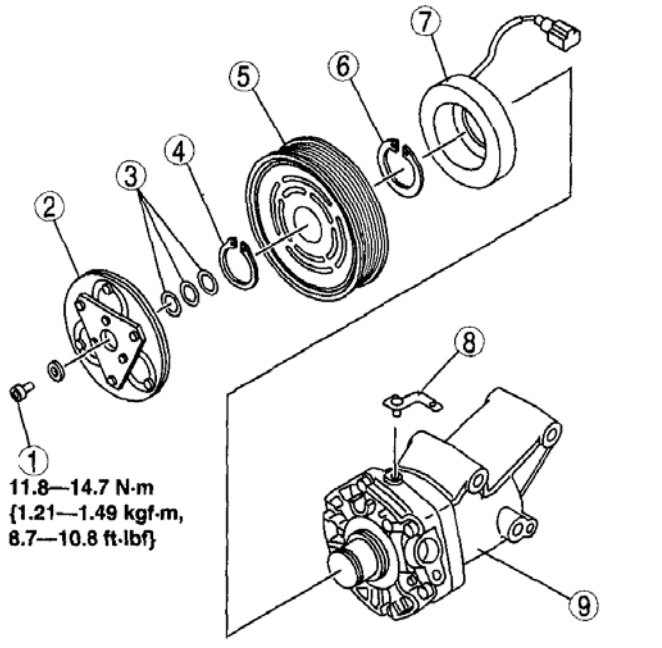
Fig. 8: Identifying Terminals Of Power MOS FET
Courtesy of MAZDA MOTORS CORP.

POWER MOS FET RESISTANCE TABLE

Tester lead		Resistance (kilohm) (approx. quantity)
+	-	
A	B	1,300
A	C	1,300
A	D	2.2
B	A	infinity
B	C	0.12
B	D	infinity
C	A	infinity
C	B	0.12
C	D	infinity
D	A	2.2
D	B	190
D	C	1,300

MAGNETIC CLUTCH DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 9** .



1	Bolt
2	Pressure plate
3	Shim
4	Snap ring
5	A/C compressor pulley
6	Snap ring
7	Stator
8	Clamp
9	A/C compressor body

Fig. 9: Identifying Magnetic Clutch Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

3. Adjust the magnetic clutch clearance. (See **MAGNETIC CLUTCH ADJUSTMENT** .)

BOLT REMOVAL/INSTALLATION NOTE

1. When removing or installing the bolt, hold the pressure plate as shown in **Fig. 10** .

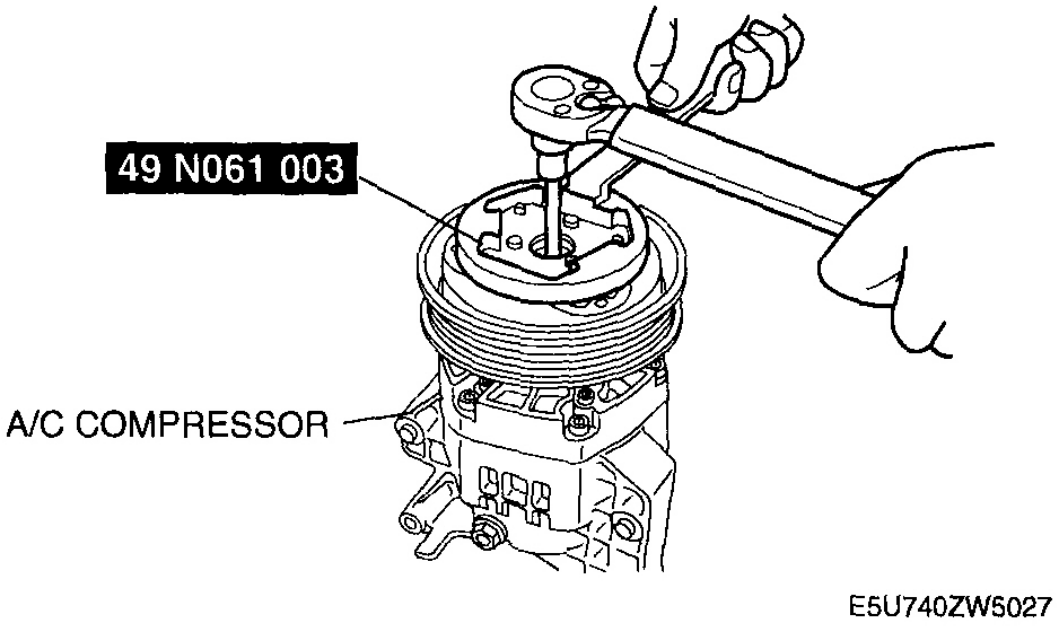


Fig. 10: Removing/Installing Bolt
Courtesy of MAZDA MOTORS CORP.

SNAP RING REMOVAL/INSTALLATION NOTE

1. Remove the snap ring using a snap ring pliers.

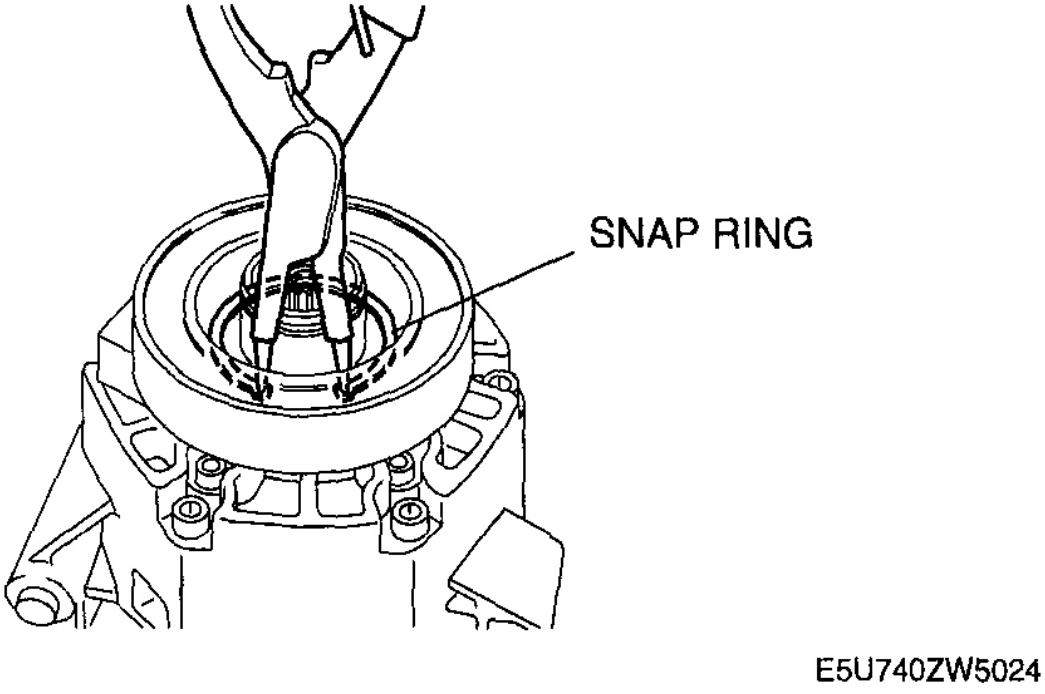


Fig. 11: Removing Snap Ring Using Snap Pliers
Courtesy of MAZDA MOTORS CORP.

A/C COMPRESSOR PULLEY REMOVAL NOTE

1. Remove the A/C compressor pulley using the **SST (49 0839 425C)** .

CAUTION:
- **Be careful that the SST (49 0839 425C) tabs do not hang over the stator.**

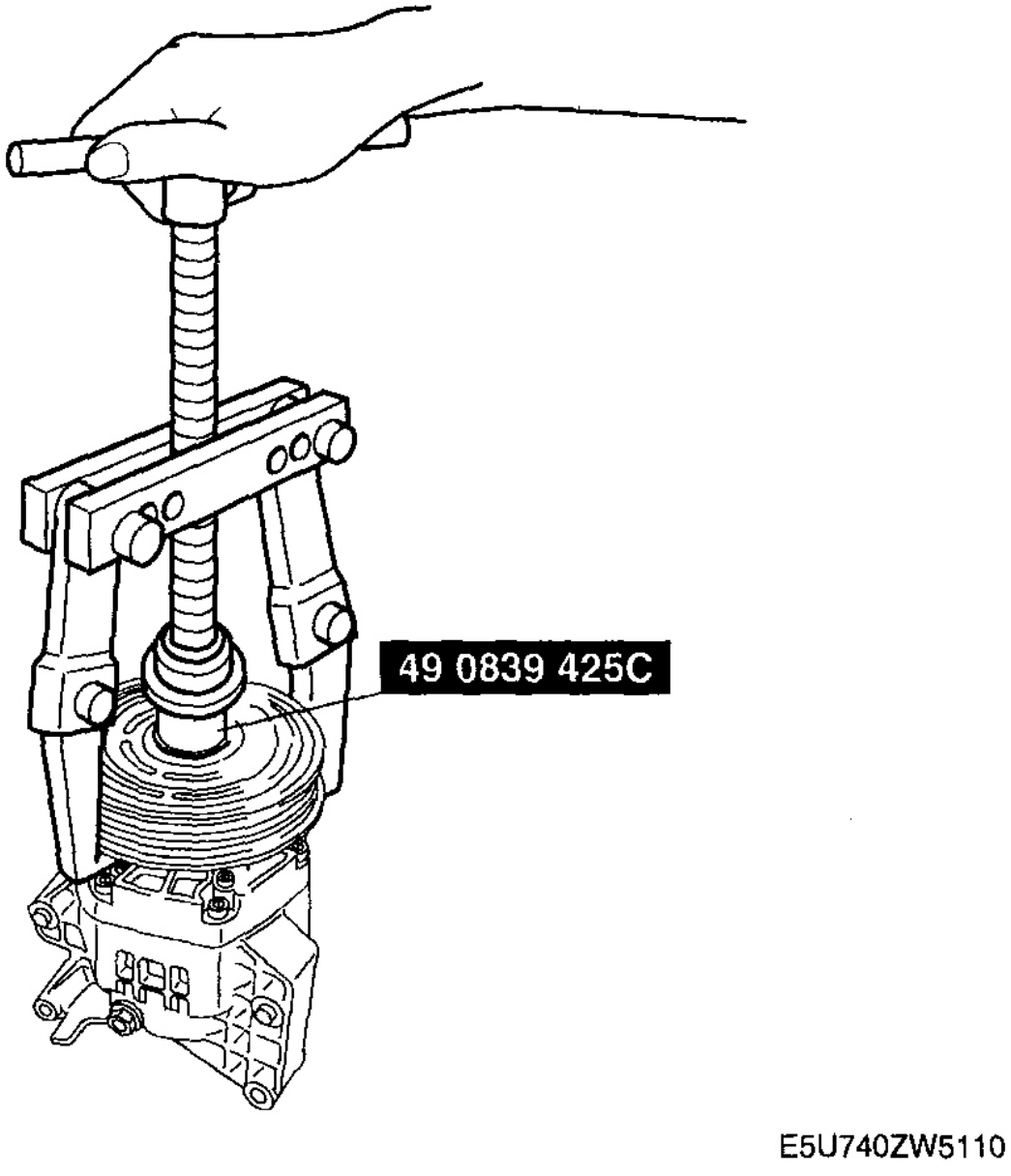


Fig. 12: Removing A/C Compressor Pulley (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

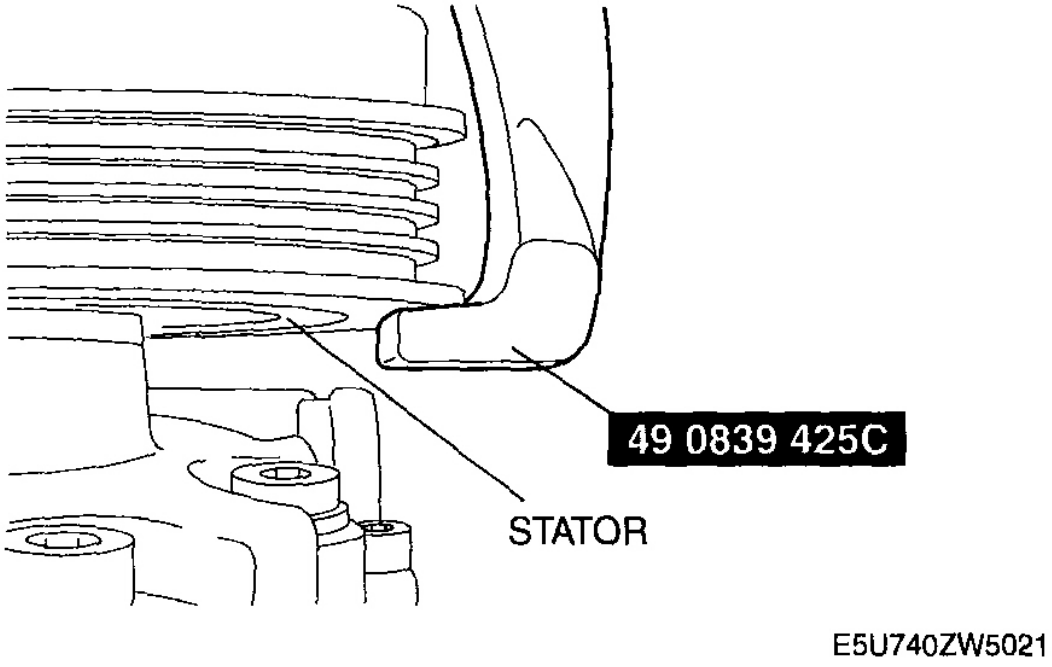


Fig. 13: Removing A/C Compressor Pulley (2 Of 2)
Courtesy of MAZDA MOTORS CORP.

STATOR INSTALLATION NOTE

1. Align the positioning pin with the hole of A/C compressor body and insert.

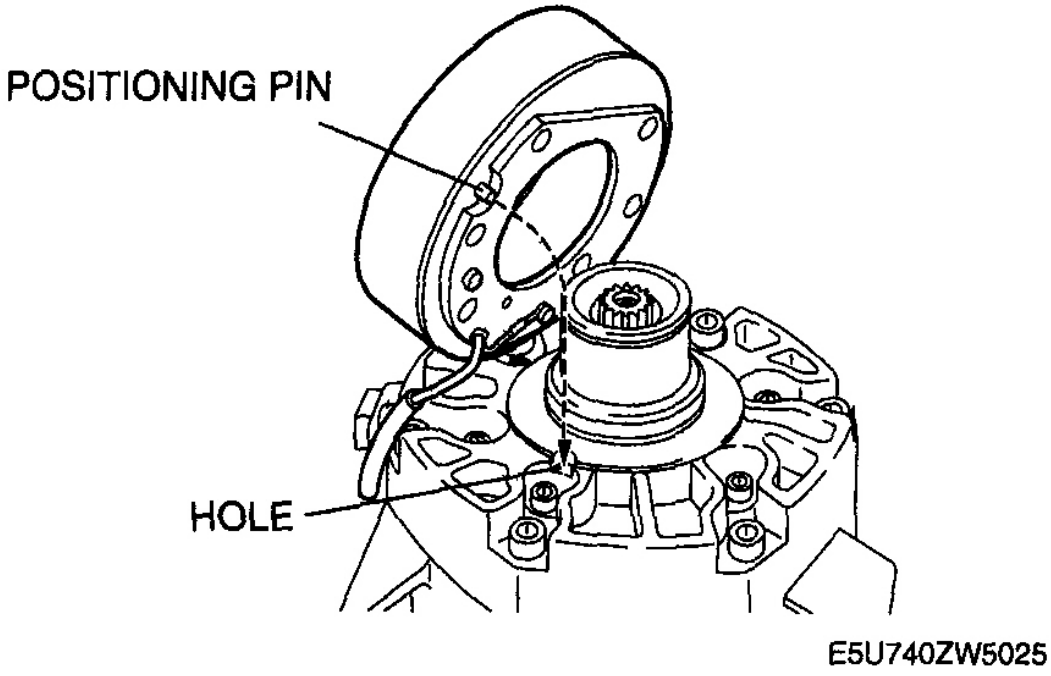


Fig. 14: Aligning Positioning Pin With Hole Of A/C Compressor Body
Courtesy of MAZDA MOTORS CORP.

A/C COMPRESSOR PULLEY INSTALLATION NOTE

1. Install the inner wheel of the pulley using a plastic hammer and SST (49 B018 003) to the compressor.

CAUTION:

- **If the SST is not properly positioned when the A/C compressor pulley is press-fit, the A/C compressor axle will interfere with the SST, possibly damaging component parts. Verify that the SST and axle are properly positioned and perform the procedure very carefully.**

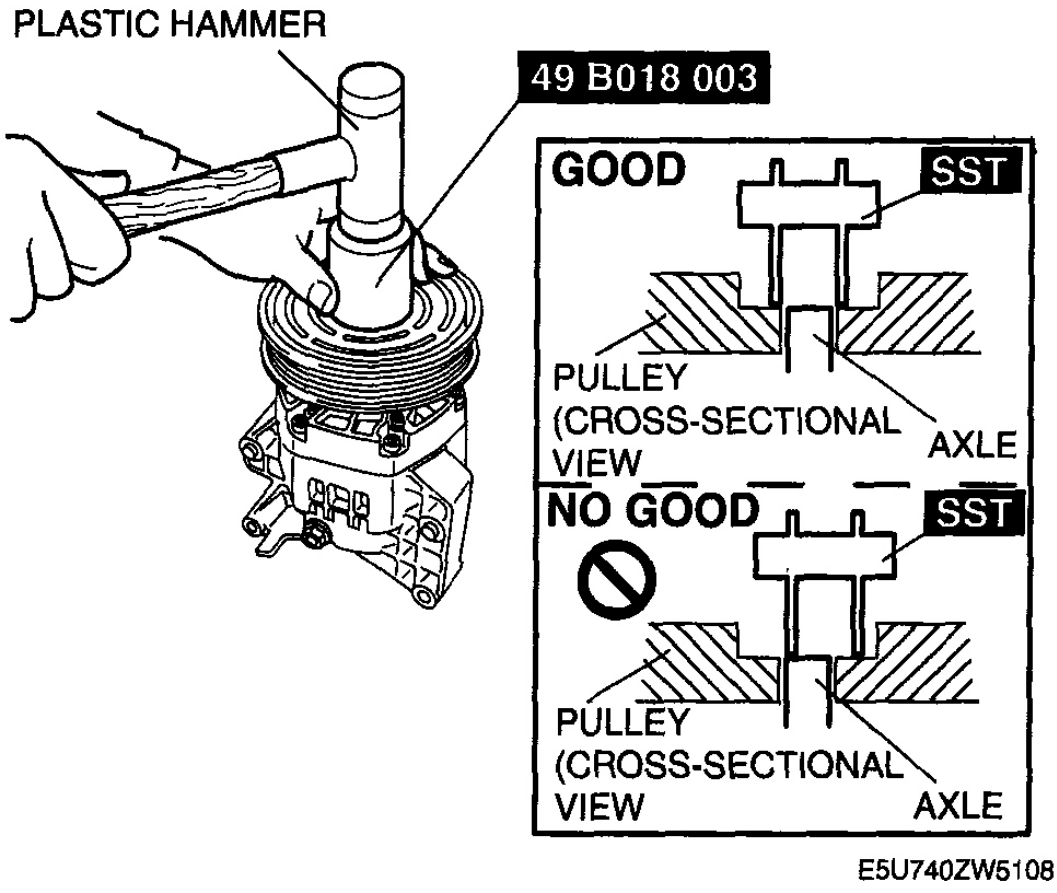


Fig. 15: Installing Inner Wheel Of Pulley Using Plastic Hammer & SST To Compressor
Courtesy of MAZDA MOTORS CORP.

SHIM INSTALLATION NOTE

1. First, insert the 1 mm (0.039 in) thick shim into the shaft.

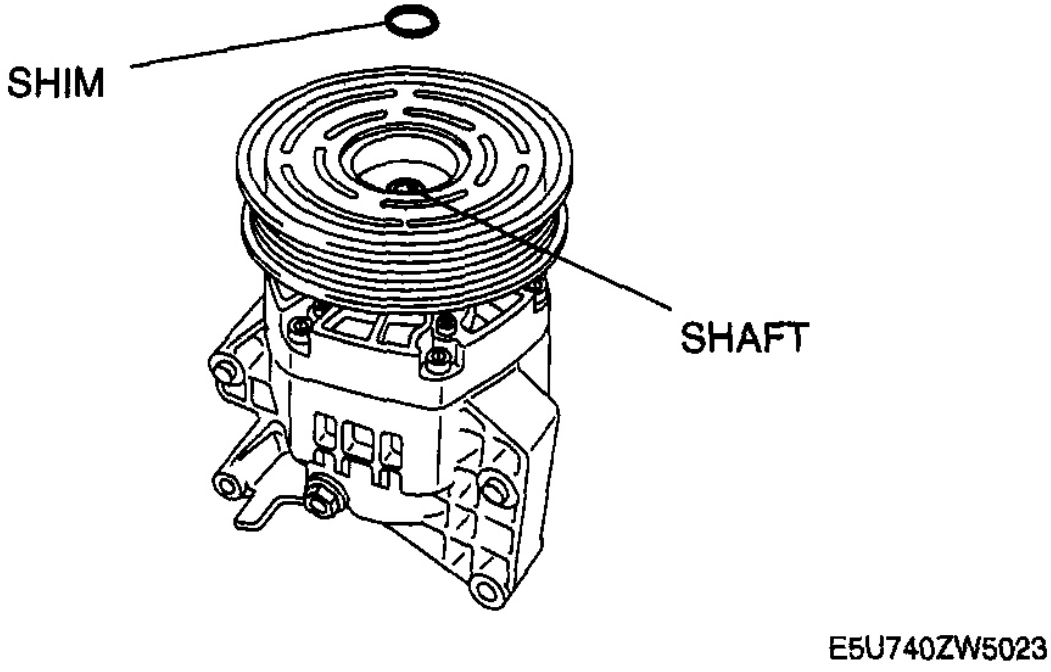


Fig. 16: Inserting 1 MM Thick Shim Into Shaft
Courtesy of MAZDA MOTORS CORP.

MAGNETIC CLUTCH ADJUSTMENT

1. Measure the clearance around the entire circumference between the pressure plate and A/C compressor pulley using a thickness gauge,
2. Inspect the clearance.
    - If not within the specification, adjust the clearance by changing the shim or the number of shims.

Magnetic clutch clearance

0.3-0.6 mm {0.012-0.023 in}

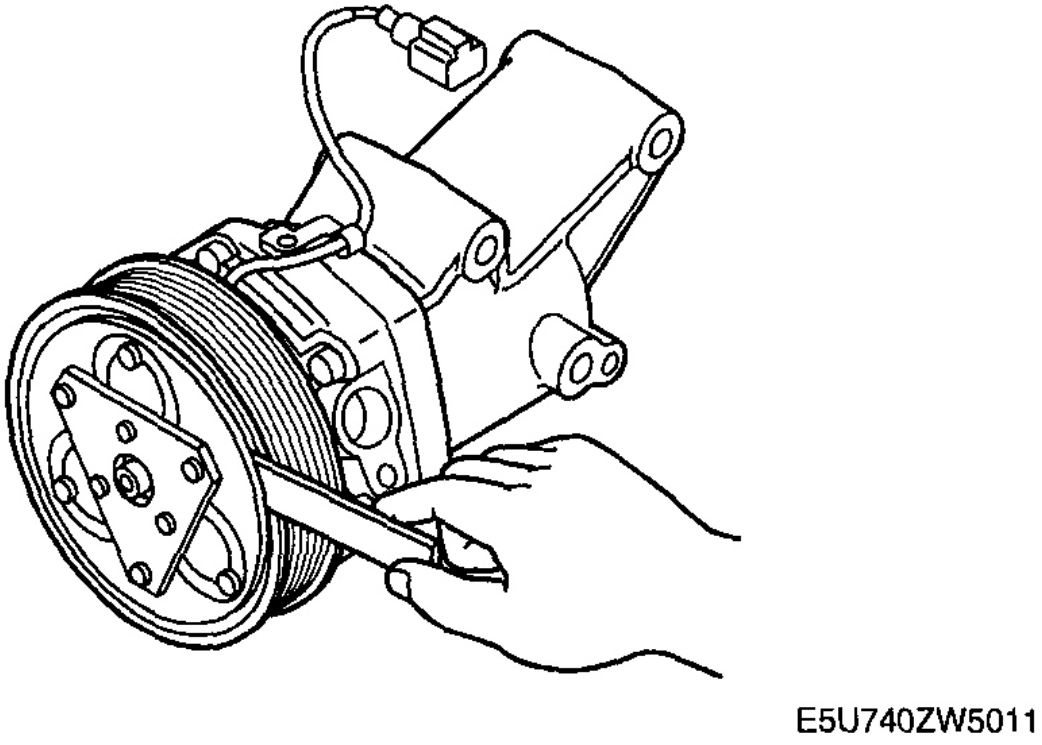


Fig. 17: Measuring Clearance Around Entire Circumference Between Pressure Plate & A/C Compressor Pulley Using Thickness Gauge
Courtesy of MAZDA MOTORS CORP.

MAGNETIC CLUTCH INSPECTION

1. Connect battery positive voltage to magnetic clutch terminal A and ground.

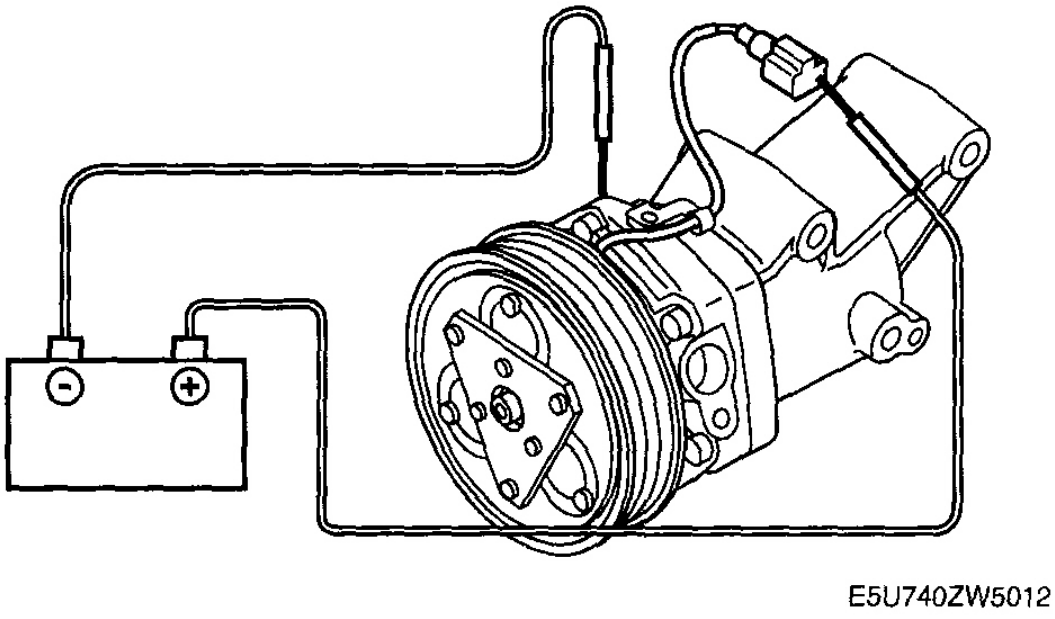


Fig. 18: Connecting Battery Positive Voltage To Magnetic Clutch Terminal A & Ground
Courtesy of MAZDA MOTORS CORP.

2. Verify that the magnetic clutch turns on.
    - If the magnetic clutch does not turn on, replace the A/C compressor.

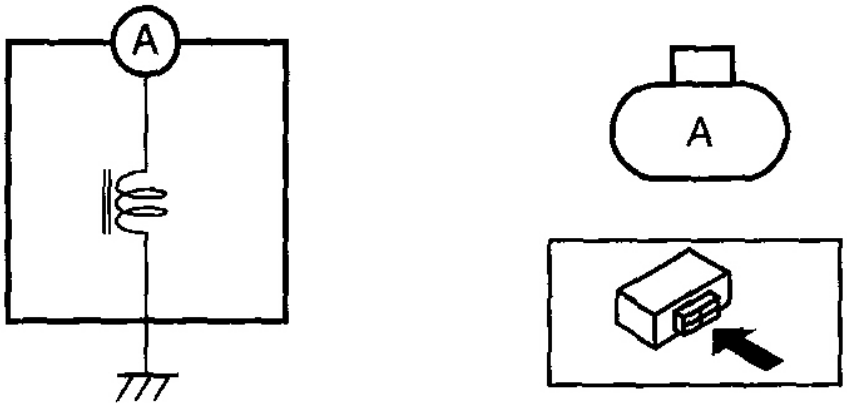


Fig. 19: Identifying Magnetic Clutch Connector
Courtesy of MAZDA MOTORS CORP.

EVAPORATOR TEMPERATURE SENSOR REMOVAL/INSTALLATION

1. Remove the evaporator temperature sensor from the A/C unit. (See **A/C UNIT DISASSEMBLY/ASSEMBLY** .)

EVAPORATOR TEMPERATURE SENSOR INSPECTION

NOTE:
- **Inspect the evaporator temperature sensor when it is installed to the A/C unit.**

1. Set the fan speed MAX-HI.
2. Set the temperature control to MAX COLD.
3. Set the air intake mode to RECIRCULATE.
4. Turn the A/C switch off.
5. Close all of the doors and roll up all the windows.
6. Wait for **5 min** .
7. Disconnect the evaporator temperature sensor connector.
8. Measure the temperature at the air intake.
9. Measure the resistance between evaporator temperature sensor terminals.

- If the characteristics of the evaporator temperature sensor are not as shown in **Fig. 20** , replace the evaporator temperature sensor.

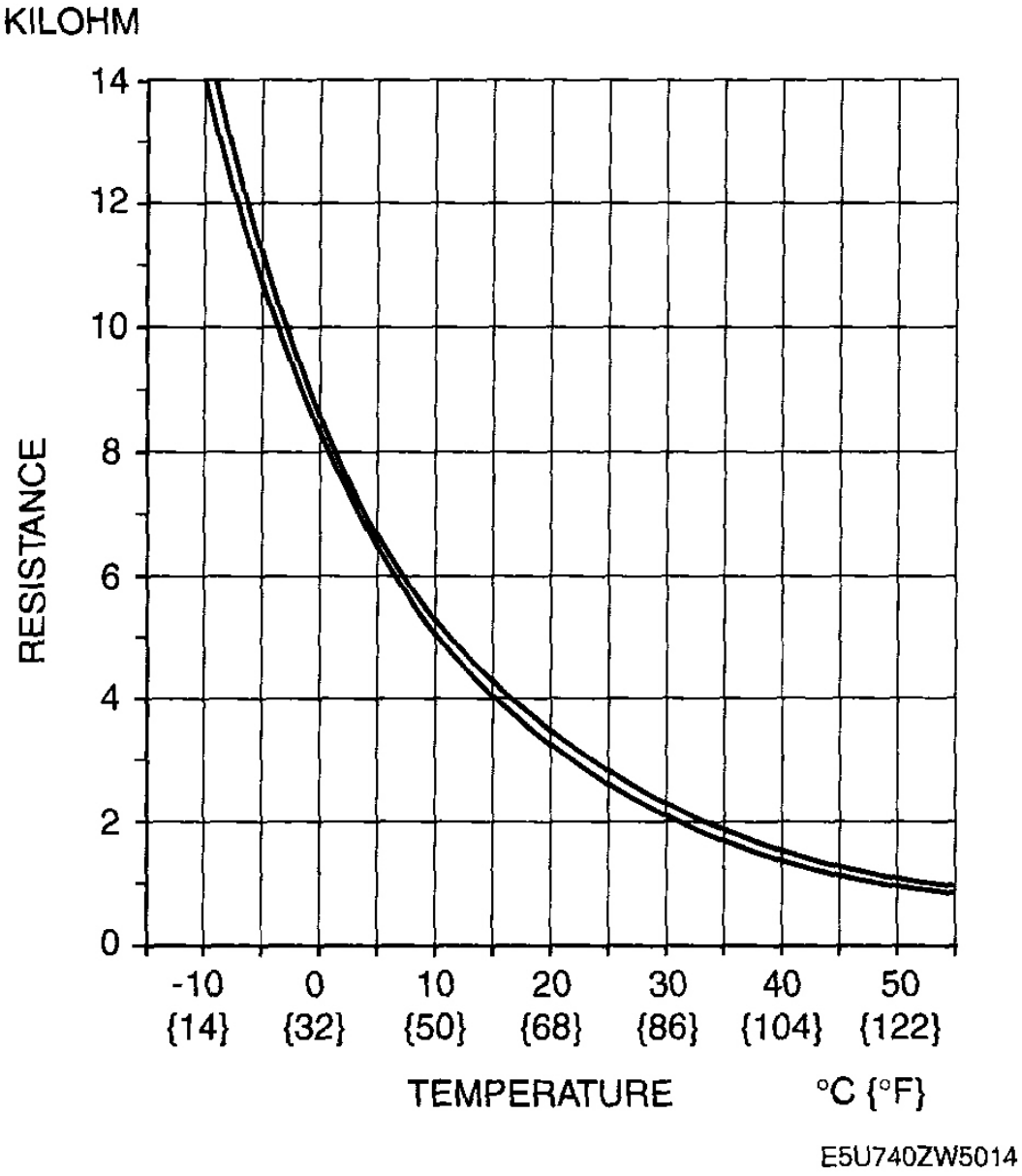
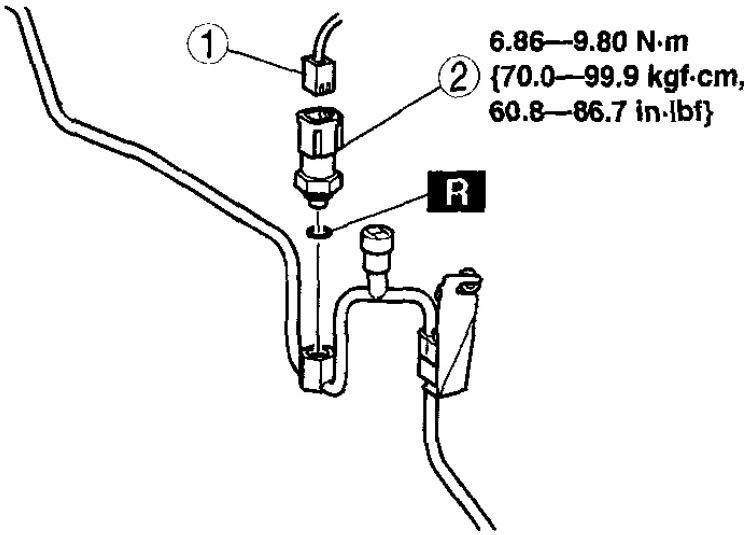


Fig. 20: Evaporator Temperature Sensor Graph
Courtesy of MAZDA MOTORS CORP.

REFRIGERANT PRESSURE SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Discharge the refrigerant from the system. (See **REFRIGERANT CHARGING** .)
4. Remove in the order indicated in **Fig. 21** .



1	Refrigerant pressure switch connector
2	Refrigerant pressure switch

Fig. 21: Removing Refrigerant Pressure Switch (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

REFRIGERANT PRESSURE SWITCH INSTALLATION NOTE

1. Apply compressor oil to the O-ring joints.

REFRIGERANT PRESSURE SWITCH INSPECTION

1. Connect the manifold gauge.
2. Verify the high-pressure side reading.
3. Disconnect the refrigerant pressure switch connector.
4. Verify continuity between the terminals of the refrigerant pressure switch.

- If the continuity is not normal, replace the refrigerant pressure switch.

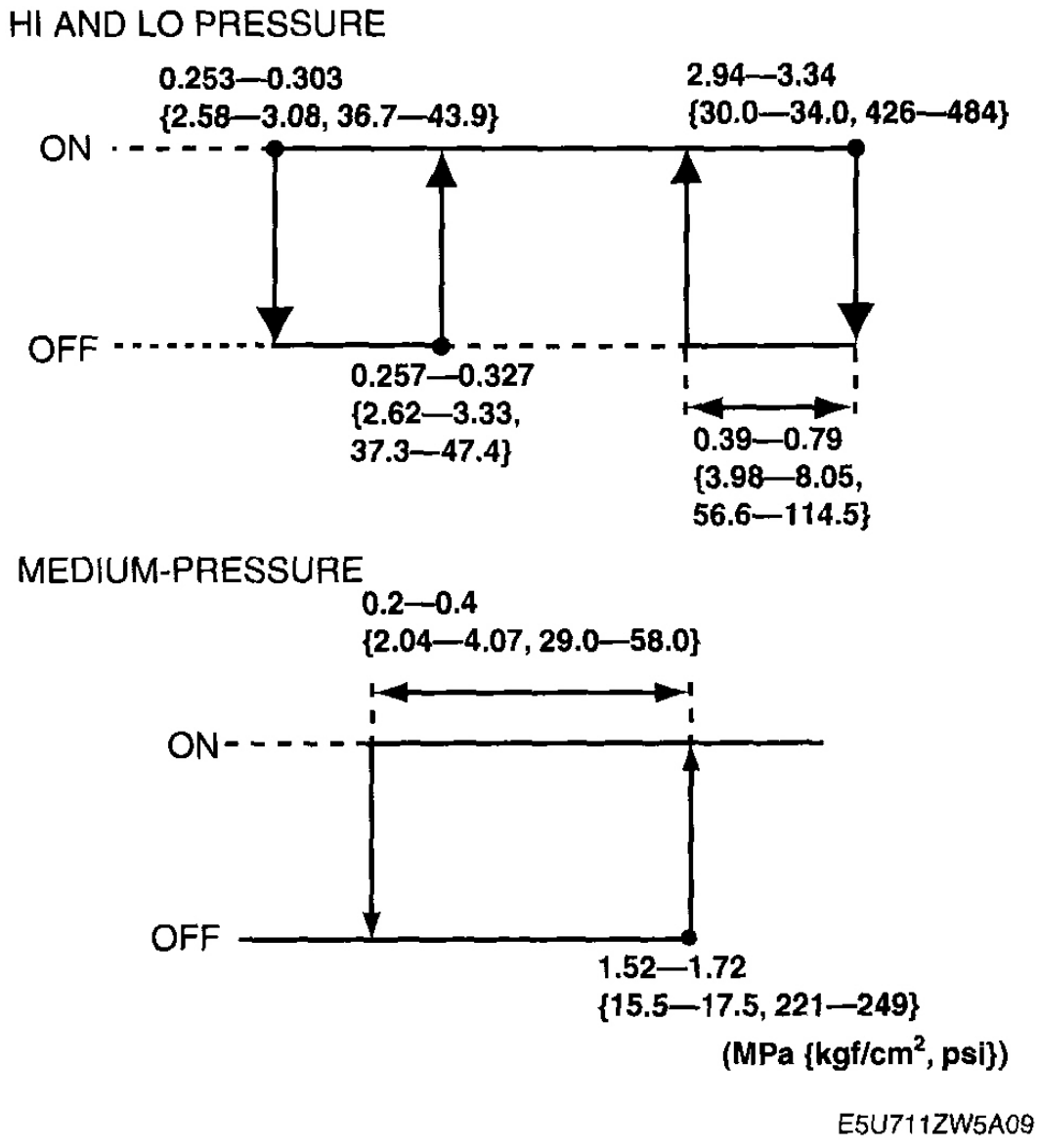


Fig. 22: Refrigerant Pressure Switch Specification
Courtesy of MAZDA MOTORS CORP.

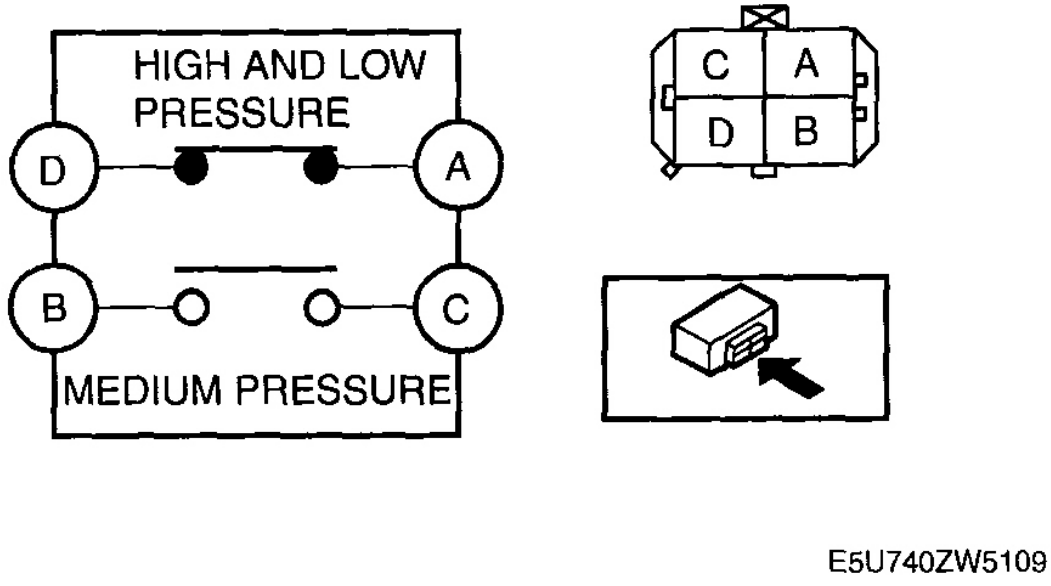


Fig. 23: Refrigerant Pressure Switch Terminals
Courtesy of MAZDA MOTORS CORP.

CLIMATE CONTROL UNIT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the center panel unit. (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
5. Remove the climate control unit from the center panel unit.
6. Install in the reverse order of removal.

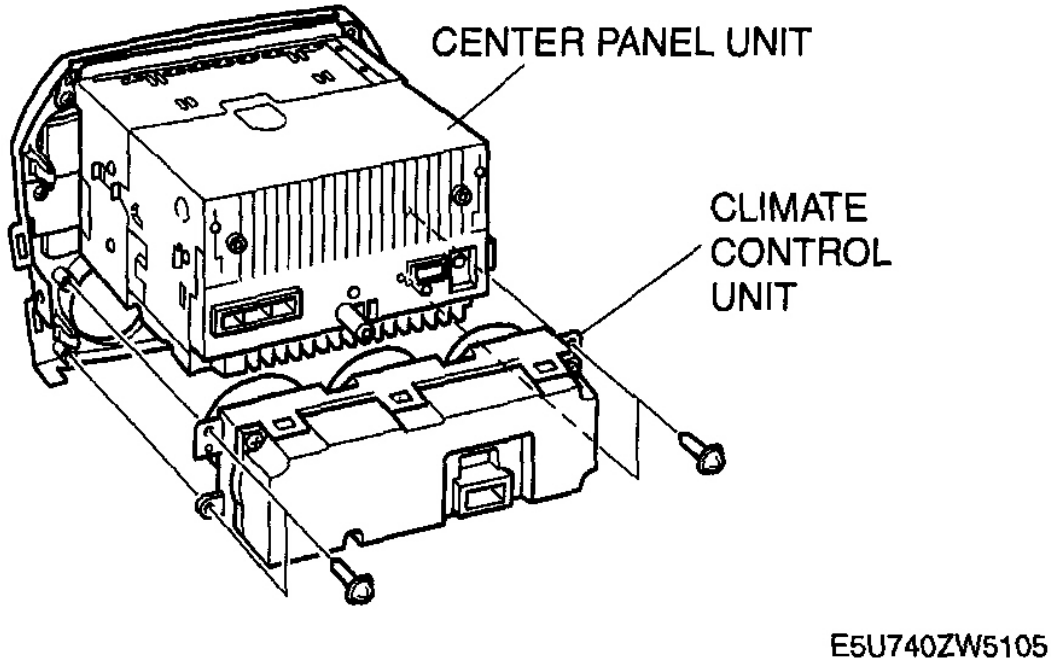
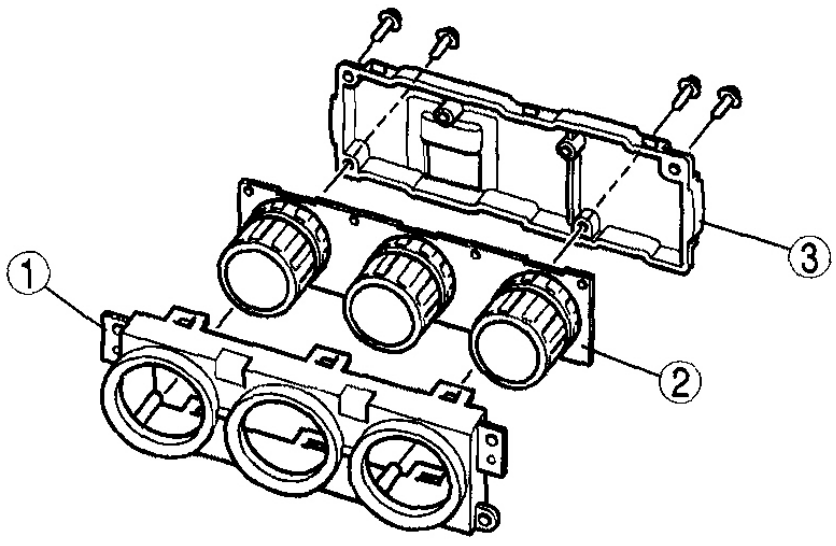


Fig. 24: Removing Climate Control Unit From Center Panel Unit
Courtesy of MAZDA MOTORS CORP.

CLIMATE CONTROL UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 25** .



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1	Case (1)
2	Panel
3	Case (2)

Fig. 25: Identifying Climate Control Unit Components
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

CLIMATE CONTROL UNIT INSPECTION

1. Turn the ignition switch to the ON position.
2. Connect the negative (-) lead of the tester to body ground.
3. By inserting the positive (+) lead of the tester into each climate control unit terminal, measure the voltage according to **TERMINAL VOLTAGE REFERENCE TABLE** .
    - If there is any malfunction, inspect the parts under "Inspection item (s)".
        - If the parts under "Inspection item (s)" are found to be normal, replace the climate control unit.

TERMINAL VOLTAGE TABLE (REFERENCE)

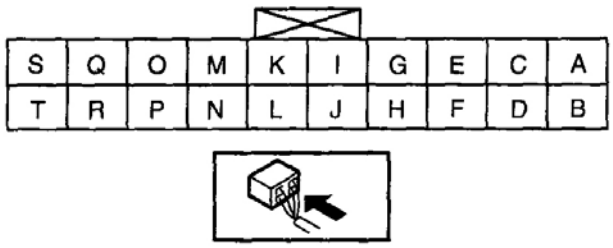

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Fig. 26: Identifying Climate Control Unit Connector Terminals
Courtesy of MAZDA MOTORS CORP.

TERMINAL VOLTAGE REFERENCE TABLE

Terminal	Signal name	Connected to	Measurement condition	Voltage (V)	Inspection item (s)
A	IG2	A/C 7.5 A fuse	IG SW ON	B+	• Wiring harness: continuity, short circuit (Climate control unit-fuse: A-A/C 7.5 A) • A/C 7.5 A fuse
			IG SW LOCK	1.0 or less	• Wiring harness: continuity, short circuit (Climate control unit-fuse: A-A/C 7.5 A)
B	B+	ROOM 15 A fuse	Under any condition	B+	• Wiring harness: continuity, short circuit (Climate control unit-fuse: B-ROOM 15 A) • ROOM 15 A fuse
C	Blower fan speed control	Power MOS FET	Fan stopped	1.0 or less	• Wiring harness: continuity, short circuit (Climate control unit-power MOS FET: C-C) • Power MOS FET
			Fan: manual LO	2.8	
			Fan: manual HI	9.9	
D	TNS signal	TNS relay	Headlight switch OFF	1.0 or less	• Wiring harness: short circuit (Climate control unit-TNS relay: D-D) • TNS relay • Headlight switch
					• Wiring harness: continuity, short circuit

			Headlight switch ON	B+	(Climate control unit-TNS relay: D-D) • TNS relay • Headlight switch
E	Blower motor feedback	Power MOS FET	Fan stopped	B+	1. Wiring harness: continuity, short circuit (Climate control unit-power MOS FET: E-B) 2. Power MOS FET 3. Blower motor 4. Blower relay 5. HEATER 40 A fuse 6. Power MOS FET replacement
			Fan: manual LO	8.17	
			Fan: manual HI	0.6	
F	Panel control signal	Instrument cluster	Headlight switch OFF	0	• Wiring harness: continuity (Climate control unit-instrument cluster: F-1F) • Instrument cluster • Climate control unit: terminal voltage (D)
			Headlight switch ON	2.7	• Wiring harness: short circuit (Climate control unit-instrument cluster: F-1F)
G	Actuator power	• Air intake actuator • Air mix actuator • Airflow mode actuator	IG SW ON	B+	• Wiring harness: continuity, short circuit (Climate control unit-air intake actuator, air mix actuator, air flow mode actuator: G-A, A, A) • Air intake actuator • Air mix actuator • Airflow mode actuator
			IG SW LOCK	1.0 or less	
H	GND	Body ground	Under any condition	1.0 or less	• Wiring harness: continuity (Climate control unit-GND: H-GND)
I	Plus Signal	-	-	-	-
J	-	-	-	-	-
					• Wiring harness: short

			A/C switch ON, fan switch at 1st	1.0 or less	circuit (Climate control unit-refrigerant pressure switch: K-A)
K	A/C	Refrigerant pressure switch	A/C switch OFF	B+	• Wiring harness: continuity, short circuit (Climate control unit-refrigerant pressure switch: K-A) (Refrigerant pressure switch-PCM: C-1J) • Refrigerant pressure switch • PCM: terminal voltage (1J)
L	-	-	-	-	-
M	Evaporator temperature sensor input	Evaporator temperature sensor	Compared with temperature detected by evaporator temperature sensor	Refer to **Fig. 27**	• Wiring harness: continuity (Climate control unit-evaporator temperature sensor: M-B, S-A) • Wiring harness: short circuit (Climate control unit-evaporator temperature sensor: M-B) • Evaporator temperature sensor
N	Rear window defroster operation	Rear window defroster relay	Rear window defroster switch OFF	B+	• Wiring harness: continuity, short circuit (Climate control unit-rear window defroster relay: N-E) • Rear window defroster relay
			Rear window defroster switch ON	1.0 or less	
O	-	-	-	-	-
P	-	-	-	-	-
Q	-	-	-	-	-
R	-	-	-	-	-
S	Sensor GND	Evaporator temperature sensor	Under any condition	1.0 or less	• Wiring harness: continuity (Climate control unit-GND: S-GND)
T	-	-	-	-	-

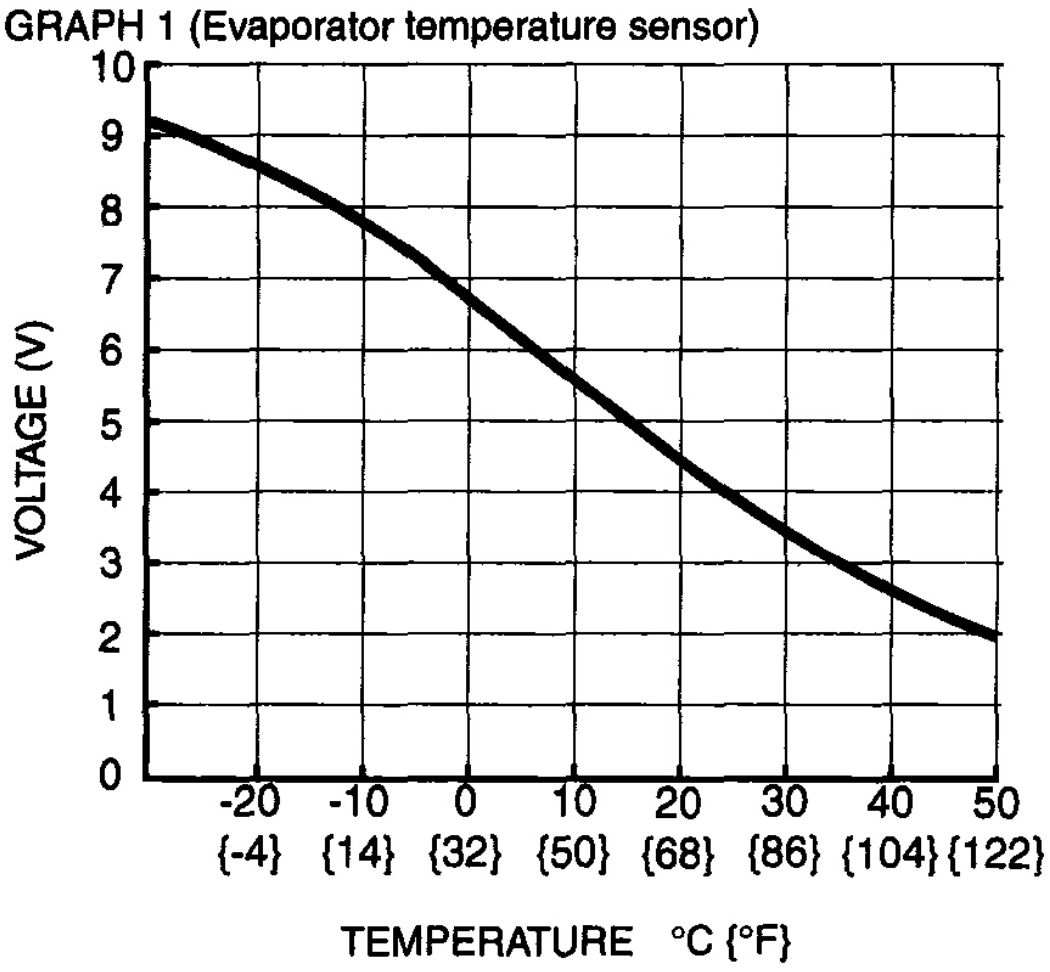
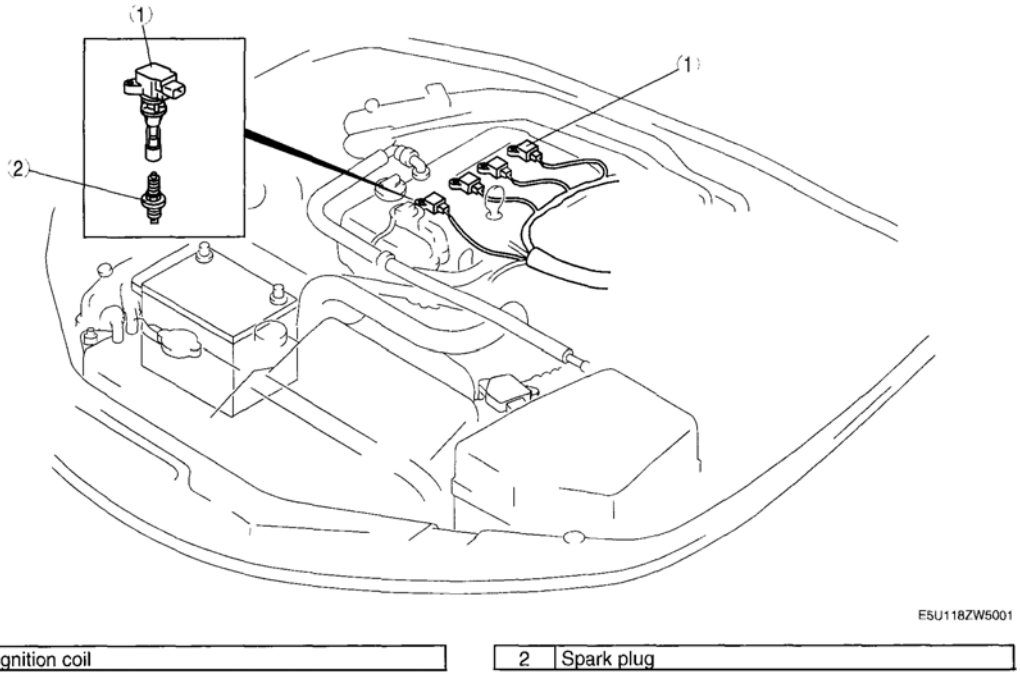


Fig. 27: Evaporator Temperature Sensor Voltage Vs. Temperature (Graph 1)
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Ignition System - MX-5 Miata

IGNITION SYSTEM LOCATION INDEX [LF]

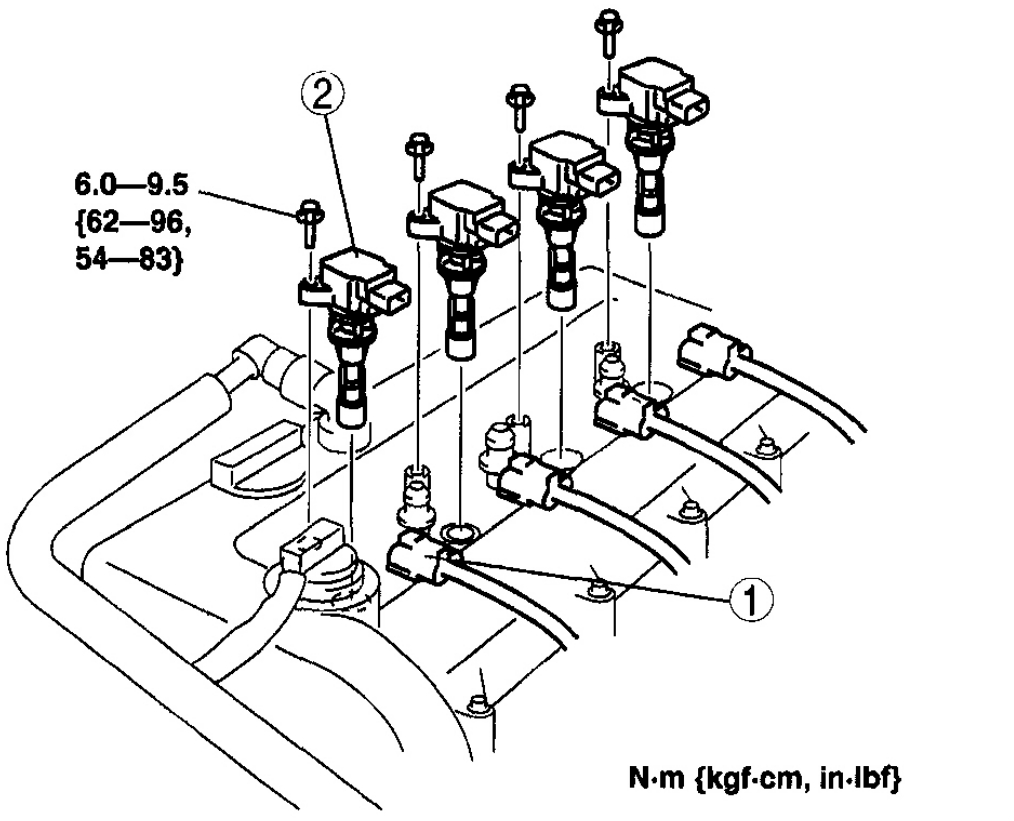


1	Ignition coil	2	Spark plug

Fig. 1: Identifying Location Of Ignition System Components
Courtesy of MAZDA MOTORS CORP.

IGNITION COIL REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
4. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
5. Remove in the order indicated in **Fig. 2** .
6. Install in the reverse order of removal.



1	Connector
2	Ignition coil

Fig. 2: Identifying Removal Order Of Ignition Coil (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

IGNITION COIL INSPECTION [LF]

IGNITION COIL INSPECTION

1. Perform the spark test and identify the malfunctioning cylinder.
2. Replace the ignition coil of the malfunctioning cylinder with that of a normal cylinder, and re-perform the spark test.
   - If the spark is not normal due to a malfunctioning ignition coil, replace that ignition coil.
   - It is unlikely that all four ignition coils fail to operate properly. To prevent replacing a normal component, perform the above procedure, identify the malfunctioning ignition coil, and replace it.

IGNITION COIL WITH BUILT-IN IGNITER INSPECTION

1. Disconnect the ignition coil connector.
2. Measure the resistance between each terminal on the ignition coil connector using an analog circuit tester.
    - If the measurement corresponds to the table, replace the ignition coil.

TESTER CONNECTION POSITION

Item	Tester Connection Position		Condition
	Positive	Negative	
Terminal	C	A	0 ohm is not normal (Infinity ohm is normal)
	A	C	
	C	B	
	B	C	
	A	B	Infinity or 0 ohm is not normal (several kilohm is normal)
	B	A	

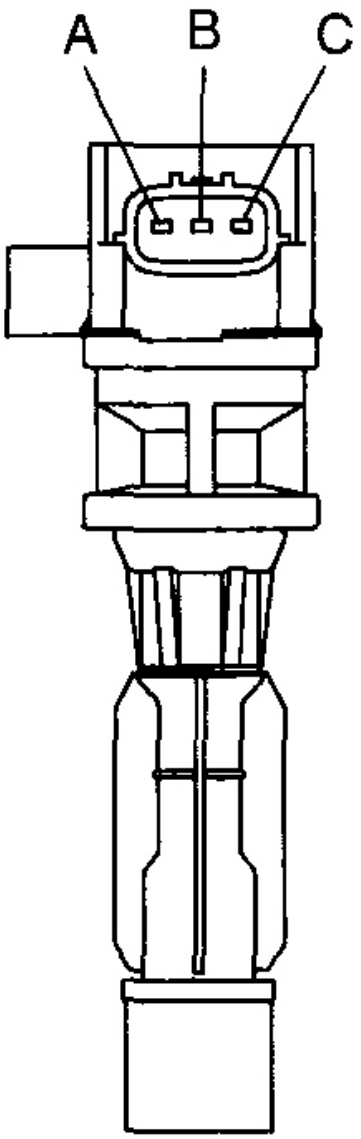


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Fig. 3: Identifying Ignition Coil Connector Terminals
Courtesy of MAZDA MOTORS CORP.

SPARK PLUG REMOVAL/INSTALLATION [LF]

CAUTION:
- **If a spark plug that is not as specified is installed, engine performance will be deteriorated. Install only the specified spark plug when replacing.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
4. Remove the front suspension tower bar (joint). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
5. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
6. Remove the spark plugs using a plug-wrench.
7. Install in the reverse order of removal.

Tightening torque

10-14 N.m {1.1-1.4 kgf.m. 8-10 ft.lbf}

SPARK PLUG INSPECTION [LF]

SPECIFICATION

Spark plug type

L3G2 18 110, L3Y1 18 110

PLUG GAP INSPECTION

CAUTION:
- **To avoid possible damage to the tip, do not adjust the plug gap.**
- **To prevent damaging the tip, use a wire type plug gap gauge when inspecting the plug gap.**

1. Measure the spark plug gap using a wire type plug gap gauge.
   - If it exceeds the specification, replace the spark plug.

Spark plug gap

1.25-1.35 mm {0.050-0.053 in}

CLEANING

CAUTION:
- **Carbon may adhere to the tip of the spark plug during vehicle delivery or repeated short distance driving during the winter time. If**

there is any malfunction such as rough idling or start difficulty due to carbon adhesion causing plug fouling, burn off the carbon by performing no-load racing of the engine.

- **When performing the no-load racing, apply the side brake and foot brake, move the shift lever to neutral (MT), or the selector lever to P position (AT) to prevent an accident and serious injury.**
- **To avoid possible damage to the spark plug tip, do not use a wire brush for cleaning.**

NOTE:

- **To avoid possible damage to the tip, use gasoline to clean the spark plugs after removing dirt.**
- **If the accelerator pedal is depressed continuously for a specified time, the engine speed may decrease to the idle speed. This is due to the fuel cut control operation, which prevents overheating, and it does not indicate a malfunction.**
- **Do not perform no-load racing at high engine speed continuously for 10s or more.**

1. If there is carbon adhering to the spark plug, perform no-load racing at **4,000 rpm for 2 min, 2 times** .

VISUAL INSPECTION

1. Inspect the following items:
   - If any of the following malfunction are indicated, replace the spark plug.
     - Insulator breakage
     - Worn electrode
     - Damaged gasket
     - Badly burned insulator (sparking side)

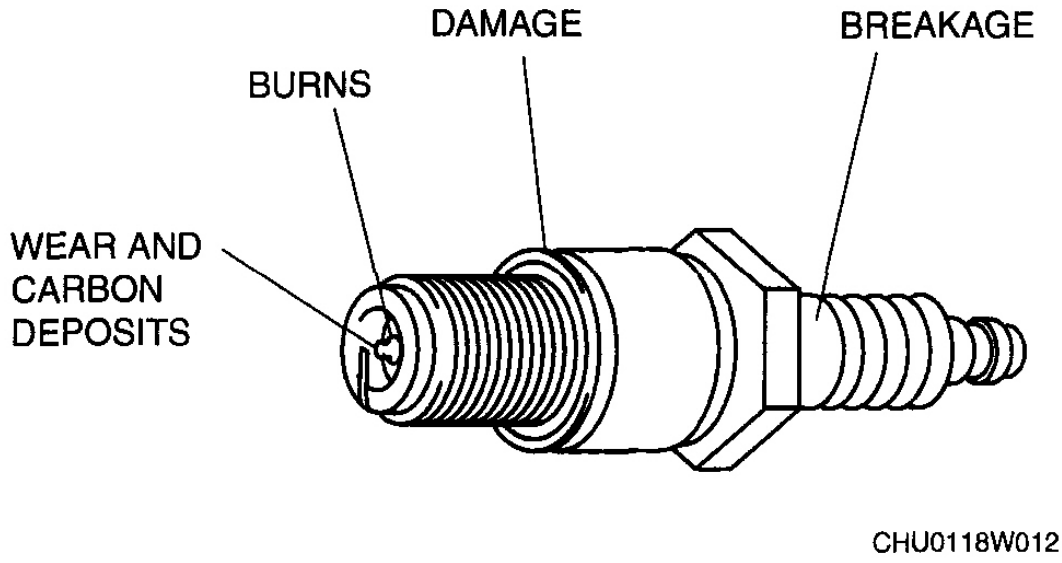

Fig. 4: Inspecting Spark Plug
Courtesy of MAZDA MOTORS CORP.

RESISTANCE INSPECTION

1. Measure the resistance of the spark plug using a tester as shown in **Fig. 5** .
    - If not within the specification, replace the spark plug.

Spark plug resistance [25°C {77°F}]

3.0-7.5 kilohms

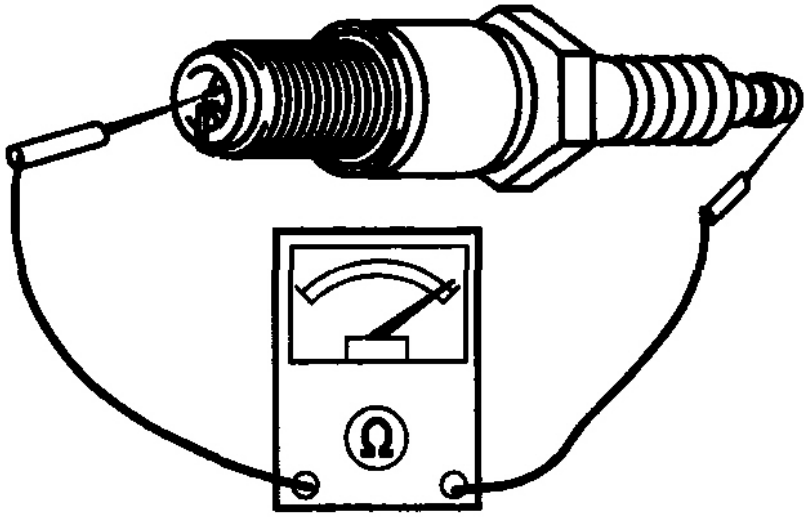

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Fig. 5: Measuring Resistance Of Spark Plug
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Symptom Troubleshooting (Instrument Cluster) - MX-5 Miata

SYMPTOM TROUBLESHOOTING [INSTRUMENT CLUSTER]

SYMPTOM TROUBLESHOOTING TABLE

No.	TROUBLESHOOTING ITEM	REFERENCE
1	Fuel gauge needle position incorrect	(See **NO.1 FUEL GAUGE NEEDLE POSITION INCORRECT** .)
2	All meters and gauges do not operate	(See **NO.2 ALL METERS AND GAUGES DO NOT OPERATE** .)
3	ABS warning light illuminates	(See **NO.3 ABS WARNING LIGHT ILLUMINATES** .)
4	MIL illuminates	(See **NO.4 MIL ILLUMINATES** .)
5	Brake system warning light illuminates	(See **NO.5 BRAKE SYSTEM WARNING LIGHT ILLUMINATES** .)
6	Instrument cluster illumination does not illuminate	(See **NO.6 INSTRUMENT CLUSTER ILLUMINATION DOES NOT ILLUMINATE** .)
7	Speedometer indication is defective	(See **NO.7 SPEEDOMETER INDICATION IS DEFECTIVE** .)
8	Tachometer indication is defective	(See **NO.8 TACHOMETER INDICATION IS DEFECTIVE** .)
9	Water temperature gauge indication is defective	(See **NO.9 WATER TEMPERATURE GAUGE INDICATION IS DEFECTIVE** .)
10	Oil pressure gauge indication is defective (oil pressure gauge needle does not move from the L position or less)	(See **NO.10 OIL PRESSURE GAUGE INDICATION IS DEFECTIVE (OIL PRESSURE GAUGE NEEDLE DOES NOT MOVE FROM THE L POSITION OR LESS)** .)

QUICK DIAGNOSTIC TABLE [INSTRUMENT CLUSTER]

X: Applicable

No.	Troubleshooting item / Possible factor	Poor connection of fuel gauge sender unit connector, terminal damage	Poor connection of instrument cluster connector, terminal damage	Fuel gauge sender unit	Instrument cluster	Fuel gauge sender unit is improperly installed	Open or short circuit in wiring harness between instrument cluster and GND	Open or short circuit in wiring harness between instrument cluster and fuel gauge sender unit	Fuse malfunction (METER)	Open or short circuit in power supply (IG1) wiring harness	Open or short circuit in GND wiring harness ABS HU/CM or DSC HU/CM	Poor connection of ABS HU/CM or DSC HU/CM connector, terminal damage	ABS HU/CM or DSC HU/CM	Short circuit in wiring harness between CAN-L, CAN-H and GND	Open circuit in CAN wiring harness (CAN-L, CAN-H)	CAN wiring harness (CAN-L, CAN-H) short each other	Poor connection of PCM connector, terminal damage	PCM	Poor connection of brake fluid level sensor connector, terminal damage	Brake fluid level sensor	Poor connection of Parking brake switch connector, terminal damage	Parking brake switch	Fuse malfunction (ROOM, ILLUMI)	Poor connection of oil pressure switch connector, terminal damage	Oil pressure switch
1	Fuel gauge needle position incorrect	X	X	X	X	X	X	X																	
2	All meters and gauges do not operate		X		X				X	X	X														
3	ABS warning light illuminates		X		X							X	X	X	X	X									
4	MIL illuminates		X		X									X	X	X	X	X							
5	Brake system warning light illuminates		X		X							X	X	X	X	X			X	X	X	X			
6	Instrument cluster illumination does not illuminate		X		X																		X		
7	Speedometer indication is defective		X		X							X	X	X	X	X	X	X							
8	Tachometer indication is defective		X		X									X	X	X	X	X							
9	Water temperature gauge indication is defective		X		X									X	X	X	X	X							
10	Oil pressure gauge indication is defective (oil pressure gauge needle does not move from the L position or less)		X		X									X	X	X	X	X						X	X

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Fig. 1: Instrument Cluster Quick Diagnostic Table
Courtesy of MAZDA MOTORS CORP.

NO. 1 FUEL GAUGE NEEDLE POSITION INCORRECT

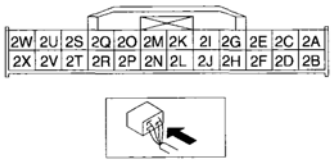
FUEL GAUGE NEEDLE POSITION INCORRECT POSSIBLE CAUSE TABLE

1	**Fuel gauge needle position incorrect**
	• Fuel gauge sender unit malfunction • Instrument cluster malfunction • Connector or pin malfunction

POSSIBLE CAUSE	• Fuel gauge sender unit is improperly installed • Open or short circuit in wiring harness between instrument cluster and GND • Open or short circuit in wiring harness between instrument cluster and fuel gauge sender unit

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Verify that the fuel gauge needle does not move after ignition switch is turned off, or the display does not indicate F even though fuel tank is full. • Is the fuel gauge normal?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Start the instrument cluster input/output check mode. • Select the check code 22. • Display value is **7-206** ?	Yes	Go to the next step.
		No	Go to Step 4.
3	• Perform the check code 23 inspection. • Is there any malfunction?	Yes	Replace the instrument cluster.
		No	Go to the next step.
4	• Perform the check code 22 inspection. • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 6.
5	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Replace the instrument cluster.
		No	Repair or replace the terminal.
6	• Turn the ignition switch to LOCK position. • Remove the instrument cluster. • Disconnect the instrument cluster connector. • Inspect for continuity between the following wiring harnesses.	Yes	Repair or replace the wiring harness between the instrument cluster and GND.

	○ 2R terminal-GND ○ 2T terminal-GND • Is there continuity?	No	Go to the next step.
7	• Turn the ignition switch off. • Inspect the fuel gauge sender unit connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal?	Yes	Go to the next step.
		No	Repair or replace the terminal.
8	• Turn the ignition switch to LOCK position. • Inspect for continuity following the wiring harness between instrument cluster and fuel gauge sender unit. ○ 2R terminal-C terminal ○ 2T terminal-A terminal • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness between the instrument cluster and the fuel gauge sender unit.
9	• Turn the ignition switch off. • Is the fuel gauge sender unit installed properly?	Yes	Inspect the fuel gauge sender unit.
		No	Reinstall the fuel gauge sender unit.

NO. 2 ALL METERS AND GAUGES DO NOT OPERATE

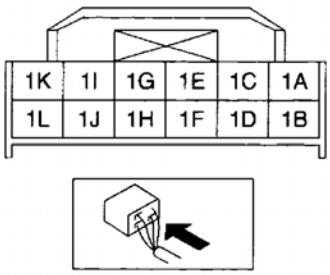
ALL METERS AND GAUGES DO NOT OPERATE POSSIBLE CAUSE TABLE

2	All meters and gauges do not operate
POSSIBLE CAUSE	• Instrument cluster malfunction • Connector or pin malfunction • Fuse malfunction • Open or short circuit in power supply (IG1) wiring harness • Open or short circuit in GND wiring harness

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Inspect the following: ○ Does the odometer/tripmeter illuminate? ○ Does the fuel gauge operate? ○ Does the MIL turn off within **approx. 3 s** ?	Yes	Troubleshooting completed.
		No	Go to the next step.

2	• Inspect the METER fuse. • Is the fuse normal?	Yes	Go to the next step.
		No	Replace the fuse. • If the fuse is melted, inspect the wiring harness for a short to ground. Repair or replace the wiring harness, then replace the fuse.
3	• Turn the ignition switch to LOCK position. • Remove the instrument cluster. • Disconnect the instrument cluster connector. • Inspect the voltage between instrument cluster wiring harness-side connector terminal 1G and terminal 1E. • Turn the ignition switch to the ON position. • Is the voltage **B+** ? 	Yes	Go to the next step.
		No	Inspect the suspect wiring harness, then repair or replace.
4	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal?	Yes	Replace the instrument cluster.
		No	Repair or replace the terminal.

NO. 3 ABS WARNING LIGHT ILLUMINATES

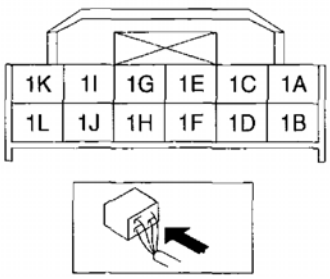
ABS WARNING LIGHT ILLUMINATES POSSIBLE CAUSE TABLE

3	ABS warning light illuminates
POSSIBLE CAUSE	• ABS HU/CM or DSC HU/CM malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H)

	• CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. • Does the ABS warning light turn off?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Are there a number of warning lights illuminated?	Yes	Go to Step 4.
		No	Go to the next step.
3	• Start the instrument cluster input/output check mode. • Does the ABS warning light turn off with a check code other than 26?	Yes	Inspect the ABS HU/CM or DSC HU/CM.
		No	Replace the instrument cluster.
4	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 6.
5	• Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
6	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Go to the next step.
		No	Repair or replace the terminal.
7	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L.	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

	• Is the resistance **114-126 ohms** ?		

NO. 4 MIL ILLUMINATES

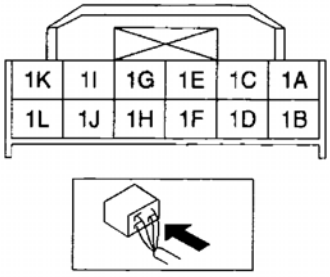
MIL ILLUMINATES POSSIBLE CAUSE TABLE

4	MIL illuminates
POSSIBLE CAUSE	• PCM malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. • Does the MIL turn off?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Are there a number of warning lights illuminated?	Yes	Go to Step 4.
		No	Go to the next step.
3	• Start the instrument cluster input/output check mode. • Does the MIL turn off with a check code other than 26?	Yes	Inspect the PCM.
		No	Replace the instrument cluster.
4	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 6.
5	• Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal?	Yes	Go to the next step.

6		No	Repair or replace the terminal.
7	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

NO. 5 BRAKE SYSTEM WARNING LIGHT ILLUMINATES

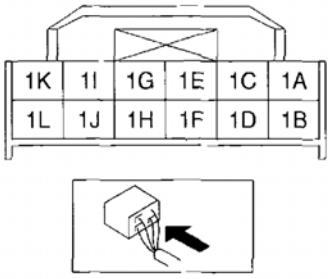
BRAKE SYSTEM WARNING LIGHT ILLUMINATES POSSIBLE CAUSE TABLE

5	Brake system warning light illuminates
POSSIBLE CAUSE	• ABS HU/CM or DSC HU/CM malfunction • Brake fluid level sensor malfunction • Parking brake switch malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. • Release the parking brake. • Does the brake system warning light turn off?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Are there a number of warning lights illuminated?	Yes	Go to Step 5.
		No	Go to the next step.
3	• Does the brake fluid need replenishment?	Yes	Add brake fluid.
		No	Go to the next step.
	• Start the instrument cluster input/output check mode.	Yes	Inspect the ABS HU/CM, DSC HU/CM, brake fluid level sensor,

4	• Does the brake system warning light turn off with a check code other than 26?		parking brake switch or connectors.
		No	Replace the instrument cluster.
5	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 7.
6	• Disconnect the negative battery cable. • Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
7	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Go to the next step.
		No	Repair or replace the terminal.
8	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

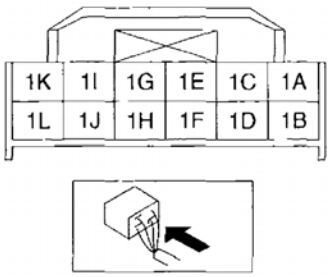
NO. 6 INSTRUMENT CLUSTER ILLUMINATION DOES NOT ILLUMINATE

INSTRUMENT CLUSTER ILLUMINATION DOES NOT ILLUMINATE POSSIBLE CAUSE TABLE

6	Instrument cluster illumination does not illuminate
POSSIBLE CAUSE	• Instrument cluster malfunction • Connector or pin malfunction • Fuse malfunction

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the light switch to the TNS position. • Does the instrument cluster illumination turn on?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Does the non-illumination include the entire instrument cluster?	Yes	Go to the next step.
		No	Replace the instrument cluster.
3	• Inspect the ROOM and ILLUMI fuse. • Are the fuses normal?	Yes	Go to the next step.
		No	Replace the fuse. • If the fuse is melted, inspect the wiring harness for short to ground. Repair or replace the wiring harness, then replace the fuse.
4	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Replace the instrument cluster.
		No	Repair or replace the terminal.

NO. 7 SPEEDOMETER INDICATION IS DEFECTIVE

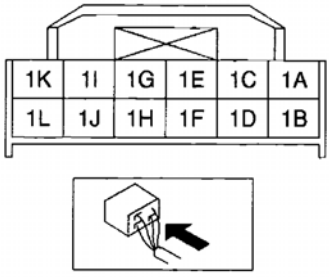
SPEEDOMETER INDICATION IS DEFECTIVE POSSIBLE CAUSE TABLE

7	Speedometer indication is defective
POSSIBLE CAUSE	• ABS HU/CM or DSC HU/CM malfunction • PCM malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine, and drive the vehicle. ○ Does the speedometer needle move smoothly? ○ Does the speedometer needle indicate correct speed?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Do the tachometer, the water temperature gauge, and the oil pressure gauge operate normally?	Yes	Go to the next step.
		No	Go to Step 4.
3	• Start the instrument cluster input/output check mode. • Inspect the speedometer using the check code 12. • Is the speedometer normal?	Yes	Inspect the ABS HU/CM, DSC HU/CM, or connectors.
		No	Replace the instrument cluster.
4	• Start the engine. • Does the ABS warning light turn off?	Yes	Inspect the PCM or connectors.
		No	Replace the instrument cluster.
5	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 7.
6	• Disconnect the negative battery cable. • Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
7	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal?	Yes	Go to the next step.
		No	Repair or replace the terminal.

			
8	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

NO. 8 TACHOMETER INDICATION IS DEFECTIVE

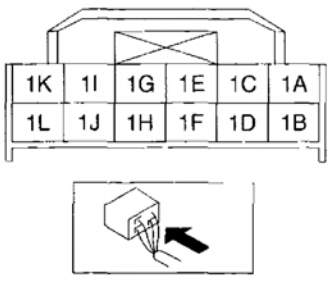
TACHOMETER INDICATION IS DEFECTIVE POSSIBLE CAUSE TABLE

8	Tachometer indication is defective
POSSIBLE CAUSE	• PCM malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. ○ Does the tachometer needle move smoothly? ○ Does the tachometer needle indicate correct engine speed?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Do the speedometer, the water temperature gauge, and the oil pressure gauge operate normally?	Yes	Go to the next step.
		No	Go to Step 4.
3	• Start the instrument cluster input/output check mode. • Inspect the tachometer using the check code 13.	Yes	Inspect the PCM or connectors.
		No	Replace the instrument cluster.

	• Is the tachometer normal?		
4	• Start the engine. • Does the ABS warning light turn off?	Yes	Inspect the PCM or connectors.
		No	Replace the instrument cluster.
5	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 7.
6	• Disconnect the negative battery cable. • Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
7	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Go to the next step.
		No	Repair or replace the terminal.
8	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

NO. 9 WATER TEMPERATURE GAUGE INDICATION IS DEFECTIVE

WATER TEMPERATURE GAUGE INDICATION IS DEFECTIVE POSSIBLE CAUSE TABLE

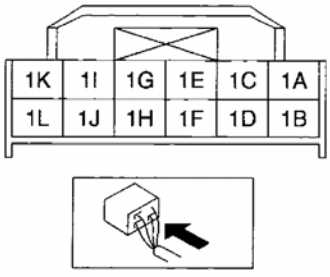
9	Water temperature gauge indication is defective
POSSIBLE CAUSE	• PCM malfunction • Instrument cluster malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND

	• Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. • Does the water temperature gauge needle move to medium range gradually and stay there?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Do the speedometer, the tachometer, and the oil pressure gauge operate normally?	Yes	Go to the next step.
		No	Go to Step 4.
3	• Start the instrument cluster input/output check mode. • Inspect the water temperature gauge using the check code 25. • Is the water temperature gauge normal?	Yes	Inspect the PCM or connectors.
		No	Replace the instrument cluster.
4	• Start the engine. • Does the ABS warning light turn off?	Yes	Inspect the PCM or connectors.
		No	Replace the instrument cluster.
5	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 7.
6	• Disconnect the negative battery cable. • Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
7	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal?	Yes	Go to the next step.
		No	Repair or replace the terminal.

			
8	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

NO. 10 OIL PRESSURE GAUGE INDICATION IS DEFECTIVE (OIL PRESSURE GAUGE NEEDLE DOES NOT MOVE FROM THE L POSITION OR LESS)

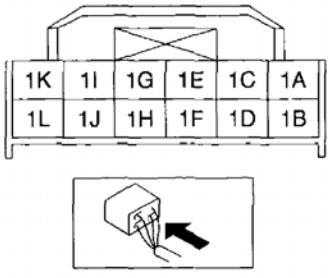
OIL PRESSURE GAUGE INDICATION IS DEFECTIVE POSSIBLE CAUSE TABLE

10	**Oil pressure gauge indication is defective (oil pressure gauge needle does not move from the L position or less)**
POSSIBLE CAUSE	• PCM malfunction • Instrument cluster malfunction • Oil pressure switch malfunction • Connector or pin malfunction • Short circuit in wiring harness between CAN-L, CAN-H and GND • Open circuit in CAN wiring harness (CAN-L, CAN-H) • CAN wiring harness (CAN-L, CAN-H) short each other

DIAGNOSTIC PROCEDURE

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Start the engine. • Does the oil pressure gauge needle indicate L position or more?	Yes	Troubleshooting completed.
		No	Go to the next step.
2	• Do the speedometer, the tachometer, and the water temperature gauge operate normally?	Yes	Go to the next step.
		No	Go to Step 5.
3	• Does the engine oil need replenishment?	Yes	Add the engine oil.
		No	Go to the next step.

4	• Start the instrument cluster input/output check mode. • Inspect the oil pressure gauge using the check code 28. • Is the oil pressure gauge normal?	Yes	Inspect the PCM, oil pressure switch, or connectors.
		No	Replace the instrument cluster.
5	• Start the engine. • Does the ABS warning light turn off?	Yes	Inspect the PCM or connectors.
		No	Go to the next step.
6	• Disconnect the negative battery cable. • Measure the resistance between the DLC-2 terminals F and E. • Is the resistance **54-66 ohms** ?	Yes	Go to the next step.
		No	Go to Step 8.
7	• Disconnect the negative battery cable. • Inspect the DLC-2 terminals F and E for short to power supply or GND. • Is there any malfunction?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.
8	• Turn the ignition switch off. • Inspect the instrument cluster connector terminals for poor connection (such as damaged/pulled-out pins, and corrosion). • Are the terminals normal? 	Yes	Go to the next step.
		No	Repair or replace the terminal.
9	• Disconnect the negative battery cable. • Measure the resistance between the instrument cluster connector terminals 1J and 1L. • Is the resistance **114-126 ohms** ?	Yes	Inspect the wiring harness and CAN system-related module. Repair or replace the malfunctioning part.
		No	Replace the instrument cluster.

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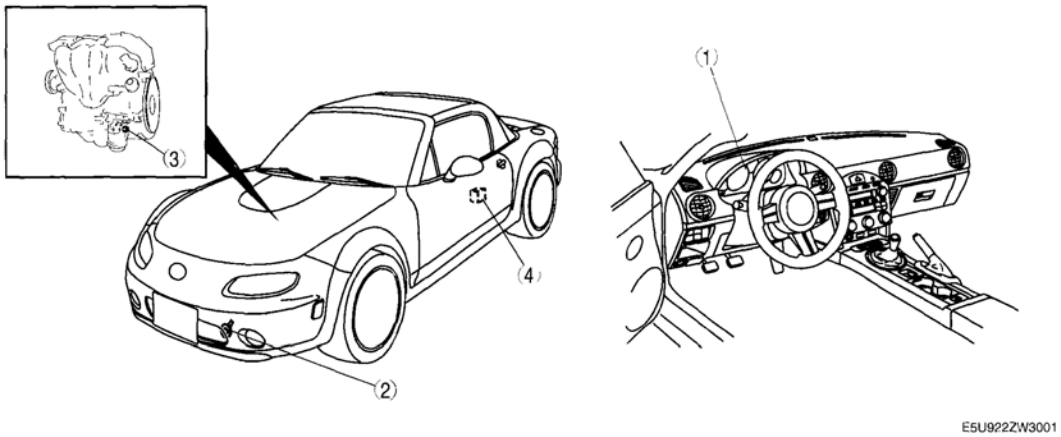
Instrumentation-Driver Info - MX-5 Miata

INSTRUMENTATION/DRIVER INFO. LOCATION INDEX



1	Instrument cluster
2	Horn
3	Oil pressure switch
4	Fuel gauge sender unit

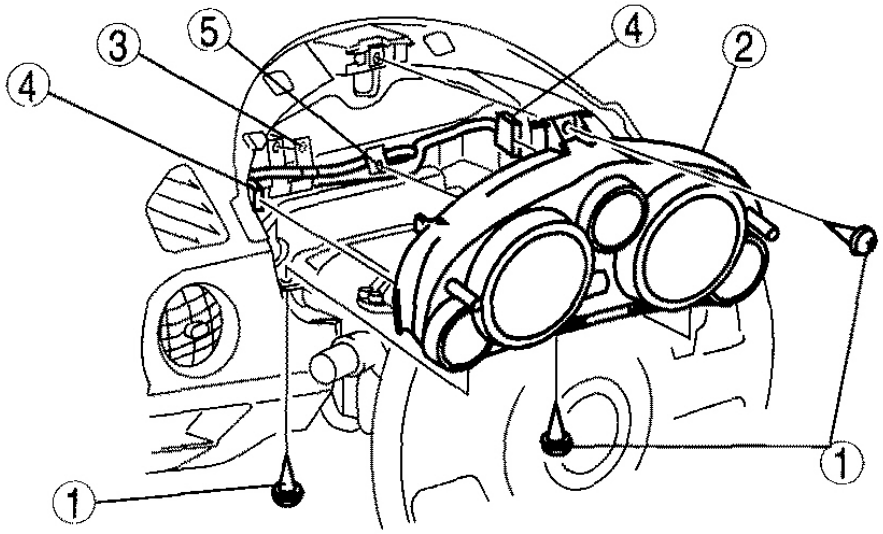
Fig. 1: Identifying Location Of Instrumentation/Driver Components
Courtesy of MAZDA MOTORS CORP.

INSTRUMENT CLUSTER REMOVAL/INSTALLATION

CAUTION:

- **When replacing the instrument cluster, the configuration procedure must be performed before removing the instrument cluster. Replacing the instrument cluster without performing the configuration procedure will result in system malfunction.**

1. Perform the instrument cluster configuration when replacing it. (See **INSTRUMENT CLUSTER CONFIGURATION** .)
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the meter hood. (See **METER HOOD REMOVAL/INSTALLATION** .)
4. Remove the lower panel. (See **LOWER PANEL REMOVAL/INSTALLATION** .)
5. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
6. Remove in the order indicated in **Fig. 2** .



1	Screw
2	Instrument cluster
3	Clip A
4	Connector
5	Clip B

Fig. 2: Removing/Installing Instrument Cluster
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal.
8. When replacing the instrument cluster of vehicles with the immobilizer system, perform the following procedure:
   - See **IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS SYSTEM]** and **IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[KEYLESS ENTRY SYSTEM]**)

CAUTION:
- **The removed instrument cluster should be placed with the display side up to prevent grease from leaking from the meters.**

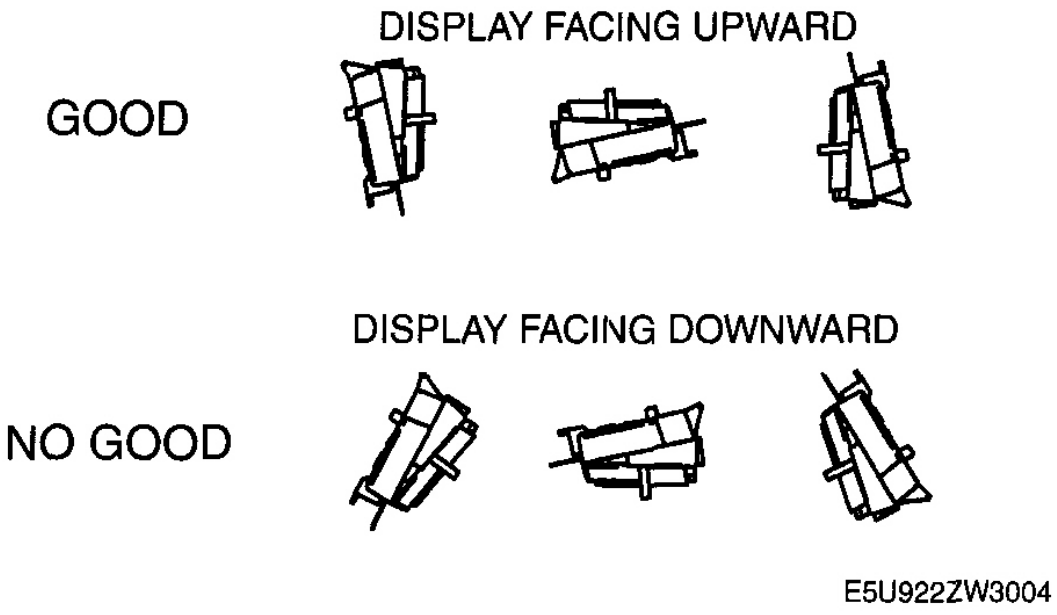


Fig. 3: Position For Placing Instrument Cluster
Courtesy of MAZDA MOTORS CORP.

INSTRUMENT CLUSTER REMOVAL NOTE

1. Rotate the instrument cluster in the direction of the arrow and remove the instrument cluster.

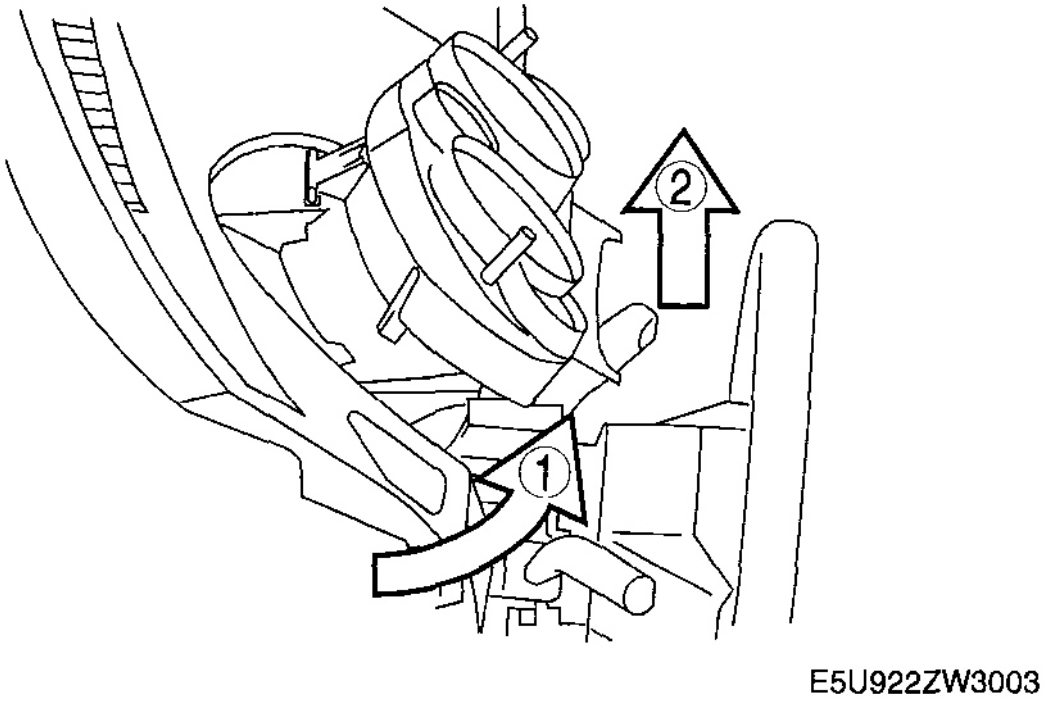


Fig. 4: Removing Instrument Cluster
Courtesy of MAZDA MOTORS CORP.

CLIP B REMOVAL NOTE

1. Rotate the clip B **90°,** then remove the clip B from the instrument cluster.

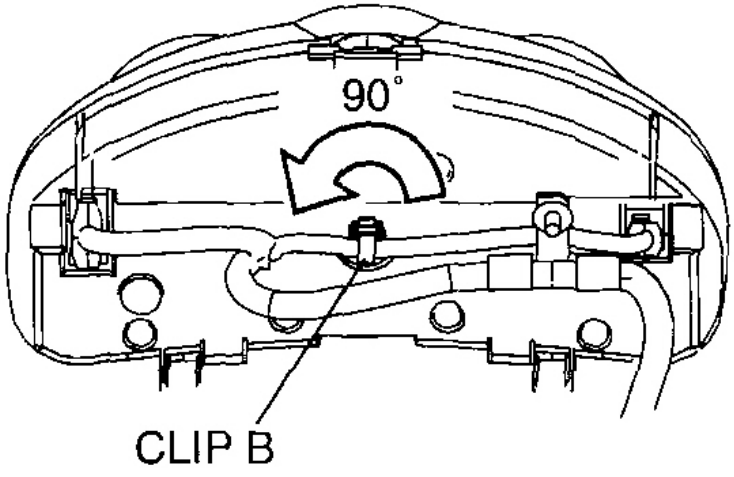


Fig. 5: Rotating Clip B 90° & Removing Clip B From Instrument Cluster
Courtesy of MAZDA MOTORS CORP.

INSTRUMENT CLUSTER CONFIGURATION

1. Connect the M-MDS to the DLC-2 connector.

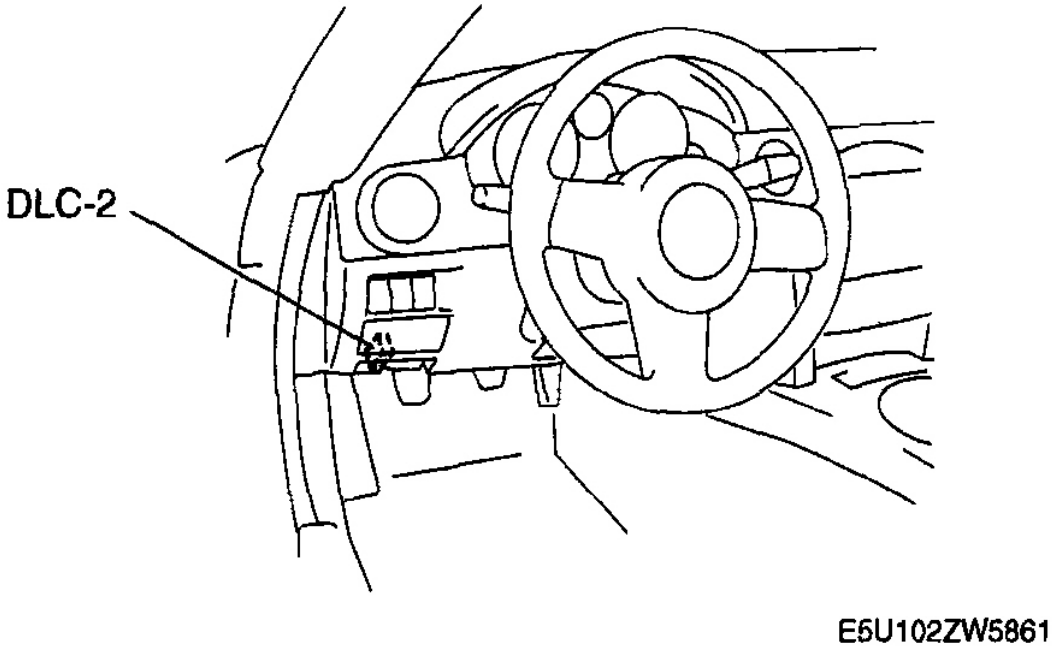


Fig. 6: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
   - When using the IDS (laptop PC)
     1. Select "Module Programming".
   - When using the PDS (Pocket PC)
     1. Select "Programming".
     2. Select "Module Programming".
3. Select "Programmable Module Installation".
4. Select "IC" and perform procedures according to directions on the M-MDS screen.
   - If odometer data is to be transferred to a new instrument cluster, perform the following procedure:
     1. Select "Programmable Parameters" from the menu.
     2. Select "Odometer Write", and perform the procedure following the screen.

NOTE: During the odometer data writing procedure, As-Built Data (VIN and Vehicle Data) input is requested. Obtain the As-Built Sheet for the vehicle, and input the necessary data.

5. Retrieve DTCs using the M-MDS and verify that there is no DTC present.
   - If any DTC is present, perform applicable DTC inspection. See **DTC TABLE [INSTRUMENT**

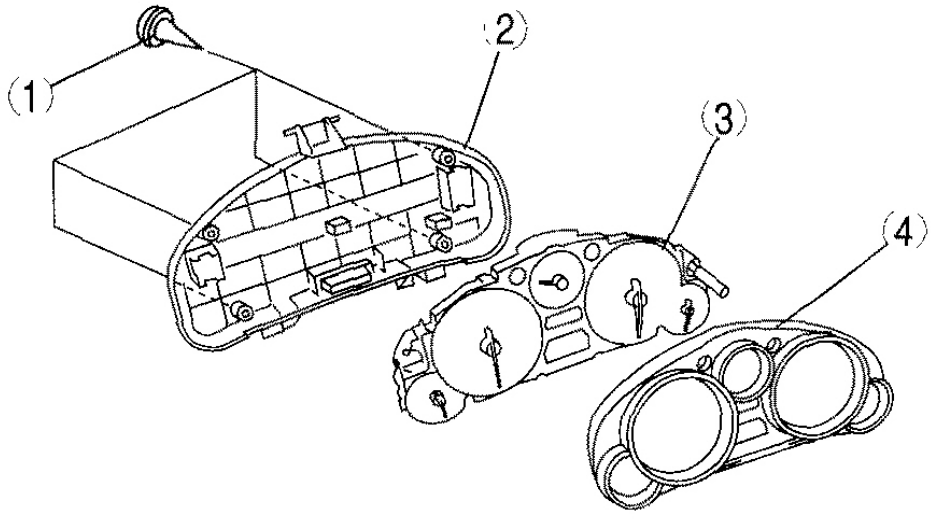
CLUSTER] .

INSTRUMENT CLUSTER DISASSEMBLY/ASSEMBLY

CAUTION:

- **Do not drop the instrument cluster or damage the printed board. This will lead to a system malfunction.**

1. Disassemble in the order indicated in **Fig. 7** .



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1	Screw
2	Cover
3	Instrument cluster unit
4	Lens

Fig. 7: Exploded View Of Instrument Cluster Components
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

INSTRUMENT CLUSTER INSPECTION

SPEEDOMETER

Using the Input/Output Check Mode

1. Inspect the speedometer by setting it to check code 12 of the input/output check mode. (See **INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE** .)

Using a Speedometer Tester

1. Adjust the tire pressure to the specification.
2. Using a speedometer tester, verify that the tester reading is as indicated in **SPEEDOMETER SPECIFICATION TABLE** .

SPEEDOMETER SPECIFICATION TABLE (KM/H)

Speedometer tester indication (km/h)	Allowable range (km/h)
20	17-23
40	37-42
60	57-63
80	76-83
100	96-103
120	116-123
140	135-143

SPEEDOMETER SPECIFICATION TABLE (MPH)

Speedometer tester indication (mph)	Allowable range (mph)
10	8-12
20	18-22
30	28-32
40	38-42
50	48-52
60	58-62
70	67-73
80	77-83

3. Verify that the speedometer reading is within the range indicated in **SPEEDOMETER SPECIFICATION TABLE** .
    - If the speedometer does not move or the indication is not within the allowable range, inspect the PCM and the related wiring harnesses.
        - If the PCM and the related wiring harnesses are normal, replace the instrument cluster.

TACHOMETER

Using the Input/Output Check Mode

1. Inspect the tachometer by setting it to check code 13 of the input/output check mode. (See

INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE .)

Using M-MDS Or External Diagnostic Equipment

CAUTION:

- **If the engine speed exceeds the allowable range, the engine could be damaged. Therefore, when inspecting the tachometer, do not allow the engine speed to exceed the allowable range indication on the tachometer.**

1. Connect the M-MDS to the DLC-2 connector.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
   - When using the IDS (laptop PC)
     - Select the "Toolbox" tab.
     - Select "DataLogger".
     - Select "Module".
     - Select "IC".
   - When using the PDS (Pocket PC)
     - Select "Module Tests".
     - Select "IC".
     - Select "DataLogger".

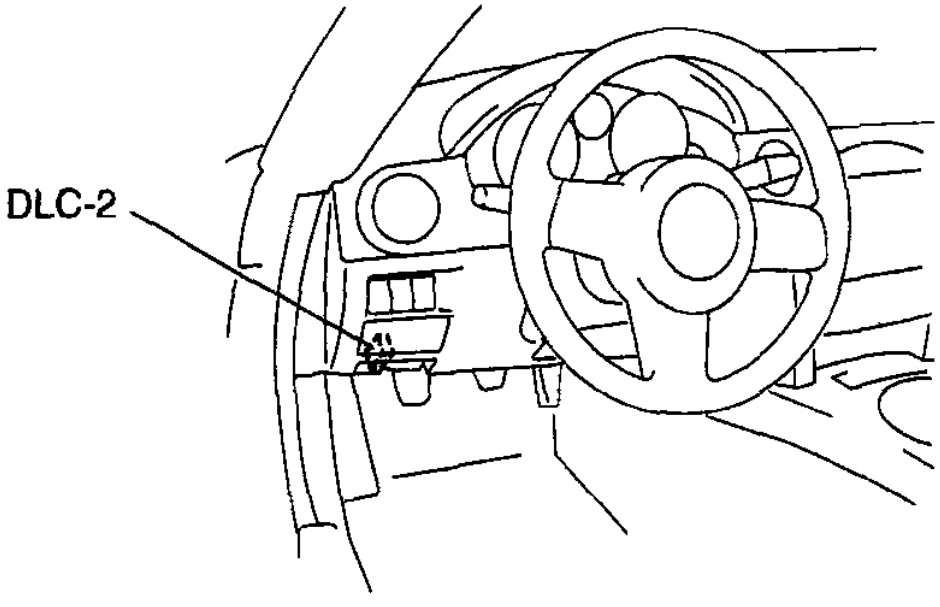

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Fig. 8: Locating DLC-2 Connector
Courtesy of MAZDA MOTORS CORP.

3. Compare the data monitor item (IC_TACHO) with the tachometer indication.
   - If the tachometer does not operate properly, inspect the PCM and the related wiring harnesses.
     - If the PCM and the related harnesses do not have any malfunction, replace the instrument cluster.

FUEL GAUGE

1. Inspect the fuel gauge by setting it to check code 23 of the input/output check mode. (See **INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE** .)

WATER TEMPERATURE GAUGE

1. Inspect the water temperature gauge by setting it to check code 25 of the input/output check mode. (See **INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE** .)

OIL PRESSURE GAUGE

1. Inspect the oil pressure gauge by setting it to check code 28 of the input/output check mode. (See **INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE** .)

INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE

NOTE:

- **In this mode, it is possible to verify the items in INSTRUMENT CLUSTER INPUT/OUTPUT SPECIFICATION TABLE .**

CHECK CODE TABLE

INSTRUMENT CLUSTER INPUT/OUTPUT CHECK CODE TABLE

Check code	Check item	Related items
01	SAS control module	Seat belt warning alarm
04	Door switch	• Lights-on reminder warning alarm • Key reminder warning alarm
08	TNS relay	• Lights-on reminder warning alarm • Each illumination light
12	Speedometer	Speedometer
13	Tachometer	Tachometer
14	Buzzer	Buzzer
16	Fuel-level warning light	Fuel-level warning light
18	Ignition key illumination	Ignition key illumination

22	Fuel gauge sender unit	Fuel gauge
23	Fuel gauge	Fuel gauge
25	Water temperature gauge	Water temperature gauge
26	• Odometer/tripmeter (LCD) • Warning and indicator light	• Odometer/tripmeter (LCD) • Warning and indicator light
28	Oil pressure gauge	Oil pressure gauge
31	Key reminder switch	Key reminder warning alarm
57	Panel light control	Illumination light bulb
59	• CAN system • Fuel gauge sender unit	• CAN system • Fuel system

NOTE:

- **Check codes which are not listed may be indicated, but they cannot be inspected.**
- **The check codes are displayed in numerical order. (While performing the inspection, if you want to inspect a check code with a number smaller than the code number you are currently inspecting, terminate the check mode then repeat the inspection from the beginning.)**
- **If a speed signal is input to the instrument cluster (the wheels are rotated), the input/output check mode will be cancelled.**
- **The check codes can be fast-forwarded by pushing and holding the odometer/tripmeter switch for 1 s or more.**

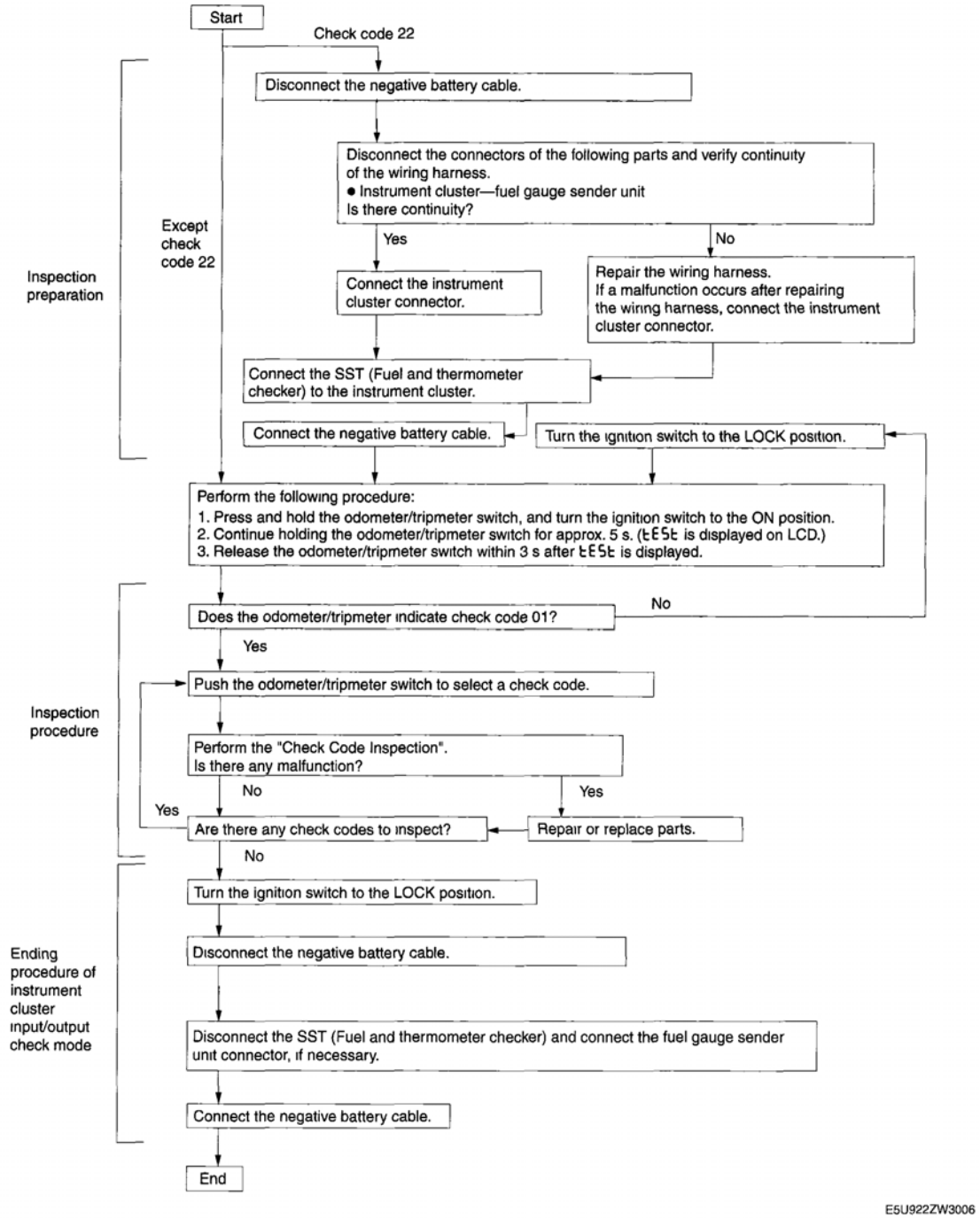


Fig. 9: Identifying Instrument/Driver Check Code Diag. Flow Diagram
Courtesy of MAZDA MOTORS CORP.

Checking Order

NOTE:

- **When inspecting more than two check codes, begin with the code with the**

highest ranking.

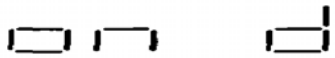
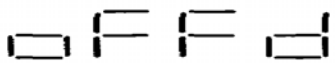
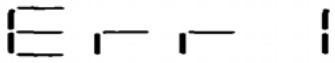
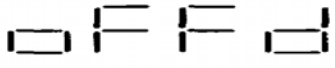
IGNITION SWITCH POSITION SPECIFICATION

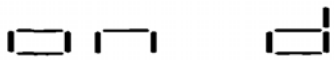
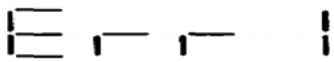
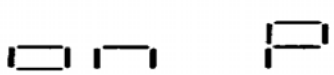
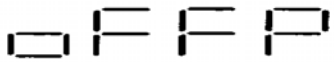
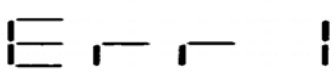
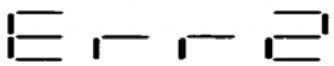
Priority order of inspection	Ignition switch position	Check code
1	ON	22
2		01, 04, 08, 12, 13, 14, 16, 18, 23, 25, 26, 28, 57, 59
3	LOCK	31

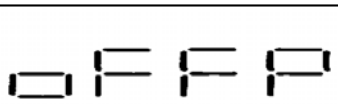
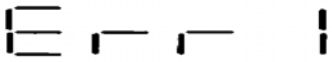
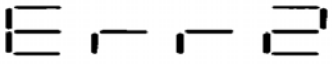
CHECK CODE INSPECTION

Check Code 01

CHECK CODE 01

Check code 01		Buckle switch and passenger sensing system	
STEP	**INSPECTION CONDITION**	**DISPLAY**	**ACTION**
1	Unfasten driver-side seat belt. (Buckle switch ON)		Go to the next step.
			Inspect the following parts: • Buckle switch (driver-side) • SAS control module • Wiring harness (Buckle switch (driver-side) - SAS control module)
			Using the DTC and PID of SAS control module, inspect the SAS control module, buckle switch and the related wiring harnesses. • If there is no malfunction, inspect for continuity between SAS control module terminal 1X and instrument cluster terminal 2A (wiring harness-side). ○ If there is continuity, replace the instrument cluster.
			Go to the next step.
			Inspect the following parts:

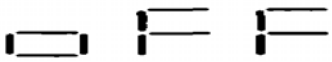
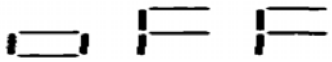
			• Buckle switch (driver-side) • SAS control module • Wiring harness (Buckle switch (driver-side)-SAS control module)
2	Fasten driver-side seat belt. (Buckle switch OFF)		Using the DTC and PID of SAS control module, inspect the SAS control module, buckle switch and the related wiring harnesses. • If there is no malfunction, inspect for continuity between SAS control module terminal 1X and instrument cluster terminal 2A (wiring harness-side). ○ If there is continuity, replace the instrument cluster.
3	Seat one person in the passenger's seat, and unfasten passenger-side seat belt. (Seat weight sensor and buckle switch ON)		Go to the next step.
			Inspect the following parts: • Buckle switch (passenger-side) • Seat weight sensor control module • Seat weight sensor • SAS control module • Wiring harness (Buckle switch (passenger-side)-SAS control module, seat weight sensor-Seat weight sense control module-SAS control module)
			Using the DTC and PID of SAS control module, inspect the SAS control module, buckle switch (driver-side, passenger-side), seat weight sensor control module, seat weight sensor and related wiring harnesses.
			• If there is no malfunction, inspect for the continuity between SAS control module terminal 1X and instrument cluster terminal 2A (wiring harness-side). ○ If there is a continuity, replace

			the instrument cluster.
4	Seat one person in the passenger's seat, and fasten passenger-side seat belt. (Seat weight sensor ON and buckle switch OFF) Seat no person in the passenger's seat, and unfasten passenger-side seat belt. (Seat weight sensor OFF and buckle switch ON) Seat no person in the passenger's seat, and fasten passenger-side seat belt. (Seat weight sensor and buckle switch OFF)		Input signal to the instrument cluster is normal.
			Inspect the following parts: • Buckle switch (passenger-side) • Seat weight sensor control module • Seat weight sensor • SAS control module • Wiring harness (Buckle switch (passenger-side)-SAS control module, seat weight sensor-Seat weight sense control module-SAS control module)
			Using the DTC and PID of SAS control module, inspect the SAS control module, buckle switch (driver-side, passenger-side), seat weight sensor control module, seat weight sensor and the related wiring harnesses.
			• If there is no malfunction, inspect for continuity between SAS control module terminal 1X and instrument cluster terminal 2A (wiring harness-side). ○ If there is continuity, replace the instrument cluster.

Check Code 04

CHECK CODE 04

Check code 04		**Door switch ON/OFF signal**	
STEP	**INSPECTION CONDITION**	**DISPLAY**	**ACTION**
1	Open the front driver-side door. (The door switch is		Close the front driver-side door, then go to the next step.
			Verify that the voltage of instrument cluster terminal 2E is **1.0 V or less.** • If the voltage is as specified, replace the instrument cluster.

	on.)		• If the voltage is not as specified, inspect the following parts: ○ Door switch ○ Wiring harness (Instrument cluster-door switch)
2	Close all doors. (Door switches are off.)		Verify that the voltage of instrument cluster terminal 2E is **B+.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ Door switch ○ Wiring harness (Instrument cluster-door switch)
			Input signal to the instrument cluster is normal.

Check Code 08

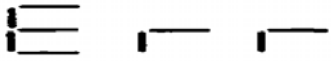
CHECK CODE 08

Check code 08		**TNS relay ON/OFF signal**	
STEP	**INSPECTION CONDITION**	**DISPLAY**	**ACTION**
1	Turn the headlight switch to the TNS position. (TNS relay ON)		Go to the next step.
			Verify that the voltage of instrument cluster terminal 1B is **B+.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ TNS relay ○ Wiring harness (Battery-TNS relay-instrument cluster)
			Verify that the voltage of the instrument cluster terminal 1B is **1.0 V or less.**

2	Turn the headlight switch off. (TNS relay OFF)		• If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ TNS relay ○ Wiring harness (TNS relay-instrument cluster)
			Input signal to the instrument cluster is normal.

Check Code 12

CHECK CODE 12

Check code 12	**Speedometer display signal**		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 12, wait for **approx. 2 s.**		The speedometer needle moves full scale then returns to **approx. 60 km/h** or **approx. 60 mph.**	The speedometer is normal.
		Except above	Replace the instrument cluster.
		-	

Check Code 13

CHECK CODE 13

Check code 13	**Tachometer operation signal**		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 13, wait for **approx. 2 s.**		The tachometer needle moves full scale then returns to **approx. 3,000 rpm.**	The tachometer is normal.
		Except above	Replace the instrument cluster.
		-	

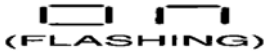
Check Code 14

CHECK CODE 14

Check code 14	Buzzer operation signal		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 14, wait **approx. 2 s.**		The buzzer sounds.	The buzzer is normal.
		The buzzer does not sound.	Replace the instrument cluster.

Check Code 16

CHECK CODE 16

Check code 16	Fuel-level warning light flashing signal		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 16, wait **approx. 2 s.**		Fuel-level warning light flashes **three times.**	The fuel-level warning light is normal.
		Except above	Replace the instrument cluster.

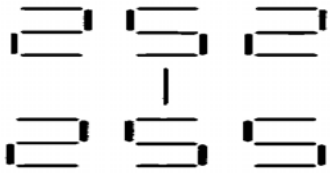
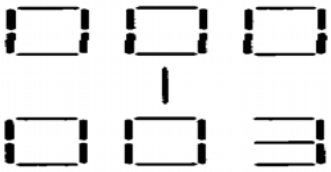
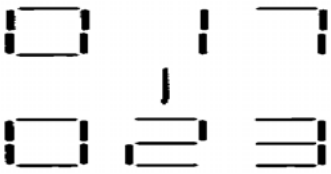
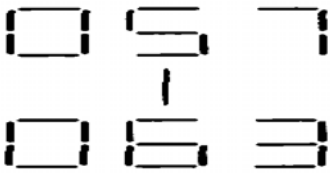
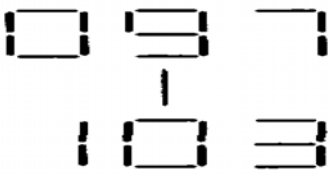
Check Code 18

CHECK CODE 18

Check code 18	Ignition key illumination control signal		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 18, wait **approx. 2 s.**		Ignition key illumination flashes **three times.**	The ignition key illumination is normal.
		Except above	Verify that the voltage of instrument cluster terminal 1K is **B+.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ Ignition key illumination bulb ○ Wiring harness (Battery-ignition key illumination-instrument cluster)

Check Code 22

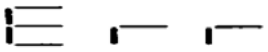
CHECK CODE 22

Check code 22	Fuel level signal		
STEP	**INSPECTION CONDITION**	**DISPLAY**	**ACTION**
1	Select check code 22 with the fuel gauge sender unit connector disconnected.		Go to the next step.
		Except above	Go to the Step 6.
2	Connect terminals 2R and 2T of the instrument cluster.		Go to the next step.
		Except above	Go to the Step 6.
3	Using the **SST** (Fuel and thermometer checker) or resistor, input **20 ohms** between instrument cluster terminals 2R and 2T.		Go to the next step.
		Except above	Go to the Step 6.
4	Using the **SST** (Fuel and thermometer checker) or resistor, input **60 ohms** between instrument cluster terminals 2R and 2T.		Go to the next step.
		Except above	Go to the Step 6.
5	Using the **SST** (Fuel and thermometer checker) or resistor, input **100 ohms** between instrument cluster terminals 2R and 2T.		Inspect the fuel gauge sender unit.
		Except above	Go to the next step.
	Inspect the wiring harness and connector between instrument cluster and fuel gauge sender unit.		

6	• If there is any malfunction, repair or replace the wiring harness or connector. • If there is no malfunction, replace the instrument cluster.

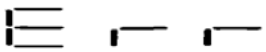
Check Code 23

CHECK CODE 23

Check code 23	**Fuel gauge operation signal**		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 23, wait **approx. 2 s.**		The fuel gauge indicates status in the following order **approx. every 2 s.** • F --> 1/2 --> E --> F (fixed)	The fuel gauge is normal.
		Except above	Replace the instrument cluster.
		Replace the instrument cluster.	

Check Code 25

CHECK CODE 25

Check code 25	**Water temperature gauge operation signal**		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 25, wait approx. **2 s.**		The water temperature gauge indicates status in the following order **approx. every 2 s.** • H --> Center --> C --> H (fixed)	The water temperature gauge is normal.
		Except above	Replace the instrument cluster.
		Replace the instrument cluster.	

Check Code 26

CHECK CODE 26

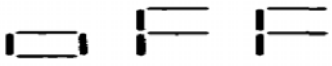
Check code 26	**Odometer/tripmeter display signal**	
INSPECTION		

CONDITION	DISPLAY	ACTION	
Select check code 26.		• Display is normal. • Warning and indicator light illuminated. ○ Generator warning light ○ AT warning light ○ DSC indicator light ○ DSC OFF light ○ ABS warning light ○ Brake system warning light ○ Selector indicator light ○ MIL ○ Cruise set indicator light ○ Cruise main indicator light ○ Security light ○ Keyless warning light ○ Keyless indicator light	• The odometer/tripmeter is normal. • Warning and indicator is normal.
		Except above	Replace the instrument cluster.

Check Code 28

CHECK CODE 28

Check code 28	Oil pressure gauge operation signal		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
After selecting check code 28,		The oil pressure gauge indicates status in the following order **approx. every 2 s.** • H --> Center --> L --> H (fixed)	The oil pressure gauge is normal.

wait approx. **2 s.**		Except above	Replace the instrument cluster.
		Replace the instrument cluster	
1	Remove the key from the steering lock, then reinsert the key into the steering lock after selecting check code 31. (The key reminder switch is on.)		Go to the next step.
			Verify that the voltage of instrument cluster terminal 2C is **B+.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ Key reminder switch ○ Wiring harness (Battery-key reminder switch-instrument cluster)
2	Remove the key from the steering lock. (The key reminder switch is off.)		Verify that the voltage of instrument cluster terminal 2C is **1.0 V or less.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ Key

			reminder switch ○ Wiring harness (Key reminder switch-instrument cluster)
			Input signal to the instrument cluster is normal.

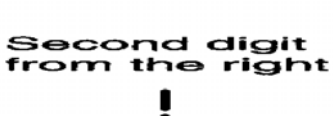
Check Code 57

CHECK CODE 57

Check code 57	**Panel light control signal**		
INSPECTION CONDITION	**DISPLAY**	**ACTION**	
Turn the headlight switch to the TNS position. After selecting check code 57, wait **approx. 2 s.**		Illumination light (hazard warning switch, center panel module, etc.) flashes **three times.**	The panel light control signal is normal.
		Except above	Verify that the voltage of instrument cluster terminal 1F is **B+.** • If the voltage is as specified, replace the instrument cluster. • If the voltage is not as specified, inspect the following parts: ○ Illumination light (hazard warning switch, center panel module, etc.) ○ Wiring harness (Instrument cluster-illumination lights-TNS relay)

Check Code 59

CHECK CODE 59

Check code 59	CAN system/fuel system		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	The three digits number is indicated after selecting check code 59. Confirm the first digit from the right.		The CAN system is normal. Go to next step.
			The DTC of CAN system is detected. Perform the DTC inspection. (See **DTC TABLE[MULTIPLEX COMMUNICATION SYSTEM]** .) • If the CAN system is normal, replace the instrument cluster. Go to next step.
2	Confirm the second digit from the right.		The wiring harnesses between the fuel gauge sender unit and instrument cluster are normal. Go to next step.
			Inspect following parts. • Fuel gauge sender unit • Wiring harness (Fuel gauge sender unit-instrument cluster) ○ If fuel gauge sender unit and wiring harness are normal, replace the instrument cluster. Go to next step.
3	Confirm the third digit from the right.		The fuel pulse signal from the PCM is normal.
			Inspect the PCM. (See **DTC TABLE [LF]** and **PCM INSPECTION [LF]**)

		Third digit from the right 1	• If the PCM is normal, replace the instrument cluster.

DATA MONITORING AND RECORDING PROCEDURE

1. Connect the M-MDS to the DLC-2 connector.
2. After the vehicle is identified, select the following items from the initial screen of the M-MDS.
    - When using the IDS (laptop PC)
        - Select the "Toolbox" tab.
        - Select "DataLogger".
        - Select "Modules".
        - Select "IC".
    - When using the PDS (Pocket PC)
        - Select "Module Tests".
        - Select "IC".
        - Select "DataLogger".

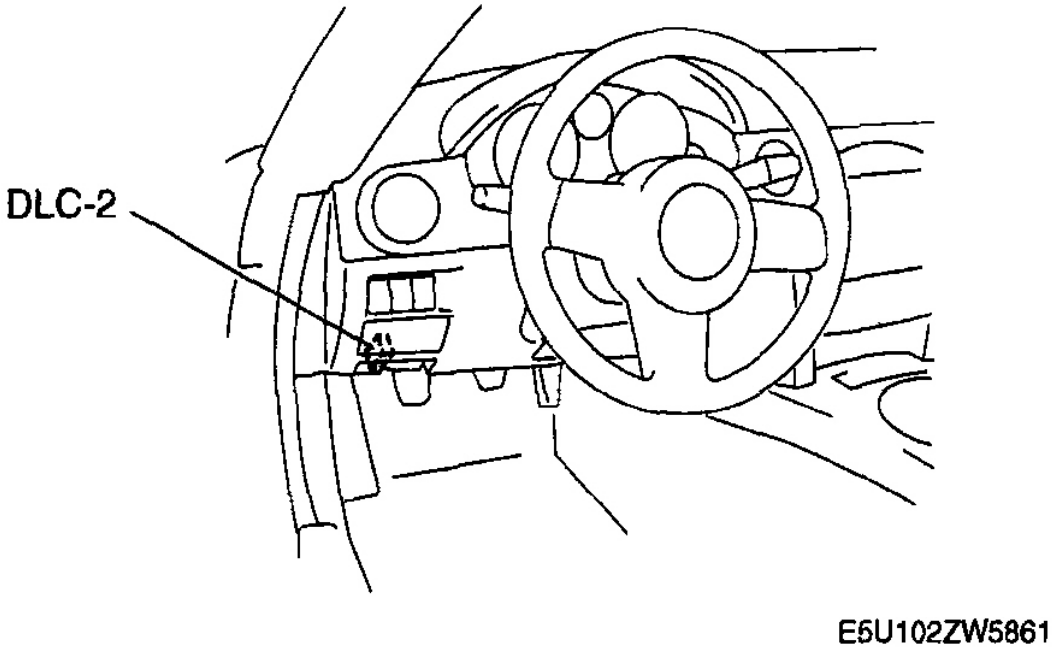


Fig. 10: Locating DLC-2 Connector

Courtesy of MAZDA MOTORS CORP.

3. Select the applicable PID from the PID table.
4. Verify the PID data according to the directions on the screen.

NOTE: The PID data screen function is used for monitoring the calculated value. Therefore, if the monitored value of the output parts is not within the specification, inspection of the monitored value of input parts corresponding to applicable output part control is necessary. In addition, because the system does not display output part malfunction as abnormality in the monitored value, it is necessary to inspect the output part individually.

INDICATION ITEM TABLE

INDICATION ITEM TABLE

Monitor item	Input-output signal/part name	Unit/State		Terminal
IC_DTC_CNT	Number of continuous DTCs	-		-
IC_ECT	Water temperature gauge	°F	°C	1J, 1L
IC_NUMKEYS	Number of key ID numbers registered with the vehicle	-		-
IC_ODO_CNT	Odometer	m		1J, 1L
IC_SPDMTR	Speedometer	MPH	KPH	
IC_TACHO	Tachometer	RPM		
IC_VPWR	Power supply voltage	V		1C

FUEL GAUGE SENDER UNIT INSPECTION

1. Move the float to the topmost and bottommost positions, and verify that the resistance between terminals A and C of the unit and the position of the float are as indicated in **Fig. 11** .

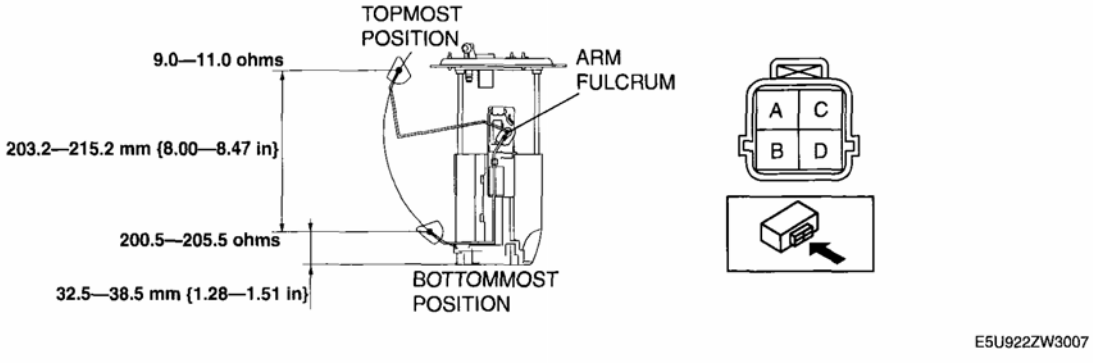


Fig. 11: Inspecting Fuel Gauge Sender Unit
Courtesy of MAZDA MOTORS CORP.

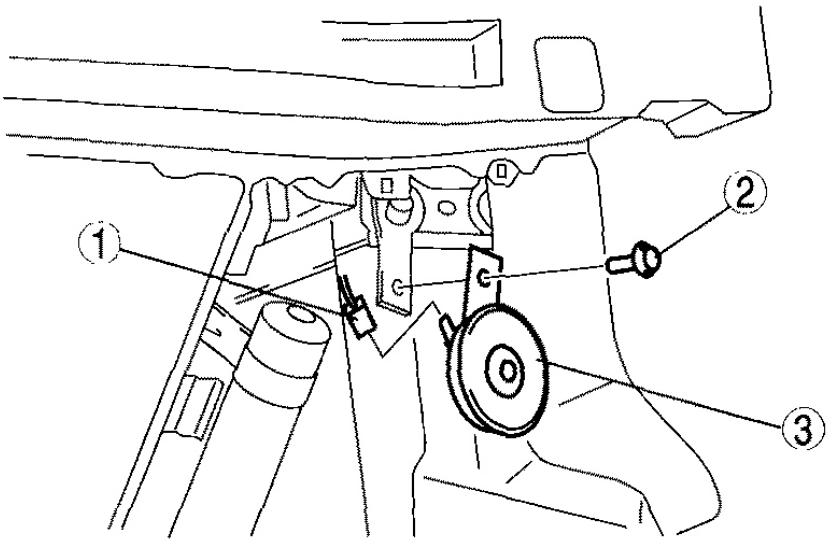
- If they are not as indicated, replace the fuel gauge sender unit.

OIL PRESSURE SWITCH INSPECTION

1. Turn the ignition switch to the ON position and verify that the oil pressure gauge reading indicates L or below.
2. Start the engine and verify that the oil pressure gauge operates.
   - If the oil pressure gauge does not operate, inspect the related wiring harness.
     - If the related wiring harness is normal, inspect the oil pressure. (See **OIL PRESSURE INSPECTION [LF]** .)
       - If the oil pressure is normal, replace the oil pressure switch.

HORN REMOVAL/INSTALLATION

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Slightly bend back the under cover.
3. Remove in the order indicated in **Fig. 12** .



E5U922ZW3008

1	Connector
2	Bolt
3	Horn

Fig. 12: Removing/Installing Horn Components
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

2007 ENGINE PERFORMANCE

Intake Air System - MX-5 Miata

INTAKE AIR SYSTEM HOSE ROUTING DIAGRAM [LF]

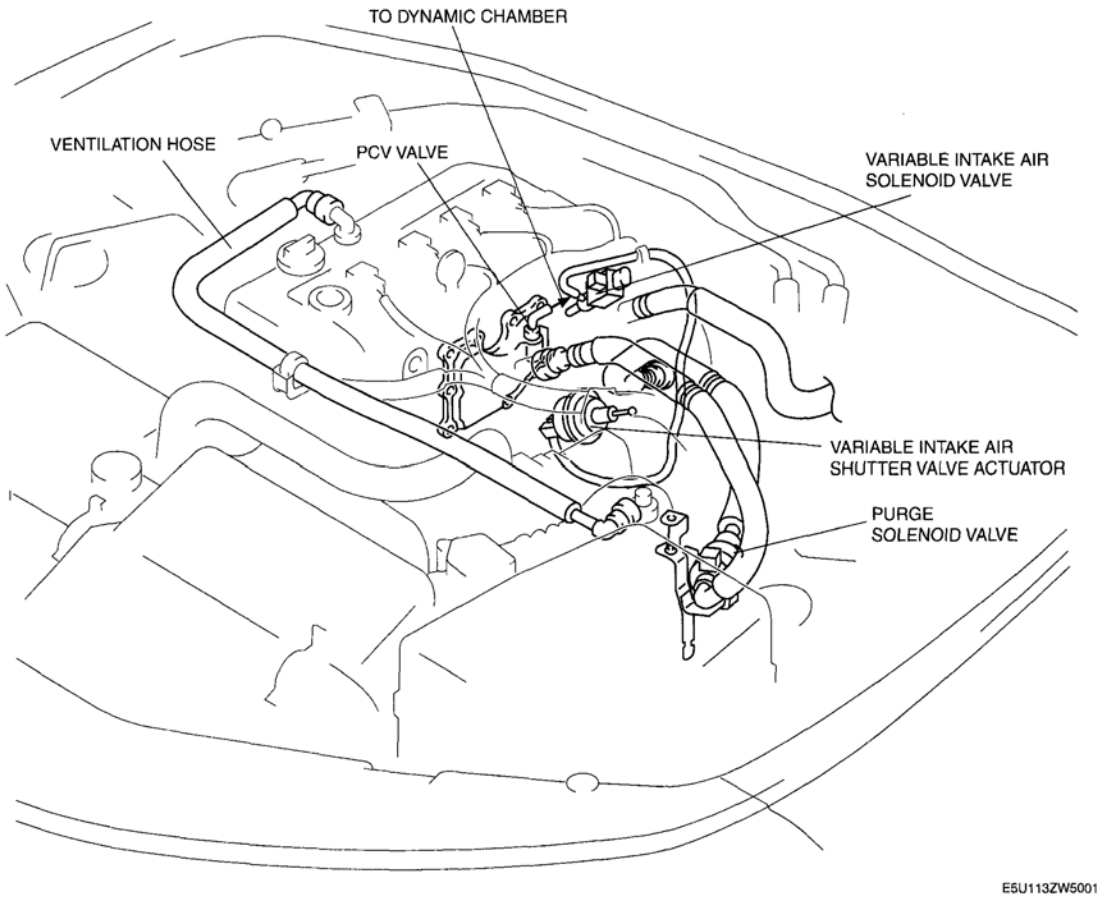
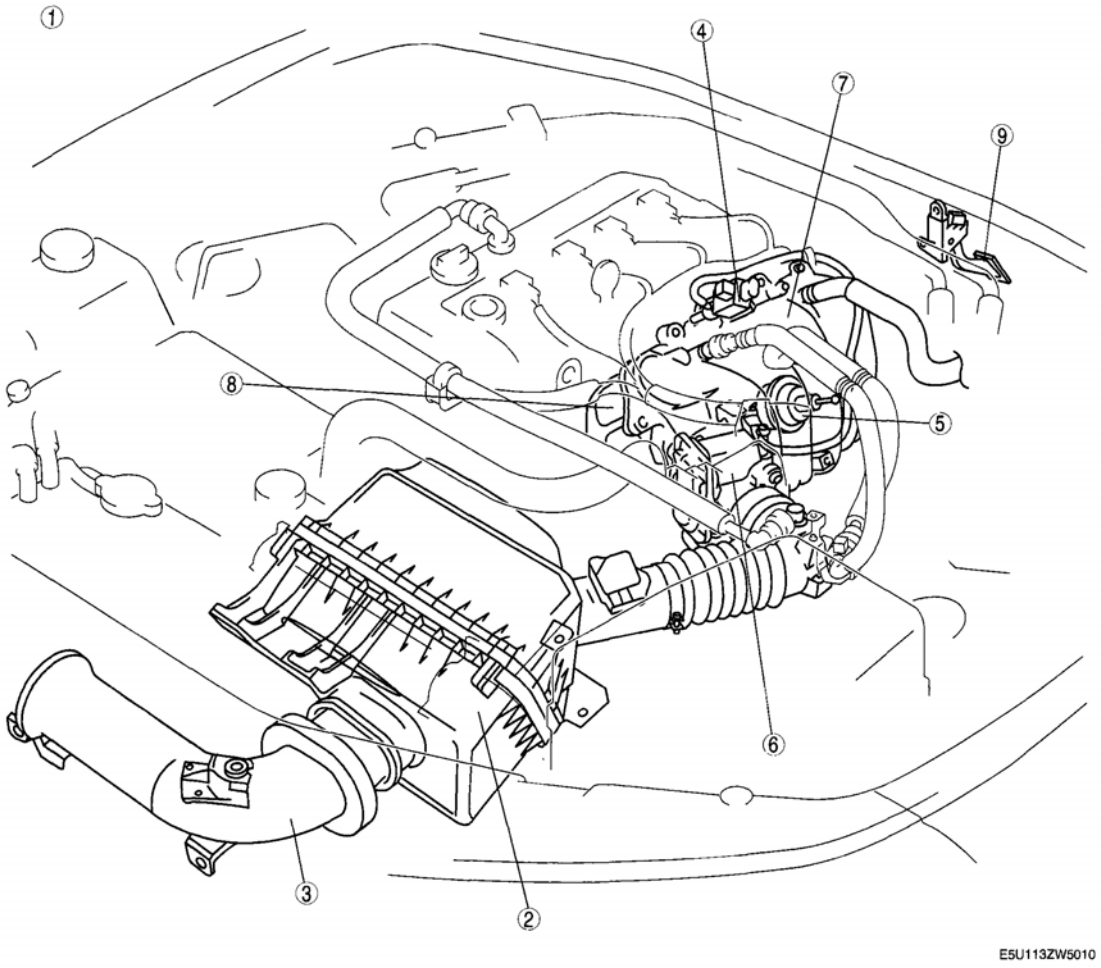


Fig. 1: Identifying Intake Air System Hose Routing Diagram
Courtesy of MAZDA MOTORS CORP.

INTAKE AIR SYSTEM LOCATION INDEX [LF]



1	Intake-air system
2	Air cleaner
3	Fresh-air duct
4	Variable intake air solenoid valve
5	Variable intake air shutter valve actuator
6	Throttle body
7	Dynamic chamber
8	Intake manifold
9	Accelerator pedal

Fig. 2: Identifying Intake Air System Components
Courtesy of MAZDA MOTORS CORP.

INTAKE AIR SYSTEM DIAGRAM [LF]

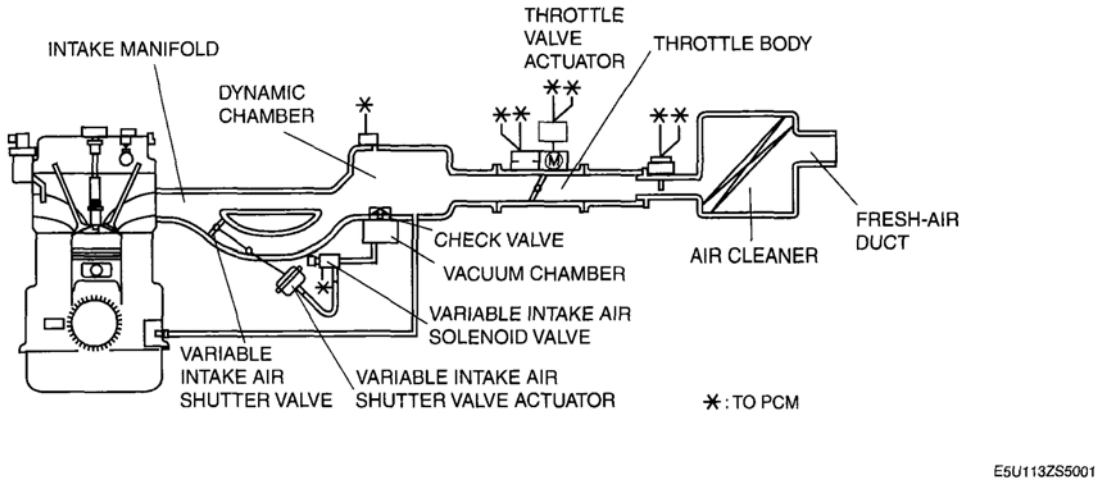


Fig. 3: Intake Air System Diagram
Courtesy of MAZDA MOTORS CORP.

INTAKE MANIFOLD VACUUM INSPECTION [LF]

1. Verify that the intake air hoses are installed securely.
2. Disconnect the vacuum hose connecting the intake manifold and the purge solenoid valve (purge solenoid valve side) and install the vacuum gauge.
3. Warm up the engine.
4. Measure the intake manifold vacuum while idling (no load) using the vacuum gauge.
    - If not within the specification, perform the following inspections.
        - Compression pressure (See **COMPRESSION INSPECTION [LF]** .)
        - Air intake
            - Each hose installation part
            - Throttle body installation part
            - Fuel injector installation part
            - PCV valve installation part
            - Dynamic chamber installation port
            - Intake manifold installation part

Standard

-60 kPa {-450 mmHg, -17.7 inHg} or more

INTAKE AIR SYSTEM REMOVAL/INSTALLATION [LF]

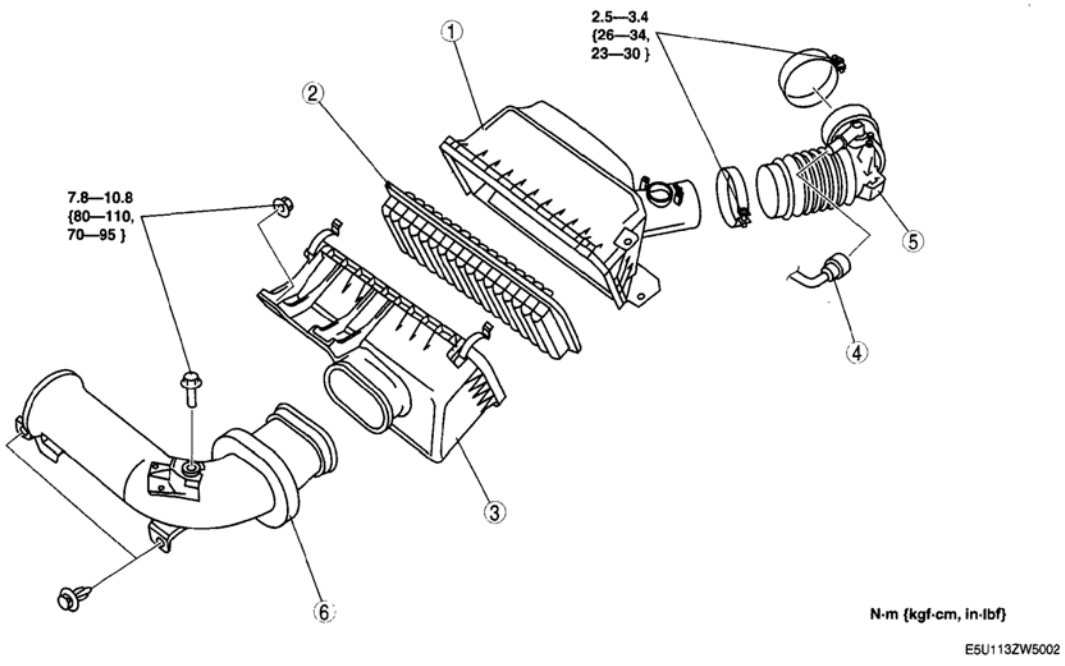
WARNING:

- **A hot engine and intake air system can cause severe burns. Turn off**

the engine and wait until they are cool before removing the intake-air system.

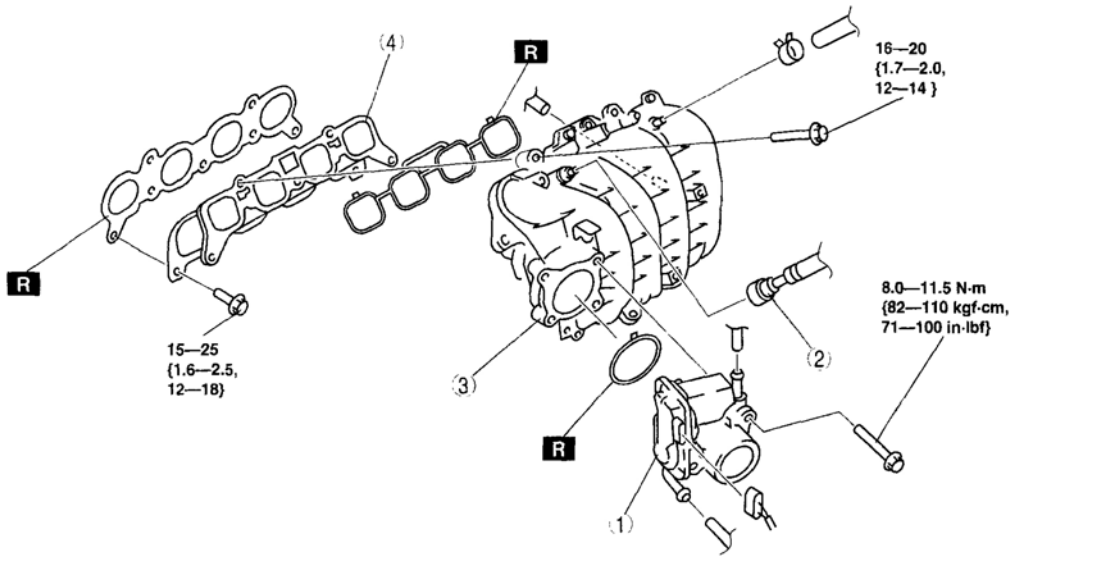
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTION [LF] ".**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Air cleaner cover
2	Air cleaner element
3	Air cleaner case
4	Quick release connector (Type B)
5	Air hose
6	Fresh-air duct

Fig. 4: Identifying Removal Order Of Intake-Air System (Step 1) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.



1	Throttle body
2	Quick release connector (Type A)
3	Dynamic chamber
4	Intake manifold

Fig. 5: Identifying Removal Order Of Intake-Air System (Step 2) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

AIR CLEANER COVER REMOVAL NOTE

1. Remove the MAF/IAT Sensor. (See **MASS AIR FLOW (MAF)/INTAKE AIR TEMPERATURE (IAT) SENSOR REMOVAL/INSTALLATION [LF]** .)

AIR HOSE REMOVAL NOTE

1. Move the purge solenoid valve slightly out of the way. (See **PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]** .)

FRESH-AIR DUCT REMOVAL NOTE

1. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)

THROTTLE BODY REMOVAL NOTE

1. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)

DYNAMIC CHAMBER REMOVAL NOTE

1. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
2. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
3. Remove the service hole cover.
    1. Remove the front suspension tower bar (joint), (right side) and (left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
    2. Remove the wiper arm. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
    3. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
    4. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
    5. Move the cooler pipe No.3 and heater pipe slightly out of the way.
    6. Remove the service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)

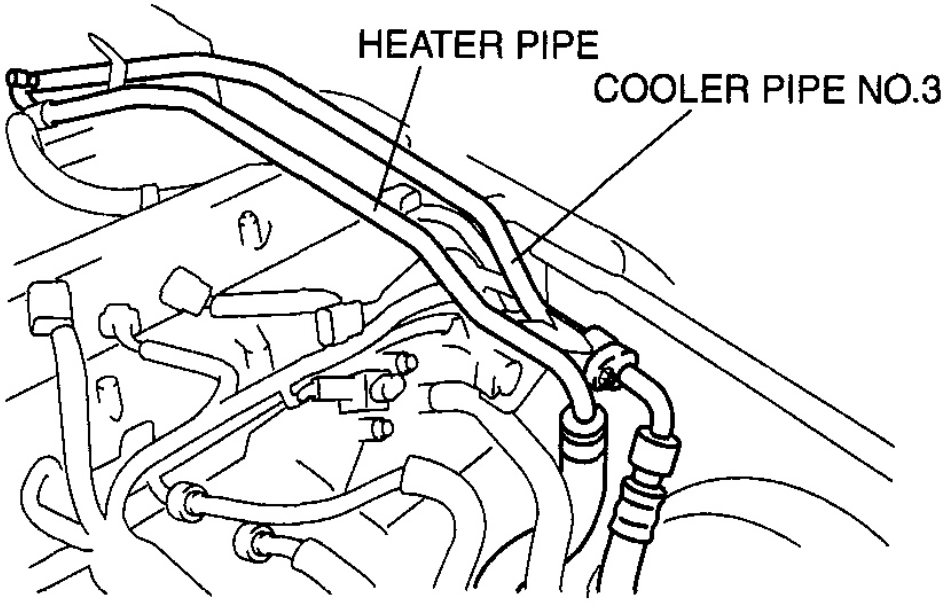


Fig. 6: Moving Cooler Pipe No.3 & Heater Pipe
Courtesy of MAZDA MOTORS CORP.

4. Disconnect the heater hose and move the heater pipe slightly out of the way.

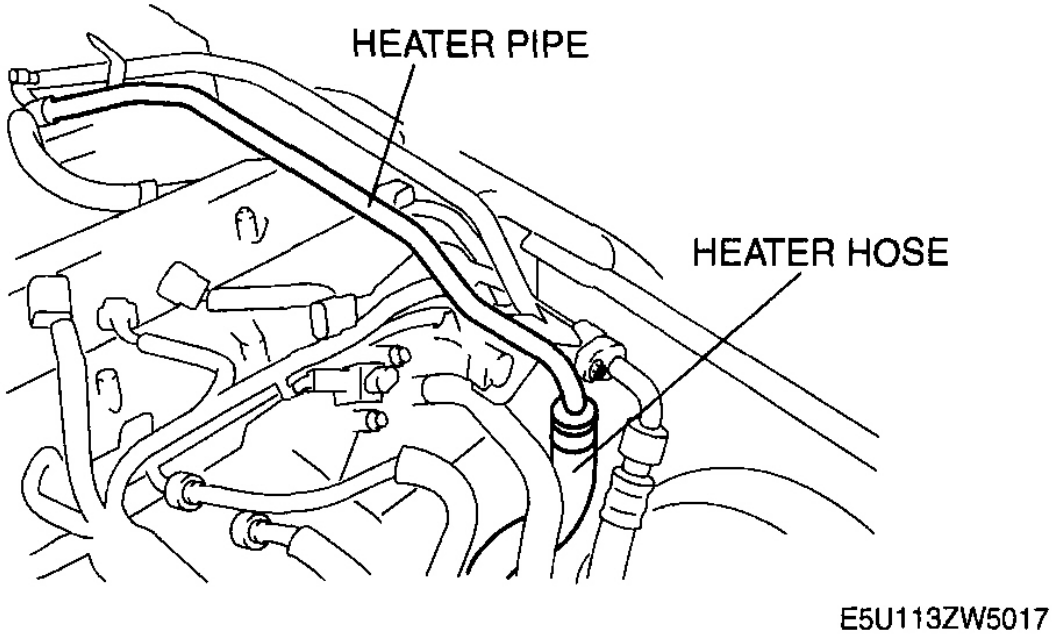


Fig. 7: Disconnecting Heater Hose
Courtesy of MAZDA MOTORS CORP.

5. Disconnect the heater hose and move the heater pipe slightly out of the way.

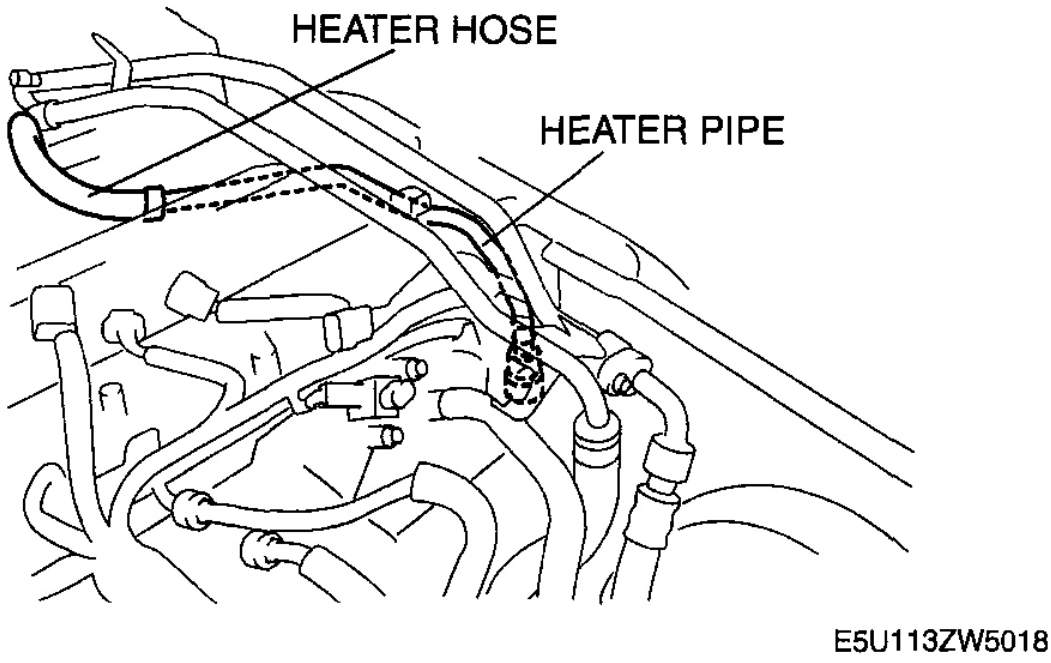


Fig. 8: Moving Heater Pipe
Courtesy of MAZDA MOTORS CORP.

6. Remove the harness bracket.

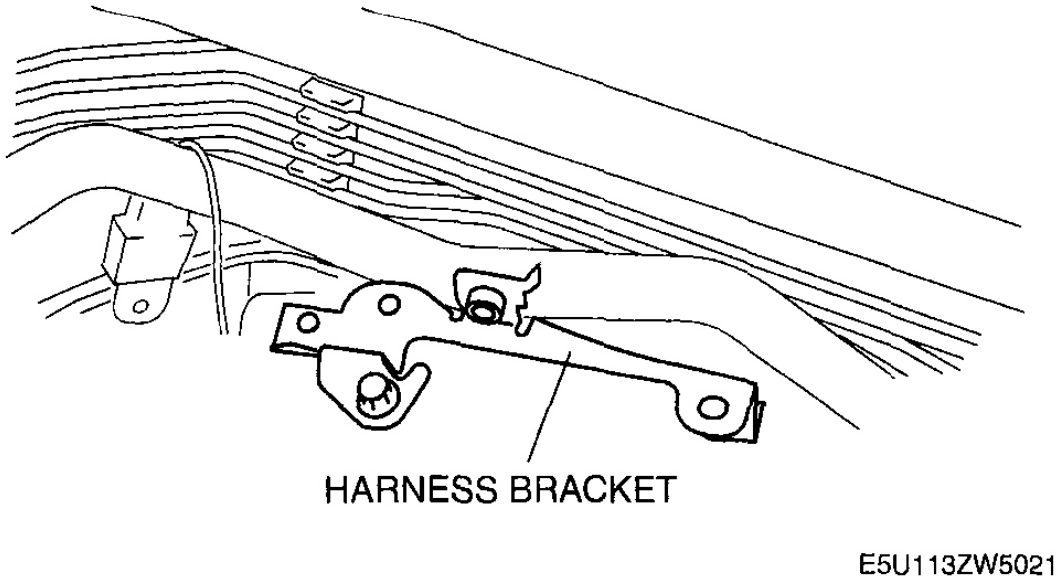


Fig. 9: Removing Harness Bracket
Courtesy of MAZDA MOTORS CORP.

7. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
8. Disconnect the variable intake air solenoid valve connector, EGR valve connector, CMP sensor connector and PSP switch connector.
9. Disconnect the ignition coil connector and fuel injector connector and move the harness slightly out of the way.
10. Disconnect the quick release connector from the fuel distributor. (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
11. Remove the fuel distributor. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
12. Disconnect the water hose from the EGR valve.
13. Disconnect two water hoses from the thermostat.
14. Remove the heater hose and heater pipe from the dynamic chamber.
15. Remove the variable intake air solenoid valve. (See **VARIABLE INTAKE AIR SOLENOID VALVE REMOVAL/INSTALLATION [LF]** .)
16. Remove the dynamic chamber installation bolts.

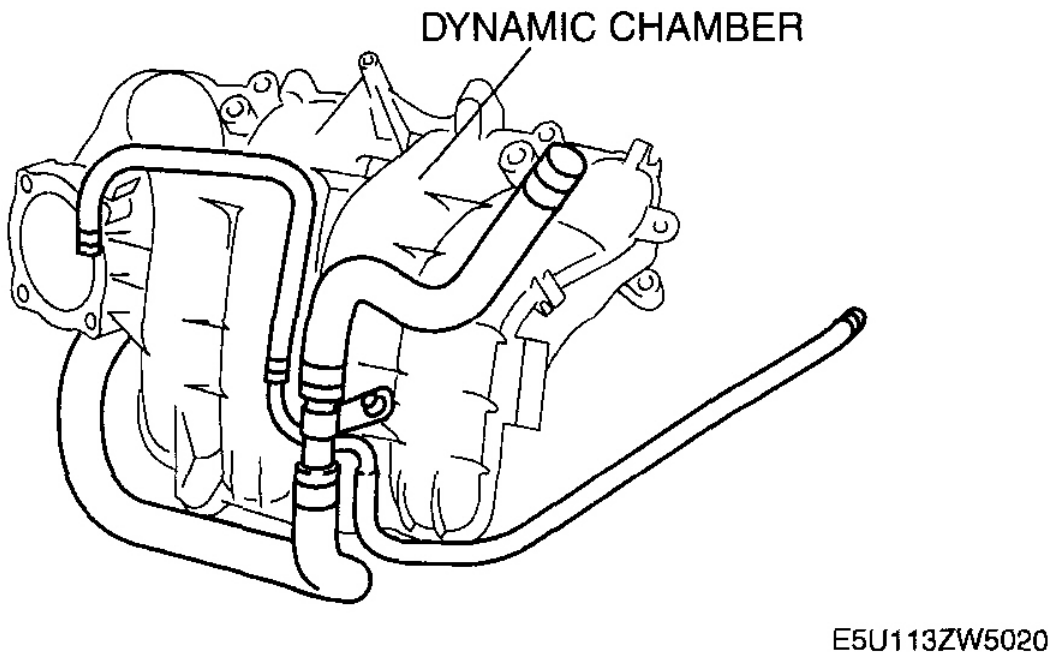


Fig. 10: Removing Heater Hose & Heater Pipe From Dynamic Chamber
Courtesy of MAZDA MOTORS CORP.

17. Remove the EGR pipe.

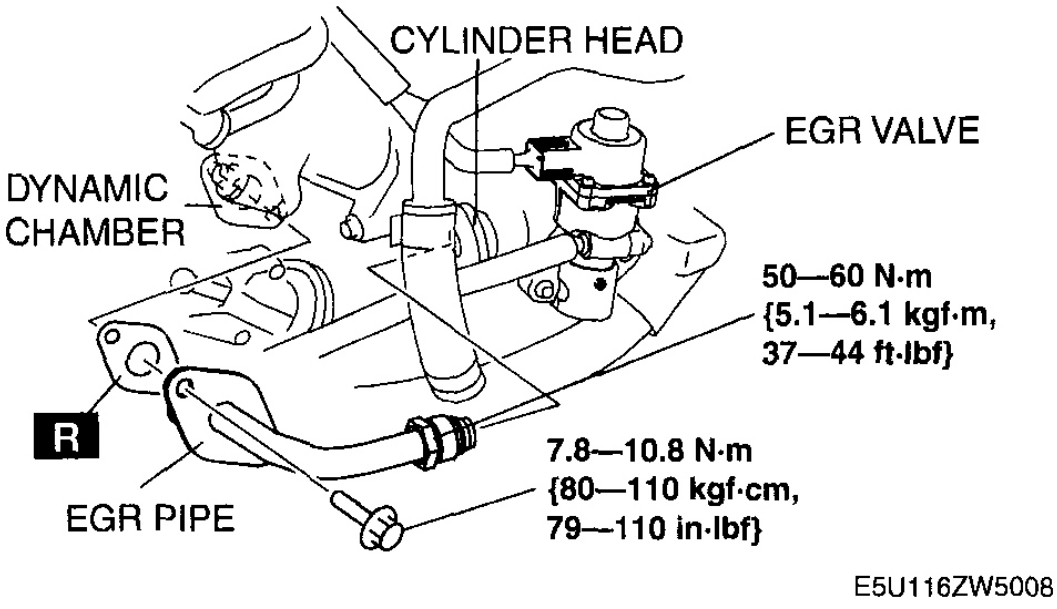


Fig. 11: Identifying EGR Pipe (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

18. Disconnect the connector from the A/C compressor.
19. Disconnect the knock sensor connector.
20. Move the vacuum hose between the purge solenoid valve and the charcoal canister slightly out of the way.
21. Move the clutch release cylinder slightly out of the way. (MT) (See **CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION** .)
22. Disconnect the evaporative hose with the dynamic chamber raised.

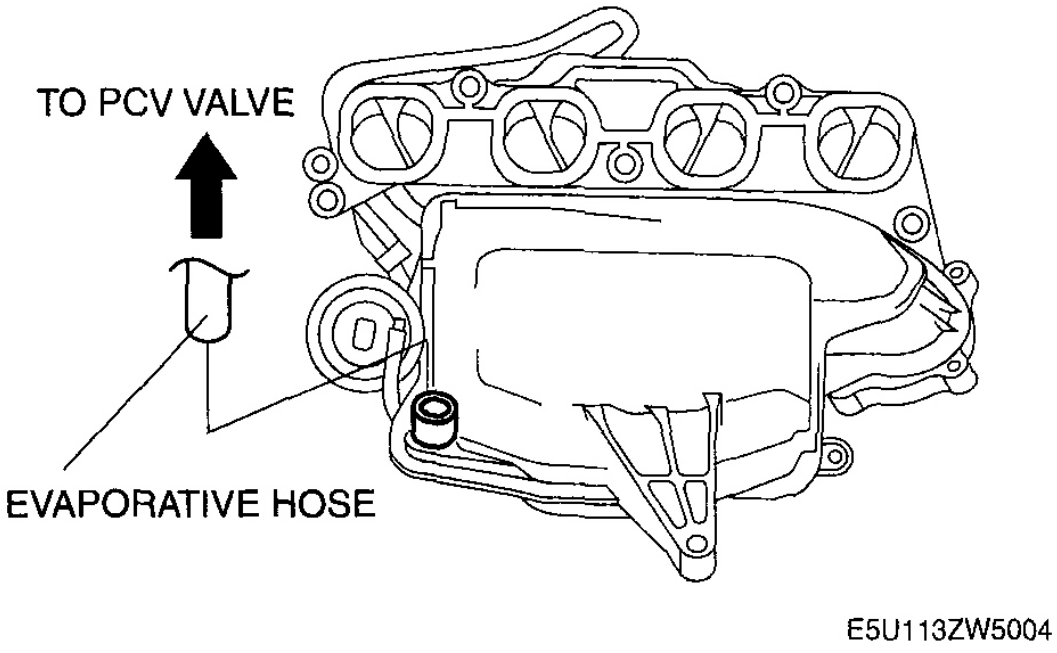


Fig. 12: Disconnecting Evaporative Hose
Courtesy of MAZDA MOTORS CORP.

23. Remove the dynamic chamber.
24. Remove the variable intake air shutter valve actuator. (See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [LF]** .)
25. Remove the MAP sensor. (See **MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [LF]** .)

THROTTLE BODY INSTALLATION NOTE

1. Tighten the bolts in the order as shown in **Fig. 13** .

   Throttle body tightening torque 8.0-11.5 N.m {82-110 kgf.cm, 71-100 in.lbf}

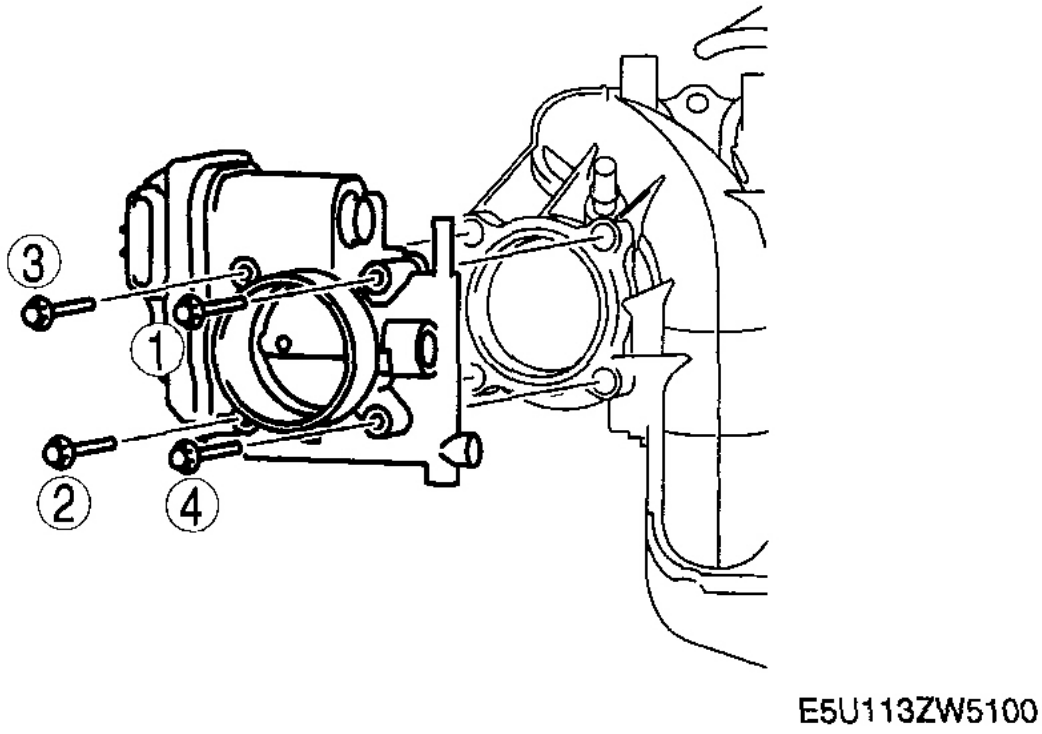


Fig. 13: Identifying Tightening Sequence Of Throttle Body Bolts
Courtesy of MAZDA MOTORS CORP.

AIR CLEANER ELEMENT INSPECTION [LF]

1. Remove the air cleaner element. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following items:
   - If there is any abnormality, clean or replace the air cleaner element.
     - Has the replacement interval come?
     - Is the air cleaner element soiled, damaged, or bent?
     - Are the air cleaner case and the air cleaner element correctly sealed?
     - Is the correct air cleaner element installed?

THROTTLE BODY INSPECTION [LF]

NOTE:
- **Perform the following inspection only when directed.**

RESISTANCE INSPECTION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the throttle body connector.
4. Measure the resistance between throttle actuator terminals A and B.
    - If not as specified, replace the throttle body. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
    - If as specified, carry out the **Circuit Open/Short Inspection** .

Specification

AMBIENT TEMPERATURE SPECIFICATION

Ambient temperature (°C {°F})	Resistance (ohm)
Approx. 20 {68}	0.3-100

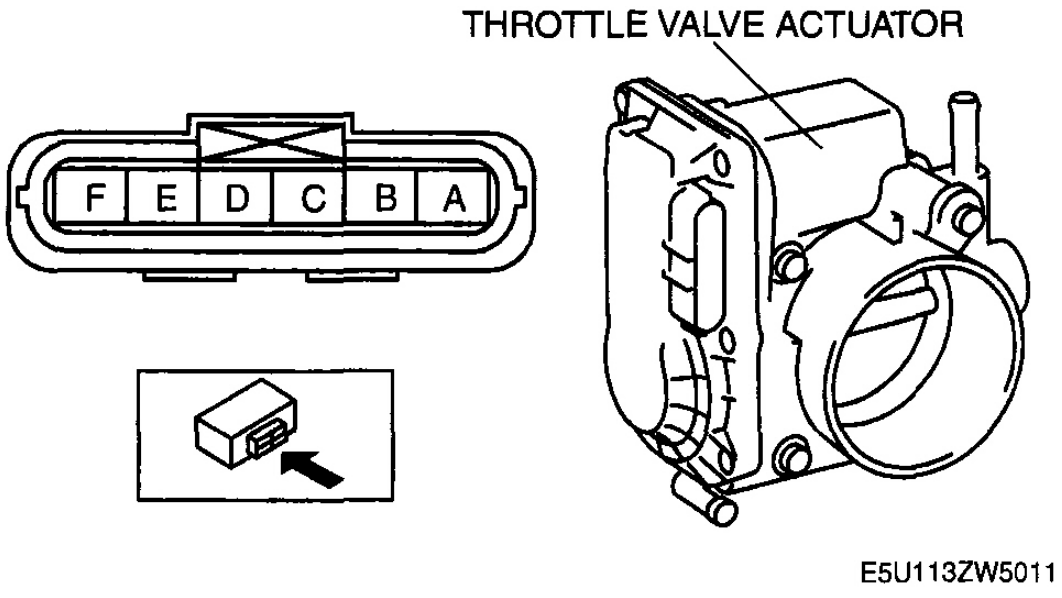


Fig. 14: Identifying Throttle Actuator Connector Terminals
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harnesses for open or short (continuity check).

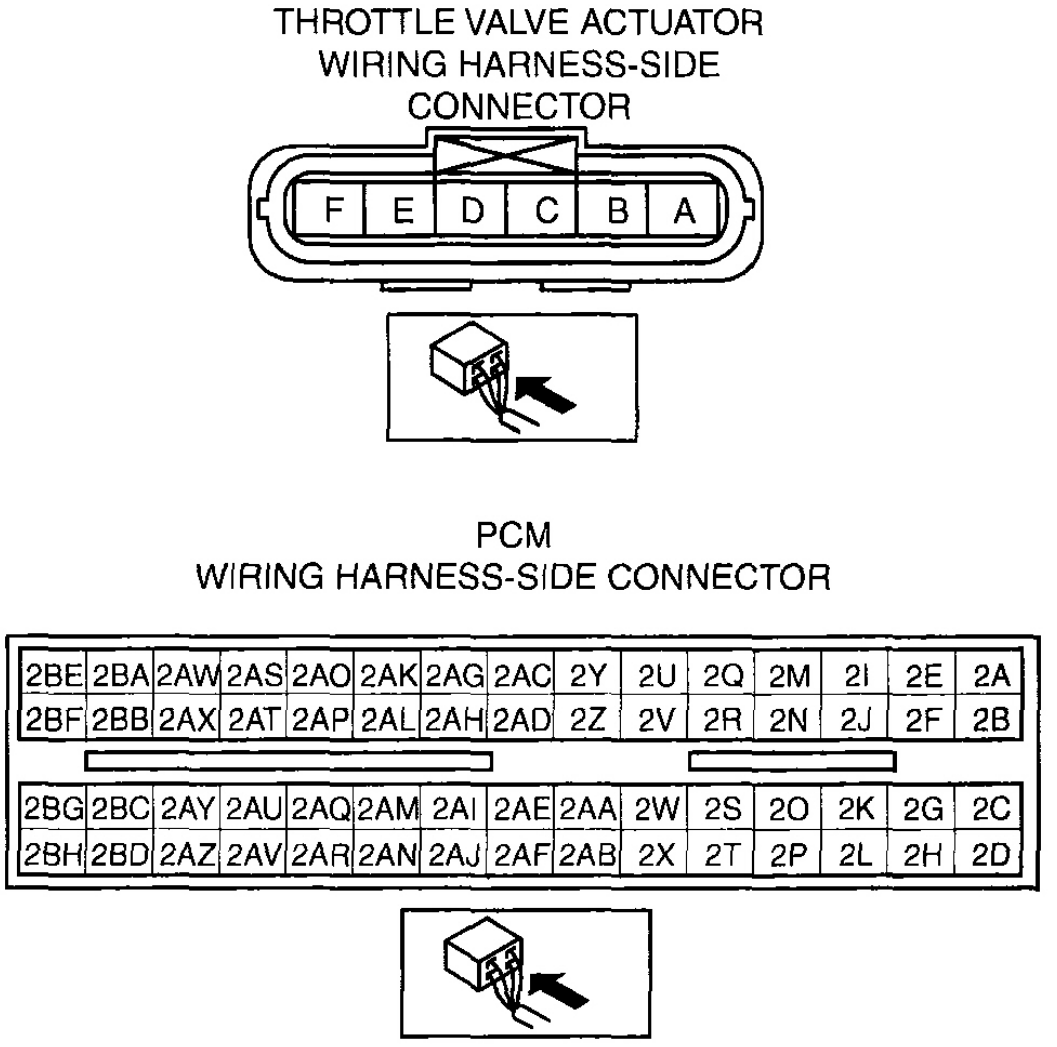


Fig. 15: Identifying Throttle Valve Actuator & PCM Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Open Circuit

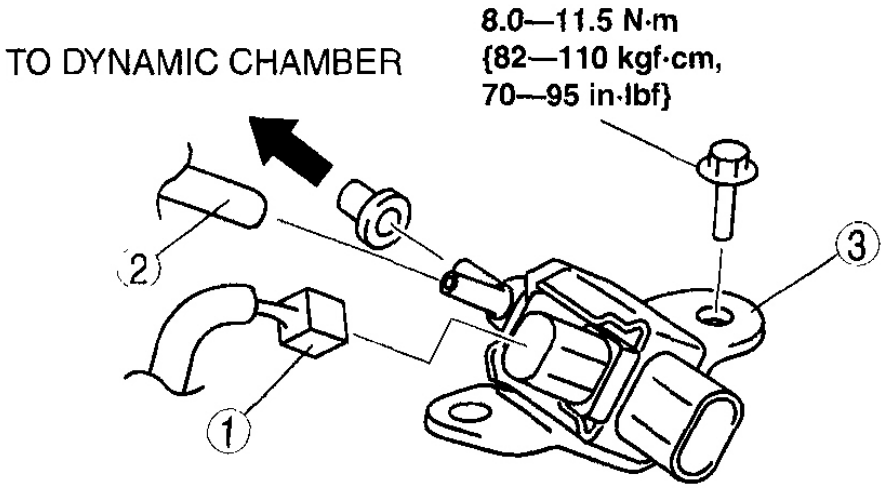
- If there is no continuity, the circuit is open. Repair or replace the wiring harness.
  - Throttle valve actuator terminal A and PCM terminal 2B
  - Throttle valve actuator terminal B and PCM terminal 2A

Short Circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.
  - Throttle valve actuator terminal A and power supply
  - Throttle valve actuator terminal A and ground
  - Throttle valve actuator terminal B and power supply
  - Throttle valve actuator terminal B and ground

VARIABLE INTAKE AIR SOLENOID VALVE REMOVAL/INSTALLATION [LF]

1. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
2. Remove the battery cover.
3. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove in the order indicated in **Fig. 16** .
5. Install in the reverse order of removal.



1	Connector
2	Vacuum hose
3	Variable intake air solenoid valve

Fig. 16: Identifying Removal Order Of Variable Intake Air Solenoid Valve (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF]

NOTE:

- **Perform the following inspection only when directed.**

AIRFLOW INSPECTION

1. Remove the battery cover
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the variable intake air solenoid valve. (See **VARIABLE INTAKE AIR SOLENOID VALVE REMOVAL/INSTALLATION [LF]** .)
4. Inspect airflow between the ports under the following conditions.
   - If not as specified, replace the variable intake air solenoid valve.
   - If as specified, carry out the **Circuit Open/Short Inspection** .

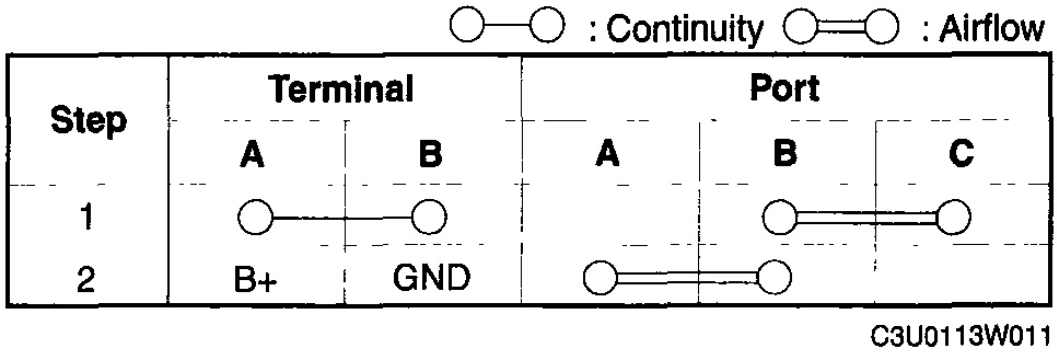


Fig. 17: Variable Intake Air Solenoid Valve Continuity Check Table
Courtesy of MAZDA MOTORS CORP.

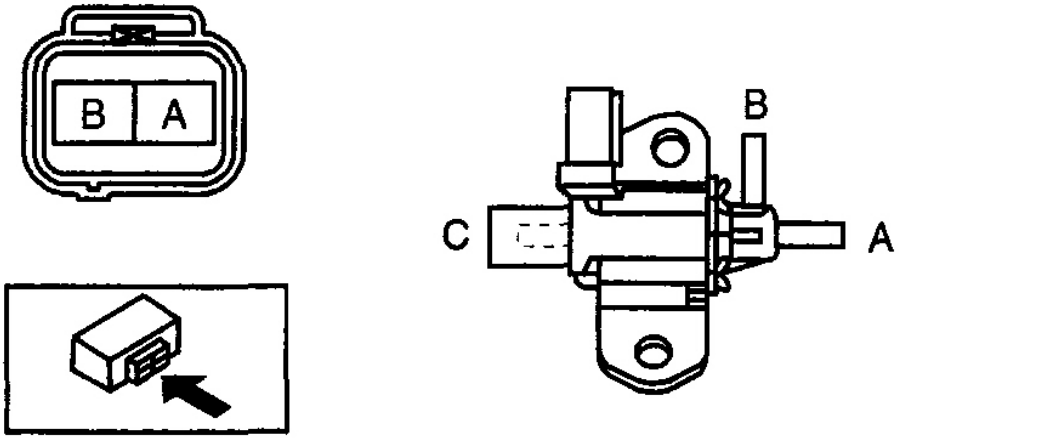


Fig. 18: Identifying Variable Intake Air Solenoid Valve Ports
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

1. Disconnect the PCM connector. (See **PCM REMOVAL/INSTALLATION [LF]** .)
2. Inspect the following wiring harness for open or short (continuity check).

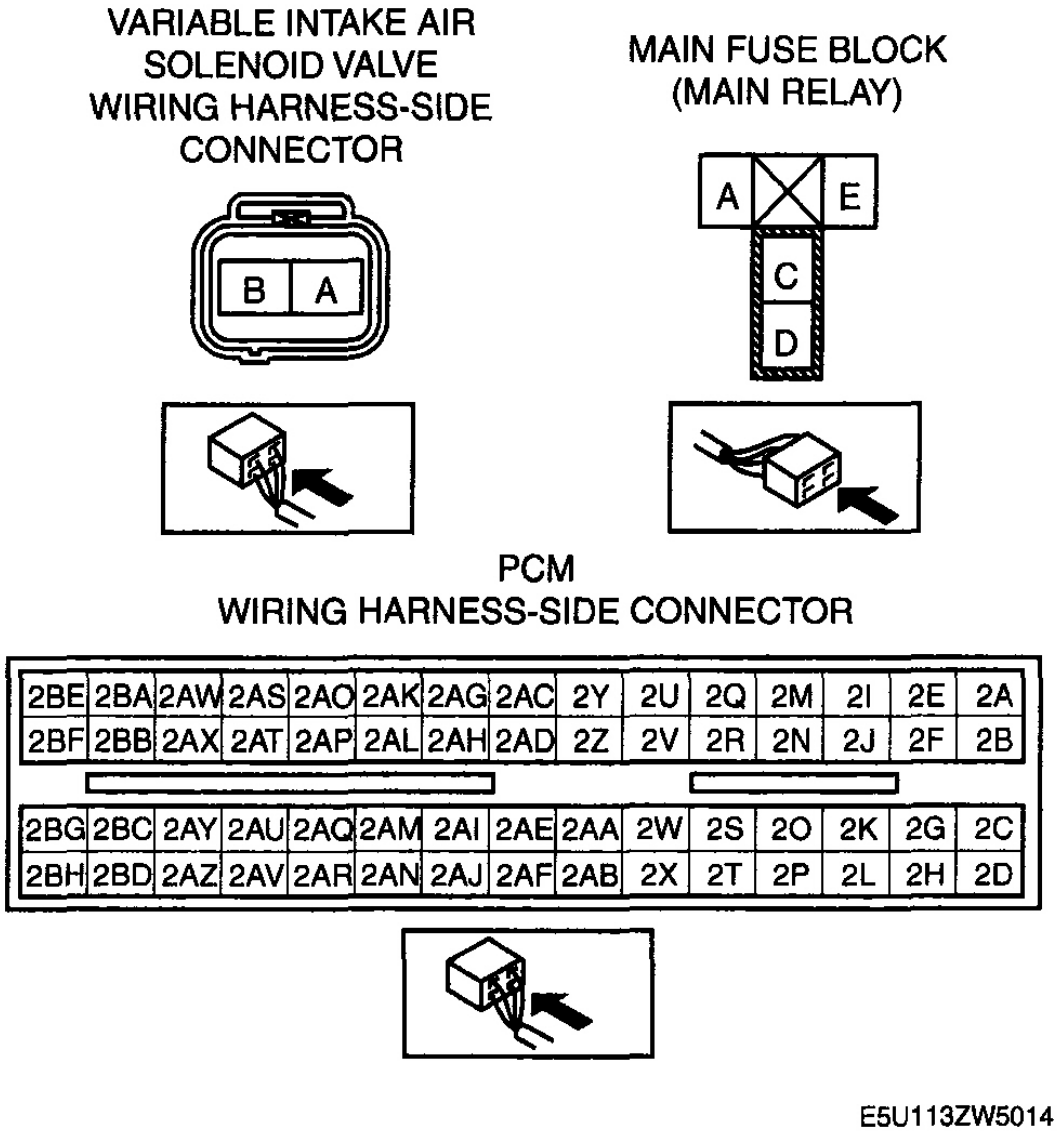


Fig. 19: Identifying Variable Intake Air Solenoid Valve, Main Relay & PCM Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Open Circuit

- If there is no continuity, the circuit is open. Repair or replace the wiring harness.
  - Variable intake air solenoid valve terminal B and PCM terminal 2J
  - Variable intake air solenoid valve terminal A and main relay

Short Circuit

- If there is continuity, the circuit is shorted. Repair or replace the wiring harness.
  - Variable intake air solenoid valve terminal B and power supply
  - Variable intake air solenoid valve terminal B and body ground
  - Variable intake air solenoid valve terminal A and body ground

VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]

1. Remove the service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)
2. Disconnect the vacuum hose from the variable intake air solenoid valve.
3. Connect a vacuum pump to the vacuum hose.

NOTE:

- **Verify that the variable intake air shutter valve actuator rod moves using a mirror.**

4. Apply vacuum and verify that the rod moves.
   - If the rod does not move, replace the variable intake air shutter valve actuator. (See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [LF]** .)

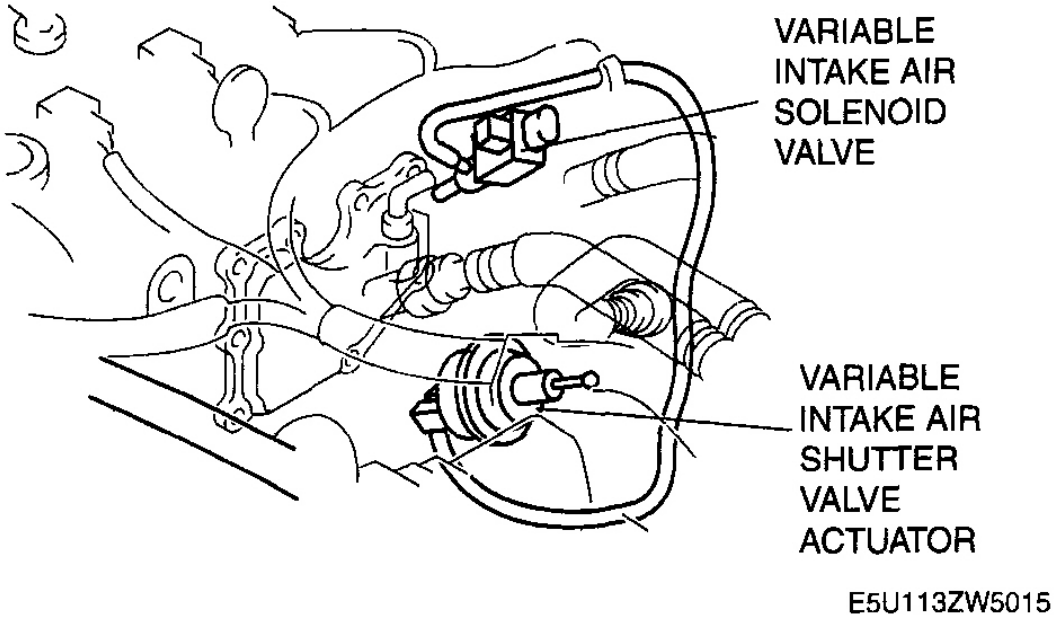


Fig. 20: Identifying Variable Intake Air Solenoid Valve & Variable Intake Air Shutter Valve Actuator
Courtesy of MAZDA MOTORS CORP.

VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR ROD OPERATION REFERENCE

Vacuum kPa {mmHg, inHg}	Rod movement
Below -2.7 {-21, -0.9}	Not operate
Above -33.4 {-251, -9.89}	Fully pulled

VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION [LF]

WARNING:

- **A hot engine and intake-air system can cause severe burns. Turn off the engine and wait until they are cool before removing the intake-air system.**
- **Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTION [LF] ".**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the throttle body. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
4. Disconnect the quick release connector (Type A) (See **QUICK RELEASE CONNECTOR (EMISSION SYSTEM) REMOVAL/INSTALLATION [LF]** .)
5. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
6. Follow "BEFORE SERVICE PRECAUTION" before performing any work operations to prevent fuel from spilling from the fuel system. (See **BEFORE SERVICE PRECAUTION [LF]** .)
7. Remove the service hole cover.
    1. Remove the front suspension tower bar (joint), (right side) and (left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
    2. Remove the wiper arm. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
    3. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
    4. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
    5. Remove the service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)
8. Remove the harness bracket.

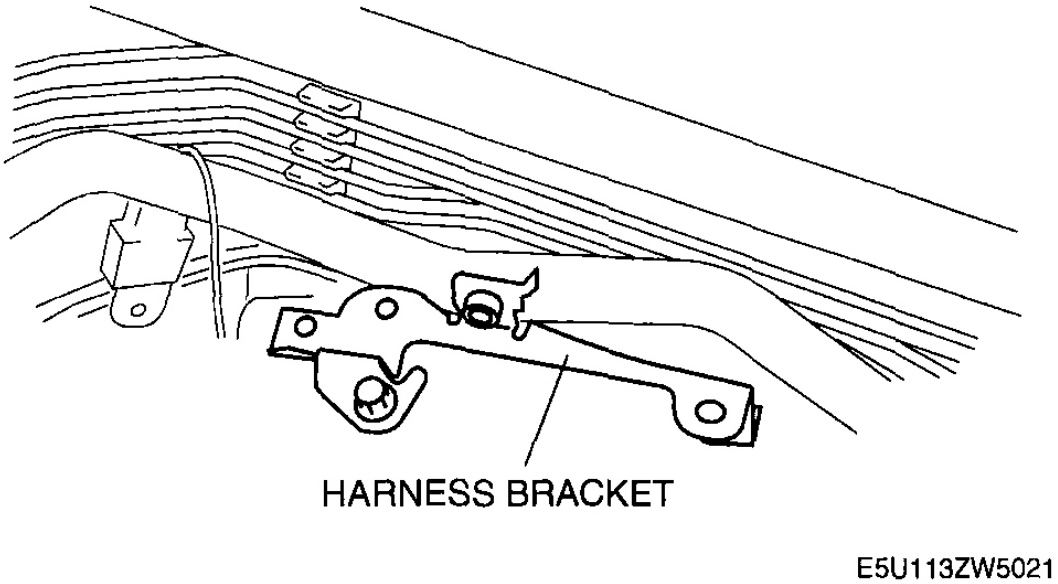
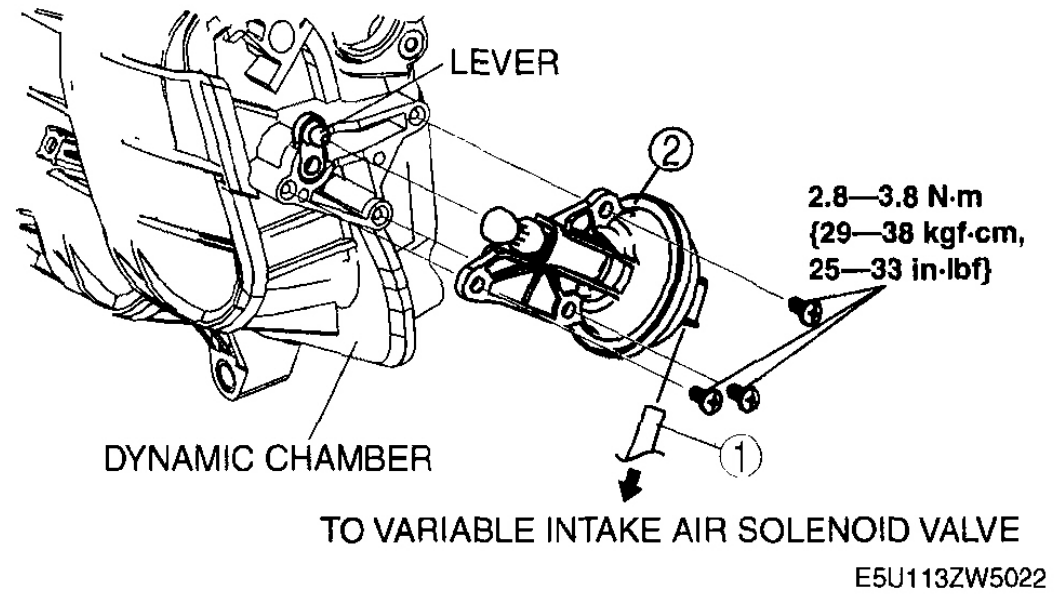


Fig. 21: Identifying Harness Bracket
Courtesy of MAZDA MOTORS CORP.

9. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
10. Disconnect the quick release connector from the fuel distributor. (See **QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [LF]** .)
11. Remove the fuel distributor. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
12. Move the clutch release cylinder slightly out of the way. (MT) (See **CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION** .)
13. Remove the dynamic chamber. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
14. Remove in the order indicated in **Fig. 22** .



1	Vacuum hose
2	Variable intake air shutter valve actuator

Fig. 22: Identifying Removal Order Of Variable Intake Air Shutter Valve Actuator (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

15. Install in the reverse order of removal.

VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR REMOVAL NOTE

1. Disengage the variable intake air shutter valve actuator rod from the dynamic chamber on the opposite side using a suitable screwdriver or equivalent tool as shown in **Fig. 23** .

CAUTION:
- **Do not remove the lever, otherwise the variable intake air shutter valve opening angle will deviate. To prevent removal of the lever when removing the variable intake shutter valve actuator, press the lever firmly to the dynamic chamber side by hand.**

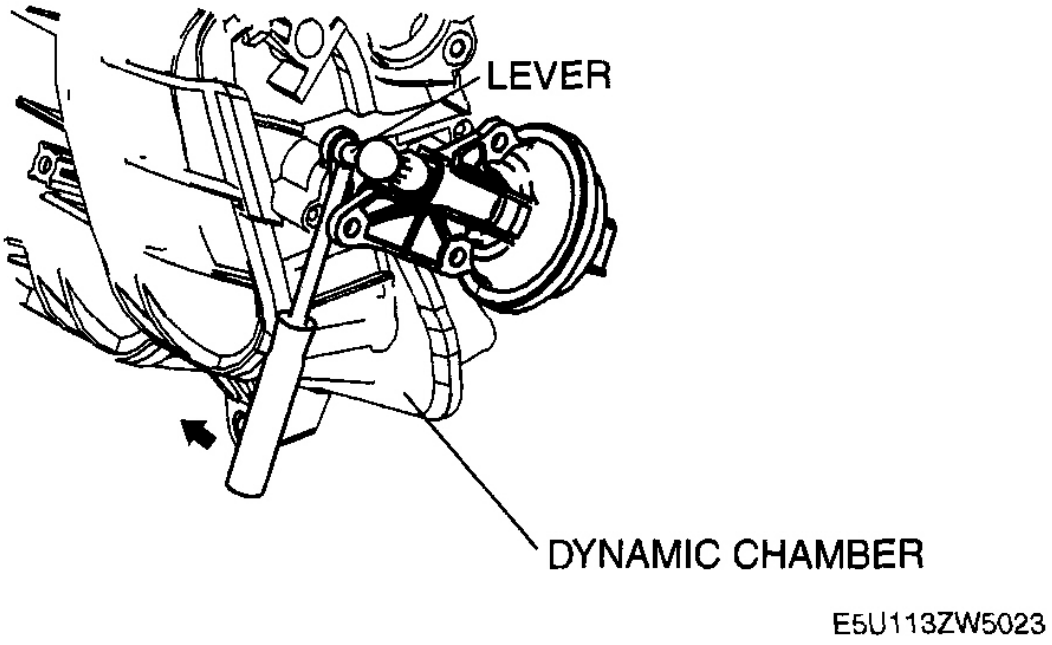


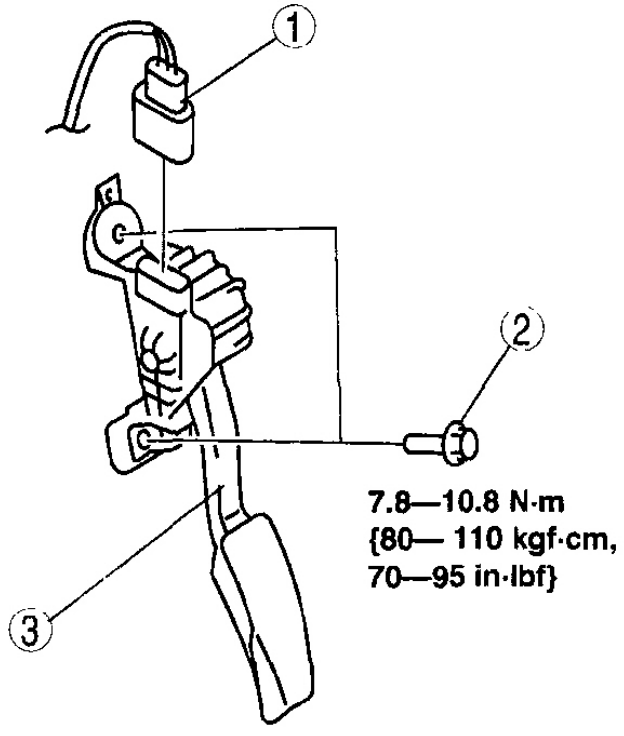
Fig. 23: Disengaging Variable Intake Air Shutter Valve Actuator Rod From Dynamic Chamber
Courtesy of MAZDA MOTORS CORP.

VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSTALLATION NOTE

1. Press the variable intake air shutter valve actuator rod into the dynamic chamber on the opposite side until a click is heard, and install it.

ACCELERATOR PEDAL REMOVAL/INSTALLATION [LF]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove in the order indicated in **Fig. 24** .



1	Connector
2	Installation bolt
3	Accelerator pedal

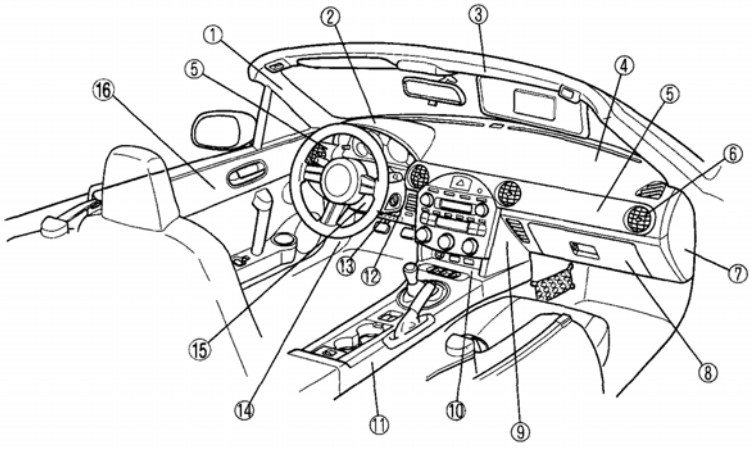
Fig. 24: Identifying Removal Order Of Accelerator Pedal (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

2007 ACCESSORIES & BODY, CAB

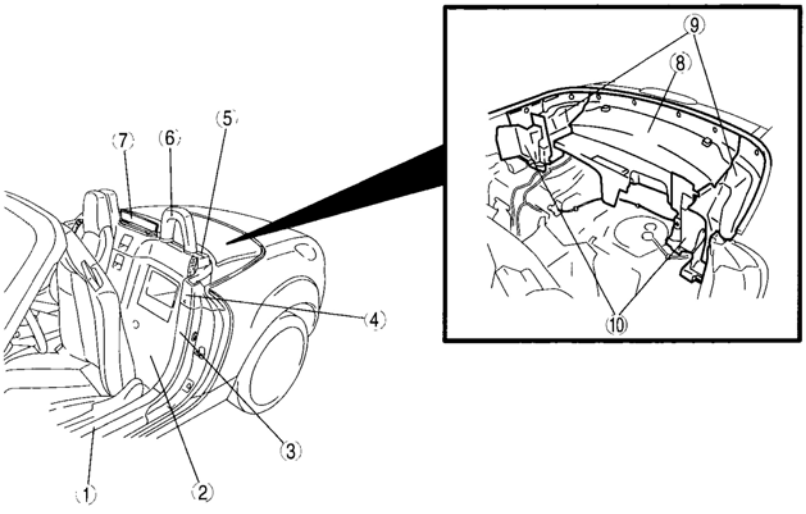
Interior Trim - MX-5 Miata

INTERIOR TRIM LOCATION INDEX



1	A-pillar trim
2	Meter hood
3	Front header trim
4	Dashboard
5	Decoration panel
6	Ventilator grille
7	Side panel
8	Glove compartment
9	Side wall
10	Console panel
11	Console
12	Knee bolster
13	Lower panel
14	Front side trim
15	Column cover
16	Door trim

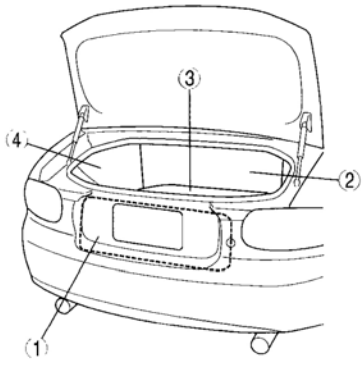
Fig. 1: Identifying Location Of Interior Trim Components (1 Of 3)
Courtesy of MAZDA MOTORS CORP.



E5U917ZW5001

1	Scuff plate
2	Back trim
3	Tire house trim
4	Quarter trim
5	Seat back bar lower garnish
6	Seat back bar garnish
7	Aeroboard
8	Rear package trim
9	Rear side trim
10	Side shelf

Fig. 2: Identifying Location Of Interior Trim Components (2 Of 3)
Courtesy of MAZDA MOTORS CORP.

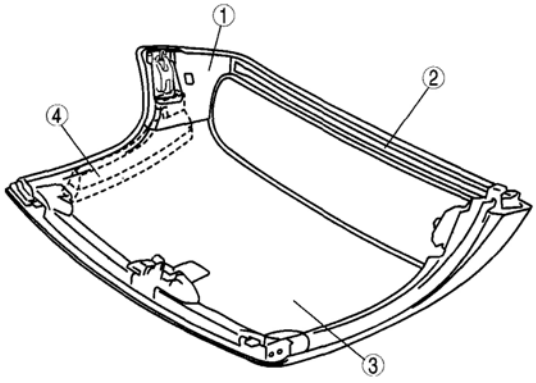


E5U917ZW5003

1	Trunk end trim
2	Partition board
3	Trunk mat
4	Trunk side trim

Fig. 3: Identifying Location Of Interior Trim Components (3 Of 3)
Courtesy of MAZDA MOTORS CORP.

DETACHABLE HARDTOP



D5E917ZW6002

1	B-pillar upper trim
2	Rear trim
3	Headliner
4	Shock-absorbing pad

Fig. 4: Identifying Location Of Detachable Hardtop Components
Courtesy of MAZDA MOTORS CORP.

DASHBOARD REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Glove compartment (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
    3. Side wall (See **SIDE WALL REMOVAL/INSTALLATION** .)
    4. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    5. Center panel unit (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
    6. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
    7. Knee bolster (See **KNEE BOLSTER REMOVAL/INSTALLATION** .)
    8. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
    9. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
    10. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
    11. Combination switch (See **COMBINATION SWITCH REMOVAL/INSTALLATION** .)
    12. Steering shaft (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
    13. Meter hood (See **METER HOOD REMOVAL/INSTALLATION** .)
    14. Instrument cluster (See **INSTRUMENT CLUSTER REMOVAL/INSTALLATION** .)

15. Side panel (See **SIDE PANEL REMOVAL/INSTALLATION** .)
16. Hood release lever (See **HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
17. Female wedge (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
18. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
19. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
20. Front side trim (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
21. Fuse box No.1

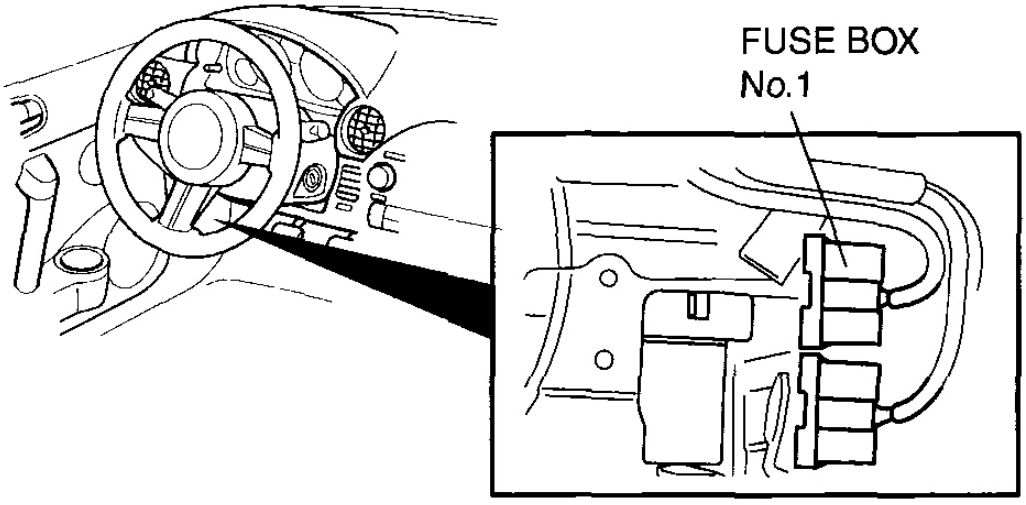
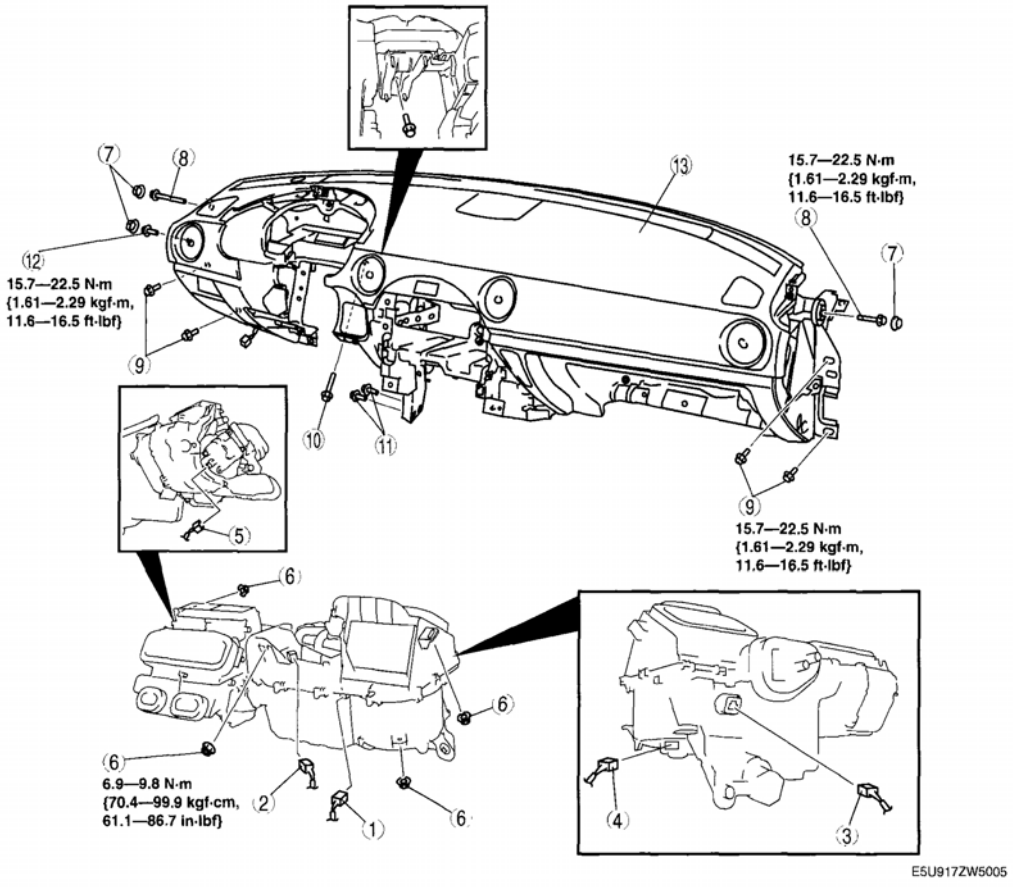


Fig. 5: Identifying Fuse Box No.1
Courtesy of MAZDA MOTORS CORP.

4. Disconnect the dashboard harness connectors.
5. Remove in the order indicated in the figure.
6. Install in the reverse order of removal.



1	Evaporator temperature sensor connector
2	Short code connector
3	Power MOS FET connector
4	Blower motor connector
5	Airflow mode actuator connector
6	Nut
7	Cover

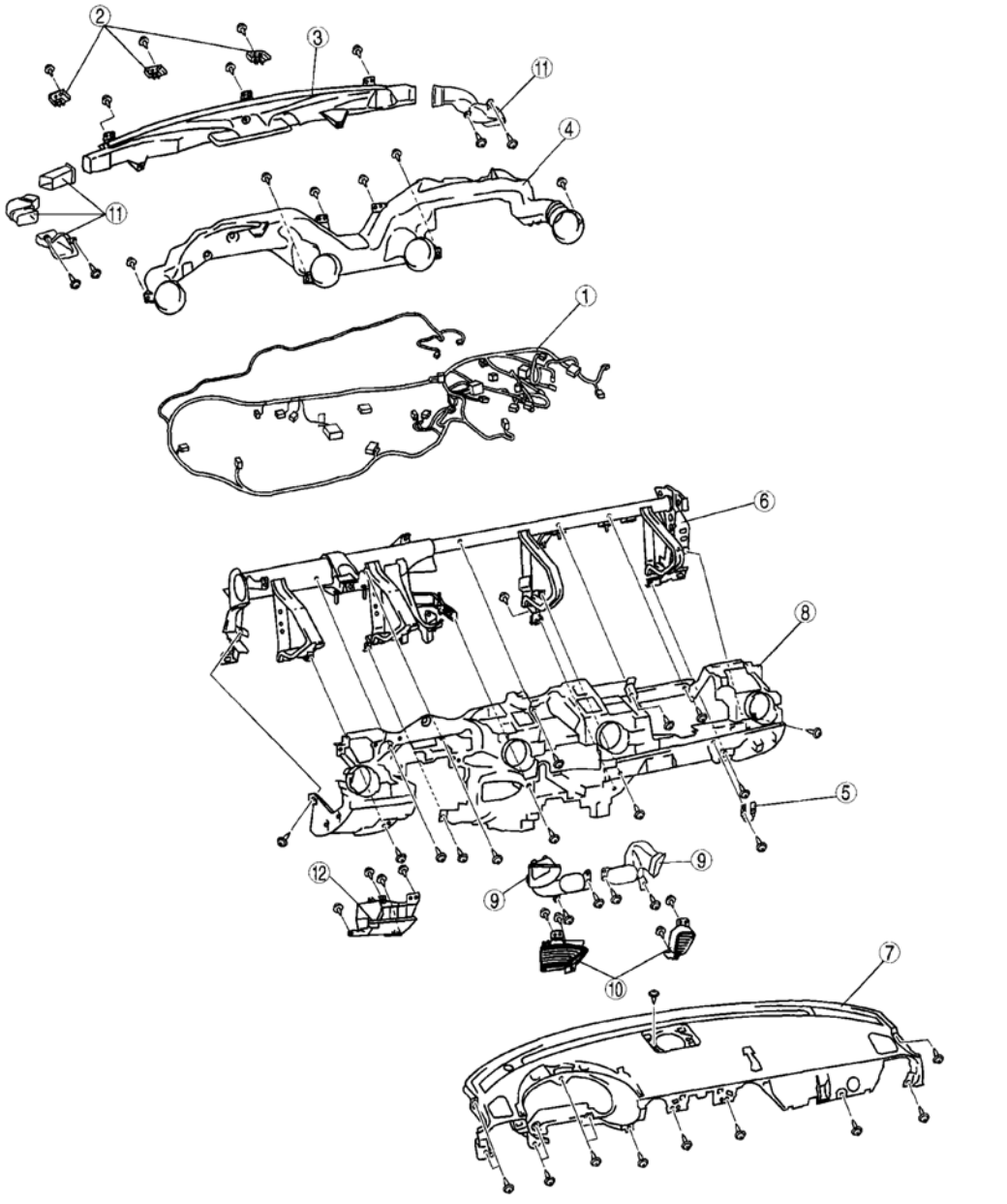
8	Bolt A
9	Bolt B
10	Bolt C
11	Bolt D
12	Bolt E
13	Dashboard

Fig. 6: Identifying Dashboard (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

DASHBOARD DISASSEMBLY/ASSEMBLY

1. Remove the following parts:
    1. Decoration panel (See **DECORATION PANEL REMOVAL/INSTALLATION** .)
    2. Hazard warning switch (See **HAZARD WARNING SWITCH REMOVAL/INSTALLATION** .)
    3. Center speaker cover (See **CENTER SPEAKER REMOVAL/INSTALLATION** .)
    4. Center speaker (vehicles with BOSE) (See **CENTER SPEAKER REMOVAL/INSTALLATION** .)
    5. Passenger-side air bag module (See **PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)

2. Disassemble in the order indicated in **Fig. 7** .
3. Assemble in the reverse order of disassembly.



1	Dashboard wiring harness
2	Pin
3	Defroster duct
4	Center duct
5	Striker
6	Dashboard member

7	Dashboard panel
8	Dashboard lower panel
9	Shower duct
10	Lower ventilator grille
11	Side demister nozzle
12	Switch panel

Fig. 7: Exploded View Of Dashboard
Courtesy of MAZDA MOTORS CORP.

COLUMN COVER REMOVAL/INSTALLATION

1. Remove the tab A, then remove the upper column cover.
2. Remove the screws, then remove the lower column cover.
3. Remove the ignition key illumination. (See **IGNITION KEY ILLUMINATION BULB REMOVAL/INSTALLATION** .)
4. Install in the reverse order of removal.

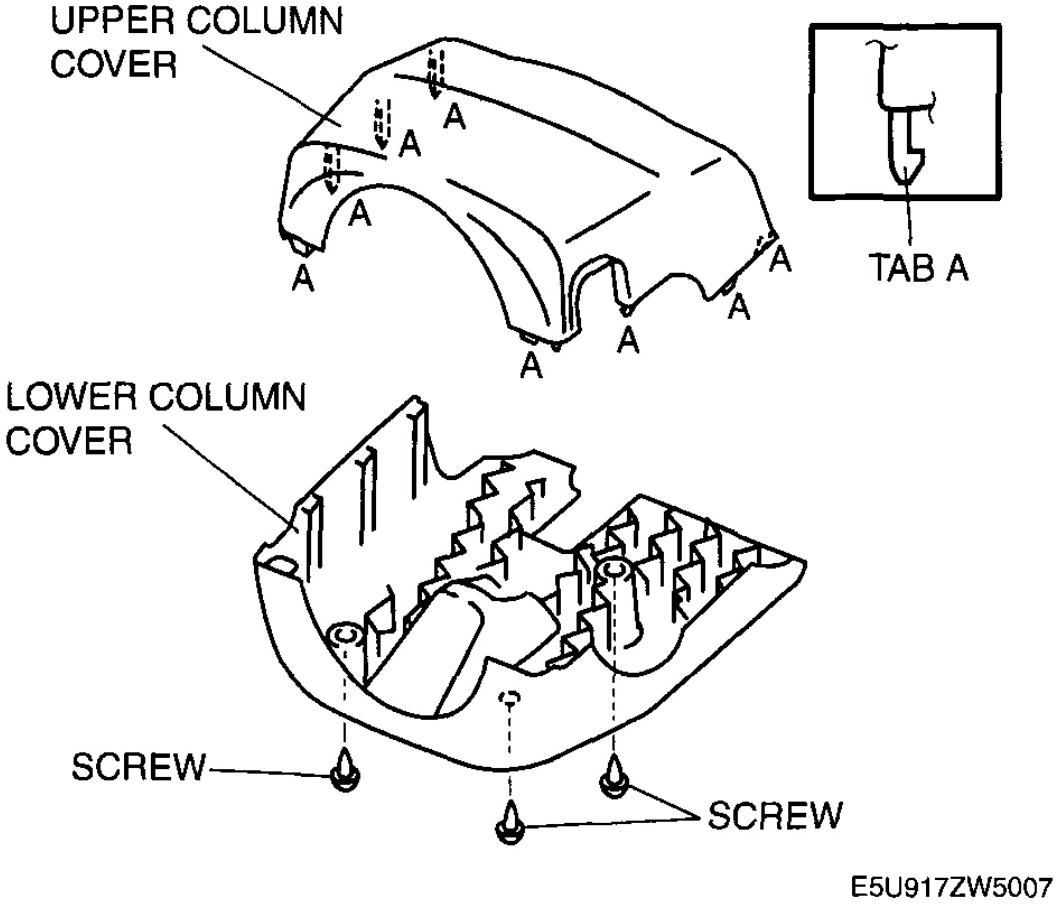


Fig. 8: Removing Upper & Lower Column Cover
Courtesy of MAZDA MOTORS CORP.

GLOVE COMPARTMENT REMOVAL/INSTALLATION

1. Remove the dumper clip.
2. Bend the stoppers inward, then remove.
3. Turn the glove compartment downward and pull the pins.
4. Remove the glove compartment.
5. Install in the reverse order of removal.

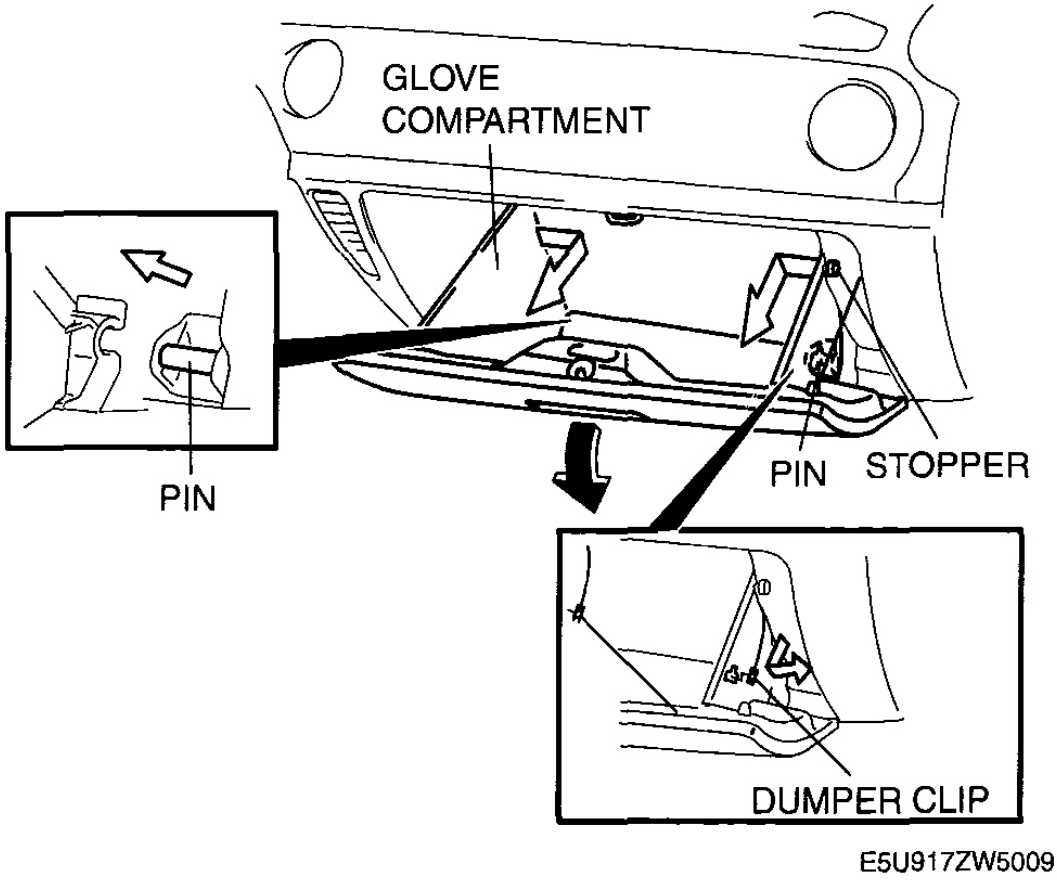


Fig. 9: Removing Glove Compartment
Courtesy of MAZDA MOTORS CORP.

LOWER PANEL REMOVAL/INSTALLATION

1. Pull the lower panel outward and detach clips A and tab B.
2. Turn the lower panel downward and remove the tabs C.
3. Remove the lower panel.
4. Install in the reverse order of removal.

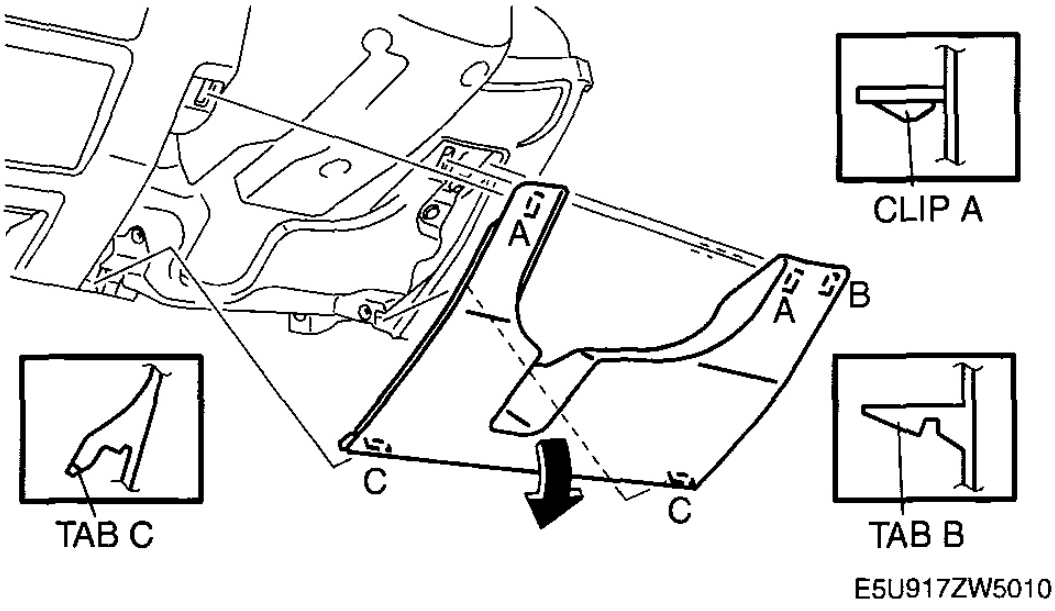


Fig. 10: Removing Lower Panel
Courtesy of MAZDA MOTORS CORP.

METER HOOD REMOVAL/INSTALLATION

1. Pull the meter hood upward and detach clips A.
2. Remove the meter hood.
3. Install in the reverse order of removal.

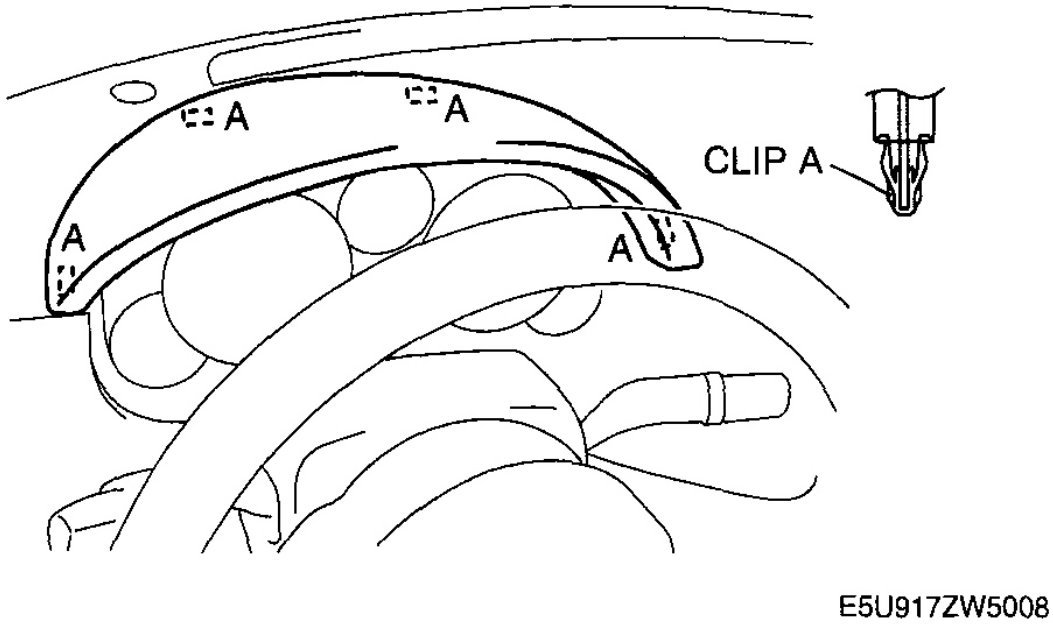


Fig. 11: Detaching "A" Clips
Courtesy of MAZDA MOTORS CORP.

VENTILATOR GRILLE REMOVAL/INSTALLATION

DRIVER'S SIDE

1. Remove the decoration panel, (driver's side) (See **DRIVER'S SIDE** .)
2. Remove the screws.
3. Remove the ventilator grille.
4. Install in the reverse order of removal.

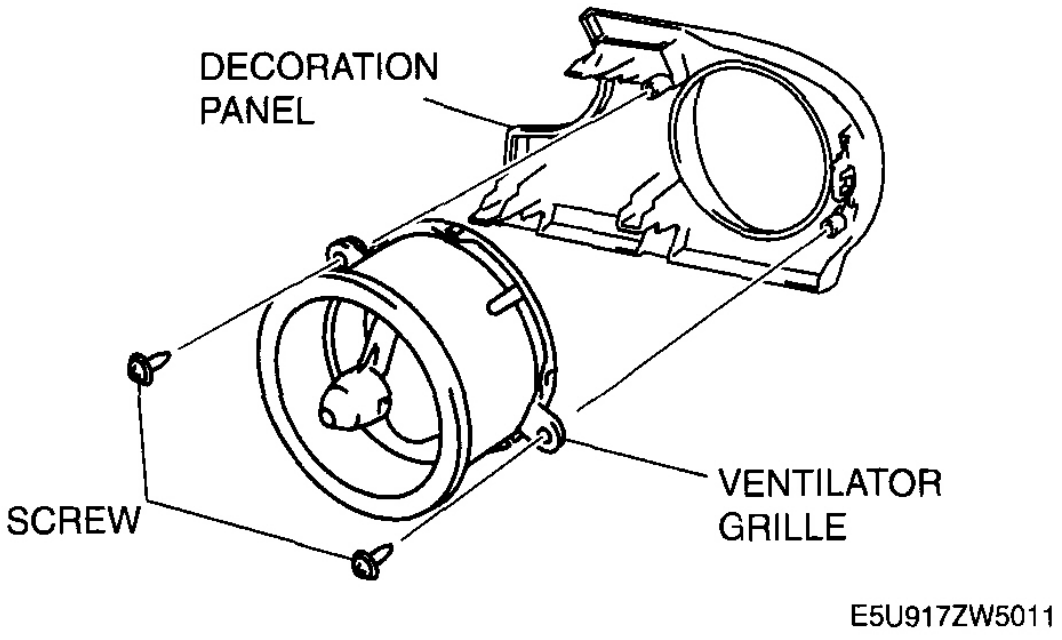


Fig. 12: Removing Ventilator Grille
Courtesy of MAZDA MOTORS CORP.

PASSENGER'S SIDE

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the center panel unit. (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
5. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
6. Remove the decoration panel, (passenger's side) (See **PASSENGER'S SIDE** .)
7. Remove the screws.
8. Remove the ventilator grille.
9. Install in the reverse order of removal.

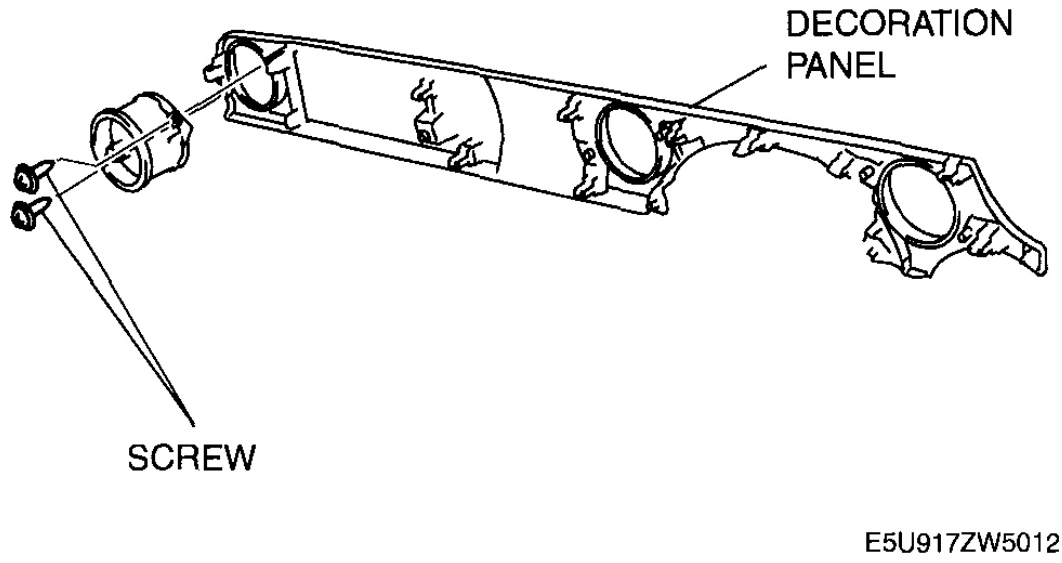


Fig. 13: Removing Decoration Panel (Passenger's Side)
Courtesy of MAZDA MOTORS CORP.

CENTER

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the center panel unit. (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
5. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
6. Remove the decoration panel, (passenger's side) (See **PASSENGER'S SIDE** .)
7. Remove the screws.
8. Remove the ventilator grille.
9. Install in the reverse order of removal.

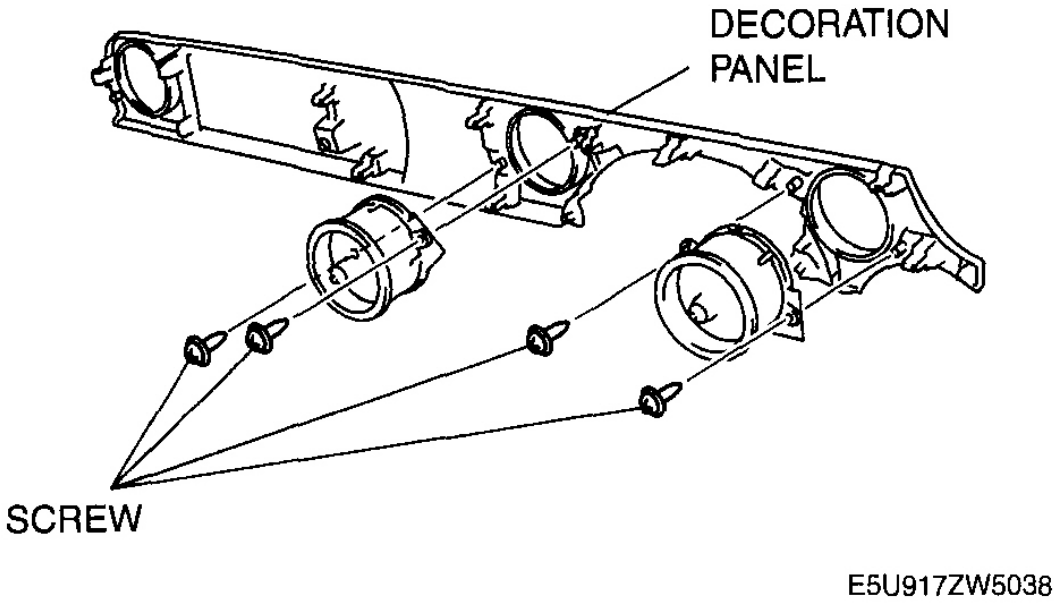


Fig. 14: Removing Decoration Panel (Center)
Courtesy of MAZDA MOTORS CORP.

SIDE PANEL REMOVAL/INSTALLATION

1. Pull the side panel outward and detach clips A.
2. Pull the side panel rearward and detach tab B from the dashboard.
3. Remove the side panel.
4. Install in the reverse order of removal.

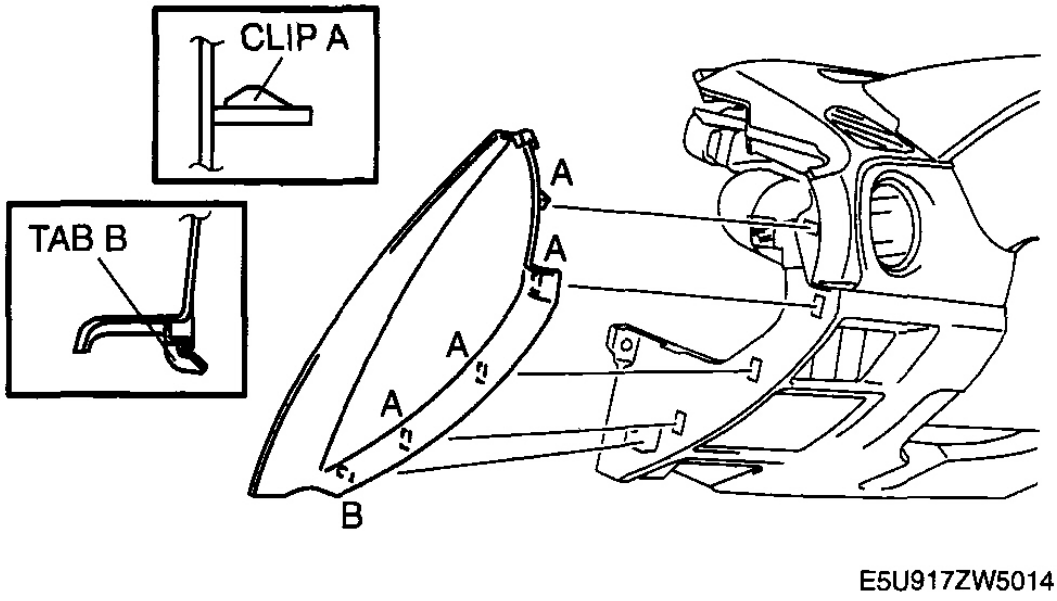


Fig. 15: Detaching Tab B From Dashboard
Courtesy of MAZDA MOTORS CORP.

KNEE BOLSTER REMOVAL/INSTALLATION

1. Remove the lower panel. (See **LOWER PANEL REMOVAL/INSTALLATION** .)
2. Remove the screws.
3. Remove the knee bolster.
4. Install in the reverse order of removal.

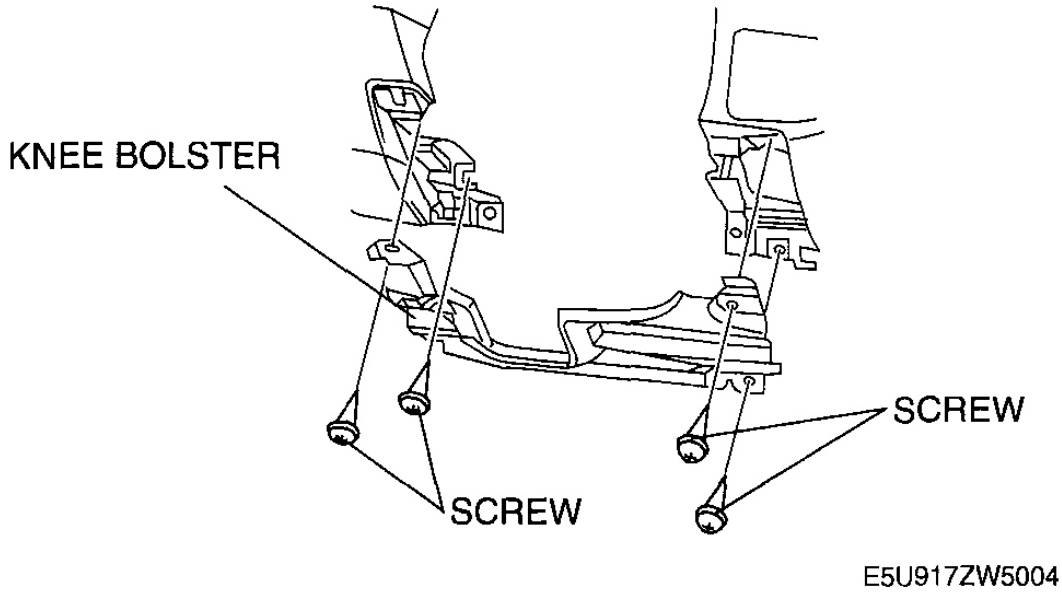


Fig. 16: Removing Knee Bolster
Courtesy of MAZDA MOTORS CORP.

SIDE WALL REMOVAL/INSTALLATION

CAUTION:
- **Do not pull the side wall ends outward to remove the side wall. The side wall and clips could be damaged.**

NOTE:
- **The removal procedure is the same for the driver's side.**

1. Insert a tape-wrapped flathead screwdriver between the side wall and console panel, and detach clips A and B, pins C, and tab D while pulling the side wall in the direction shown by the arrow.
2. Remove the side wall.
3. Install in the reverse order of removal.

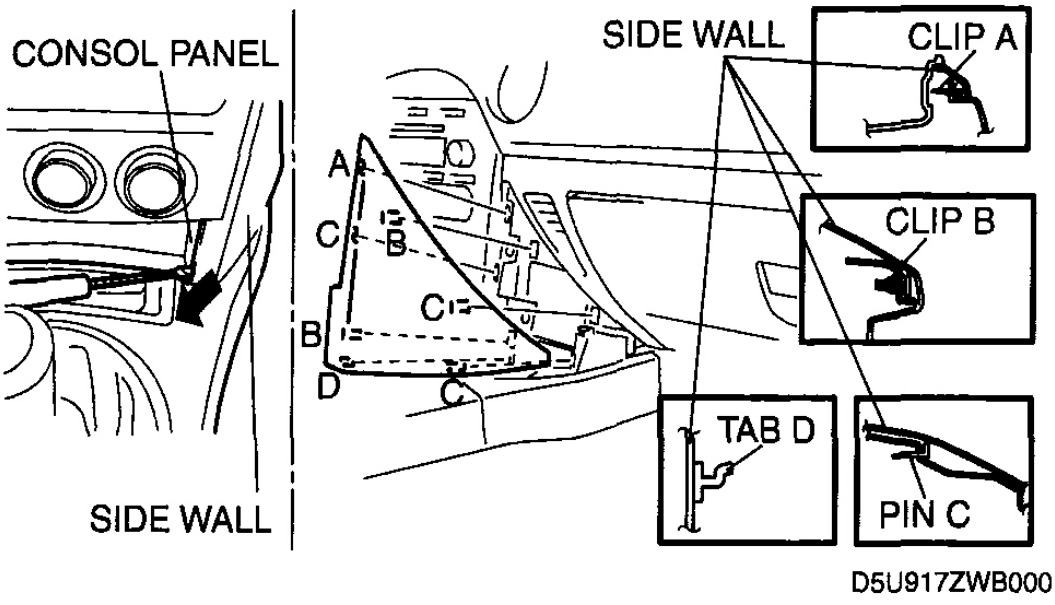
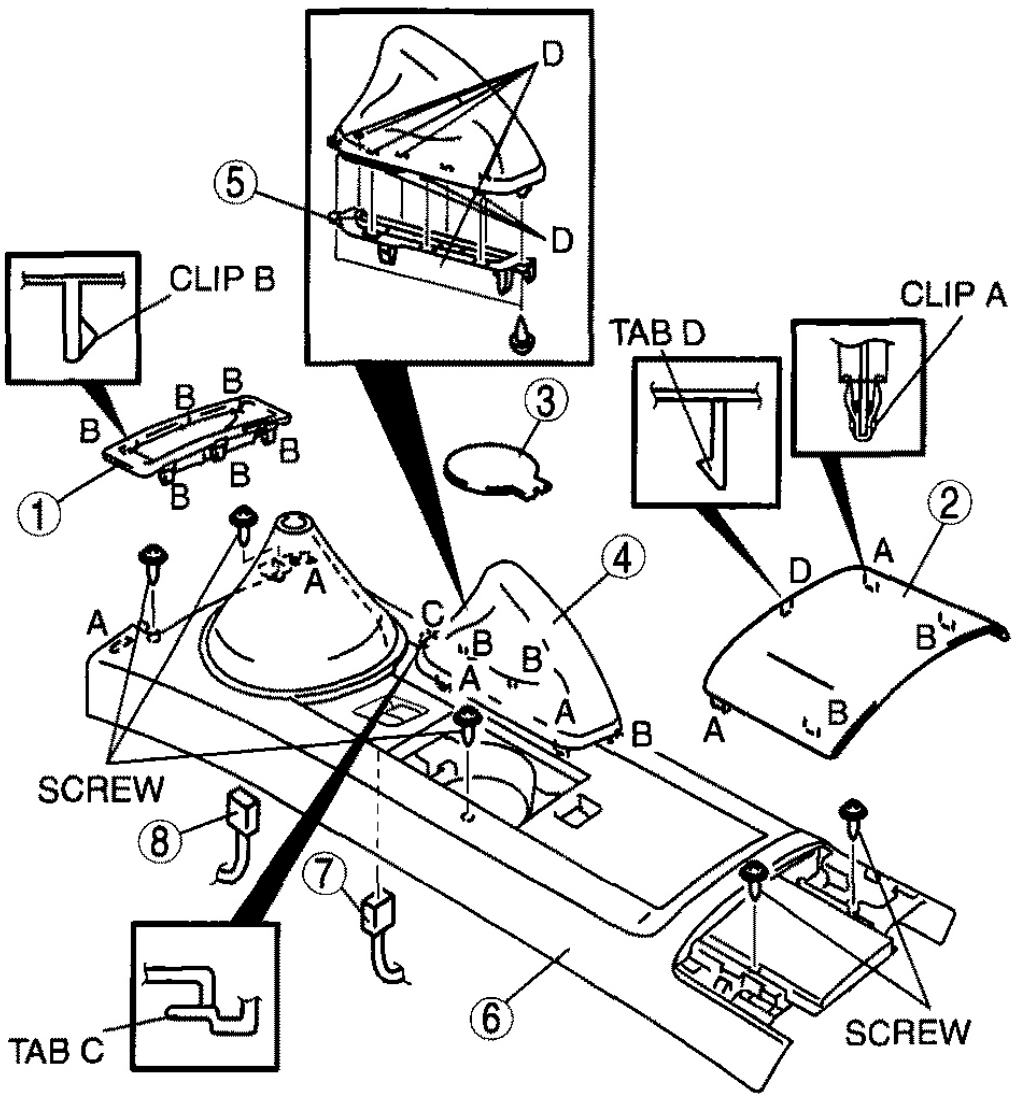


Fig. 17: Removing Side Wall
Courtesy of MAZDA MOTORS CORP.

CONSOLE REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the selector lever knob (AT), shift lever knob (MT).
4. Remove in the order indicated in **Fig. 18** .



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1	Front cover
2	Rear cover
3	Hole cover
4	Parking brake lever boot
5	Parking brake lever boot plate
6	Console
7	Power window main switch connector
8	Indicator compartment connector (AT)

Fig. 18: Identifying Console
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

FRONT COVER REMOVAL NOTE

1. Adhere protective tape in the shaded area shown in the figure and remove the clips using a fastener remover inserted in the position indicated by the arrow.

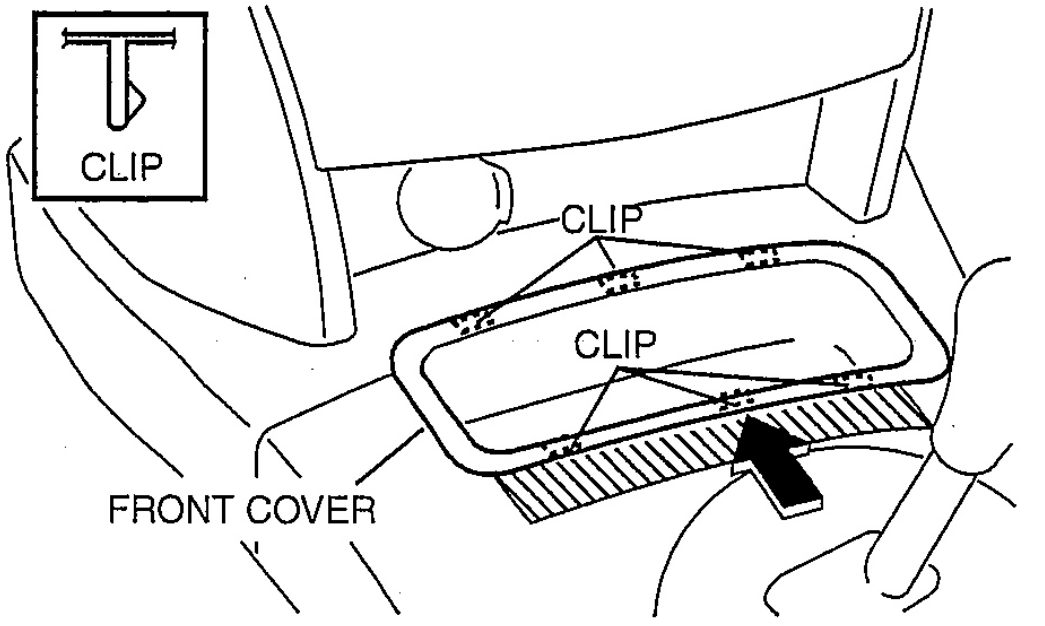


Fig. 19: Identifying Front Cover Clips & Protective Tape
Courtesy of MAZDA MOTORS CORP

2. Remove the front cover in the direction shown in the figure.

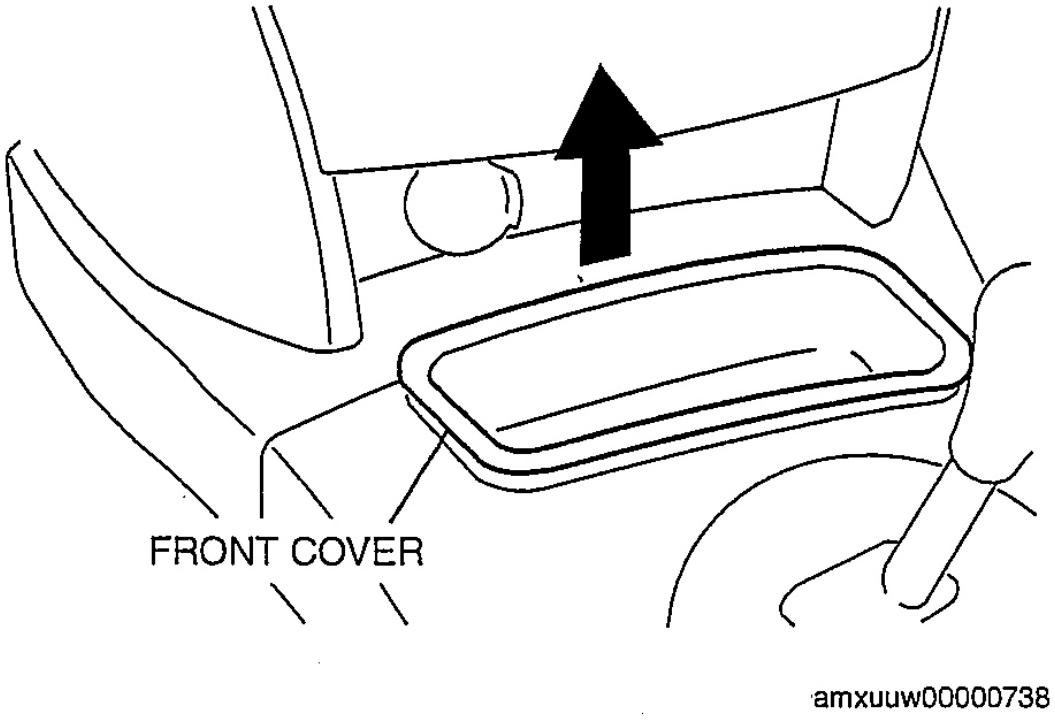
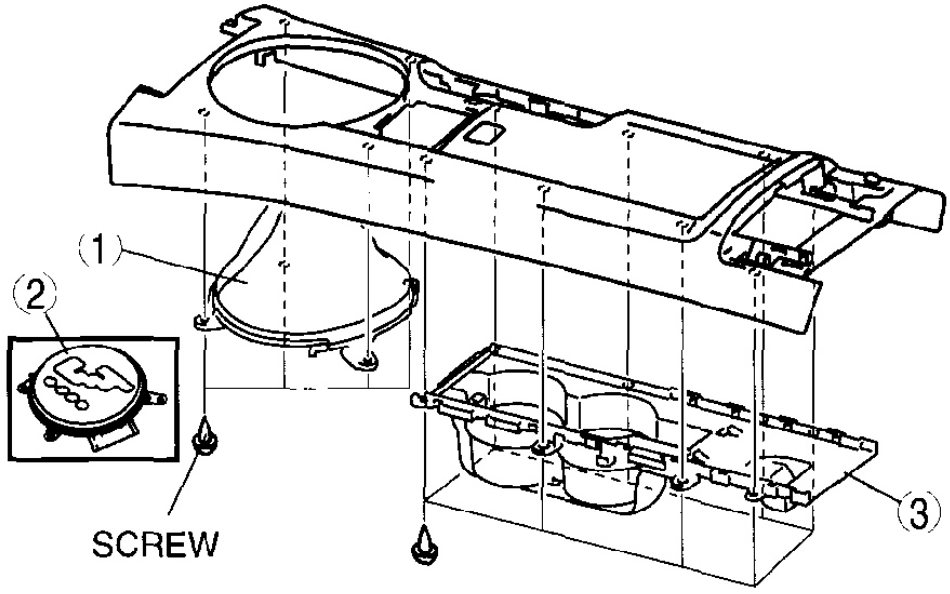


Fig. 20: Removing Front Cover
Courtesy of MAZDA MOTORS CORP

CONSOLE DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 21** .



E5U917ZW5016

1	Boot (MT)
2	Indicator compartment (AT)
3	Cop holder

Fig. 21: Disassembling/Assembling Console
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

CONSOLE PANEL REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
4. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
5. Remove the screws.
6. Pull the console panel outward and detach tabs A and pins B.
7. Disconnect the seat warmer switch connector. (Vehicles with seat warmer)

8. Disconnect the accessory socket connector.
9. Remove the console panel.
10. Install in the reverse order of removal.

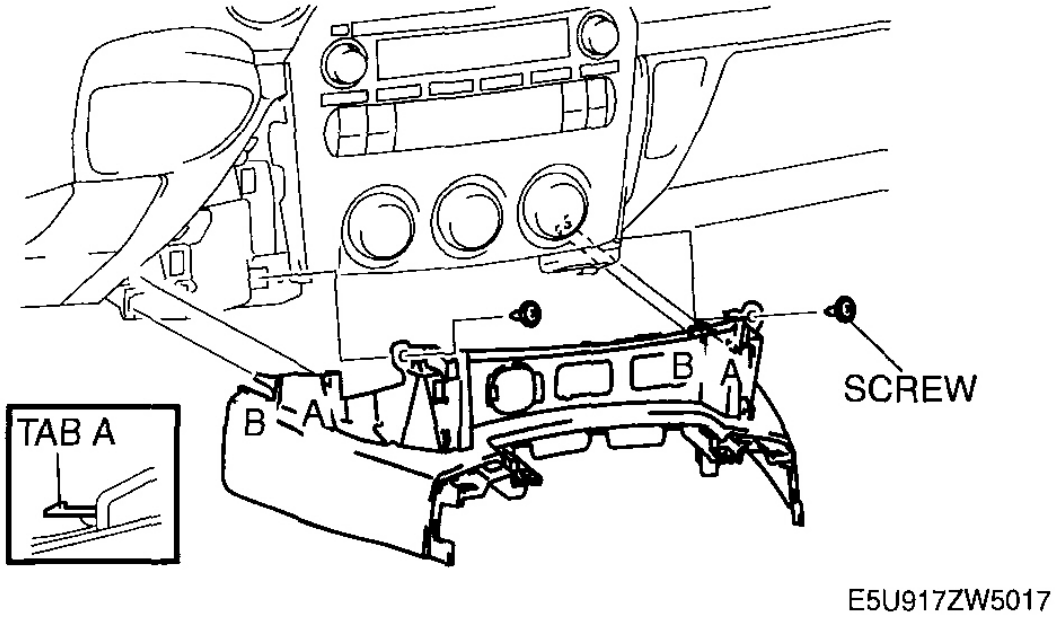


Fig. 22: Removing Console Panel
Courtesy of MAZDA MOTORS CORP.

A-PILLAR TRIM REMOVAL/INSTALLATION

1. Remove the female wedge. (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
2. Pull the A-pillar trim, then disengage clips A and B.
3. Pull the A-pillar trim upward, then disengage tabs C from the body.
4. Remove the A-pillar trim.
5. Install in the reverse order of removal.

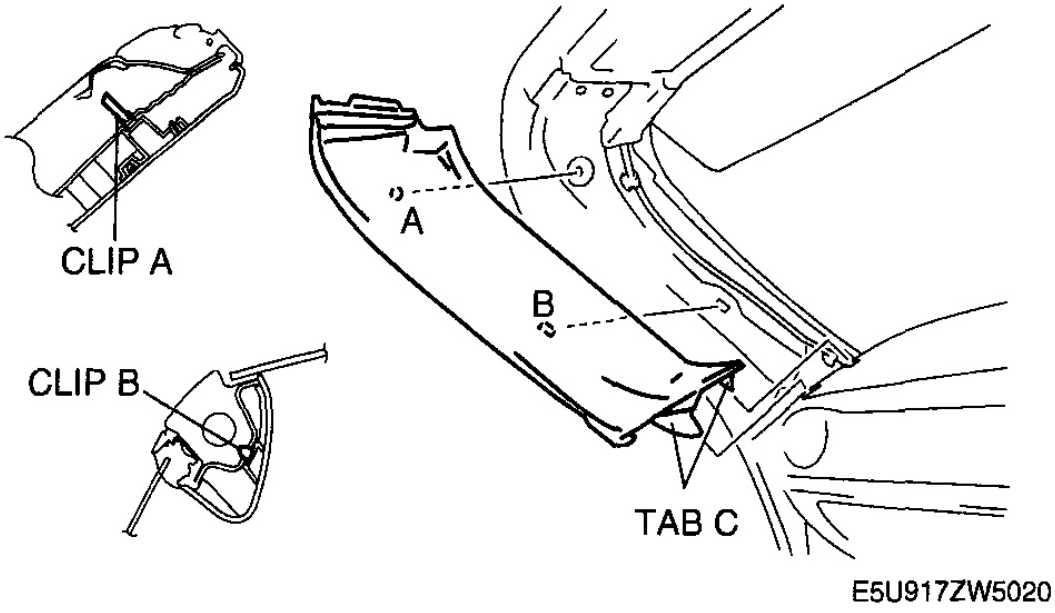


Fig. 23: Removing A-Pillar Trim
Courtesy of MAZDA MOTORS CORP.

FRONT HEADER TRIM REMOVAL/INSTALLATION

REMOVAL

CAUTION:
- **Do not twist or drop the front header trim, otherwise the vanity mirror could be damaged.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the female wedge. (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
4. Remove the map light. (See **MAP LIGHT REMOVAL/INSTALLATION** .)
5. Remove the A-pillar trim. (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
6. Remove the screws.
7. Pull the front header trim toward you, then disengage the clips A and pin B from the body.
8. Remove the front header trim.

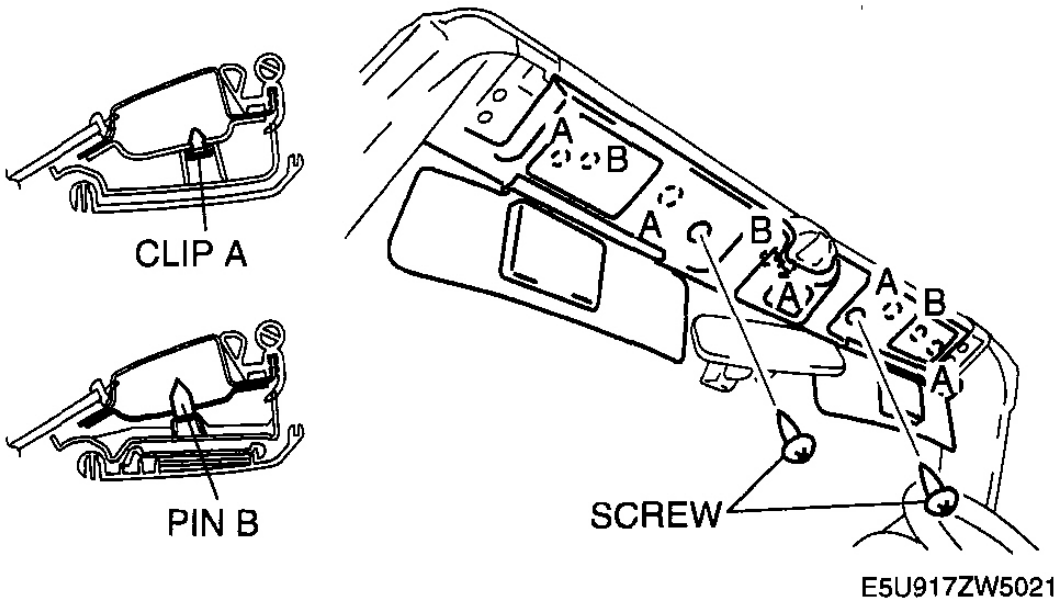


Fig. 24: Removing Front Header Trim
Courtesy of MAZDA MOTORS CORP.

INSTALLATION

CAUTION:

- **Do not twist or drop the front header trim, otherwise the vanity mirror could be damaged.**
- **If the front header trim is installed with the sunvisor pulled up, the vanity mirror could be damaged. Always install the front header trim with the sunvisor pulled down.**

1. Install the pin A and clip B.
2. Pull down the sunvisor on the right, then install pin C and clips D.
3. Pull down the sunvisor on the left, then install pin E and clips F.
4. Install the screw.
5. Install the A-pillar trim. (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
6. Install the map light. (See **MAP LIGHT REMOVAL/INSTALLATION** .)
7. Install the female wedge. (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)

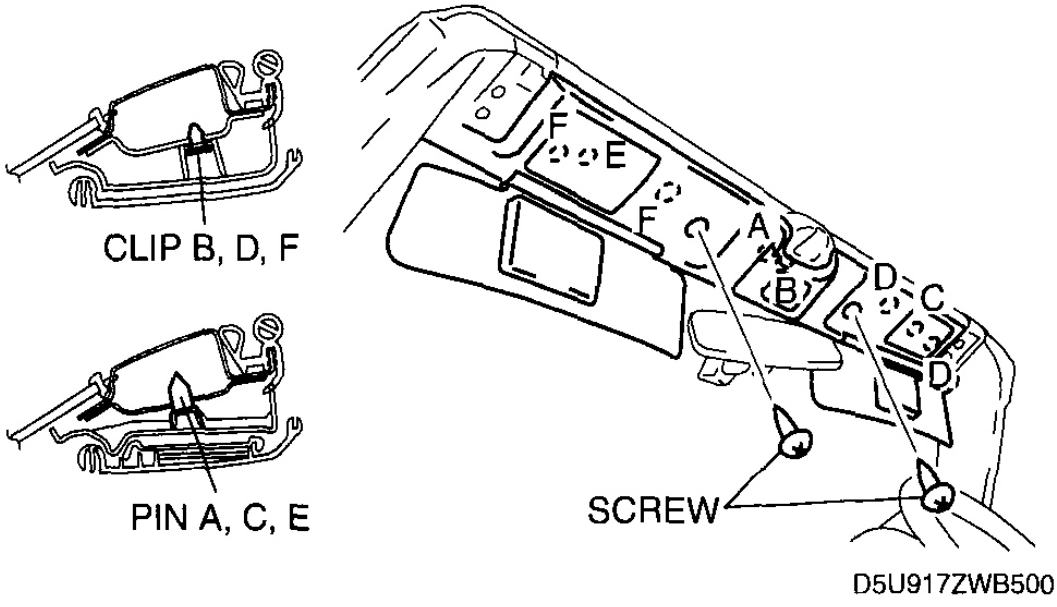


Fig. 25: Installing Front Header Trim
Courtesy of MAZDA MOTORS CORP.

8. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
9. Install the battery cover.

QUARTER TRIM REMOVAL/INSTALLATION

1. Remove the side striker (detachable bale hardtop).
2. Remove the fastener.
3. Remove the clips A.
4. Pull the quarter trim upward and detach clips B.
5. Remove the seat belt from the quarter trim through the slit in the quarter trim and remove the quarter trim.
6. Install in the reverse order of removal.

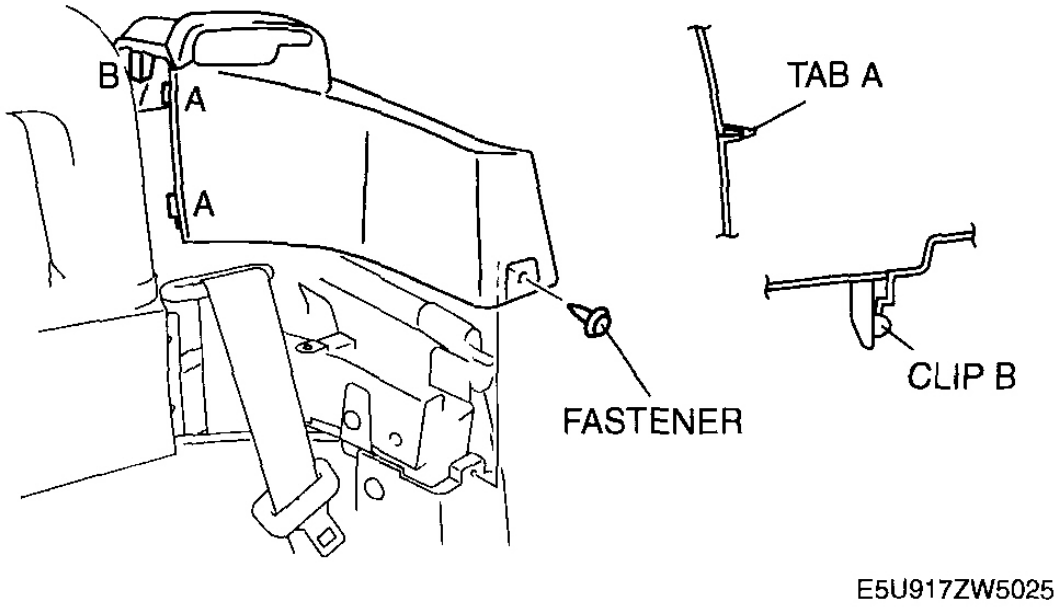


Fig. 26: Removing Quarter Trim
Courtesy of MAZDA MOTORS CORP.

DOOR TRIM REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the covers.
4. Remove the screws.
5. Detach clips A from the door trim using fastener remover.
6. Pull the door trim upward and detach tabs B from the door.
7. Disconnect the power outer mirror switch connector, (driver's side)

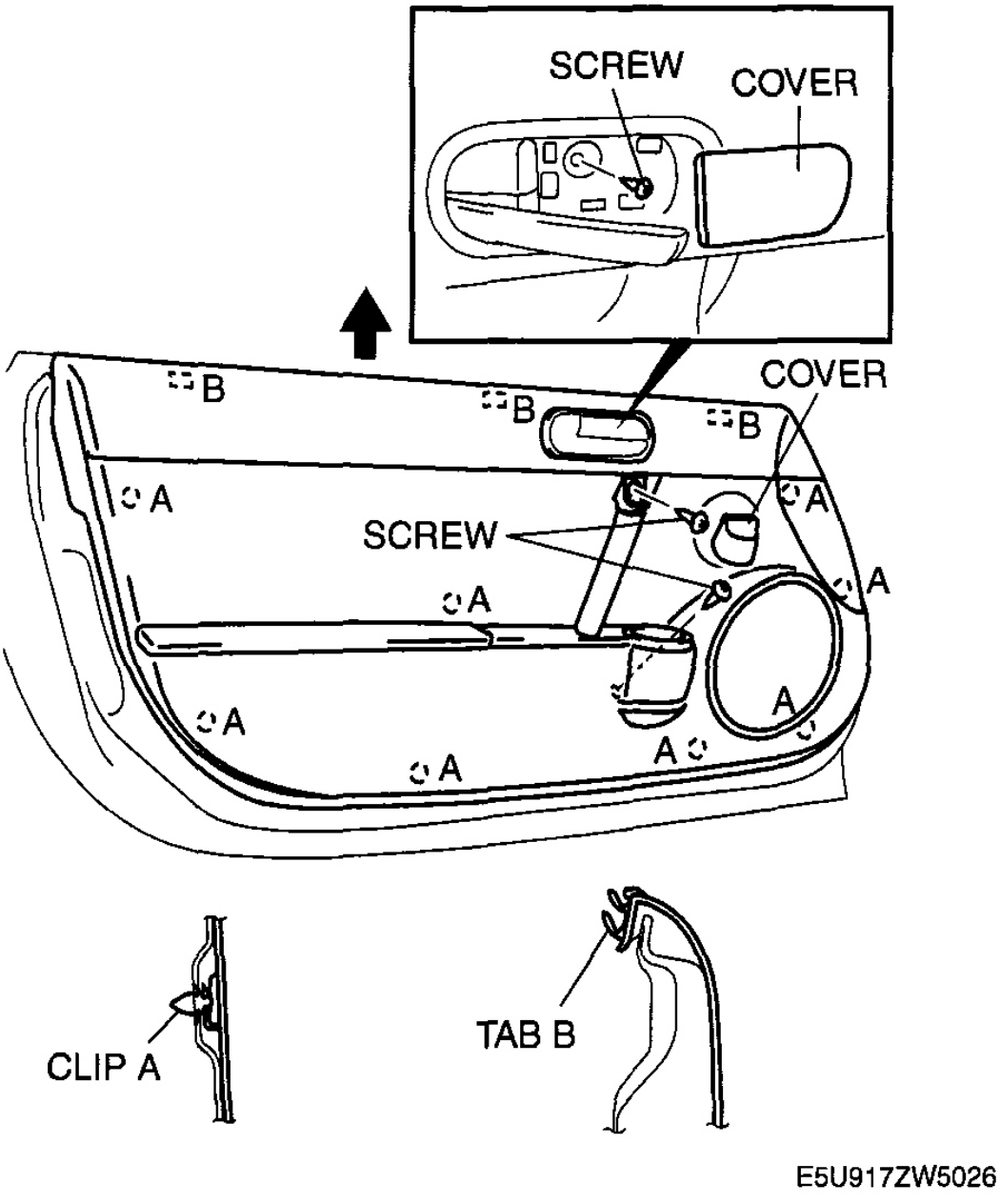


Fig. 27: Removing Door Trim
Courtesy of MAZDA MOTORS CORP.

8. Remove the inner handle cover.
9. Remove the door trim.
10. Install in the reverse order of removal.

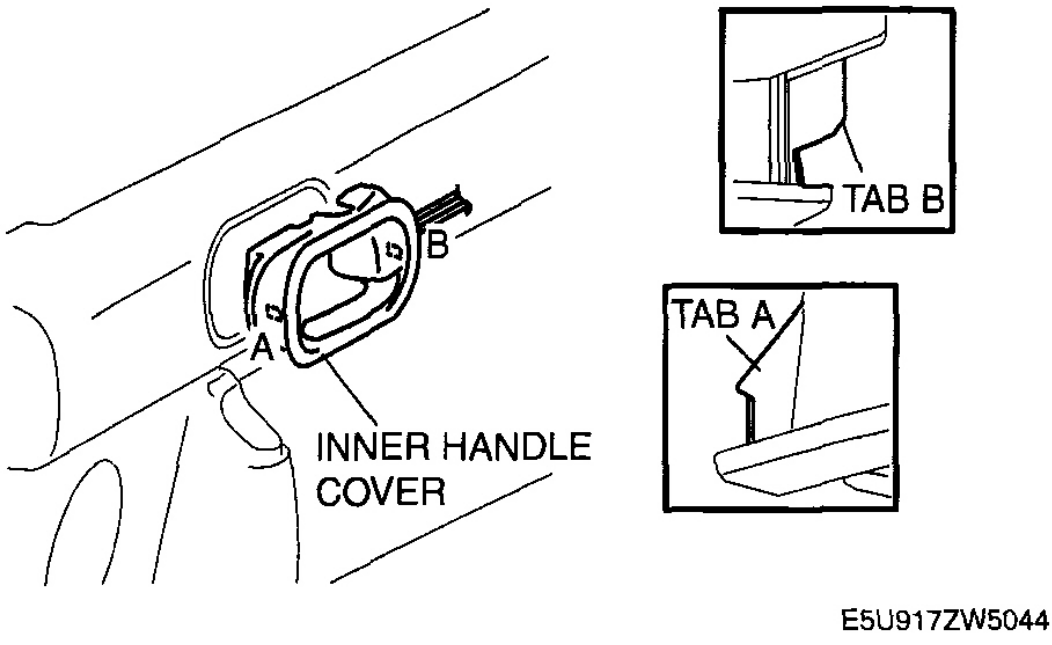
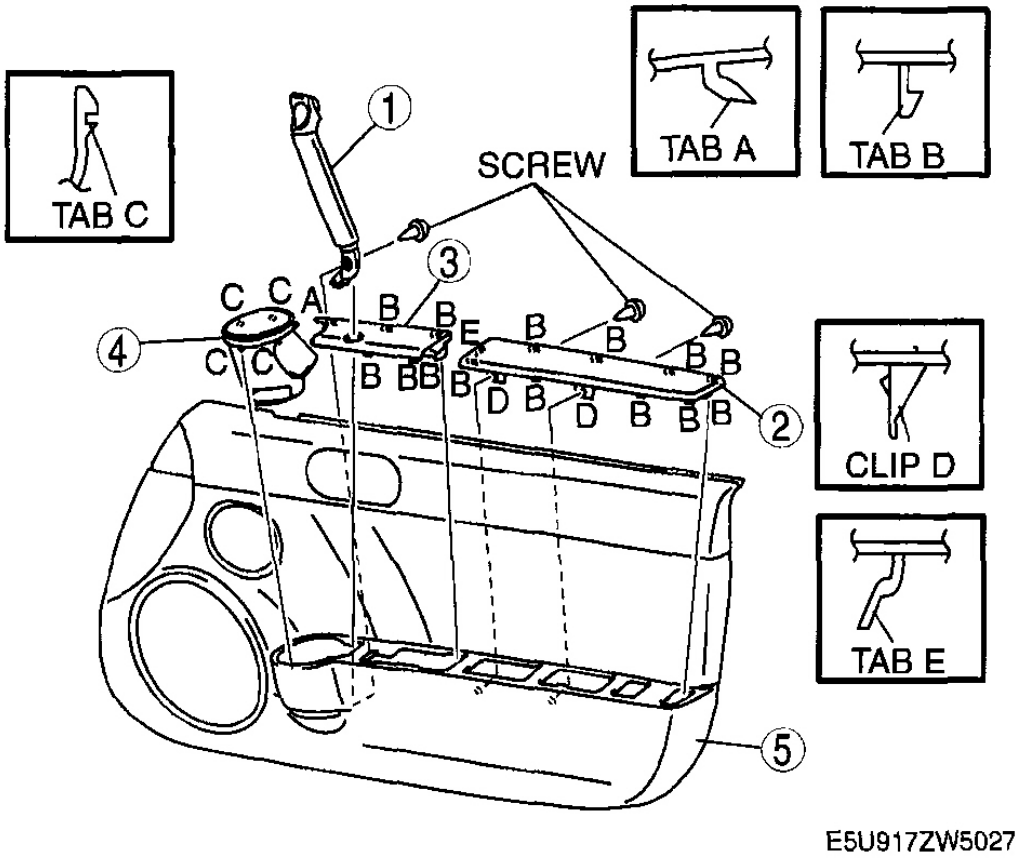


Fig. 28: Removing Inner Handle Cover
Courtesy of MAZDA MOTORS CORP.

DOOR TRIM DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 29** .



1	Handle pull
2	Armrest
3	Switch panel
4	Cup holder
5	Door trim

Fig. 29: Identifying Door Trim Components
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

AEROBOARD REMOVAL/INSTALLATION

1. Insert a tape-wrapped flathead screwdriver into the service hole.
2. Twist the flathead screwdriver as indicated by the arrow to remove the clips A and tab B.

3. Remove the aeroboard.
4. Install in the reverse order of removal.

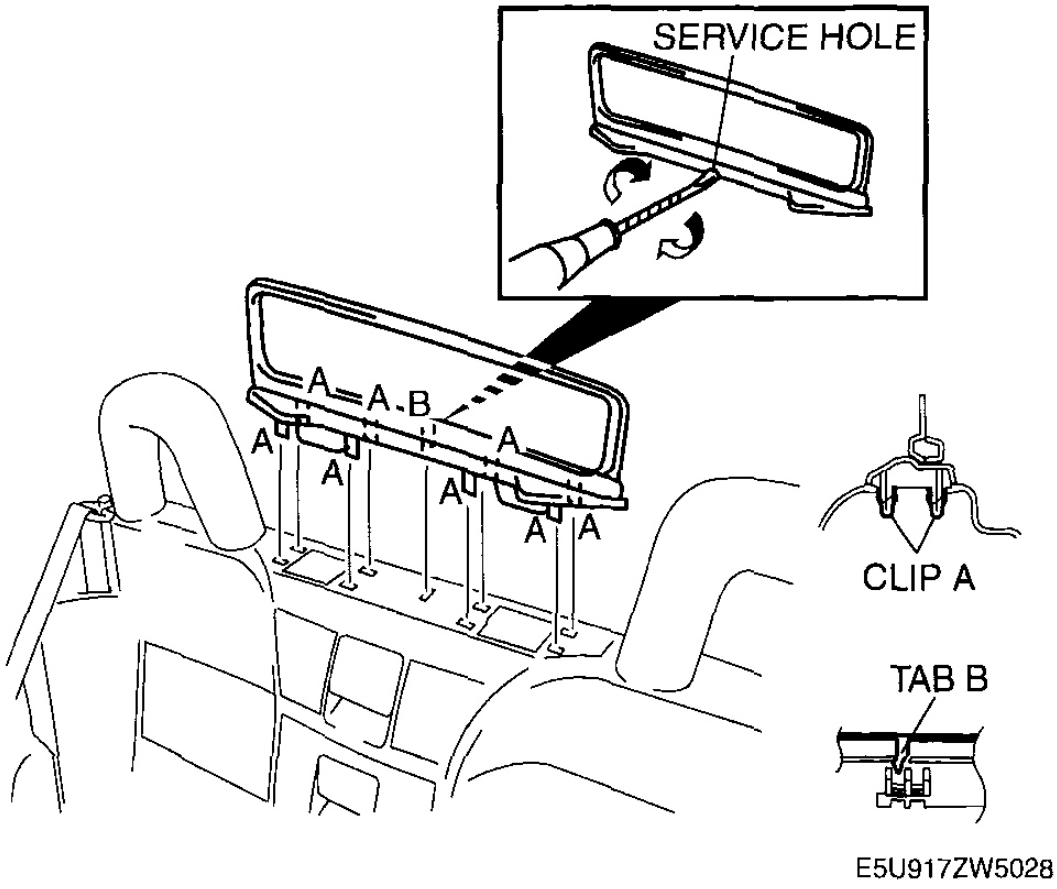


Fig. 30: Identifying Aeroboard
Courtesy of MAZDA MOTORS CORP.

SEAT BACK BAR LOWER GARNISH REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE HARDTOP

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)

6. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)

2. Remove the fasteners.
3. Slide the seat back bar lower garnish to the vehicle rear and detach clips A and pin B.
4. Remove the seat back bar lower garnish.
5. Install in the reverse order of removal.

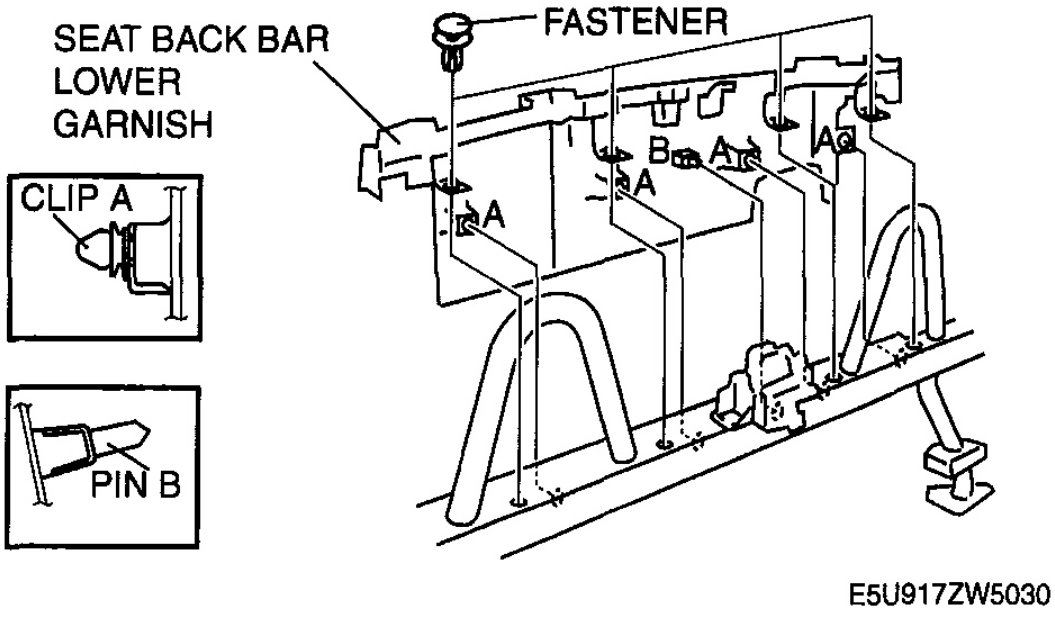


Fig. 31: Removing Seat Back Bar Lower Garnish
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP

1. Remove the following parts:
   a. Console (See **CONSOLE REMOVAL/INSTALLATION**.)
   b. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION**.)
   c. Scuff plate (**SCUFF PLATE REMOVAL/INSTALLATION**.)
   d. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION**.)
   e. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION**.)
   f. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION**.)
   g. Back trim (See **BACK TRIM REMOVAL/INSTALLATION**.)
   h. Roof hook. (See ROOF HOOK REMOVAL/INSTALLATION in EXTERIOR TRIM article

2. Remove the clip A.
3. Remove the roof stopper.

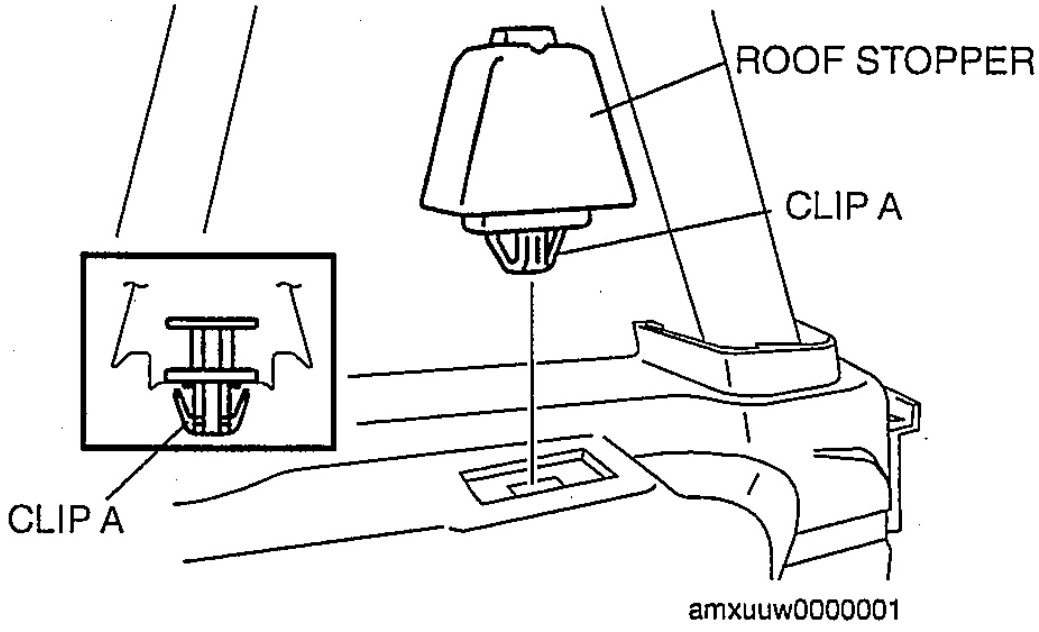


Fig. 32: Identifying Clip A Of Roof Stopper
Courtesy of MAZDA MOTORS CORP

4. Remove the fasteners.
5. Slide the seat back bar lower garnish to the vehicle rear and detach clips B and pin C.

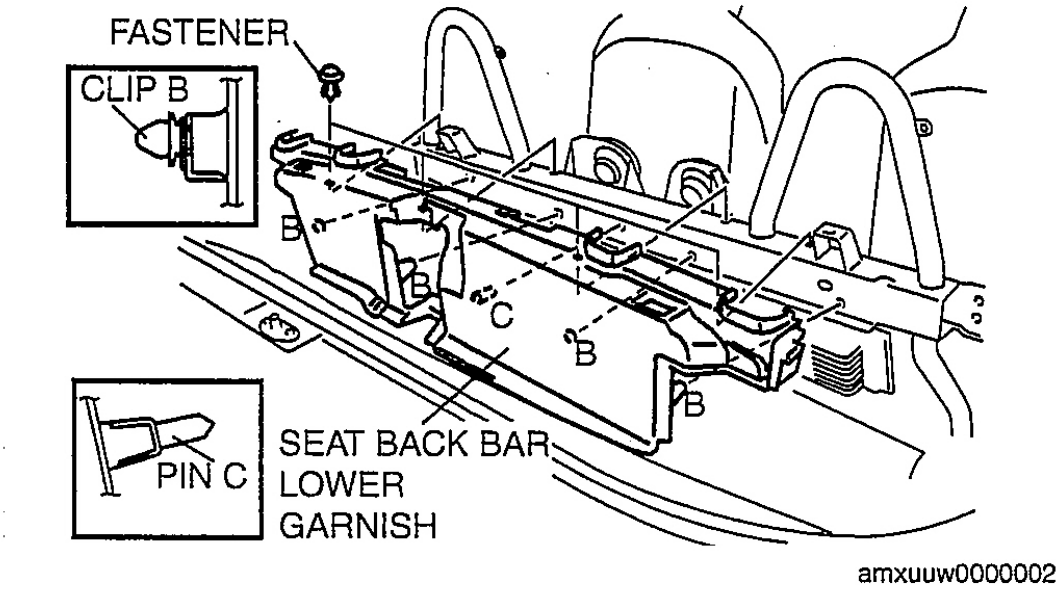


Fig. 33: Identifying Clips B & C Of Seat Back Bar Lower Garnish
Courtesy of MAZDA MOTORS CORP

6. Remove the seat back bar lower garnish.
7. Install in the reverse order of removal.

BACK TRIM REMOVAL/INSTALLATION

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
2. Pull the open hook lever outward and remove it while pinching the tabs as shown in **Fig. 34** .

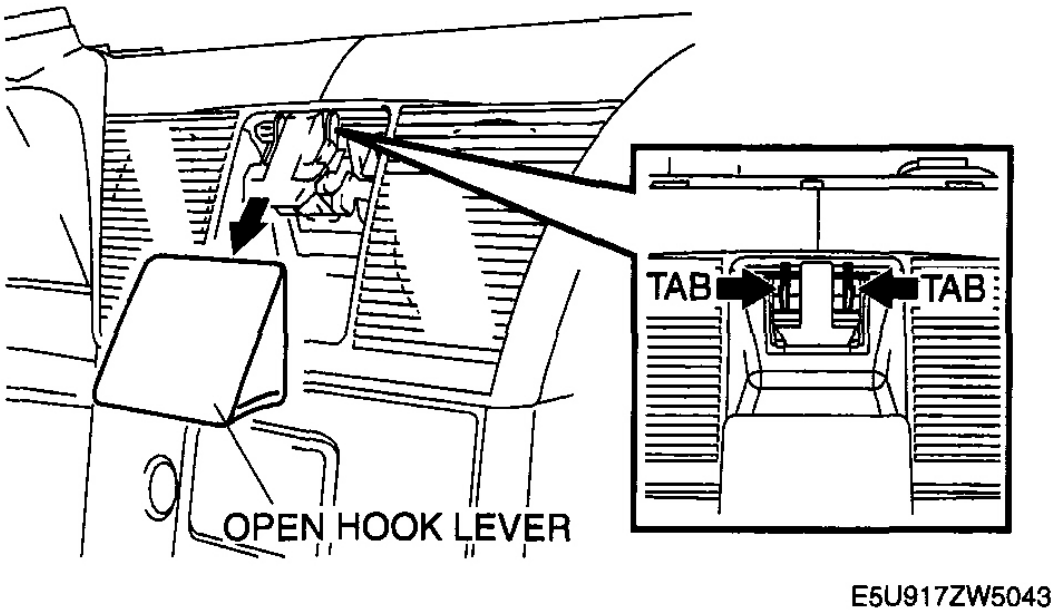


Fig. 34: Removing Rear Seat Back Bar Garnish
Courtesy of MAZDA MOTORS CORP.

3. Remove the fasteners.

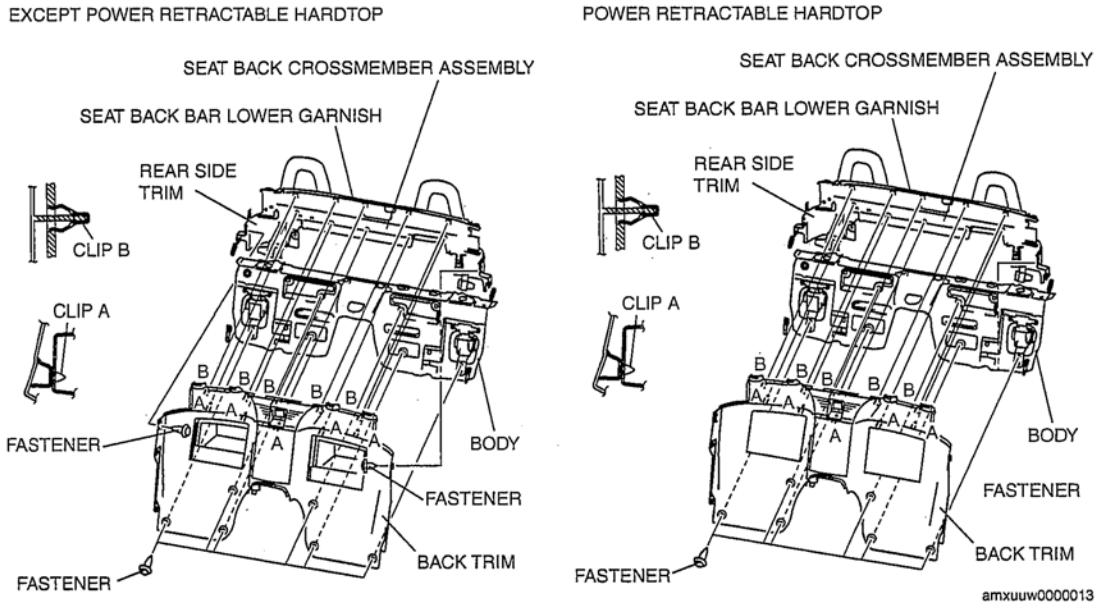


Fig. 35: Identifying Seat Back Trim

Courtesy of MAZDA MOTORS CORP.

4. Pull the back trim outward and detach clips A and B.
5. Remove the back trim.
6. Install in the reverse order of removal.

SEAT BACK BAR GARNISH REMOVAL/INSTALLATION

1. Pull the front seat back bar garnish outward and detach tabs A and pins B.
2. Remove the front seat back bar garnish.

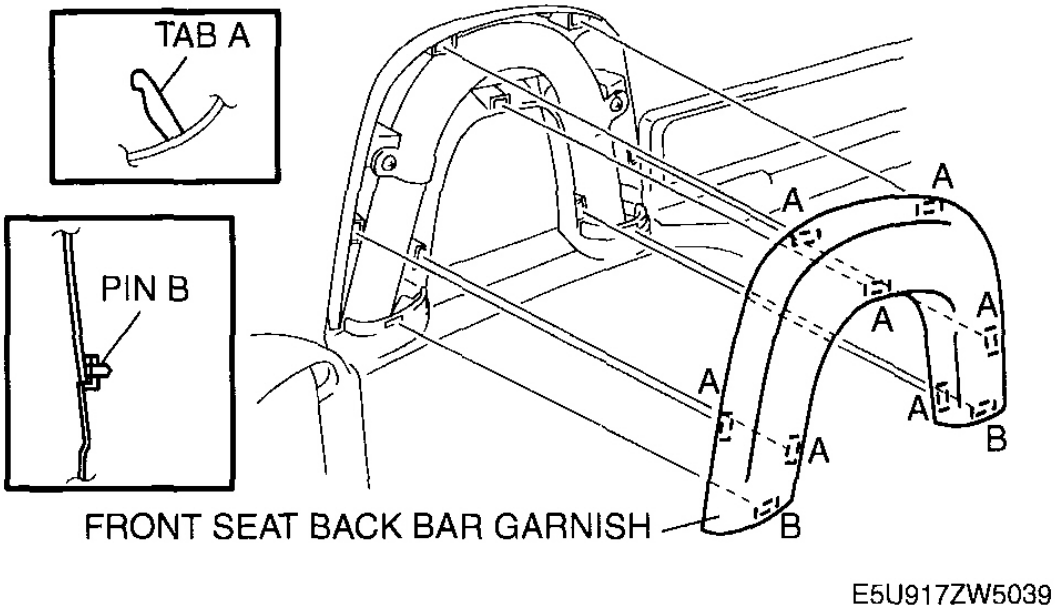


Fig. 36: Identifying Front Seat Back Bar Garnish
Courtesy of MAZDA MOTORS CORP.

3. Remove the screws.
4. Pull the rear seat back bar garnish upward and detach clips A.
5. Remove the rear seat back bar garnish.
6. Install in the reverse order of removal.

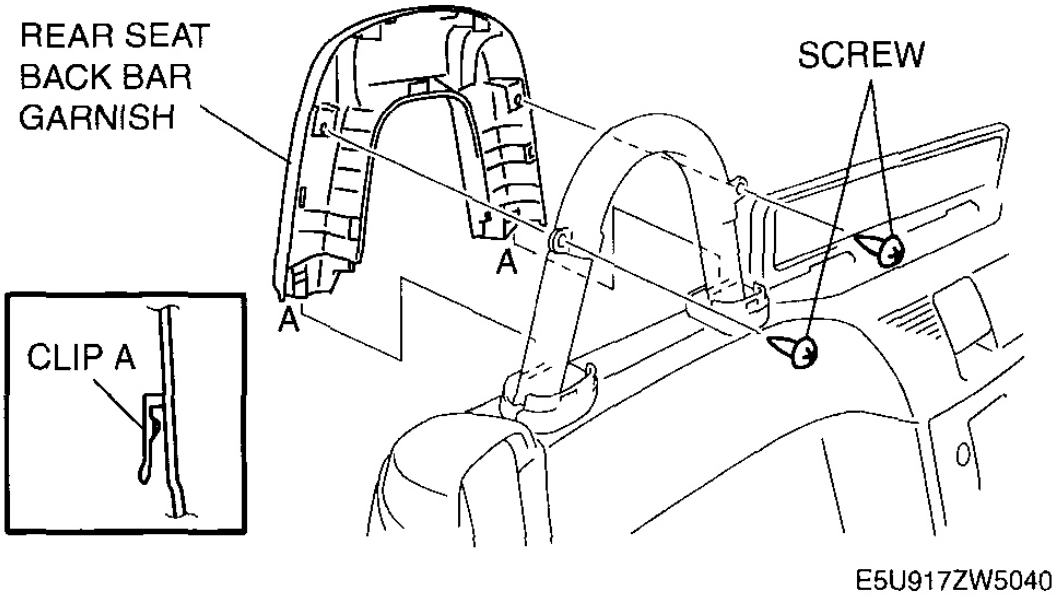


Fig. 37: Identifying Rear Seat Back Bar Garnish
Courtesy of MAZDA MOTORS CORP.

SIDE SHELF REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE HARDTOP

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Rear package trim (See **REAR PACKAGE TRIM REMOVAL/INSTALLATION** .)
2. Remove the fasteners.

3. Pull the side shelf outward and detach clip A.
4. Remove the side shelf.
5. Install in the reverse order of removal.

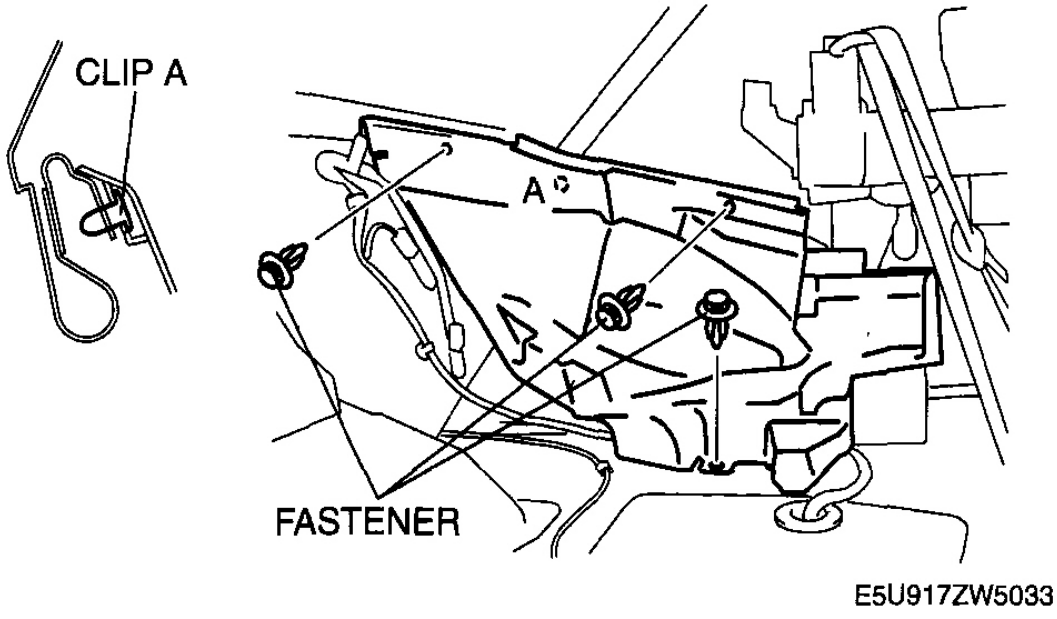


Fig. 38: Identifying Side Shelf
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP

1. Fully open the deck panel.
2. Remove the following parts:
   a. Console (See **CONSOLE REMOVAL/INSTALLATION**.)
   b. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION**.)
   c. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION**.)
   d. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION**.)
   e. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION**.)
   f. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION**.)
   g. Back trim (See **BACK TRIM REMOVAL/INSTALLATION**.)
   h. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION**.)
3. Remove the fasteners.
4. Pull the side shelf outward and detach clip A.

5. Remove the side shelf.
6. Install in the reverse order of removal.

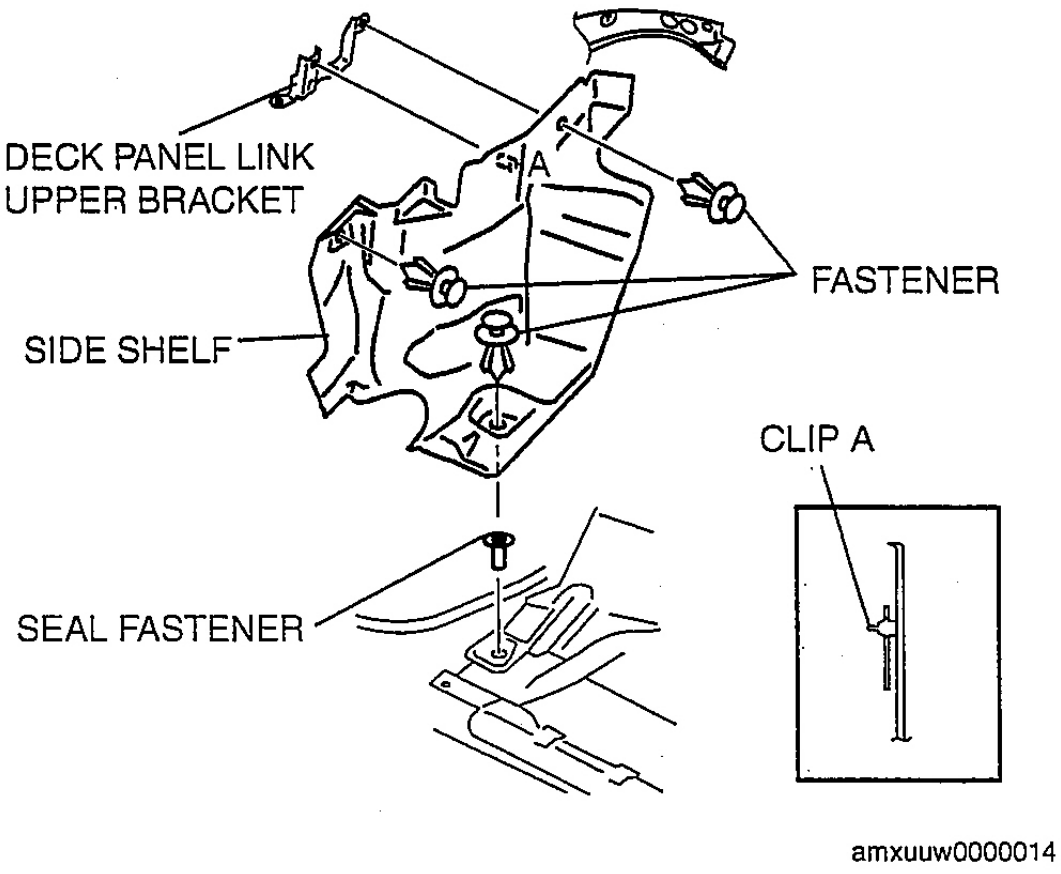


Fig. 39: Identifying Side Shelf & Fasteners
Courtesy of MAZDA MOTORS CORP.

B-PILLAR UPPER TRIM REMOVAL [DETACHABLE HARDTOP]

1. Remove the detachable hardtop.
2. Remove the B-pillar garnish.
3. Remove the side lock.
4. Disengage the B-pillar upper trim clips A using a fastener remover.
5. While cutting the double-sided adhesive tape using a screwdriver or a razor, separate the B-pillar upper trim from the body.

WARNING:

- **Using a razor with bare hands can cause injury. Always wear**

gloves when using a razor.

6. Remove the B-pillar upper trim.

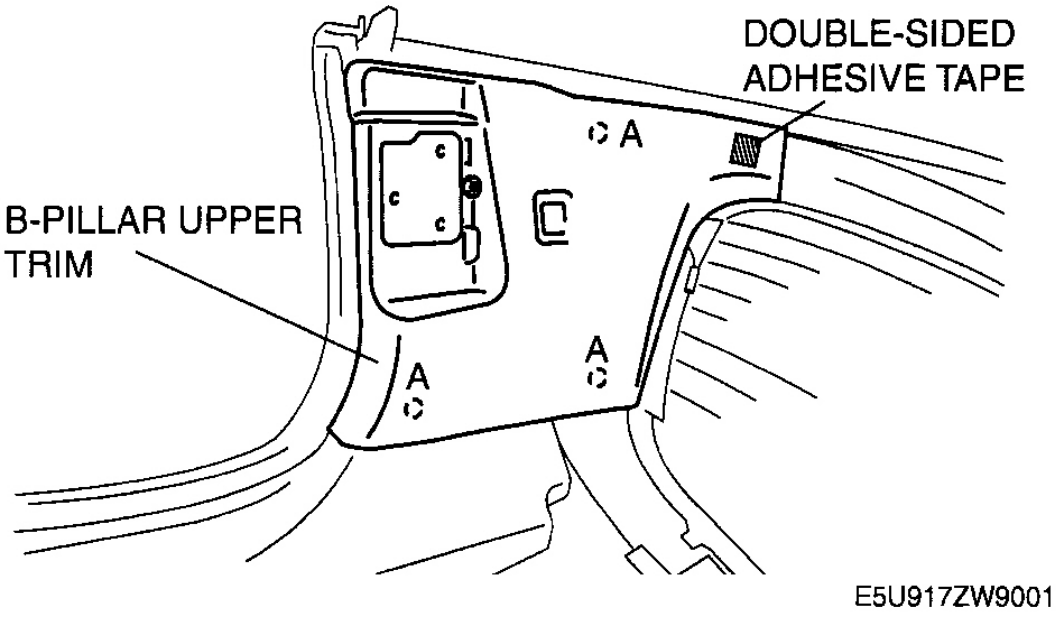


Fig. 40: Removing B-Pillar Upper Trim
Courtesy of MAZDA MOTORS CORP.

B-PILLAR UPPER TRIM INSTALLATION [DETACHABLE HARDTOP]

NOTE:

- **Double-sided adhesive tape has already been attached to the new rear door garnish.**

WARNING:

- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

1. When installing a new B-pillar upper trim, follow the procedure below:
    1. Remove the adhesive remaining on the body using razor.
    2. Remove any grease or dirt from the adhesion surface of the body.
2. When reusing the B-pillar upper trim, follow the procedure below:
    1. Remove the adhesive remaining on the B-pillar upper trim and the body using a razor.
    2. Remove any grease or dirt from the adhesion surface of the B-pillar upper trim and the body.
    3. Apply primer to the bonding area of the B-pillar upper trim.

4. Attach double-sided adhesive tape to the B-pillar upper trim as shown in **Fig. 41**.

NOTE:

- **Use 3M GT7108 double-sided adhesive tape or equivalent.**

3. Peel off the backing of the double-sided adhesive tape, then install the B-pillar upper trim to the detachable hardtop.

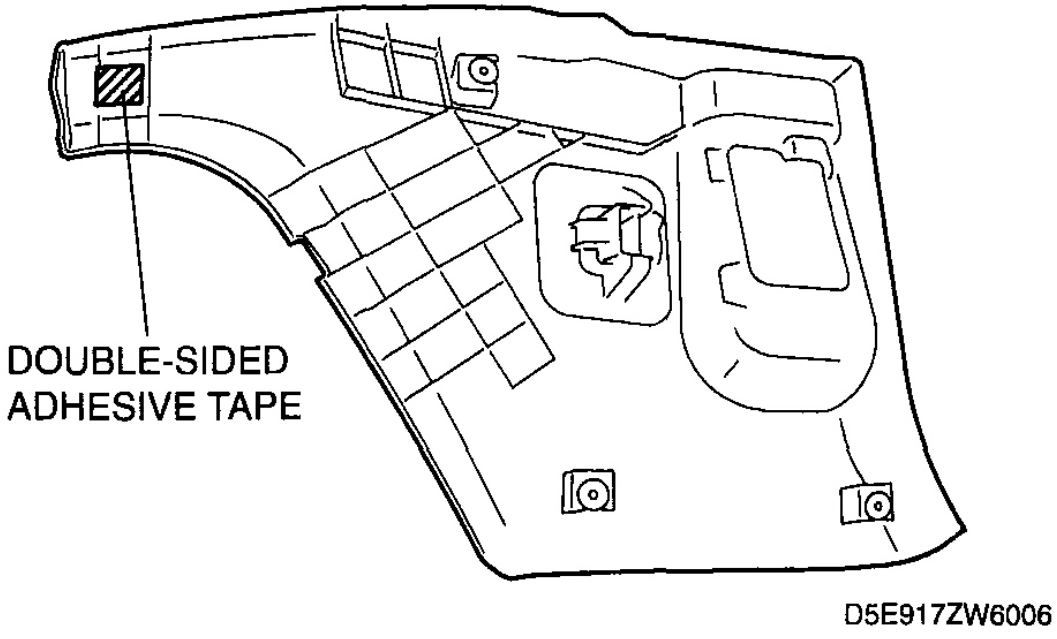


Fig. 41: Identifying Double-Sided Adhesive Tape To B-Pillar Upper Trim
Courtesy of MAZDA MOTORS CORP.

TIRE HOUSE TRIM REMOVAL/INSTALLATION

1. Remove the quarter trim. (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
2. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
3. Remove the fasteners.
4. Pull the tire house trim outward and detach clips A.
5. Remove the tire house trim.

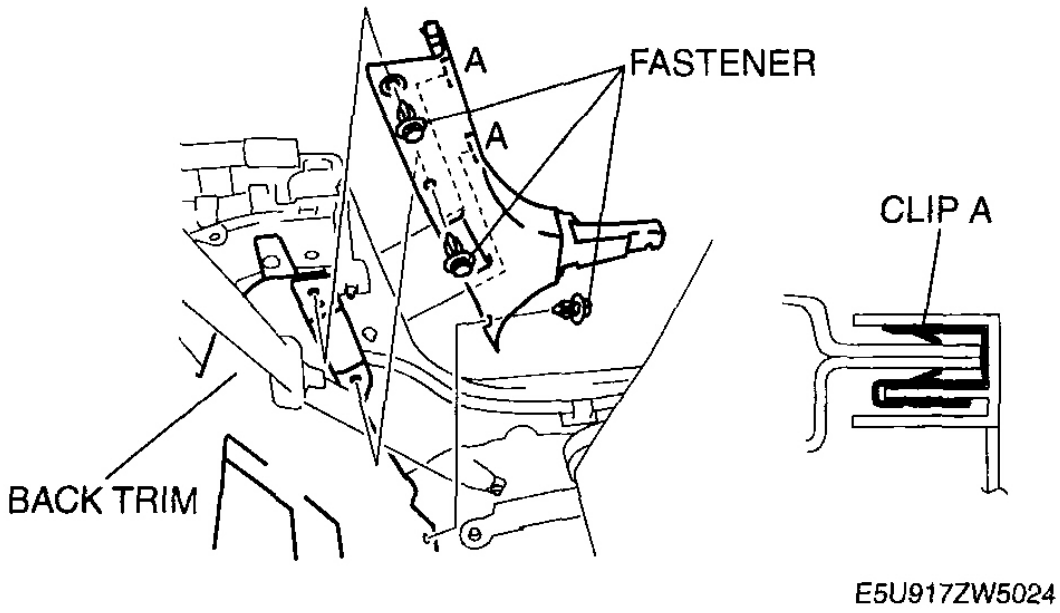


Fig. 42: Removing Tire House Trim
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

REAR PACKAGE TRIM REMOVAL/INSTALLATION

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
2. Remove the fasteners.
3. Remove the pins A and B.

4. Remove the rear package trim.
5. Install in the reverse order of removal.

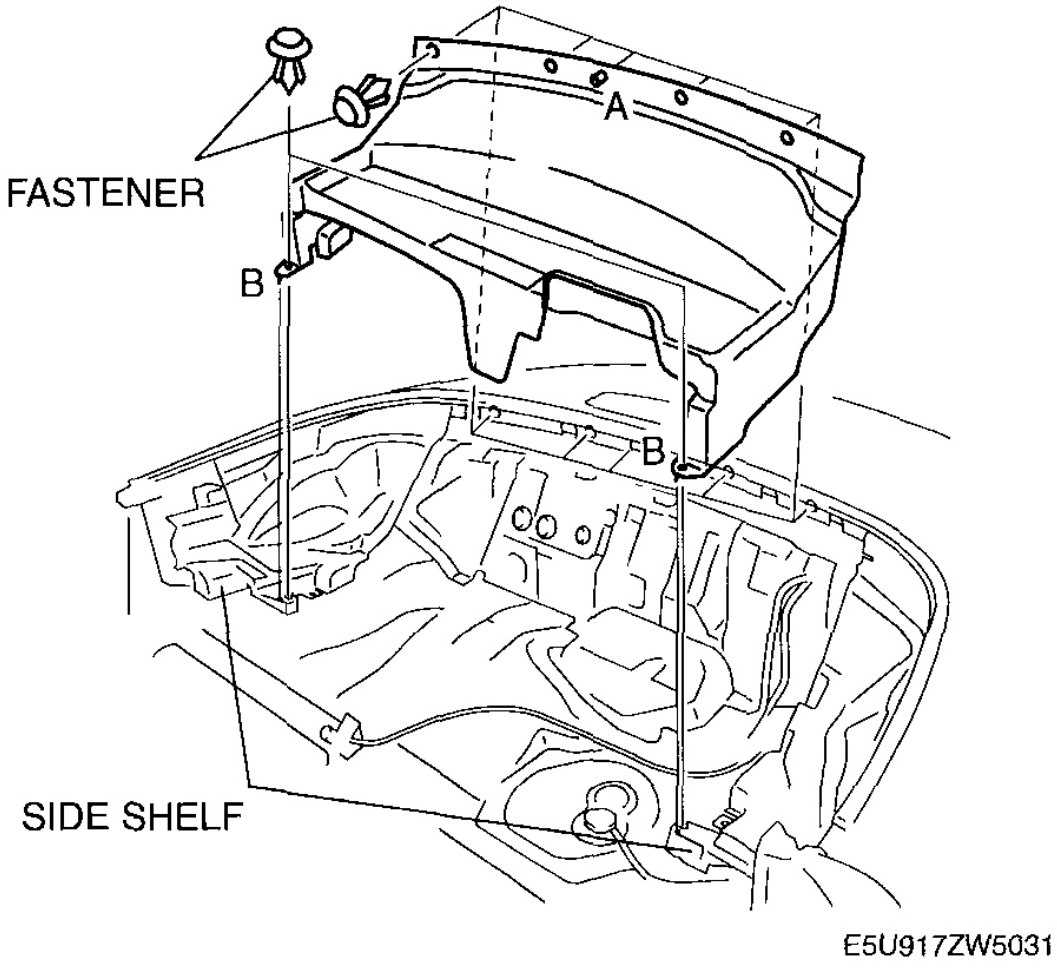


Fig. 43: Removing Rear Package Trim
Courtesy of MAZDA MOTORS CORP.

DECORATION PANEL REMOVAL/INSTALLATION

DRIVER'S SIDE

1. Pull the decoration panel outward and detach clips A.
2. Remove the decoration panel.
3. Install in the reverse order of removal.

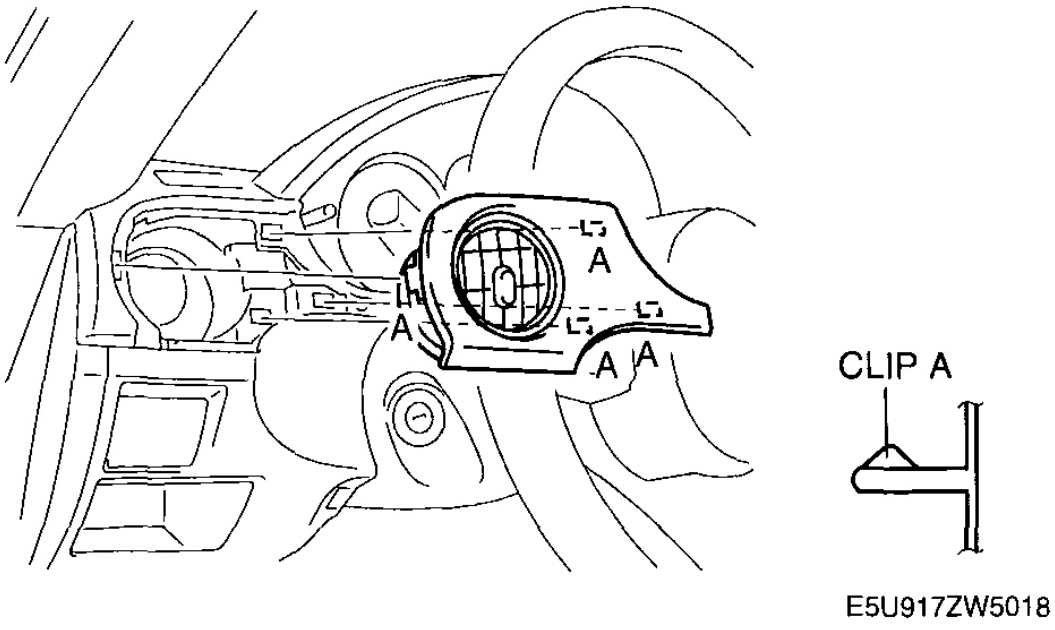


Fig. 44: Pulling Decoration Panel Outward & Detach Clips A (Driver'S Side)
Courtesy of MAZDA MOTORS CORP.

PASSENGER'S SIDE

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the center panel unit. (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
5. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
6. Remove the three screws.
7. Pull the decoration panel outward and detach clips A and B.
8. Remove the decoration panel.
9. Install in the reverse order of removal.

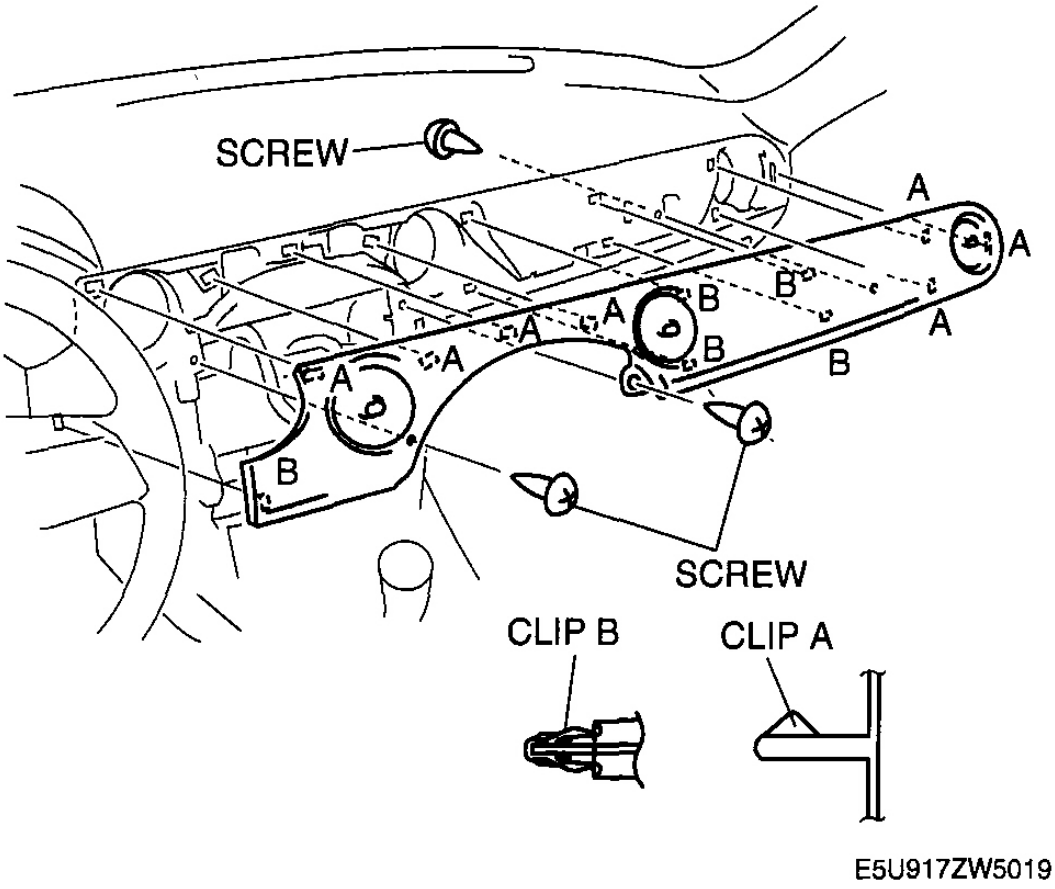


Fig. 45: Pulling Decoration Panel Outward (Passenger's Side)
Courtesy of MAZDA MOTORS CORP.

FRONT SIDE TRIM REMOVAL/INSTALLATION

1. Remove the scuff plate. (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
2. Remove the seaming welt.
3. Remove the fastener.
4. Pull the front side trim toward you, then disengage clip A and pin B from the body.
5. Remove the front side trim.
6. Install in the reverse order of removal.

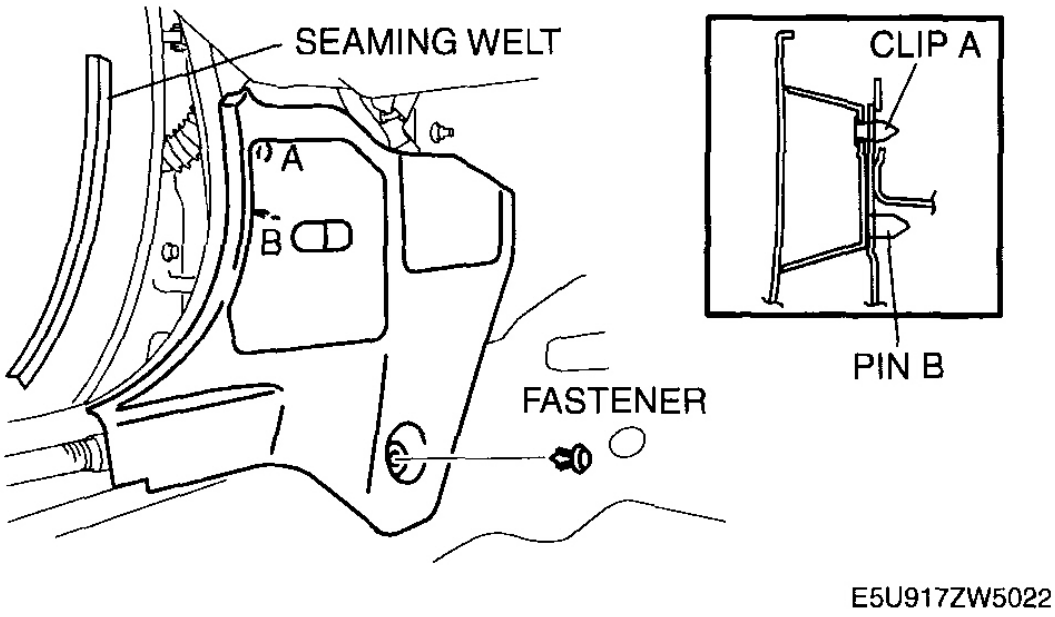


Fig. 46: Removing Front Side Trim
Courtesy of MAZDA MOTORS CORP.

SCUFF PLATE REMOVAL/INSTALLATION

1. Pull the scuff plate upward while detaching tabs C, and then detach clips A and D, and pins B (4), E (1) from the body, and remove the scuff plate.
2. Install in the reverse order of removal.

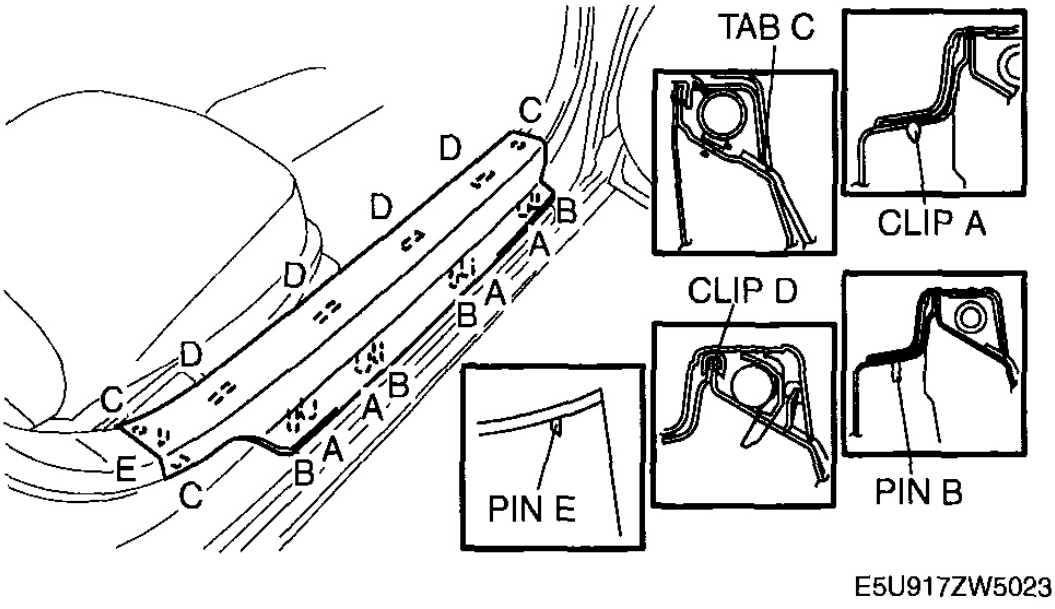


Fig. 47: Removing Scuff Plate
Courtesy of MAZDA MOTORS CORP.

REAR TRIM REMOVAL [DETACHABLE HARDTOP]

1. Remove the detachable hardtop.
2. Cut the double-sided adhesive tape using a flathead screwdriver or razor.

WARNING:

- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

3. Remove the rear trim.

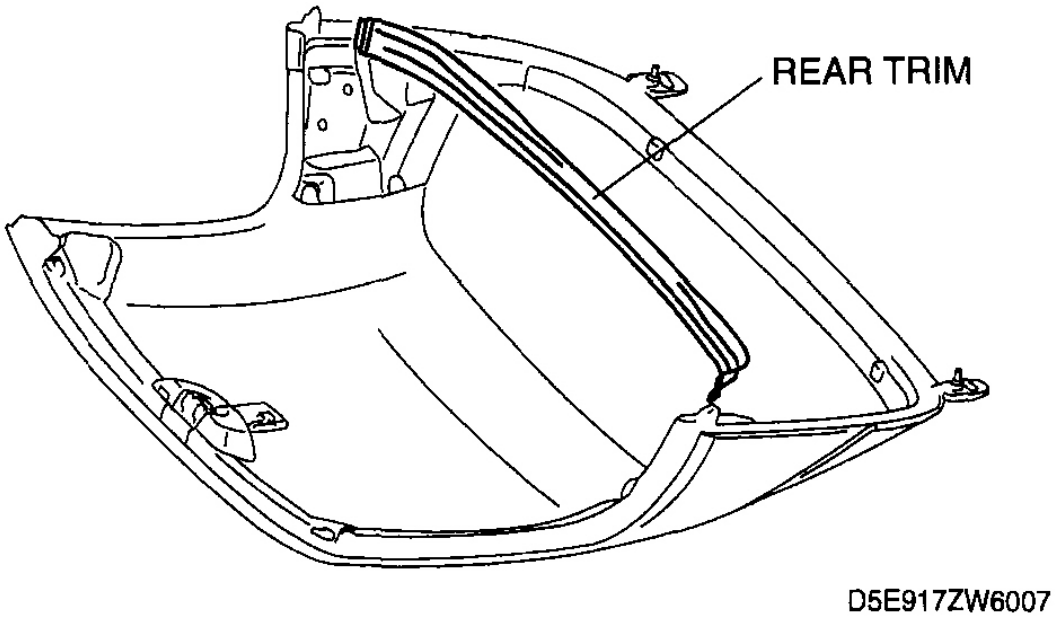


Fig. 48: Identifying Rear Trim
Courtesy of MAZDA MOTORS CORP.

REAR TRIM INSTALLATION [DETACHABLE HARDTOP]

NOTE:
- **Double-sided adhesive tape has already been attached to the new rear trim.**

1. When installing a new rear trim, follow the procedure below:
    1. Remove the double-sided tape from the detachable hardtop.
    2. Remove any grease or dirt from the adhesion surface of the detachable hardtop.
2. When reusing the rear trim, follow the procedure below:
    1. Remove the double-sided adhesive tape from the rear trim and detachable hardtop.
    2. Remove any grease or dirt from the adhesion surface of the rear trim and the detachable hardtop.
    3. Attach double-sided adhesive tape to the rear trim as shown in **Fig. 49**.

NOTE:
- **Use 3M GT7108 double-sided adhesive tape or equivalent.**

3. Peel off the ends of the double-sided adhesive tape and attach the rear trim to the detachable hardtop.
4. Peel off the tape backings from double-sided adhesive tape and attach it.

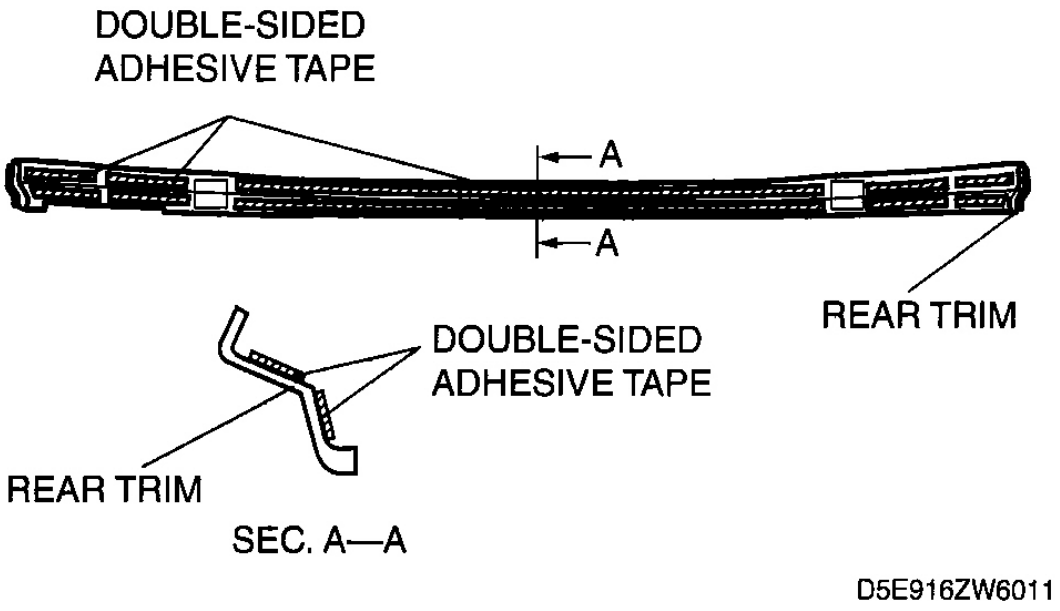


Fig. 49: Attaching Double-Sided Adhesive Tape To Rear Trim
Courtesy of MAZDA MOTORS CORP.

REAR SIDE TRIM REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE HARDTOP

1. Remove the following parts:
    1. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt set plate (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Seat back crossmember assembly (See **SEAT BACK CROSSMEMBER ASSEMBLY REMOVAL/INSTALLATION** .)
2. Remove the fasteners.
3. Pull the rear side trim outward and detach pins A, B and tab C.
4. Remove the rear side trim.

5. Install in the reverse order of removal.

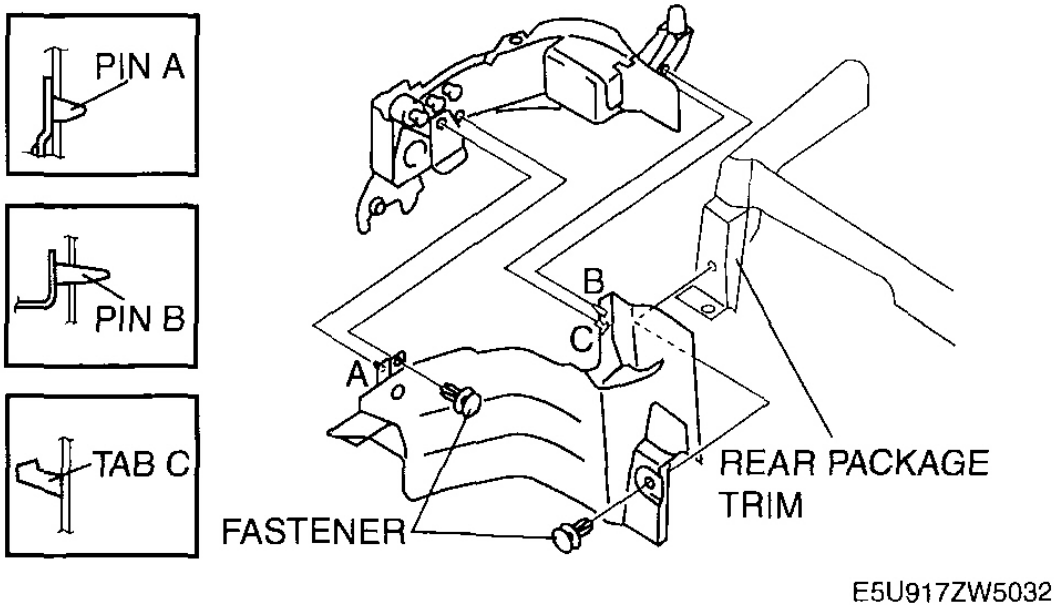


Fig. 50: Removing Rear Side Trim
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP

1. Remove the following parts:
   a. Console (See **CONSOLE REMOVAL/INSTALLATION**.)
   b. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION**.)
   c. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION**.)
   d. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION**.)
   e. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION**.)
   f. Seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION**.)
   g. Back trim (See **BACK TRIM REMOVAL/INSTALLATION**.)
2. Disconnect the power retractable hardtop drain hose. (See POWER RETRACTABLE HARDTOP DRAIN HOSE REMOVAL/INSTALLATION in EXTERIOR TRIM article.)
3. Remove the fasteners.
4. Remove the clip A and pin.
5. Remove the rear side trim.
6. Install in the reverse order of removal.

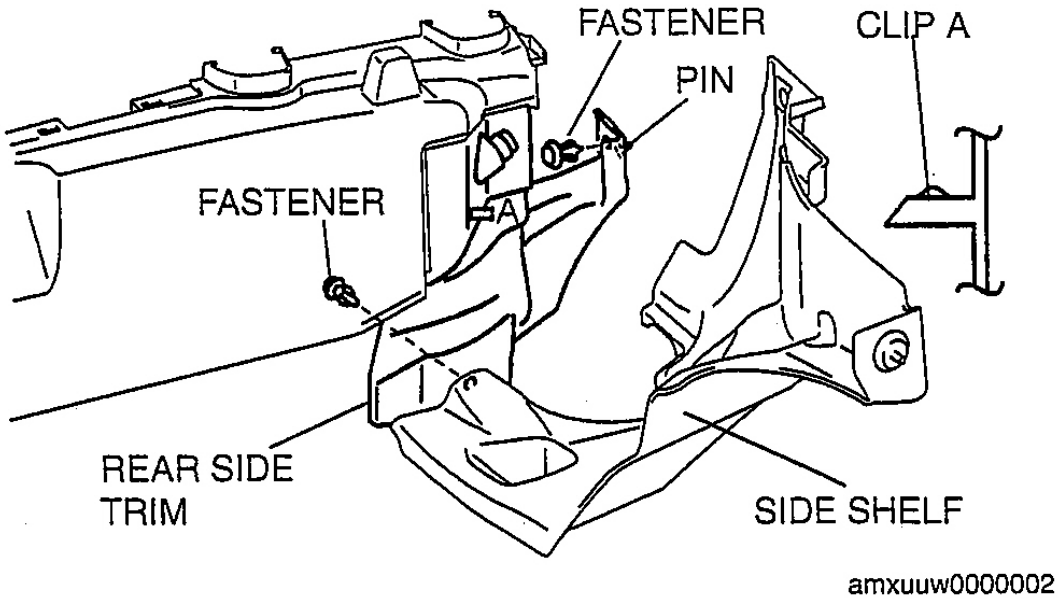


Fig. 51: Identifying Rear Side Trim & Fasteners
Courtesy of MAZDA MOTORS CORP.

TRUNK SIDE TRIM REMOVAL/INSTALLATION

1. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
2. Remove the partition board. (See **PARTITION BOARD REMOVAL/INSTALLATION** .)
3. Remove the fasteners.
4. Remove the trunk side trim.
5. Install in the reverse order of removal.

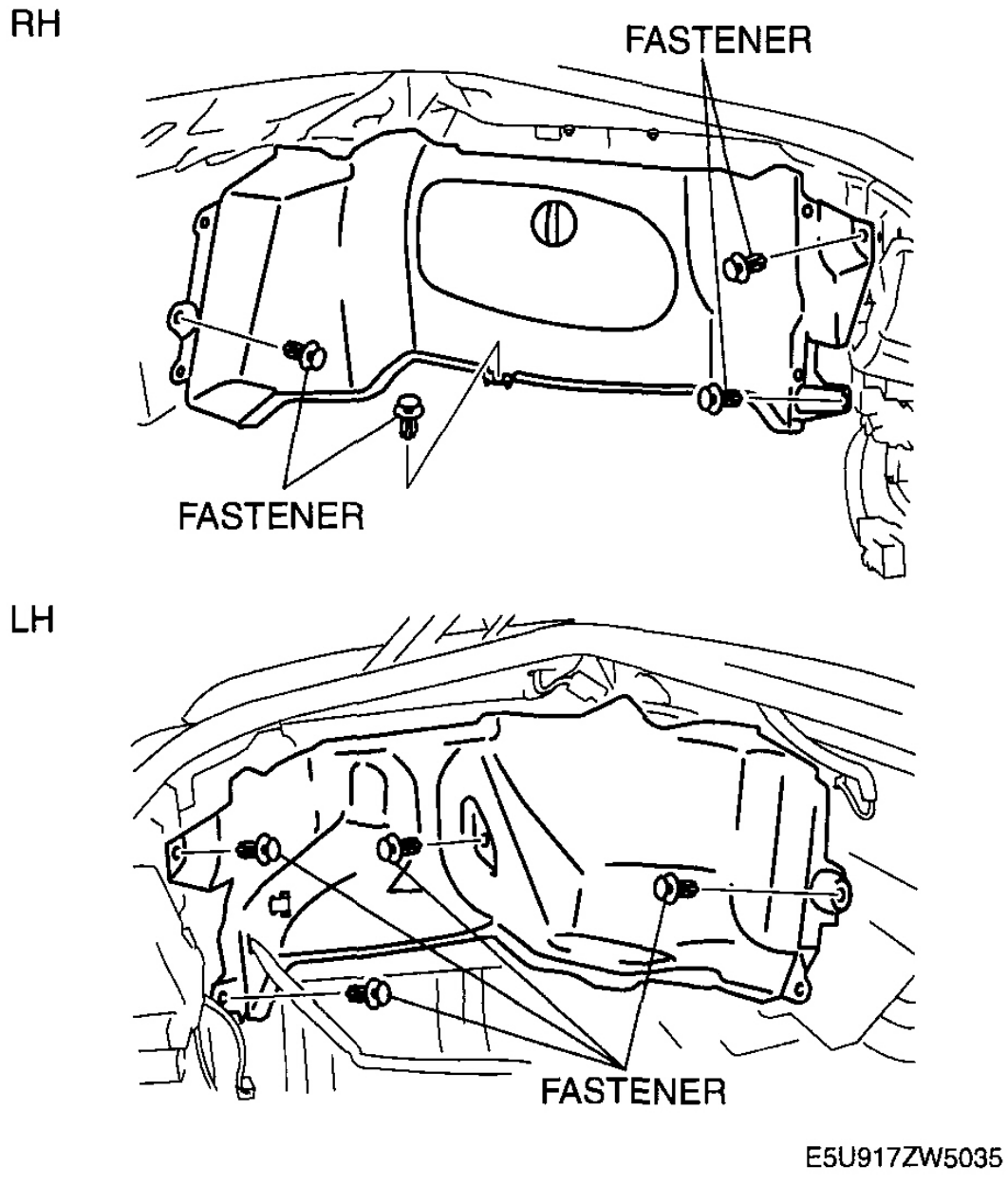


Fig. 52: Identifying Trunk Side Trim
Courtesy of MAZDA MOTORS CORP.

PARTITION BOARD REMOVAL/INSTALLATION

1. Remove the fasteners.
2. Remove the partition board.

3. Install in the reverse order of removal.

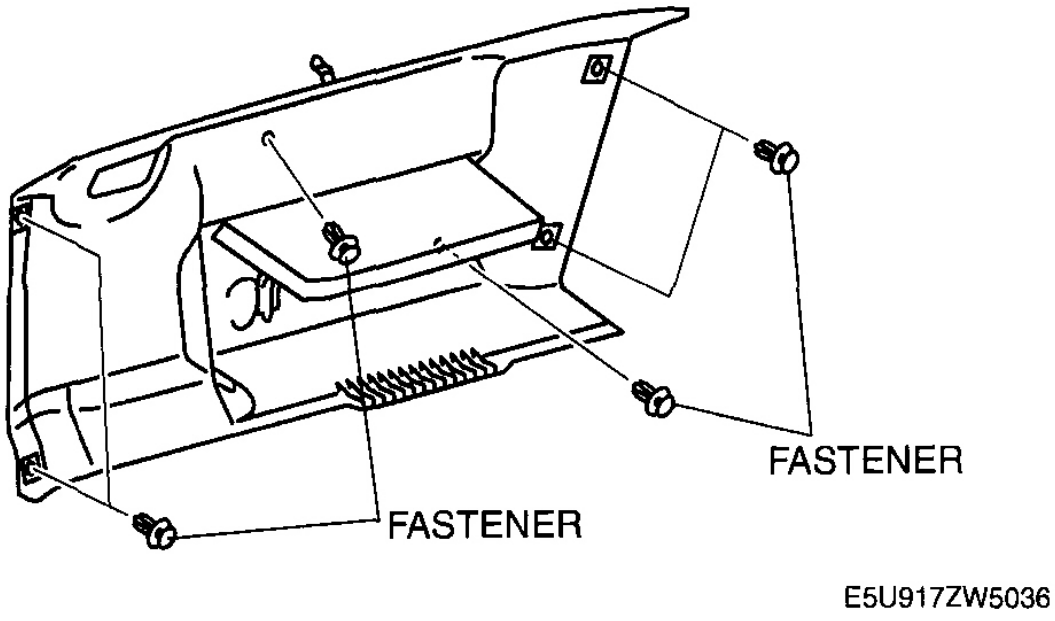


Fig. 53: Identifying Partition Board
Courtesy of MAZDA MOTORS CORP.

TRUNK END TRIM REMOVAL/INSTALLATION

1. Remove the fasteners.
2. Disconnect the trunk compartment light connector.
3. Disconnect the trunk rid cancel switch connector.
4. Remove the trunk end trim.
5. Install in the reverse order of removal.

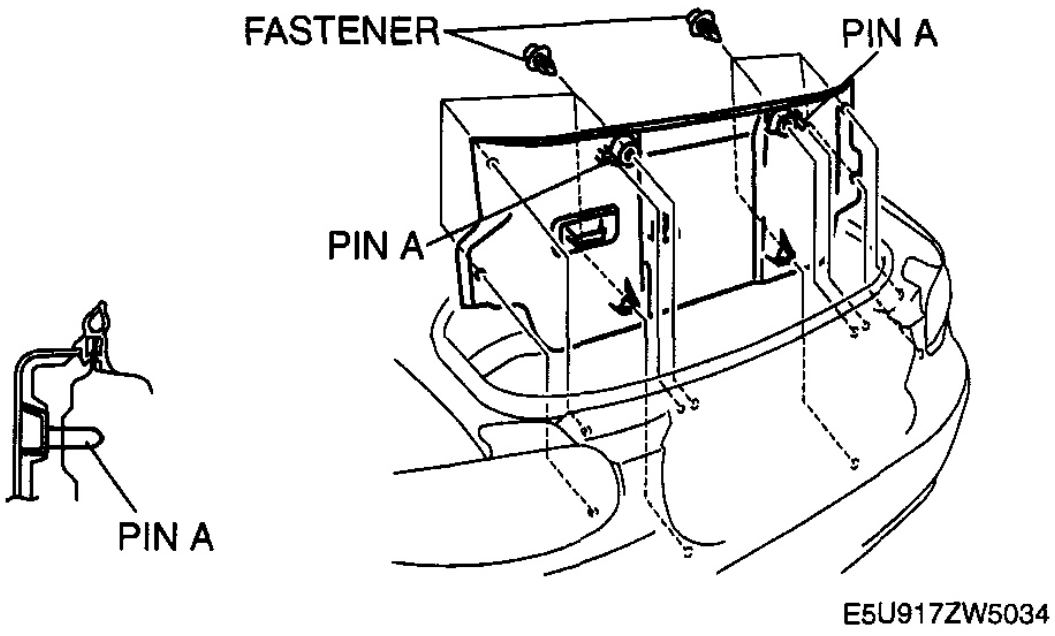


Fig. 54: Identifying Trunk End Trim
Courtesy of MAZDA MOTORS CORP.

TRUNK MAT REMOVAL/INSTALLATION

1. Remove the fasteners.
2. Remove the trunk mat.
3. Remove the seal fasteners.
4. Install in the reverse order of removal.

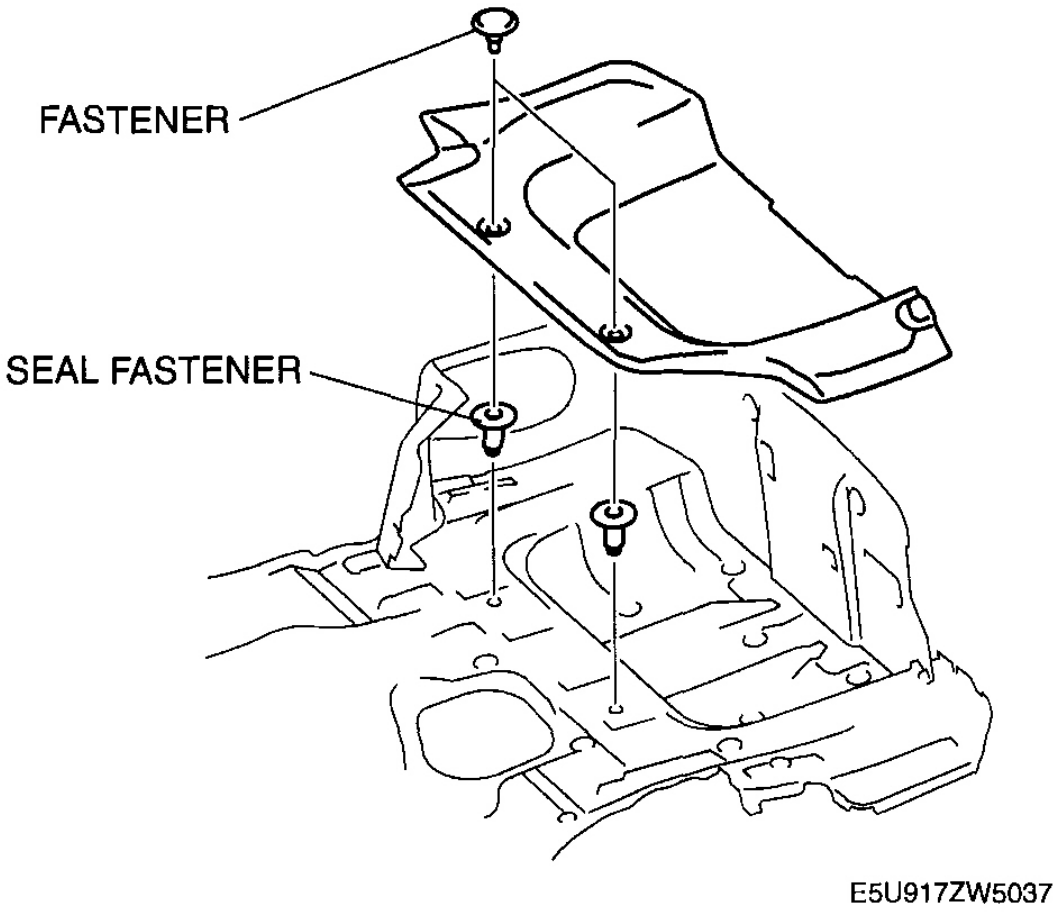


Fig. 55: Identifying Trunk Mat
Courtesy of MAZDA MOTORS CORP.

SHOCK ABSORBING PAD REMOVAL/INSTALLATION [DETACHABLE HARDTOP]

1. Remove the detachable hardtop.
2. Remove the following parts:
    1. B-pillar garnish
    2. Side lock
    3. B-pillar upper trim (See **B-PILLAR UPPER TRIM REMOVAL [DETACHABLE HARDTOP]** , **B-PILLAR UPPER TRIM INSTALLATION [DETACHABLE HARDTOP]** .)
    4. Male wedge cover
    5. Top lock cover
    6. Headliner (See **HEADLINER REMOVAL/INSTALLATION [DETACHABLE HARDTOP]** .)

3. Pull the shock absorbing pad rearward and detach clips A.
4. Remove the shock-absorbing pad.
5. Install in the reverse order of removal.

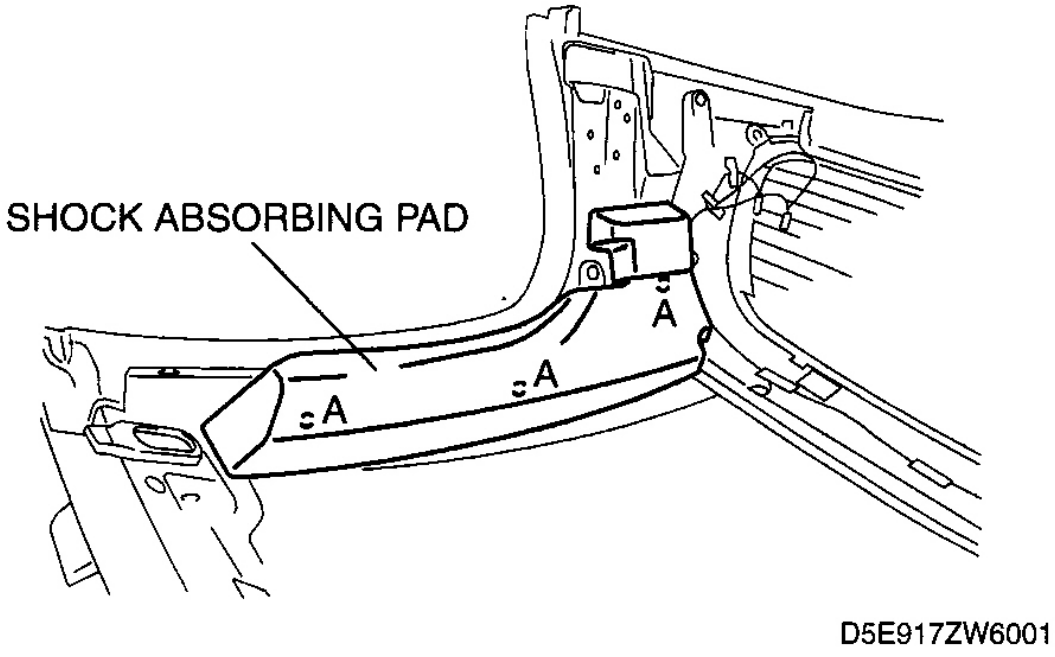


Fig. 56: Identifying Shock-Absorbing Pad
Courtesy of MAZDA MOTORS CORP.

HEADLINER REMOVAL/INSTALLATION [DETACHABLE HARDTOP]

1. Remove the detachable hardtop.
2. Remove the following parts:
    1. B-pillar garnish.
    2. Side lock.
    3. B-pillar upper trim. (See **B-PILLAR UPPER TRIM REMOVAL [DETACHABLE HARDTOP]** .)
    4. Male wedge cover.
    5. Top lock cover.
3. Remove the fasteners.
4. Pull the headliner outward and remove it.
5. Install in the reverse order of removal.

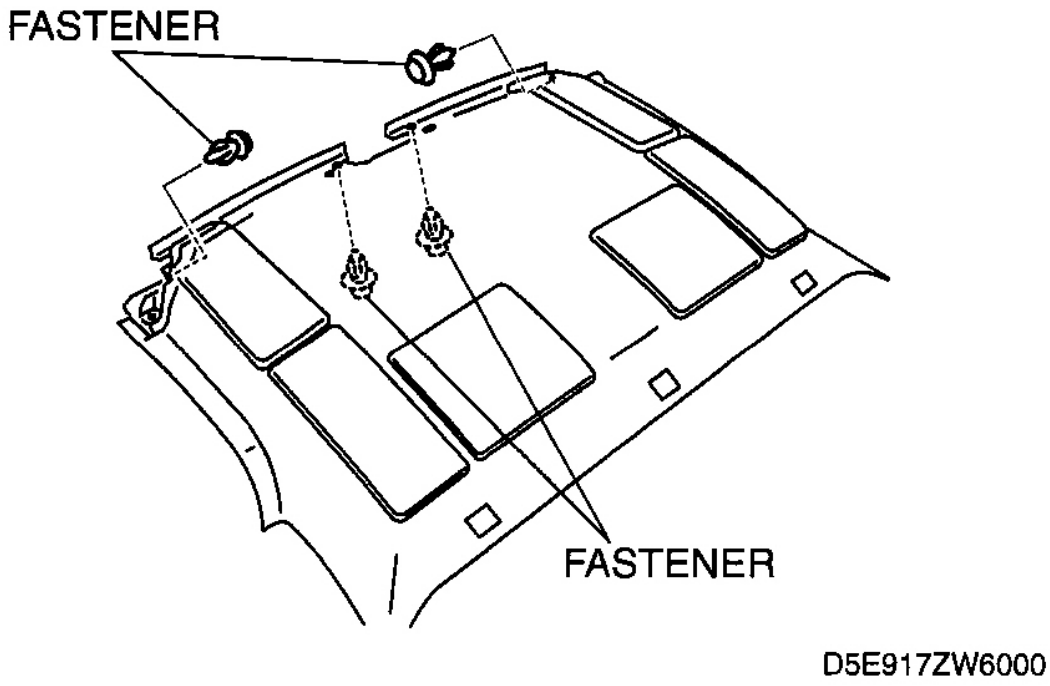


Fig. 57: Identifying Headliner
Courtesy of MAZDA MOTORS CORP.

FLOOR COVERING REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Seat (See **SEAT REMOVAL/INSTALLATION** .)
    2. Console (See **CONSOLE REMOVAL/INSTALLATION** .)
    3. Side wall (See **SIDE WALL REMOVAL/INSTALLATION**
    4. Console panel (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    5. Foot rest
    6. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    7. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    8. Front side trim (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
    9. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    10. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    11. Front seat back bar garnish (See **SEAT BACK BAR GARNISH**

REMOVAL/INSTALLATION .)

12. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)

4. Cut away the floor covering as shown in **Fig. 58**.

NOTE:

- **The cut part needs to match up when installing the floor covering.**

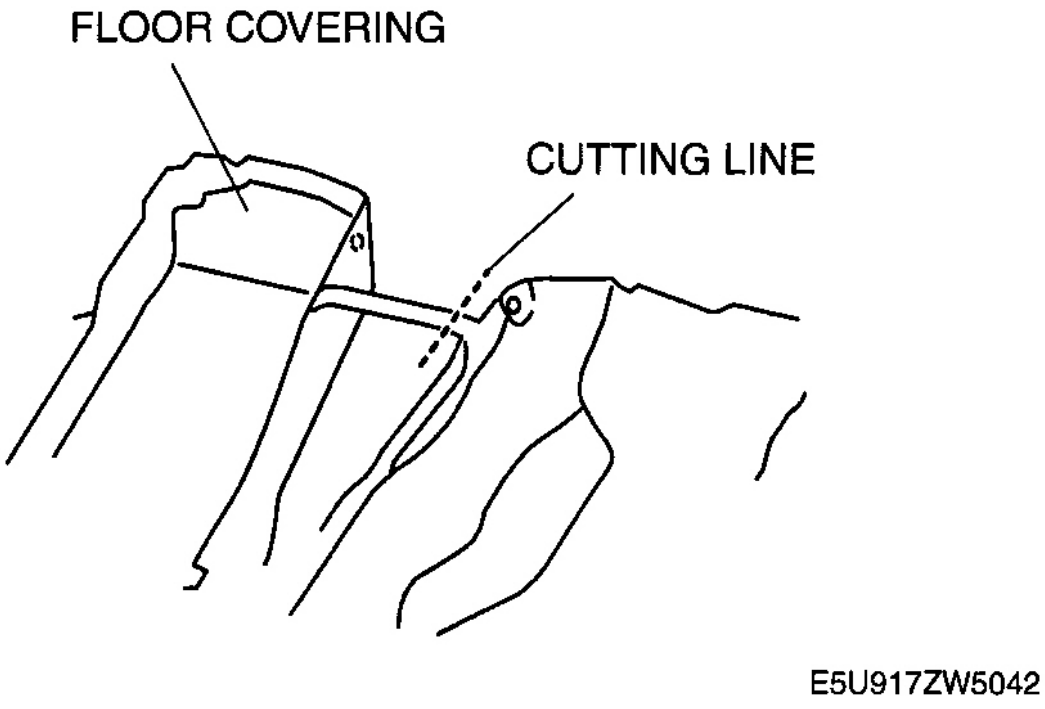


Fig. 58: Identifying Floor Covering Cutting Line
Courtesy of MAZDA MOTORS CORP.

5. Remove the fasteners.
6. Remove the floor covering.
7. Install in the reverse order of removal.

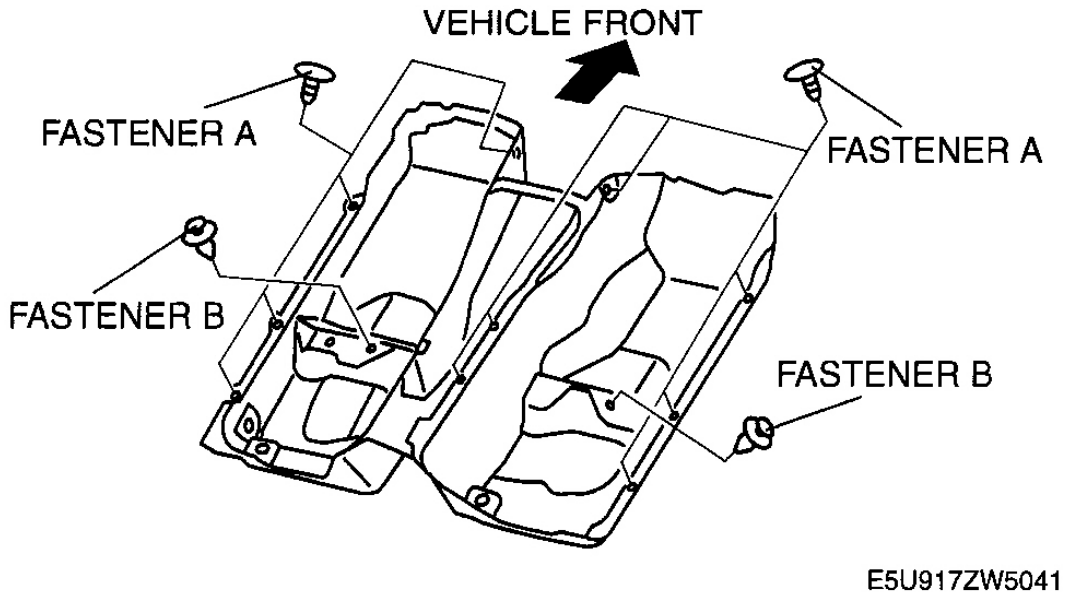


Fig. 59: Removing Floor Covering Fasteners
Courtesy of MAZDA MOTORS CORP.

REAR FLOOR COVERING (POWER RETRACTABLE HARDTOP)

1. Fully open the deck panel.
2. Remove the side shelf. (See **SIDE SHELF REMOVAL/INSTALLATION**.)
3. Remove the stoppers.
4. Remove the fasteners.
5. Remove the rear floor covering.
6. Install in the reverse order of removal.

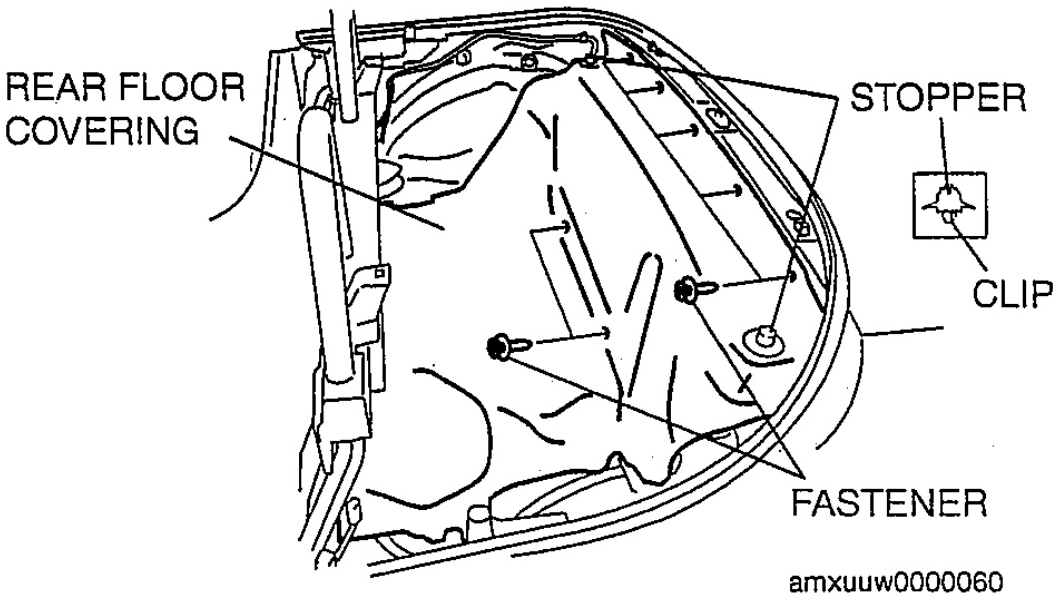
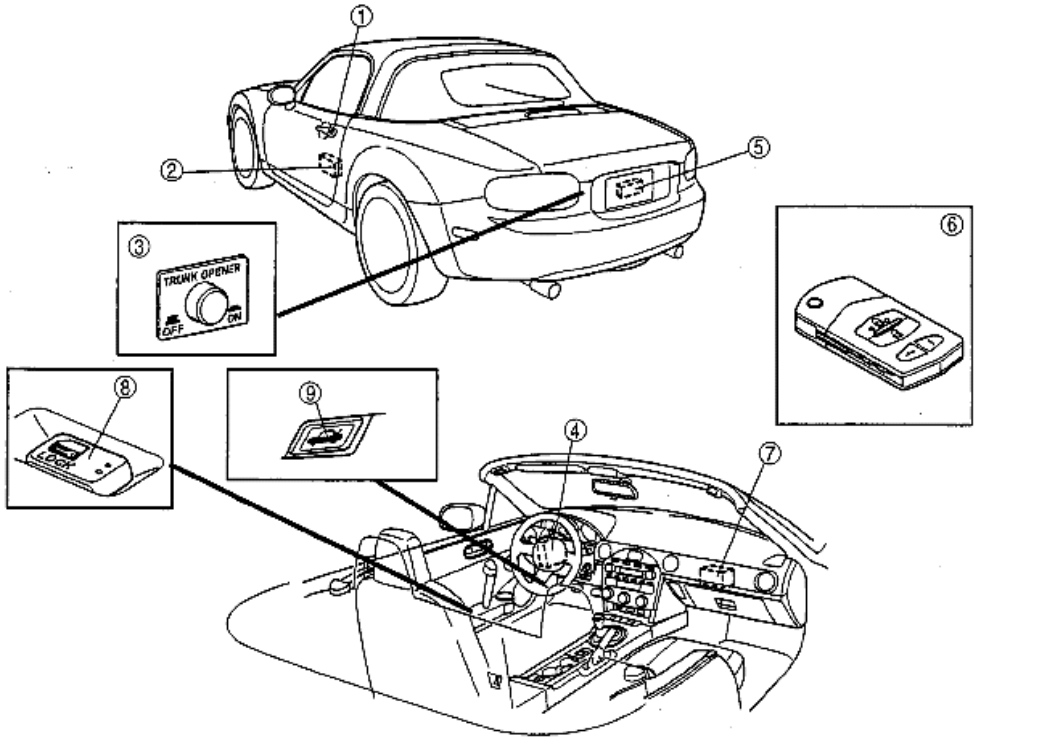


Fig. 60: Identifying Rear Floor Covering
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Security and Locks (Keyless Entry System) - MX-5 Miata

POWER DOOR LOCK SYSTEM AND KEYLESS ENTRY SYSTEM LOCATION INDEX[KEYLESS ENTRY SYSTEM]



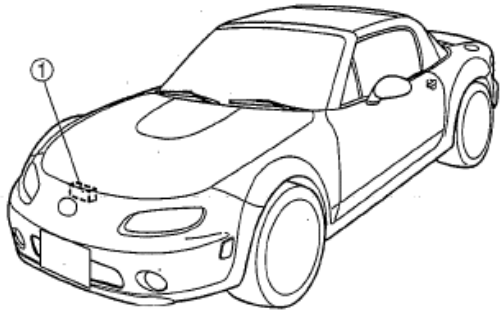
e6u914bw4001

1	Door key cylinder (See 09-14A-4 DOOR KEY CYLINDER REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM])
2	Door latch and lock actuator (See 09-14A-5 DOOR LATCH AND LOCK ACTUATOR REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-6 DOOR LOCK ACTUATOR INSPECTION[ADVANCED KEYLESS SYSTEM])
3	Trunk lid opener cancel switch (See 09-14A-38 TRUNK LID OPEN CANCEL SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-39 TRUNK LID OPEN CANCEL SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])
4	Keyless control module (See 09-14A-22 KEYLESS CONTROL MODULE REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14B-14 KEYLESS CONTROL MODULE INSPECTION[KEYLESS ENTRY SYSTEM])

5	Trunk lid latch and opener (See 09-14A-38 TRUNK LID OPENER REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-37 TRUNK LID OPENER INSPECTION[ADVANCED KEYLESS SYSTEM])
6	Transmitter (See 09-14B-11 TRANSMITTER BATTERY REPLACEMENT[KEYLESS ENTRY SYSTEM]) (See 09-14B-12 TRANSMITTER ID CODE REGISTRATION[KEYLESS ENTRY SYSTEM])
7	Keyless receiver (See 09-14A-31 KEYLESS RECEIVER REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14B-17 KEYLESS RECEIVER INSPECTION[KEYLESS ENTRY SYSTEM])
8	Door lock switch (See 09-14A-5 DOOR LOCK SWITCH REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-5 DOOR LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])
9	Trunk lid opener switch (See 09-14A-38 TRUNK LID OPENER SWITCH REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-40 TRUNK LID OPENER SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])

Fig. 1: Identifying Power Door Lock System And Keyless Entry System Components Location
Courtesy of MAZDA MOTORS CORP.

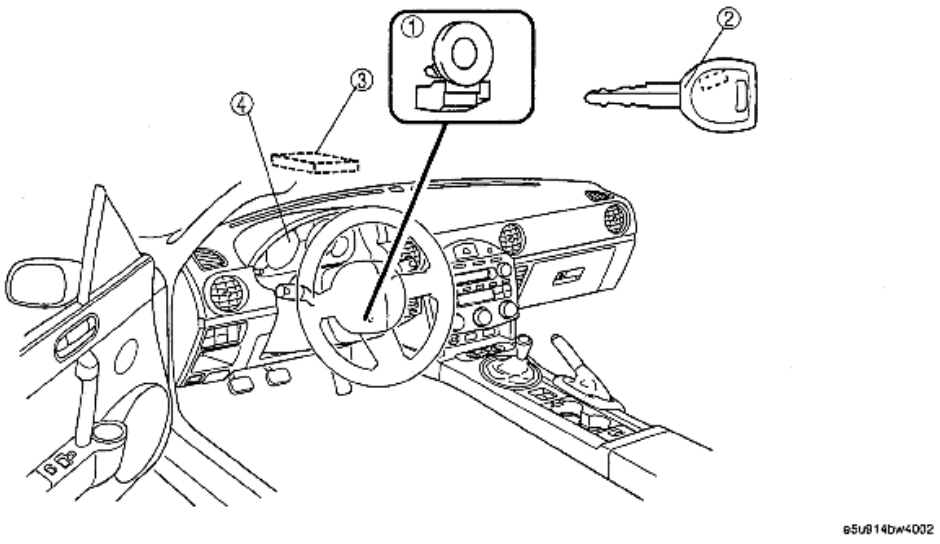
THEFT-DETERRENT SYSTEM LOCATION INDEX[KEYLESS ENTRY SYSTEM]



1	Hood latch (See 09-14A-19 HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]) (See 09-14A-20 HOOD LATCH SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM])

Fig. 2: Identifying Hood Latch
Courtesy of MAZDA MOTORS CORP.

IMMOBILIZER SYSTEM LOCATION INDEX[KEYLESS ENTRY SYSTEM]



1	Coil antenna (See 09-14A-9 COIL ANTENNA REMOVAL/ INSTALLATION[ADVANCED KEYLESS SYSTEM])
2	Key (transponder) (See 09-14B-5 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[KEYLESS ENTRY SYSTEM])

3	PCM (See 09-14B-5 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[KEYLESS ENTRY SYSTEM])
4	Instrument cluster (See 09-14B-5 IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[KEYLESS ENTRY SYSTEM])

Fig. 3: Identifying Immobilizer System Components Location
Courtesy of MAZDA MOTORS CORP.

COIL ANTENNA REMOVAL/INSTALLATION[KEYLESS ENTRY SYSTEM]

NOTE:

- **Do not remove the coil antenna unless you are replacing it.**

1. Disconnect the negative battery cable.
2. Remove the following parts:
    1. Hood release lever (See **HOOD LATCH AND RELEASE LEVER REMOVAL/INSTALLATION[ADVANCED KEYLESS SYSTEM]** .)
    2. Scuff plate (Driver's side) (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    3. Front side trim (Driver's side) (See **FRONT SIDE TRIM REMOVAL/INSTALLATION** .)
    4. Lower panel (See **LOWER PANEL REMOVAL/INSTALLATION** .)
    5. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
3. Disconnect the coil antenna connector.
4. Detach the steering lock tabs from the holes on the coil antenna.
5. Install in the reverse order of removal.

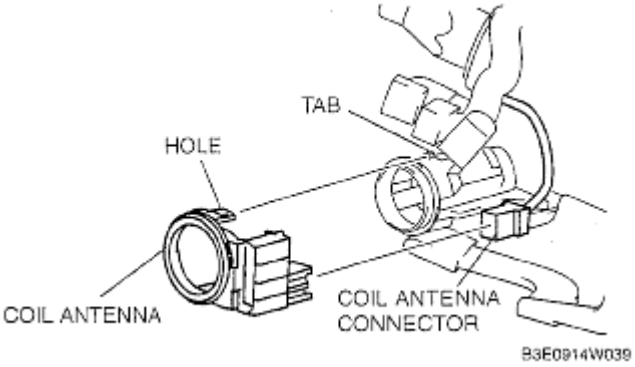


Fig. 4: Removal/Installation Of Coil Antenna
Courtesy of MAZDA MOTORS CORP.

IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[KEYLESS ENTRY SYSTEM]

FOREWORD

- When performing the following procedures, the immobilizer resetting procedure using the M-MDS must also always be performed: "instrument cluster replacement", "PCM replacement", "instrument cluster and PCM joint replacement", "Key ID number clearing". The engine will not start unless all work is performed using the M-MDS.
- There are two methods for registering an additional key: Using the M-MDS and using two keys that are able to start the engine.
- When replacing any of the immobilizer system component parts, adding/erasing keys or performing other functions, refer to the following table and perform the applicable procedure (No.1 to 5).

IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING PROCEDURE [KEYLESS ENTRY SYSTEM]

Reference number	Situation	Required items	Cautionary notes
1	Making a spare key when the customer has two or more keys that can start the engine. Or registering an additional key.	• Registration key	• If the additional key registration method has been changed to "Customer spare key programming disabled" (inhibiting the method that uses two keys that are able to start the engine), the M-MDS is required when registering the additional key. In that

			case, perform procedure No.2
2	Making a spare key when the customer has one key that can start the engine or no keys. Or registering an additional key.	• Registration key • M-MDS	-
3	Clearing previously registered key ID numbers.	• Registration keys (two or more) • M-MDS	• All the key ID numbers registered in the vehicle will be cleared. • Unless keys are re-registered after clearing the key ID numbers, the engine cannot be started. Before beginning the procedure, verify that the customer has turned in all of the keys for the vehicle. • Unless two or more keys are registered after replacement, the engine cannot be started. • The keys (two or more keys) readied before beginning the procedure do not have to be new keys. Any key that is capable of starting the engine before beginning the procedure can be used.
3	Replace all the keys. (Key cylinder replacement)	• Registration keys (two or more) • M-MDS	• When replacing the key cylinder, have two or more keys ready for registration before beginning the procedure, since the previous keys will be invalid.
	Changing the method for registering additional keys.	• M-MDS	• After performing this procedure it is not

4	(Method for registering other keys using two keys that can start the engine is disabled.)		possible to register additional keys according to procedure No.1. The system can be returned to the original setting. The M-MDS must always be used to change the system setting.
4	Changing the method for registering additional keys. (Method for registering other keys using two keys that can start the engine is enabled.)	• M-MDS	• This is the default setting on new vehicles.
5	Replacing the instrument cluster.	• Replacement instrument cluster • Registration keys (two or more) • M-MDS	• Unless keys are registered after replacing the steering lock, the engine cannot be started. Before beginning the procedure, verify that the customer has turned in all of the keys for the vehicle. • Unless two or more keys are registered after replacement, the engine cannot be started. • The keys (two or more keys) readied before beginning the procedure do not have to be new keys. Any key that is capable of starting the engine before beginning the procedure can be used.
5	Replacing the PCM.	• Replacement PCM • M-MDS	-
	Replacing the PCM and instrument cluster.	• Replacement PCM • Replacement instrument cluster	• Unless keys are registered after replacing the steering

5		• Registration keys (two or more) • M-MDS	lock, the engine cannot be started. Before beginning the procedure, verify that the customer has turned in all of the keys for the vehicle. • Unless two or more keys are registered after replacement, the engine cannot be started. • The keys (two or more keys) readied before beginning the procedure do not have to be new keys. Any key that is capable of starting the engine before beginning the procedure can be used.
-	Replacing the coil antenna.	• New coil antenna	• It is not necessary to reset the immobilizer system.

CAUTION:

- **If any of the following items are touching or near the key head, signal communication between the key and vehicle is negatively affected, resulting in the engine not starting or the key registration failure. Do not perform the procedure if any of the following items are touching or near the key head.**
  - **Any metallic object**
  - **Spare keys or keys for other vehicles equipped with an immobilizer system**
  - **Any electronic device, or any credit or other cards with magnetic strips**

NOTE:

- **Within the following procedures, the term a "valid key" means a "key that can start the engine".**
- **After adding/registering keys, clearing ID numbers or replacing any component part of the immobilizer system, verify that all keys can start the engine within 5 s .**
- **When verifying that the keys can start the engine, wait at least 5 s or more**

between inserting them.

- **If the engine cannot be started using a registered key, repeat the procedure from the beginning.**
- **Do not start the engine until the key registration procedure for all the necessary keys is completed. If the engine is started during the registration procedure, registration is stopped at that point. Repeat the procedure starting from the beginning if the engine is started before completion.**
- **Two or more key ID numbers must be registered for the engine to start.**
- **A maximum of eight key ID numbers can be registered for one vehicle. The M-MDS can be used to verify the number of key ID numbers registered to a single vehicle.**
- **Do not select screen menus of the M-MDS that are not indicated within the procedures.**

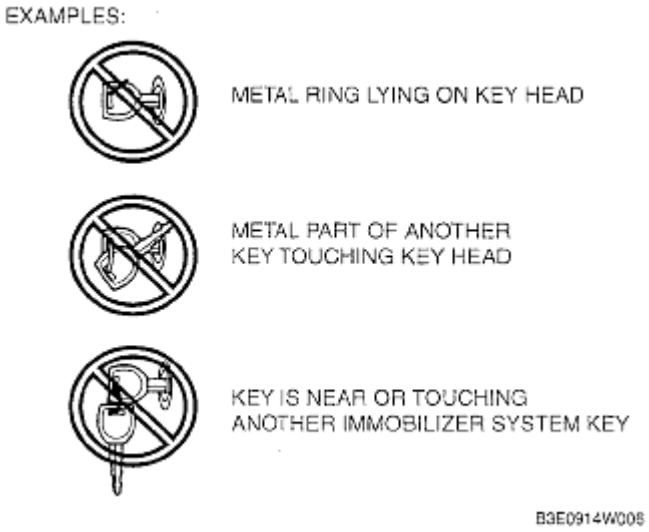


Fig. 5: Caution For Key Registration Failure
Courtesy of MAZDA MOTORS CORP.

NO.1 ADDITIONAL KEY REGISTRATION PROCEDURE (USING TWO VALID KEYS)
CONDITIONS

- Customer has two or more valid keys.

NOTE:

- **A maximum of eight keys can be registered for any one vehicle. If key registration is not successful and DTC 15 appears even though the procedure was performed properly, use the PID/data monitor function of the M-MDS and verify the number of keys that have been registered.**
- **If eight keys have already been registered, and it is necessary to register other keys, the previously registered key ID numbers must first be cleared.**

To clear the key ID numbers, refer to "NO.3 KEY REPLACEMENT PROCEDURE (CLEARING PREVIOUSLY REGISTERED KEY ID NUMBERS, KEY RE-REGISTRATION)".

Procedure

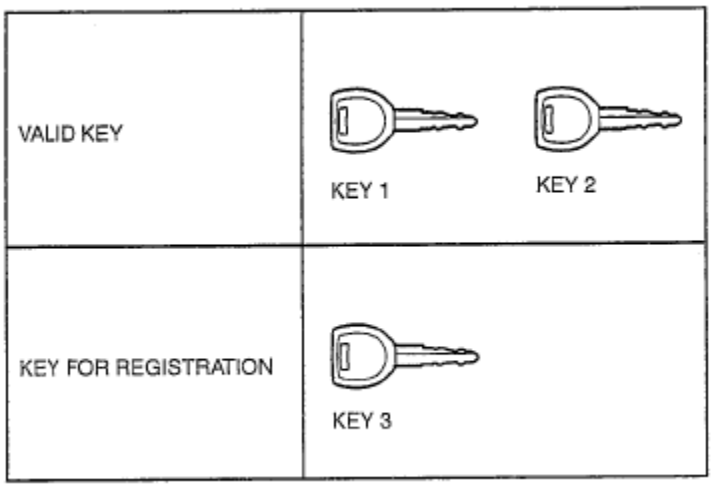


Fig. 6: Identifying Valid Key And Key For Registration
Courtesy of MAZDA MOTORS CORP.

1. Have one key (key 3) ready for registration.
2. Using key 1, turn the ignition switch to the ON position.
3. Verify that the security light illuminates for **approx. 3 s** and then goes out.
4. Using key 1, turn the ignition switch to the LOCK position **within approx. 4 s** after the security light goes out.
5. Remove key 1
6. Repeat Steps 2-5 using key 2.
7. Repeat Steps 2-5 using key 3.
8. If additional keys need to be registered, repeat Steps 1-7 in the same manner as key 3.

NO.2 ADDITIONAL KEY REGISTRATION PROCEDURE (USING THE M-MDS) CONDITIONS

- Customer has only one valid key. Or customer has no valid keys. (Can also be performed even if there are two or more valid keys)

NOTE:

- **A maximum of eight keys can be registered for any one vehicle. If key registration is not successful and DTC 15 appears even though the procedure was performed properly, use the PID/data monitor function of the M-MDS and verify the number of keys that have been registered.**
- **If eight keys have already been registered, and it is necessary to register**

other keys, the previously registered key ID numbers must first be cleared. To clear the key ID numbers, refer to "NO.3 KEY REPLACEMENT PROCEDURE (CLEARING PREVIOUSLY REGISTERED KEY ID NUMBERS, KEY RE-REGISTRATION)".

Procedure

1. Have one key (key 1) ready for registration.
2. Using key 1, turn the ignition switch to the ON position.

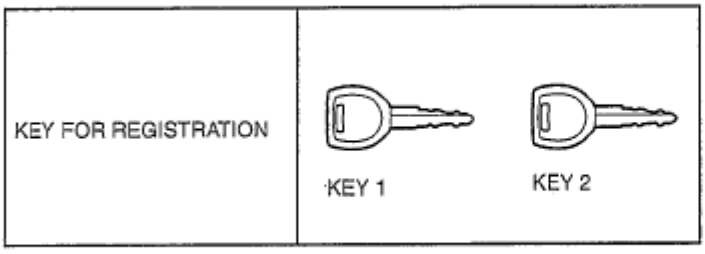
NOTE:

- **Although the security light flashes and DTC 15 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

3. Connect the M-MDS to the DLC-2.
4. Select "Body/Security/PATS function" from the M-MDS screen menu.
5. Perform security access as indicated on the M-MDS screen. (See **NO.6 SECURITY ACCESS PROCEDURE**.)
6. Select "Program Additional Ignition Key" from the M-MDS screen menu.

NO.3 KEY REPLACEMENT PROCEDURE (CLEARING PREVIOUSLY REGISTERED KEY ID NUMBERS, KEY RE-REGISTRATION)

Procedure



CHU0914WD47

Fig. 7: Identifying Keys For Registration
Courtesy of MAZDA MOTORS CORP.

1. Have two or more keys (key 1, key 2) ready for registration after the clearing the key ID numbers.
2. Using key 1, turn the ignition switch to the ON position.

NOTE:

- **Although the security light flashes and DTC 15 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

3. Connect the M-MDS to the DLC-2.
4. Select "Body/Security/PATS function" from the M-MDS screen menu.
5. Perform security access as indicated on the M-MDS screen. (See **NO.6 SECURITY ACCESS PROCEDURE**.)
6. Select "Ignition key ID number Erase" from the M-MDS screen menu and perform the tasks according to the M-MDS screen.

NO.4 CHANGING THE METHOD FOR REGISTERING ADDITIONAL KEYS

NOTE:

- **This procedure is for changing the enable/disable setting of the "No.1 Additional Key Registration Procedure (Using Two Valid Keys)".**
- **The default setting for new vehicles and new instrument cluster replacement is "Enabled".**
- **By disabling the "No.1 Additional Key Registration Procedure (Using Two Valid Keys)", only the M-MDS can be used to register additional keys, thereby preventing two valid keys from being used to create an unauthorized spare key. This function is for use by rental car or other companies with vehicle fleets.**

Procedure

1. Using any key, turn the ignition switch to the ON position. (Either a valid or an unregistered key can be used.)

NOTE:

- **When using an unregistered key, although the security light flashes and DTC 15 is displayed, this does not indicate an improper procedure. Continue to perform the procedure as indicated.**

2. Connect the M-MDS to the DLC-2.
3. Select "Body/Security/PATS function" from the M-MDS screen menu.
4. Perform security access as indicated on the M-MDS screen. (See **NO.6 SECURITY ACCESS PROCEDURE**.)
5. Select either "Customer Spare Key Programming Enable" or "Customer Spare Key Programming Disable" from the M-MDS screen menu. Depending on the selected menu, the additional key registration method is as shown below:

ADDITIONAL KEY REGISTRATION METHOD

Setting	Additional key registration method	
	Procedure using two valid keys	Procedure using the M-MDS
Customer spare key programming enable	x	x
Customer spare key programming disable	-	x

x: Procedure is possible -: Procedure is not possible

6. After verifying that the PATS function menu is displayed again on the M-MDS screen, select "Exit" to complete the M-MDS function.
7. After Step 6, wait **10 s or more** and then turn the ignition switch to the LOCK position.

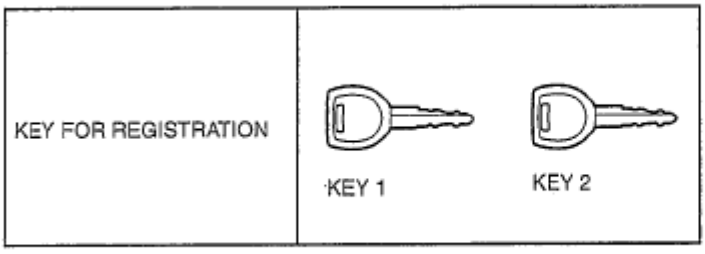
NO.5 RESETTING PROCEDURE FOR THE IMMOBILIZER SYSTEM WHEN REPLACING THE PCM OR INSTRUMENT CLUSTER CONDITIONS

- When replacing only the PCM: No conditions.
- When replacing only the instrument cluster: Customer has two or more valid keys after replacement tasks.
- When replacing the PCM and the instrument cluster: Customer has two or more valid keys after replacement.

CAUTION:

- **When replacing the PCM and the instrument cluster at the same time, follow the same instructions described in the procedure for "when replacing the instrument cluster".**
- **When replacing only the PCM, start from Step 2. Also, when key 1 is indicated within the procedure, any valid key can be used.**
- **Before starting Step 1, complete the procedure for PCM and instrument cluster replacement.**

Procedure



CHU0814W047

Fig. 8: Identifying Keys For Registration
Courtesy of MAZDA MOTORS CORP.

1. Have two or more keys (key 1, key 2) ready for registration.
2. Using key 1, turn the ignition switch to the ON position.

NOTE:

- **When replacing only the PCM: The security light illuminates for 3 s and then goes out.**
- **When replacing the instrument cluster: Although the security light flashes and DTC 15 is displayed, this does not indicate an improper**

procedure. Continue to perform the procedure as indicated.

3. Connect the M-MDS to the DLC-2.
4. Select "Body/Security/PATS function" from the M-MDS screen menu.
5. Perform security access as indicated on the M-MDS screen. (See **NO.6 SECURITY ACCESS PROCEDURE**.)
6. Select "Parameter Reset" from the M-MDS screen menu.
7. Perform security access again as indicated on the M-MDS screen. (See **NO.6 SECURITY ACCESS PROCEDURE**.)
8. Select the replaced part as indicated on the M-MDS screen.
   - When replacing only the PCM: Select "PCM".
   - When replacing only the instrument cluster: Select "HEC".

NOTE:
- **At this time, do not select any other parts from the M-MDS screen menu.**

9. Perform the tasks according to the M-MDS screen.

NO.6 SECURITY ACCESS PROCEDURE

NOTE:
- **Security access must be performed when performing the following functions: "Program Additional Ignition Key", "Ignition Key ID Number Erase", "Customer Spare Key Programming Enable/Disable" and "Parameter Reset".**

Procedure

1. Connect the M-MDS to the DLC-2.
2. Select "Body/Security/PATS function" from the M-MDS screen menu.
3. Security access is started and the M-MDS displays "Outcode".

CAUTION:
- **After reading out the outcode, do not turn ignition switch from LOCK to ON position 5 times, otherwise the outcode value will be changed.**

4. Input the corresponding "Incode" for the "Outcode" displayed on the M-MDS screen.
5. After successfully performing security access, "Program Additional Ignition Key", "Ignition key ID number Erase" or "Customer Spare Key Programming Enable/Disable" is displayed on the M-MDS screen. When performing "Parameter Reset", security access is requested two times and after successfully performing it the second time, "Replacement Module" is displayed.

TRANSMITTER BATTERY REPLACEMENT[KEYLESS ENTRY SYSTEM]

RETRACTABLE KEY TYPE

1. Insert a small screwdriver into the slot and push the tab to remove the key from the transmitter.

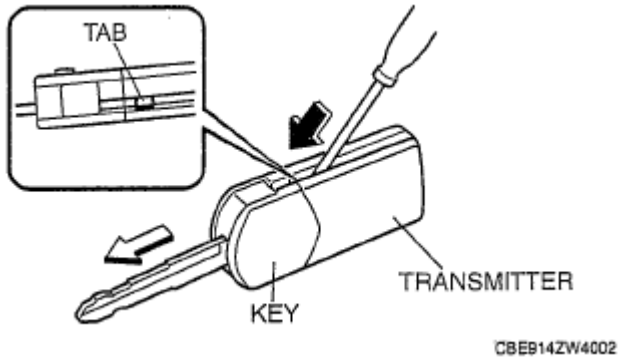


Fig. 9: Removing Key From Transmitter
Courtesy of MAZDA MOTORS CORP.

2. Insert a small screwdriver into the slot and gently pry open the transmitter.

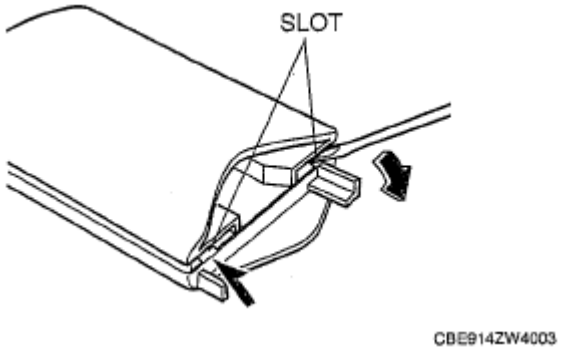


Fig. 10: Opening Transmitter
Courtesy of MAZDA MOTORS CORP.

3. Remove the battery.

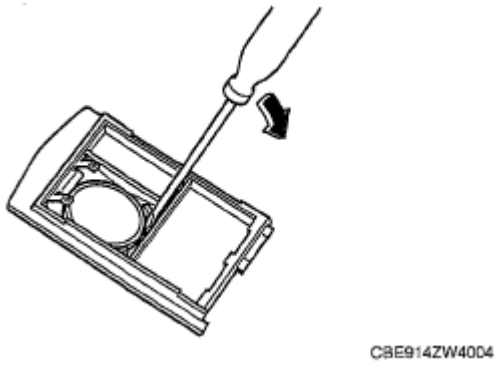


Fig. 11: Removing Battery
Courtesy of MAZDA MOTORS CORP.

4. Put in the new battery (CR1620) with the positive pole (+) facing down.
5. Align the front and back covers and snap the transmitter shut.

Battery specification

Lithium CR1620 x 1

NOTE:
- **The batteries will last about 2 years when used 10 times a day.**

6. Install the key to the transmitter.

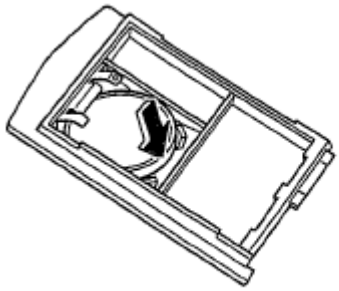


Fig. 12: Position Of Putting New Battery
Courtesy of MAZDA MOTORS CORP.

TRANSMITTER ID CODE REGISTRATION[KEYLESS ENTRY SYSTEM]

CAUTION:
- **Always program three ID codes because the programming mode terminates if three ID codes are programmed. At this time, the same transmitter (programmed transmitter) can be programmed two or three times.**

NOTE:
- **Always program three ID codes because all the ID codes programmed prior to activation are cleared when the programming mode is activated.**
- **A maximum of three ID codes can be programmed.**
- **When programming the ID code into a keyless control module, verify that other transmitters are not being operated in the vicinity.**
- **After ID code programming, remove the key from the steering lock and verify that all doors lock/unlock normally using the transmitter.**

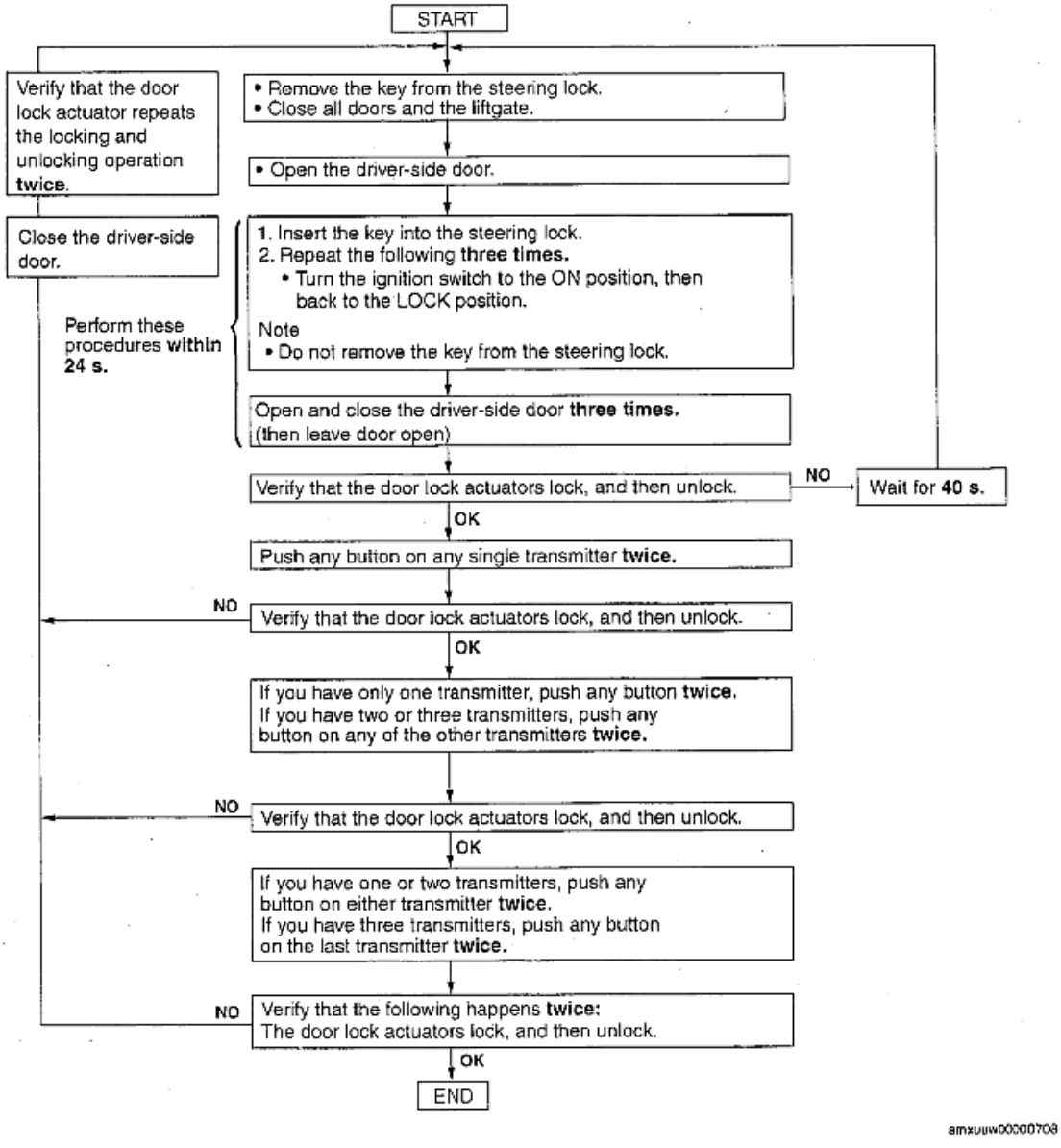


Fig. 13: Doors Lock/Unlock Program Flow Chart
Courtesy of MAZDA MOTORS CORP.

KEYLESS CONTROL MODULE REMOVAL/INSTALLATION[KEYLESS ENTRY SYSTEM]

1. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the side panel. (See **SIDE PANEL REMOVAL/INSTALLATION** .)
3. Remove the bolt and nut.
4. While inclining the keyless control module along the body panel in the direction indicated by the arrow, disengage the bracket tab from the hole in the body panel.
5. Disconnect the keyless control module connector.

6. Remove the keyless control module.

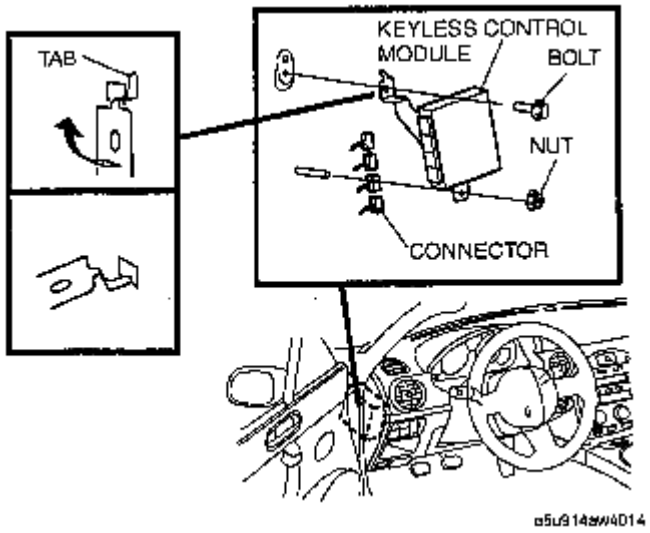


Fig. 14: Disengaging Bracket Tab
Courtesy of MAZDA MOTORS CORP.

7. Remove the screw, then remove the bracket.

NOTE:

- **The screw which fixes the keyless control module and bracket is for a body ground connection. Be sure to secure the screw when installing.**

8. Install in the reverse order of removal.

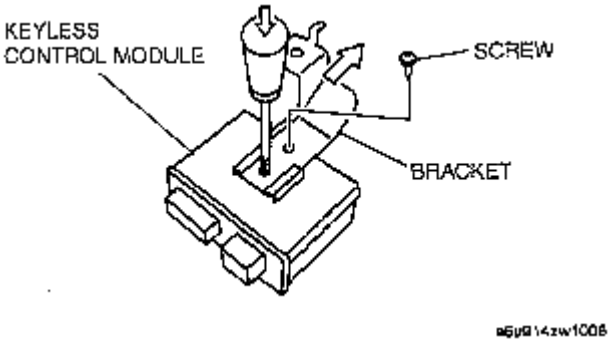


Fig. 15: Removing Bracket & Screw
Courtesy of MAZDA MOTORS CORP.

KEYLESS CONTROL MODULE INSPECTION[KEYLESS ENTRY SYSTEM]

1. Measure the voltage or inspect for continuity according to the Terminal Voltage Table (Reference).

- If the voltage is not as specified in the Terminal Voltage Table (Reference), inspect the parts under "Inspection item(s)" and related wiring harnesses.

TERMINAL VOLTAGE TABLE (REFERENCE)

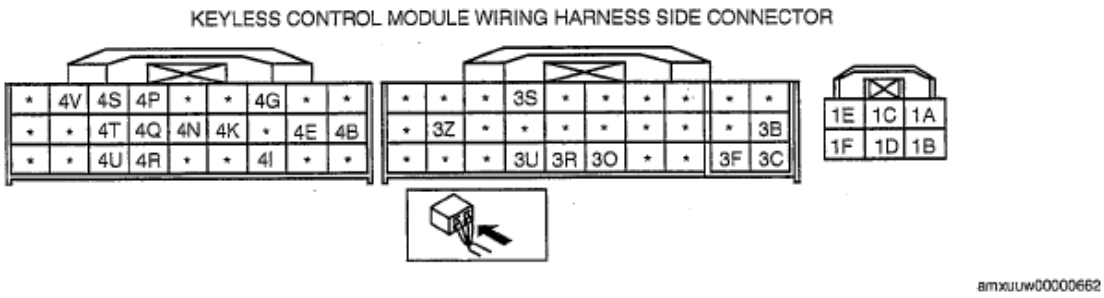


Fig. 16: Identifying Keyless Control Module Connector Terminals
Courtesy of MAZDA MOTORS CORP.

KEYLESS CONTROL MODULE INSPECTION CHART

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/ Continuity	Inspection item(s)
1A	Door unlock control	Door lock actuator (driver's side)	Door lock actuator unlocking	1.0 or less <-- B+ <--1.0 or less	• Door lock actuator (driver's side) • Related wiring harnesses
			Other	1.0 or less	
1B	GND	GND	Under any condition: Inspect for continuity to GND.	Continuity detected	• Related wiring harnesses
1C	Door lock control	Door lock actuator	Door lock actuator locking	1.0 or less <-- B+ <-- 1.0 or less	• Door lock actuator • Related wiring harnesses
			Other	1.0 or less	
1D	Door unlock control	Door lock actuator (except driver's side)	Door lock actuator unlocking	1.0 or less <-- B+ <-- 1.0 or less	• Door lock actuator (except driver's side) • Related wiring harnesses
			Other	1.0 or less	
1E	Power supply	D.LOCK 20 A fuse	Under any condition	B+	• LOCK 20 A fuse • Battery
1F	Power supply	ROOM 15 A fuse	Under any condition	B+	• ROOM 15 A fuse

					• Battery
3B	IG1	METER 15 A fuse	Ignition switch is at ON position	B+	METER 15 A fuse
			Ignition switch is at LOCK or ACC position	1.0 or less	
3C	GND	body ground	Under any condition: Inspect for continuity to ground.	Continuity detected	GND
3F	Security light	Instrument cluster	Under any condition: Inspect for continuity to instrument cluster.	Continuity detected	Instrument cluster
3O	Key reminder switch	Steering lock unit	Key reminder switch is ON	B+	Steering lock unit
			Other	1.0 or less	
3R	TPMS signal	Instrument cluster	Under any condition: Inspect for continuity to instrument cluster.	Continuity detected	Instrument cluster
3S	Power supply (keyless receiver)	Keyless receiver	Under any condition	B+	Keyless receiver
3U	Communication (keyless receiver)	Keyless receiver	Under any condition: Inspect for continuity to keyless receiver.	Continuity detected	Keyless receiver
3Z	Trunk open signal	Trunk compartment light switch	Trunk lid open (trunk compartment light switch on)	1.0 or less	• Trunk compartment light switch • Related wiring harnesses
			Trunk lid closed (trunk compartment light switch off)	B+	
4B	Lock/unlock input	Door lock switch	Door lock switch is locked	2.5	• Door lock switch (driver-side) • Door lock switch (passenger-side) • Related wiring harnesses
			Door lock switch is unlocked	1.0 or less	
			Other	5	
4E	Lock signal input	Door lock-link switch (driver-side)	Driver-side door is locked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (driver-side)
			Driver-side door is unlocked: Inspect for continuity to ground.	No continuity	
			At the moment key		

4G	Lock/unlock input	Driver-side door key cylinder switch	cylinder is locked	2.5	• Driver-side door key cylinder switch • Related wiring harnesses
			At the moment key cylinder is unlocked	1.0 or less	
			At the moment key cylinder is neutral position	5	
4I	Unlock signal input	Door lock-link switch (driver-side)	Driver-side door is unlocked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (driver-side)
			Driver-side door is locked: Inspect for continuity to ground.	No continuity	
4K	Unlock input (trunk lid)	Trunk key cylinder switch	At the moment key cylinder is unlocked	1.0 or less	• Trunk key cylinder switch • Related wiring harnesses
			At the moment key cylinder is neutral position	5	
4N	Hazard output	Hazard warning light	Press the LOCK button (transmitter)	B+ <-- 1.0 or less<--B+	• Hazard warning light • Related wiring harnesses
			Press the UNLOCK button (transmitter)	B+ <-- 1.0 or less<--B+<-- 1.0 or less<-- B+	
			Other	B+	
4P	Trunk open output	Trunk opener relay	Press the trunk open switch	1.0 or less	• Trunk opener relay • Related wiring harnesses
			Other	B+	
4Q	Door switch signal (RH) output	Door switch	Door open (RH) (Door switch on)	1.0 or less	• Door switch (RH) • Related wiring harnesses
			Door closed (RH) (Door switch off)	B+	
4R	Unlock signal input	Door lock-link switch (passenger-side)	Passenger-side door is unlocked: Inspect for continuity to ground.	Continuity detected	Door lock-link switch (passenger-side)
			Passenger-side door is locked: Inspect for continuity to ground.	No continuity	
4S[*1]	Serial communication	Power window main switch	Because this terminal is for communication, good/no good judgment by terminal voltage is not possible.	-	• Power window main switch • Related wiring harnesses
			Door open (LH) (Door		

4T	Door switch signal (LH) output	Door switch	switch on)	1.0 or less	• Door switch (LH) • Related wiring harnesses
			Door closed (LH) (Door switch off)	B+	
4U	Horn on/off	Horn relay	Transmitter LOCK button is pressed twice within 5 s.	B+<--1.0 or less<--B+	• Horn relay • Related wiring harnesses
			Other	B+	
4V	Hood switch signal	Hood switch	Hood open (Hood latch switch off)	B+	• Hood latch switch • Related wiring harnesses
			Hood closed (Hood latch switch on)	1.0 or less	
*1: With exterior open function (Power window system)					

KEYLESS RECEIVER INSPECTION[KEYLESS ENTRY SYSTEM]

1. Measure the voltage or inspect for continuity according to the Terminal Voltage Table (Reference).
    - If the voltage is not as specified in the Terminal Voltage Table (Reference), inspect the parts under "Inspection item(s)" and related wiring harnesses.

TERMINAL VOLTAGE TABLE (REFERENCE)

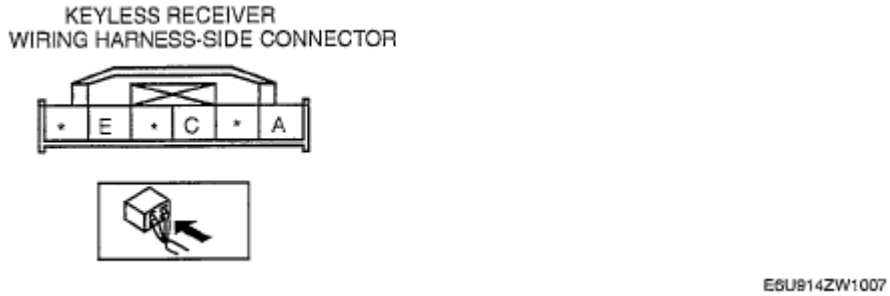


Fig. 17: Identifying Keyless Receiver Connector Terminals
Courtesy of MAZDA MOTORS CORP.

KEYLESS RECEIVER CONNECTOR TERMINALS VOLTAGE TABLE (REFERENCE)

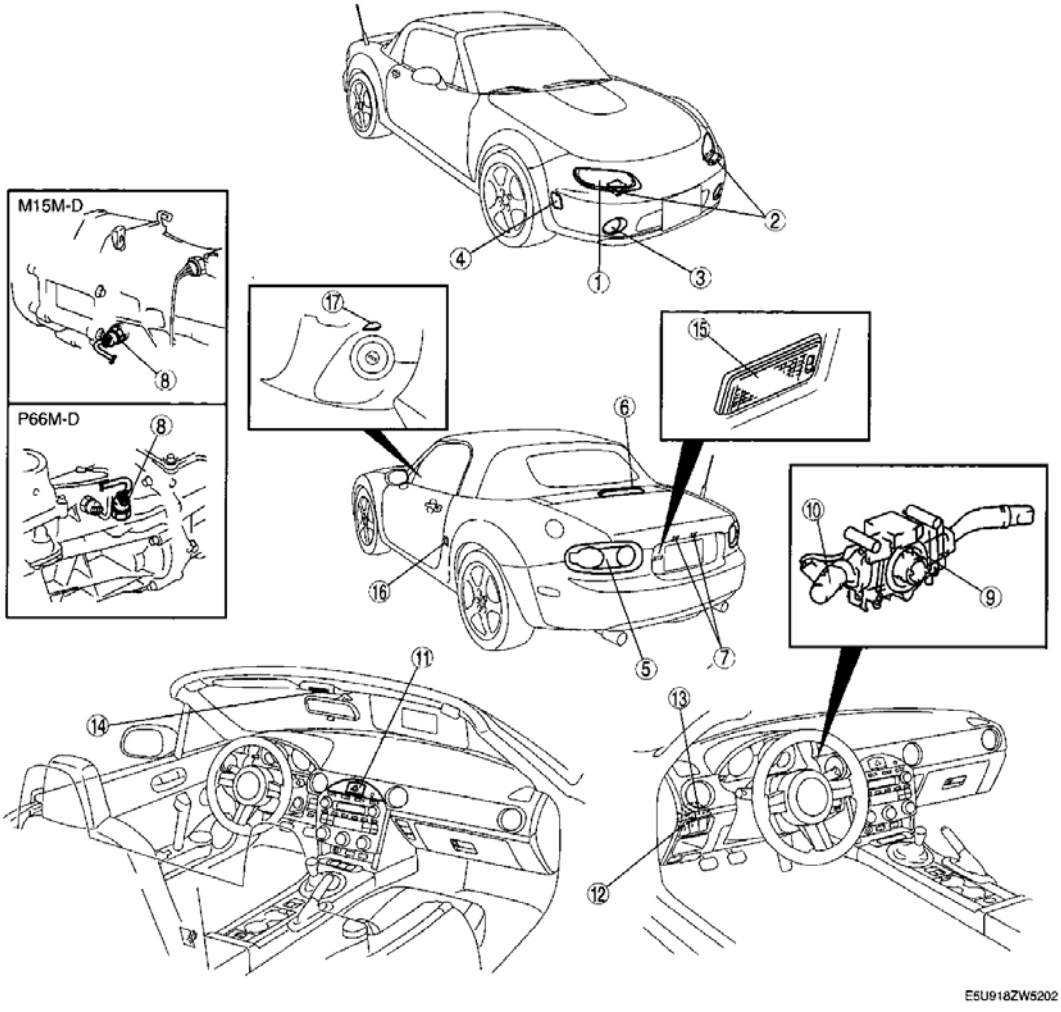
Terminal	Signal name	Connected to	Measured condition	Voltage (V)/ Continuity	Inspection item(s)
A	Power supply	Keyless control module	Under any condition	B+	• Keyless control module • Related wiring harnesses

C	Data	Keyless control module	Under any condition: Inspect the wiring harness between the keyless receiver and keyless control module terminal 3U for continuity.	Continuity detected	• Keyless control module • Related wiring harnesses
E	GND	Body ground	Under any condition: Inspect for continuity to ground.	Continuity detected	GND

2007 ACCESSORIES & BODY, CAB

Lighting Systems - MX-5 Miata

LIGHTING SYSTEMS LOCATION INDEX



1	Front combination light
2	Discharge headlight control module
3	Front fog light
4	Front side marker light
5	Rear combination light
6	High-mount brake light
7	License plate light
8	Back-up light switch
9	Conbination switch
10	Light switch
11	Hazard warning switch
12	Flasher control module
13	DRL control module
14	Map light
15	Trunk compartment light
16	Door switch
17	Ignition key illumination

Fig. 1: Identifying Location Of Lighting Systems Components

Courtesy of MAZDA MOTORS CORP.

DISCHARGE HEADLIGHT SERVICE WARNINGS

DISCHARGE HEADLIGHT BULB SERVICE WARNINGS

- **To prevent electrical shock when replacing the discharge headlight bulb, dry hands thoroughly, and perform the work in an area out of rain.**
- **When the light switch is on, approx. 25,000 V of high voltage passes through the discharge headlight bulb socket. Because of the danger of electrical shock, do not insert fingers or a tester.**
- **When the headlights are on, high voltage flows around the socket and bulb. When turning on the discharge headlights while working, always leave the headlights in the vehicle-installed condition to prevent electrical shock.**

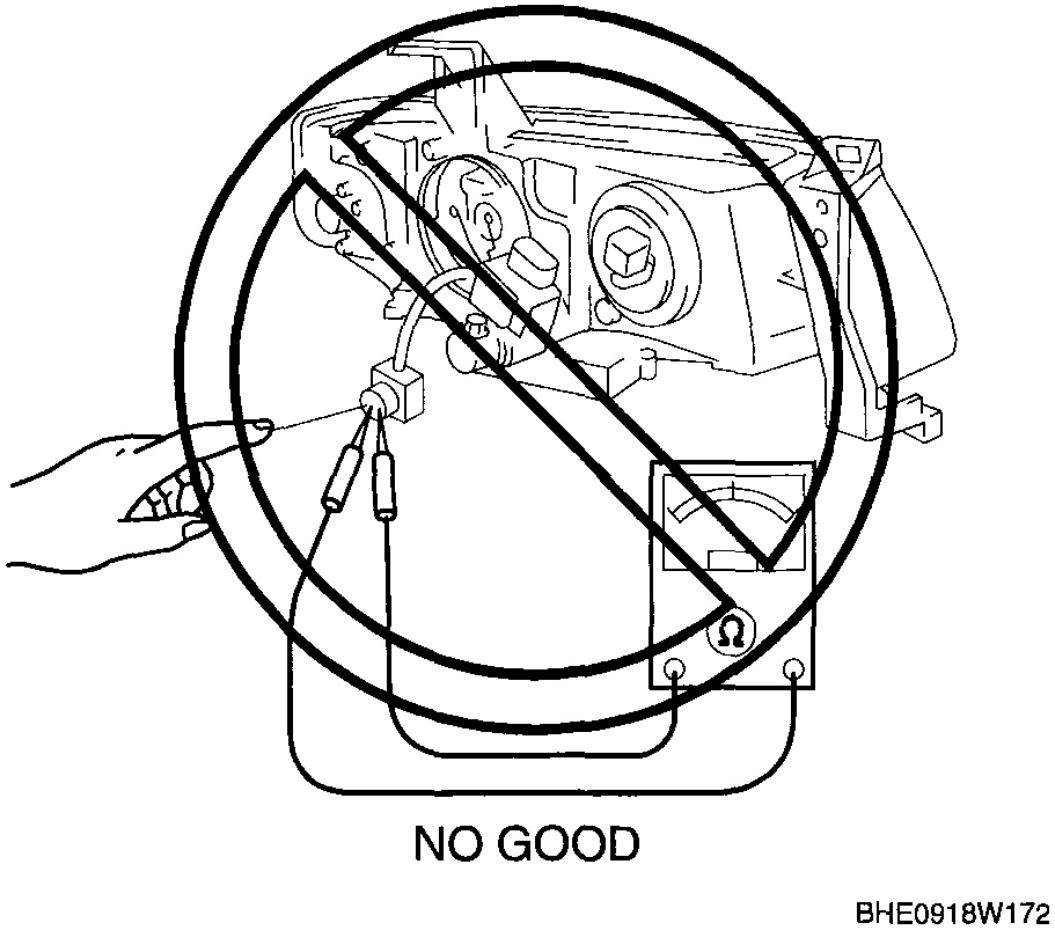


Fig. 2: Precaution For Discharge Headlight Bulb
Courtesy of MAZDA MOTORS CORP.

DISCHARGE HEADLIGHT CONTROL MODULE SERVICE WARNINGS

- **Because of the danger of electrical shock, when inspecting with a tester, do not inspect the discharge headlight control module as a single unit or disassemble it.**

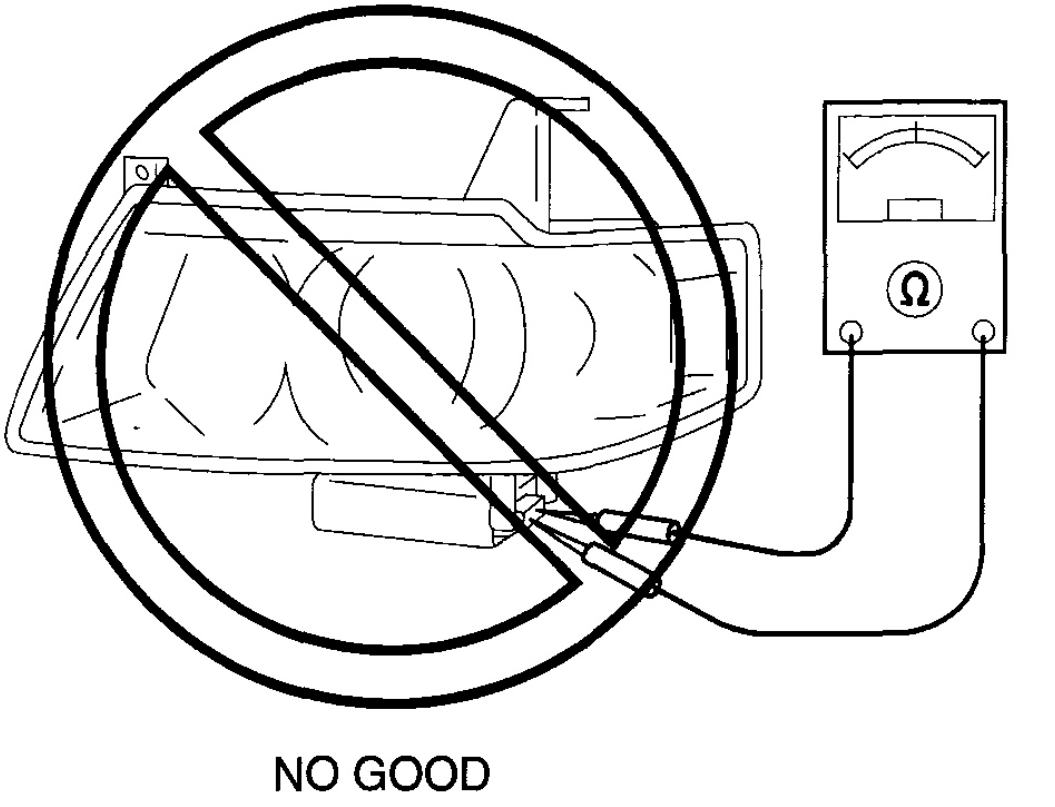


Fig. 3: Precaution For Discharge Headlight Control Module
Courtesy of MAZDA MOTORS CORP.

DISCHARGE HEADLIGHT CONTROL MODULE REUSE

- **If the discharge headlight control module is dented or damaged in any way, replace the module with a new one to prevent electrical shock and improper operation.**
- **Although the control module may temporarily operate normally even though it has received an impact, it is possible that the interior may have been damaged. When reusing the control module, inspect the following items regarding discharge headlight illumination to verify that there are no malfunctions.**
  - **Verify that the discharge headlights illuminate normally by testing them several times under**

cold illumination (headlights off for approx. 10 min or more and then turned on) and hot illumination (headlights on for approx. 15 min or more, turned off for approx. 1 min, and then turned on again) conditions.

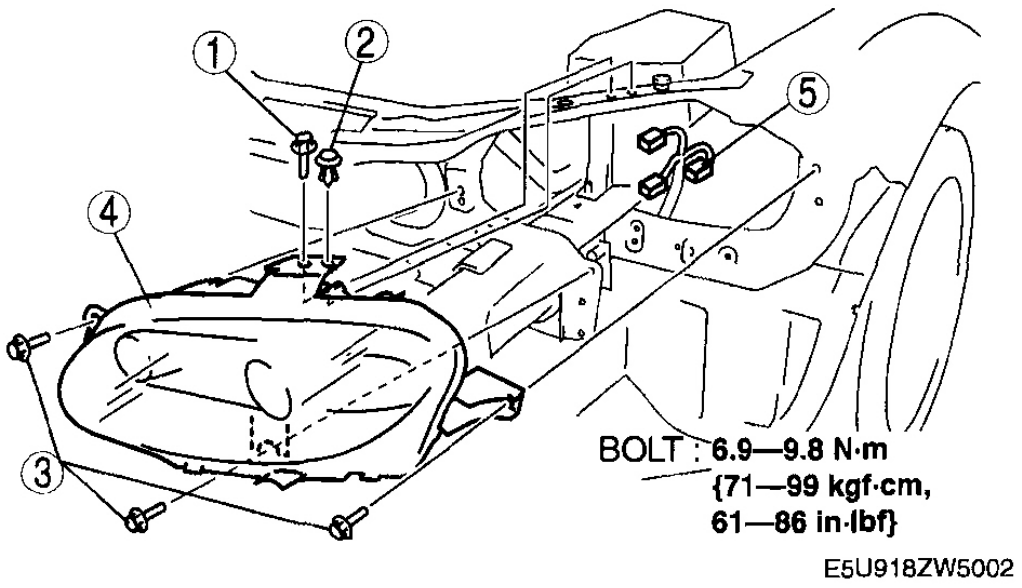
- **Inspect the headlight illumination in the period from directly after cold illumination until they are uniformly illuminated (approx. 5 min) and verify that there is no flickering or inconsistent brightness.**
- **Turn on the headlights for approx. 30 min with normal condition bulbs and verify that there is no brightness difference between the right and left, and that illumination is consistent.**

FRONT COMBINATION LIGHT REMOVAL/INSTALLATION

WARNING:

- **Incorrect servicing of the discharge headlights could result in electrical shock. Before servicing the discharge headlights, always refer to the discharge headlight service warnings. (See DISCHARGE HEADLIGHT SERVICE WARNINGS .)**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the front bumper. (See **FRONT BUMPER REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 4** .



1	Bolt A
2	Fastener
3	Bolt B
4	Front combination light
5	Connector

Fig. 4: Identifying Front Combination Light (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.
6. Adjust the headlight aiming. (See **HEADLIGHT AIMING**)

HEADLIGHT AIMING

1. Point the headlight beams to a wall and verify that the headlight beams are as shown in **Fig. 5** .

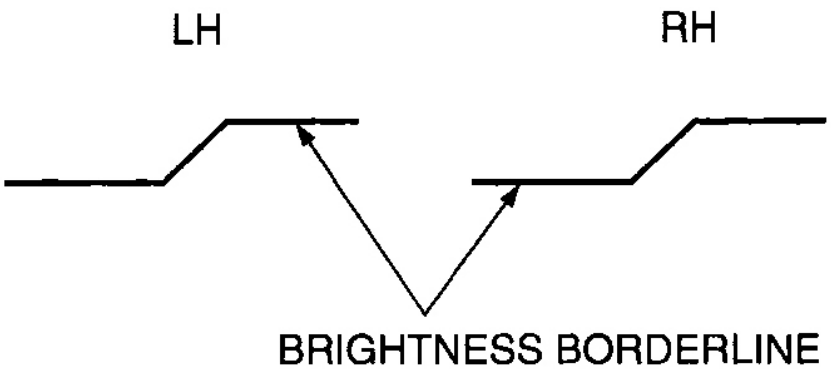


Fig. 5: Identifying Headlight Aiming Adjustment
Courtesy of MAZDA MOTORS CORP.

2. Make a headlight adjustment screen as shown in **Fig. 6** using double-weight, white paper.
3. Adjust the tire pressure to the specification.
4. Position the unloaded vehicle on a flat, level surface.
5. Seat one person in the driver's seat.
6. Position the vehicle straight ahead and perpendicular to the white screen.

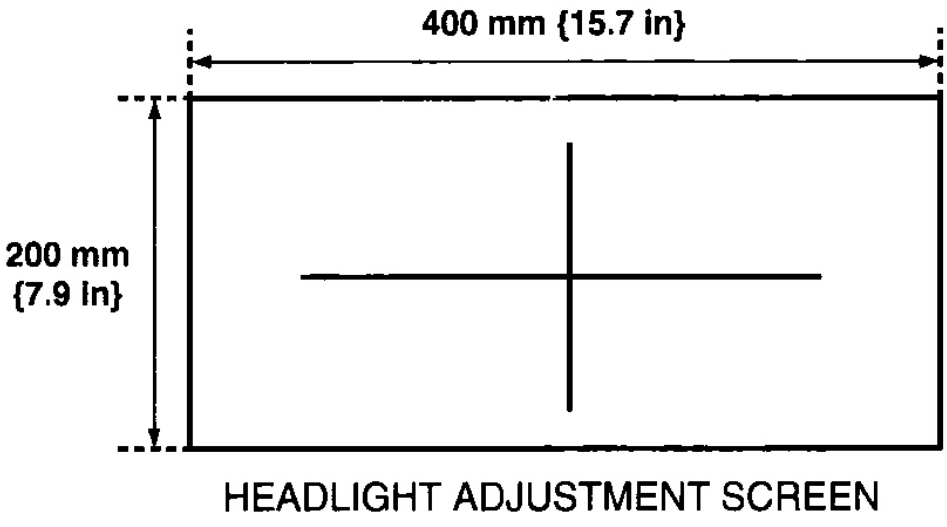


Fig. 6: Identifying Headlight Adjustment Screen
Courtesy of MAZDA MOTORS CORP.

7. Set the headlights **3 m {9.8 ft}** from the white screen.
8. Place an object in front of the headlight not being adjusted to block its light beam.
9. Start the engine so that the battery remains charged.
10. Turn on the low-beam headlight.

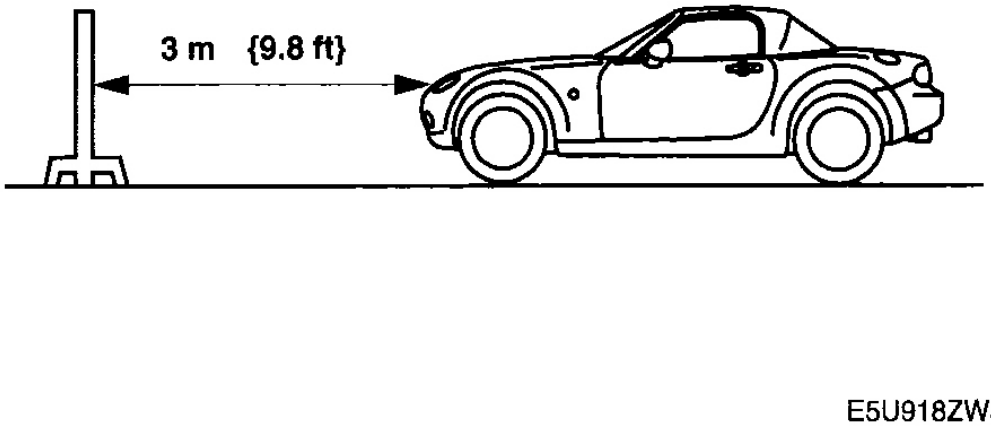


Fig. 7: Identifying Distance Between Headlight Adjustment Screen & Vehicle
Courtesy of MAZDA MOTORS CORP.

11. Adjust by turning the aiming adjustment screw so that elbow point is in the position shown in **Fig. 8** .

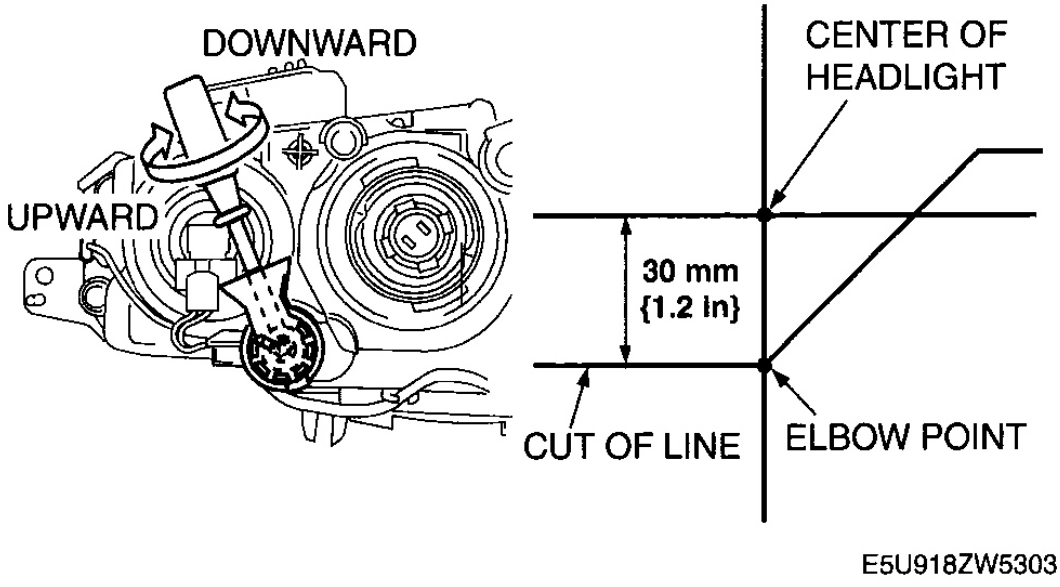


Fig. 8: Identifying Aiming Adjustment Screw
Courtesy of MAZDA MOTORS CORP.

HEADLIGHT BULB REMOVAL/INSTALLATION

LOW-BEAM

Halogen Type

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the washer tank. (RH) (See **WASHER TANK REMOVAL/INSTALLATION** .)
4. Remove the fasteners. (LH)

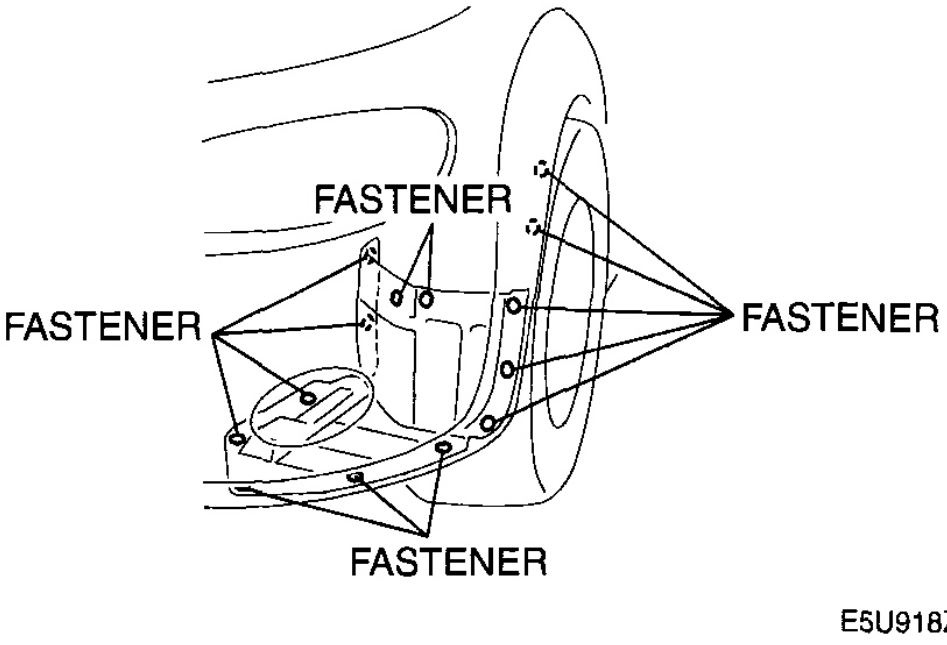


Fig. 9: Identifying Fasteners
Courtesy of MAZDA MOTORS CORP.

5. Slightly bent back the mudguard.
6. Disconnect the connector.

CAUTION:

- **A halogen bulb generates extremely high heat when it is illuminated. If the surface of the bulb is soiled, excessive heat will build up and the life of the bulb will be shortened. When replacing the bulb, hold the metal flange, not the glass. Wipe off any finger prints before installation.**

7. Remove the cover.
8. Remove the socket, then remove the headlight bulb.
9. Install in the reverse order of removal.

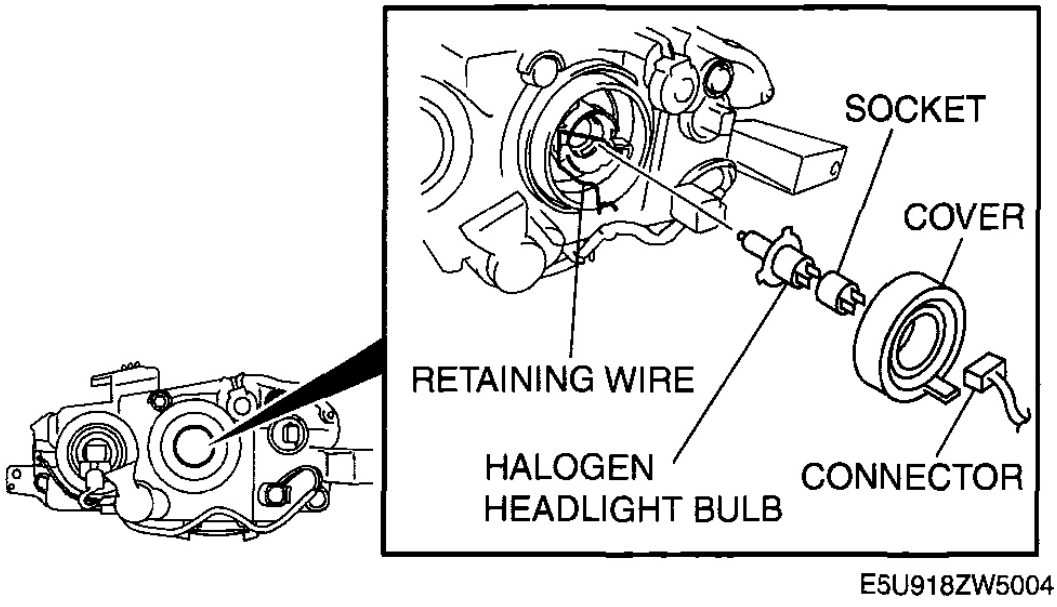


Fig. 10: Removing Halogen Headlight Bulb
Courtesy of MAZDA MOTORS CORP.

Discharge Type

WARNING:

- **Incorrect servicing of the discharge headlights could result in electrical shock. Before servicing the discharge headlights, always refer to the discharge headlight service warnings. (See DISCHARGE HEADLIGHT SERVICE WARNINGS .)**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the washer tank. (RH) (See **WASHER TANK REMOVAL/INSTALLATION** .)
4. Remove the fasteners. (LH)

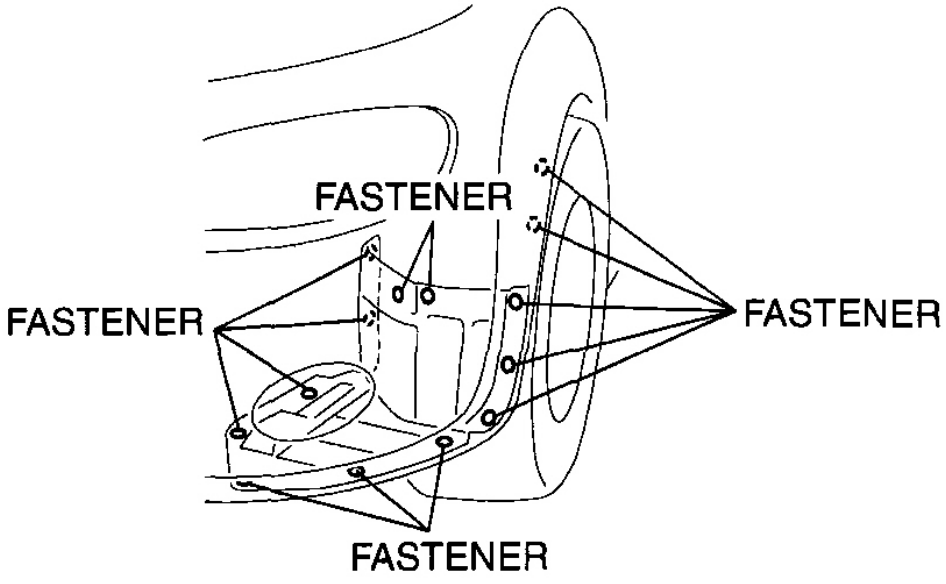


Fig. 11: Identifying Fasteners
Courtesy of MAZDA MOTORS CORP.

5. Slightly bent back the mudguard.
6. Remove the cover.

CAUTION:

- **The bulb generates extremely high heat when it is illuminated. If the surface of the bulb is soiled, excessive heat will build up and the life of the bulb will be shortened. When replacing the bulb, hold the metal flange, not the glass. Wipe off any finger prints before installation.**

7. Remove the connector, then remove the discharge headlight bulb.

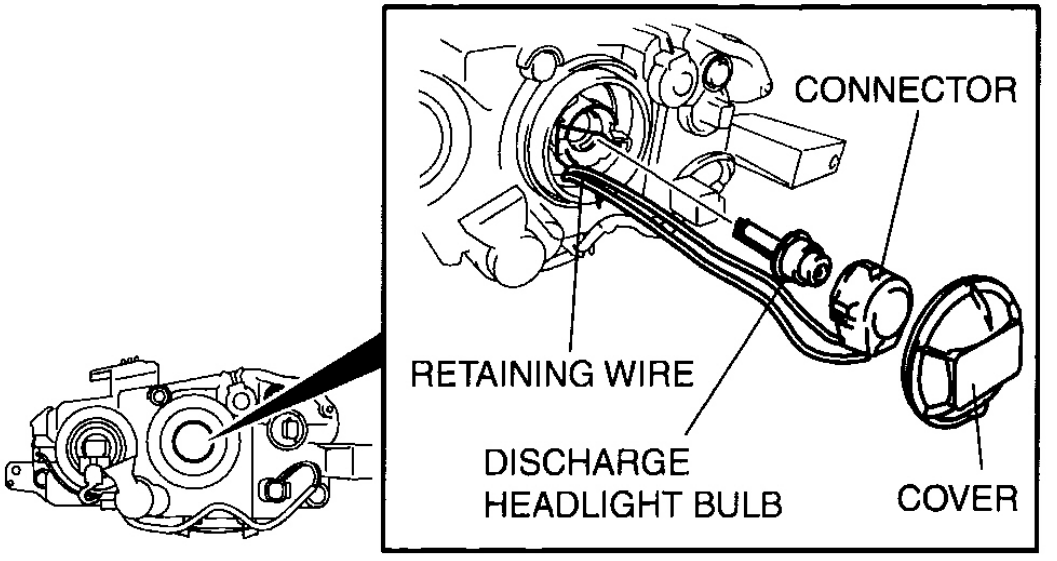


Fig. 12: Identifying Discharge Headlight Bulb
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

HIGH-BEAM

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the connector.

CAUTION:

- **A halogen bulb generates extremely high heat when it is illuminated. If the surface of the bulb is soiled, excessive heat will build up and the life of the bulb will be shortened. When replacing the bulb, hold the metal flange, not the glass. Wipe off any finger prints before installation.**

4. Remove the socket, then remove the headlight bulb.
5. Install in the reverse order of removal.

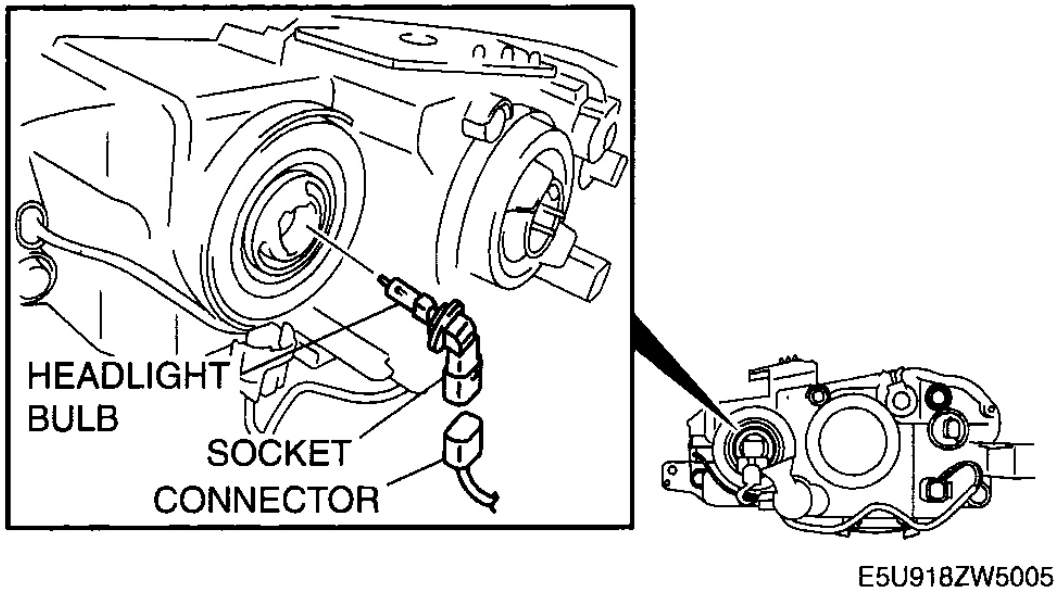


Fig. 13: Identifying Headlight Bulb
Courtesy of MAZDA MOTORS CORP.

DISCHARGE HEADLIGHT CONTROL MODULE REMOVAL/INSTALLATION

WARNING:

- **Incorrect servicing of the discharge headlights could result in electrical shock. Before servicing the discharge headlights, always refer to the discharge headlight service warnings. (See DISCHARGE HEADLIGHT SERVICE WARNINGS .)**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the front combination light. (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)
4. Remove screws.
5. Disconnect the connector.
6. Remove the discharge headlight control module.
7. Install in the reverse order of removal.

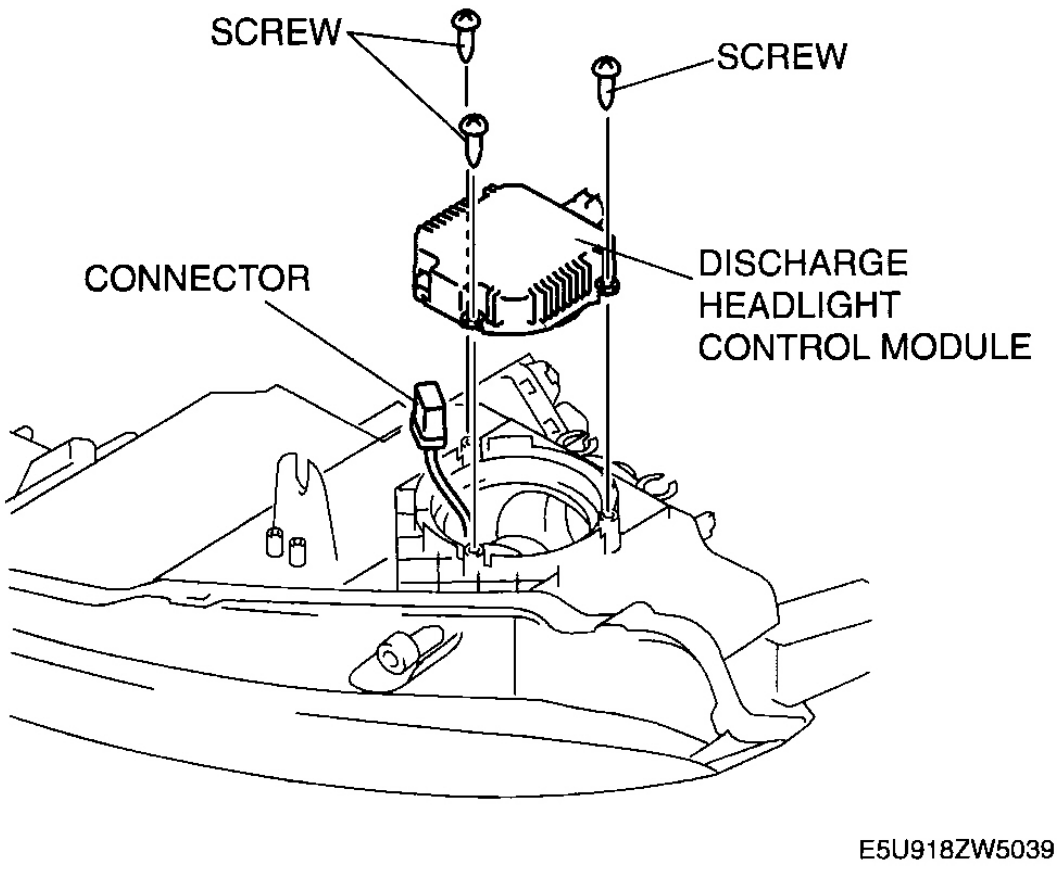


Fig. 14: Identifying Discharge Headlight Control Module
Courtesy of MAZDA MOTORS CORP.

DISCHARGE HEADLIGHT SYSTEM INSPECTION

DISCHARGE HEADLIGHT INOPERATIVE

WARNING:

- **Incorrect servicing of the discharge headlights could result in electrical shock. Before servicing the discharge headlights, always refer to the discharge headlight service warnings. (See DISCHARGE HEADLIGHT SERVICE WARNINGS .)**

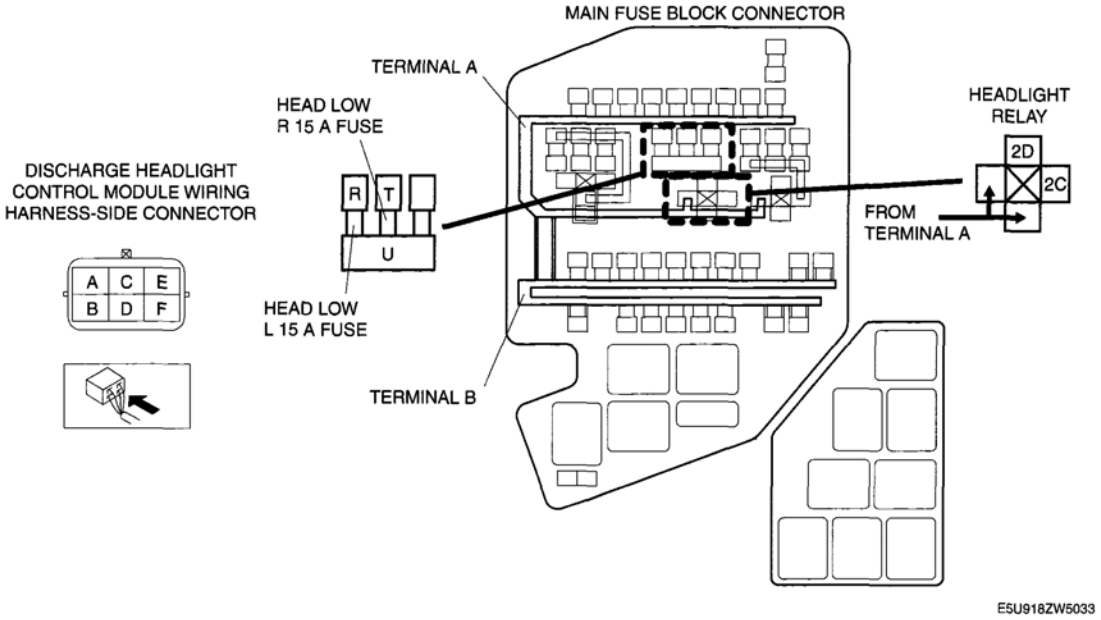


Fig. 15: Identifying Discharge Headlight System Terminal layout
Courtesy of MAZDA MOTORS CORP.

INSPECTION PROCEDURE

STEP	INSPECTION		ACTION
1	**INSPECT POWER SUPPLY CIRCUIT OF DISCHARGE HEADLIGHT CONTROL MODULE** • Disconnect the discharge headlight control module connector. • Turn the headlight switch to the HEADLIGHT (LO) position. • Measure the voltage at discharge headlight control module terminal C (wiring harness-side). • Is the voltage **approx. 12 V** ?	Yes	Go to Step 6.
		No	Go to the next step.
2	**INSPECT FUSE** • Turn the headlight switch to the OFF position. • Remove the HEAD LOW R 15 A fuse (RH) or HEAD LOW L 15 A fuse (LH). • Inspect the fuses. • Are the fuses normal?	Yes	Go to the next step.
		No	Replace the fuse.

3	**INSPECT HEADLIGHT RELAY** • Remove the headlight relay. (See **RELAY LOCATION** .) • Inspect the headlight relay. (See **RELAY INSPECTION** .) • Is the headlight relay normal?	Yes	Go to the next step.
		No	Replace the headlight relay. (See **RELAY LOCATION** .)
4	**INSPECT LIGHT SWITCH** • Inspect the light switch. (See **LIGHT SWITCH INSPECTION** .) • Is the light switch normal?	Yes	Go to the next step.
		No	Replace the light switch. (See **LIGHT SWITCH REMOVAL/INSTALLATION** .)

5	**INSPECT WIRING HARNESS BETWEEN BATTERY AND DISCHARGE HEADLIGHT CONTROL MODULE**
	• Remove the battery cover.
	• Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
	• Inspect for continuity between the following terminals:
	  ○ Battery (positive terminal) and headlight relay (main fuse block terminal A)
	  ○ Headlight relay terminal 2C and HEAD LOW R 15 A fuse (RH) terminal U
	  ○ Headlight relay terminal 2C and HEAD LOW L 15 A fuse (LH) terminal U
	  ○ HEAD LOW R 15 A fuse (RH) terminal T and discharge headlight control module terminal C
	  ○ HEAD LOW L 15 A fuse (LH) terminal R and discharge headlight control module terminal C
	• Are the wiring harnesses normal?
		Yes	Go to the next step.

		No	Replace the related wiring harness.
6	**INSPECT WIRING HARNESS BETWEEN DISCHARGE HEADLIGHT CONTROL MODULE AND GROUND** • Inspect wiring harness between discharge	Yes	Go to the next step.
		No	

	headlight control module terminal F and ground for following: ○ Short to power supply ○ Open circuit • Is the wiring harness normal?	No	Replace the related wiring harness.
7	**VERIFY WHETHER MALFUNCTION IS IN DISCHARGE HEADLIGHT BULB OR DISCHARGE HEADLIGHT CONTROL MODULE** • Install the discharge headlight low bulb (previously verified as illuminating normally). (See **HEADLIGHT BULB REMOVAL/INSTALLATION** .) • Connect the discharge headlight control module connector. • Turn the headlight switch to the HEADLIGHT (LO) position. • Does the headlight (low-beam) illuminate?	Yes	System inspection completed.
		No	Replace the front combination light. (See **FRONT COMBINATION LIGHT REMOVAL/INSTALLATION** .)

PARKING LIGHT BULB REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the connector.
4. Remove the socket, then remove the parking light bulb.
5. Install in the reverse order of removal.

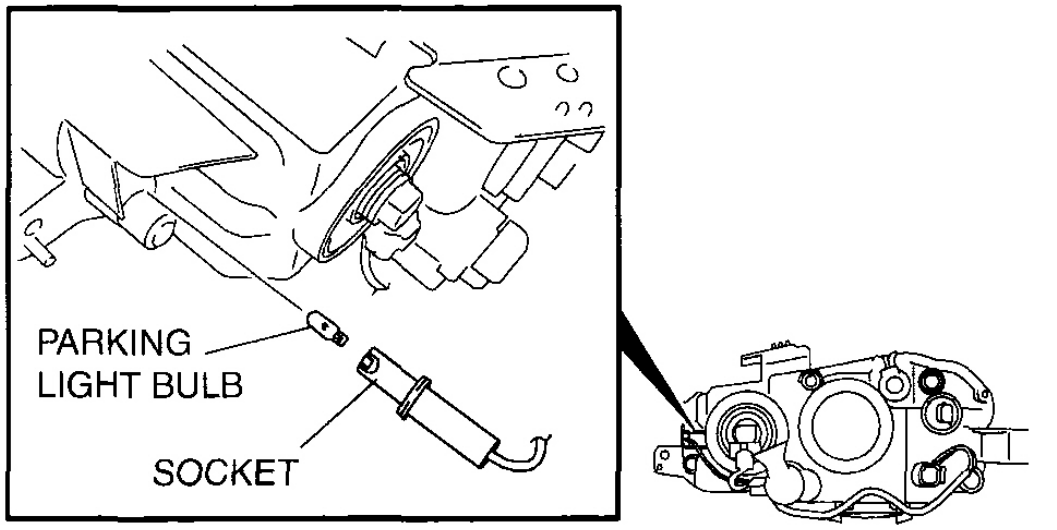


Fig. 16: Identifying Parking Light Bulb
Courtesy of MAZDA MOTORS CORP.

FRONT SIDE MARKER LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Move the front side marker light in the direction of the arrow (1) and detach the tab.
4. Pull area A of the front side marker light in the defection of arrow (2) and remove the front side marker light.
5. Detach the socket and remove the front side marker light bulb.
6. Install in the reverse order of removal.

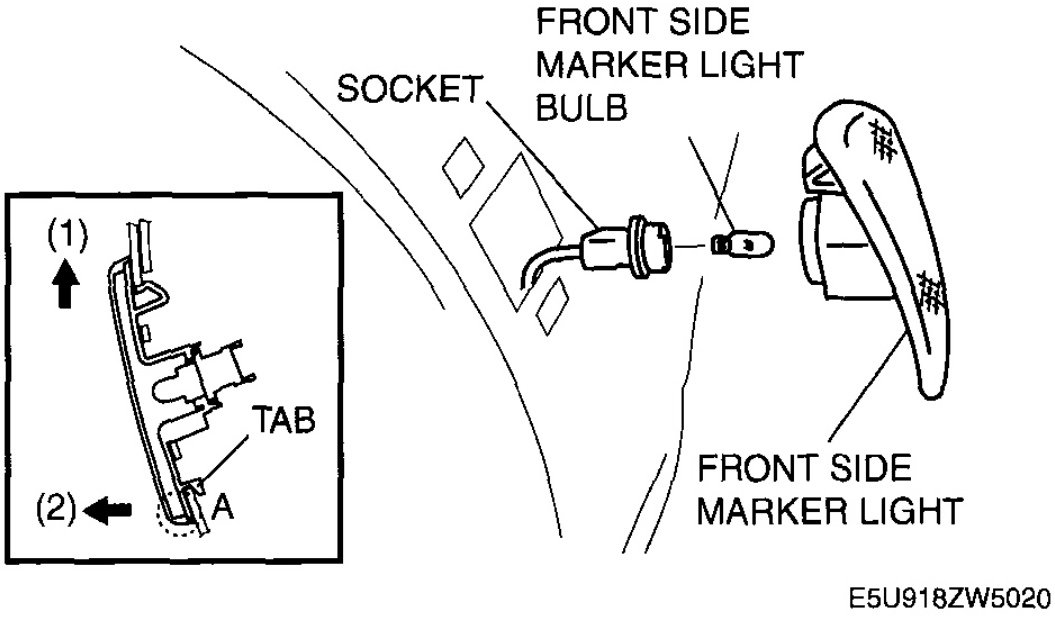


Fig. 17: Removing Front Side Marker Light Bulb
Courtesy of MAZDA MOTORS CORP.

FRONT TURN LIGHT BULB REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the fasteners.
4. Slightly bent back the mudguard.

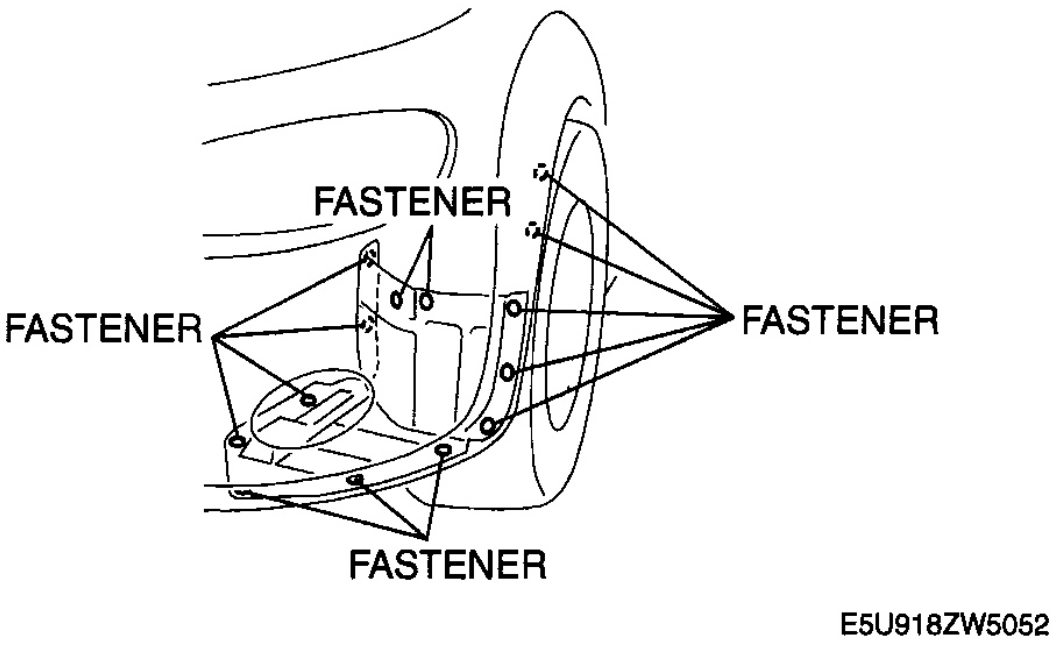


Fig. 18: Identifying Fasteners
Courtesy of MAZDA MOTORS CORP.

5. Disconnect the connector.
6. Remove the socket, then remove the front turn light bulb.
7. Install in the reverse order of removal.

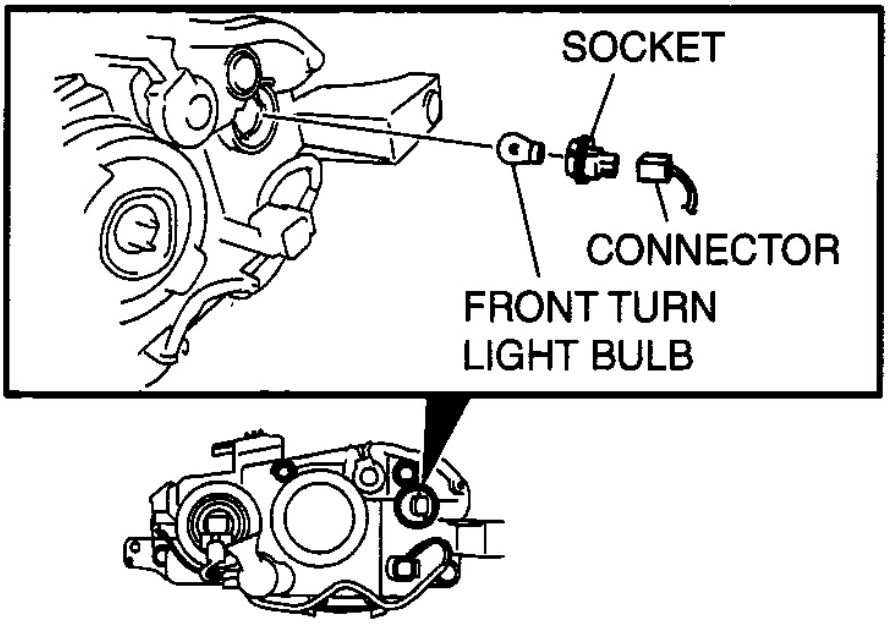


Fig. 19: Identifying Front Turn Light Bulb
Courtesy of MAZDA MOTORS CORP.

FRONT FOG LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the fasteners.
4. Slightly bent back the mudguard.

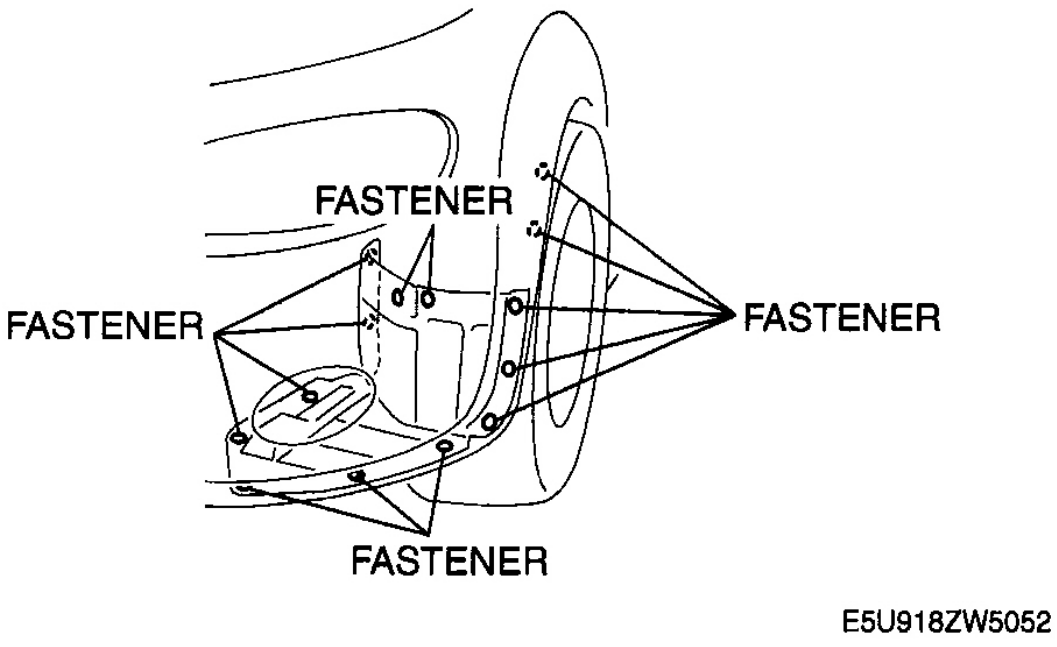


Fig. 20: Identifying Fasteners
Courtesy of MAZDA MOTORS CORP.

5. Disconnect the front fog light connector.
6. Remove the bolt, then remove the front fog light.
7. Install in the reverse order of removal.
8. Adjust the front fog light aiming. (See **FRONT FOG LIGHT AIMING** .)

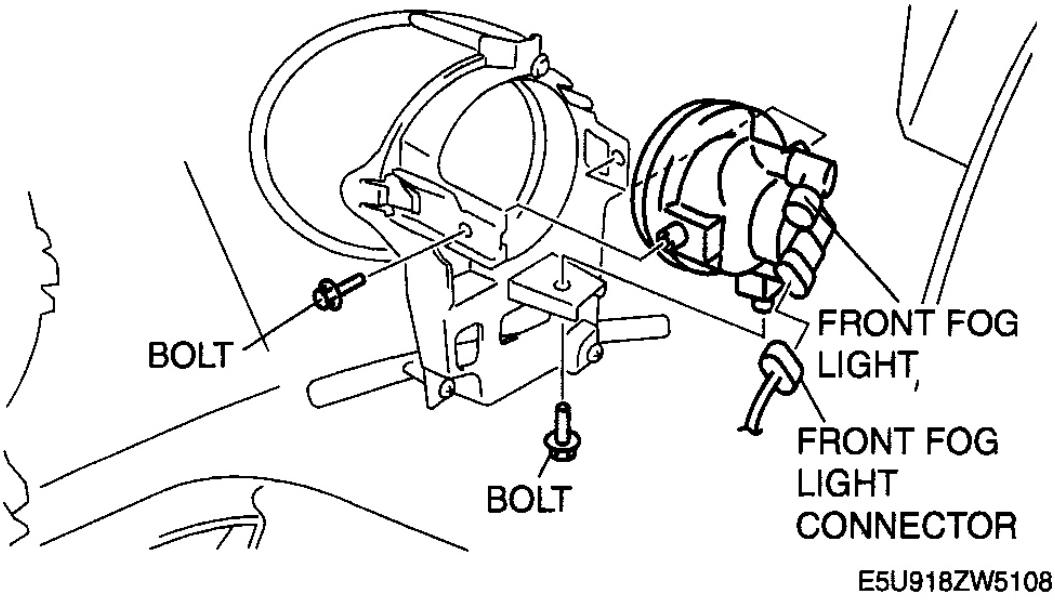


Fig. 21: Identifying Front Fog Light
Courtesy of MAZDA MOTORS CORP.

FRONT FOG LIGHT AIMING

1. Point the headlight beams to a wall and verify that the headlight beams are as shown in **Fig. 22** .

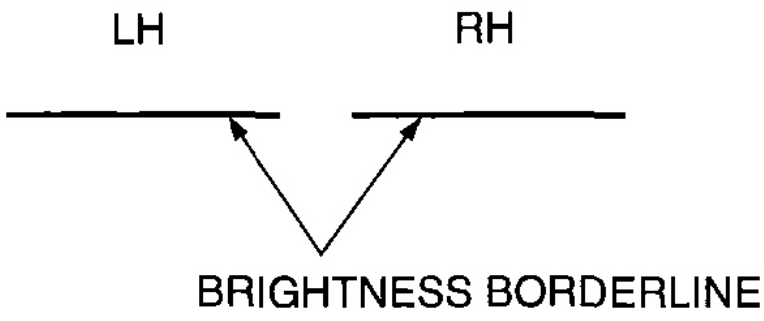


Fig. 22: Identifying Front Fog Light Aiming Adjustment
Courtesy of MAZDA MOTORS CORP.

2. Make a headlight adjustment screen as shown in **Fig. 23** using double-weight, white paper.

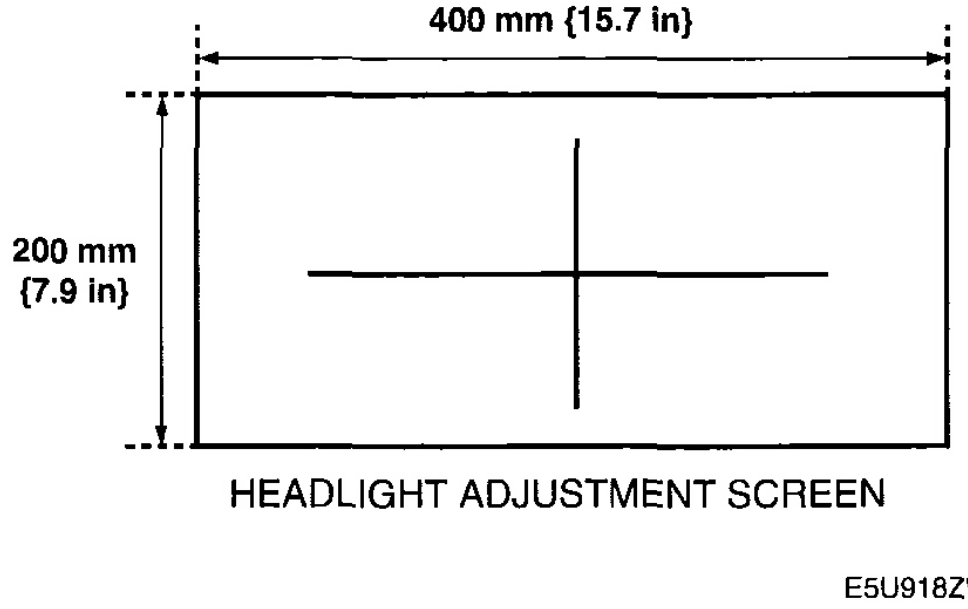


Fig. 23: Identifying Headlight Adjustment Screen
Courtesy of MAZDA MOTORS CORP.

3. Remove the bolt A and cut the front fog light hole cover at the position shown in **Fig. 24** .
4. Adjust the tire pressure to the specification.
5. Position the unloaded vehicle on a flat, level surface.

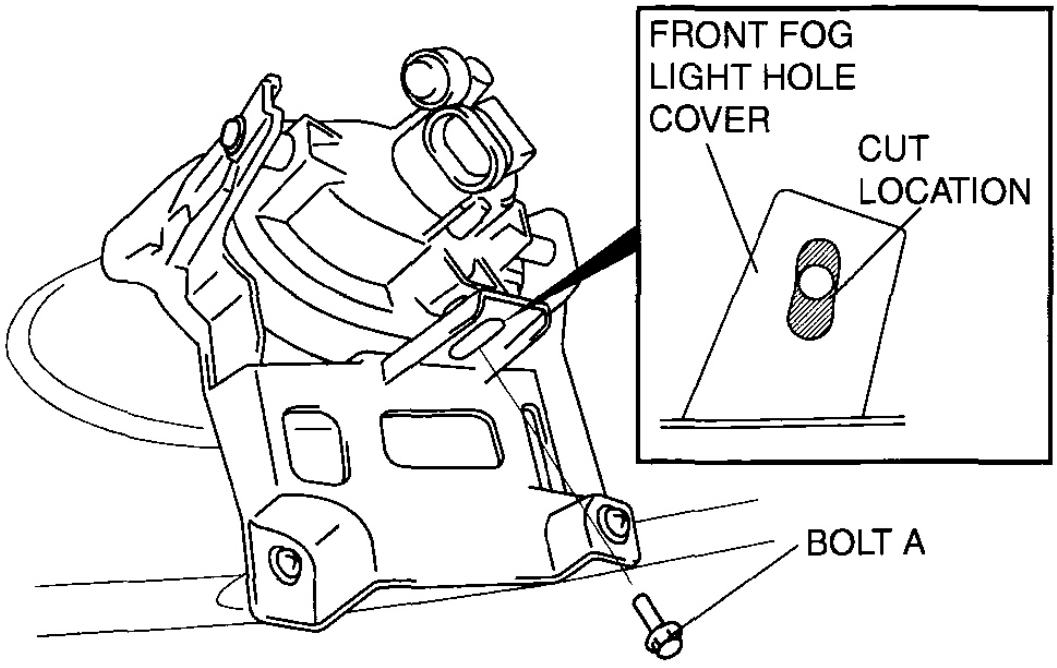


Fig. 24: Identifying Bolt "A" & Cutting Location For Front Fog Light Hole Cover
Courtesy of MAZDA MOTORS CORP.

6. Seat one person in the driver's seat.
7. Line up the headlights with the white screen at a distance of **3 m {9.8 ft}** apart.
8. Place an object in front of the fog light not being adjusted to block its light beam.
9. Start the engine so that the battery remains charged.
10. Turn the front fog lights on.

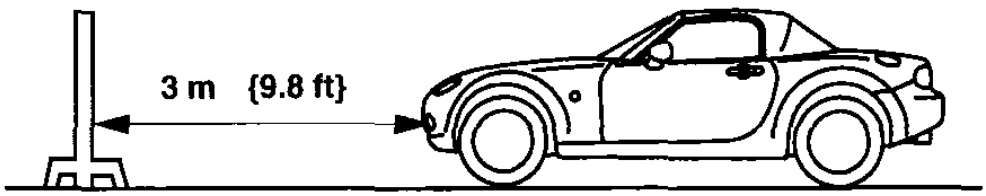


Fig. 25: Identifying Distance Between Headlight Adjustment Screen & Vehicle
Courtesy of MAZDA MOTORS CORP.

11. Loosen the bolt B, move the front fog light in the direction of the arrows, and adjust the center of the front fog light to the position shown in **Fig. 26** .

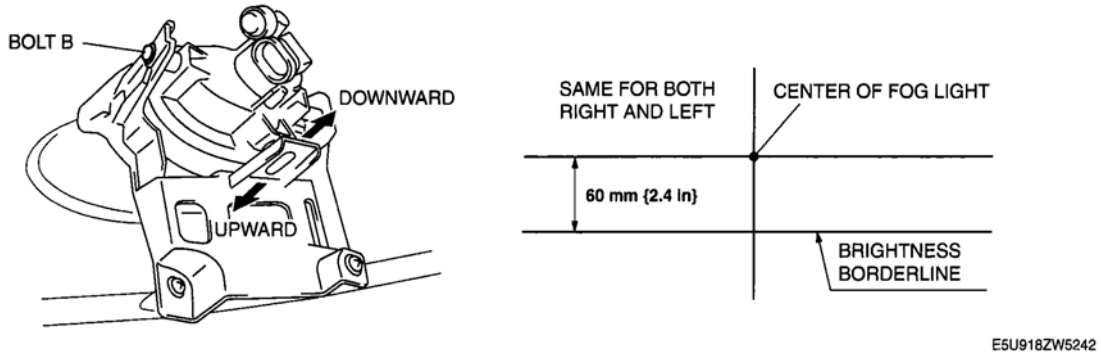


Fig. 26: Identifying Bolt B
Courtesy of MAZDA MOTORS CORP.

12. Install the bolt A and tighten the bolt B.

FRONT FOG LIGHT BULB REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the fasteners.
4. Slightly bend back the mudguard.

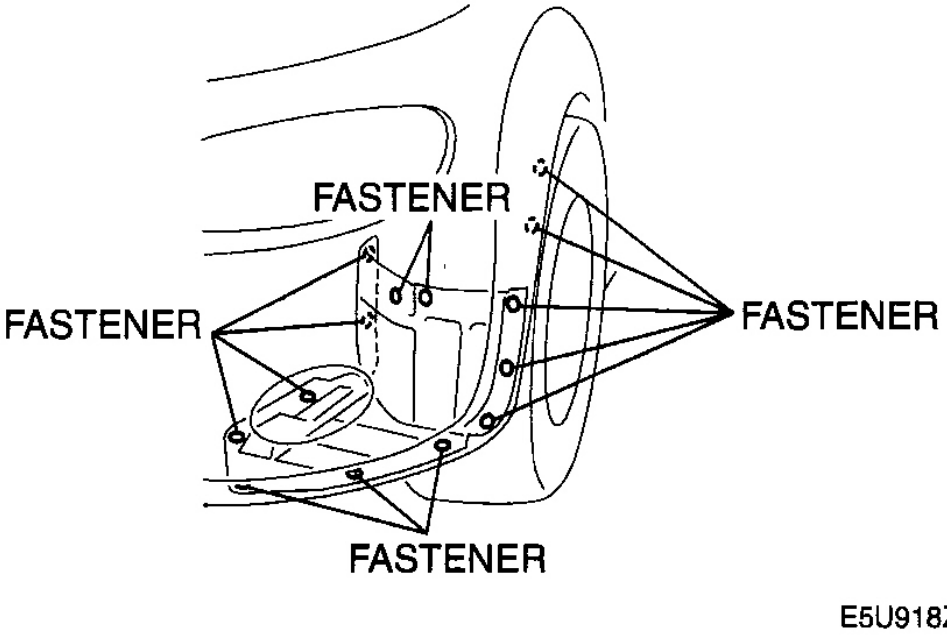


Fig. 27: Identifying Fasteners
Courtesy of MAZDA MOTORS CORP.

5. Disconnect the front fog light bulb connector and remove the front fog light bulb by turning it in the direction of the arrow.

CAUTION:

- **A halogen bulb generates extremely high heat when it is illuminated. If the surface of the bulb is soiled, excessive heat will build up and the life of the bulb will be shortened. When handling the bulb, hold the flange, not the glass. Wipe off any finger prints before installation.**

6. Install in the reverse order of removal.

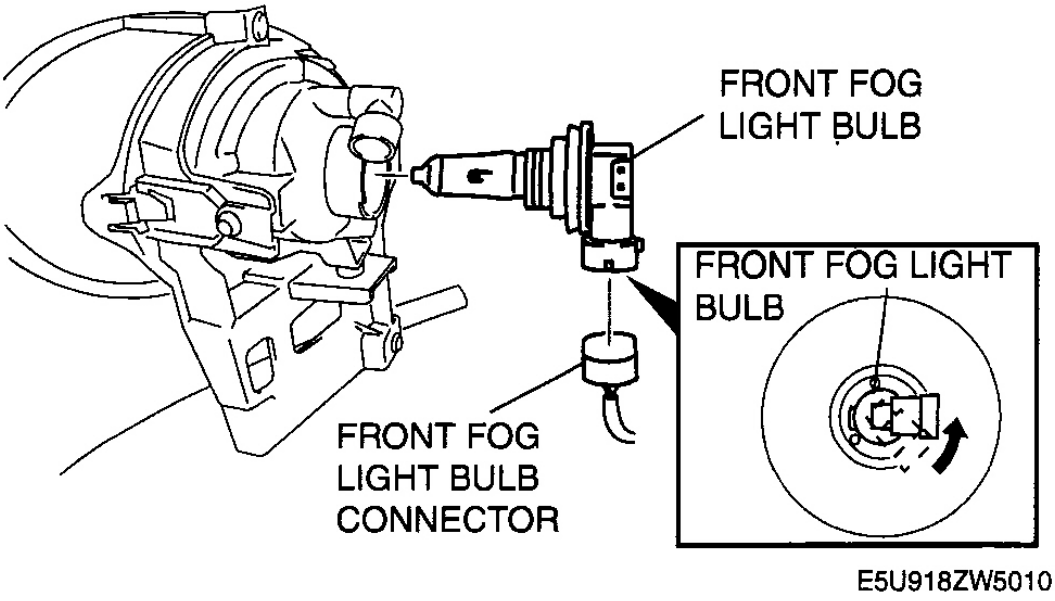
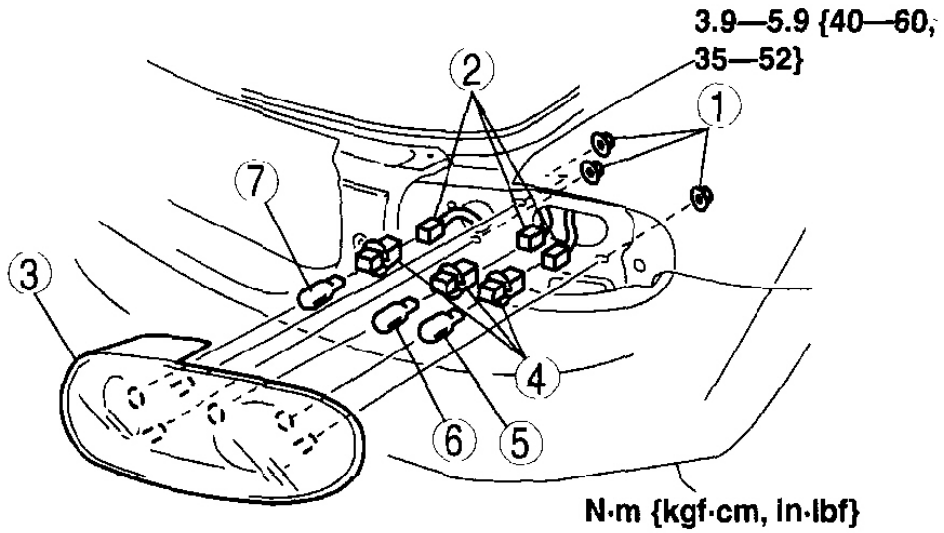


Fig. 28: Disconnecting Front Fog Light Bulb Connector & Removing Front Fog Light Bulb
Courtesy of MAZDA MOTORS CORP.

REAR COMBINATION LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
4. Remove the trunk side trim. (See **TRUNK SIDE TRIM REMOVAL/INSTALLATION** .)
5. Remove in the order indicated in **Fig. 29** .



1	Nut
2	Connector
3	Rear combination light
4	Socket
5	Brake light/taillight bulb
6	Rear turn light bulb
7	Back-up light bulb

Fig. 29: Identifying Rear Combination Light (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

HIGH-MOUNT BRAKE LIGHT REMOVAL/INSTALLATION

EXCEPT POWER RETRACTABLE TOP

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the partition board. (See **PARTITION BOARD REMOVAL/INSTALLATION** .)
4. Disconnect the high-mount brake light connector.

5. Press the tabs and remove the clips.
6. Install in the reverse order of removal.

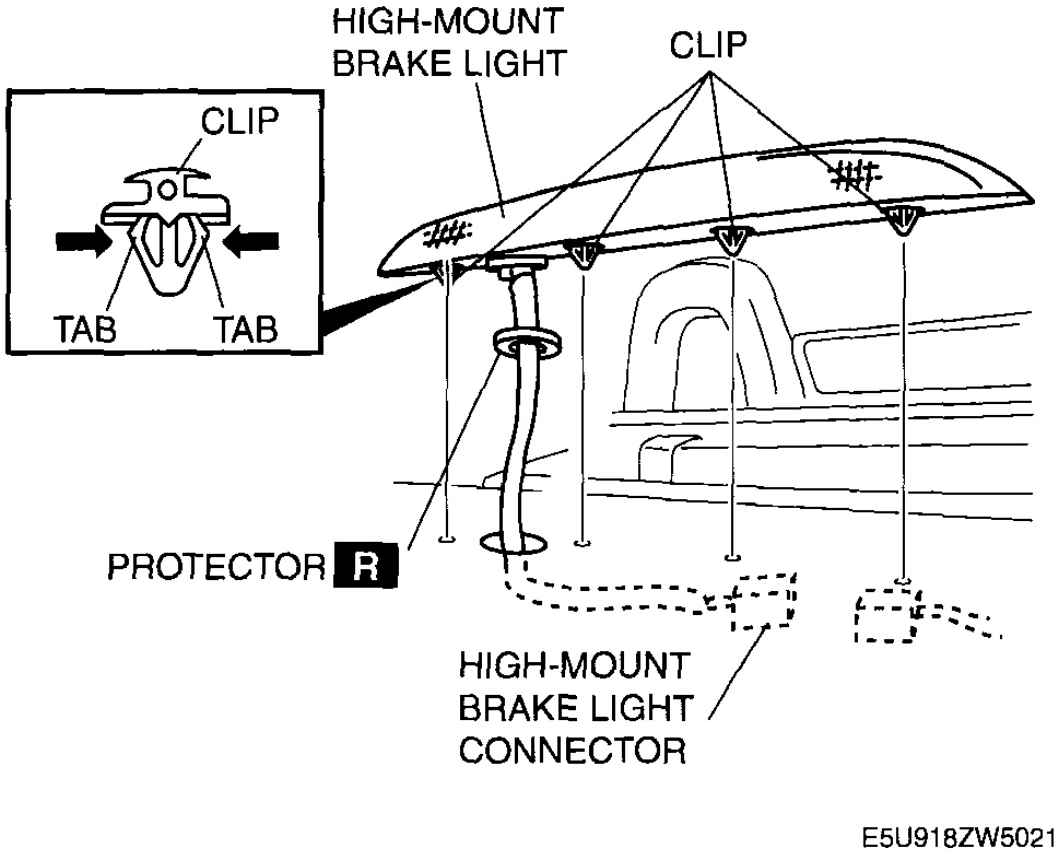


Fig. 30: Disconnecting High-Mount Brake Light Connector
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE TOP

1. Fully open the deck panel.
2. Partially peel back the seal cover.
3. Disconnect the high-mount brake light connector.
4. Remove the wiring harness and connector of the high-mount brake light from the deck panel.

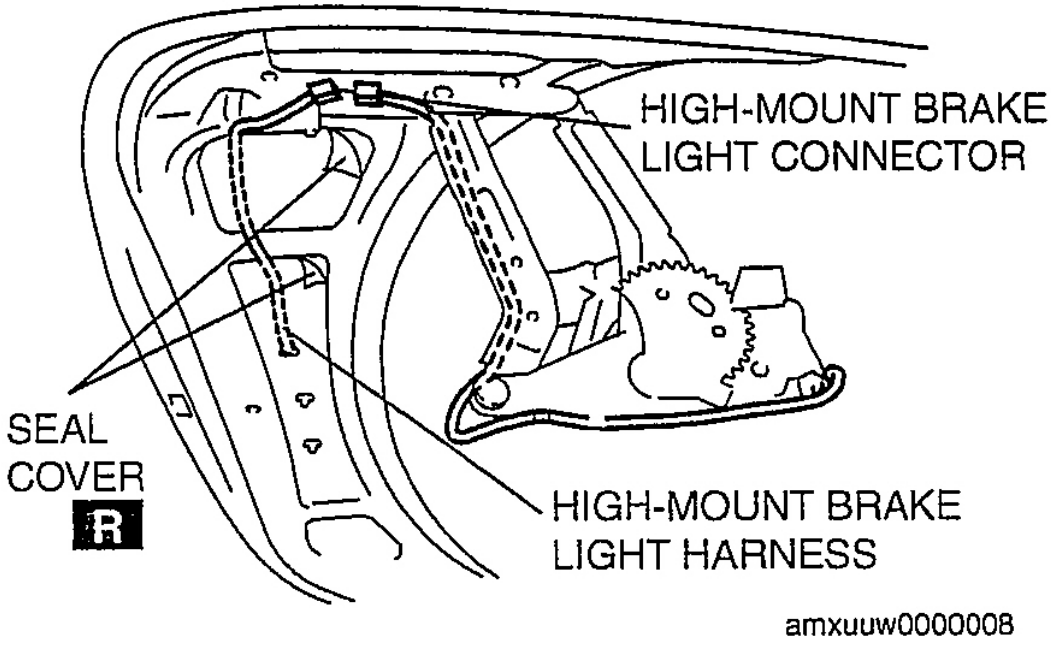


Fig. 31: Identifying High Mount Brake Light Connector And Harness
Courtesy of MAZDA MOTORS CORP.

5. remove the nuts.
6. Remove the high-mount brake light.

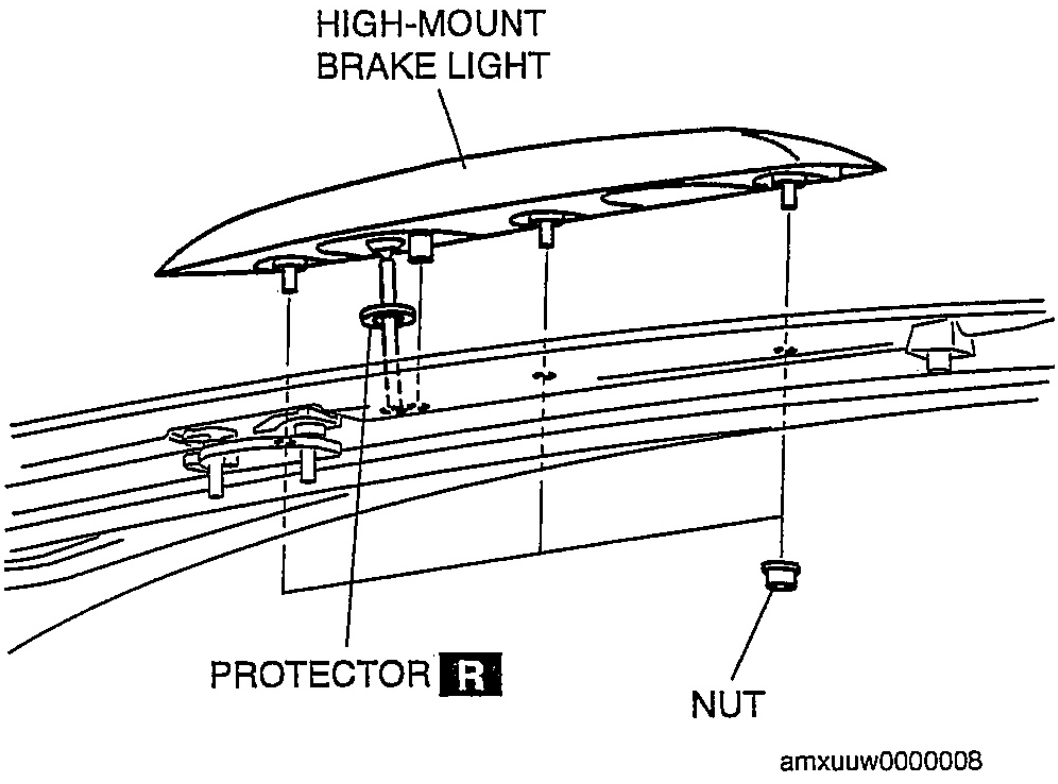


Fig. 32: Identifying High Mount Brake Light Assembly
Courtesy of MAZDA MOTORS CORP.

7. Install in the reverse order of removal

LICENSE PLATE LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Move the license plate light in the direction of the arrow (1) and detach the tab.
4. Pull area A of the license plate light in the direction of the arrow (2) and remove the license plate light.
5. Disconnect the connector.
6. Detach the socket and remove the license plate light bulb.
7. Install in the reverse order of removal.

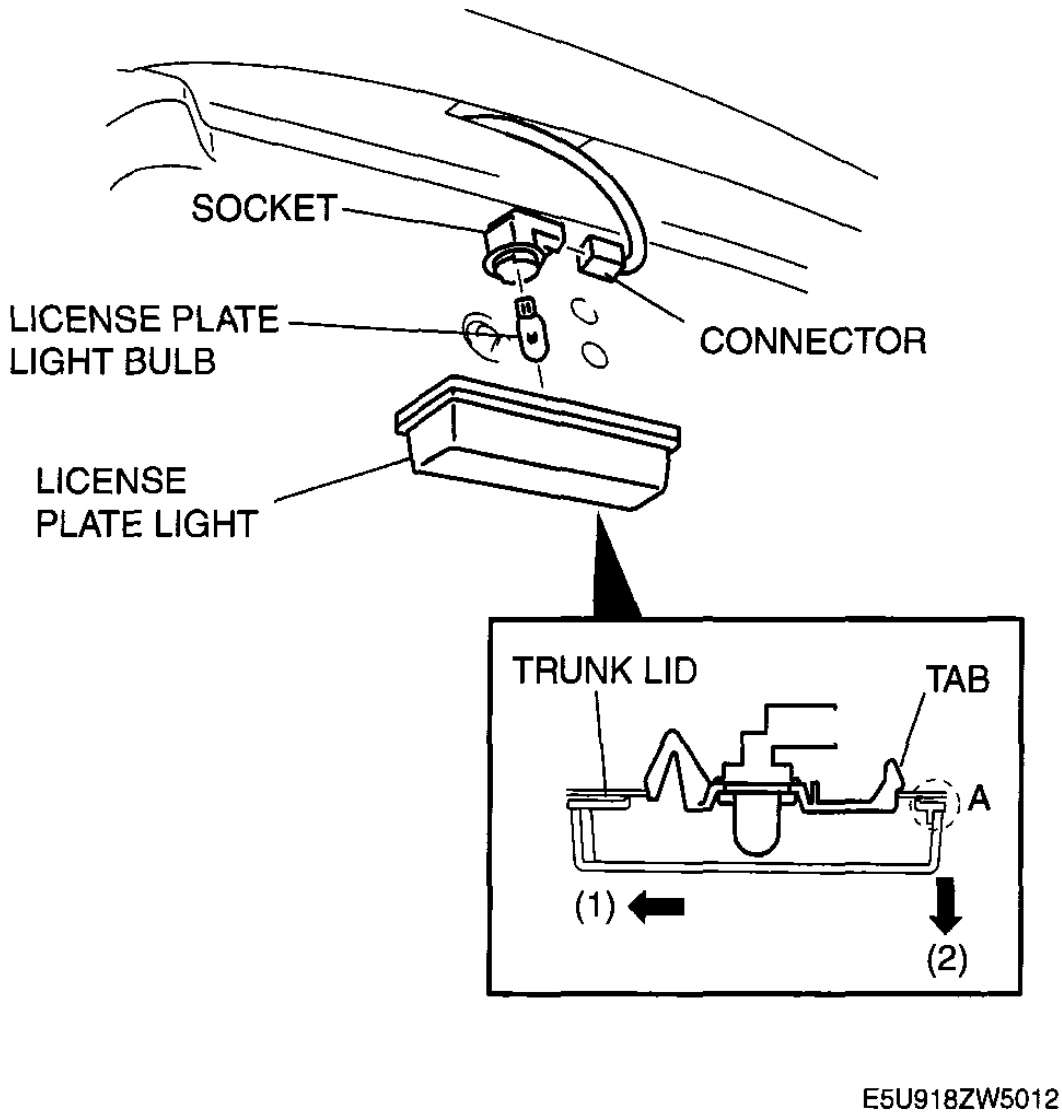
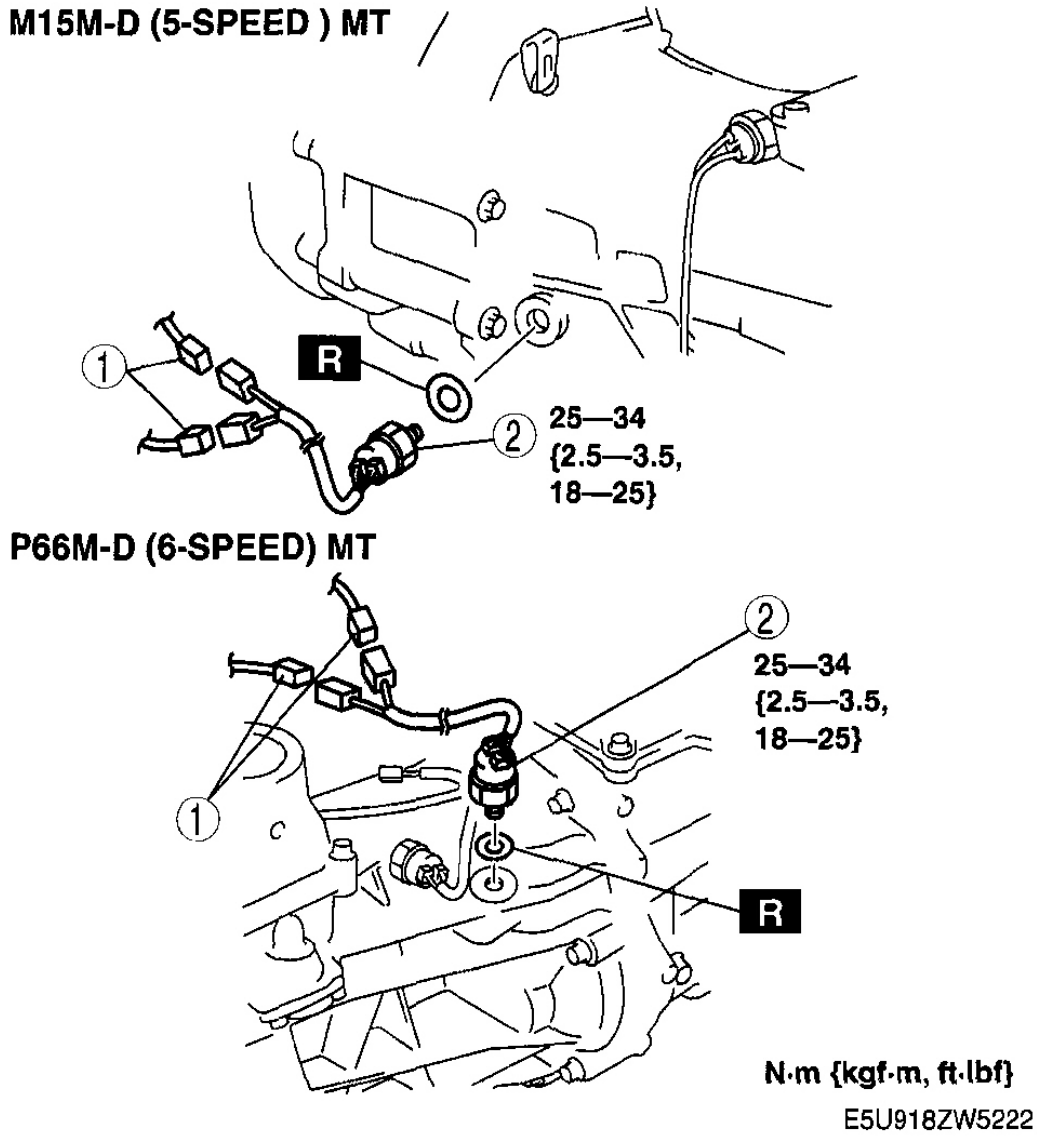


Fig. 33: Detaching Socket & Removing License Plate Light Bulb
Courtesy of MAZDA MOTORS CORP.

BACK-UP LIGHT SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Loosen the starter installation bolts only enough that the starter is loose, but not removed. (P66M-D) (See **STARTER REMOVAL/INSTALLATION [LF]** .)
4. Remove the transmission.(P66M-D) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .)

5. Remove in the order indicated in **Fig. 34** .



1	Connector
2	Back-up light switch

Fig. 34: Identifying Back-Up Light Switch (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

6. Install in the reverse order of removal.

BACK-UP LIGHT SWITCH INSPECTION

1. Disconnect the back-up light switch connector.
2. Inspect for continuity between the back-up light switch terminals using an ohmmeter.
   - If there is any malfunction, replace the back-up light switch.

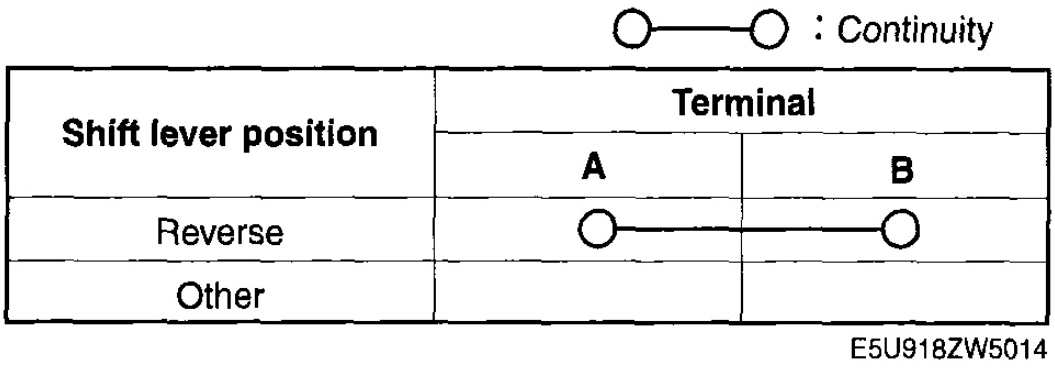


Fig. 35: Back-Up Light Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

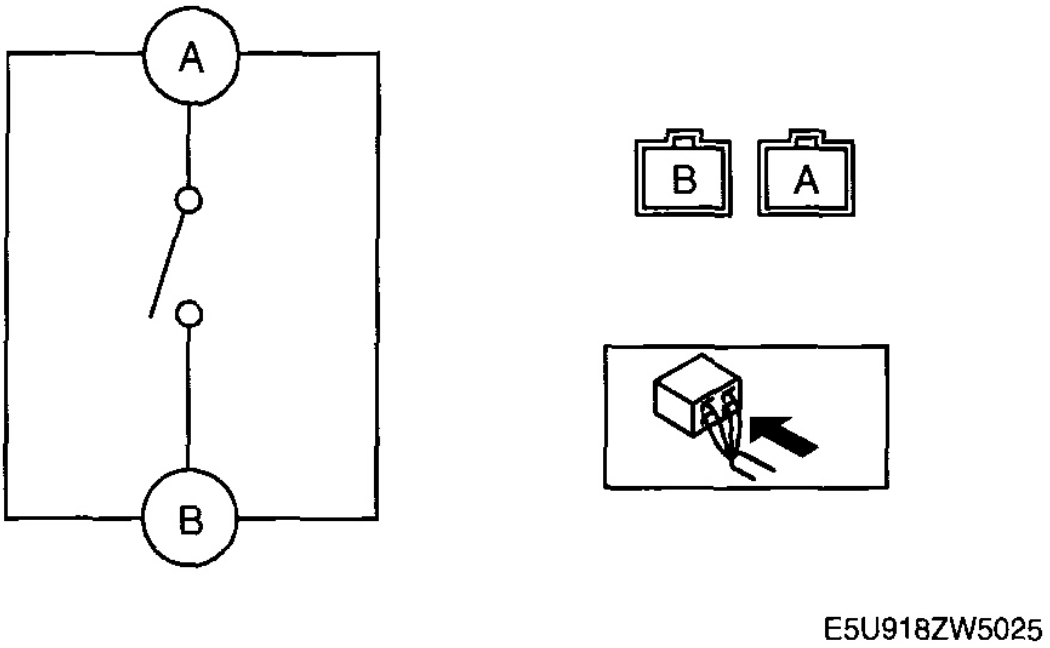


Fig. 36: Identifying Back-Up Light Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

COMBINATION SWITCH REMOVAL/INSTALLATION

WARNING:

- **For vehicles with DSC, if the negative battery cable or the steering angle sensor connector or ROOM 15 A fuse is disconnected, the stored initial position of the steering angle sensor will be cleared and the DSC will not operate properly, making the vehicle unsafe to drive. Perform the steering angle sensor initialization procedure after connecting the negative battery cable.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Driver-side air bag module (See **DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION** .)
    2. Steering wheel (See **STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION** .)
    3. Column cover (See **COLUMN COVER REMOVAL/INSTALLATION** .)
    4. Clock spring (See **CLOCK SPRING REMOVAL/INSTALLATION** .)
4. Disconnect the connector.
5. Disconnect the steering angle sensor connector. (Vehicles with DSC)
6. Remove the screws and then remove the combination switch.
7. Install in the reverse order of removal.
8. Perform the steering angle sensor initialization procedure. (Vehicles with DSC) (See **STEERING ANGLE SENSOR INITIALIZATION PROCEDURE** .)
9. If the steering angle sensor (combination switch body) Is replaced, perform initialization of the DSC HU/CM steering angle signal. (See **STEERING ANGLE SIGNAL INITIALIZATION PROCEDURE** .)

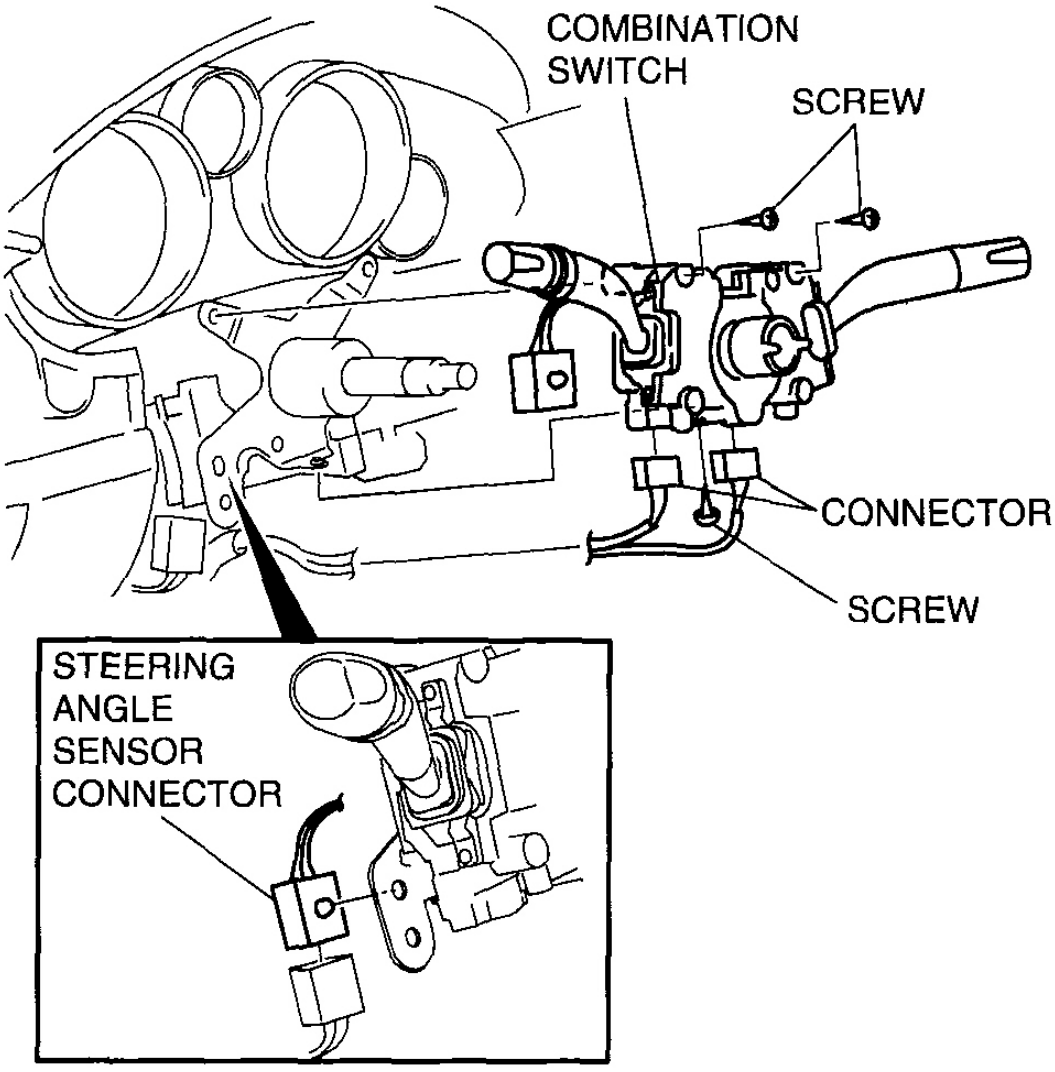


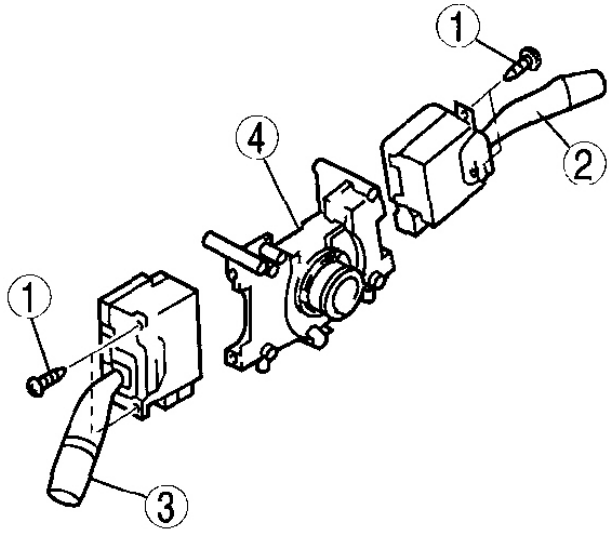
Fig. 37: Identifying Combination Switch
Courtesy of MAZDA MOTORS CORP.

COMBINATION SWITCH DISASSEMBLY/ASSEMBLY

CAUTION:

- **For vehicles with DSC: If the disc on the combination switch is deformed or has foreign material adhering to it, performance of the steering angle sensor may be reduced, causing abnormal operation. When handling the combination switch, be careful not to deform the disc and make sure there is no foreign material on it.**

1. Disassemble in the order indicated in **Fig. 38** .



CHU0918W124

1	Screw
2	Wiper and washer switch
3	Light switch
4	Body

Fig. 38: Identifying Combination Switch
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

LIGHT SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Disconnect the connector.
5. Remove the screws and then remove the light switch.
6. Install in the reverse order of removal.

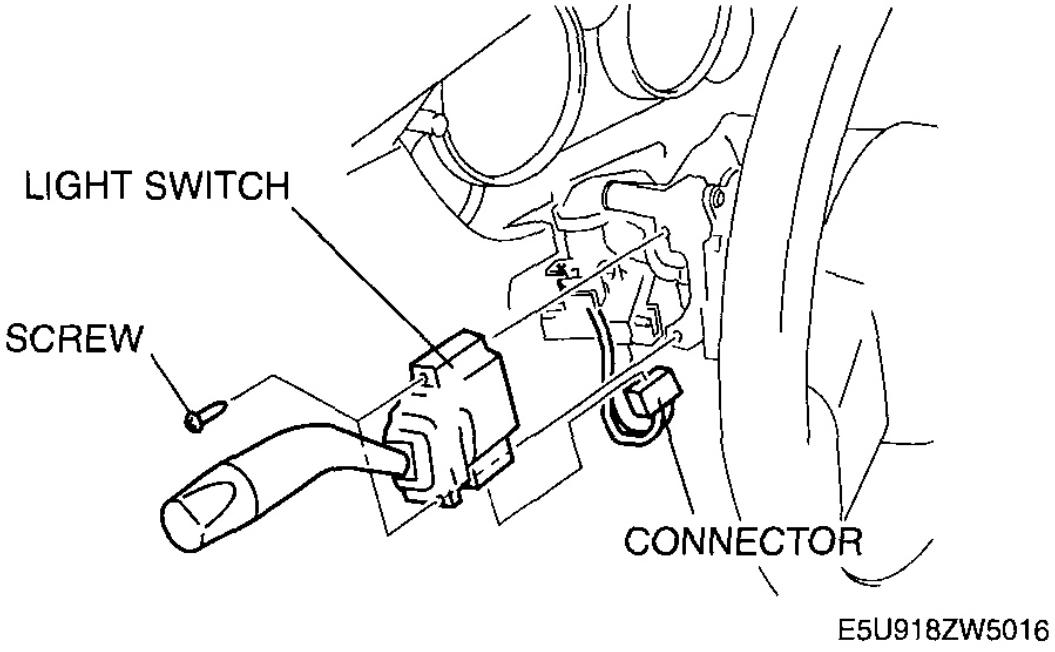


Fig. 39: Identifying Light Switch
Courtesy of MAZDA MOTORS CORP.

LIGHT SWITCH INSPECTION

1. Verify that the continuity between the light switch terminals is as indicated in **Fig. 40** .

- If not as indicated in **Fig. 40** replace the light switch.

Headlight Switch

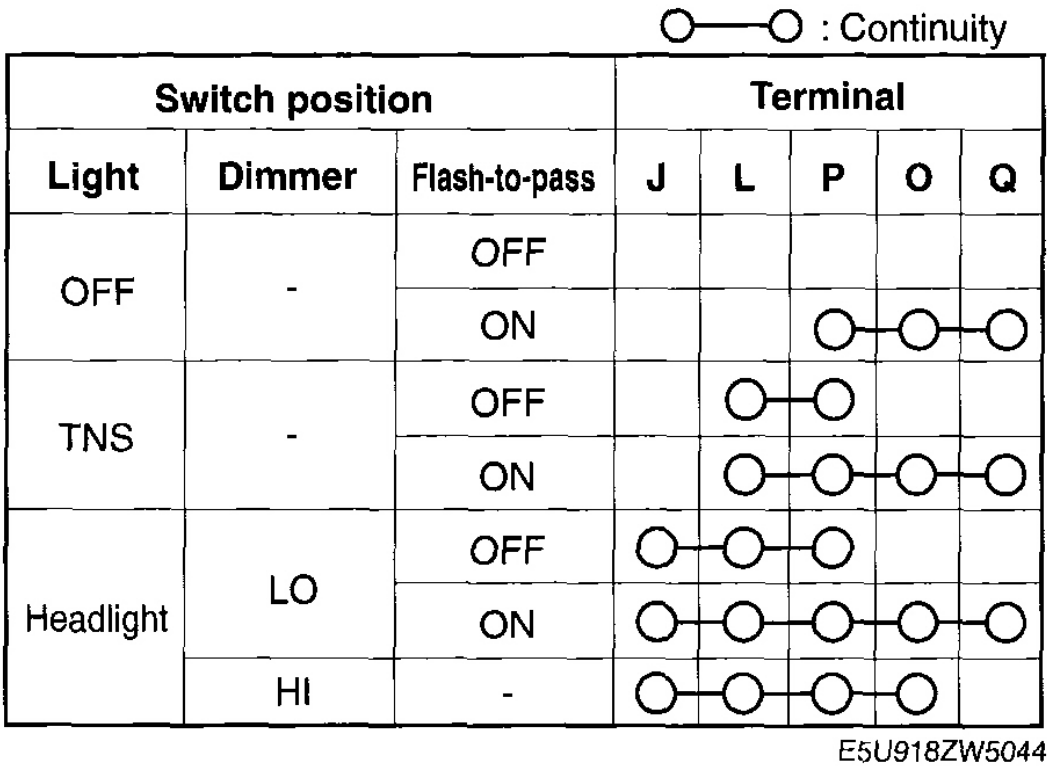
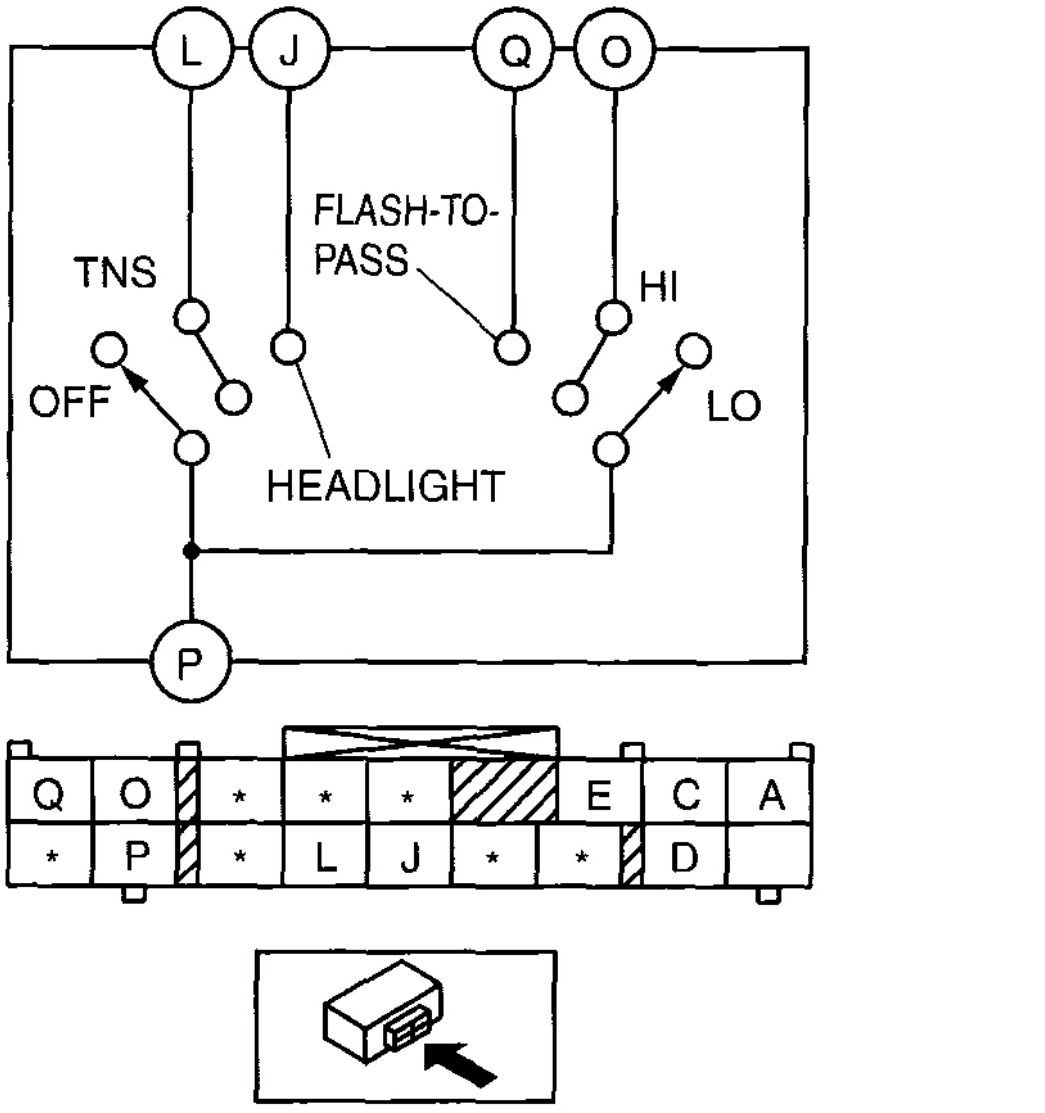


Fig. 40: Headlight Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.



E5U918ZW5043

Fig. 41: Identifying Headlight Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

Turn Switch

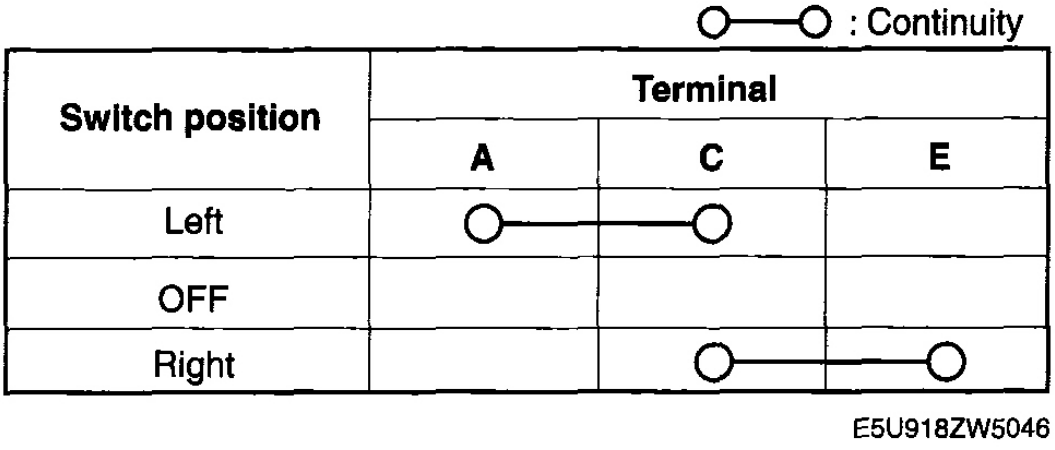


Fig. 42: Turn Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

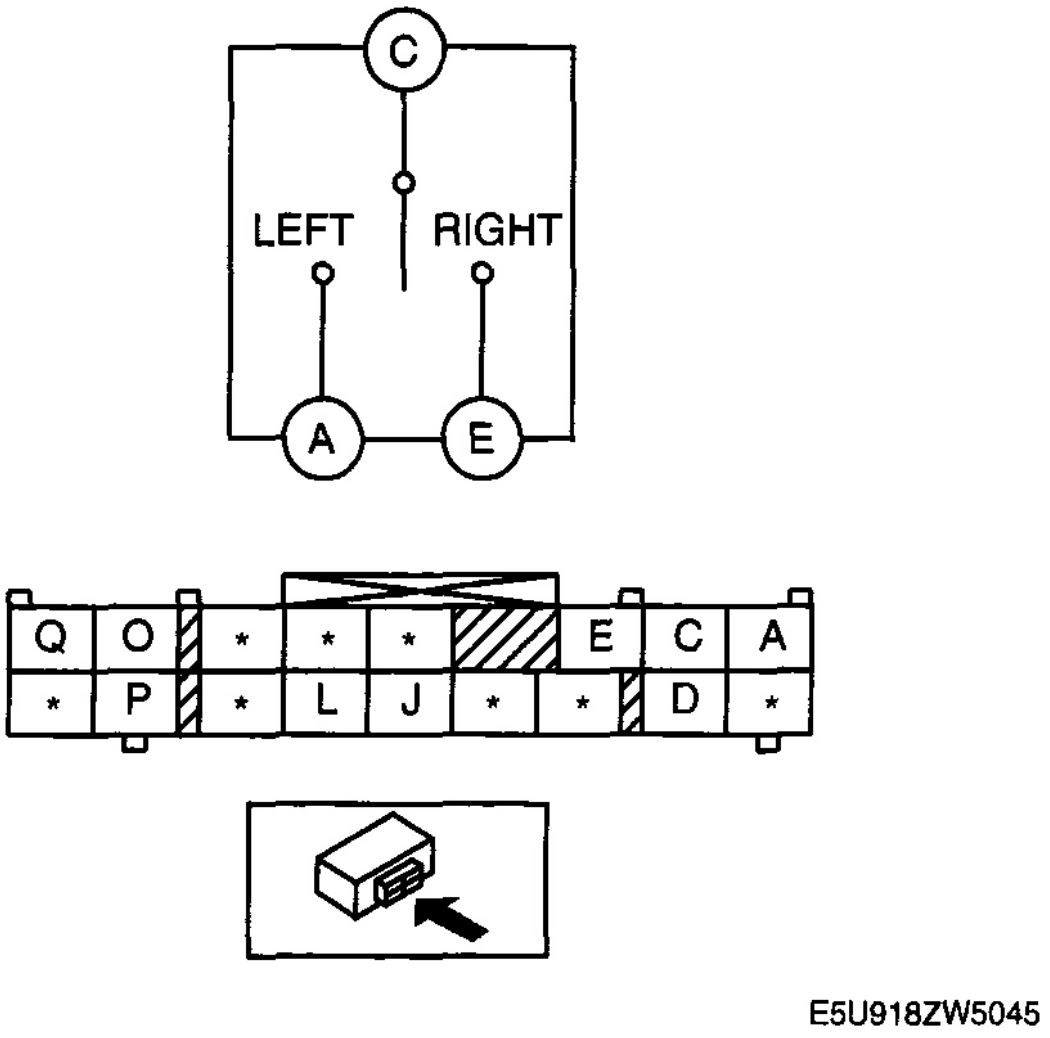


Fig. 43: Identifying Turn Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

FRONT FOG LIGHT SWITCH INSPECTION

1. Verify that the continuity between the front fog light switch terminals is as indicated in **Fig. 44** .
    - If not as indicated in **Fig. 44** , replace the light switch.

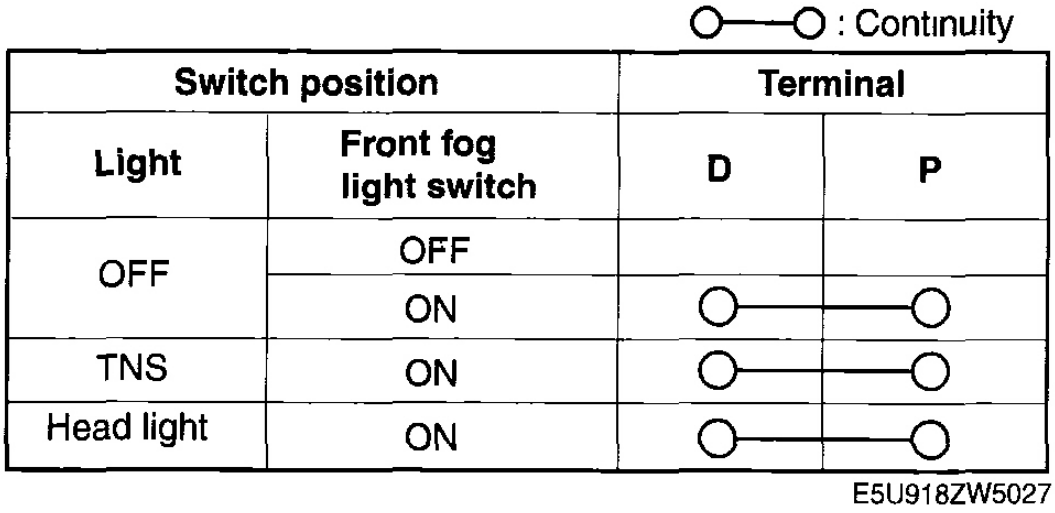


Fig. 44: Front Fog Light Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

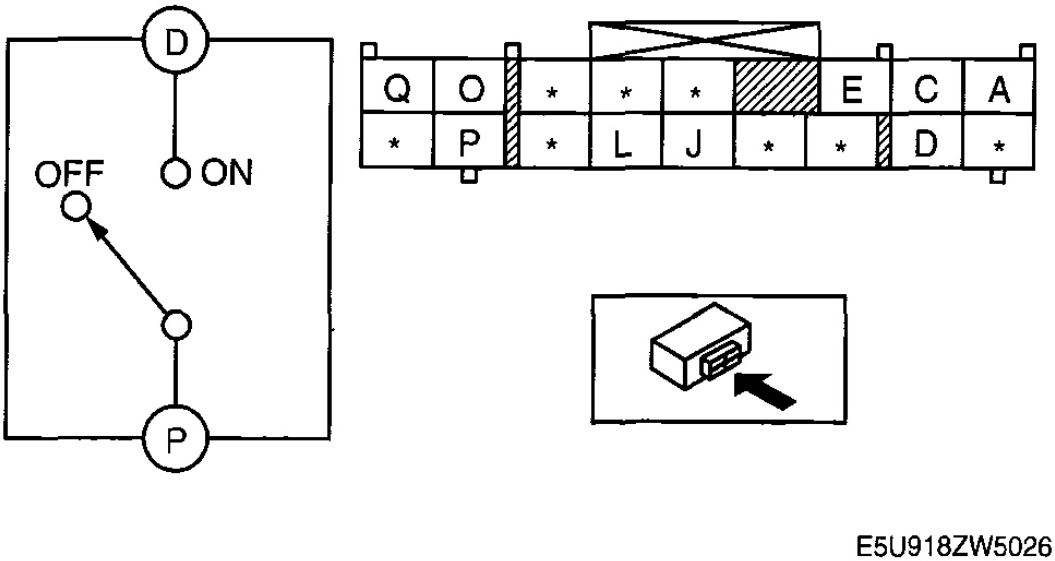
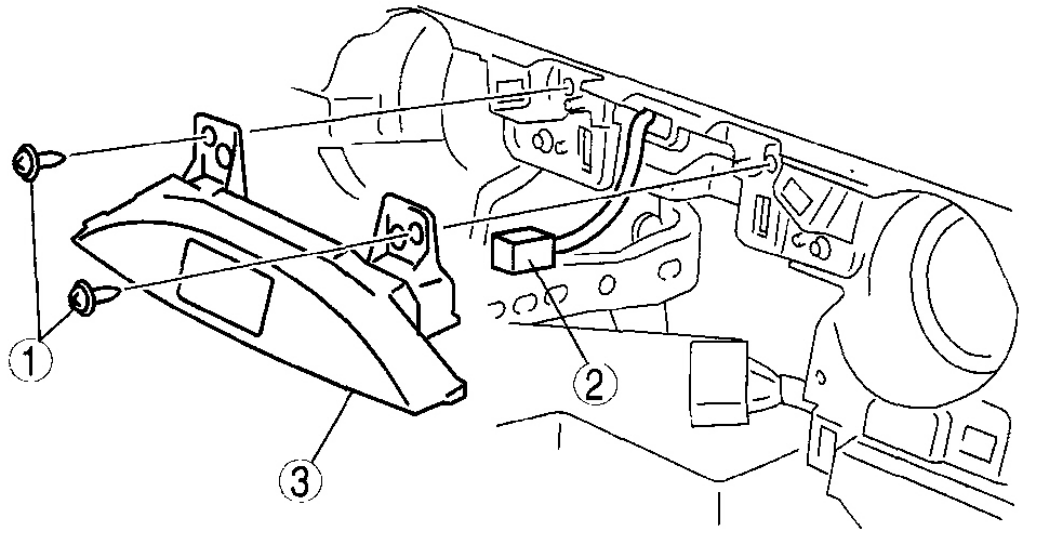


Fig. 45: Identifying Front Fog Light Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

HAZARD WARNING SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
4. Remove the center panel unit. (See **CENTER PANEL UNIT REMOVAL/INSTALLATION** .)
5. Remove the glove compartment. (See **GLOVE COMPARTMENT REMOVAL/INSTALLATION** .)
6. Remove the decoration panel (passenger's side). (See **DECORATION PANEL REMOVAL/INSTALLATION** .)
7. Remove in the order indicated in **Fig. 46**.



1	Screw
2	Hazard warning switch connector
3	Hazard warning switch

Fig. 46: Identifying Hazard Warning Switch
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.

HAZARD WARNING SWITCH INSPECTION

1. Verify that the continuity between the hazard switch terminals is as indicated in **Fig. 47** .
   - If not as indicated in **Fig. 47** , replace the hazard warning switch.

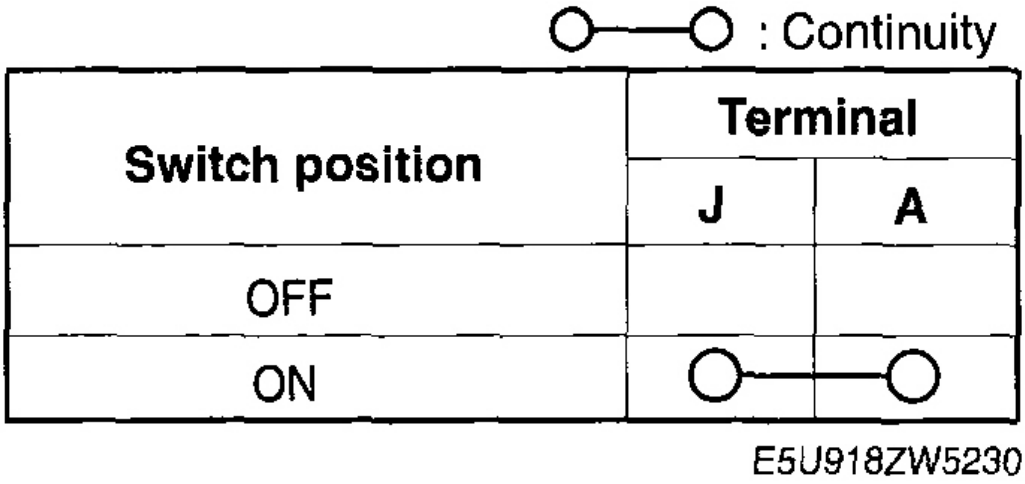


Fig. 47: Hazard Warning Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

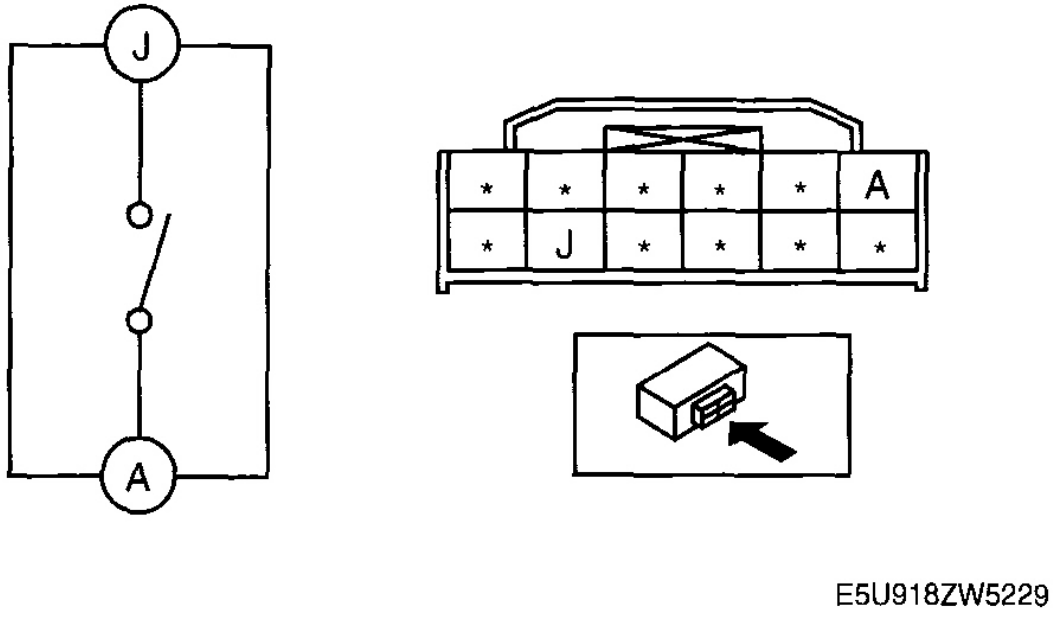


Fig. 48: Identifying Hazard Warning Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

FLASHER CONTROL MODULE REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the connector.
4. Remove the screw and then remove the flasher control module.
5. Install in the reverse order of removal.

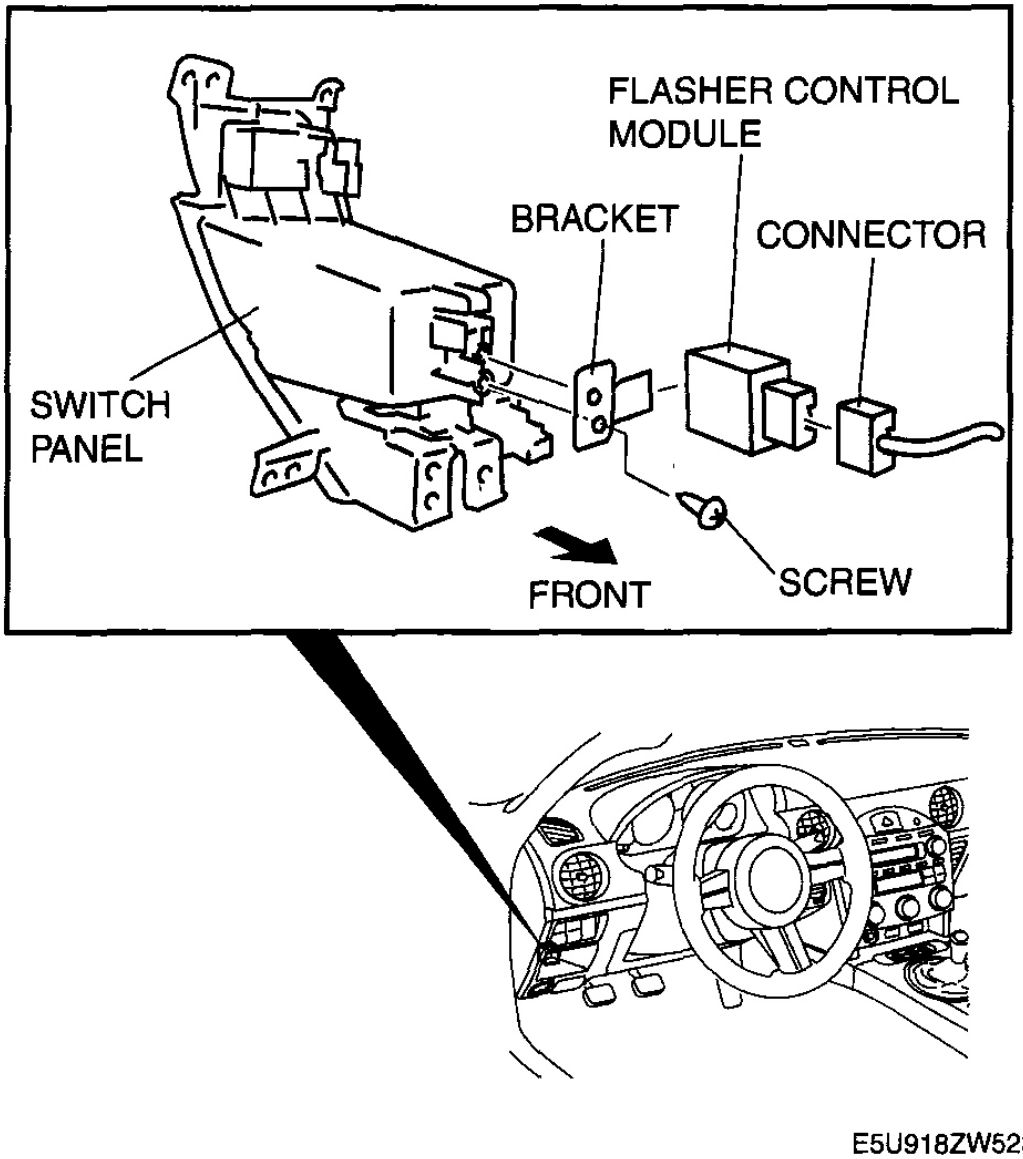


Fig. 49: Identifying Flasher Control Module

Courtesy of MAZDA MOTORS CORP.

FLASHER CONTROL MODULE INSPECTION

1. Remove the flasher control module with the connector still connected.
2. Measure the voltage at each terminal (other than terminal F).
    - If the voltage is not as specified in **TERMINAL VOLTAGE TABLE** inspect the parts under "Inspection item(s)".
3. Disconnect the flasher control module connector.
4. Verify that continuity at terminal F is as indicated in **TERMINAL VOLTAGE TABLE** .
    - If there is any malfunction, inspect the parts under "Inspection item(s)".
        - If the system does not work properly even though the parts or related wiring harnesses do not have any malfunction, replace the flasher control module.

TERMINAL VOLTAGE TABLE (REFERENCE)

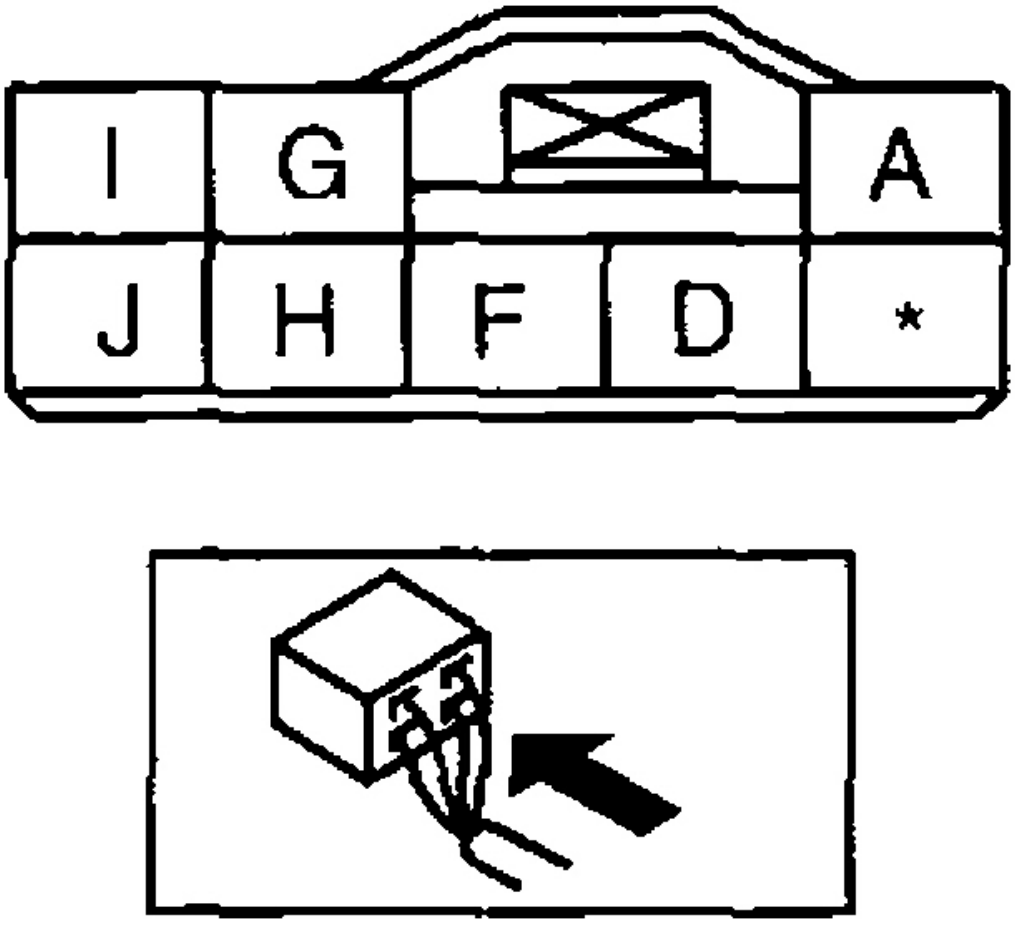


Fig. 50: Identifying Flasher Control Module Connector
Courtesy of MAZDA MOTORS CORP.

TERMINAL VOLTAGE TABLE (REFERENCE)

Terminal	Signal name	Connected to	Measured condition		Voltage (V)/Continuity	Inspection item(s)
A	Power supply	HAZARD 10 A fuse	Under any condition		B+	• HAZARD 10 A fuse • Related wiring harnesses
D	Flasher control	Turn light	Turn light switch (LH) is on.	Turn light (LH)	Alternates between 1.0 or	• Turn light (LH)
			Hazard			

	module output	(LH)	warning switch is on.	flashes.	less and B+	• Related wiring harnesses
			Except above		1.0 or less	
F	GND	Body ground	Under any condition: Inspect for continuity to ground.		Continuity detected	• GND
G	Flasher control module output	Turn light (RH)	Turn light switch (RH) is on.	Turn light (RH) flashes.	Alternates between 1.0 or less and B+	• Turn light (RH) • Related wiring harnesses
			Hazard warning switch is on.			
			Except above		1.0 or less	
H	Hazard warning switch input	Hazard warning switch	Hazard warning switch is on.		1.0 or less	• Hazard warning switch (See **HAZARD WARNING SWITCH INSPECTION** .) • Related wiring harnesses
			Hazard warning switch is off.		B+	
I	Turn switch (RH) input	Turn switch	Turn the ignition switch to the ON position.	Turn switch (RH) is on.	B+	• Turn switch (See **LIGHT SWITCH INSPECTION** .) • Related wiring harnesses
			Except above		1.0 or less	
J	Turn switch (LH) input	Turn switch	Turn the ignition switch to the ON position.	Turn switch (LH) is on.	B+	• Turn switch (See **LIGHT SWITCH INSPECTION** .) • Related wiring harnesses
			Except above		1.0 or less	

DRL CONTROL MODULE REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the connectors.
4. Remove the screw and then remove the DRL control module.
5. Install in the reverse order of removal.

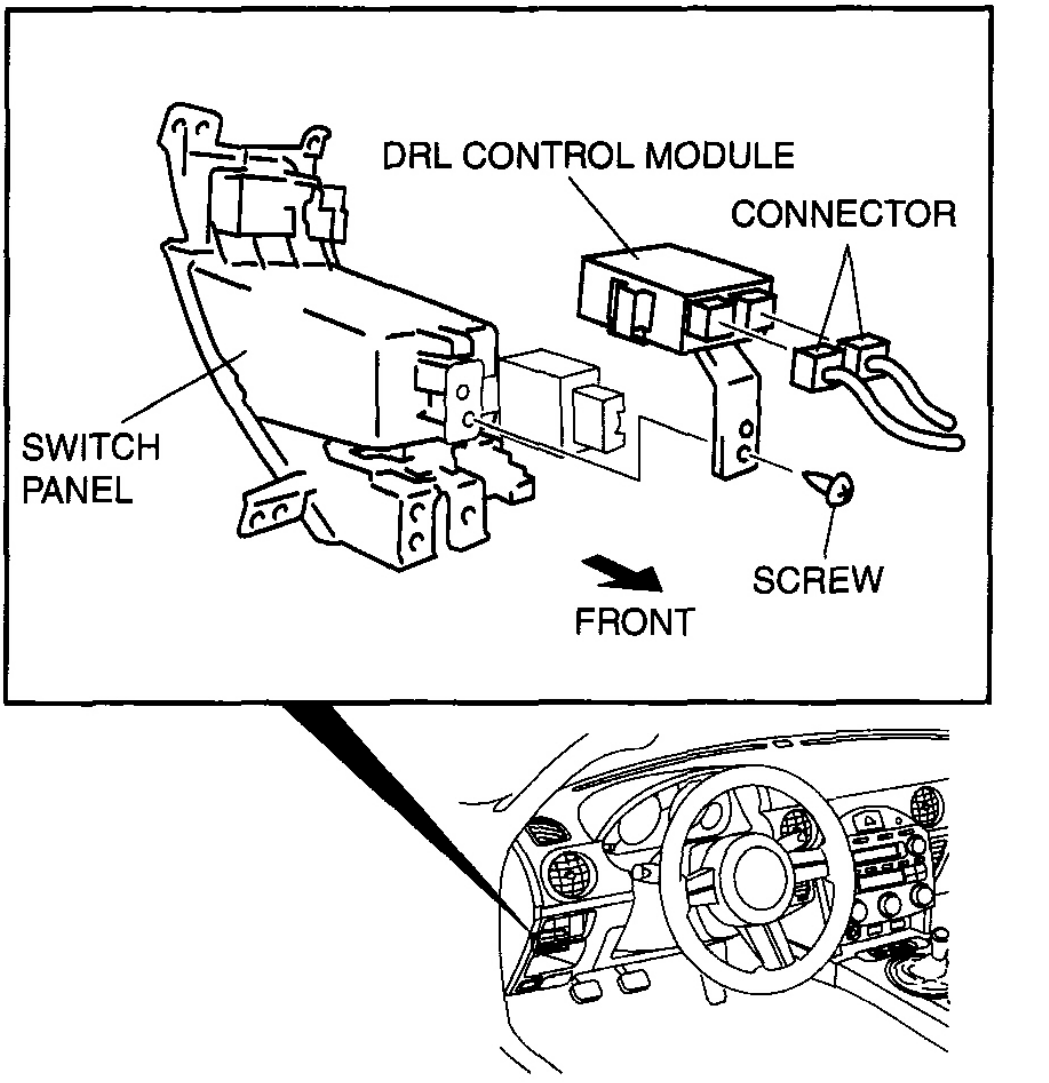


Fig. 51: Identifying DRL Control Module
Courtesy of MAZDA MOTORS CORP.

DRL SYSTEM WIRING DIAGRAM

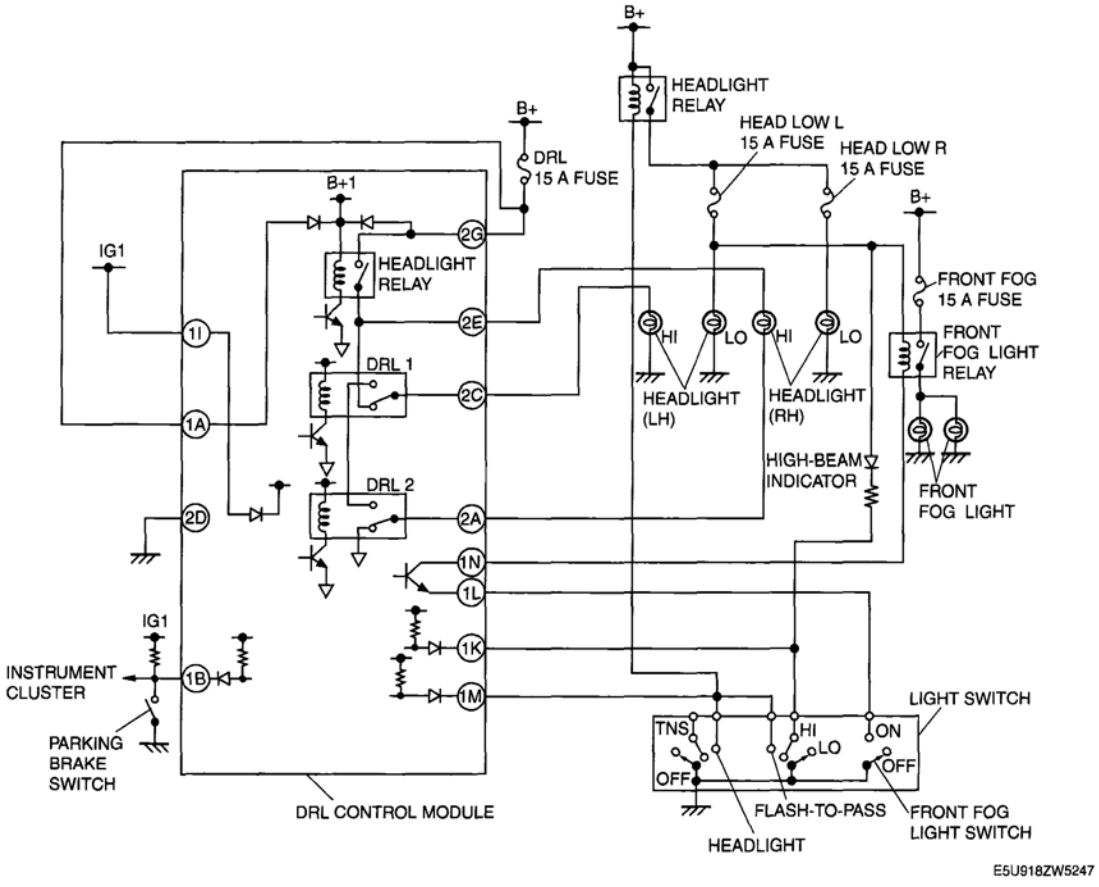


Fig. 52: DRL System Wiring Diagram
Courtesy of MAZDA MOTORS CORP.

DRL CONTROL MODULE INSPECTION

1. Connect the connector to the DRL control module.
2. Connect the negative battery cable.
3. Measure the voltage at the DRL control module using voltmeter.
    - When inspecting terminal 1B, 1D or 2D for continuity, disconnect the DRL control module connector.
4. If the value are not as specified in **TERMINAL VOLTAGE TABLE (REFERENCE)** , inspect the parts under "Inspection item(s)" and related wiring harnesses.
5. If the system does not work properly even though the parts or related wiring harnesses do not have any malfunction, replace the DRL control module.

TERMINAL VOLTAGE TABLE (REFERENCE)

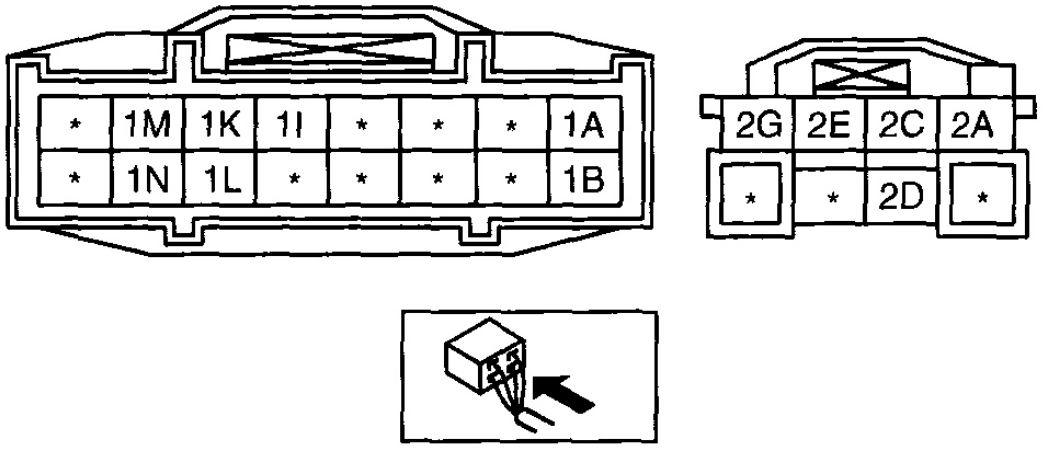


Fig. 53: Identifying DRL Control Module Connector
Courtesy of MAZDA MOTORS CORP.

TERMINAL VOLTAGE TABLE (REFERENCE)

Terminal	Signal name	Connected to	Test condition		Voltage (V)/Continuity	Inspection item(s)
1A	Power supply	ROOM 30 A fuse	Under any condition		B+	• ROOM 30 A fuse • Related wiring harness
1B	Parking brake lever pulled/released	Parking brake switch	Parking brake lever pulled: Check for continuity to ground.		Continuity	• Parking brake switch (See **PARKING BRAKE SWITCH INSPECTION** .) • Related wiring harness
			Parking brake lever released: Check for continuity to ground.		No	
1I	IG1	Ignition switch	Turn the ignition switch to the ON position.		B+	• Ignition switch (See **IGNITION SWITCH INSPECTION** .) • Related wiring harness
			Turn the ignition switch to the LOCK position.		1.0 or less	
	High-beam	Light	Turn the ignition	Dimmer switch at HI	1.0 or less	• Light switch (See **LIGHT SWITCH**

1K	on/off	switch	switch to the ON position.	Dimmer switch at LO	B+	**INSPECTION** .) • Related wiring harness
1L	Front fog light switch ON/OFF	Front fog light switch	Light switch at 2nd position	Front fog light switch is on.	1.0 or less	• Light switch (See **LIGHT SWITCH INSPECTION** .) • Related wiring harness
				Front fog light switch is off.	B+	
1M	Flash-to-pass	Light switch	Turn the ignition switch to the ON position.	Flash-to-pass activated.	1.0 or less	• Light switch (See **LIGHT SWITCH INSPECTION** .) • Related wiring harness
				Flash-to-pass not activated.	B+	
1N	Front fog light relay operation	Front fog light relay	Light switch at 2nd position and dimmer switch at LO	Front fog light switch is on.	1.0 or less	• FOG 15 A fuse • Front fog light relay (See **RELAY INSPECTION** .) • Related wiring harness
				Front fog light switch is off.	B+	
2A	Headlight (RH) operation (high-beam)	Headlight (high-beam)	Light switch at 2nd position	Dimmer switch at LO	1.0 or less	• Headlight (RH) • Related wiring harness
				Dimmer switch at HI	1.0 or less	
2C	Headlight (LH) operation (high-beam)	Headlight (high-beam)	Light switch at 2nd position	Dimmer switch at LO	1.0 or less	• Headlight (LH) • Related wiring harness
				Dimmer switch at HI	B+	
2D	Ground	GND	Under any condition: Check for continuity to ground.		Continuity	GND
2E	Headlight (RH) operation (high-beam)	Headlight (high-beam)	Light switch at 2nd position	Dimmer switch at LO	1.0 or less	• Headlight (RH) • Related wiring harness
				Dimmer switch at	B+	

			HI		
2G	Power supply	DRL 15A fuse	Under any condition	B+	• Headlight 15 A fuse • Related wiring harness

MAP LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the lens.
4. Remove the map light bulb

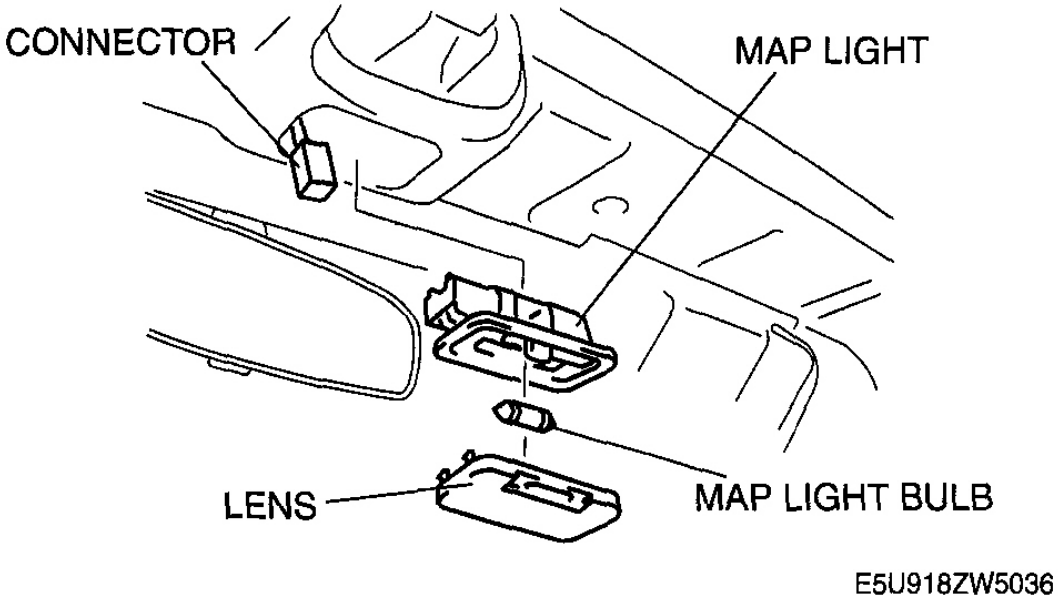


Fig. 54: Identifying Map Light Bulb
Courtesy of MAZDA MOTORS CORP.

5. Remove the map light. (See **MAP LIGHT REMOVAL NOTE** .)
6. Disconnect the connector.
7. Install in the reverse order of removal.

MAP LIGHT REMOVAL NOTE

1. Insert a tape-wrapped flathead screwdriver into the gap between the headliner and the map light.
2. Press the tab, and remove the map light.

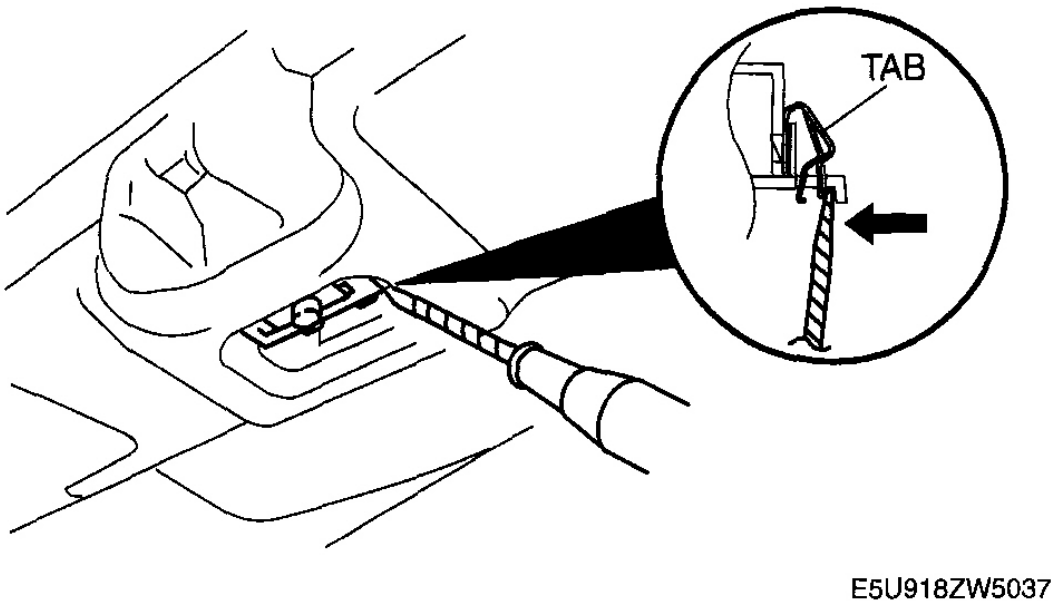


Fig. 55: Inserting Tape-Wrapped Flathead Screwdriver Into Gap Between Headliner & Map Light
Courtesy of MAZDA MOTORS CORP.

MAP LIGHT INSPECTION

1. Verify that the continuity between the map light terminals is as indicated in **Fig. 56** .
   - If not as indicated in **Fig. 56** , replace the map light.

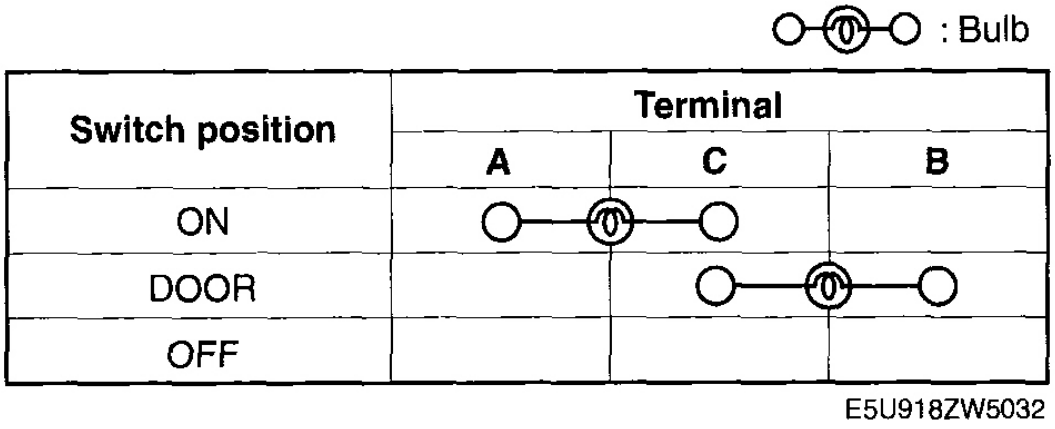


Fig. 56: Map Light Continuity Table

Courtesy of MAZDA MOTORS CORP.

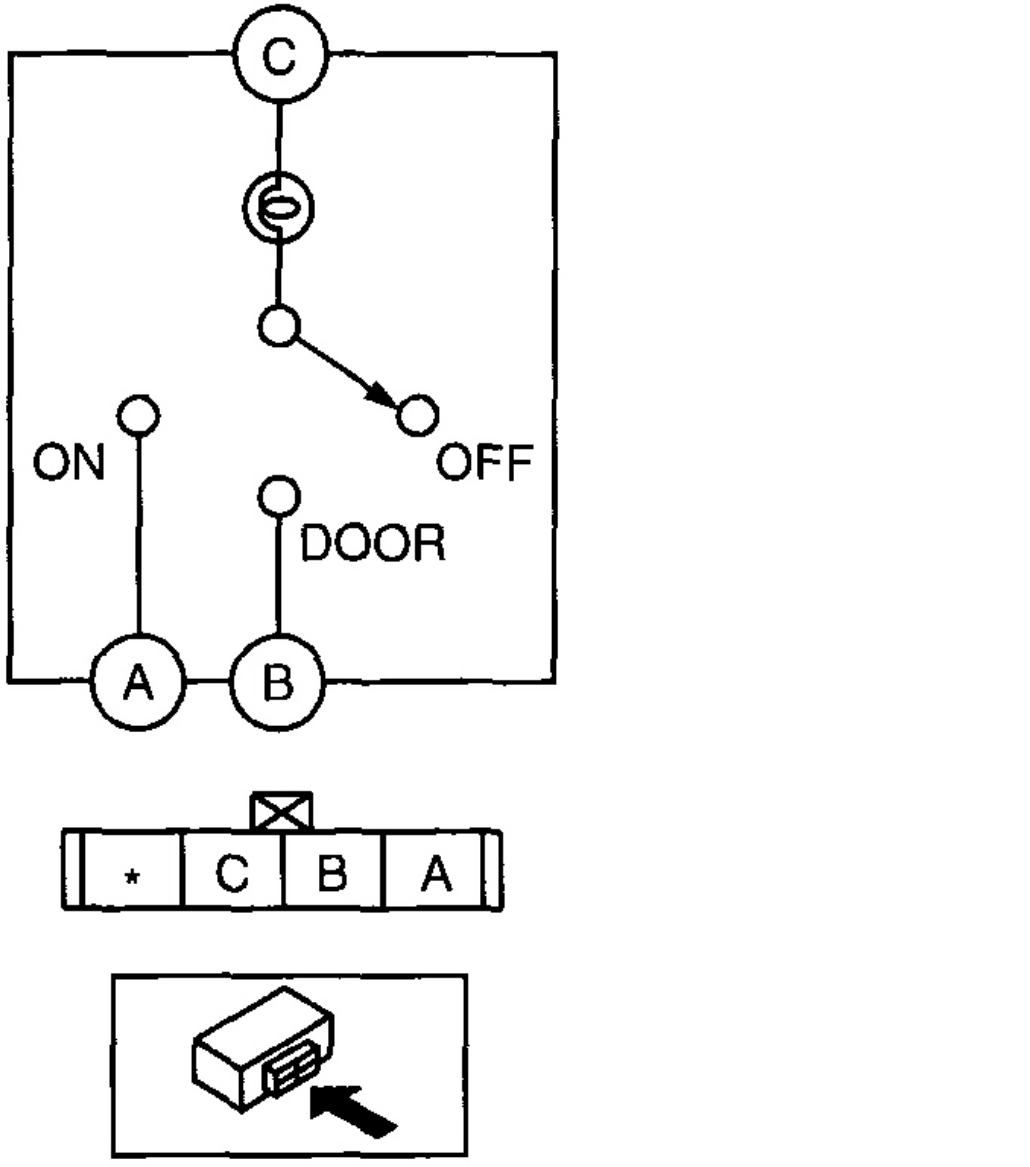


Fig. 57: Identifying MAP Light Connector Terminals
Courtesy of MAZDA MOTORS CORP.

TRUNK COMPARTMENT LIGHT REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the trunk compartment light.
4. Disconnect the trunk compartment light connector.
5. Remove the trunk compartment light bulb.
6. Install in the reverse order of removal.

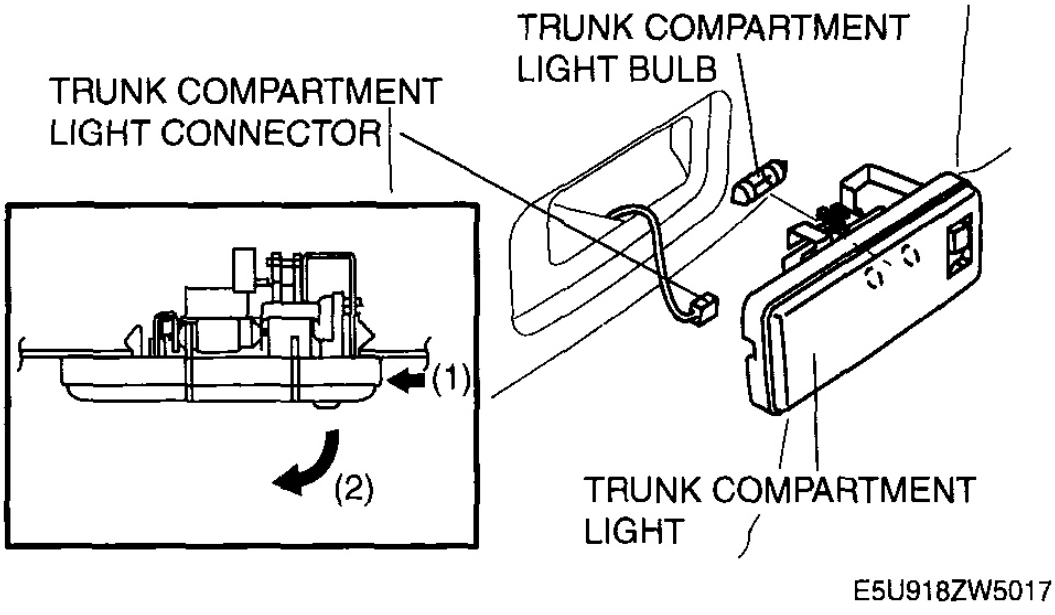


Fig. 58: Removing Trunk Compartment Light Bulb
Courtesy of MAZDA MOTORS CORP.

TRUNK COMPARTMENT LIGHT INSPECTION

1. Verify that the continuity between the trunk compartment light terminals is as indicated in **Fig. 59** .
   - If not as indicated in **Fig. 59** , replace the cargo compartment light.

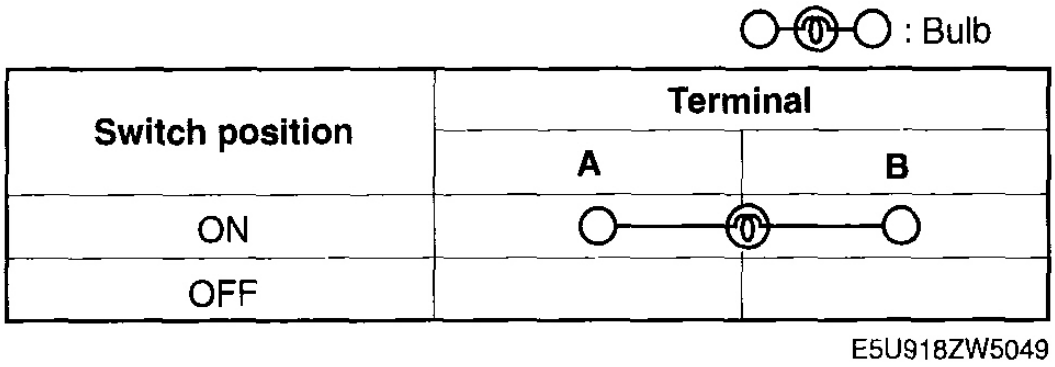


Fig. 59: Trunk Compartment Light Continuity Table
Courtesy of MAZDA MOTORS CORP.

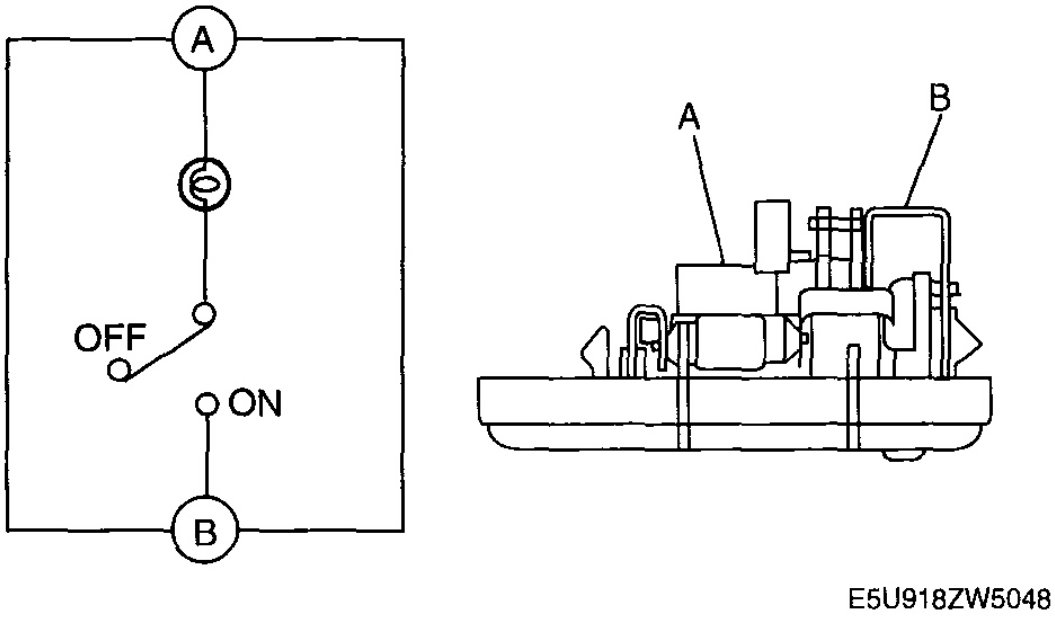


Fig. 60: Identifying Trunk Compartment Light Connector Terminals
Courtesy of MAZDA MOTORS CORP.

IGNITION KEY ILLUMINATION BULB REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)

3. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Remove the ignition key illumination bulb.
5. Install in the reverse order of removal.

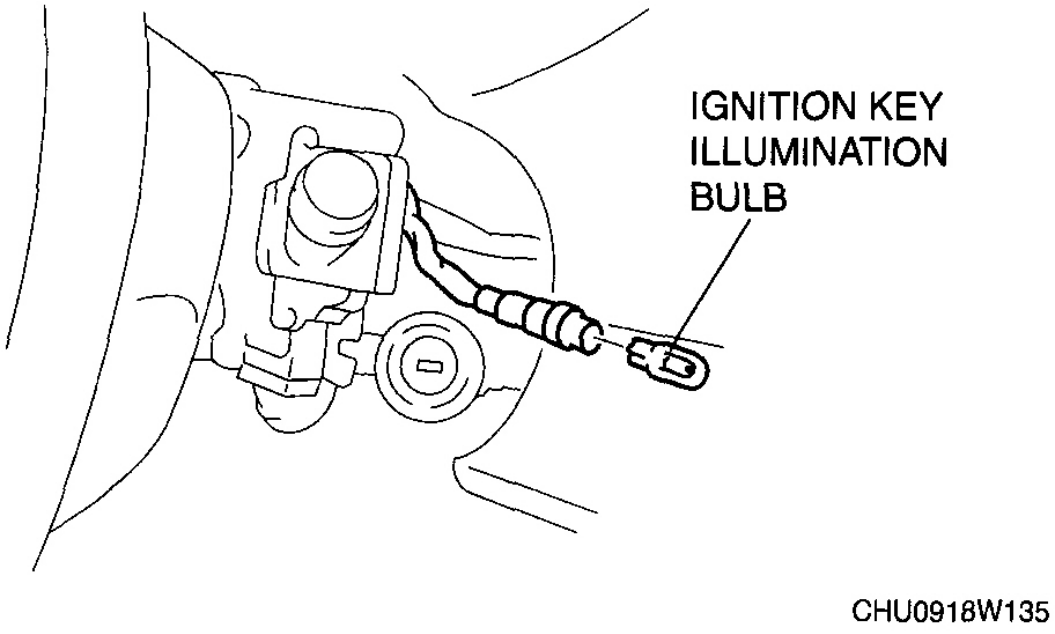
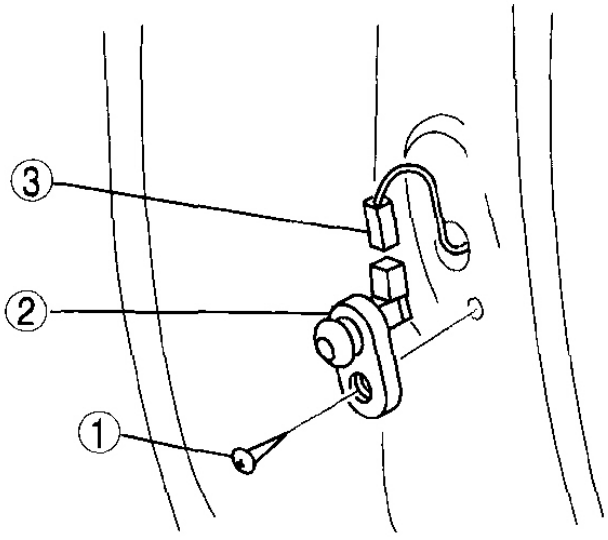


Fig. 61: Identifying Ignition Key Illumination Bulb
Courtesy of MAZDA MOTORS CORP.

DOOR SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disassemble in the order indicated in **Fig. 62** .



1	Screw
2	Door switch
3	connector

Fig. 62: Identifying Door Switch
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

DOOR SWITCH INSPECTION

1. Remove the door switch. (See **DOOR SWITCH REMOVAL/INSTALLATION** .)
2. Verify that the continuity between door switch terminal and the body ground is as indicated in **Fig. 63** .
   - If not as indicated in **Fig. 63** , replace the door switch.

: Continuity

Switch position	Terminal	
	A	Body ground
Door switch pressed		
Door switch released	○	○

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Fig. 63: Door Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

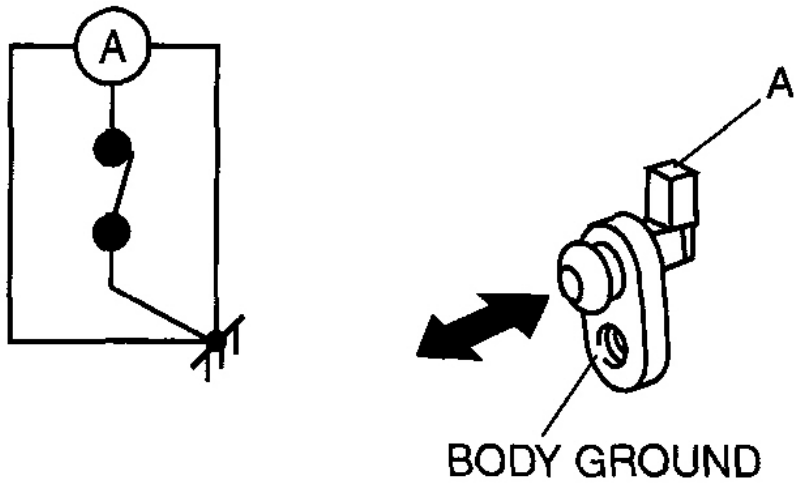

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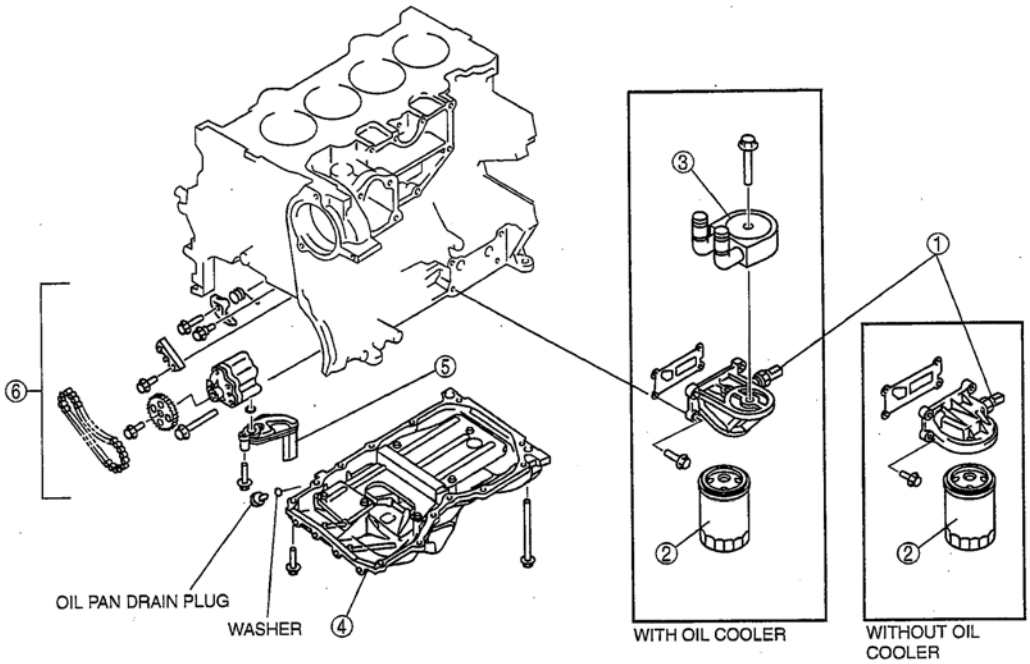
Fig. 64: Identifying Door Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Lubrication [LF] - MX-5 Miata

LUBRICATION SYSTEM LOCATION INDEX [LF]



1	Oil pressure switch (See OIL PRESSURE INSPECTION[LF].)
2	Oil filter (See OIL FILTER REPLACEMENT[LF].)
3	Oil cooler (See OIL COOLER REMOVAL/ INSTALLATION [LF])
4	Oil pan (See OIL PAN REMOVAL/ INSTALLATION[LF])
5	Oil strainer (See OIL PUMP REMOVAL/ INSTALLATION[LF])
6	Oil pump component (See OIL PUMP REMOVAL/ INSTALLATION[LF])

Fig. 1: Identifying Location Of Lubrication System Components
Courtesy of MAZDA MOTORS CORP.

ENGINE OIL LEVEL INSPECTION [LF]

1. Position the vehicle on level ground.
2. Warm up the engine.
3. Stop the engine and allow **approx. 5 min.** before continuing.
4. Remove the dipstick and verify that the oil level is between the F and L marks on the dipstick.
    - If the oil level is below the L mark, add engine oil.

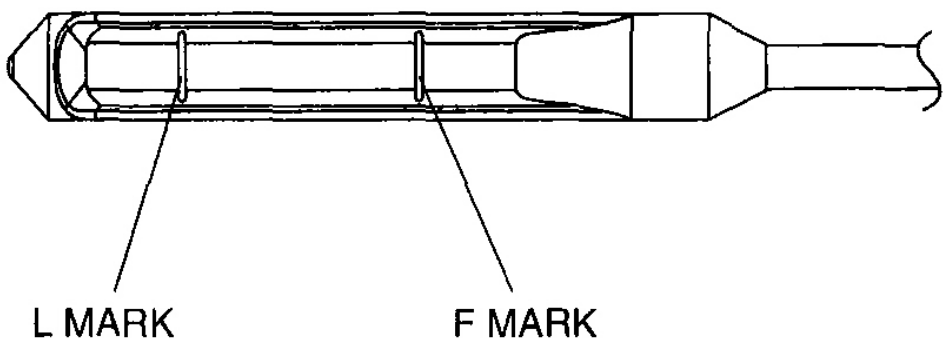


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Fig. 2: Identifying Mark On Dipstick
Courtesy of MAZDA MOTORS CORP.

ENGINE OIL REPLACEMENT [LF]

WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

CAUTION:

- **In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.**

1. Position the vehicle on level ground.
2. Remove the oil filler cap.
3. Remove the oil pan drain plug.
4. Drain the engine oil into a container.
5. Install the oil pan drain plug with a new washer.

Oil pan drain plug tightening torque

30-41 N.m {3.1-4.1 kgf.m, 23-30 ft.lbf}

NOTE:

- **The amount of residual oil in the engine can vary according to factors such as the replacement method and oil temperature. Verify the oil level after engine oil replacement.**

6. Refill the following type and amount of the engine oil.

NOTE:

- **The maintenance intervals on scheduled maintenance table (See SCHEDULED MAINTENANCE) can only be supported with the use of the following oils.**

ENGINE OIL SPECIFICATION

Item	U.S.A. and CANADA	Except U.S.A. and CANADA
Engine oil grade	AMERICAN PETROLEUM INSTITUTE FOR GASOLINE ENGINES CERTIFIED (ILSAC)	API SERVICE SL SAE 5W-20 ENERGY CONSERVING II; AMERICAN PETROLEUM INSTITUTE FOR GASOLINE ENGINES CERTIFIED (ILSAC); API SL or ILSAC; API SL or ILSAC
Engine oil viscosity	5W-20	

Engine oil capacity (approx. quantity) (AT, 5MT)*[1]

Oil replacement: 3.9 L {4.1 US qt, 3.4 Imp qt}

Oil and oil filter replacement: 4.3 L {4.5 US qt, 3.8 Imp qt}

Total (dry engine): 4.6 L {4.9 US qt, 4.0 Imp qt}

Engine oil capacity (approx. quanity) (AT, 5MT)*[2]

Oil replacement: 4.05 L {4.28 US qt, 3.56 Imp qt}

Oil and oil filter replacement: 4.45 L {4.70 US qt, 3.92 Imp qt}

Total (dry engine): 4.75 L {5.02 US qt, 4.18 Imp qt}

Engine oil capacity (approx. quanity) (6MT)

Oil replacement: 4.05 L {4.28 US qt, 3.56 Imp qt}

Oil and oil filter replacement: 4.55 L {4.81 US qt, 4.00 Imp qt}

Total (dry engine): 4.85 L {5.12 US qt, 4.27 Imp qt}

*1 :Applied VIN (Assumed)

JM1 NC15F*7# 100001-130613

JM1 NC16F*7# 100001-130613

JM1 NC25F*7# 100001-130613

JM1 NC26F*7# 100001-130613

*2 :Applied VIN (Assumed)

JM1 NC15F*7# 130614-

JM1 NC16F*7# 130614-

JM1 NC25F*7# 130614-

JM1 NC26F*7# 130614-

7. Install the oil filler cap.
8. Start the engine and confirm that there is no oil leakage.
   - If there is oil leakage, repair or replace the applicable part.
9. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [LF]** .)

OIL PRESSURE INSPECTION [LF]

WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported**

on safety stands.

- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Remove the oil pressure switch.
4. Screw the **SSTs** into the oil pressure switch installation hole.
5. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
6. Warm up the engine to normal operating temperature.
7. Run the engine at the specified speed, and note the gauge readings.
   - If not within the specification, inspect for the cause and repair or replace if necessary.

NOTE:

- **The oil pressure can vary with oil viscosity and temperature.**

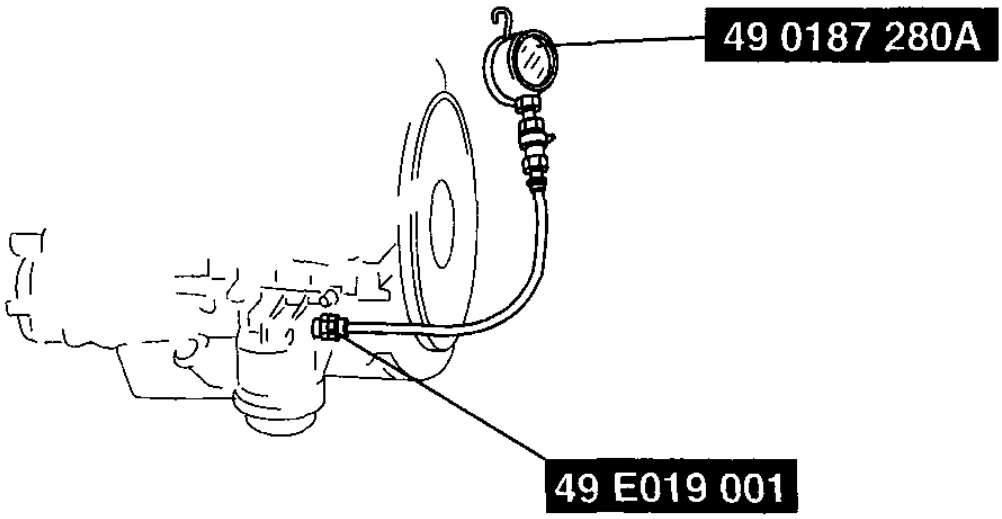


Fig. 3: Screwing SST Into Oil Pressure Switch Installation Hole
Courtesy of MAZDA MOTORS CORP.

Oil pressure (reference value) [oil temperature: 100°C {212°F}]

337-591 kPa {3.44-6.03 kgf/cm^2 , 49.0-85.8 psi} min [3,000 rpm]

8. Stop the engine and wait until it is cool.
9. Disconnect the negative battery cable.
10. Remove the **SSTs.**

CAUTION:
- **Make sure that there is no sealant between 1.0-2.0 mm {0.04-0.07 in} from the end of the oil pressure switch to prevent a possible operation malfunction.**

11. Apply silicone sealant to the oil pressure switch threads as shown in **Fig. 4** .
12. Install the oil pressure switch.

Tightening torque

12-18 N.m {1.3-1.8 kgf.m, 9-13 ft.lbf}

13. Connect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
14. Install the battery cover.
15. Start the engine and confirm that there is no oil leakage.
    - If there is oil leakage, repair or replace the applicable part.

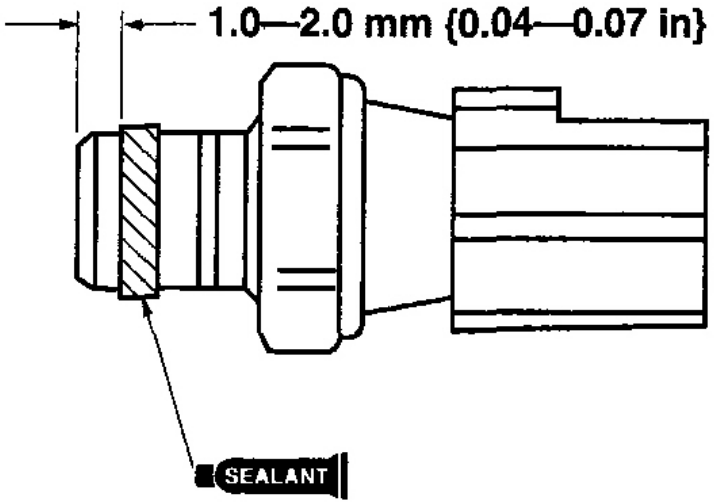


Fig. 4: Applying Silicone Sealant To Oil Pressure Switch Threads

Courtesy of MAZDA MOTORS CORP.

OIL FILTER REPLACEMENT [LF]

WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

CAUTION:

- **In case you spill engine oil on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.**

1. Remove the oil filter using a commercially available, cup-type oil filter wrench **(76 mm {3.0 in} diameter, 15 sided).**
2. Use a clean rag to wipe off the mounting surface.
3. Apply clean engine oil to the gasket of a new oil filter.
4. Tighten the oil filter using a cup-type oil filter wrench and according to the instruction on the package or side of the oil filter.

Tightening torque (reference value)

15-20 N.m {1.6-2.0 kgf.m, 11-14 ft.lbf}

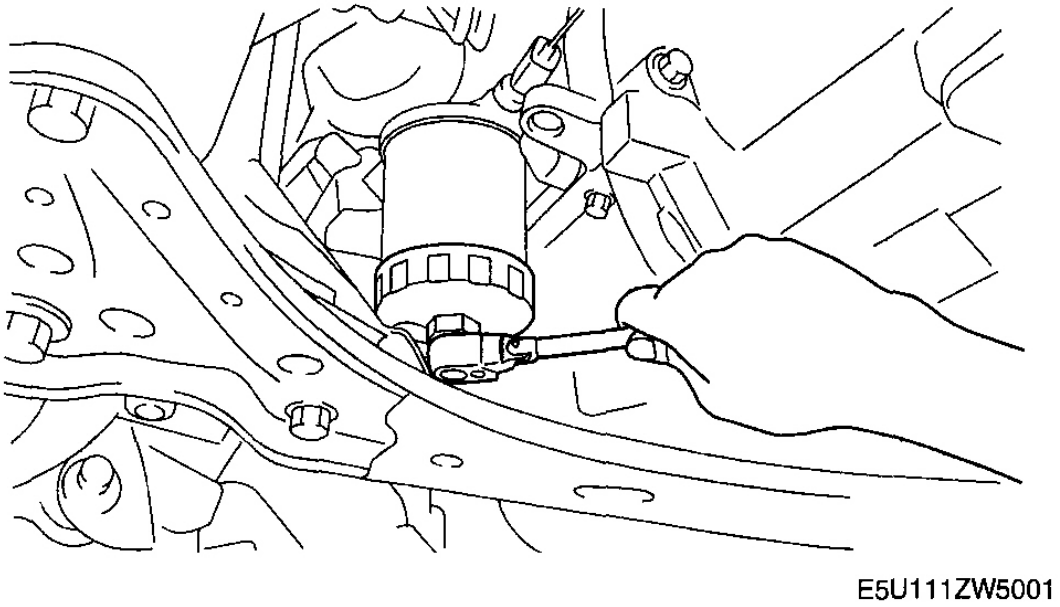


Fig. 5: Removing Oil Filter
Courtesy of MAZDA MOTORS CORP.

5. Start the engine and confirm that there is no oil leakage.
   - If there is oil leakage, repair or replace the applicable part.
6. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [LF]** .)

OIL PAN REMOVAL/INSTALLATION [LF]

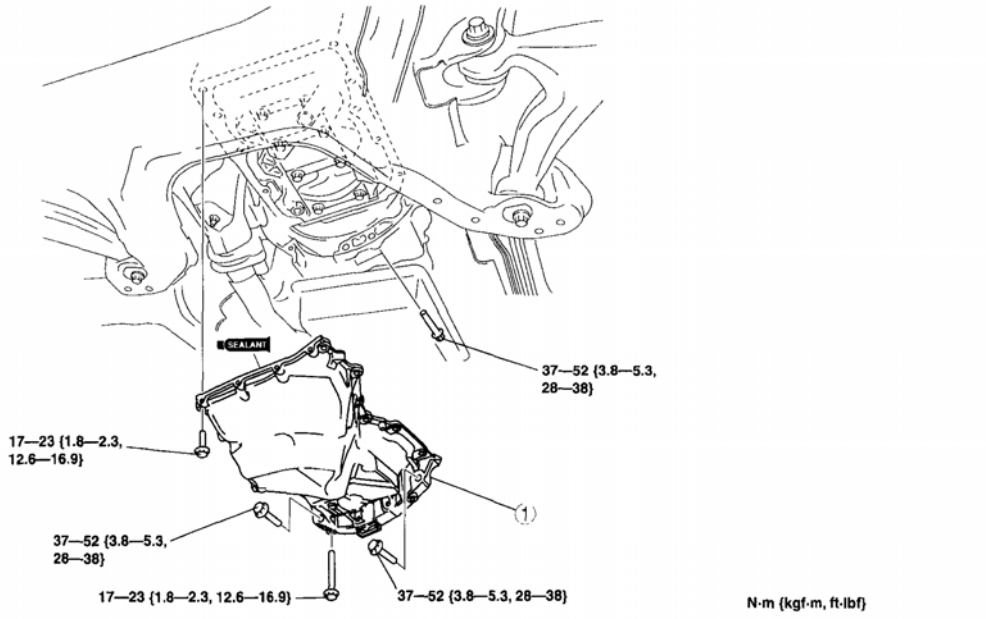
WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine oil. (See **ENGINE OIL REPLACEMENT [LF]** .)
4. Loosen the water pump pulley bolt and remove the drive belt. (See **DRIVE BELT REPLACEMENT**

[LF] .)

5. Remove the front suspension tower bar (joint, right side, and left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)
6. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
7. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
8. Remove the P/S oil pump with the hose and pipe sill connected. Position the P/S oil pump out of the way. (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
9. Remove the crankshaft position (CKP) sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
10. Remove the engine front cover. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
11. Remove the transverse member. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
12. Remove the member bracket. (MT) (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .)
13. Remove in the order indicated in **Fig. 6** .
14. Install in the reverse order of removal.
15. Refill the specified type and amount of the engine oil. (See **ENGINE OIL REPLACEMENT [LF]** .)
16. Start the engine and confirm that there is no oil leakage.
    - If there is oil leakage, repair or replace the applicable part.
17. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [LF]** .)
18. Inspect for the ignition timing and idle speed. (See **ENGINE TUNE-UP [LF]** .)



1	Oil pan

Fig. 6: Identifying Oil Pan Components (With Torque Specifications)

Courtesy of MAZDA MOTORS CORP.

OIL PAN REMOVAL NOTE

NOTE:

- **Lift up the engine approx. 25 mm {0.98 in} to assure clearance for the oil pan removal, then remove the oil pan.**

1. Remove the windshield wiper arm. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
2. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
3. Remove the side cowl grille. (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
4. Remove the engine compartment service hole cover. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)
5. Remove the front tires.
6. Support the engine using the **SST.**

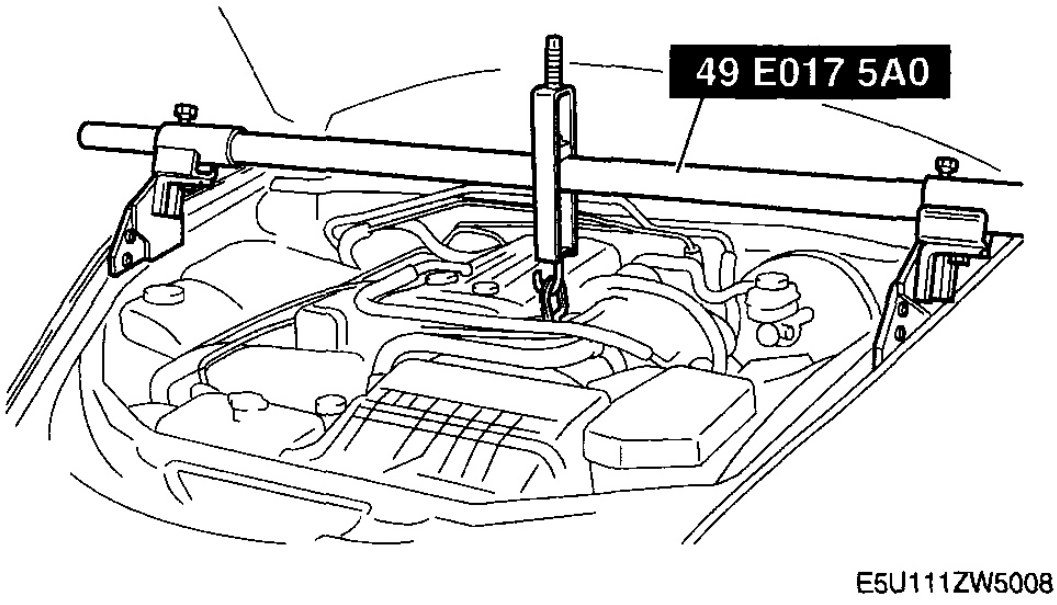


Fig. 7: Supporting Engine Using SST
Courtesy of MAZDA MOTORS CORP.

7. Remove the engine mount rubber installation nuts.

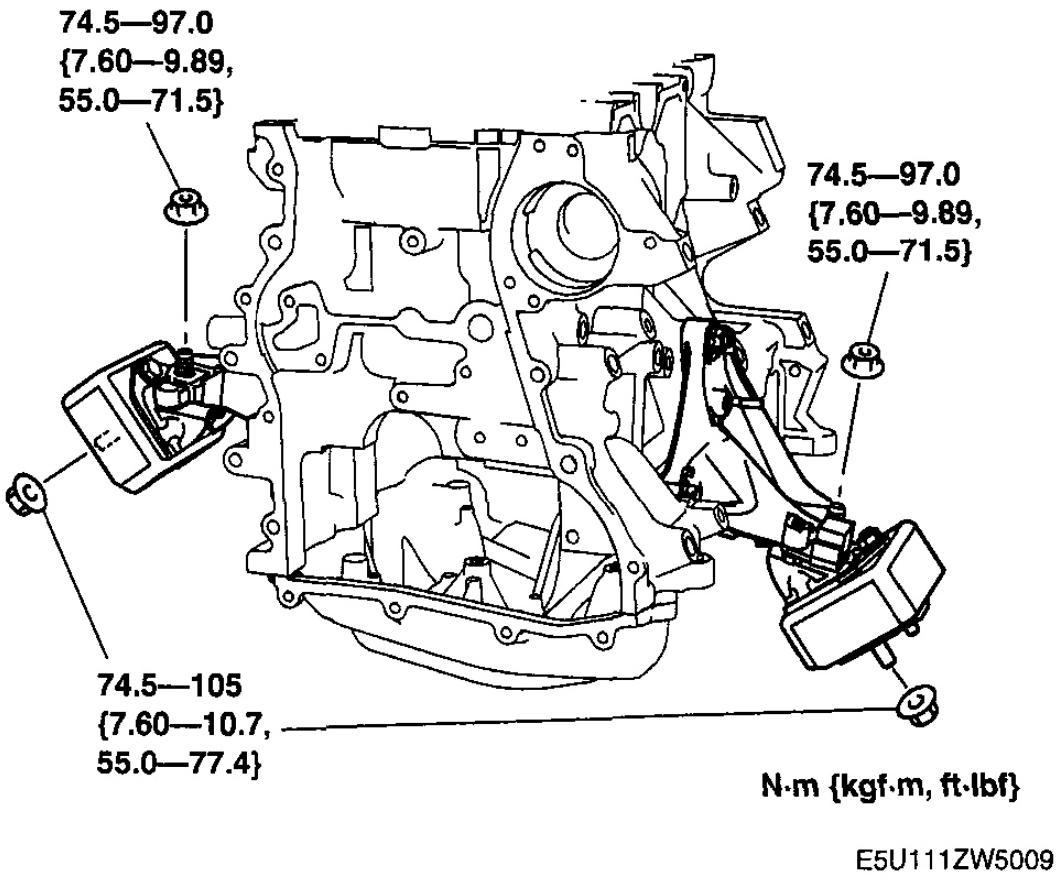


Fig. 8: Identifying Engine Mount Rubber Installation Nuts (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

8. Lift up the engine **approx. 25 mm {0.98 in}** using the **SST.**
9. Remove the oil pan installation bolts.
10. Remove the oil pan using the separator tool.

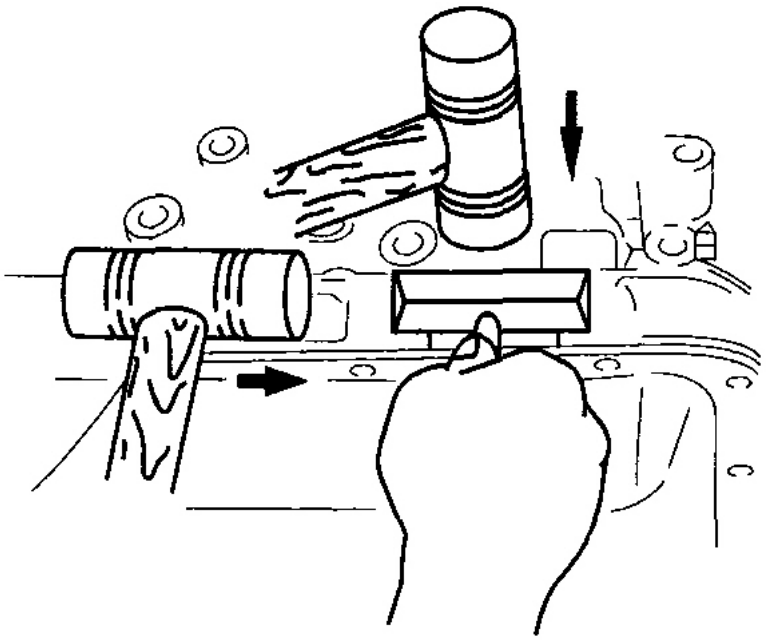


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Fig. 9: Removing Oil Pan Using Separator Tool
Courtesy of MAZDA MOTORS CORP.

11. Remove the oil pan.

OIL PAN INSTALLATION NOTE

CAUTION:
- **Apply the silicon sealant in a single, unbroken line around the whole perimeter.**
- **Using bolts with the old seal adhering could cause cracks in the housing.**

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the housing and oil pan.
2. When reusing the oil pan installation bolts, clean any old sealant from the bolts.

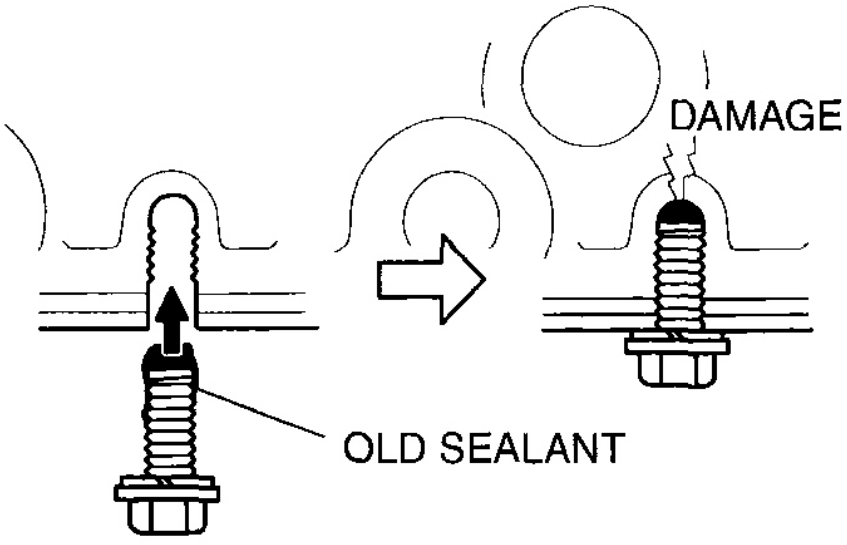

Fig. 10: Identifying Old Sealant On Oil Pan Bolts
Courtesy of MAZDA MOTORS CORP.

3. Use a square ruler to align the oil pan and the cylinder block junction side on the engine front cover side.

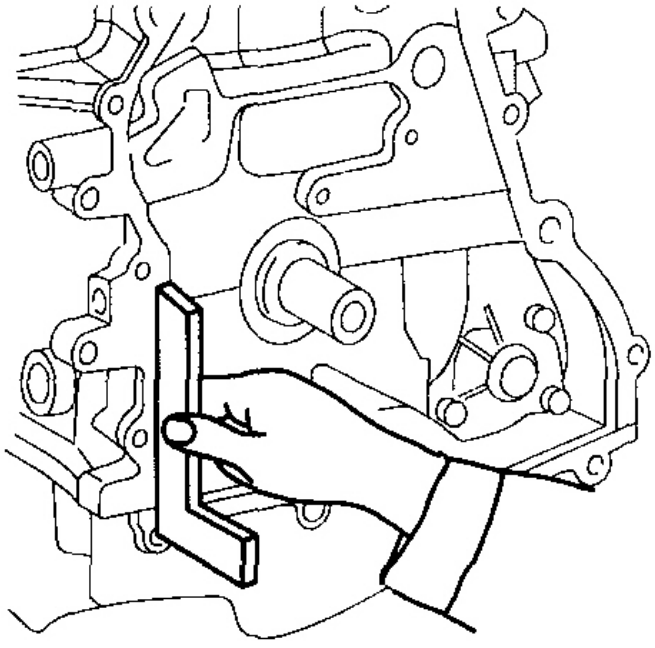

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Fig. 11: Aligning Oil Pan & Cylinder Block Junction Side On Engine Front Cover Side Using Square Ruler
Courtesy of MAZDA MOTORS CORP.

4. Apply silicone sealant to the oil pan along the inside of the bolt holes as shown in **Fig. 12** .

   Thickness

   2.2-3.2 mm {0.087-0.126 in}

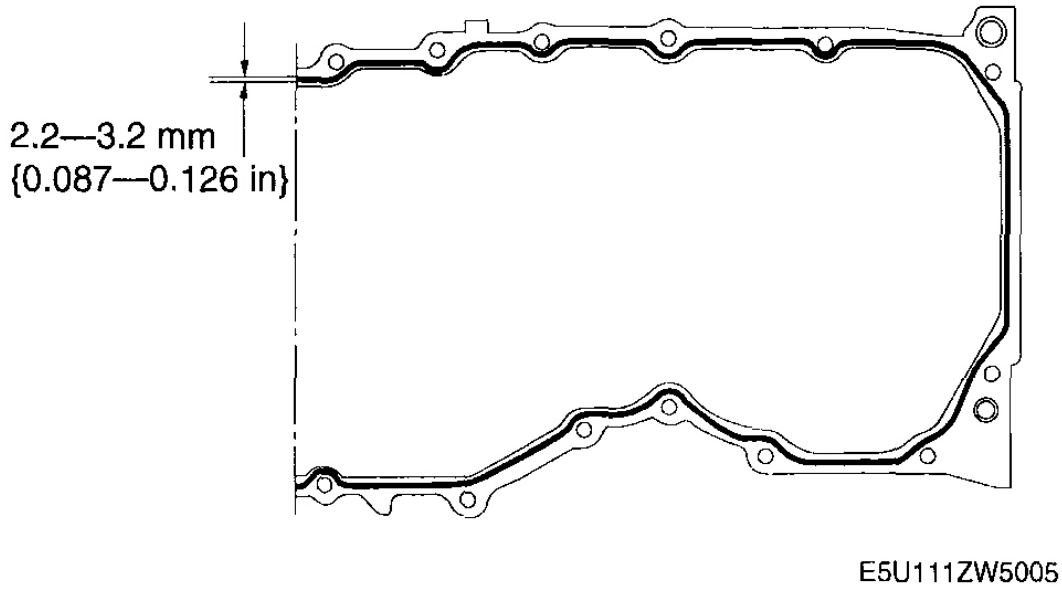


Fig. 12: Applying Silicone Sealant To Oil Pan
Courtesy of MAZDA MOTORS CORP.

5. Tighten the bolts in the order shown in **Fig. 13** .

Tightening torque

17-23 N.m {1.8-2.3 kgf.m, 12.6-16.9 ft.lbf}

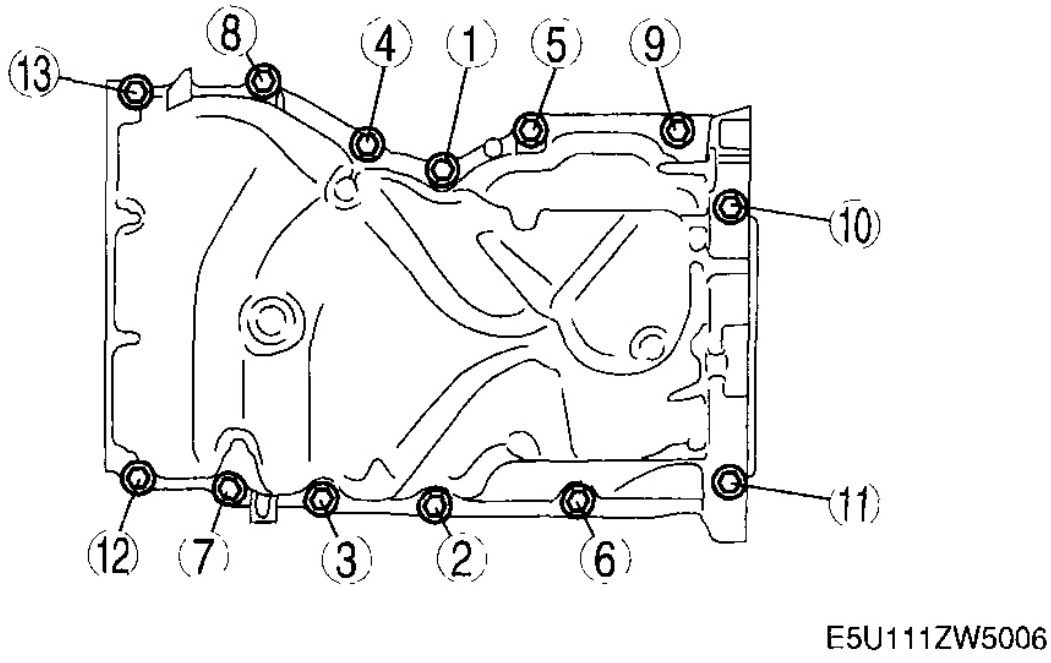


Fig. 13: Identifying Tightening Sequence Of Oil Pan Bolts
Courtesy of MAZDA MOTORS CORP.

6. Tighten the oil pan-transmission installation bolts.

   Tightening torque

   37-52 N.m {3.8-5.3 kgf.m, 28-38 ft.lbf}

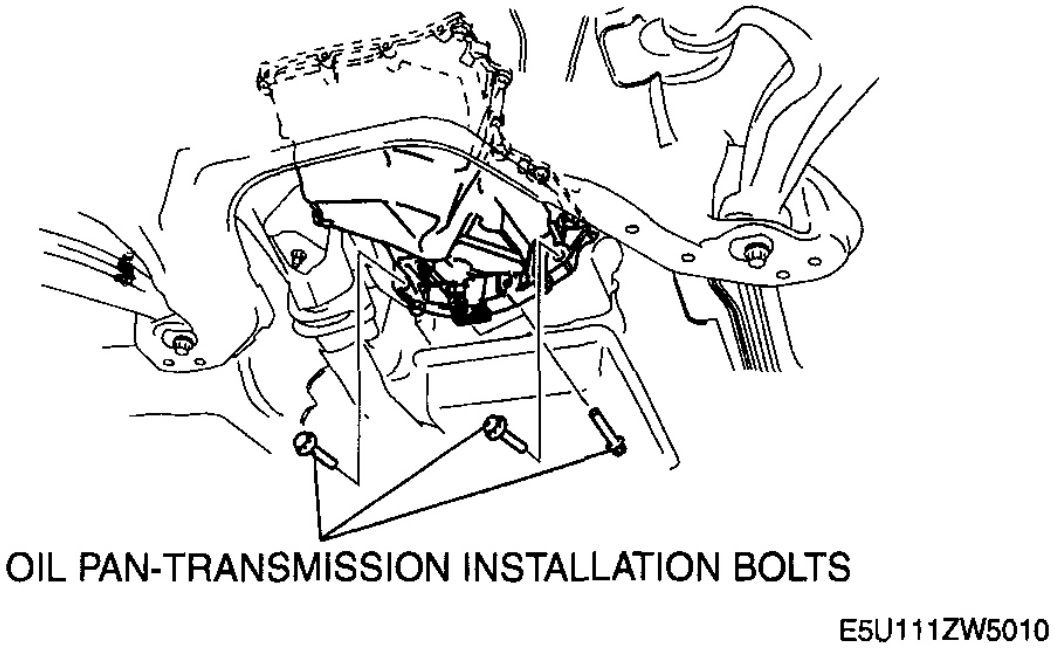


Fig. 14: Tightening Oil Pan-Transmission Installation Bolts
Courtesy of MAZDA MOTORS CORP.

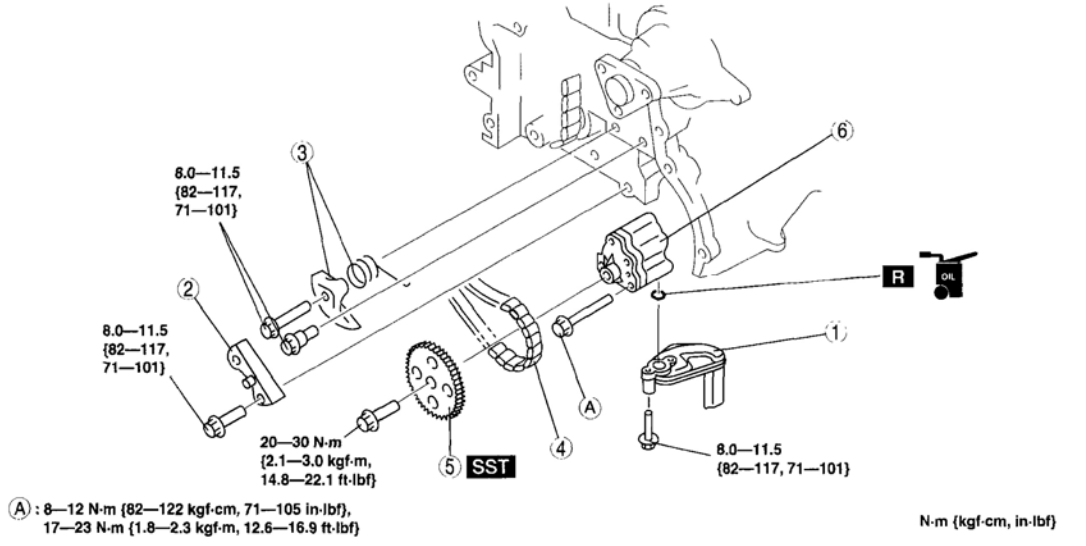
OIL PUMP REMOVAL/INSTALLATION [LF]

WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

1. Remove the battery and battery tray. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
2. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine oil. (See **ENGINE OIL REPLACEMENT [LF]** .)
4. Loosen the water pump pulley bolt and remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
5. Remove the front suspension tower bar (joint, right side, and left side). (See **FRONT SUSPENSION TOWER BAR REMOVAL/INSTALLATION** .)

6. Remove the plug hole plate. (See **PLUG HOLE PLATE REMOVAL/INSTALLATION [LF]** .)
7. Remove the ignition coils. (See **IGNITION COIL REMOVAL/INSTALLATION [LF]** .)
8. Remove the P/S oil pump with the hose and pipe sill connected. Position the P/S oil pump out of the way. (See **POWER STEERING OIL PUMP REMOVAL/INSTALLATION** .)
9. Remove the crankshaft position (CKP) sensor. (See **CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [LF]** .)
10. Remove the engine front cover. (See **TIMING CHAIN REMOVAL/INSTALLATION [LF]** .)
11. Remove the transverse member. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
12. Remove the member bracket. (MT) (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .)
13. Remove the oil pan. (See **OIL PAN REMOVAL/INSTALLATION [LF]** .)
14. Remove in the order indicated in **Fig. 15** .
15. Install in the reverse order of removal.
16. Refill the specified type and amount of the engine oil. (See **ENGINE OIL REPLACEMENT [LF]** .)
17. Start the engine and confirm that there is no oil leakage.
    - If there is oil leakage, repair or replace the applicable part.
18. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [LF]** .)
19. Inspect for the ignition timing and idle speed. (See **ENGINE TUNE-UP [LF]** .)
20. Inspect the oil pressure. (See **OIL PRESSURE INSPECTION [LF]** .)



1	Oil strainer
2	Oil pump chain guide
3	Oil pump chain tensioner
4	Oil pump chain
5	Oil pump sprocket
6	Oil pump

Fig. 15: Identifying Removal Order Of Oil Pump (With Torque Specifications)

Courtesy of MAZDA MOTORS CORP.

OIL PUMP SPROCKET REMOVAL/INSTALLATION NOTE

1. Temporarily install the crankshaft pulley and crankshaft pulley lock bolt to the crankshaft, and lock the oil pump against rotation as shown in figure.

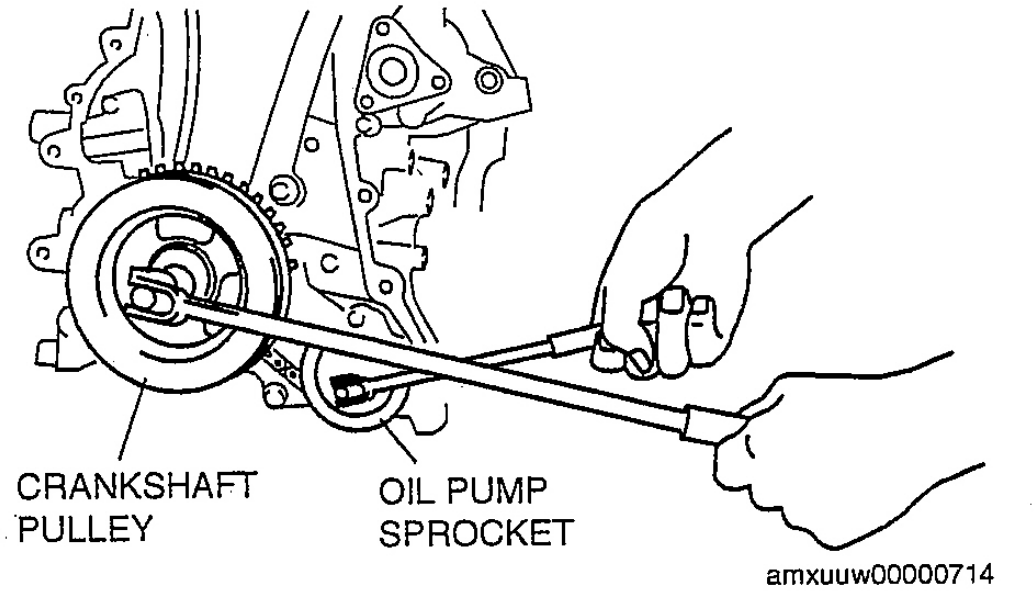


Fig. 16: Installing SST To Oil Pump Sprocket
Courtesy of MAZDA MOTORS CORP.

2. Remove/install the oil pump sprocket, and then remove the crankshaft pulley lock bolt.

   Tightening torque

   20-30 N.m {2.1-3.0 kgf.m, 14.8-22.1 ft.lbf}

OIL PUMP INSTALLATION NOTE

1. Tighten the oil pump bolts in two steps in the order shown in **Fig. 17** .

   Tightening torque

   Step 1: 8-12 N.m {82-122 kgf.cm, 71-105 in.lbf}

   Step 2: 17-23 N.m {1.8-2.3 kgf.m, 12.6-16.9 ft.lbf}

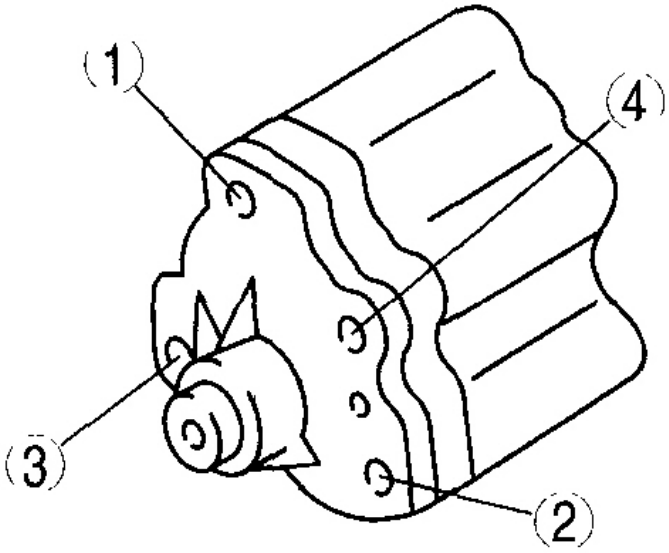


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Fig. 17: Tightening Oil Pump Bolts
Courtesy of MAZDA MOTORS CORP.

OIL COOLER REMOVAL/INSTALLATION [LF]

WARNING:

- **Hot engine and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.**

1. Remove the battery cover.
2. Disconnect the negative battery cable.
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the under cover. (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)

5. Remove the under guard. (LF engine MT models) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .)
6. Remove the side cover. (LH)
7. Remove oil filter. (See **OIL FILTER REPLACEMENT [LF]**.)
8. Remove in the order indicated in the table.
9. Use a clean rag to wipe off the mounting surface on the oil filter adapter and the oil cooler.
10. Install in the reverse order of the removal.
11. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
12. Start the engine and confirm that there is no oil leakage.
    - If there is oil leakage, repair or replace the applicable part.
13. Inspect the oil level. (See **ENGINE COOLANT LEVEL INSPECTION [LF]** .)

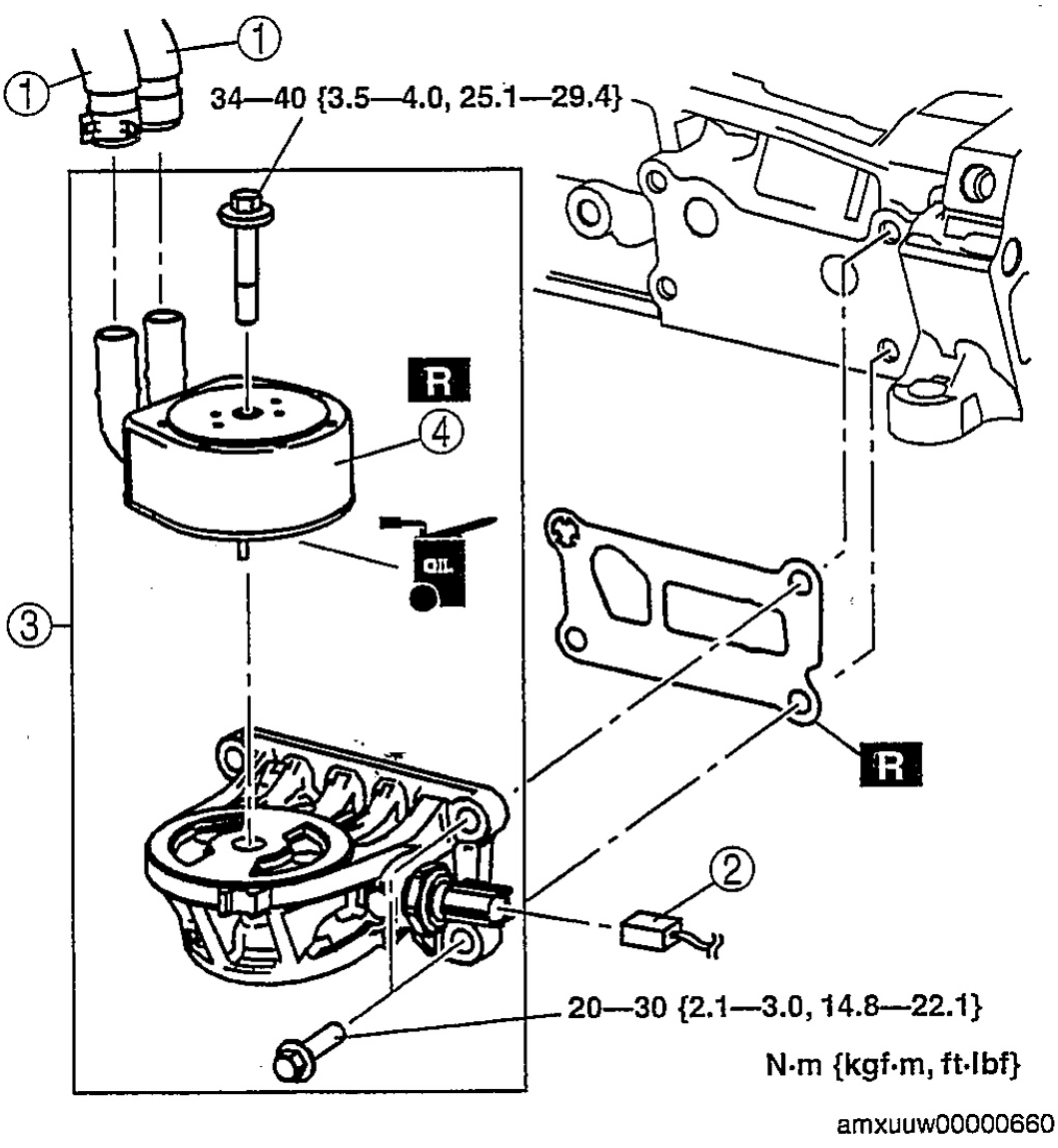


Fig. 18: Identifying Oil Cooler Components
Courtesy of MAZDA MOTORS CORP.

OIL COOLER ITEM DESCRIPTION

1	Water hose
2	Oil pressure switch connector
3	Oil cooler and oil filter adapter component
4	Oil cooler

OIL COOLER REMOVAL NOTE

1. Secure the oil cooler and oil filter adapter component in a vise.
2. Loosen the oil cooler fitting bolt.
3. Remove the oil cooler.

2007 BRAKES

Parking Brake System - MX-5 Miata

PARKING BRAKE SYSTEM LOCATION INDEX

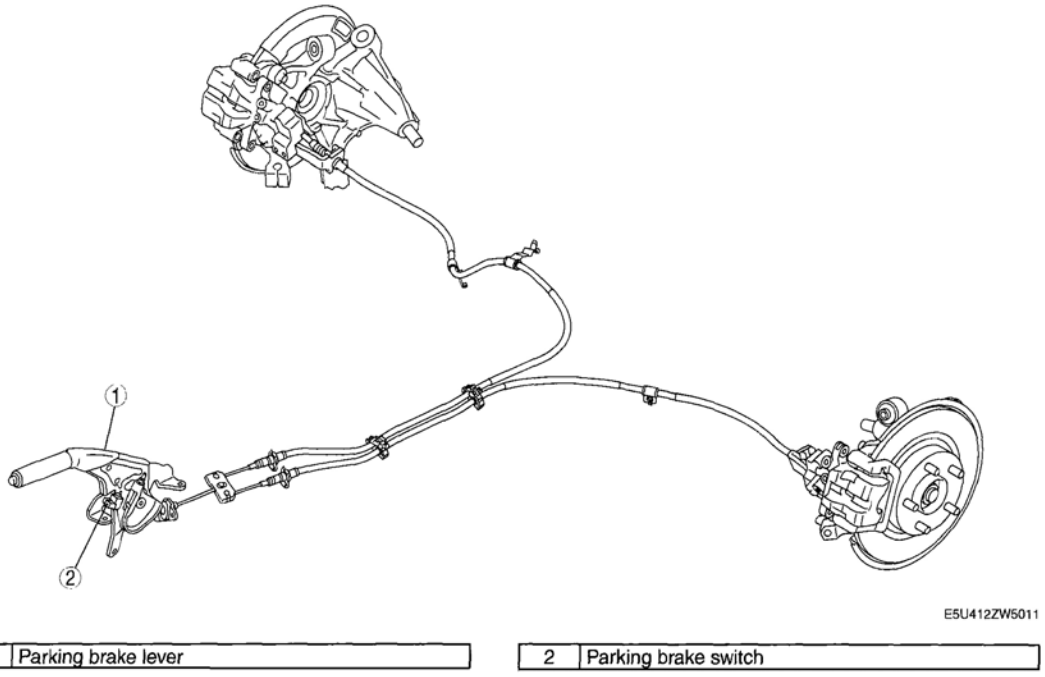


Fig. 1: Identifying Parking Brake System Components
Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE LEVER INSPECTION

STROKE INSPECTION

1. Depress the brake pedal several times.
2. Pull the parking brake lever **2-3 times.**
3. Inspect the parking brake stroke by slowly pulling at point **A 50 mm {1.97 in}** from the end of the parking brake lever with a force of **98 N {10 kgf, 22 lbf}** and counting the number of notches (clicking sound).
    - If not within the specification, adjust the parking brake lever.

    Parking brake lever stroke when pulled at 98 N {10 kgf, 22 lbf}

    1-3 notches

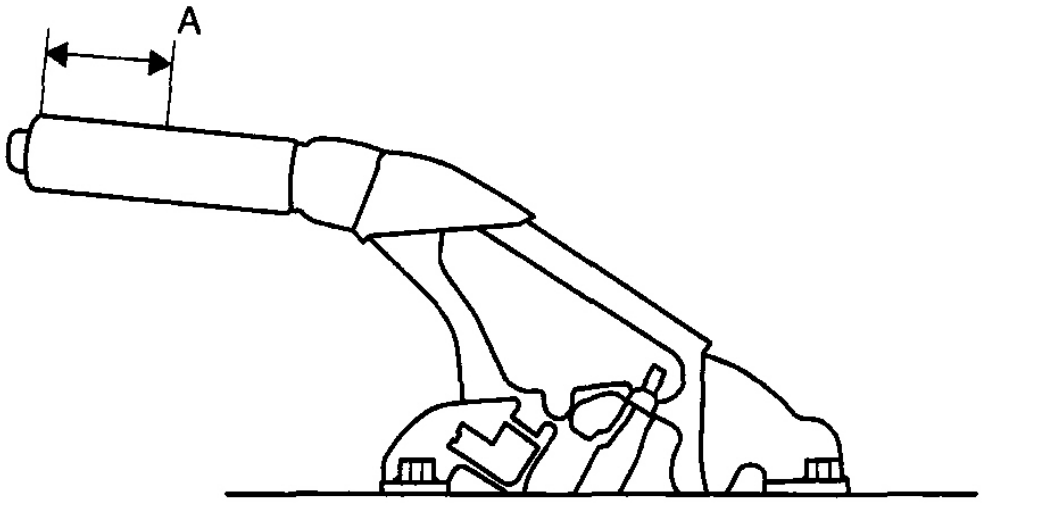


Fig. 2: Inspecting Parking Brake Stroke
Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE LEVER ADJUSTMENT

1. Depress the brake pedal several times.
2. Remove the parking brake lever boot.
3. Turn the adjusting nut and adjust the parking brake lever.
4. After adjustment, pull the parking brake lever one notch and verify that the parking brake warning light illuminates.
5. Verify that the rear brakes do not drag.

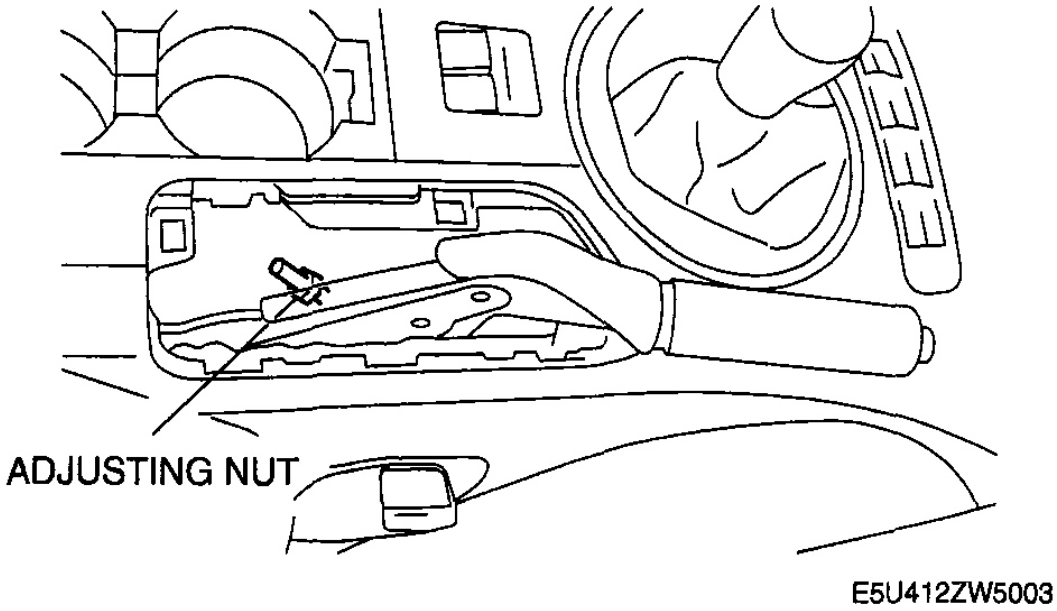
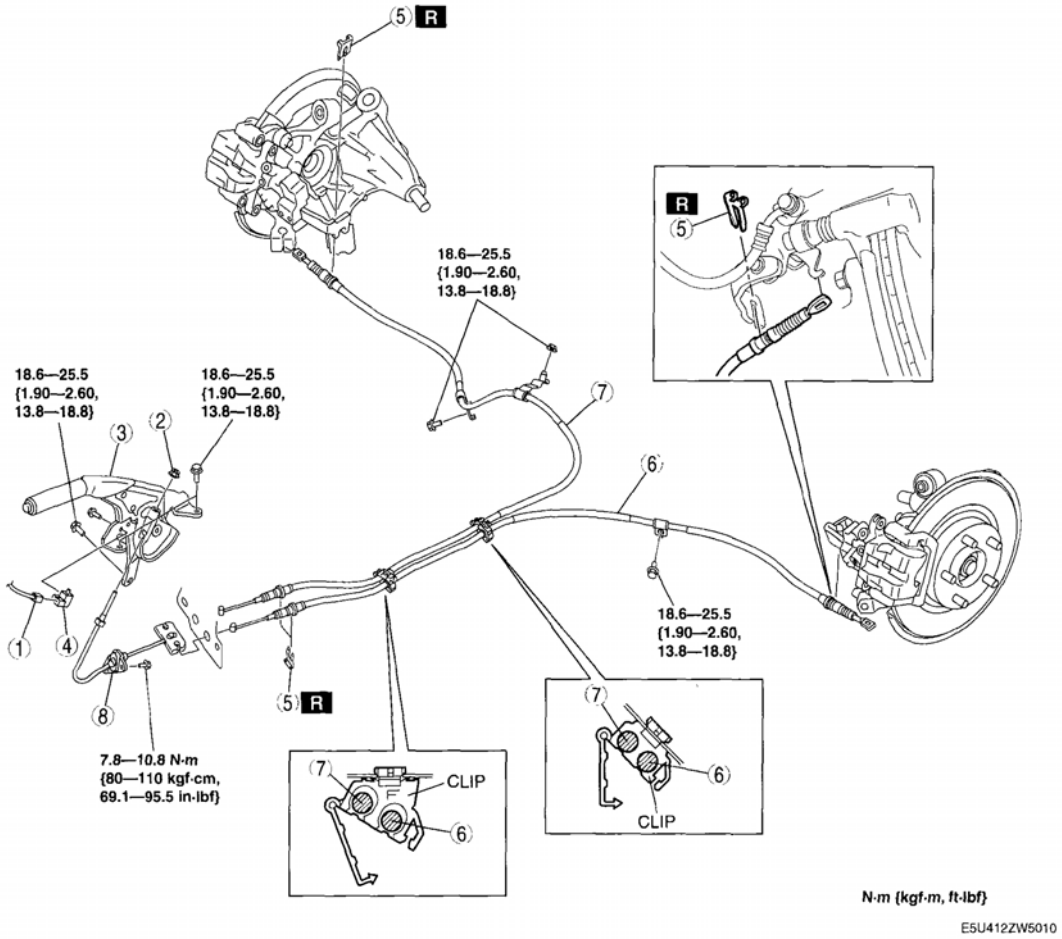


Fig. 3: Identifying Parking Brake Lever Adjusting Nut
Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE LEVER REMOVAL/INSTALLATION

1. Remove the middle pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
2. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
3. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. After installation, inspect the parking brake stroke and adjust if necessary.



1	Parking brake switch connector
2	Adjusting nut
3	Parking brake lever
4	Parking brake switch

5	Clip
6	Rear parking brake cable (LH)
7	Rear parking brake cable (RH)
8	Front parking brake cable

Fig. 4: Identifying Parking Brake Lever Removing/Installing Steps (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE LEVER REMOVAL NOTE

1. Partially peel back the floor mat and remove the bolt shown in **Fig. 5** .
2. Remove the two bolts.
3. Remove the parking brake lever.

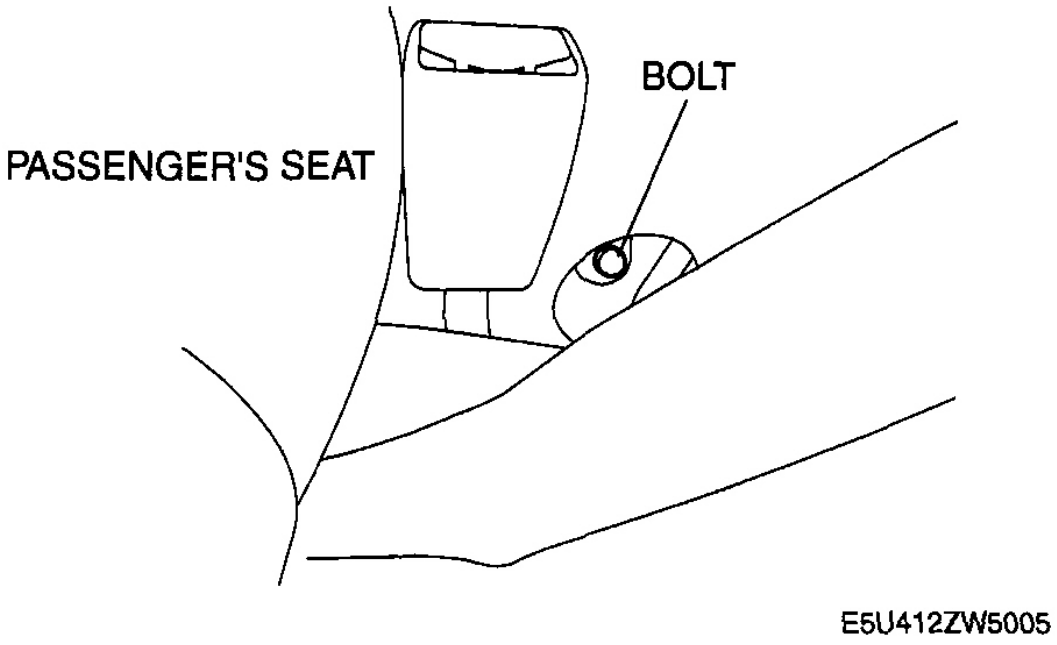


Fig. 5: Removing Bolt
Courtesy of MAZDA MOTORS CORP.

PARKING BRAKE SWITCH INSPECTION

1. Disconnect the parking brake switch connector.
2. Verify that the continuity is as indicated in **Fig. 6** .
    - If not as indicated in **Fig. 6** , replace the parking brake switch.

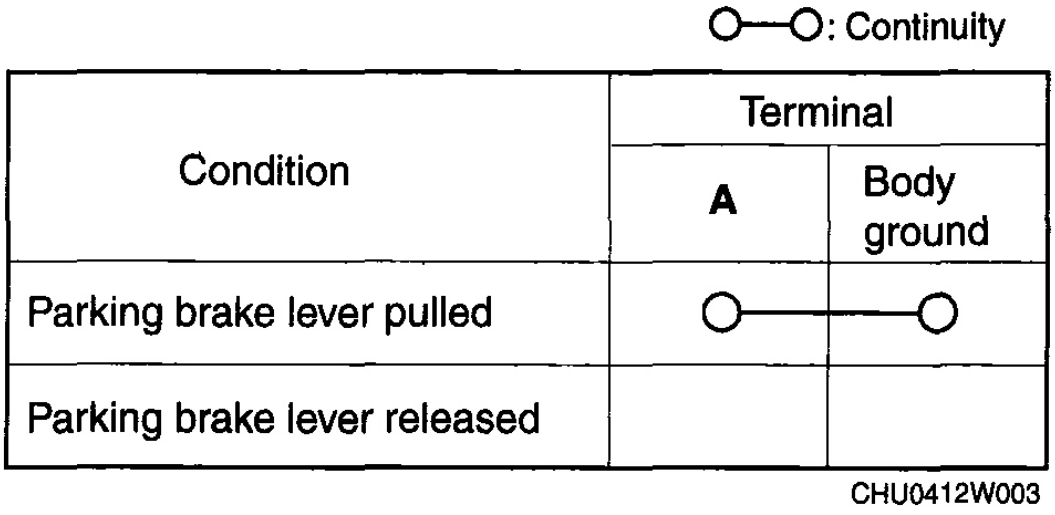


Fig. 6: Parking Brake Switch Continuity Reference Table
Courtesy of MAZDA MOTORS CORP.

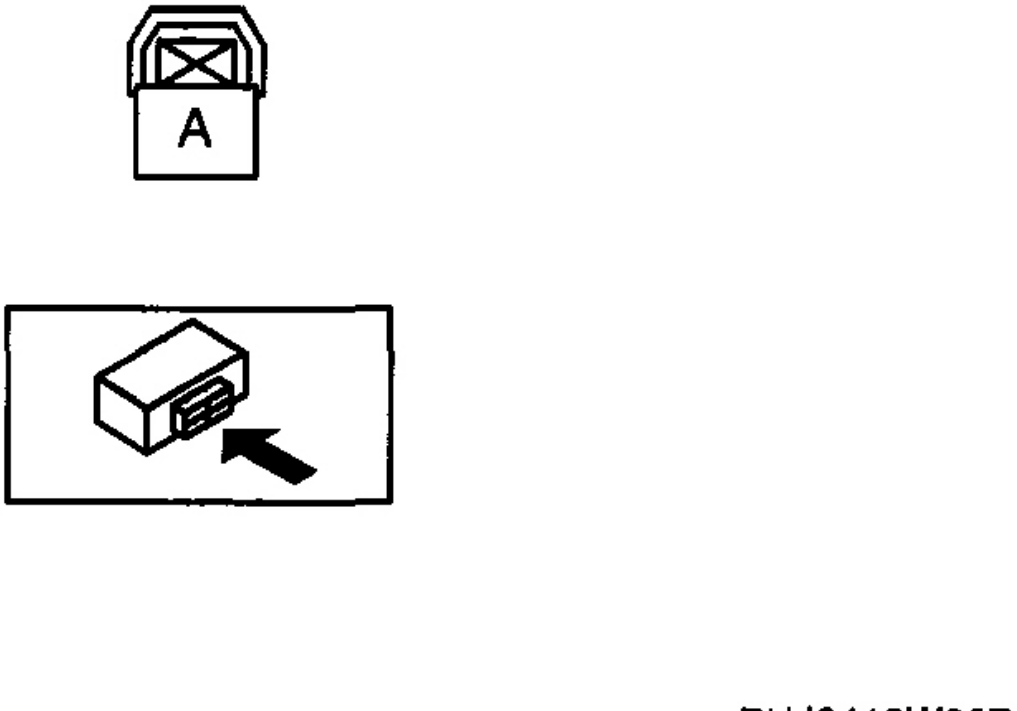


Fig. 7: Identifying Parking Brake Switch Connector
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Symptom Troubleshooting (Power Retractable Hardtop) - MX-5 Miata

SYMPTOM TROUBLESHOOTING INDEX[POWER RETRACTABLE HARDTOP]

SYMPTOM TROUBLESHOOTING INDEX[POWER RETRACTABLE HARDTOP]

No.	TROUBLESHOOTING ITEM	DESCRIPTION
1	Power retractable hardtop warning buzzer sounds continuously	Power retractable hardtop warning buzzer sounds continuously while vehicle is stopped
2	Power retractable hardtop indicator light flashing	Power retractable hardtop indicator light flashes when power retractable hardtop is stopped
3	Power retractable hardtop does not start to open	Power retractable hardtop does not start to open when power retractable hardtop (open) switch is pressed
4	Power retractable hardtop does not start to close	Power retractable hardtop does not start to close when power retractable hardtop (close) switch is pressed
5	Power retractable hardtop stops while operating	Power retractable hardtop stops while power retractable hardtop is opening/closing

NO. 1 POWER RETRACTABLE HARDTOP WARNING BUZZER SOUNDS CONTINUOUSLY[POWER RETRACTABLE HARDTOP]

POWER RETRACTABLE HARDTOP WARNING BUZZER SOUNDS CONTINUOUSLY[POWER RETRACTABLE HARDTOP] POSSIBLE CAUSES

1	Power retractable hardtop warning buzzer sounds continuously
DESCRIPTION	• Power retractable hardtop warning buzzer sounding continuously while the vehicle is stopped.

POSSIBLE CAUSE	• Power retractable hardtop control module sends an buzzer operation signal to the instrument cluster.
	  ○ Power retractable hardtop control module malfunction
	  ○ Power retractable hardtop control module cannot detect the power retractable hardtop permission condition signal.
	  • Vehicle speed detected
	  • Transmission position detected (except for transmission neutral (MT)/N or P position (AT) detected)
	• Power retractable hardtop control module detects a system malfunction
	• Instrument cluster malfunction (Buzzer sounds regardless of the

	instruction from the power retractable hardtop control module)

DIAGNOSTIC PROCEDURE

- When performing the asterisked (*) troubleshooting inspection, slightly shake the wiring harness and connectors while performing the inspection to determine whether poor contact points are the cause of any intermittent malfunction. If there is a problem, verify that the connectors, terminals and wiring harness are connected correctly and undamaged.

POWER RETRACTABLE HARDTOP WARNING BUZZER SOUNDS CONTINUOUSLY[POWER RETRACTABLE HARDTOP] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**VERIFY THAT PRESENT DTC IS STORED** • Stop the vehicle. • Shift to P or N position (AT)/neutral position (MT). • Turn the ignition switch to the ON position. • Verify that power retractable hardtop indicator light status. • Is the power retractable hardtop indicator light flashing?	Yes	Retrieve the DTC for the power retractable hardtop control module using the M-MDS. If the DTC is displayed, perform the appropriate troubleshooting procedure. Then go to the next step.
		No	Go to the next step.
2	**VERIFY THAT POWER RETRACTABLE HARDTOP INDICATOR LIGHT ILLUMINATES** • Turn the ignition switch to ON position. • Verify the power retractable hardtop indicator light status. • Does the power retractable hardtop indicator light illuminate?	Yes	Fully open/close the roof and lock the top lock (if the roof is fully closed). Verify the power retractable hardtop indicator light status again. If the indicator light illuminates with the power retractable hardtop fully open, return to step 1. If the indicator light illuminates with the power retractable hardtop fully closed, inspect the top lock switch. If the indicator light does not illuminate go to the next step.
		No	Go to the next step.
3	**INSPECT TO SEE WHETHER MALFUNCTION IS IN OPERATION PERMISSION CONDITION SIGNAL OR ELSEWHERE** • Connect the M-MDS to the DLC-2.	Yes	Go to the next step.

	• Monitor the following PIDs. (See **PCM INSPECTION [LF]** .) (See **PID/DATA MONITOR INSPECTION [SJ6A-EL]** .) (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .) **PCM** ○ VSS ○ PNP/CPP (MT) ○ CPP (MT) **TCM (AT)** ○ TR **Power Retractable Hardtop Control Module** ○ VSS • Are these monitor values normal?	No	Inspect and repair the suspected signal related wiring harness and component.
4*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN INSTRUMENT CLUSTER (BUZZER) OR POWER RETRACTABLE HARDTOP CONTROL MODULE** • Perform the "INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE". (See **INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE** .) • Does the buzzer sound with check code 14?	Yes	Replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)
		No	Replace the instrument cluster. (See **INSTRUMENT CLUSTER REMOVAL/INSTALLATION** .) (See **INSTRUMENT CLUSTER DISASSEMBLY/ASSEMBLY** .)

NO. 2 POWER RETRACTABLE HARDTOP INDICATOR LIGHT FLASHING [POWER RETRACTABLE HARDTOP]

POWER RETRACTABLE HARDTOP INDICATOR LIGHT FLASHING[POWER RETRACTABLE HARDTOP] POSSIBLE CAUSES

2	**Power retractable hardtop indicator light flashing**
DESCRIPTION	• Power retractable hardtop indicator light flashes when the power retractable hardtop is stopped.

POSSIBLE CAUSE	• Locking of the top lock is unstable when it is fully closed. (Locks and unlocks repeatedly)
	  ○ Top lock switch malfunction
	  ○ Open or short circuit in the wiring harness between the top lock switch and the power retractable hardtop control module
	• Power retractable hardtop control module cannot control thepower retractable hardtop indicator light operation.
	  ○ Power retractable hardtop control module malfunction
	  ○ Short to ground in the wiring harness between power retractable hardtop control module and the power retractable hardtop indicator light.
	• Power retractable hardtop control module detects a system malfunction.

DIAGNOSTIC PROCEDURE

- When performing the asterisked (*) troubleshooting inspection, slightly shake the wiring harness and connectors while performing the inspection to determine whether poor contact points are the cause of any intermittent malfunction. If there is a problem, verify that the connectors, terminals and the wiring harness are connected correctly and undamaged.

POWER RETRACTABLE HARDTOP INDICATOR LIGHT FLASHING[POWER RETRACTABLE HARDTOP] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**VERIFY THAT PRESENT DTC IS STORED** • Connect the M-MDS to DLC-2. • Retrieve the DTC for the power retractable hardtop control module • Is there a DTC present?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE[POWER RETRACTABLE HARDTOP]** .)
		No	Go to the next step.
2	**INSPECT TO SEE WHETHER MALFUNCTION IS IN TOP LOCK SWITCH OR ELSEWHERE** • Verify the power retractable hardtop status. • Is the power retractable hardtop	Yes	Go to the next step.
		No	Go to step 4.

	fully closed?		
3	**INSPECT TOP LOCK SWITCH** • Inspect the top lock switch. (See **TOP LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]** .) • Is the top lock switch normal?	Yes	Inspect and repair for an open or short circuit in the wiring harness between the top lock switch and power retractable hardtop control module.
		No	Replace the striker switch. (See **CONVERTIBLE TOP REMOVAL/INSTALLATION** .)
4*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP INDICATOR LIGHT CONTROL CIRCUIT OR ELSEWHERE** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (6-pin) and power retractable hardtop switch connectors. • Verify the continuity between the power retractable hardtop control module terminal 2C and ground. • Is there continuity?	Yes	Replace for a short to the ground circuit.
		No	Go to the next step.
5	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP INDICATOR LIGHT OR POWER RETRACTABLE HARDTOP CONTROL MODULE** • Reinspect malfunction condition. Does the power retractable hardtop indicator light flash?	Yes	Replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)
		No	Replace the power retractable hardtop switch. (See **POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION** .)

NO. 3 POWER RETRACTABLE HARDTOP DOES NOT START TO OPEN [POWER RETRACTABLE HARDTOP]

POWER RETRACTABLE HARDTOP DOES NOT START TO OPEN[POWER RETRACTABLE HARDTOP] POSSIBLE CAUSES

3	**Power retractable hardtop does not to start open**
DESCRIPTION	• Power retractable hardtop does not start to open when the power retractable hardtop (open) switch is pressed
	• Power retractable hardtop control module cannot detect the power

POSSIBLE CAUSE	retractable hardtop permission condition signal. ○ Improper vehicle speed detected ○ Improper transmission position detected (except for transmission neutral (MT)/N or P position (AT) detected) • Power retractable hardtop control module cannot detect the proper power retractable hardtop switch signal. ○ Power retractable hardtop (open) switch malfunction (stuck off) ○ Power retractable hardtop (close) switch malfunction (stuck on) ○ Open or short circuit in the wiring harness between the power retractable hardtop control module and the power retractable hardtop switch. • Release of the top lock cannot be determined by the Power retractable hardtop control module. ○ Top lock switch malfunction ○ Open or short circuit in the wiring harness between the top lock switch and the power retractable hardtop control module • Power retractable hardtop control module cannot detect proper deck panel and roof positions ○ Deck panel open position switch signal improper • Deck panel open position switch malfunction • Deck panel open position switch improper installation • Open or short circuit in the wiring harness ○ Deck panel close position switch signal malfunction • Deck panel close position switch malfunction • Deck panel close position switch improper installation • Open or short circuit in the wiring harness ○ Power retractable hardtop open position switch signal malfunction • Power retractable hardtop open position switch malfunction • Power retractable hardtop open position switch improper installation • Open or short circuit in the wiring harness ○ Power retractable hardtop close position switch signal malfunction • Power retractable hardtop close position switch malfunction • Power retractable hardtop close position switch improper installation • Open or short circuit in the wiring harness • Power retractable hardtop link mechanics malfunction ○ Excessive restriction or hesitation • Power retractable hardtop control module detects a system malfunction

	NOTE: • **If the following conditions are recognized, the power retractable hardtop control module invalidates the operation of the power retractable hardtop (open) switch.** ○ **Top lock is locked with the power retractable hardtop fully closed** ○ **Power retractable hardtop the fully open**

DIAGNOSTIC PROCEDURE

- When performing the asterisked (*) troubleshooting inspection, slightly shake the wiring harness and connectors while performing the inspection to determine whether poor contact points are the cause of any intermittent malfunction. If there is a problem, verify that the connectors, terminals and the wiring harness are connected correctly and undamaged.

POWER RETRACTABLE HARDTOP DOES NOT START TO OPEN[POWER RETRACTABLE HARDTOP] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**INSPECT TO SEE WHETHER MALFUNCTION IS IN OPERATION PERMISSION CONDITION SIGNAL OR ELSEWHERE** • Connect the M-MDS to the DLC-2. • Monitor the following PIDs. (See **PCM INSPECTION [LF]** .) (See **PID/DATA MONITOR INSPECTION [SJ6A-EL]** .) (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .) **PCM** ○ VSS ○ PNP/CPP (MT) ○ CPP (MT) **TCM (AT)**	Yes	Go to the next step.
		No	Inspect and repair the suspected signal related wiring harness and component.

	○ TR **Power Retractable Hardtop Control Module** ○ VSS • Are these monitor values normal?		
2*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP (CLOSE) SWITCH SIGNAL OR ELSEWHERE** • Monitor the power retractable hardtop control module PID SW_CL (power retractable hardtop (close) switch) using the M-MDS without the power retractable hardtop (close) switch pressed. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .) • Is the monitor value OFF?	Yes	Go to step 4.
		No	Go to the next step.
3	**INSPECT POWER RETRACTABLE HARDTOP (CLOSE) SWITCH** • Turn the ignition switch to the LOCK position. • Remove the power retractable hardtop switch. • Measure the resistance between power retractable hardtop switch component side connector terminals A and F without the power retractable hardtop (close) switch pressed. • Is the resistance **2.18-2.22 kohms?**	Yes	Replace the power retractable hardtop switch. (See **POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION** .)
		No	Inspect and repair the wiring harness between power retractable hardtop control module terminal 1H and power retractable hardtop switch terminal F at wiring harness side connectors.
4	**VERIFY THAT POWER RETRACTABLE HARDTOP INDICATOR LIGHT ILLUMINATION** • Turn the ignition switch to the ON	Yes	**If the indicator light is flashing:** Go to the next step. **If the indicator light is illuminated: Go to step 6.**

	position. • Verify the power retractable hardtop indicator light status. • Does the power retractable hardtop indicator light flash or illuminate?	No	Go to step 9.
5	**VERIFY THAT PRESENT MALFUNCTION DTC IS STORED** • Connect the M-MDS to DLC-2. • Retrieve the DTC for the power retractable hardtop control module. (See **DTC INSPECTION[POWER RETRACTABLE HARDTOP]** .) • Is there any present malfunction DTC?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE[POWER RETRACTABLE HARDTOP]** .)
		No	Go to **NO. 2 POWER RETRACTABLE HARDTOP INDICATOR LIGHT FLASHING[POWER RETRACTABLE HARDTOP]** .
6*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN TOP LOCK SWITCH OR ELSEWHERE** • Connect the M-MDS to DLC-2. • Monitor the power retractable hardtop control module PID SW_STRIKER using the M-MDS while the top lock switch is released. (See **DTC INSPECTION[POWER RETRACTABLE HARDTOP]** .) • Is the monitor value OFF?	Yes	Go to step 8.
		No	Go to the next step.
7	**INSPECT TOP LOCK SWITCH** • Inspect the top lock switch. (See **TOP LOCK SWITCH INSPECTION[ADVANCED KEYLESS SYSTEM]** .) • Is the top lock switch normal?	Yes	Inspect and repair for an open or short circuit between the top lock switch and power retractable hardtop control module.
		No	Replace the striker switch. (See **CONVERTIBLE TOP REMOVAL/INSTALLATION** .)
8*	**INSPECT POWER RETRACTABLE HARDTOP LIMIT SWITCH AND DECK PANEL LIMIT SWITCH** • Monitor the power retractable	Yes	Verify that the malfunction symptom appears without the roof and deck panel in the fully open position. If the same symptom appears, replace the power retractable hardtop control module. (See

	hardtop control module PID RHT_OP, RHT_CL, DECK_OP and DECK_CL using the M-MDS. • Do the monitoring values indicate the roof and deck panel positions properly?		**POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION** .)
		No	Inspect and repair suspected position sensor. (See **POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION** .) (See **DECK PANEL LIMIT SWITCH INSPECTION** .)
9*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP (OPEN) SWITCH SIGNAL OR ELSEWHERE** • Monitor the power retractable hardtop control module PID SW_OP using the M-MDS while the power retractable hardtop (open) switch is pressed. • Is the monitor value ON?	Yes	Go to step 10.
		No	Go to the next step.
10	**INSPECT POWER RETRACTABLE HARDTOP (OPEN) SWITCH** • Remove the power retractable hardtop switch. • Measure the resistance between power retractable hardtop switch connector (component side) terminal A and F while the power retractable hardtop (open) switch is pressed. • Is the resistance **0.99-1.01 kohms?**	Yes	Inspect and repair the wiring harness between power retractable hardtop control module terminal 1H and power retractable hardtop switch terminal F at the wiring harness side connectors.
		No	Replace the power retractable hardtop switch.
11	**INSPECT POWER RETRACTABLE HARDTOP LINK MECHANICS** • Inspect the power retractable hardtop link mechanics. • Is there any restriction or hesitation with power retractable hardtop operation?	Yes	Repair or replace the malfunctioning part.
		No	Replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)

NO. 4 POWER RETRACTABLE HARDTOP DOES NOT START TO CLOSE [POWER RETRACTABLE HARDTOP]

POWER RETRACTABLE HARDTOP DOES NOT START TO CLOSE[POWER RETRACTABLE

HARDTOP] POSSIBLE CAUSES

4	**Power retractable hardtop does not start to close**
DESCRIPTION	• Power retractable hardtop does not start to close when the power retractable hardtop (close) switch is pressed
POSSIBLE CAUSE	• Power retractable hardtop control module cannot detect the power retractable hardtop permission condition signal. ○ Improper vehicle speed detected ○ Improper transmission position detected (except for transmission neutral (MT)/N or P position (AT) detected) • Power retractable hardtop control module cannot detect the proper power retractable hardtop switch signal. ○ Power retractable hardtop (open) switch malfunction (stuck on) ○ Power retractable hardtop (close) switch malfunction (stuck off) ○ Open or short circuit in the wiring between the power retractable hardtop control module and the power retractable hardtop switch • Power retractable hardtop control module cannot detect proper deck panel and roof positions ○ Deck panel open position switch signal improper • Deck panel open position switch malfunction • Deck panel open position switch improper installation • Open or short circuit in the wiring harness ○ Deck panel close position switch signal improper • Deck panel close position switch malfunction • Deck panel close position switch improper installation • Open or short circuit in the wiring harness ○ Power retractable hardtop open position switch signal improper • Power retractable hardtop open position switch malfunction • Power retractable hardtop open position switch improper installation • Open or short circuit in the wiring harness ○ Power retractable hardtop close position switch signal improper • Power retractable hardtop close position switch malfunction • Power retractable hardtop close position switch improper installation • Open or short circuit in the wiring harness • Power retractable hardtop link mechanics malfunction ○ Excessive restriction or hesitation • Power retractable hardtop control module detects a system malfunction

DIAGNOSTIC PROCEDURE

- When performing the asterisked (*) troubleshooting inspection, slightly shake the wiring harness and connectors while performing the inspection to determine whether poor contact points are the cause of any intermittent malfunction. If there is a problem, verify that the connectors, terminals and the wiring harness are connected correctly and undamaged.

POWER RETRACTABLE HARDTOP DOES NOT START TO CLOSE[POWER RETRACTABLE HARDTOP] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**INSPECT TO SEE WHETHER MALFUNCTION IS IN OPERATION PERMISSION CONDITION SIGNAL OR ELSEWHERE** • Connect the M-MDS to the DLC-2. • Monitor the following PIDs. (See **PCM INSPECTION [LF]** .) (See **PID/DATA MONITOR INSPECTION [SJ6A-EL]** .) (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .) **PCM** ○ VSS ○ PNP/CPP (MT) ○ CPP (MT) **TCM (AT)** ○ TR **Power Retractable Hardtop Control Module** ○ VSS • Are these monitor values normal?	Yes	Go to the next step.
		No	Inspect and repair the suspected signal related wiring harness and component.
2*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP**	Yes	Go to step 4.

	(OPEN) SWITCH SIGNAL OR ELSEWHERE • Monitor the power retractable hardtop control module PID SW_OP using the M-MDS without the power retractable hardtop (open) switch pressed. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .) • Is the monitor value OFF?	No	Go to the next step.
3	**INSPECT POWER RETRACTABLE HARDTOP (OPEN) SWITCH** • Remove the power retractable hardtop switch. • Measure the resistance between power retractable hardtop switch component side connector terminals A and F without the power retractable hardtop (open) switch pressed. • Is the resistance **0.99-1.01 kohms?**	Yes	Replace the power retractable hardtop switch. (See **POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION** .)
		No	Inspect and repair the wiring harness between power retractable hardtop control module terminal 1H and power retractable hardtop switch terminal F at wiring harness side connectors.
4	**VERIFY THAT POWER RETRACTABLE HARDTOP INDICATOR LIGHT ILLUMINATES** • Turn the ignition switch to the ON position. • Verify the power retractable hardtop indicator light status. • Does the power retractable hardtop indicator light flash or illuminate?	Yes	**If the indicator light is flashing:** Go to the next step. **If the indicator light is illuminated:** Go to step 6.
		No	Go to step 7.
5	**VERIFY THAT PRESENT MALFUNCTION DTC IS STORED** • Connect the M-MDS to DLC-2. • Retrieve the DTC for the power retractable hardtop control	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE[POWER RETRACTABLE HARDTOP]** .)
		No	Go to **NO. 2 POWER RETRACTABLE**

	module. (See **DTC INSPECTION[POWER RETRACTABLE HARDTOP]** .) • Is there any present malfunction DTC?		**HARDTOP INDICATOR LIGHT FLASHING[POWER RETRACTABLE HARDTOP]** .
6*	**INSPECT POWER RETRACTABLE HARDTOP LIMIT SWITCH** • Connect the M-MDS to DLC-2. • Monitor the power retractable hardtop control module PID RHT_OP, RHT_CL, DECK_OP and DECK_CL using the M-MDS. • Do the monitoring values indicate the roof and deck panel positions properly?	Yes	Verify that the malfunction symptom appears without the roof and deck panel in the fully open position. If the same symptom appears, replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)
		No	Inspect and repair the suspected position sensor. (See **POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION** .) (See **DECK PANEL LIMIT SWITCH INSPECTION** .)
7*	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP (CLOSE) SWITCH SIGNAL OR ELSEWHERE** • Monitor the power retractable hardtop control module PID SW_CL using the M-MDS while the power retractable hardtop (close) switch is pressed. • Is the monitor value ON?	Yes	Go to step 9.
		No	Go to the next step.
8	**INSPECT POWER RETRACTABLE HARDTOP (CLOSE) SWITCH** • Remove the power retractable hardtop switch. • Measure the resistance between the power retractable hardtop switch connector (component side) terminal A and F while the open is switch pressed. • Is the resistance **2.18-2.22 kohms?**	Yes	Inspect and repair the wiring harness between power retractable hardtop control module terminal 1H and power retractable hardtop switch terminal F at wiring harness side connectors.
		No	Replace the power retractable hardtop switch. (See **POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION** .)
9	**INSPECT POWER RETRACTABLE**	Yes	Repair or replace malfunctioning part.

	HARDTOP LINK MECHANICS • Inspect the power retractable hardtop link mechanics. • Is there any restriction or hesitation with power retractable hardtop operation?	No	Replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)

NO. 5 POWER RETRACTABLE HARDTOP STOPS WHILE OPERATING [POWER RETRACTABLE HARDTOP]

POWER RETRACTABLE HARDTOP STOPS WHILE OPERATING[POWER RETRACTABLE HARDTOP] POSSIBLE CAUSES

5	**Power retractable hardtop stops while operating**
DESCRIPTION	• Power retractable hardtop stops while the power retractable hardtop is opening/closing

POSSIBLE CAUSE	• Deck panel does not operate while power retractable hardtop is operating
	  ○ Deck panel cannot move
	  • Open or short circuit or poor connection in the wiring harness between the left/right deck panel motor and power retractable hardtop control module
	  • Left/right deck panel motor malfunction
	  • Deck panel link mechanics malfunction (excessive restriction or hesitation)
	  ○ Deck panel position cannot be detected
	  • Deck panel open position switch malfunction
	  • Deck panel close position switch malfunction
	  • Open or short circuit or poor connection in the wiring harness between the deck panel open position switch and the power retractable hardtop control module
	  • Open or short circuit or poor connection in wiring harness between deck panel close position switch and power retractable hardtop control module
	  • Foreign material caught in mechanism.
	• Roof does not operate while the power retractable hardtop is operating
	  ○ Roof cannot move
	  • Open or short circuit or poor connection in the wiring harness between the left/right roof motor and the power retractable hardtop control module
	  • Left/right roof motor malfunction
	  • Roof link mechanics malfunction (excessive restriction or

	hesitation) ○ Roof position cannot be detected • Power retractable hardtop open position switch malfunction • Power retractable hardtop close position switch malfunction • Open or short circuit or poor connection in the wiring harness between the power retractable hardtop open position switch and the power retractable hardtop control module • Open or short circuit or poor connection in the wiring harness between the power retractable hardtop close position switch and the power retractable hardtop control module • Foreign material caught in mechanism. • Power retractable hardtop switch signal is interrupted while the power retractable hardtop is operating ○ Power retractable hardtop (open) switch malfunction (Contact point defective) ○ Power retractable hardtop (close) switch malfunction (Contact point defective) ○ Open or short circuit or poor connection in the wiring harness between the power retractable hardtop control module and the power retractable hardtop switch • Power retractable hardtop control module detects a system malfunction

DIAGNOSTIC PROCEDURE

- When performing the asterisked (*) troubleshooting inspection, slightly shake the wiring harness and connectors while performing the inspection to determine whether poor contact points are the cause of any intermittent malfunction. If there is a problem, verify that the connectors, terminals and the wiring harness are connected correctly and undamaged.

POWER RETRACTABLE HARDTOP STOPS WHILE OPERATING[POWER RETRACTABLE HARDTOP] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**VERIFY THAT POWER RETRACTABLE HARDTOP INDICATOR LIGHT ILLUMINATES** • Turn the ignition switch to the ON position. • Verify the power retractable hardtop indicator light status. • Does the power retractable hardtop indicator light flash?	Yes	Go to the next step.
		No	Go to step 3.
2	**VERIFY THAT PRESENT**	Yes	Go to the appropriate DTC inspection.

	MALFUNCTION DTC STORED • Connect the M-MDS to DLC-2. • Retrieve DTC for power retractable hardtop control module. (See **DTC INSPECTION[POWER RETRACTABLE HARDTOP]** .) • Is there a DTC present?		(See **DTC TABLE[POWER RETRACTABLE HARDTOP]** .)
		No	Go to **NO. 2 POWER RETRACTABLE HARDTOP INDICATOR LIGHT FLASHING [POWER RETRACTABLE HARDTOP]** .
3	**INSPECT TO SEE WHETHER MALFUNCTION IS IN DECK PANEL OR ELSEWHERE** • Verify the malfunction symptom. • Does the deck panel operation stop during the open or close operation?	Yes	**Stops during the deck panel open operation: Go to the next step.** **Stops during the deck panel close operation:** • Go to step 7.
		No	Go to step 14.
4	**INSPECT TO SEE WHETHER MALFUNCTION IS IN DECK PANEL OPEN POSITION SWITCH OR ELSEWHERE** • Monitor the power retractable hardtop control module PID DECK_OP using the M-MDS at the position where the deck panel does not operate. • Is the monitor value ON (deck panel fully open)?	Yes	Go to the next step.
		No	Go to step 10.
5	**INSPECT DECK PANEL OPEN POSITION SWITCH** • Inspect the deck panel open position switch. (See **DECK PANEL LIMIT SWITCH INSPECTION** .) • Is the deck panel open position switch normal?	Yes	Go to the next step.
		No	Replace the deck panel limit switch. (See **DECK PANEL LIMIT SWITCH REMOVAL/INSTALLATION** .)
6*	**INSPECT DECK PANEL OPEN POSITION SWITCH WIRING HARNESS** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (16-pin) and the deck panel open position switch connectors.	Yes	Adjust the deck panel open position switch installation.
		No	Repair for a short to the ground circuit.

	• Verify the continuity between power retractable hardtop control module terminal 3F and ground. • Is there continuity?		
7	**INSPECT TO SEE WHETHER MALFUNCTION IS IN DECK PANEL CLOSE POSITION SWITCH OR ELSEWHERE** • Monitor the power retractable hardtop control module PID DECK_CL using the M-MDS when the position where the deck panel could not operate. • Is the monitor value ON (deck panel fully closed)?	Yes	Go to the next step.
		No	Go to step 10.
8	**INSPECT DECK PANEL CLOSE POSITION SWITCH** • Inspect the deck panel close position switch. (See **DECK PANEL LIMIT SWITCH INSPECTION** .) • Is the deck panel close position switch normal?	Yes	Go to the next step.
		No	Replace the deck panel limit switch. (See **DECK PANEL LIMIT SWITCH REMOVAL/INSTALLATION** .)
9*	**INSPECT DECK PANEL CLOSE POSITION SWITCH WIRING HARNESS** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (16-pin) and the deck panel close position switch connectors. • Verify that the continuity between the power retractable hardtop control module terminal 3F and ground. • Is there any continuity?	Yes	Adjust the deck panel close position switch installation.
		No	Repair for a short to the ground circuit.
10*	**INSPECT DECK PANEL MOTOR WIRING HARNESS** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (16-pin, 24-	Yes	Repair or replace malfunctioning part.

	pin), and deck panel motor (left, right)(6-pin) connectors on both sides. • Inspect for an open or short circuit and poor connection at the following terminals: ○ Power retractable hardtop control module terminal 3M-deck panel motor (right) terminal A ○ Power retractable hardtop control module terminal 3E-deck panel motor (right) terminal E ○ Power retractable hardtop control module terminal 1K-deck panel motor (right) terminal F ○ Power retractable hardtop control module terminal 3H-deck panel motor (left) terminal A ○ Power retractable hardtop control module terminal 3P-deck panel motor (left) terminal E ○ Power retractable hardtop control module terminal 1O-deck panel motor (left) terminal F • Is there an open or short circuit, or a poor connection?	No	Go to the next step.
11	**INSPECT DECK PANEL MOTOR** • Inspect the deck panel motors on both sides. (See **DECK PANEL MOTOR INSPECTION** .) • Are both deck panel motors normal?	Yes	Go to the next step.
		No	Replace suspected deck panel motor. (See **DECK PANEL MOTOR REMOVAL/INSTALLATION** .)
12	**INSPECT DECK PANEL MOTOR HALL SENSOR** • Measure the pulse profiles for the following power retractable hardtop control module (24-pin) while the	Yes	Go to the next step.
		No	Replace the suspected deck panel motor.

	deck panel is operating using the oscilloscope. ○ Terminal 1K (right deck panel motor hall sensor) ○ Terminal 1O (left deck panel motor hall sensor) • Is the pulse profile normal? (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .)		(See **DECK PANEL MOTOR REMOVAL/INSTALLATION** .)
13	**INSPECT POWER RETRACTABLE HARDTOP LINK MECHANICS** • Inspect the power retractable hardtop link mechanics. • Is there any restriction or hesitation for the power retractable hardtop operation?	Yes	Repair or replace the malfunctioning part.
		No	Go to step 25.
14	**INSPECT TO SEE WHETHER MALFUNCTION IS IN ROOF OR ELSEWHERE** • Verify that malfunction symptom. • Does the roof operation stop during the open or close operation?	Yes	**Stops during the roof open operation:** • Go to the next step. **Stops during the roof close operation:** • Go to step 18.
		No	Go to step 25.
15	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP OPEN POSITION SWITCH OR ELSEWHERE** • Monitor the power retractable hardtop control module PID RHT_OP using the M-MDS at the position where the roof does operate. • Is the monitor value on (roof fully open)?	Yes	Go to the next step.
		No	Go to step 22.
16	**INSPECT POWER RETRACTABLE HARDTOP OPEN POSITION SWITCH** • Inspect the power retractable hardtop open position switch.	Yes	Go to the next step.
		No	Replace the power retractable hardtop limit switch. (See **POWER RETRACTABLE HARDTOP LIMIT**

	(See **POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION** .) • Is the power retractable hardtop open position switch normal?		**SWITCH REMOVAL/INSTALLATION** .)
17*	**INSPECT POWER RETRACTABLE HARDTOP OPEN POSITION SWITCH WIRING HARNESS** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (24-pin) and the power retractable hardtop open position switch connectors. • Verify that continuity between power retractable hardtop control module terminal 1T-ground. • Is there continuity?	Yes	Adjust the power retractable hardtop open position switch installation.
		No	Repair for a short to the ground circuit.
18	**INSPECT TO SEE WHETHER MALFUNCTION IS IN POWER RETRACTABLE HARDTOP CLOSE POSITION SWITCH OR ELSEWHERE** • Monitor the power retractable hardtop control module PID RHT_CL using the M-MDS at the position where the roof could not operate. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .) • Is the monitor value on (roof fully closed)?	Yes	Go to the next step.
		No	Go to step 20.
19	**INSPECT POWER RETRACTABLE HARDTOP CLOSE POSITION SWITCH** • Inspect the power retractable hardtop close position switch. (See **POWER RETRACTABLE HARDTOP LIMIT SWITCH INSPECTION** .) • Is the power retractable hardtop close position switch normal?	Yes	Go to the next step.
		No	Replace the power retractable hardtop limit switch. (See **POWER RETRACTABLE HARDTOP LIMIT SWITCH REMOVAL/INSTALLATION** .)
20*	**INSPECT POWER RETRACTABLE**	Yes	Adjust the power retractable hardtop

	HARDTOP CLOSE POSITION SWITCH WIRING HARNESS • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (24-pin) and the deck panel close position switch connectors. • Verify that continuity between power retractable hardtop control module terminal 1F-ground. • Is there any continuity?		close position switch installation position.
		No	Repair for a short to the ground circuit.
21*	**INSPECT ROOF MOTOR WIRING HARNESS** • Turn the ignition switch to the LOCK position. • Disconnect the power retractable hardtop control module (16-pin, 24-pin), and the roof motor (left, right) (6-pin) connector on both sides. • Inspect for the open or short circuit and poor connection at the following terminals: ○ Power retractable hardtop control module terminal 3I-roof motor (right) terminal A ○ Power retractable hardtop control module terminal 3A-roof motor (right) terminal E ○ Power retractable hardtop control module terminal 1I-roof motor (right) terminal D ○ Power retractable hardtop control module terminal 3C-roof motor (left) terminal A ○ Power retractable hardtop control module terminal 3L-roof motor (left) terminal E ○ Power retractable hardtop control module terminal 1M-roof motor (left) terminal D • Is there an open or short circuit, or a	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.

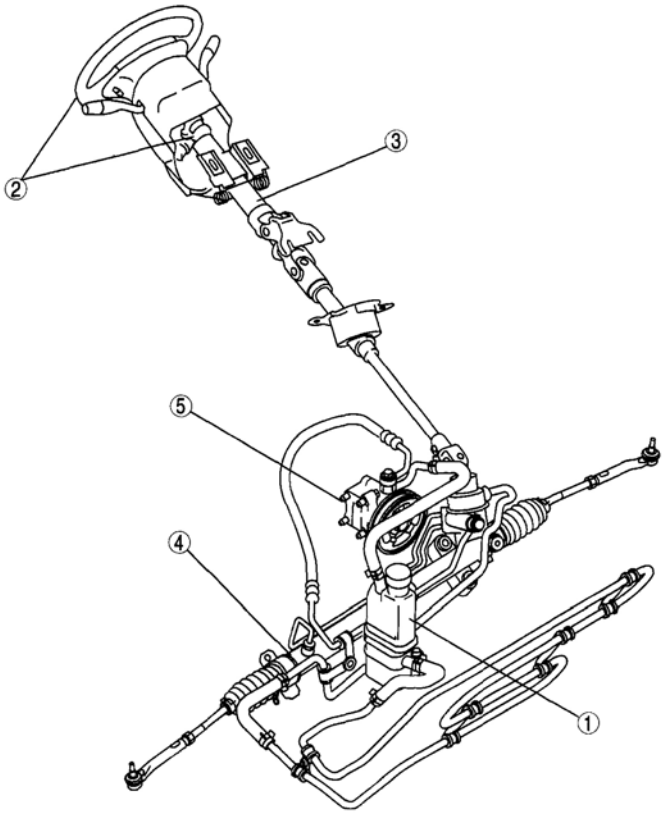
	poor connection?		
22	**INSPECT ROOF MOTOR** • Inspect the both side roof motor hall sensors on both side. (See **ROOF MOTOR INSPECTION** .) • Are both roof motors normal?	Yes	Go to the next step.
		No	Replace the suspected roof motor. (See **ROOF MOTOR REMOVAL/INSTALLATION** .)
23	**INSPECT ROOF MOTOR HALL SENSOR** • Measure the pulse profiles for the following power retractable hardtop control module (24-pin) while the roof is operating using the oscilloscope. ○ Terminal 1I (right side roof motor hall sensor) ○ Terminal 1M (left side roof motor hall sensor) • Is the pulse profile normal? (See **POWER RETRACTABLE HARDTOP CONTROL MODULE INSPECTION** .)	Yes	Go to the next step.
		No	Replace the suspected roof motor. (See **ROOF MOTOR REMOVAL/INSTALLATION** .)
24	**INSPECT POWER RETRACTABLE HARDTOP LINK MECHANICS** • Inspect the roof link mechanics. • Does the roof operation stop during open or close operation?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
25	**INSPECT POWER RETRACTABLE HARDTOP SWITCH** • Remove the power retractable hardtop switch. • Measure the resistance between power retractable hardtop switch connector (component side) terminals A and F. • Is the resistance normal? **Power retractable hardtop (open) switch pressed: 0.99-1.01 kohms** **Power retractable hardtop (close) switch**	Yes	Go to the next step.
		No	Replace the power retractable hardtop switch. (See **POWER RETRACTABLE HARDTOP SWITCH REMOVAL/INSTALLATION** .)

	pressed: 2.18-2.22 kohms		
26*	**INSPECT POWER RETRACTABLE HARDTOP SWITCH WIRING HARNESS** • Turn the ignition switch to the ON position. • Disconnect the power retractable hardtop control module (24-pin) and power retractable hardtop switch connectors. • Inspect for an open or short circuit and poor connection between the power retractable hardtop control module terminal 1H and the power retractable hardtop switch terminal F. • Is there any open or short circuit, or poor connection?	Yes	Repair or replace the malfunctioning part.
		No	Replace the power retractable hardtop control module. (See **POWER RETRACTABLE HARDTOP CONTROL MODULE REMOVAL/INSTALLATION** .)

2007 STEERING

Power Steering - MX-5 Miata

STEERING LOCATION INDEX



1	Power steering fluid tank
2	Steering wheel and column
3	Steering shaft
4	Steering gear and linkage
5	Power steering oil pump

Fig. 1: Identifying Location Of Steering Components
Courtesy of MAZDA MOTORS CORP.

AIR BLEEDING

CAUTION:
- **Do not turn the steering wheel during the fluid level inspection, otherwise the fluid level changes and cannot be inspected correctly.**

1. Inspect the fluid level. (See **POWER STEERING FLUID INSPECTION** .)
2. Jack up the front of the vehicle and support it on safety stands.
3. Turn the steering wheel fully to the left and right several times with the engine not running.
4. Reinspect the fluid level.
   - If it has dropped, add fluid.
5. Repeat Steps 3 and 4 until the fluid level stabilizes.
6. Lower the vehicle.
7. Start the engine and let it idle.
8. Turn the steering wheel fully to the left and right several times.
9. Verify that the fluid is not foamy and that the fluid level has not dropped.
   - If the fluid level has dropped, add fluid as necessary and repeat Steps 8 and 9.

POWER STEERING FLUID INSPECTION

FLUID LEVEL INSPECTION

1. Inspect the power steering fluid level.
   - Add fluid to the specified level as necessary.

Power steering fluid type

ATF M-III or equivalent (e.g. Dexron®RII)

Power steering fluid capacity (approximate quantity)

1.19 L {1.25 US qt, 1.04 Imp qt}

FLUID LEAKAGE INSPECTION

1. Start the engine and let it idle.
2. Turn the steering wheel fully to the left and right to apply fluid pressure.

CAUTION:
- **If the steering wheel is kept in the fully turned position for more than 5 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.**

3. Inspect for fluid leakage.
   - If fluid leakage is found, replace related pipe or hose.

NOTE:

- **The points where fluid leakage may occur are indicated in the figure.**

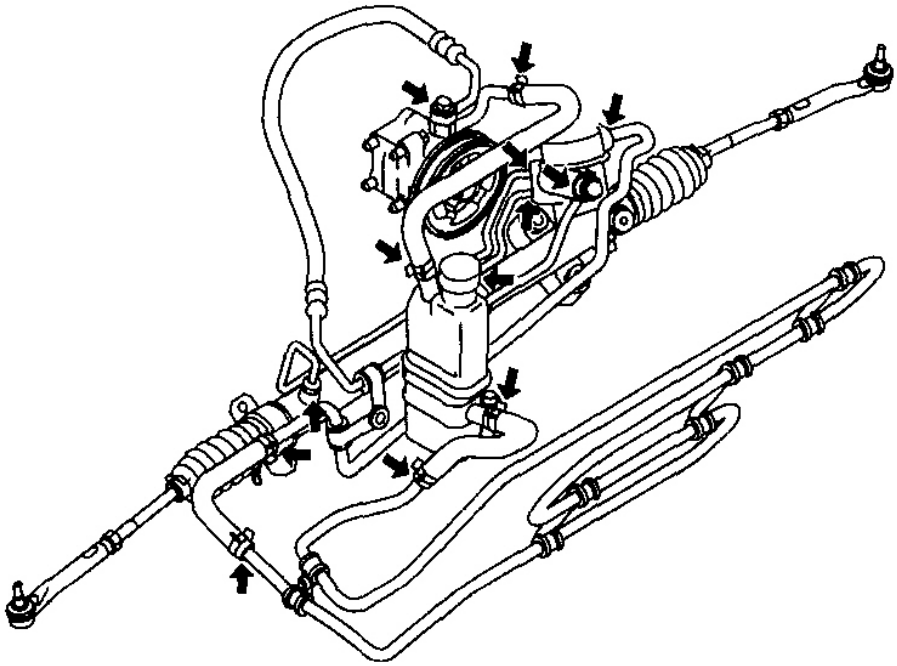


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Fig. 2: Identifying Fluid Leakage Points
Courtesy of MAZDA MOTORS CORP.

FLUID PRESSURE INSPECTION

1. Assemble the **SSTs** as shown in **Fig. 3** .

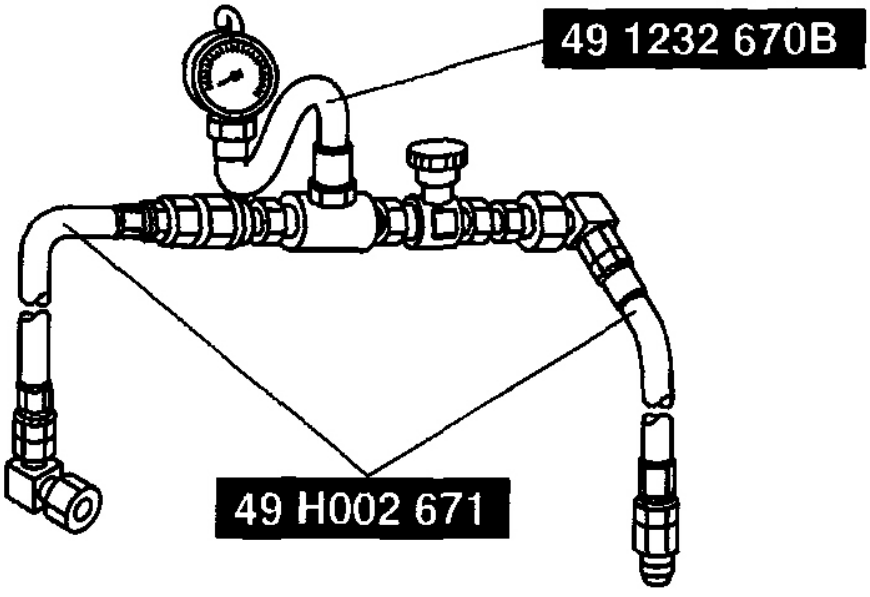

Fig. 3: Assembling SSTs
Courtesy of MAZDA MOTORS CORP.

2. Disconnect the pressure pipe from the oil pump, and connect the **SSTs** .

   Tightening torque

   29.4-44.1 N.m {3.00-4.49 kgf.m, 21.7-32.5 ft.lbf}

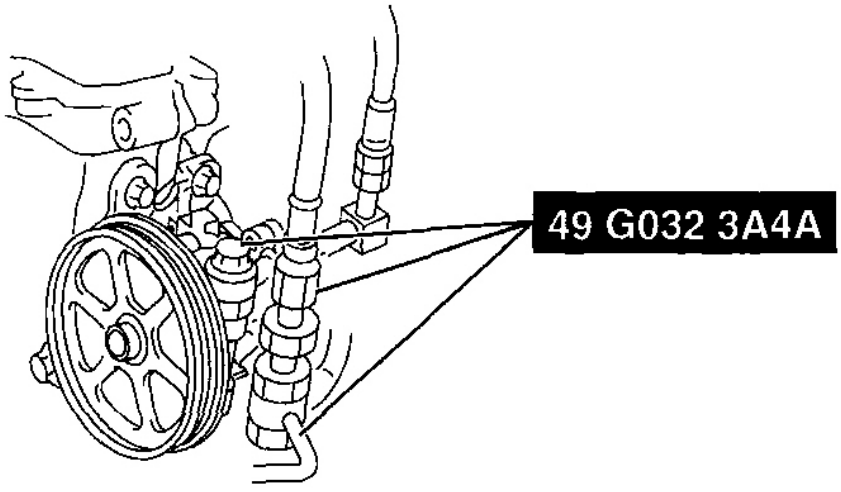

Fig. 4: Connecting SSTs
Courtesy of MAZDA MOTORS CORP.

3. Bleed the air from the system. (See **AIR BLEEDING** .)
4. Open the gauge valve fully.
5. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50-60°C {122-140°F}** .
6. Close the gauge valve completely.
7. Increase the engine speed to **1,000-1,500 rpm** and measure the fluid pressure generated by the oil pump.
   - If the pressure is not within the specification, repair or replace the oil pump component.

CAUTION:
- **If the valve is left closed for more than 5 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.**

Oil pump fluid pressure

7.55-8.05 MPa {77.0-82.0 kgf/cm^2 , 1095-1167 psi}

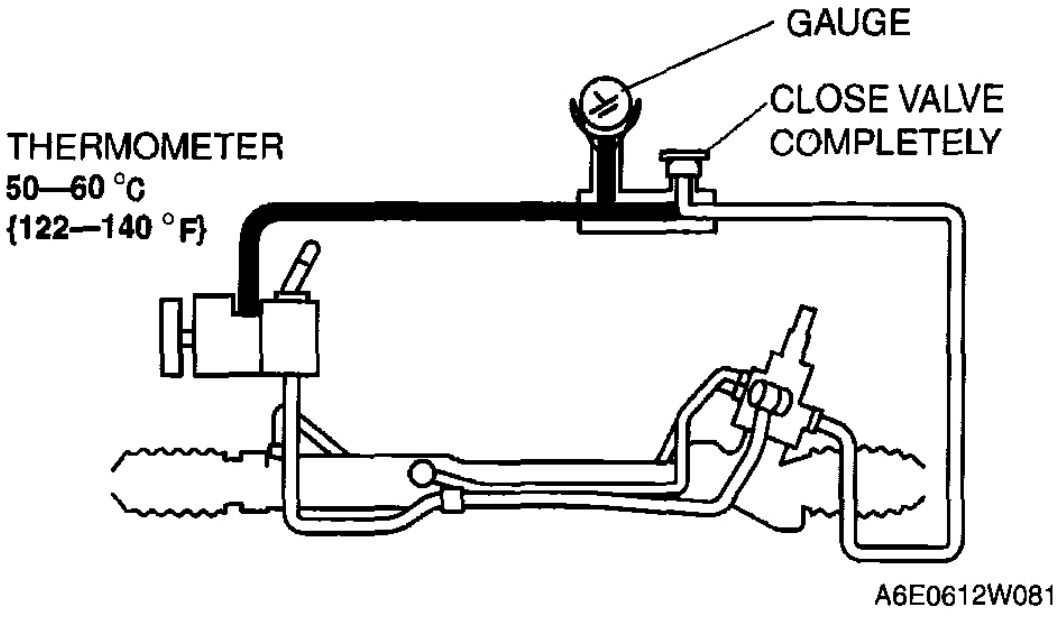

Fig. 5: Inspecting Fluid Pressure (Valve Closed)
Courtesy of MAZDA MOTORS CORP.

8. Open the gauge valve fully and increase the engine speed to **1,000-1,500 rpm** .
9. Turn the steering wheel fully to the left and right, then measure the fluid pressure generated at the gear housing.
    - If the pressure is not within the specification, repair or replace the steering gear component.

CAUTION:
- **If the steering wheel is kept in the fully turned position for more than 5 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.**

Gear housing fluid pressure

7.55-8.05 MPa {77.0-82.0 kgf/cm^2 ,1095-1167 psi}

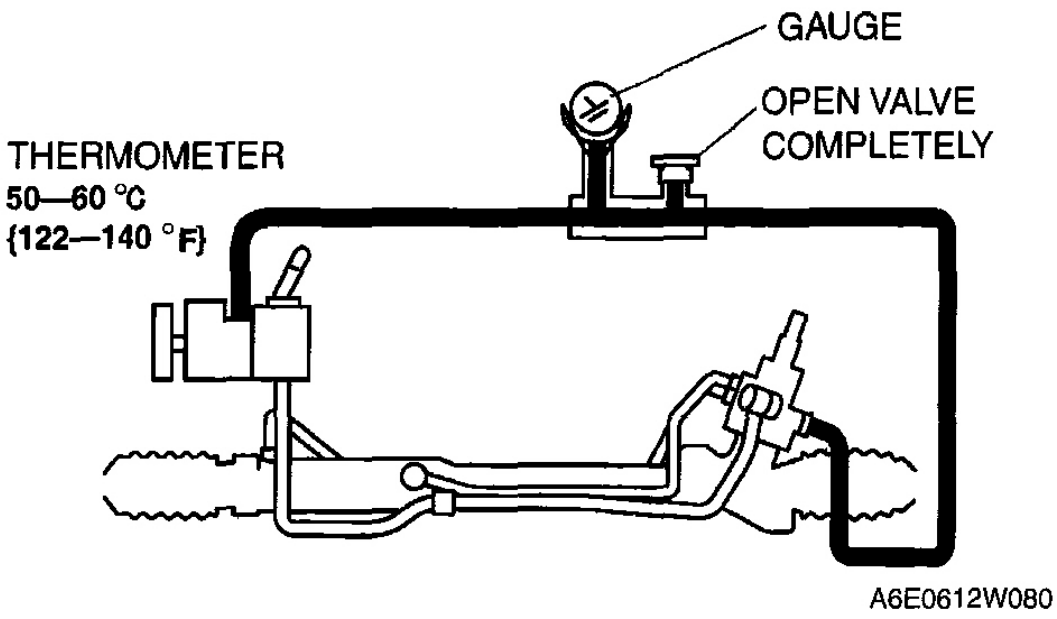

Fig. 6: Inspecting Fluid Pressure (Valve Open)
Courtesy of MAZDA MOTORS CORP.

10. Remove the **SSTs** . Install and tighten the pressure pipe to the specified torque.

    Tightening torque

    29.4-44.1 N.m {3.00-4.49 kgf.m, 21.7-32.5 ft.lbf}

11. Bleed the air from the system.

STEERING WHEEL AND COLUMN INSPECTION

STEERING WHEEL PLAY INSPECTION

1. With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and verify that the play is within the specification.
   - If the play exceeds the specification, either the steering joints are worn or the backlash of the steering gear is excessive. Correct as necessary.

   Steering wheel play

   0-30 mm {0-1.18 in}

STEERING WHEEL LOOSENESS INSPECTION

1. Move the steering wheel as shown in **Fig. 7** to inspect for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.
    - Repair or replace as necessary.

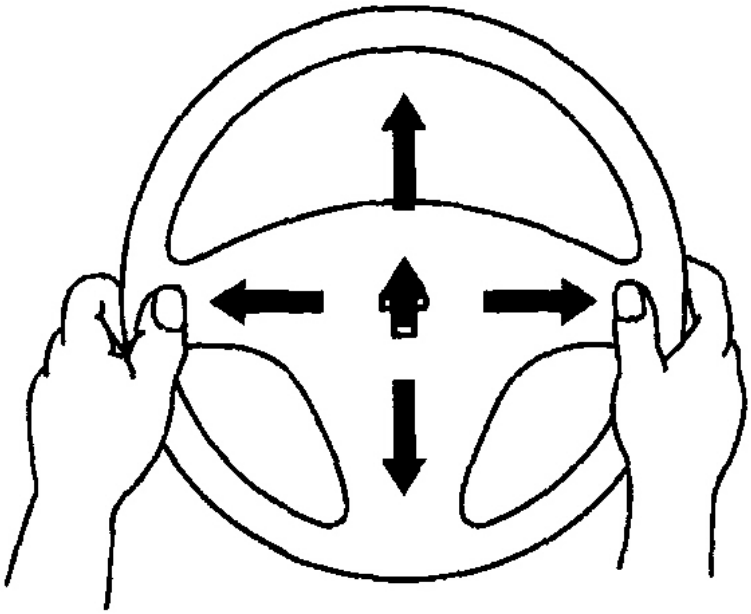

Fig. 7: Inspecting Steering Wheel Play
Courtesy of MAZDA MOTORS CORP.

STEERING WHEEL EFFORT INSPECTION

1. Inspect the following points:
    - Tire size and tire pressure
    - Fluid level
    - Drive belt deflection
2. With the vehicle on a hard, level surface, put the wheels in the straight-ahead position.
3. Remove the air bag module.

WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read AIR BAG SYSTEM WARNINGS before handling the air**

bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)

4. Start the engine and warm the power steering fluid to **50-60°C {122-140°F}** .
5. Measure the steering wheel effort using a torque wrench.
   - If not within the specification, verify the following:
     - No air in steering system
     - No fluid leakage at hose or connectors
     - Function of oil pump and steering gear

Steering wheel effort

7.8 N.m {80 kgf.cm, 58 in.lbf} max.

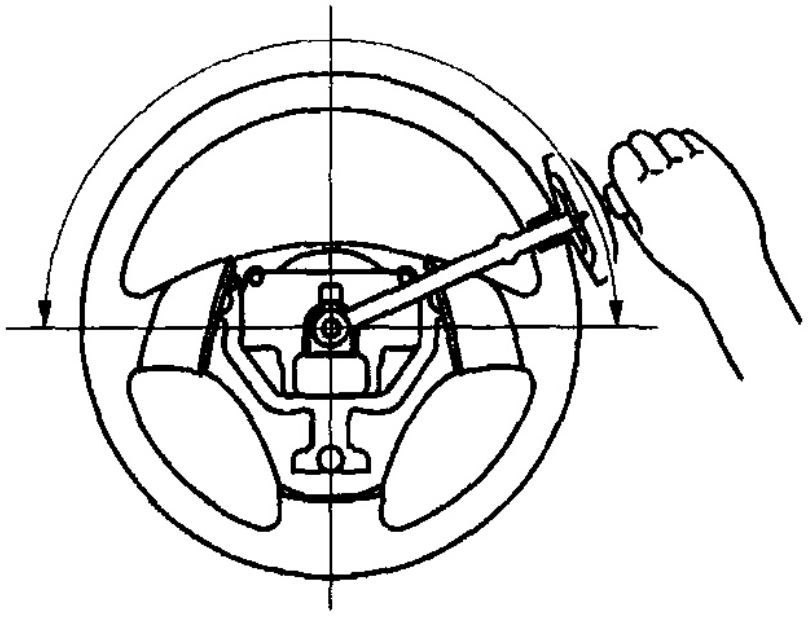

Fig. 8: Measuring Steering Wheel Effort Using Torque Wrench
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **To determine whether the steering effort is satisfactory or not, perform the inspection on another vehicle of the same model and under the same conditions, and compare the results.**

- **The steering wheel effort varies with conditions as shown below.**
  - **Road conditions, such as dry or wet, and asphalt or concrete.**
  - **Tire conditions, such as brand, wear, and tire pressure.**

STEERING SHAFT INSPECTION

1. Inspect the following.
   1. Column bearing for damage
   2. Steering shaft length
      - Replace the steering shaft component as necessary.

Steering shaft length

247.3 mm {9.736 in}

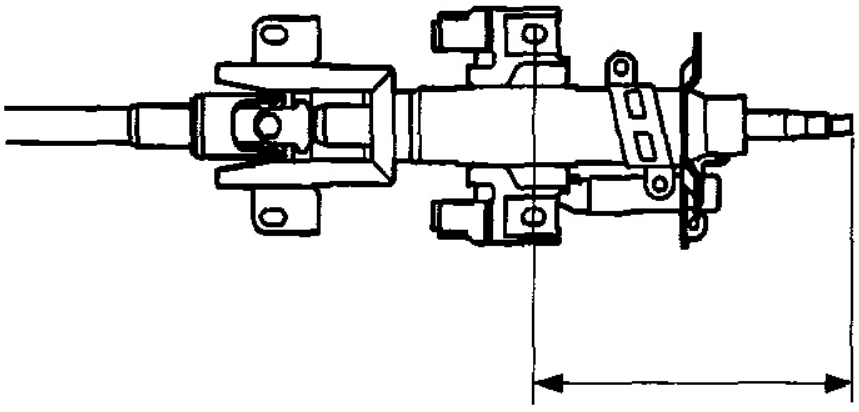

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Fig. 9: Identifying Steering Shaft Length
Courtesy of MAZDA MOTORS CORP.

2. Inspect the tilt operation.
   1. Verify that the adjusting lever moves smoothly from unlock position to lock position.
   2. Verify that the steering shaft is fixed firmly when the adjusting lever is locked.
      - Replace the steering shaft component as necessary.

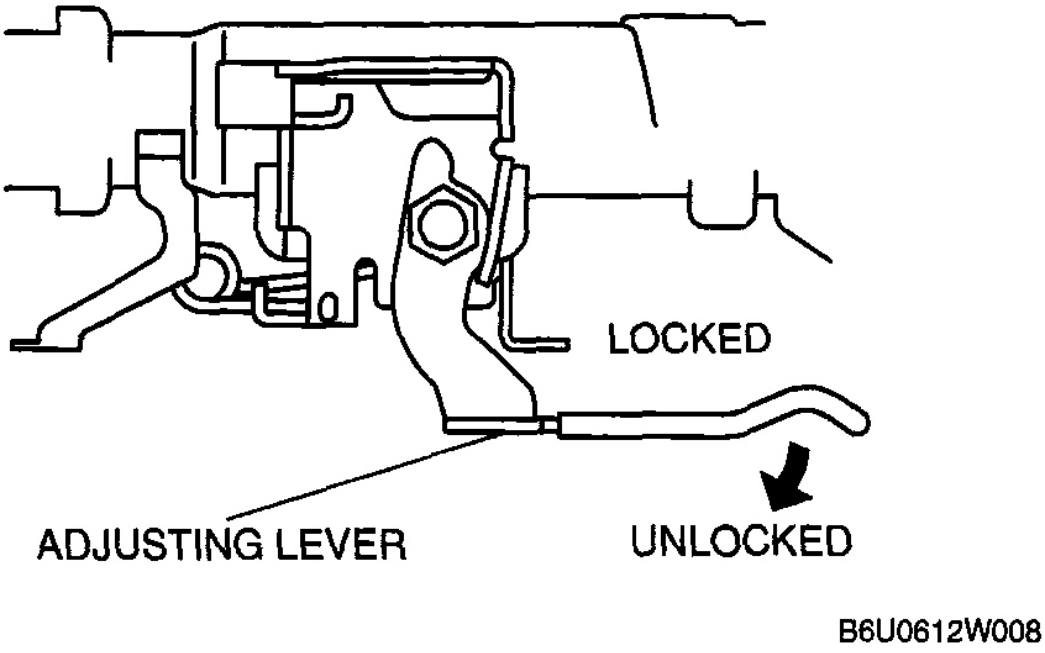


Fig. 10: Inspecting Tilt Operation
Courtesy of MAZDA MOTORS CORP.

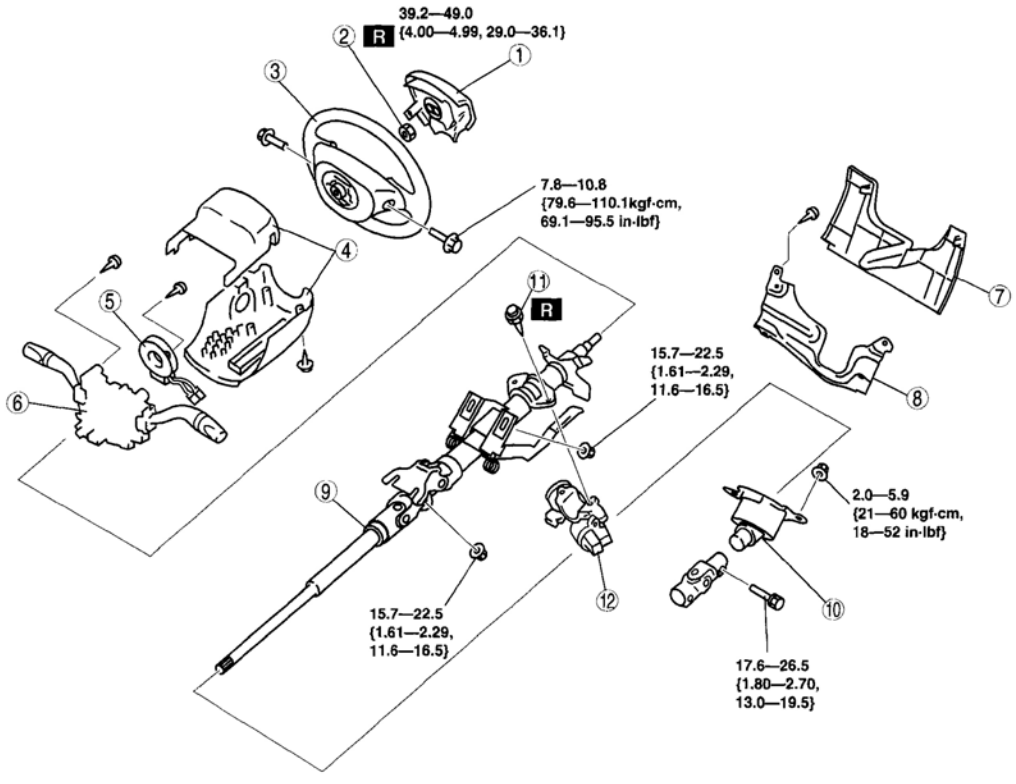
STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION

WARNING:

- **Handling the air bag module improperly can accidentally deploy the air bag module, which may seriously injure you. Read AIR BAG SYSTEM WARNINGS before handling the air bag module. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

1. Remove in the order indicated in **Fig. 11**.
2. Install in the reverse order of removal.
3. If the steering lock component of a vehicle equipped with the advanced keyless system is replaced, perform the following procedure after installation.
   - Without immobilizer system
     - Steering lock unit programming (See **STEERING LOCK UNIT ID CODE REGISTRATION[ADVANCED KEYLESS SYSTEM]** .)
   - With immobilizer system
     - Immobilizer system resetting (See **IMMOBILIZER SYSTEM COMPONENT REPLACEMENT/KEY ADDITION AND CLEARING[ADVANCED KEYLESS**

SYSTEM] .)



1	Air bag module
2	Locknut
3	Steering wheel
4	Column cover
5	Clock spring
6	Combination switch
7	Lower panel
8	Knee bolster
9	Steering shaft
10	Dust cover
11	Steering lock mounting bolts
12	Steering lock component

Fig. 11: Removing & Installing Steering Wheel & Column (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

STEERING WHEEL REMOVAL NOTE

CAUTION:

- **Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**

1. Set the vehicle in the straight-ahead position.
2. Remove the steering wheel using a suitable puller.

STEERING LOCK MOUNTING BOLTS REMOVAL NOTE

1. Make a groove in the heads of the steering lock mounting bolts using a chisel and a hammer.
2. Remove the bolts using a screwdriver.
3. Disassemble the steering lock component.

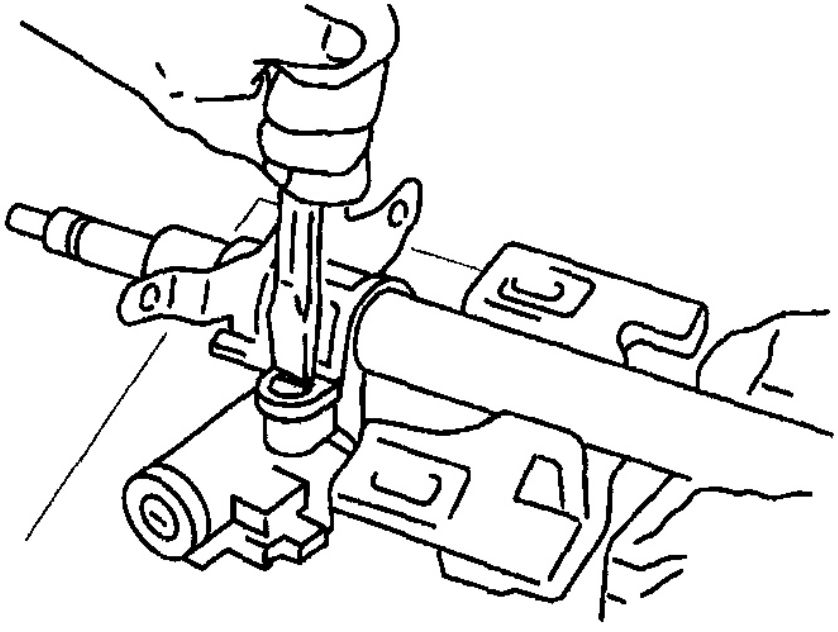


Fig. 12: Removing Bolts Using Screwdriver
Courtesy of MAZDA MOTORS CORP.

STEERING LOCK MOUNTING BOLTS INSTALLATION NOTE

1. Assemble the steering lock component to the steering shaft.
2. Verify that the lock operates correctly.
3. Install new steering lock mounting bolts.
4. Tighten the bolts until the heads break off.

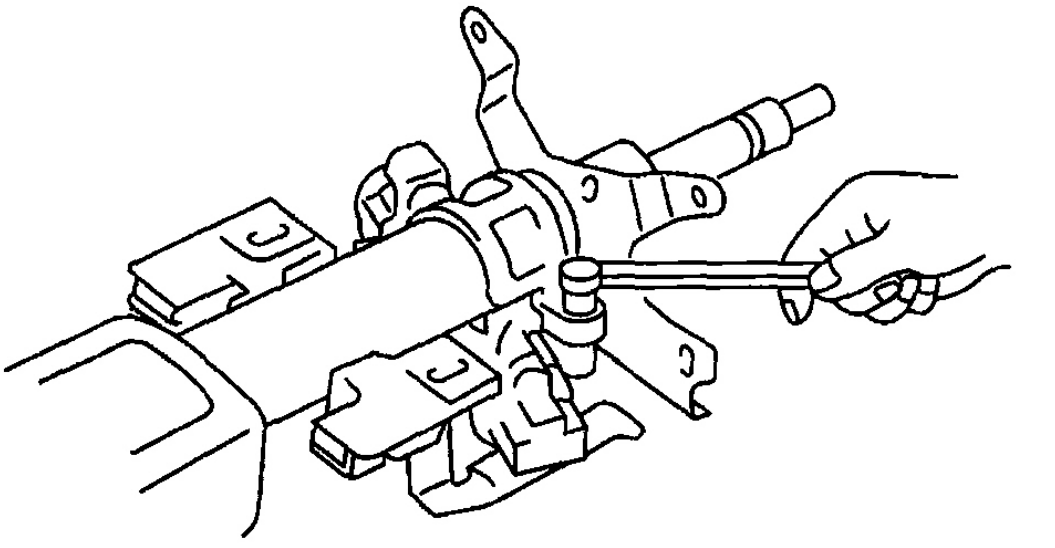


Fig. 13: Installing Steering Lock Mounting Bolts
Courtesy of MAZDA MOTORS CORP.

STEERING SHAFT INSTALLATION NOTE

CAUTION:
- **Do not apply a shock in the axial direction of the shaft.**

1. Lock the tilt lever.
2. Tighten nut A.
3. Tighten nut B.
4. Tighten bolt C.

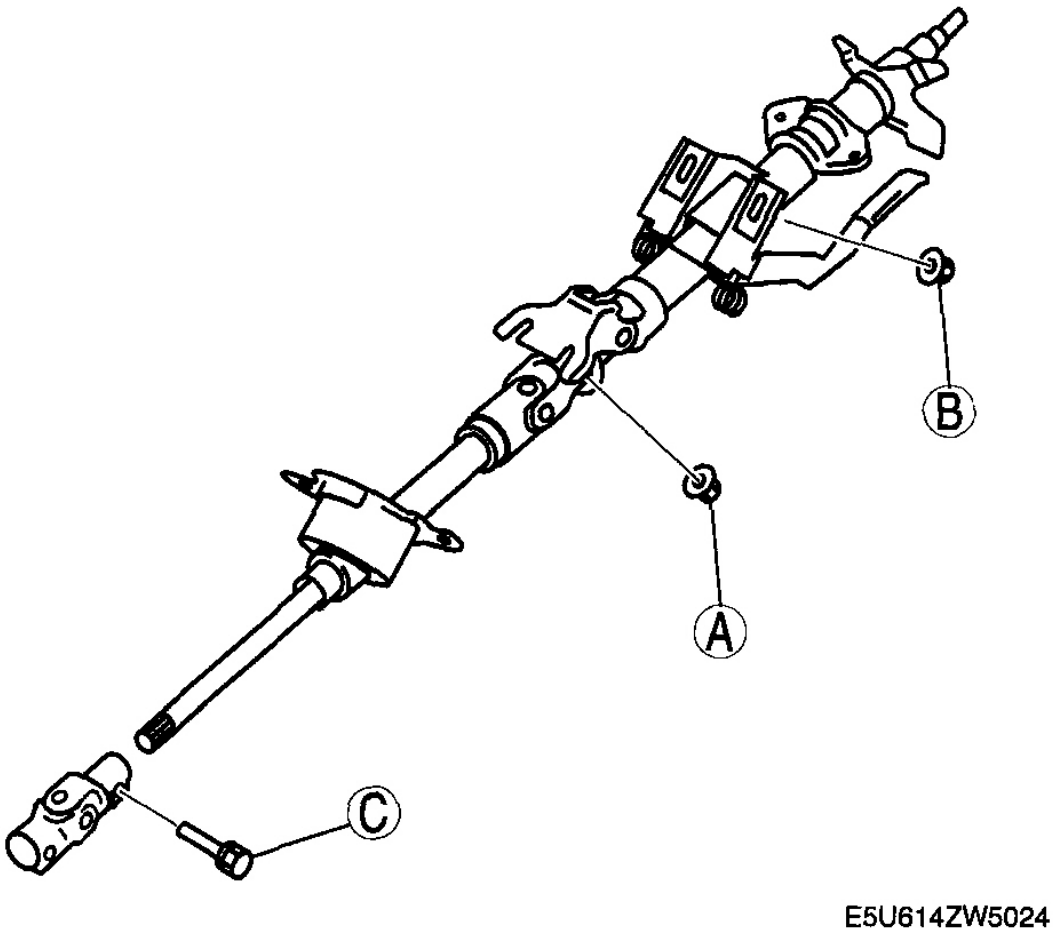


Fig. 14: Steering Shaft Nuts
Courtesy of MAZDA MOTORS CORP.

STEERING WHEEL INSTALLATION NOTE

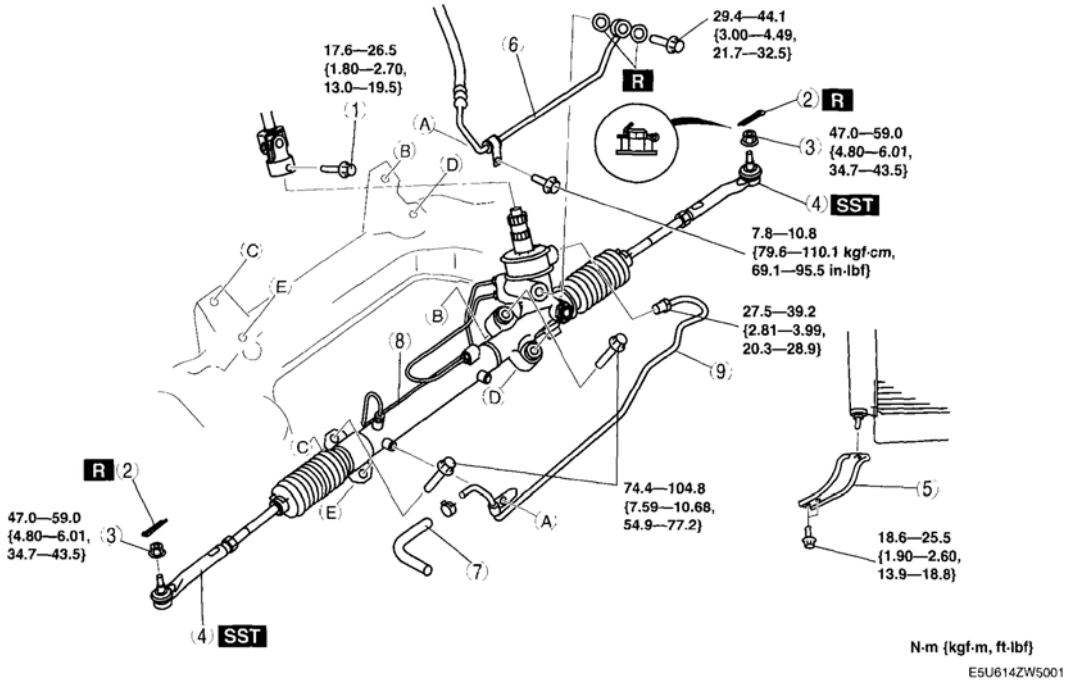
1. Make sure the wheels in the straight-ahead position, and install the steering wheel.

STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.**

1. Remove the ABS wheel-speed sensor. (See **FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION** .)
2. Remove the front stabilizer. (See **FRONT STABILIZER REMOVAL/INSTALLATION** .)
3. Remove in the order indicated in **Fig. 15**.
4. Install in the reverse order of removal.
5. After installation, adjust the total toe-in. (See **FRONT WHEEL ALIGNMENT** .)



1	Bolt (intermediate shaft)
2	Cotter pin
3	Nuts (tie-rod end ball joint)
4	Tie-rod end ball joint
5	Lower mounting rubber bracket
6	Pressure pipe
7	Return hose
8	Steering gear and linkage
9	Return pipe

Fig. 15: Removing & Installing Steering Gear & Linkage (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

BOLT (INTERMEDIATE SHAFT) REMOVAL NOTE

1. Mark the pinion shaft and gear housing for proper installation.

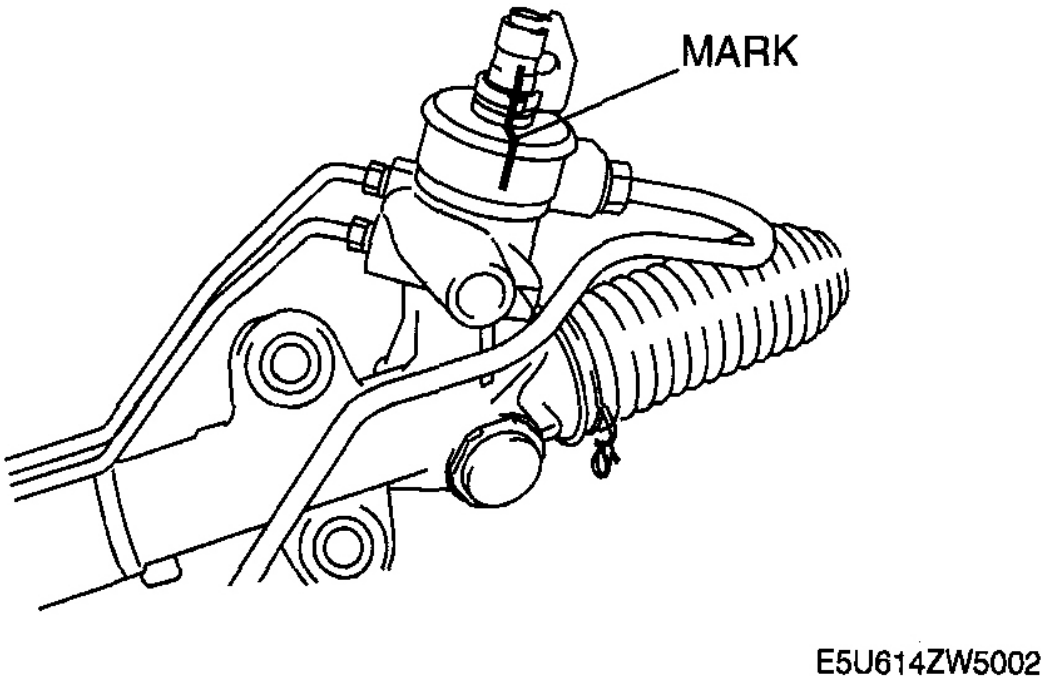


Fig. 16: Locating Mark On Pinion Shaft & Gear Housing
Courtesy of MAZDA MOTORS CORP.

TIE-ROD END BALL JOINT REMOVAL NOTE

1. Remove the tie-rod nut.
2. Separate the tie-rod end from the steering knuckle using the **SSTs** .

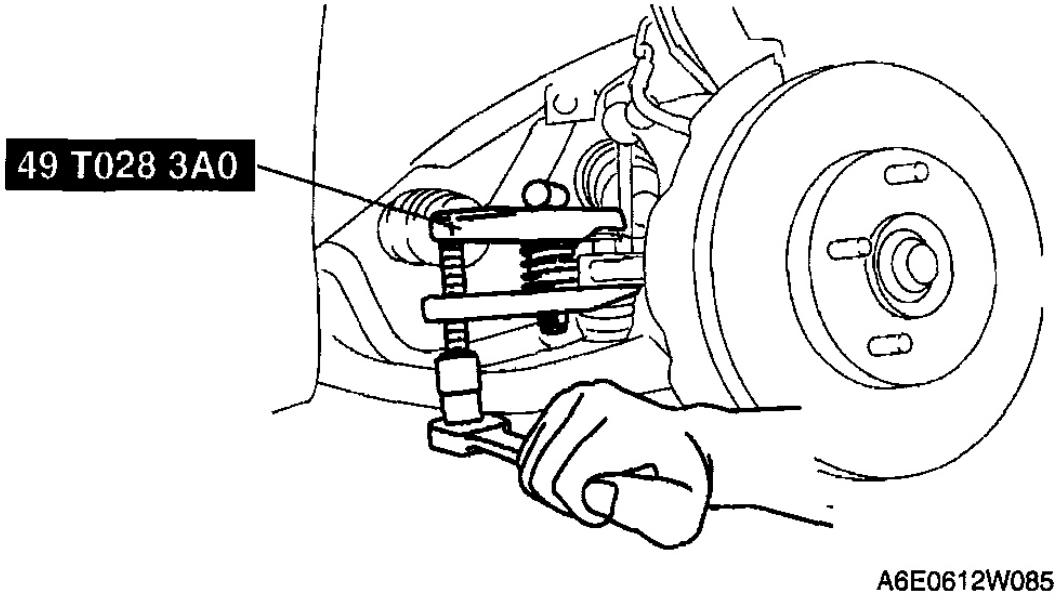


Fig. 17: Separating Tie-Rod End From Steering Knuckle Using SSTs
Courtesy of MAZDA MOTORS CORP.

STEERING GEAR AND LINKAGE REMOVAL NOTE

1. Remove the steering gear and linkage by pulling it from the right side.

STEERING GEAR AND LINKAGE INSTALLATION NOTE

1. Tighten bolts loosely.
2. Assemble the mounting bracket with the mark on the bracket facing the vehicle rear.

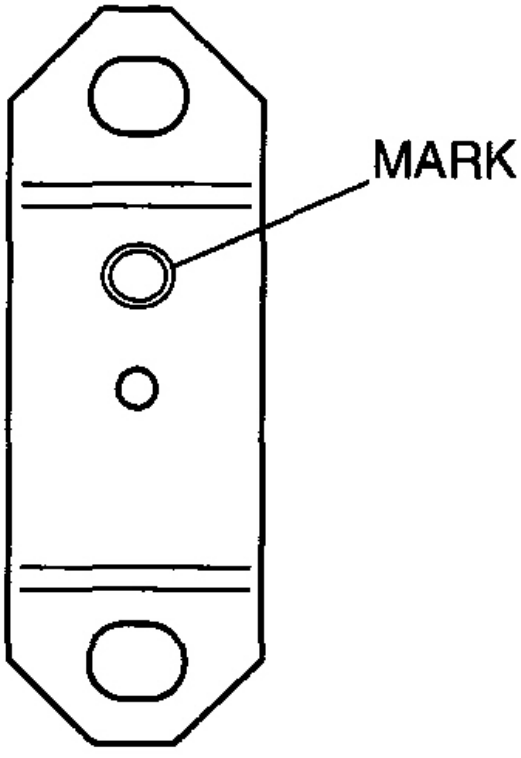


Fig. 18: Locating Mark On Bracket
Courtesy of MAZDA MOTORS CORP.

3. Tighten the mounting bracket bolts to the specified torque in the order shown.

Tightening torque

74.4-104.8 N.m {7.587-10.68 kgf.m, 54.88-77.29 ft.lbf}

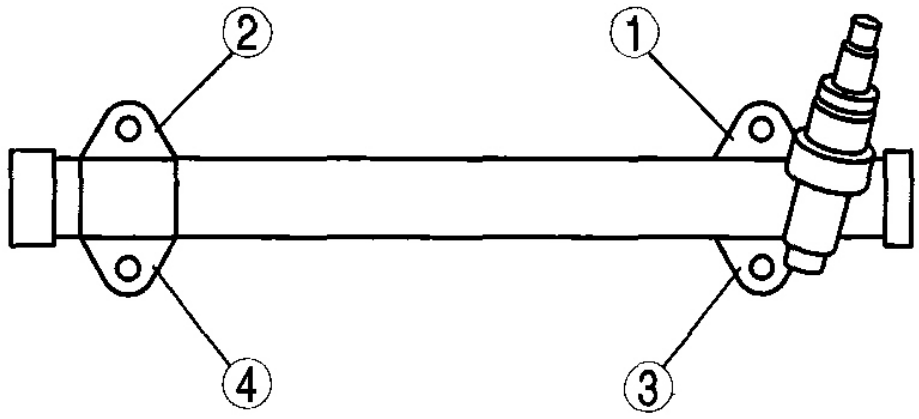


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Fig. 19: Mounting Bracket Bolts Tightening Order
Courtesy of MAZDA MOTORS CORP.

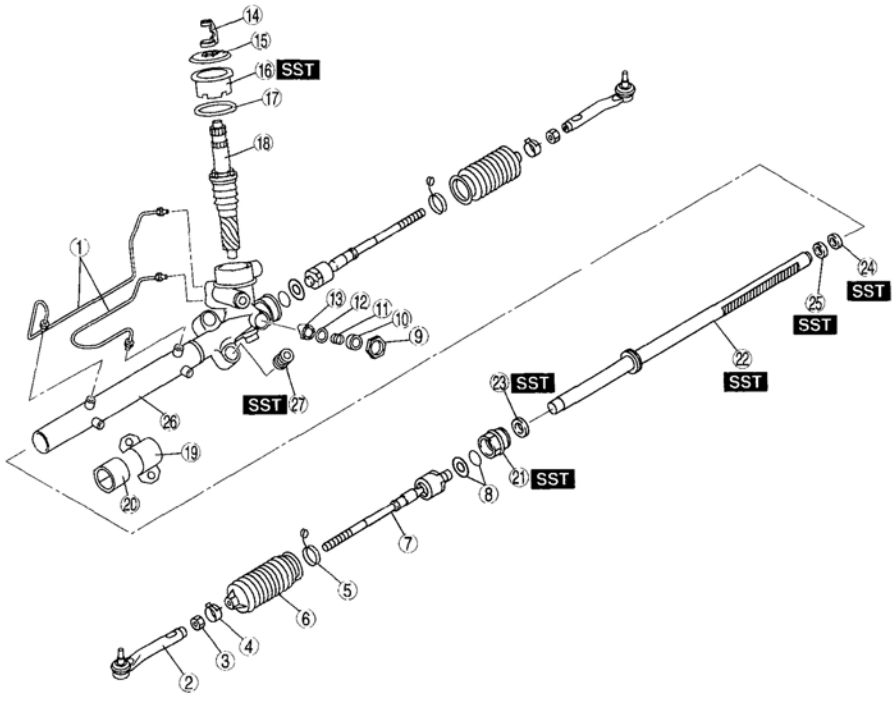
BOLT (INTERMEDIATE SHAFT) INSTALLATION NOTE

1. Align the marks and install the intermediate shaft and bolt.

STEERING GEAR AND LINKAGE DISASSEMBLY

CAUTION:
- **Place copper plates, rag, or similar material in a vise, when securing the mounting bracket portion of the steering gear.**

1. Disassemble in the order indicated in **Fig. 20**.



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1	Oil pipe
2	Tie-rod end
3	Locknut
4	Boot clamp
5	Boot band
6	Boot
7	Tie rod
8	Lock washer and o-ring
9	Locknut (adjusting cover)
10	Adjusting cover
11	Yoke spring
12	Washer
13	Support yoke
14	Clip
15	Dust cover
16	Pinion plug
17	O-ring

18	Pinion shaft component
19	Mounting bracket
20	Mounting rubber
21	Holder
22	Steering rack
23	Oil seal (holder side)
24	Inner guide
25	Oil seal (gear housing side)
26	Gear housing
27	Mounting rubber

Fig. 20: Exploded View Of Steering Gear & Linkage
Courtesy of MAZDA MOTORS CORP.

TIE ROD DISASSEMBLY NOTE

1. Unclamp the washer.
2. Remove the tie rod.

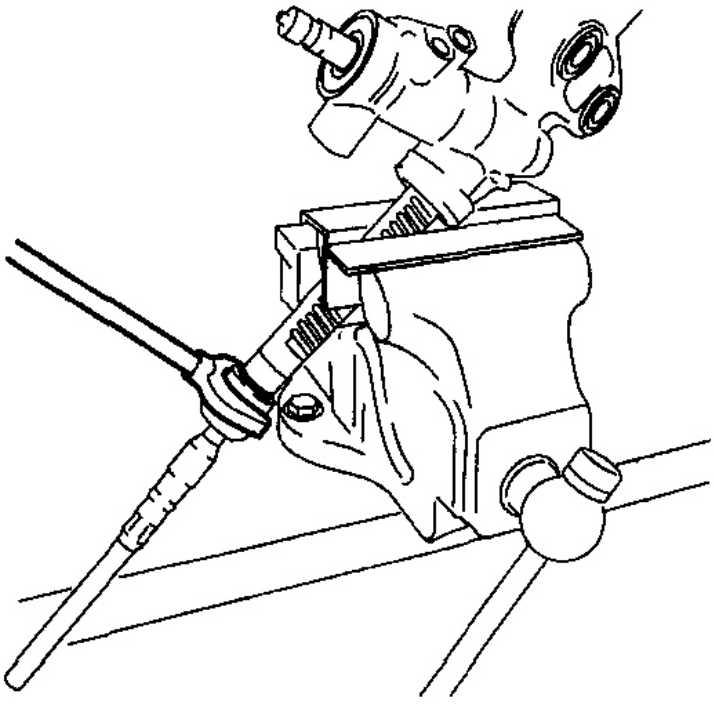


Fig. 21: Removing Tie Rod
Courtesy of MAZDA MOTORS CORP.

PINION PLUG, PINION SHAFT COMPONENT DISASSEMBLY NOTE

1. Remove the clip and the dust cover, then remove the pinion plug using the **SST** .

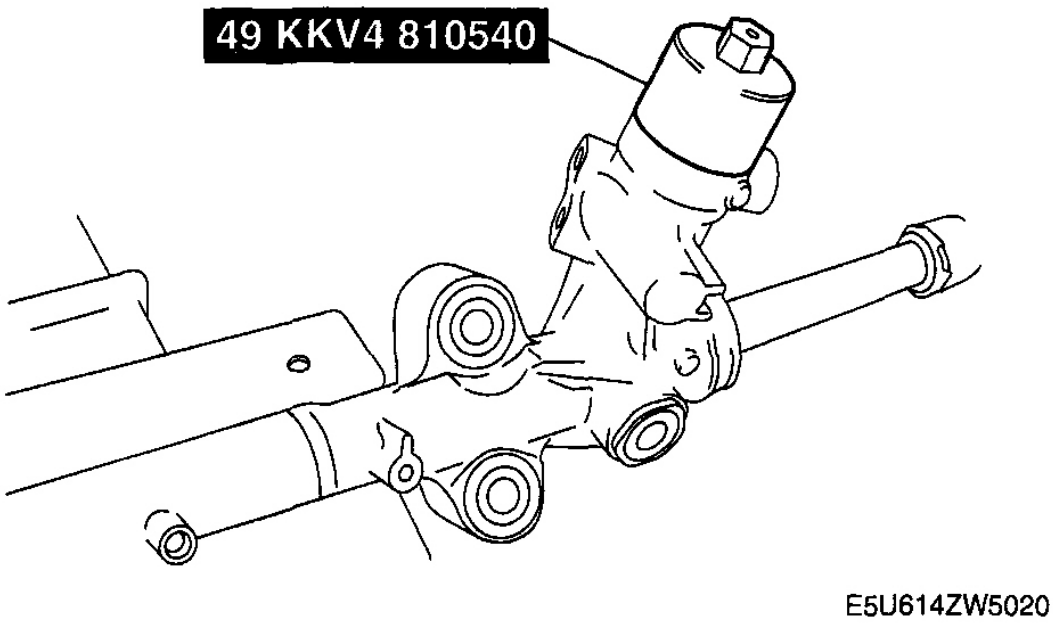


Fig. 22: Removing Pinion Plug Using SST
Courtesy of MAZDA MOTORS CORP.

2. Remove the pinion shaft component from the gear housing.

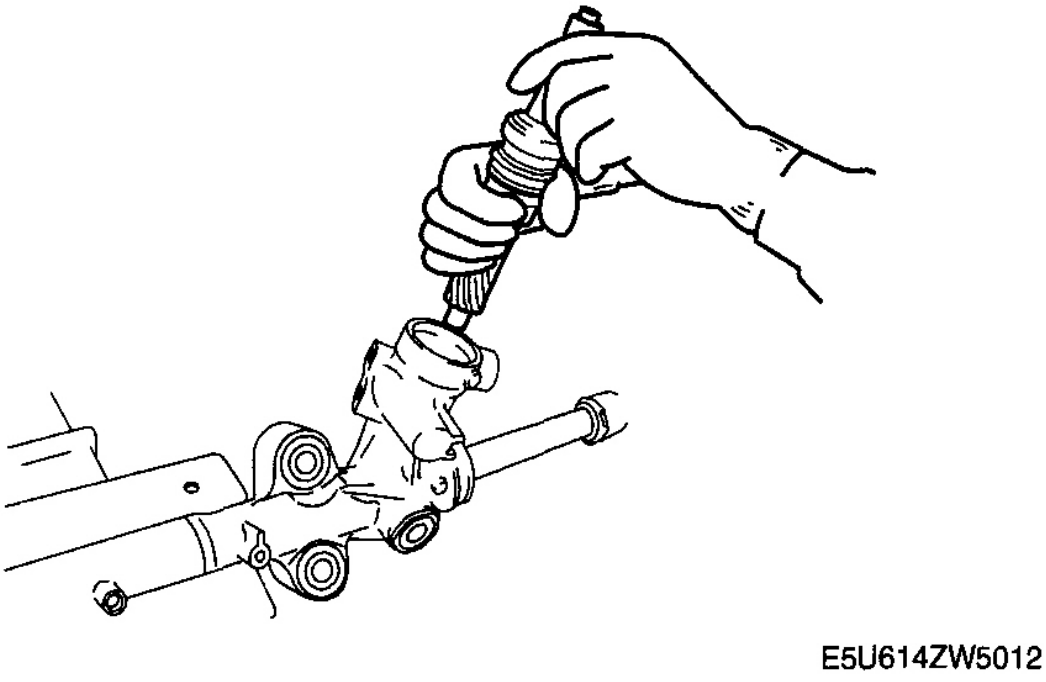


Fig. 23: Removing Pinion Shaft Component From Gear Housing
Courtesy of MAZDA MOTORS CORP.

HOLDER DISASSEMBLY NOTE

1. Remove the crimp from the holder and cylinder ends using a hacksaw.

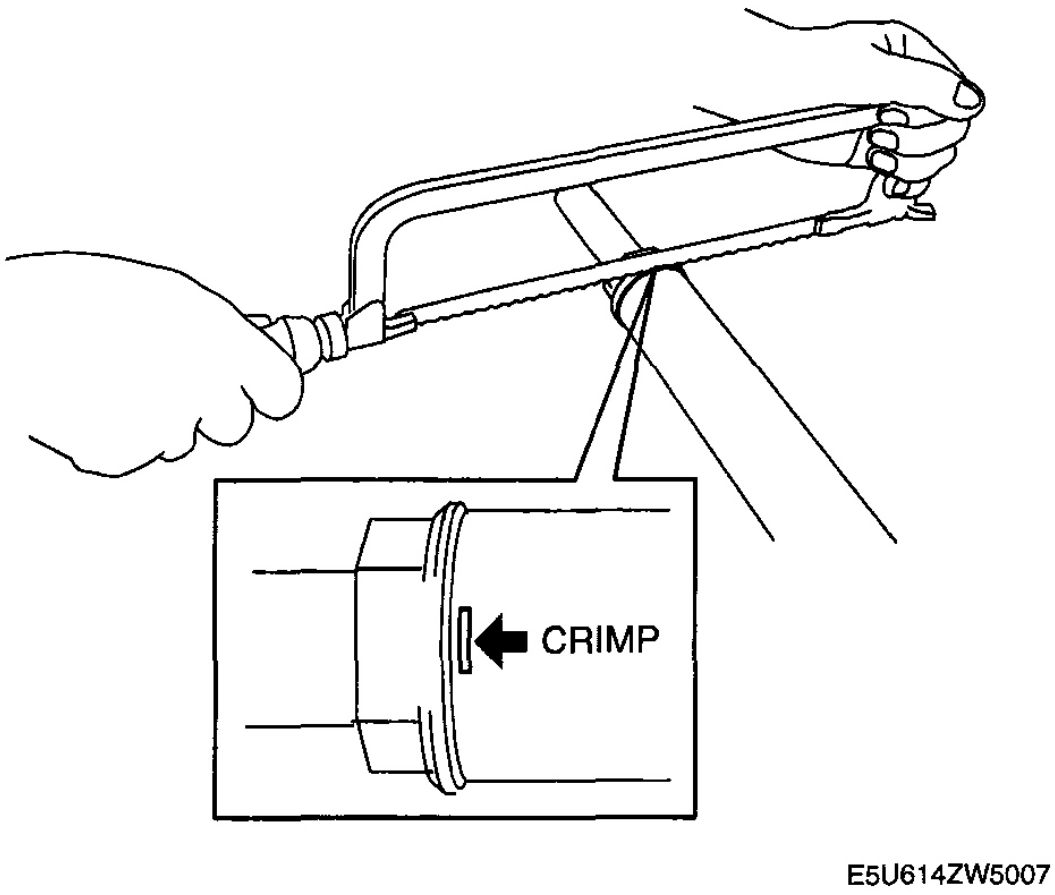


Fig. 24: Removing Crimp From Holder & Cylinder Ends Using Hacksaw
Courtesy of MAZDA MOTORS CORP.

2. Remove the holder using the **SST** .

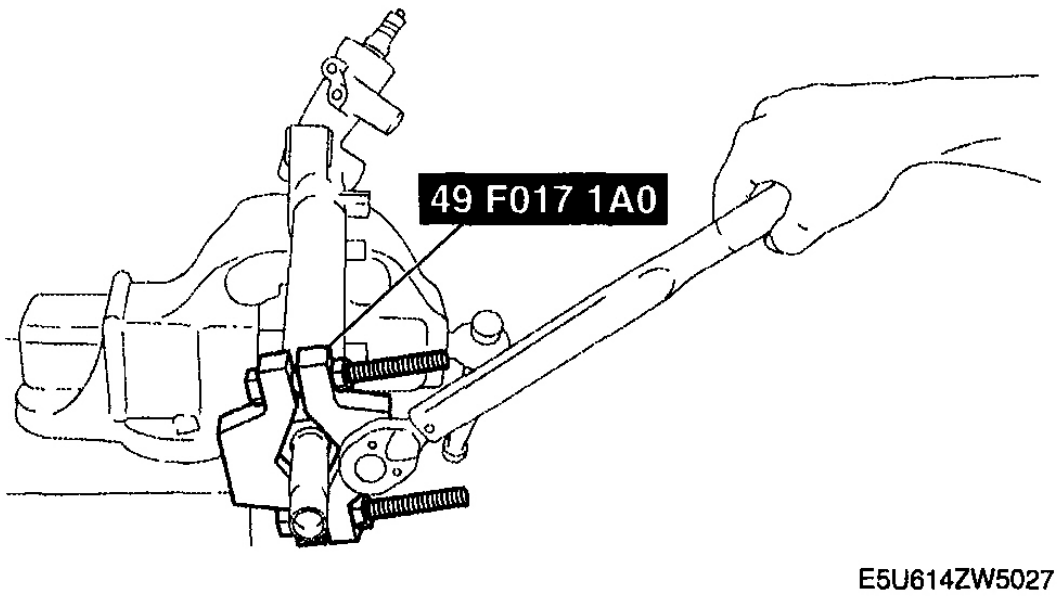


Fig. 25: Removing Holder Using SST
Courtesy of MAZDA MOTORS CORP.

STEERING RACK, OIL SEAL (HOLDER SIDE) DISASSEMBLY NOTE

1. Install the **SST** to the gear housing.
2. Remove the steering rack and oil seal (holder side) using a press.
3. Remove the oil seal (holder side) from the steering rack.

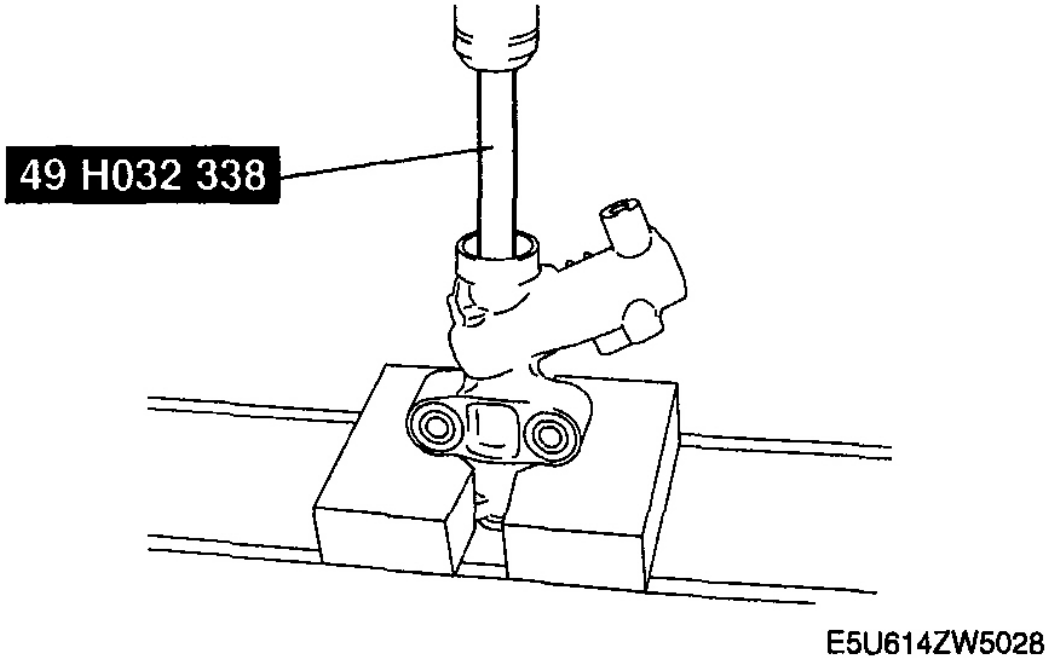


Fig. 26: Removing Steering Rack, Oil Seal (Holder Side)
Courtesy of MAZDA MOTORS CORP.

OIL SEAL (GEAR HOUSING SIDE), INNER GUIDE DISASSEMBLY NOTE

1. Set the **SSTs** as shown.
2. Install the **SST** to the gear housing.
3. Remove the oil seal (gear housing side) and inner guide using a press.

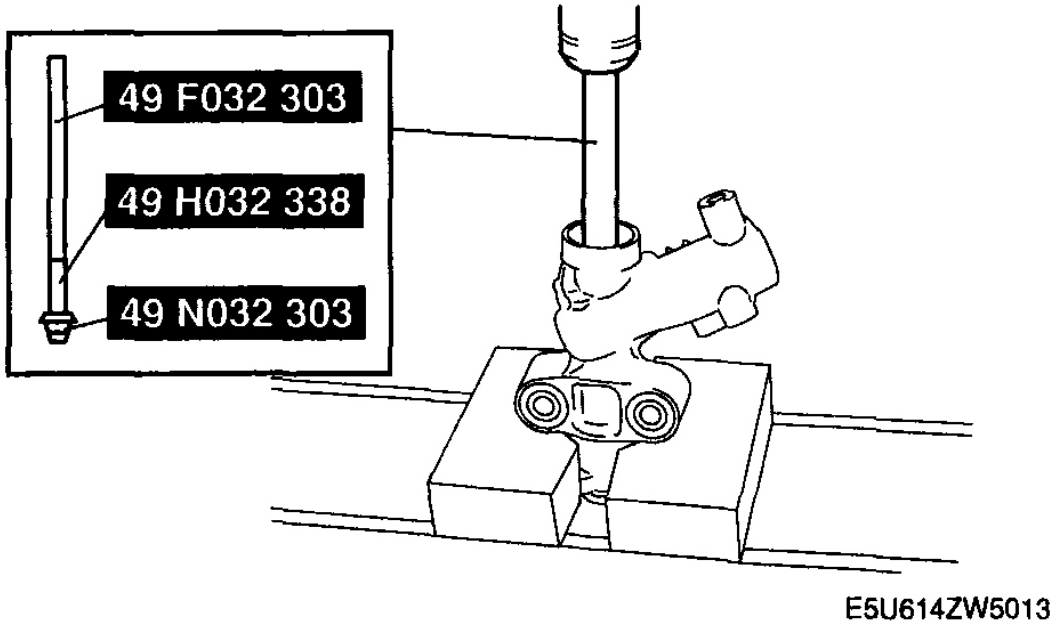


Fig. 27: Disassembling Oil Seal (Gear Housing Side)
Courtesy of MAZDA MOTORS CORP.

MOUNTING RUBBER DISASSEMBLY NOTE

- Press the mounting rubber out from the gear housing using the **SSTs** and a press.

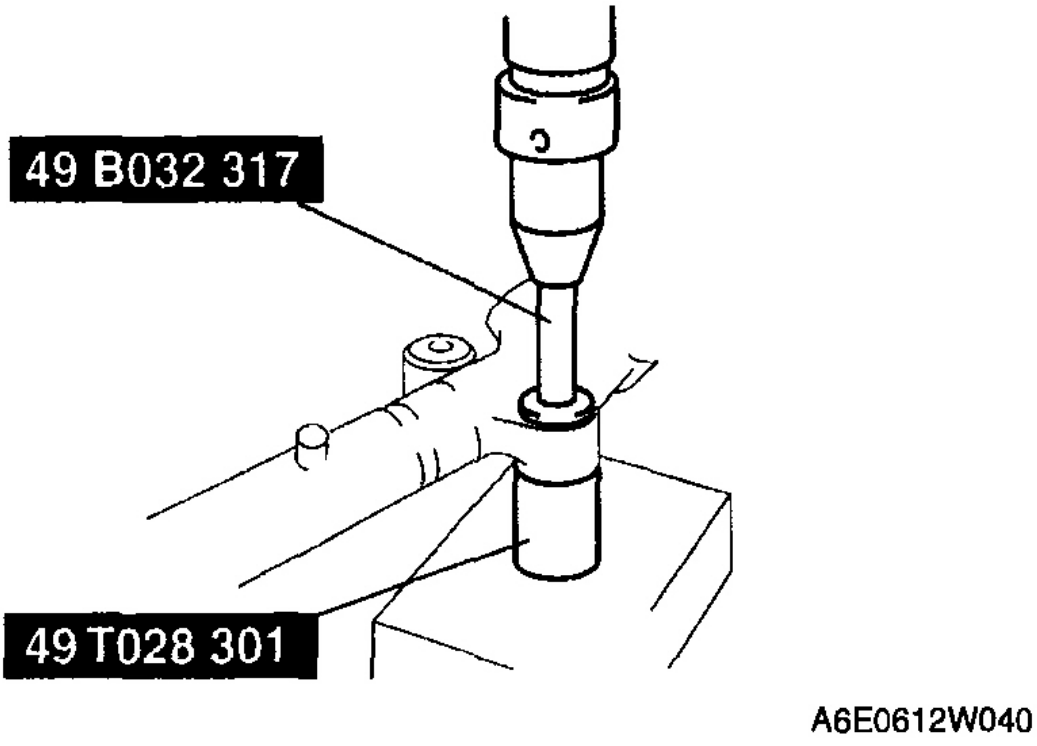


Fig. 28: Disassembling Mounting Rubber
Courtesy of MAZDA MOTORS CORP.

STEERING GEAR AND LINKAGE INSPECTION

RACK INSPECTION

1. Inspect the rack for cracking, damage, and tooth wear. Replace it if necessary.
2. Measure the runout of the rack.

   Steering rack runout

   Near point A: 0.08 mm {0.003 in} max.

   Near point B: 0.15 mm {0.006 in} max.

3. If not within the specification, replace the rack.

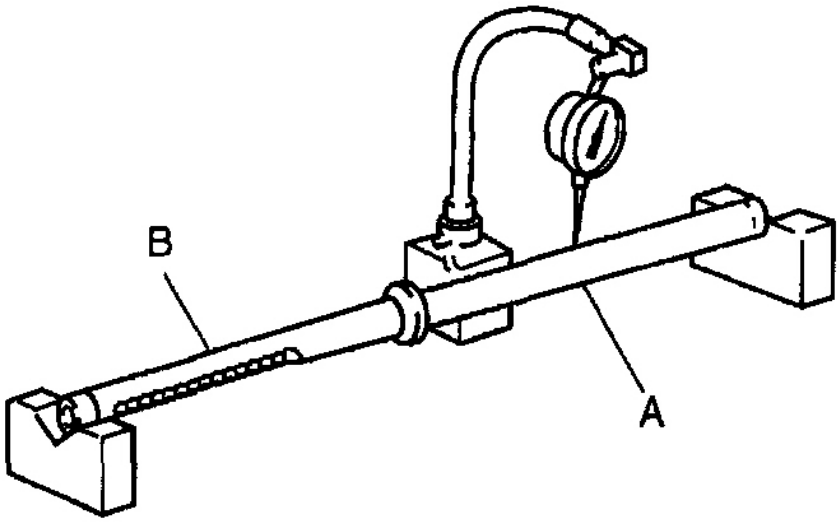


Fig. 29: Measuring Rack Runout
Courtesy of MAZDA MOTORS CORP.

TIE-ROD END INSPECTION

1. Inspect the tie-rod end for damage and boot cracks. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie-rod end if necessary.
3. Rotate the ball joint five times.
4. Measure the rotation torque of the ball joint using the **SST** and a pull scale.

   Tie-rod end rotational torque

   0.4-3.0 N.m {3.5-30.5 kgf.cm, 3.1-26.5 in.lbf}

   [Pull scale reading: 3.5-29.9 N {0.35-3.05 kgf, 0.8-6.7 lbf}]

5. If not within the specification, replace the tie-rod end.

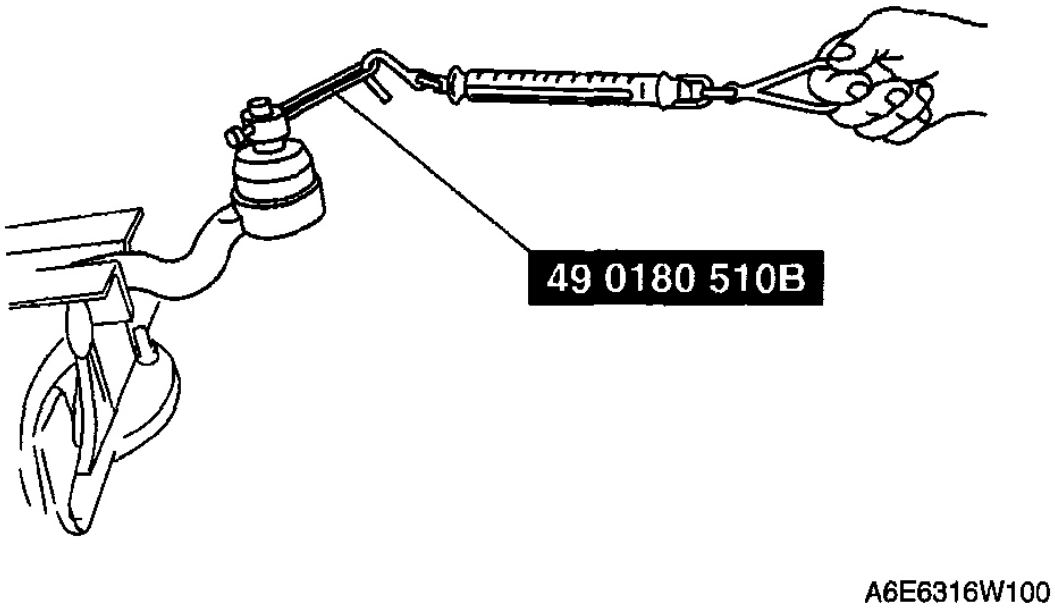


Fig. 30: Measuring Rotational Torque Of Ball Joint
Courtesy of MAZDA MOTORS CORP.

TIE ROD INSPECTION

1. Inspect the tie rod for bending and damage. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie rod if necessary.
3. Swing the tie rod five times.
4. Measure the swinging torque using a pull scale.

   Tie-rod swing torque

   0.1-4.1 N.m {1.1-41.8 kgf.cm, 1.0-36.2 in.lbf}

   [Pull scale reading: 0.6-24.4 N {0.06-2.49 kgf, 0.2-5.4 lbf}]

5. If not within the specification, replace the tie rod.

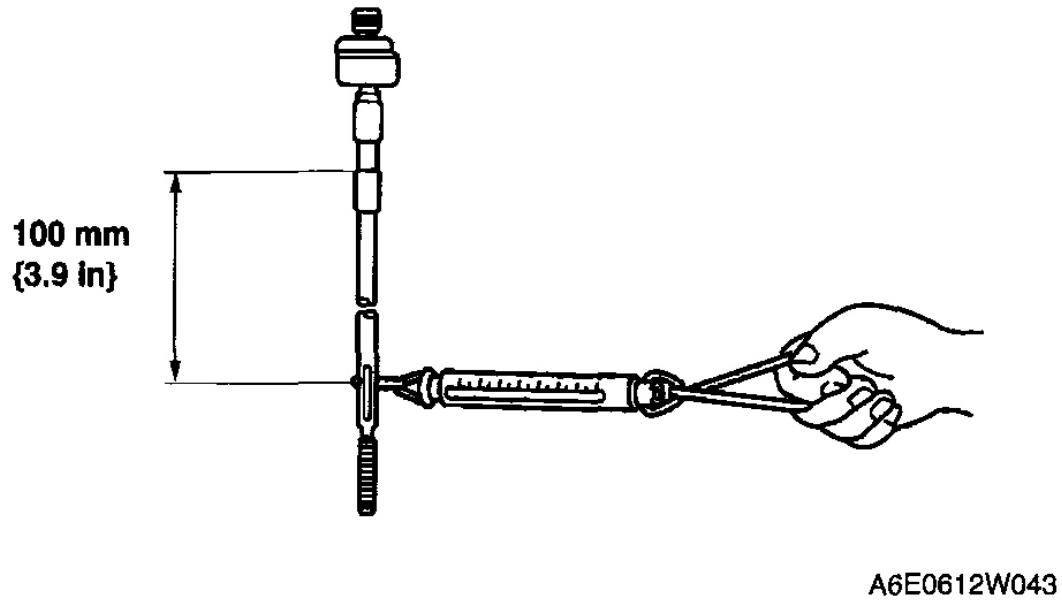
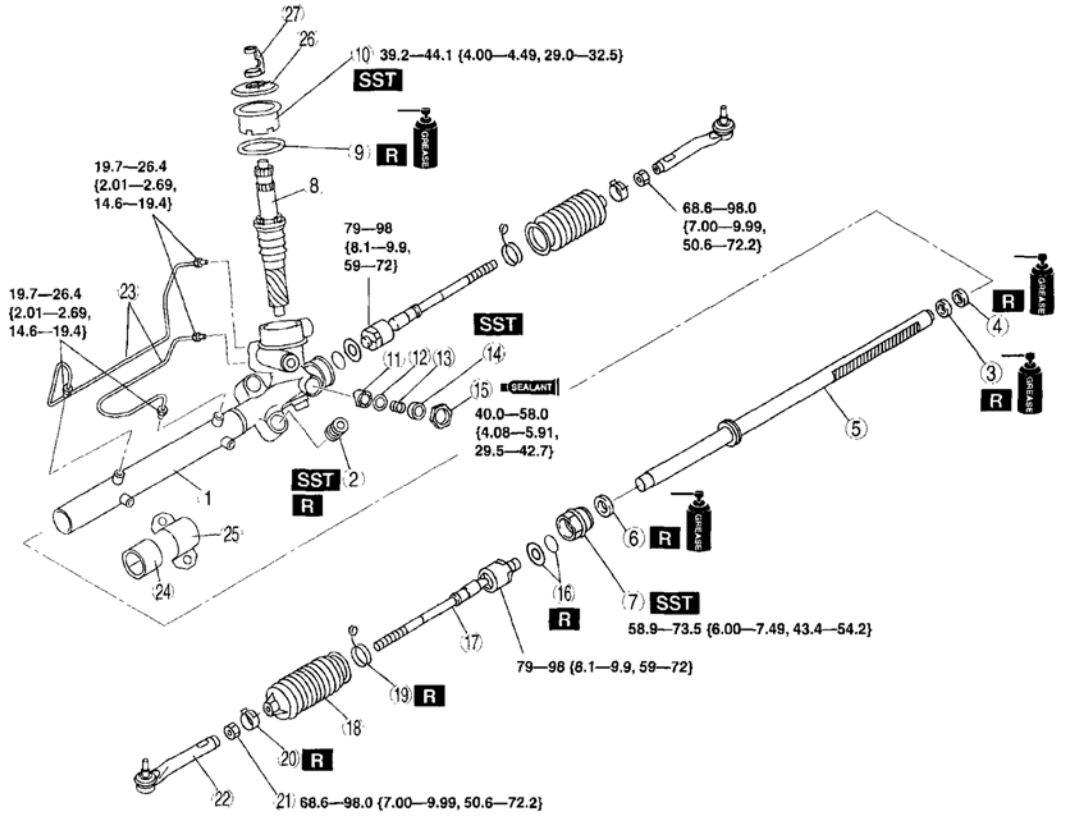


Fig. 31: Measuring Swinging Torque
Courtesy of MAZDA MOTORS CORP.

STEERING GEAR AND LINKAGE ASSEMBLY

CAUTION:
- **Place copper plates, rag, or similar material in a vise, when securing the mounting bracket portion of the steering gear.**

1. Assemble in the order indicated in **Fig. 32** .



1	Gear housing
2	Mounting rubber
3	Oil seal (gear housing side)
4	Inner guide
5	Steering rack
6	Oil seal (holder side)
7	Holder
8	Pinion shaft component
9	O-ring
10	Pinion plug
11	Support yoke
12	Washer
13	Yoke spring

14	Adjusting cover
15	Locknut (adjusting cover)
16	Washer and O-ring
17	Tie rod
18	Boot
19	Boot band
20	Boot clamp
21	Locknut
22	Tie-rod end
23	Oil pipe
24	Mounting rubber
25	Mounting bracket
26	Dust cover
27	Clip

Fig. 32: Assembling Steering Gear & Linkage (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

MOUNTING RUBBER ASSEMBLY NOTE

1. Install the mounting rubber so that two notches of mounting rubber are aligned to the steering rack.

2. Apply soapy water to the rubber part of the mounting rubber.

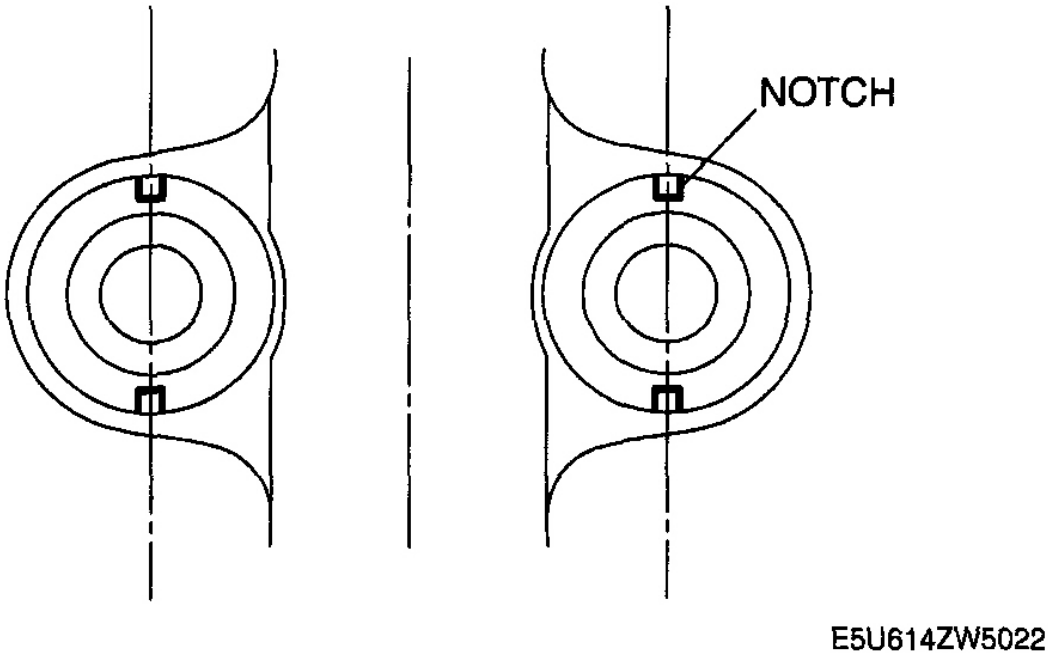


Fig. 33: Aligning Notches Of Mounting Rubber
Courtesy of MAZDA MOTORS CORP.

3. Press the mounting rubber until the mounting rubber end comes out completely from the gear housing using the **SSTs** and a press.

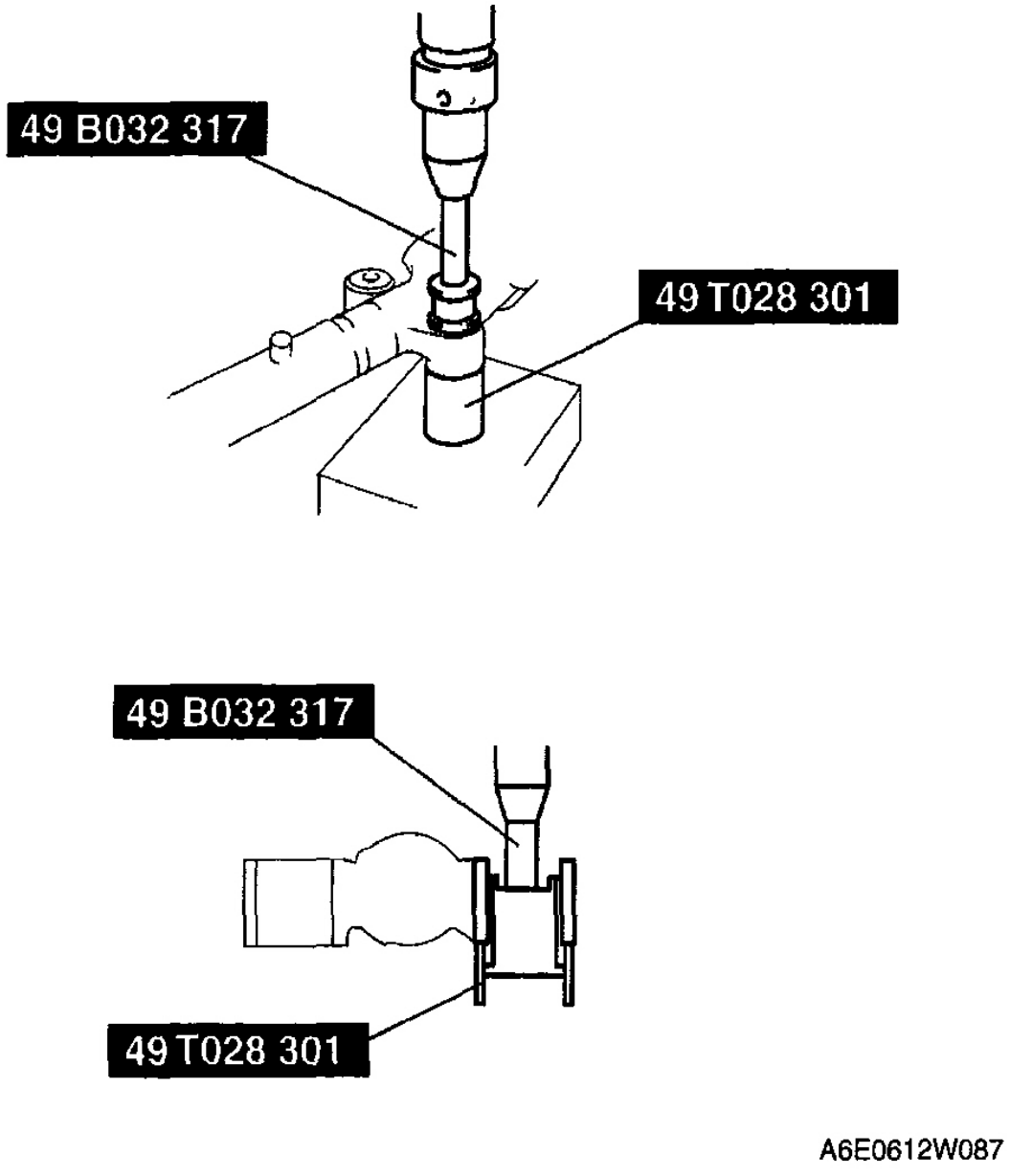


Fig. 34: Installing Mounting Rubber
Courtesy of MAZDA MOTORS CORP.

4. Reverse the gear housing, then press the mounting rubber until the mounting rubber end comes out completely from the other side. At this time, the mounting rubber end and steel pipe are aligned.

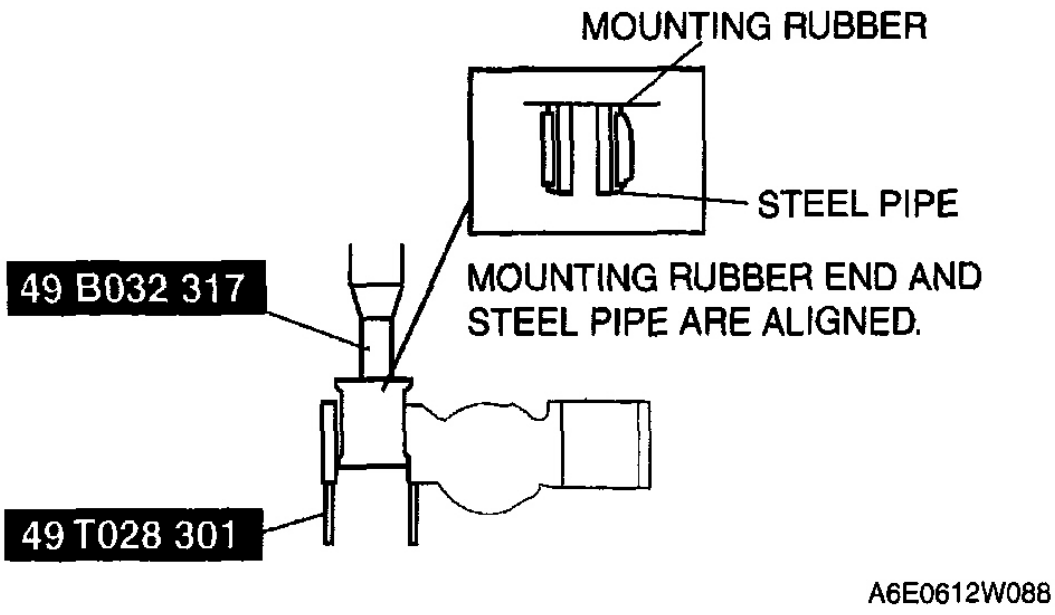


Fig. 35: Aligning Mounting Rubber End & Steel Pipe
Courtesy of MAZDA MOTORS CORP.

STEELING RACK, OIL SEAL (GEAR HOUSING SIDE), INNER GUIDE ASSEMBLY NOTE

1. Apply multi-purpose grease to the oil seal (gear housing side) and Inner guide.
2. Install the plastic bag to the steering rack teeth so as not to damage the oil seal (gear housing side) and the inner guide, and install the oil seal (gear housing side) and the inner guide to the seal. Move the oil seal (gear housing side) and the inner guide together with the plastic bag so that they pass the steering rack teeth, then remove the plastic bag.

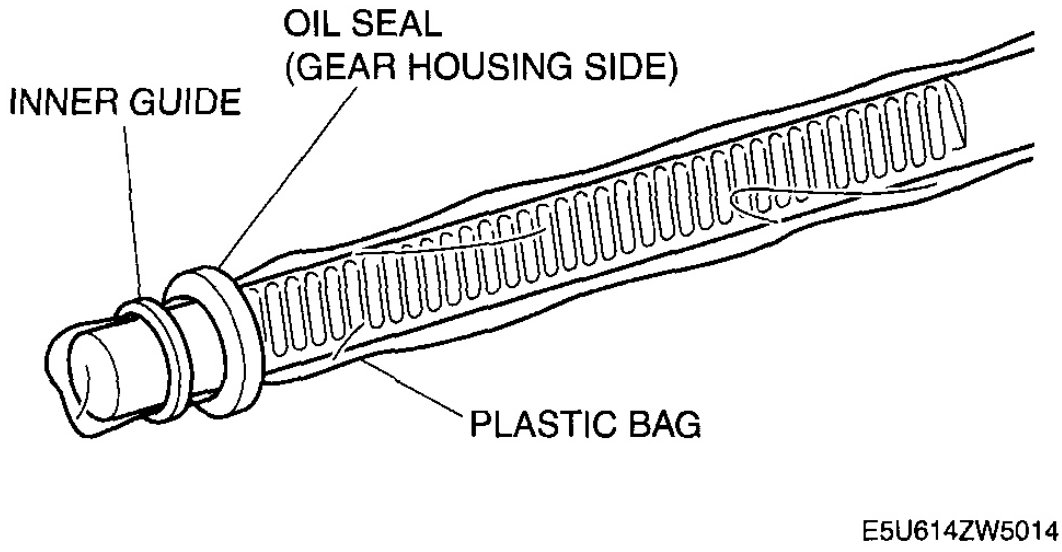


Fig. 36: Installing Plastic Bag To Steering Rack Teeth
Courtesy of MAZDA MOTORS CORP.

3. Put the steering rack into the gear housing.

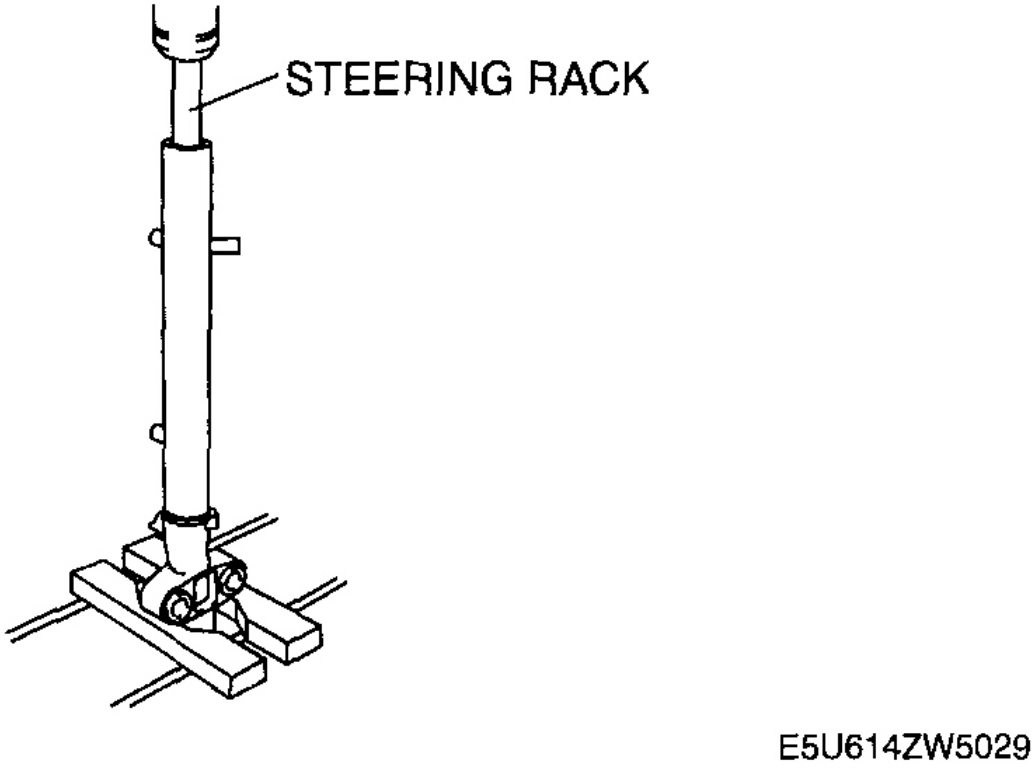


Fig. 37: Putting Steering Rack Into Gear Housing
Courtesy of MAZDA MOTORS CORP.

4. Using a press, press-in the oil seal (gear housing side) and inner guide until the press-in force increases rapidly.

OIL SEAL (HOLDER SIDE), HOLDER ASSEMBLY NOTE

1. Apply multi-purpose grease to the oil seal holder side)
2. Install the plastic bag to the steering rack end so as not to damage the oil seal (holder side) and install the oil seal (holder side) to the seal. Move the oil seal (holder side) together with the plastic bag so that they pass the steering rack end, then remove the plastic bag.
3. Install the holder and move the steering rack until it contacts the housing.

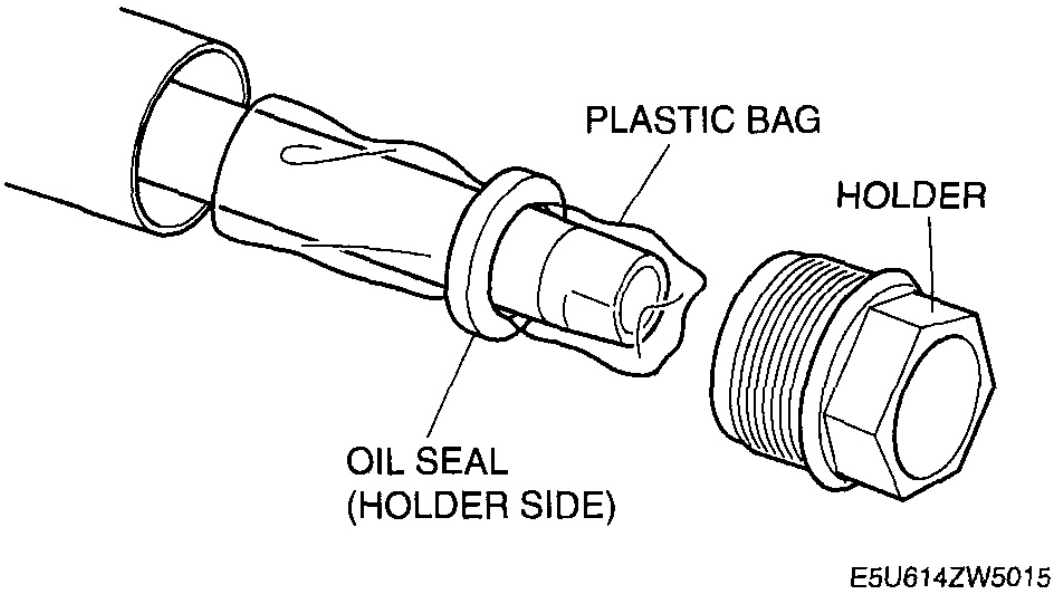


Fig. 38: Identifying Oil Seal (Holder Side), Plastic Bag And Holder
Courtesy of MAZDA MOTORS CORP.

4. Tighten the holder to the specified torque using the **SST** .

   Tightening torque

   58.9-73.5 N.m {6.00-7.49 kgf.m, 43.4-54.2 ft.lbf}

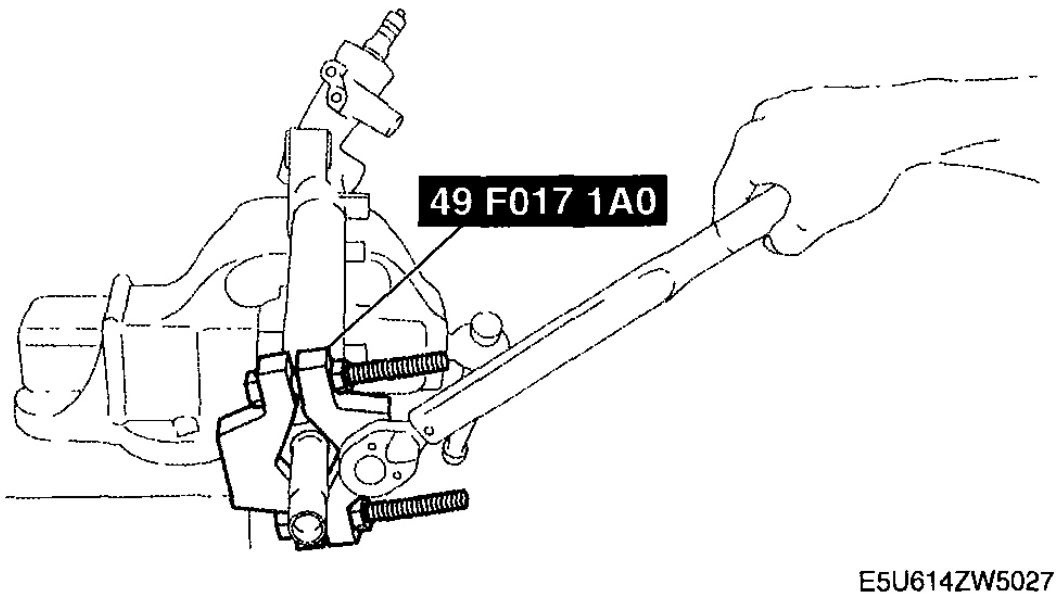


Fig. 39: Tightening Holder To Specified Torque
Courtesy of MAZDA MOTORS CORP.

5. After tightening the holder, crimp the cylinder end as shown in **Fig. 40** using a flathead screwdriver so that the holder does not loosen.

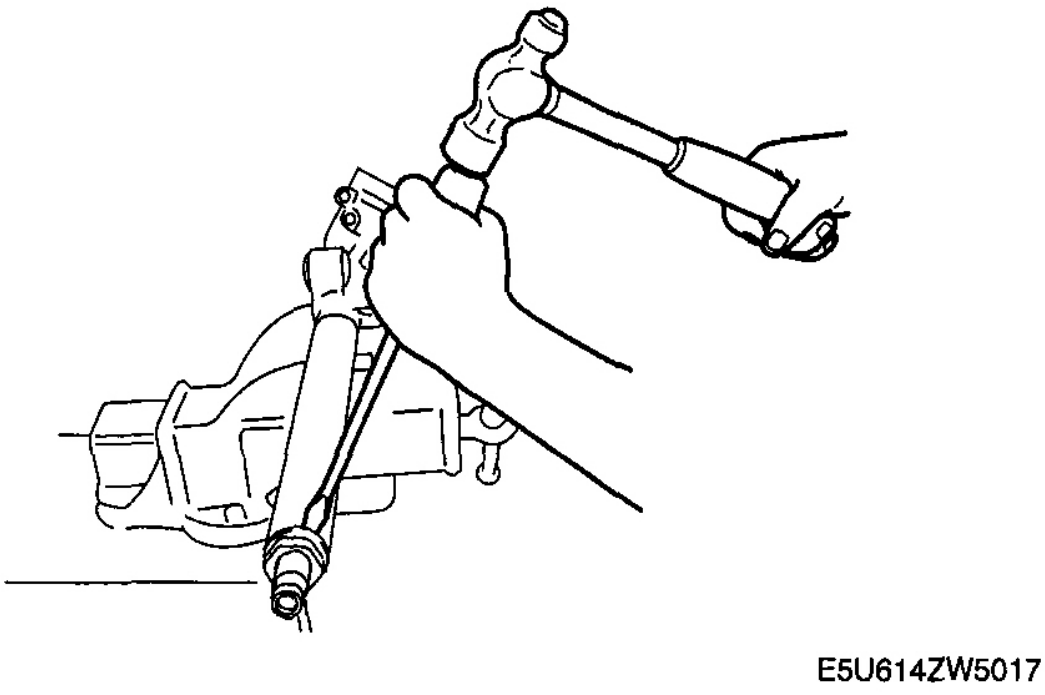


Fig. 40: Crimping Cylinder End Using Flathead Screwdriver
Courtesy of MAZDA MOTORS CORP.

PINION PLUG ASSEMBLY NOTE

1. Tighten the pinion plug using the **SST** .

   Tightening torque

   39.2-44.1 N.m {4.00-4.49 kgf.m, 29.0-32.5 ft.lbf}

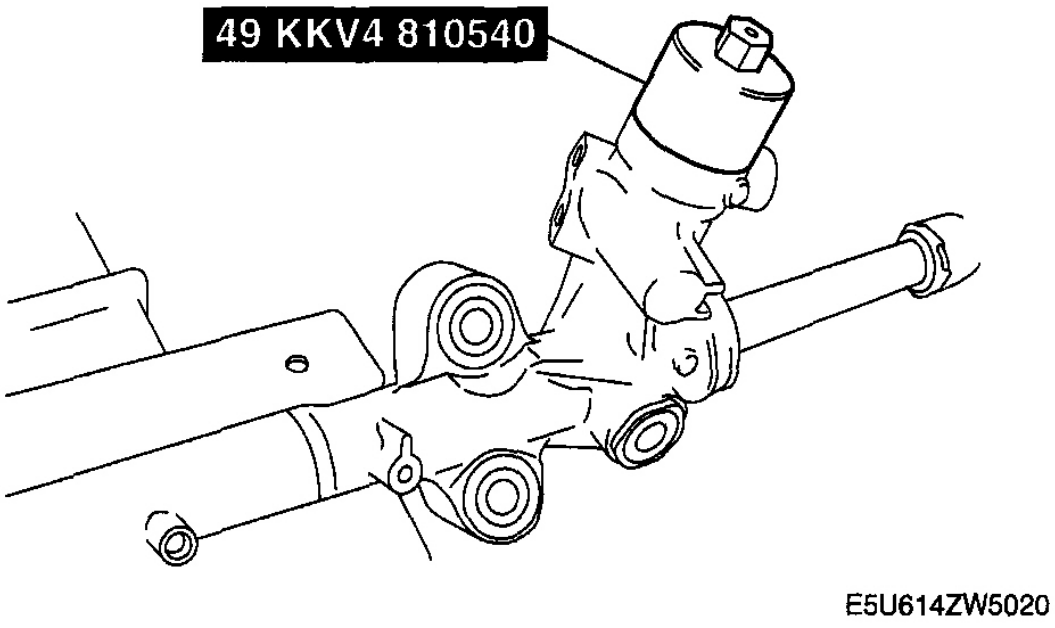


Fig. 41: Tightening Pinion Plug Using SST
Courtesy of MAZDA MOTORS CORP.

ADJUSTING COVER ASSEMBLY NOTE

1. Set the rack to the center position.
2. Tighten the adjusting cover to **20 N.m {2.0 kgf.m, 15 ft.lbf}** .
3. Rotate the pinion shaft thoroughly three times to make sure that the pinion shaft and the rack engage smoothly, then loosen the adjusting cover.
4. Retighten the adjusting cover to **4.9 N.m {0.5 kgf.m, 3.6 ft.lbf}** , then loosen it about **0 to 15°** using the **SST** .

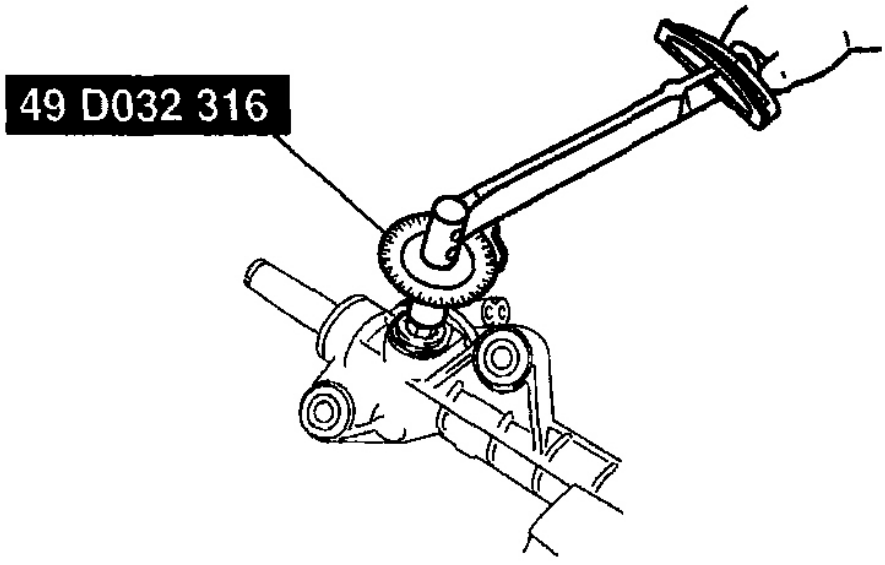


Fig. 42: Tightening Adjusting Cover
Courtesy of MAZDA MOTORS CORP.

5. Measure the rotation torque in the range **+/-90+/-** from the pinion gear neutral point using a **SST** and a pull-scale.
   - If not within the specification, repeat **Steps 2 - 4** .

   Pinion shaft rotation torque

   Center of rack +/-90+/-: 0.98-1.38 N.m {10.0-14.0 kgf.cm, 8.7-12.2 in.lbf}

   [Pull scale reading: 9.8-13.8 N {1.00-1.40 kgf, 2.21-3.10 lbf}]

   Except center of rack +/-90+/-: Less than 1.87 N.m {19.1 kgf.cm, 16.6 in.lbf}

   [Pull scale reading: Less than 19.5 N {1.99 kgf, 4.38 lbf}]

6. Apply sealant to the thread of the locknut.

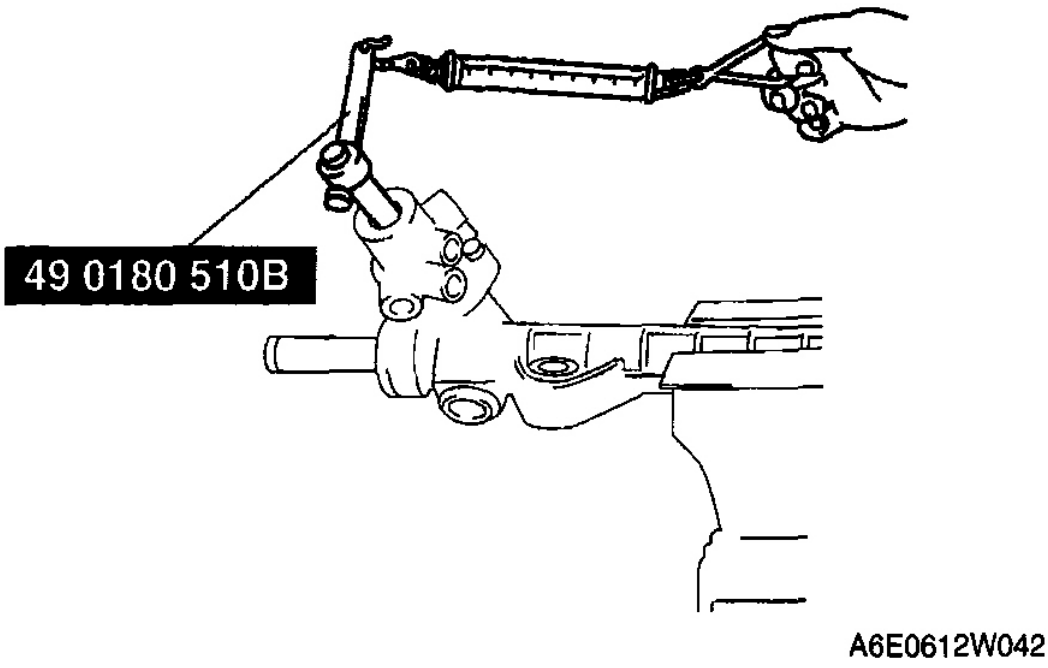


Fig. 43: Measuring Rotation Torque From Pinion Gear
Courtesy of MAZDA MOTORS CORP.

7. Hold the adjusting cover so as not to rotate and tighten the locknut.

   Tightening torque

   40.0-58.0 N.m {4.08-5.91 kgf.m, 29.5-42.7 ft.lbf}

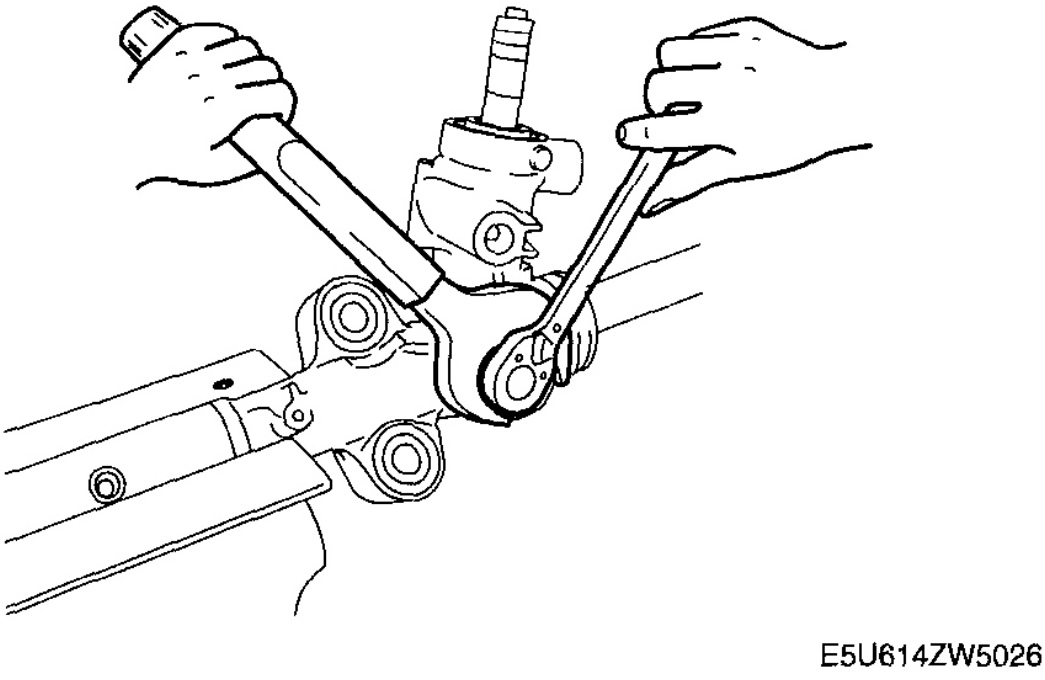


Fig. 44: Tightening Locknut
Courtesy of MAZDA MOTORS CORP.

HERMETIC SEALING INSPECTION

1. Connect the **SSTs** to the power cylinder section of the gear housing.
2. Apply **53.3 kPa {400 mmHg, 15.7 inHg}** vacuum with a vacuum pump and verify that it is held for at least **30 seconds** .
3. If the vacuum is not held, replace the oil seal.

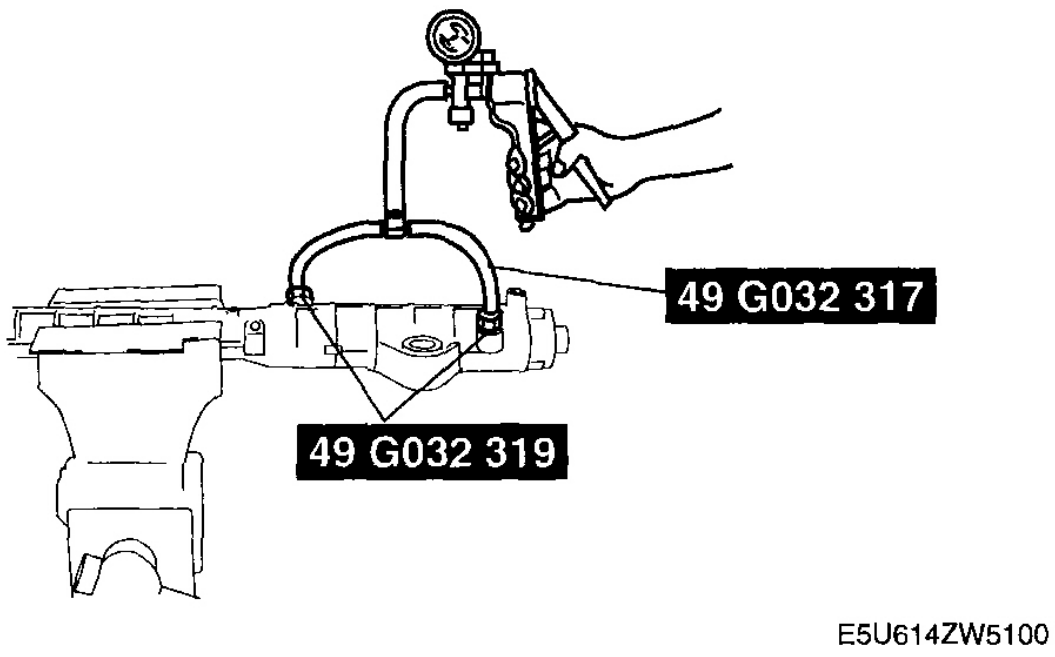
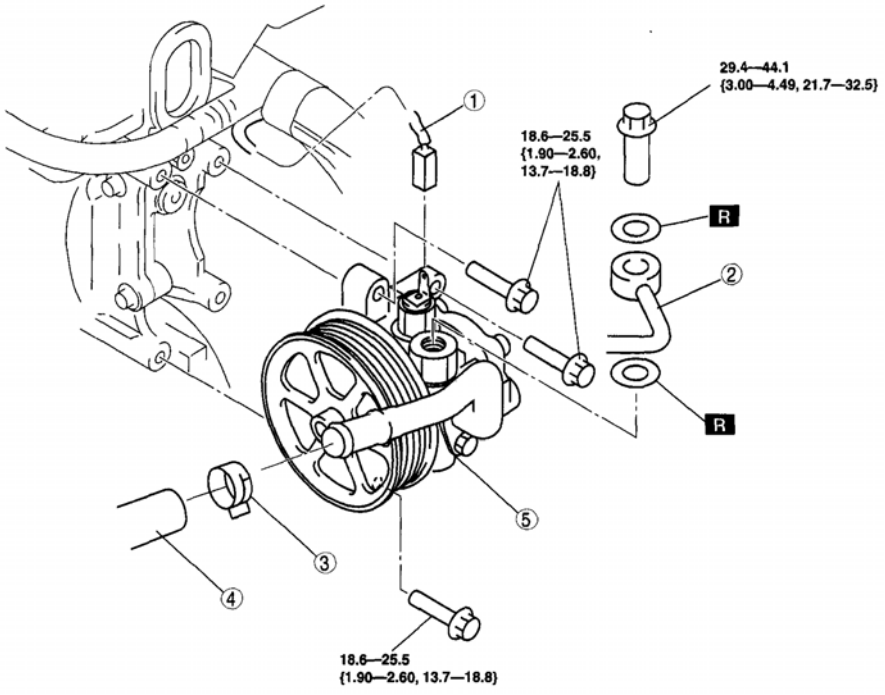


Fig. 45: Inspecting Hermetic Sealing
Courtesy of MAZDA MOTORS CORP.

POWER STEERING OIL PUMP REMOVAL/INSTALLATION

1. Remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)
2. Remove in the order indicated in **Fig. 46** .
3. Install in the reverse order of removal.



1	Pressure switch connector	4	Return hose
2	Pressure pipe	5	Power steering oil pump
3	Hose band		

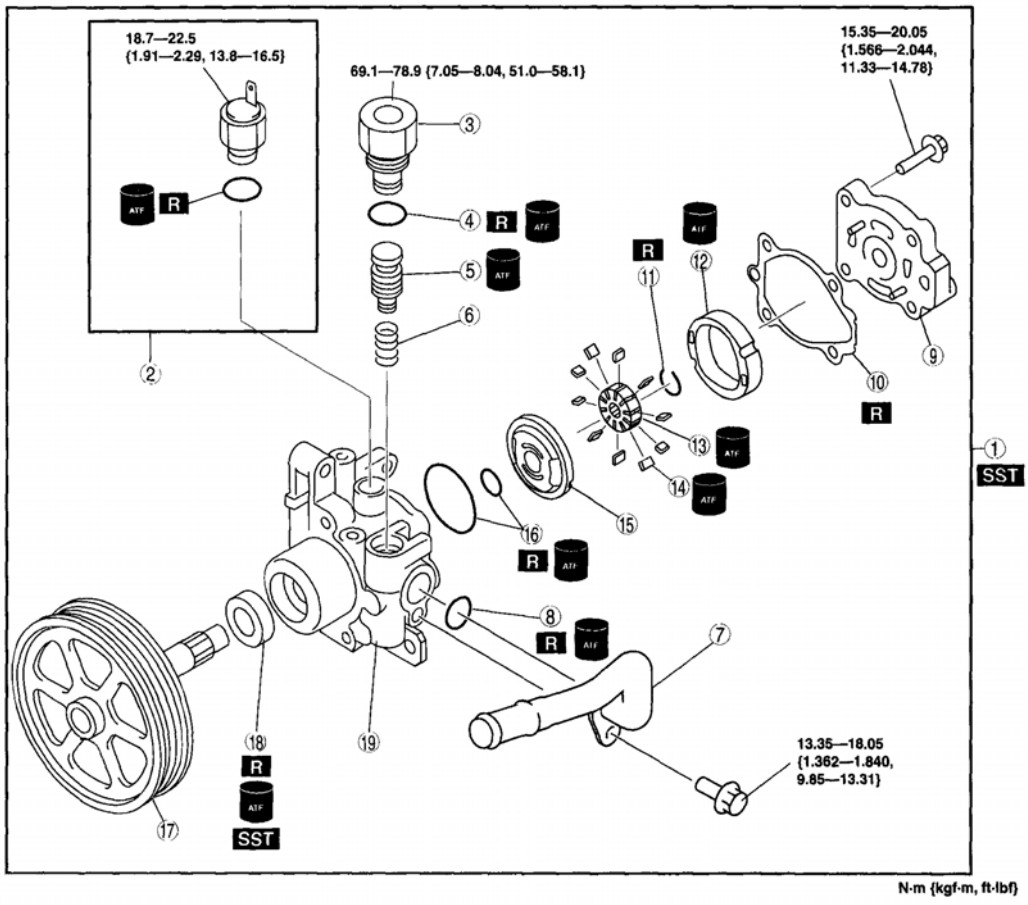
Fig. 46: Removing & Installing Power Steering Oil Pump (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY

NOTE:

- **The following procedure is for replacement of the O-ring and oil seal only. Replace the pump component if other repairs are necessary.**

1. Disassemble in the order indicated in **Fig. 47** .
2. Assemble in the reverse order of disassembly.



1	Power steering oil pump component
2	Pressure switch component
3	Pressure pipe fitting
4	O-ring
5	Control valve
6	Spring
7	Suction pipe
8	O-ring
9	Rear pump body
10	Gasket

11	Clip
12	Cam ring
13	Rotor
14	Vane
15	Side plate
16	O-rings
17	Shaft component
18	Oil seal
19	Front pump body

Fig. 47: Exploded View Of Power Steering Oil Pump (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

POWER STEERING OIL PUMP COMPONENT DISASSEMBLY NOTE

1. Secure the power pressure oil pump using the **SST** .

CAUTION:
- **Use the SST to prevent damage to the pump when securing it in a vise.**

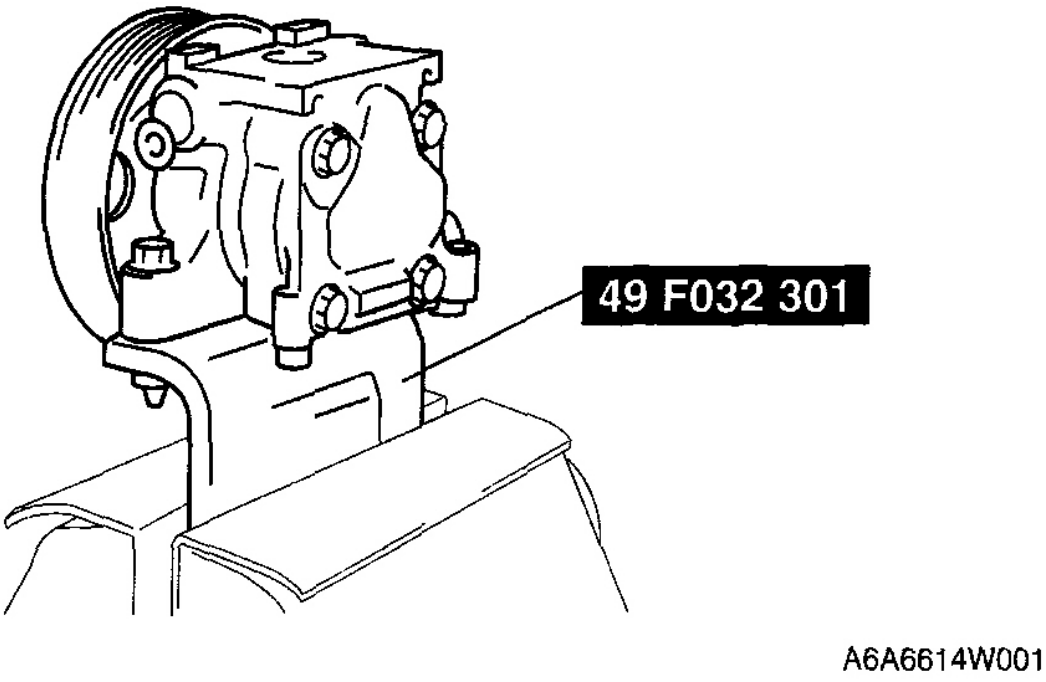


Fig. 48: Securing Power Pressure Oil Pump Using SST
Courtesy of MAZDA MOTORS CORP.

OIL SEAL ASSEMBLY NOTE

1. Install the oil seal in the front pump body using the **SST** and plastic hammer.

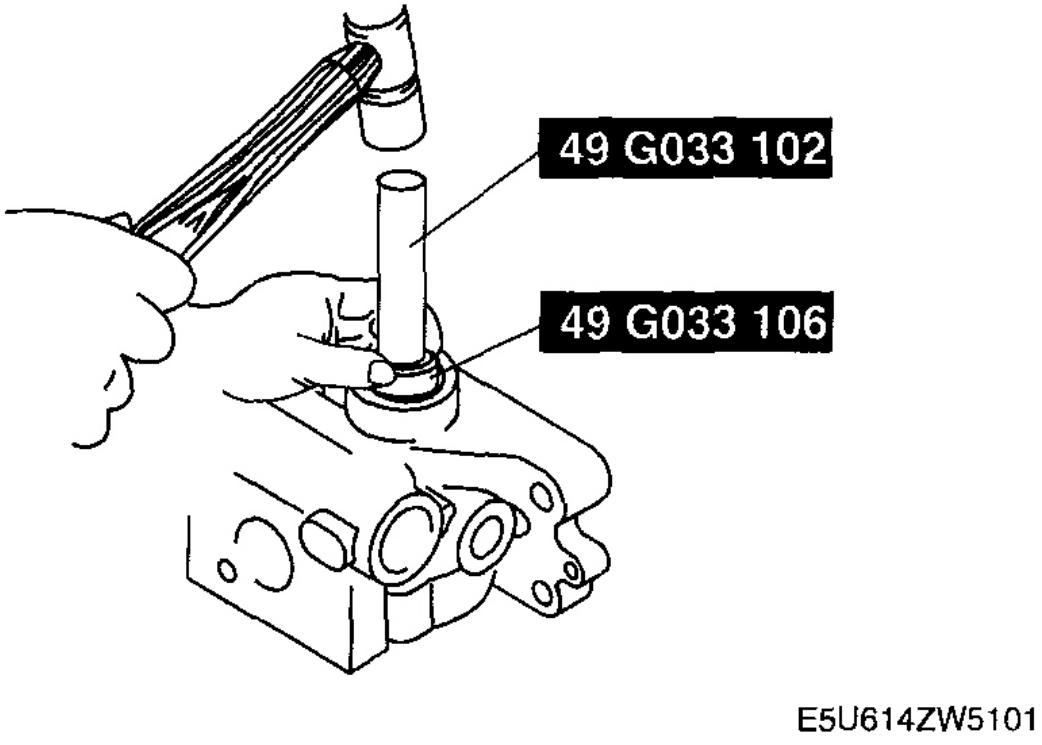


Fig. 49: Installing Oil Seal In Front Pump Body Using SST & Hammer
Courtesy of MAZDA MOTORS CORP.

VANE ASSEMBLY NOTE

1. Place the vanes in the rotor with the rounded edges contacting the cam.

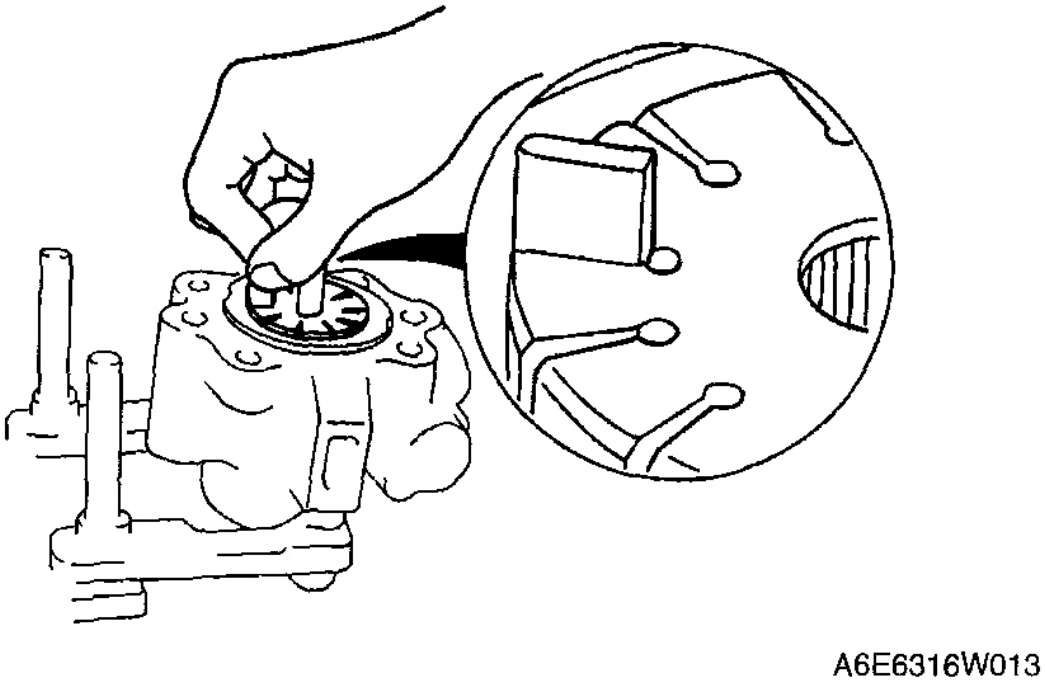


Fig. 50: Placing Vanes In Rotor With Rounded Edges Contacting Cam
Courtesy of MAZDA MOTORS CORP.

CAM RING ASSEMBLY NOTE

1. Install the cam ring in the front pump body with the mark facing upward.

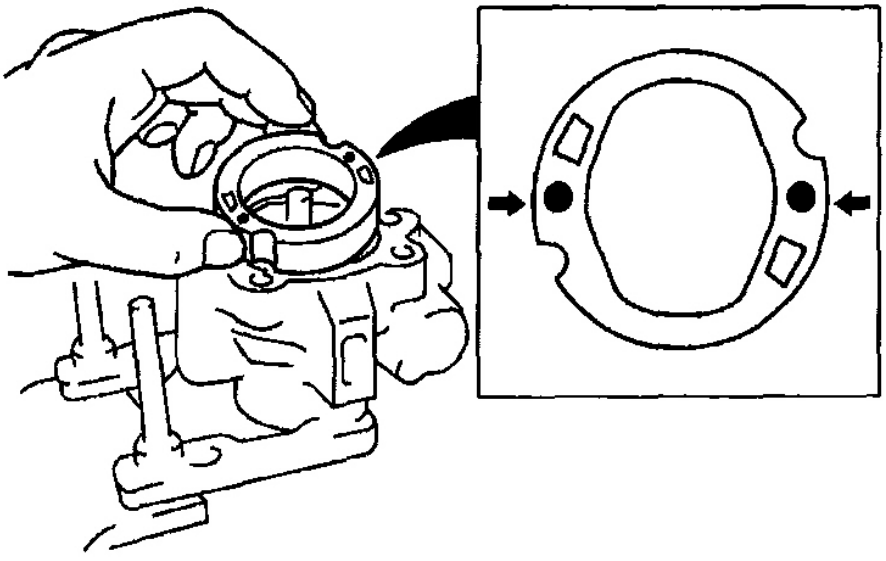


Fig. 51: Installing Cam Ring In Front Pump Body
Courtesy of MAZDA MOTORS CORP.

REAR PUMP BODY ASSEMBLY NOTE

1. After installing the rear body, manually turn the shaft to verify that it rotates smoothly.

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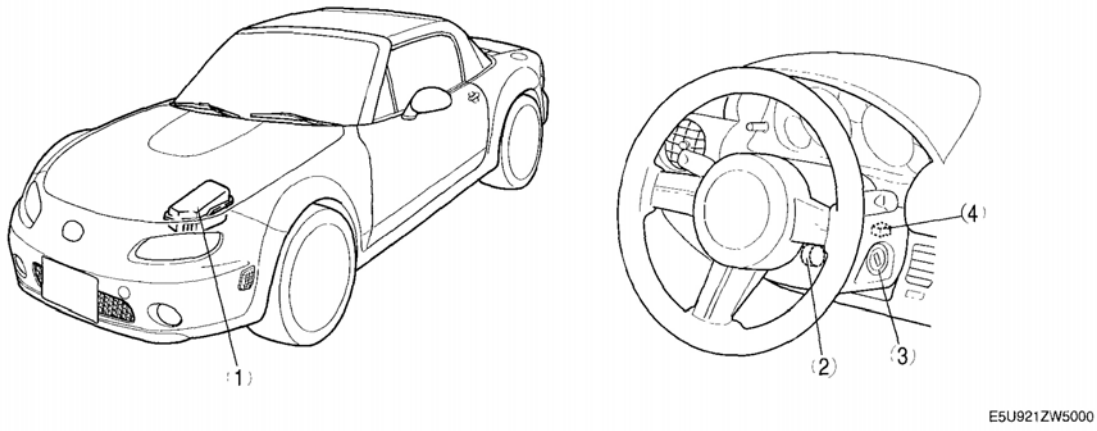
Power Systems - MX-5 Miata

POWER SYSTEM LOCATION INDEX



1	Main fuse block
2	Ignition switch
3	Steering lock unit [advanced keyless system]
4	Key reminder switch [except advanced keyless system]

Fig. 1: Identifying Location Of Power System Components
Courtesy of MAZDA MOTORS CORP.

FUSE SERVICE WARNINGS

WARNING:

- **For vehicles with DSC, if the room fuse is disconnected, the stored initial position of the steering angle sensor will be cleared and the DSC will not operate properly, making the vehicle unsafe to drive. Perform the steering angle sensor initialization procedure after connecting the room fuse. (See STEERING ANGLE SENSOR INITIALIZATION PROCEDURE .)**

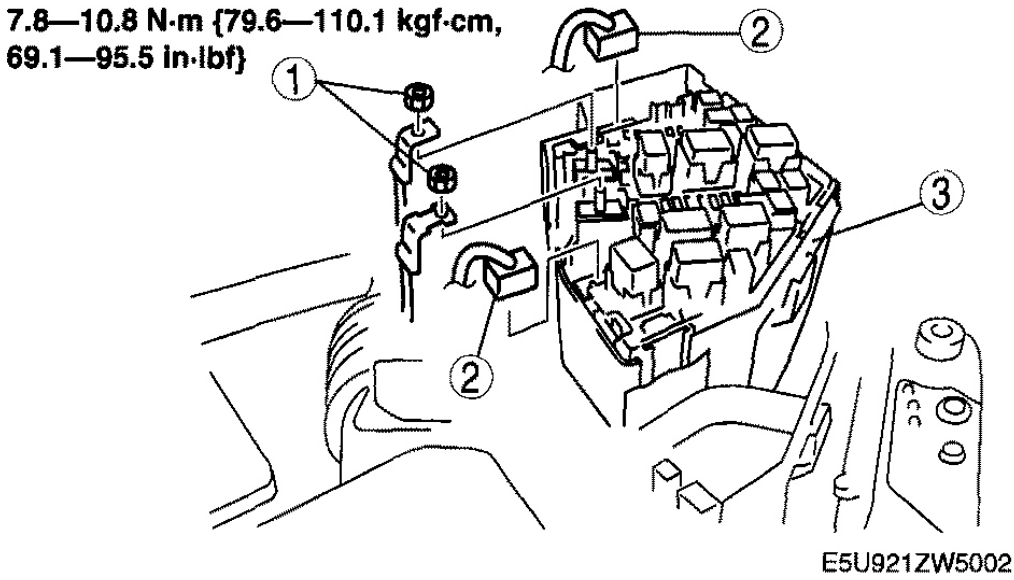
FUSE SERVICE CAUTION

CAUTION:

- **Determine and correct the cause of the burnt fuse before replacing it. If the fuse is replaced before doing this, it may burn again.**

UPPER BLOCK REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the main fuse block cover.
4. Remove in the order indicated in **Fig. 2** .
5. Install in the reverse order of removal.



1	Nut
2	Connector
3	Upper block

Fig. 2: Removing/Installing Upper Block (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

UPPER BLOCK REMOVAL NOTE

1. Press and remove the tabs on upper block at the positions indicated by the arrows.
2. Raise the upper block and remove it.

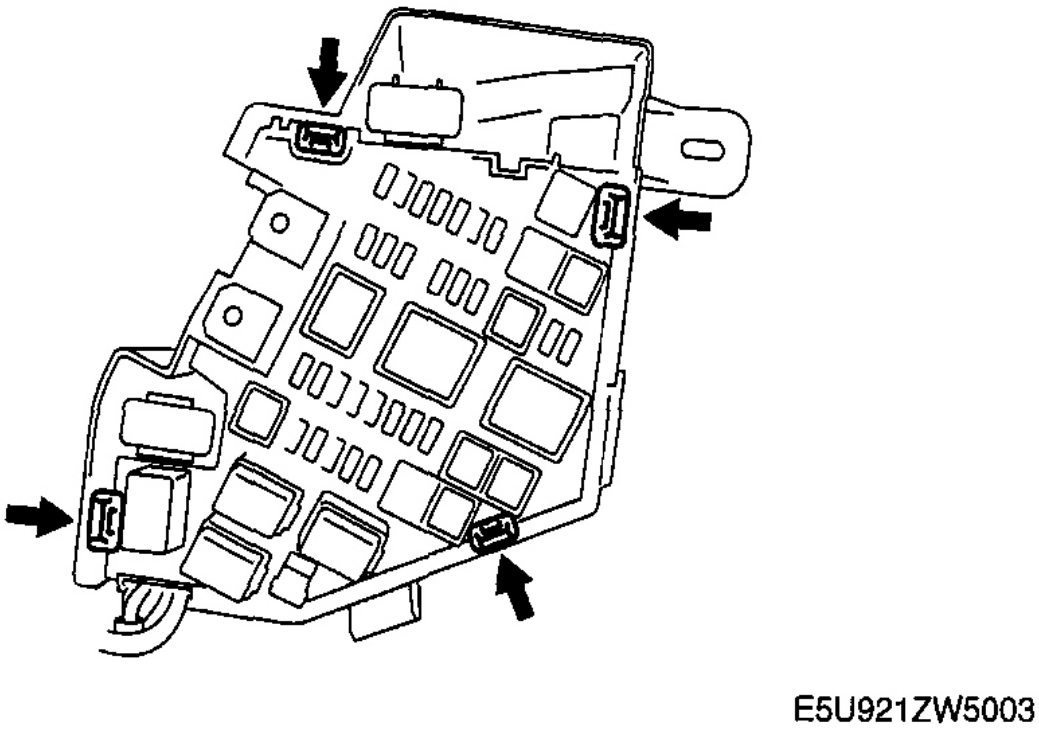
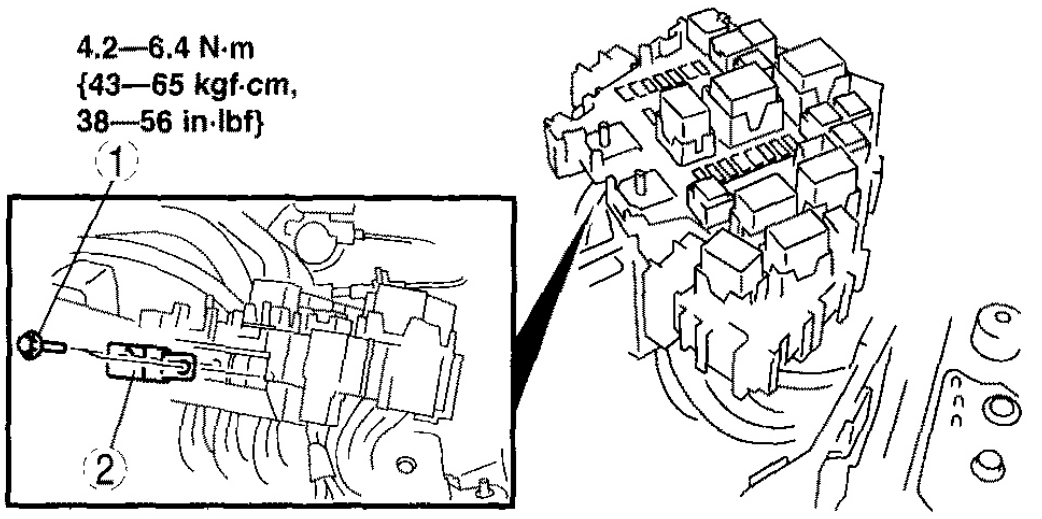


Fig. 3: Removing Upper Block
Courtesy of MAZDA MOTORS CORP.

MAIN FUSE REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the upper block. (See **UPPER BLOCK REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 4** .



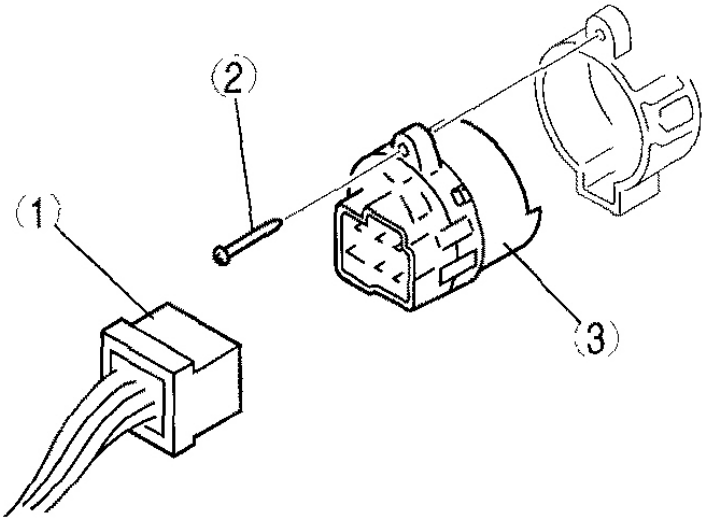
1	Bolt
2	Main fuse

Fig. 4: Removing/Installing Main Fuse (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

IGNITION SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Remove in the order indicated in **Fig. 5** .



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1	Connector
2	Screw
3	Ignition switch

Fig. 5: Removing/Installing Ignition Switch
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

IGNITION SWITCH INSPECTION

1. Verify that the continuity between the ignition switch terminals is as indicated in **Fig. 6** .
    - If not as indicated in **Fig. 6** , replace the ignition switch.

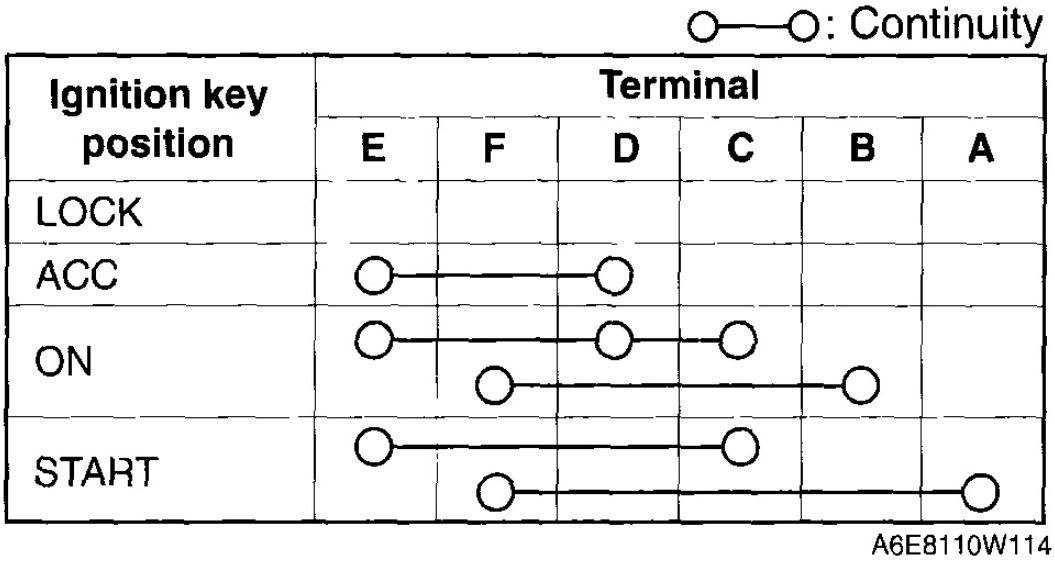


Fig. 6: Ignition Switch Terminal Resistance Reference Table
Courtesy of MAZDA MOTORS CORP.

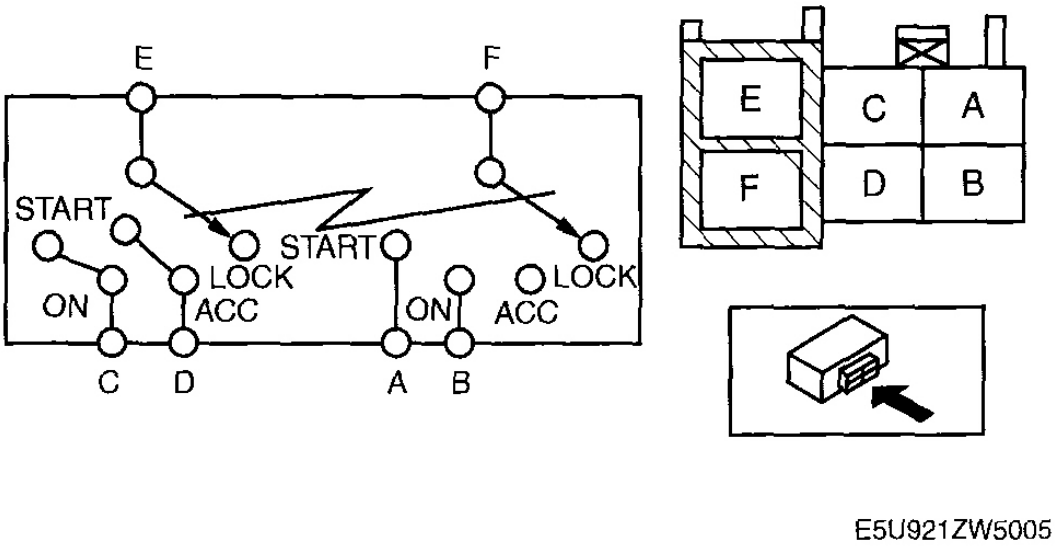


Fig. 7: Inspecting Ignition Switch
Courtesy of MAZDA MOTORS CORP.

KEY REMINDER SWITCH REMOVAL/INSTALLATION [EXCEPT ADVANCED

KEYLESS SYSTEM]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Disconnect the key reminder switch connector.
5. Remove the key reminder switch.
6. Install in the reverse order of removal.

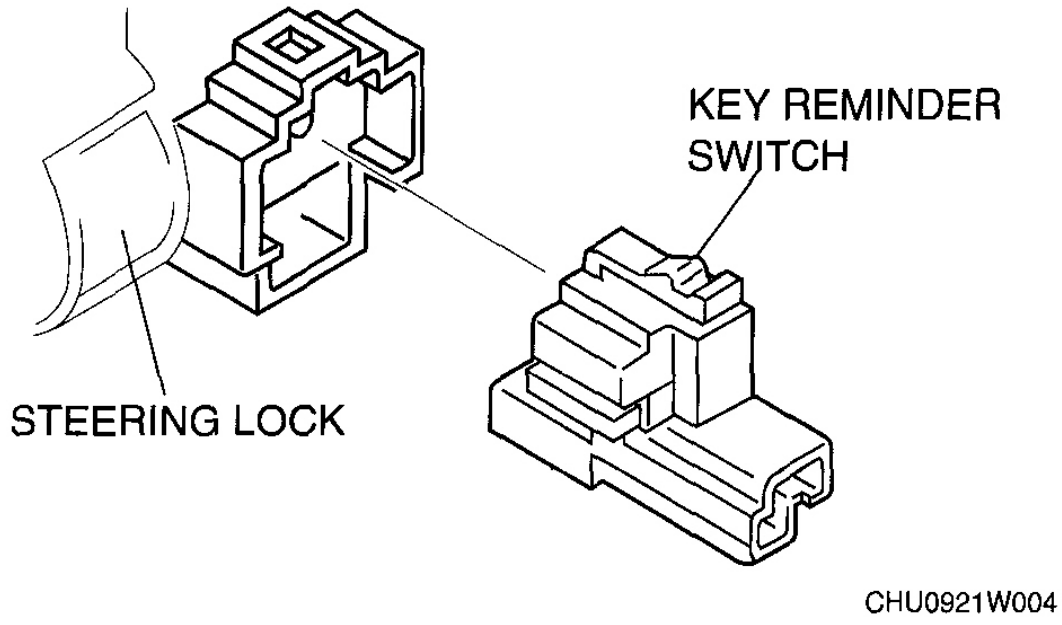


Fig. 8: Removing/Installing Key Reminder Switch
Courtesy of MAZDA MOTORS CORP.

KEY REMINDER SWITCH INSPECTION [EXCEPT ADVANCED KEYLESS SYSTEM]

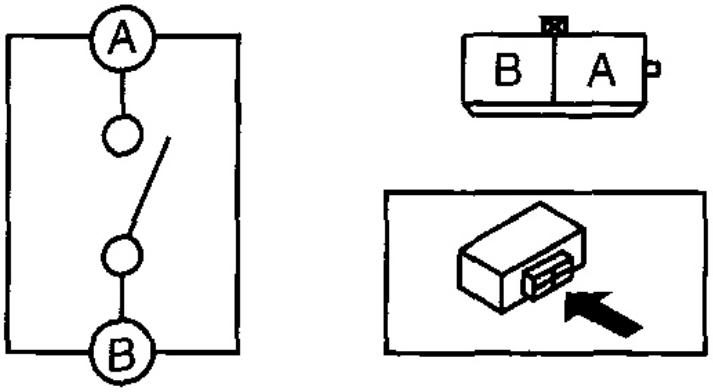
1. Verify that the continuity between the key reminder switch terminals is as indicated in **Fig. 9** .
   - If not as indicated in **Fig. 9** , replace the key reminder switch.

: Continuity

Key position	Terminal	
	A	B
Key inserted	○——○	
Key removed		

A6E8110W115

Fig. 9: Key Reminder Switch Terminal Resistance Reference Table
Courtesy of MAZDA MOTORS CORP.



A6E8110W117

Fig. 10: Inspecting Key Reminder Switch
Courtesy of MAZDA MOTORS CORP.

STEERING LOCK UNIT INSPECTION [ADVANCED KEYLESS SYSTEM]

1. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
2. Measure the voltage at each terminal (other than terminals G and H).

- If the voltage is not as specified in the **Terminal Voltage Table (Reference)**, inspect the parts under "Inspection item(s)".

3. Disconnect the steering lock unit connector
4. Verify that continuity at terminals G and H is as indicated in the **Terminal Voltage Table (Reference)**.
   - If there is any malfunction, inspect the parts under "Inspection item(s)".
     - If the system does not work properly even though the parts or related wiring harnesses do not have any malfunction, replace the panel light control switch.

TERMINAL VOLTAGE TABLE (REFERENCE)

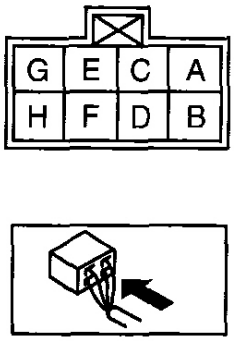


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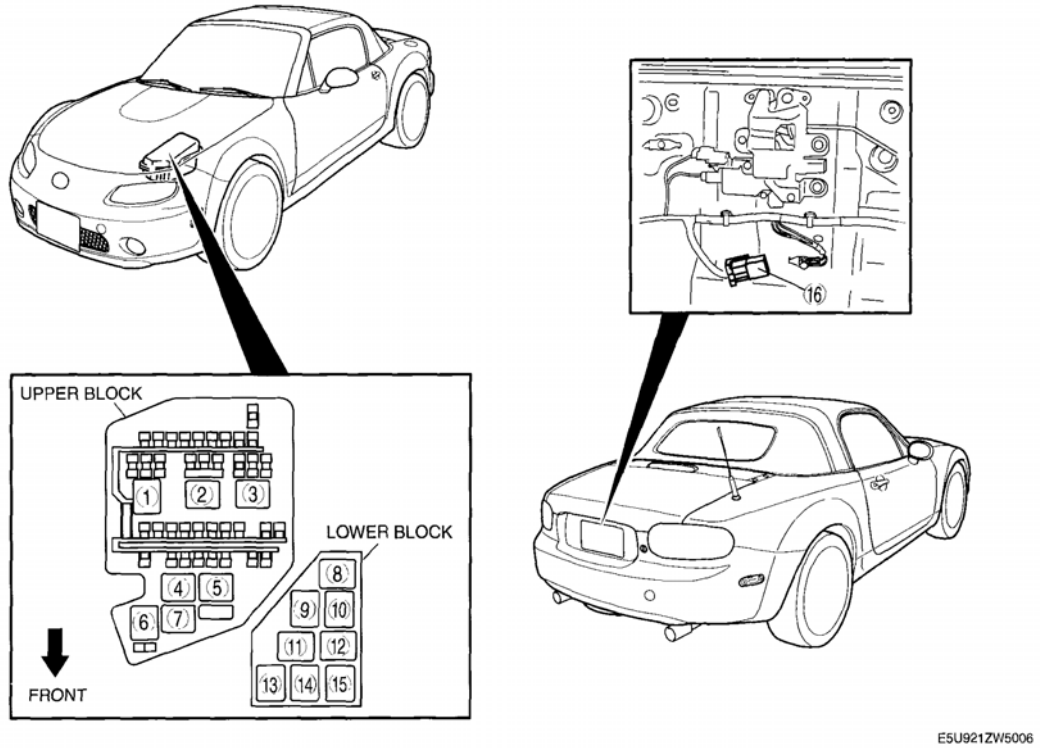
Fig. 11: Inspecting Steering Lock Unit Connector
Courtesy of MAZDA MOTORS CORP.

TERMINAL VOLTAGE TABLE

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/Continuity	Inspection item(s)
A	Push switch signal	Keyless control module	Start knob pressed	B+	• Keyless control module • Related wiring harnesses
			Start knob released	1.0 or less	
B	Power supply	Fuse	Under any condition	B+	• Fuse • Related wiring harnesses
C	Key reminder switch signal	Keyless control module	Key inserted	B+	• Keyless control module • Related wiring harnesses
			Key removed	1.0 or less	
					• Fuse

D	Power supply	Fuse	Under any condition	B+	• Related wiring harnesses
E	Power supply	Fuse	Under any condition	B+	• Fuse • Related wiring harnesses
F	Ignition key illumination signal	Ignition key illumination bulb	Ignition switch off and driver-side door opened.	1.0 or less	• Ignition key illumination bulb • Related wiring harnesses
			30s or more after driver-side door closed.	B+	
G	Serial communication	Keyless control module	Under any condition: Inspect for continuity to keyless control module.	Continuity detected	Related wiring harnesses
H	GND	Body ground	Under any condition: Inspect for continuity to GND.	Continuity detected	Related wiring harnesses

RELAY LOCATION



1	Main relay
2	Headlight relay
3	Ignition relay
4	Starter relay
5	Drive-by-wire relay
6	Blower relay
7	Fuel pump relay
8	Front fog light relay

9	A/C relay
10	TNS relay
11	Rear window defroster relay
12	Horn relay
13	Cooling fan relay No.3
14	Cooling fan relay No.2
15	Cooling fan relay No.1
16	Trunk lid opener relay

Fig. 12: Identifying Relay Locations
Courtesy of MAZDA MOTORS CORP.

TRUNK LID OPENER RELAY REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the trunk end trim. (See **TRUNK END TRIM REMOVAL/INSTALLATION** .)
4. Remove the trunk lid opener relay.
5. Install in the reverse order of removal.

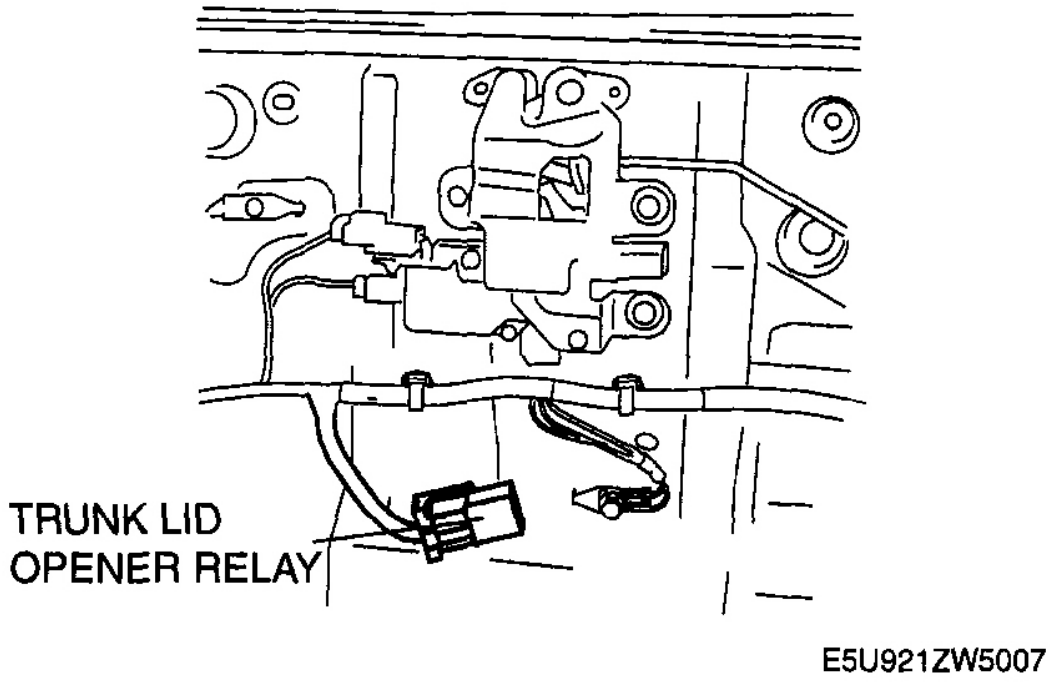


Fig. 13: Removing/Installing Trunk Lid Opener Relay
Courtesy of MAZDA MOTORS CORP.

RELAY INSPECTION

RELAY TYPE

RELAY TYPE TABLE

Terminal type	Part name
Type A	• Main relay • Starter relay • Drive-by-wire relay • Blower relay • Fuel pump relay • Front fog light relay • A/C relay • TNS relay • Rear window defroster relay • Horn relay

	• Cooling fan relay No.1 • Cooling fan relay No.2 • Cooling fan relay No.3 • Trunk lid opener relay
Type B	• Headlight relay • Ignition relay

TYPE A

1. Verify the continuity between the relay terminals.
   - If not as indicated in **Fig. 14** , replace the relay.

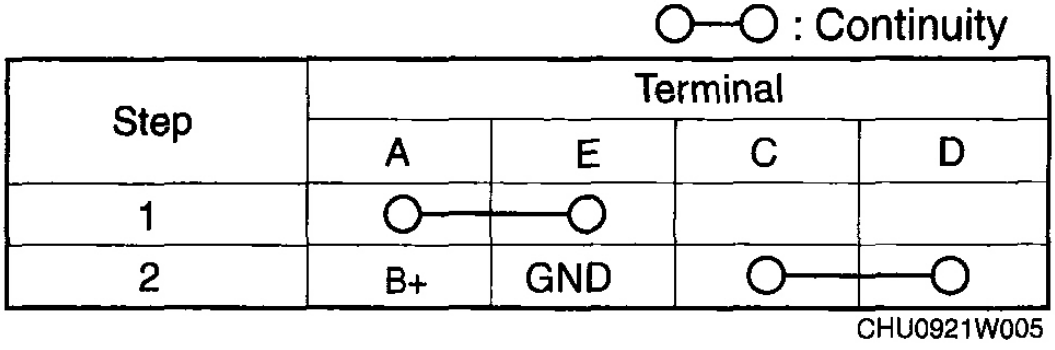


Fig. 14: Type A Continuity Table
Courtesy of MAZDA MOTORS CORP.

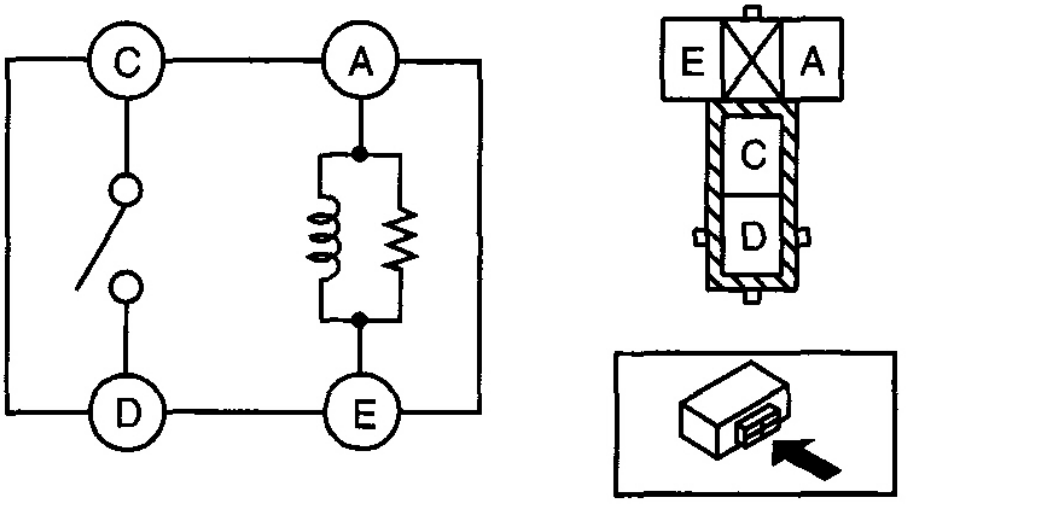


Fig. 15: Type A Circuit & Connector
Courtesy of MAZDA MOTORS CORP.

TYPE B

1. Verify the continuity between the relay terminals.
   - If not as indicated in **Fig. 16** , replace the relay.

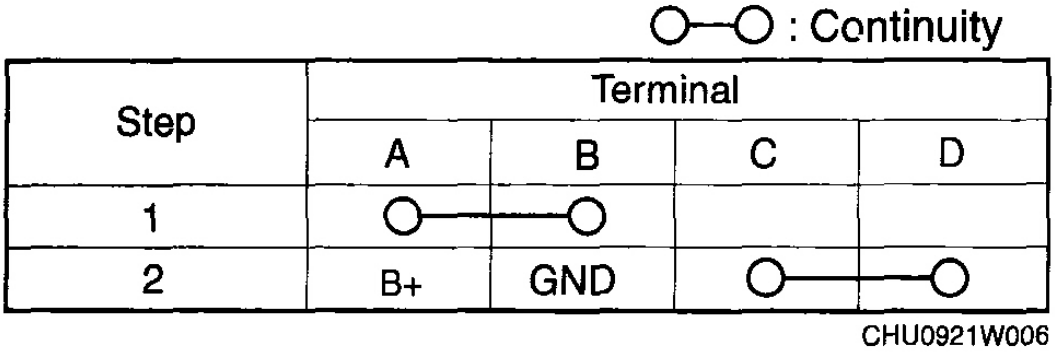


Fig. 16: Type B Continuity Table
Courtesy of MAZDA MOTORS CORP.

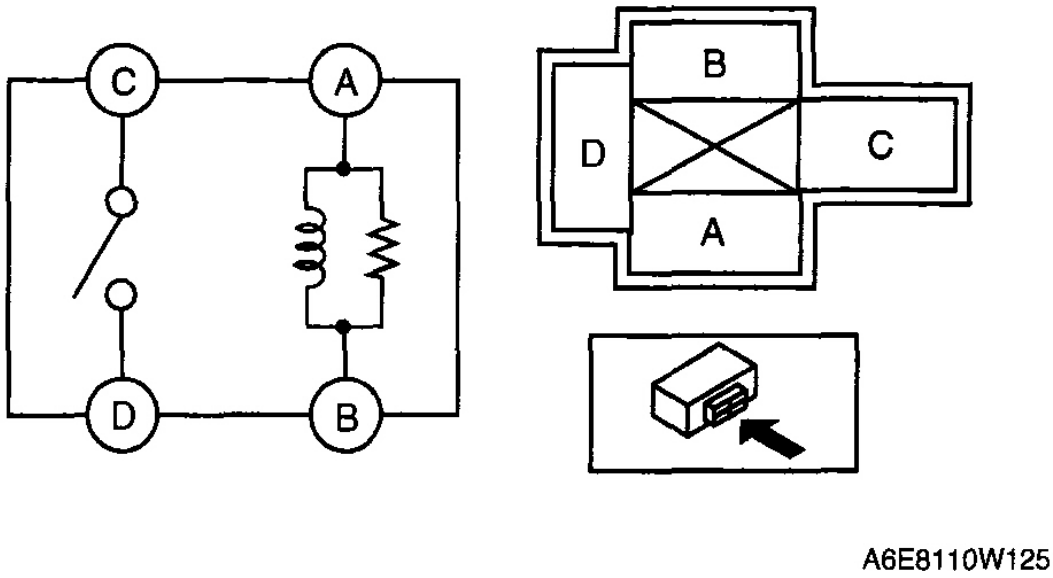


Fig. 17: Type B Circuit & Connector
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Symptom Troubleshooting (Power Window System) - MX-5 Miata

POWER WINDOW SYSTEM WIRING DIAGRAM[POWER WINDOW SYSTEM]

POWER RETRACTABLE HARDTOP MODEL (WITH EXTERIOR OPEN FUNCTION)

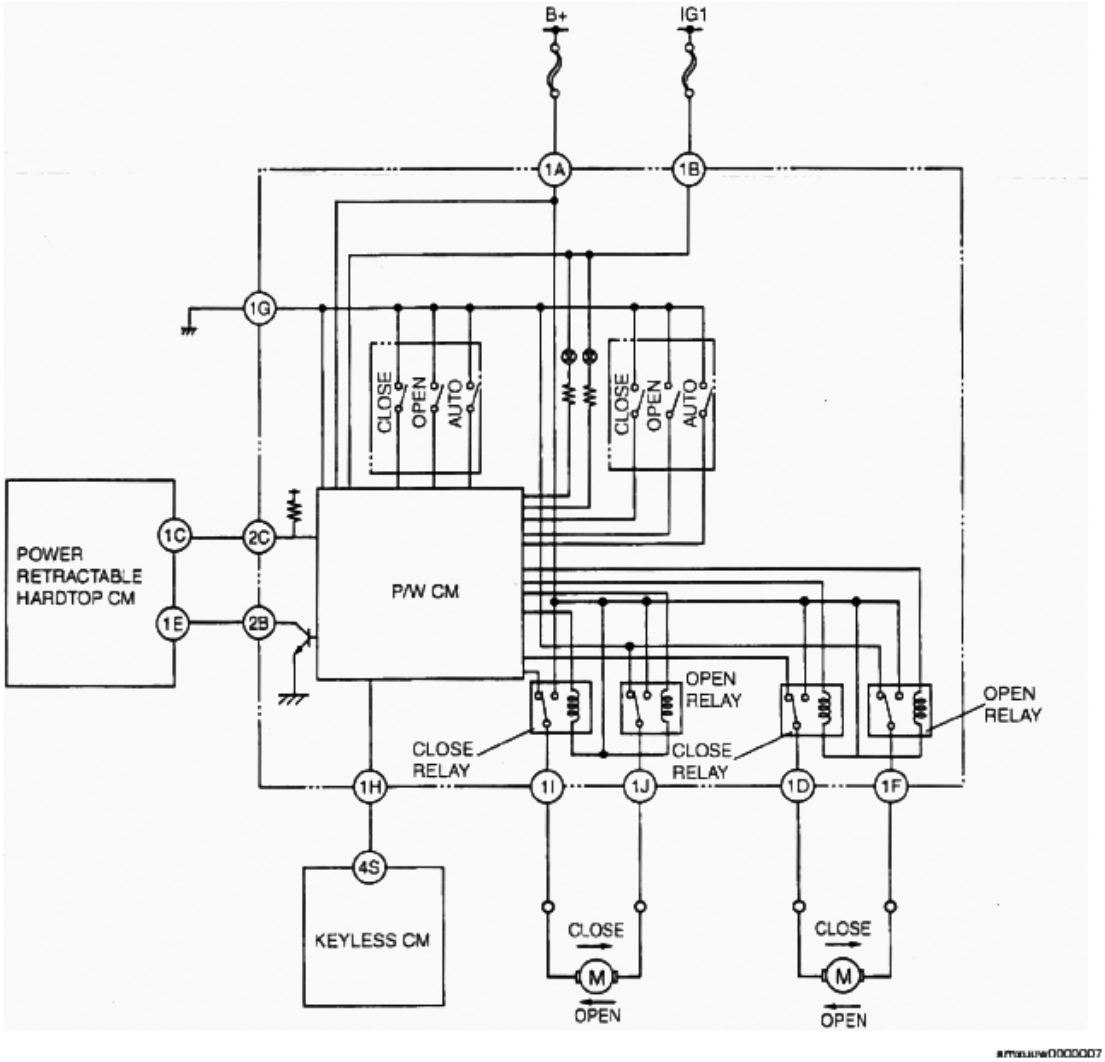


Fig. 1: Power Window System Wiring Diagram - Power Retractable Hardtop Model (With Exterior Open Function)
Courtesy of MAZDA MOTORS CORP.

POWER RETRACTABLE HARDTOP MODEL (WITHOUT EXTERIOR OPEN FUNCTION)

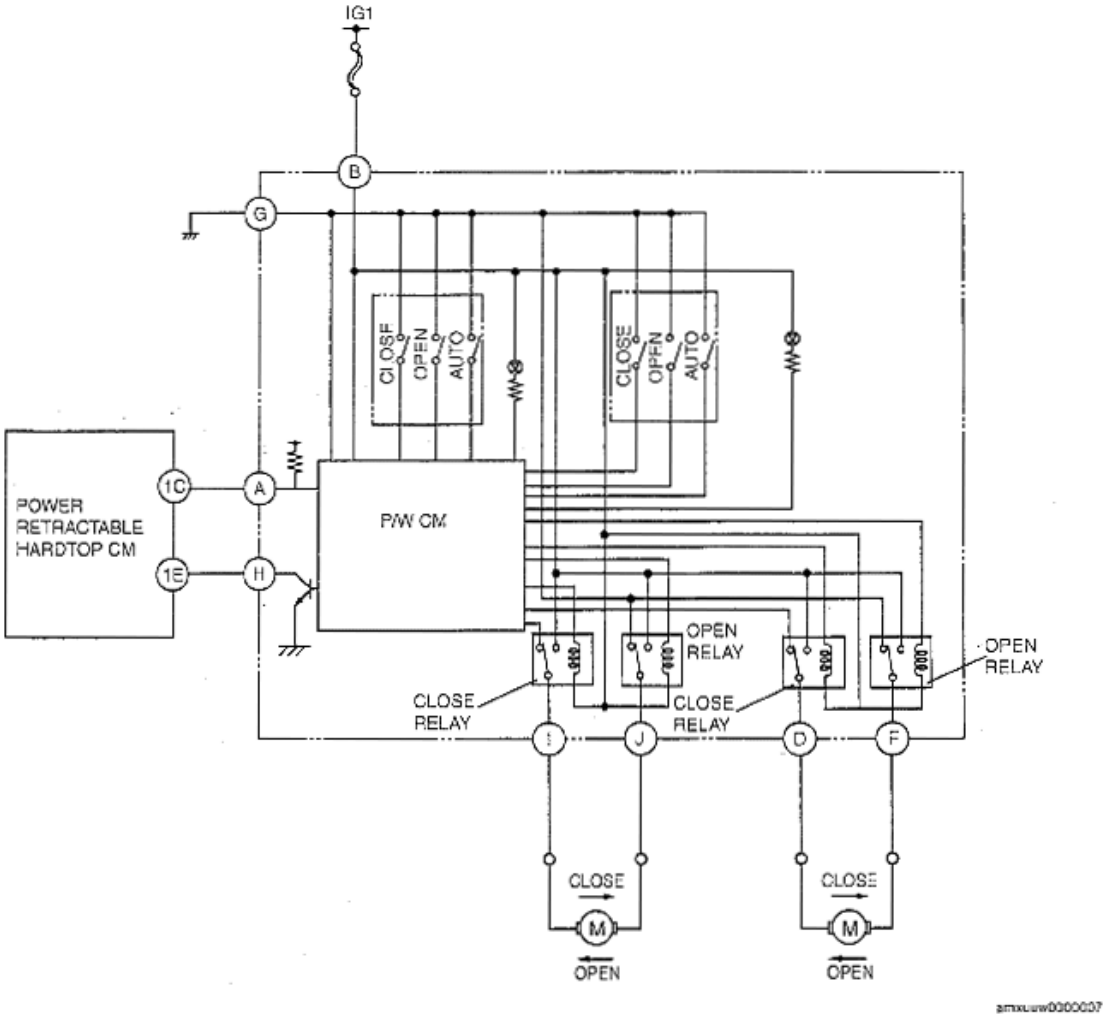


Fig. 2: Power Window System Wiring Diagram - Power Retractable Hardtop Model (Without Exterior Open Function)
Courtesy of MAZDA MOTORS CORP.

SOFT-TOP MODEL

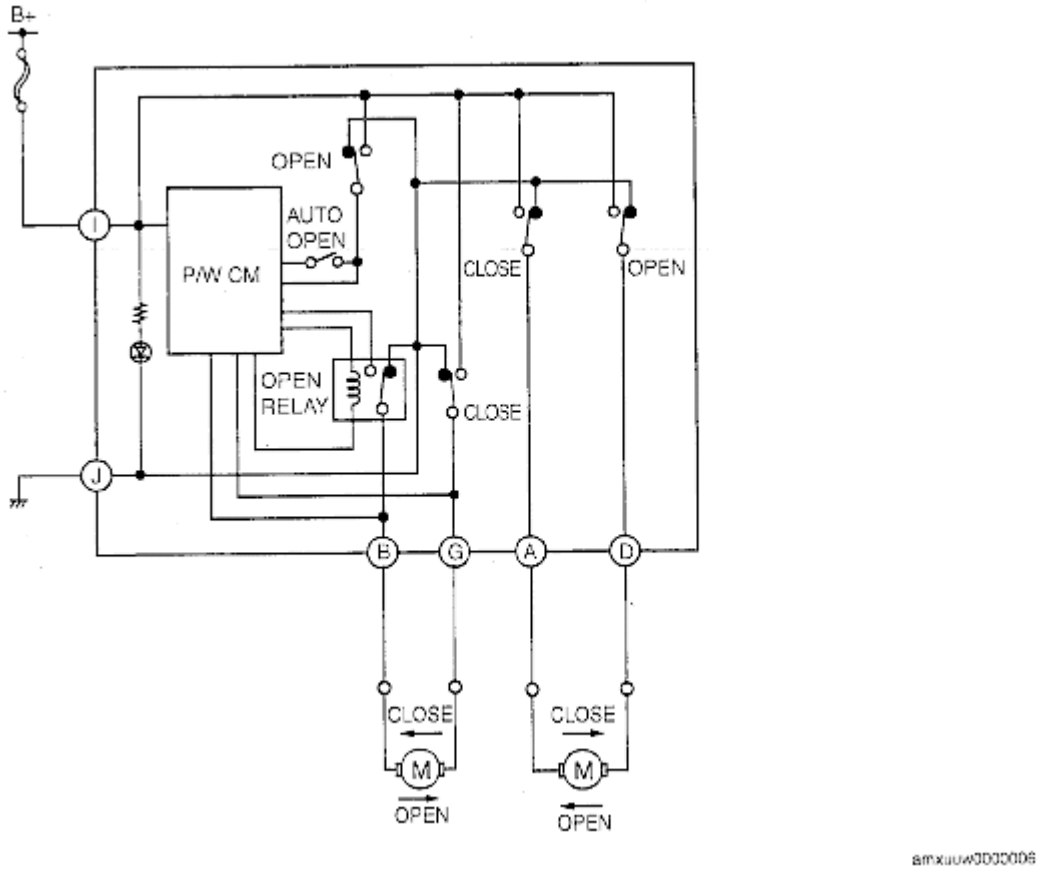


Fig. 3: Power Window System Wiring Diagram - Soft-Top Model
Courtesy of MAZDA MOTORS CORP.

FOREWORD[POWER WINDOW SYSTEM]

TROUBLESHOOTING PROCEDURE

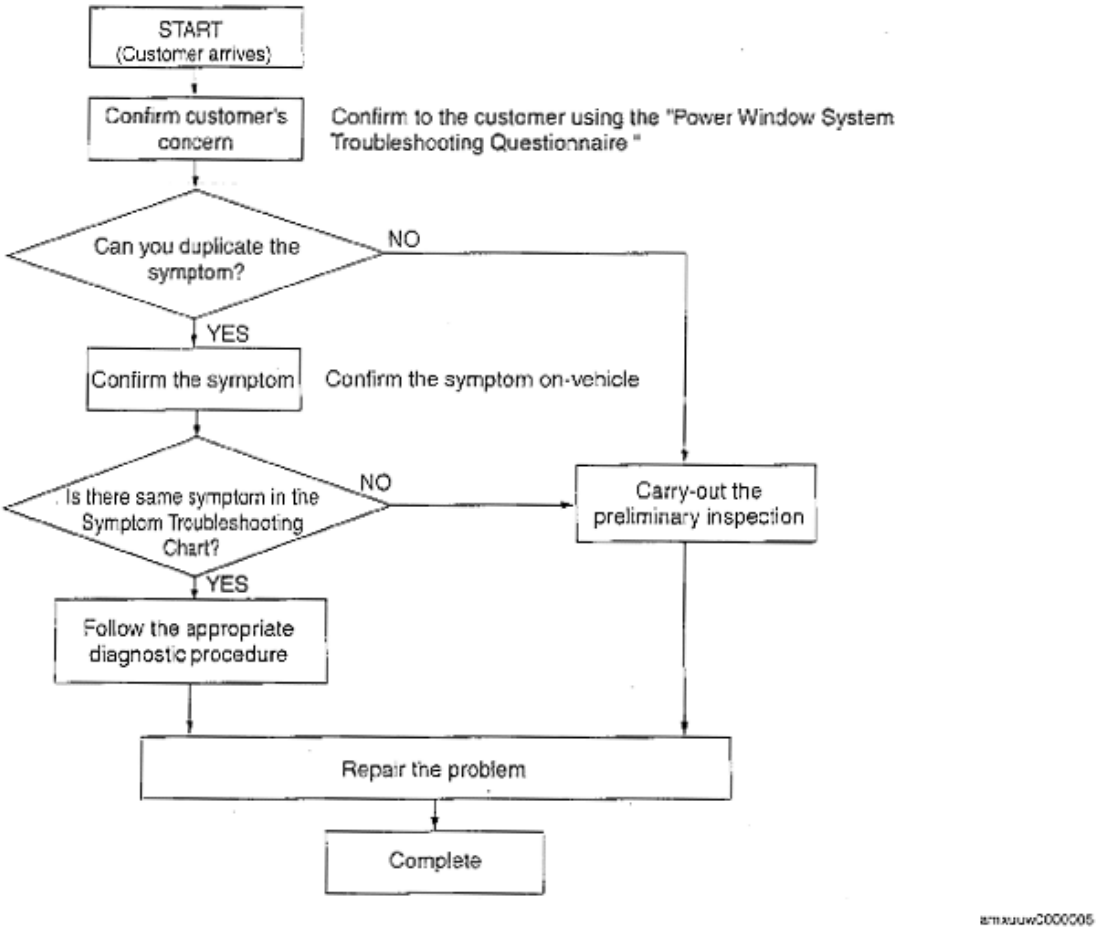


Fig. 4: Foreword (Power Window System) Troubleshooting Procedure
Courtesy of MAZDA MOTORS CORP.

- Slightly shake the wiring harness and connectors while performing the inspection to discover whether poor contact points are the cause of any intermittent malfunctions.

POWER WINDOW SYSTEM TROUBLESHOOTING QUESTIONNAIRE[POWER WINDOW SYSTEM]

Date :

When did the malfunction first occur ?			
Weather conditions	☐Fair weather ☐Cloudy ☐Rain ☐Snow ☐Other ( )	Outside temperature	Approx. °F
Driving conditions	☐ Driving ☐Stopped (Engine is : ☐ Running ☐ Stopped)		
Duplicate symtom?	☐YES ☐NO	Frequency	☐ Always ☐ Sometimes (times/month)
Road conditions	☐ City ☐Outer city ☐ Freeway ☐Other ( ) / ☐Paved ☐ Dirt road		

*Follow the appropriate diagnostic procedures shown below or perform the basic troubleshooting flow.

☐ (No.1) The auto open function on the driver's and passenger's side power window inoperative.

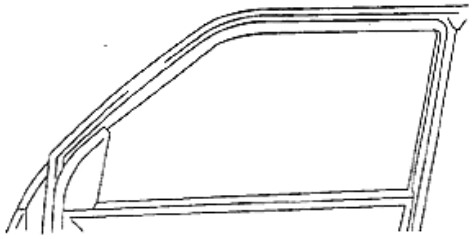
☐ (No.2) The driver's side power window is inoperative.

☐ (No.3) The passenger's side power window is inoperative.

☐ (No.4) All power windows are inoperative.

☐ (No.5) Abnormal noise while the door glass is opening or closing.

☐ Other (Describe the symptom below if the symptom does not appear in the above list.)



Please describe the conditions when the malfunction occurs.
(Example) : When the outer mirrors are operated

Please describe the conditions under which the system returns to normal operation after malfunctioning.
(Example) : The ignition switch is turned to the ON position after inserting the ignition key into the key cylinder

amcuuw0000005

Fig. 5: Power Window System Troubleshooting Questionnaire (Power Window System)
Courtesy of MAZDA MOTORS CORP.

SYMPTOM TROUBLESHOOTING CHART[POWER WINDOW SYSTEM]

SYMPTOM TROUBLESHOOTING CHART[POWER WINDOW SYSTEM]

No.	Malfunction symptom

1	**NO.1 THE AUTO OPEN FUNCTION ON THE DRIVER'S AND PASSENGER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]**
2	**NO.2 THE DRIVER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]**
3	**NO.3 THE PASSENGER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]**
4	**NO.4 ALL POWER WINDOWS ARE INOPERATIVE[POWER WINDOW SYSTEM]**
5	**NO.5 ABNORMAL NOISE WHILE THE DOOR GLASS IS OPENIGN OR CLOSING [POWER WINDOW SYSTEM]**

POWER WINDOW SYSTEM PRELIMINARY INSPECTION[POWER WINDOW SYSTEM]

MANUAL OPEN/CLOSE FUNCTION INSPECTION

MANUAL OPEN/CLOSE FUNCTION INSPECTION CHART

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Operate the driver-side power window using the manual open/close function on the power window main switch. • Does the driver-side power window operate properly?	Yes	Go to the next step.
		No	• Inspect the following items: ○ Power window main switch power supply fuse ○ Power window main switch ground wiring harness ○ Power window main switch power supply wiring harness ○ Wiring harness between power window main switch and driver-side power window motor ○ Power window main switch (driver-side power window control is malfunctioning) ○ Driver-side power window motor • Repair or replace the malfunctioning part, then go to the next step.
2	• Operate the passenger-side power window using the power window main switch. • Does the passenger-side power window operate properly?	Yes	• Manual open/close function is normal. • Perform the auto open/close function inspection.
		No	• Inspect the following items: ○ Wiring harness between

			power window main switch and passenger-side power window motor ○ Power window main switch (passenger-side power window control is malfunctioning) ○ Passenger-side power window motor • Repair or replace the malfunctioning part, then go to the next step.

AUTO OPEN FUNCTION INSPECTION

NOTE:
- **The soft-top models do not have passenger's side power window auto open function.**

AUTO OPEN FUNCTION INSPECTION CHART

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Operate the driver-side and passenger-side power window using the auto open function on the driver-side and passenger-side power window main switch. • Do each power window operate properly?	Yes	Go to the next step.
		No	• Go to **NO.1 THE AUTO OPEN FUNCTION ON THE DRIVER'S AND PASSENGER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]**.
2	• Operate the power window main switch to the close position while the power window is opening. • Does the power window operation stop?	Yes	• Auto open function is normal.
		No	• Replace the power window main switch (power window control unit is malfunctioning.)

NO.1 THE AUTO OPEN FUNCTION ON THE DRIVER'S AND PASSENGER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]

AUTO OPEN FUNCTION ON DRIVER'S AND PASSENGER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] POSSIBLE CAUSES

1	**The auto open function on the driver's and passenger's side power window is inoperative.**
	• No power supply to power window main switch

POSSIBLE CAUSE	• Power window main switch malfunction (power window control unit malfunction, auto switch malfunction) • Power window motor malfunction • Malfunction in wiring harness between power window motor and power window main switch

NOTE:

- **The soft-top models do not have passenger's side power window auto open function.**

DIAGNOSTIC PROCEDURE

AUTO OPEN FUNCTION ON DRIVER'S AND PASSENGER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to ON position. • Operate driver and passenger side power window using automatic open function on the power window main switch. • Do each side power window open normally?	Yes	The power window system is normal.
		No	**Automatic open function does not operate both sides:** • Go to the next step. **Automatic open function does not operate one side:** • Go to step 4.

2	• Turn the ignition switch to ON position.
	• Measure the voltage between power window main switch following terminal and ground.
	  ○ Terminal 1B (power retractable hardtop model)
	  ○ Terminal I (soft-top model)
	• Is the voltage B+?
		Yes	Go to the next step.

		No	Repair or replace for open circuit.
3	• Turn the ignition switch to LOCK position. • Disconnect the power window main switch connector. • Verify that the continuity between following power window main switch terminal and ground. ○ Terminal 1G (power retractable hardtop model)	Yes	Inspect the power window main switch. (See **POWER WINDOW MAIN SWITCH INSPECTION** .) (See **POWER WINDOW MAIN SWITCH INSPECTION[POWER RETRACTABLE HARDTOP]** .) Replace the power window main switch if necessary.

	○ Terminal J (soft-top model) • Is there continuity?	No	Repair or replace for open circuit.
4	• Turn the ignition switch to ON position. • Operate suspected side power window using manual open function on the power window main switch. • Do suspected side power window open normally?	Yes	Replace the power window main switch. (power window control unit malfunction) (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
		No	Go to the next step.
5	• Turn the ignition switch to LOCK position. • Disconnect the power window main switch and suspected side power window motor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion etc.) • Is there any malfunction?	Yes	Go to the next step.
		No	Repair or replace malfunctioning part.
6	• Inspect for open or short circuit in wiring harness between suspected side power window motor and power window main switch. **Power retractable hardtop model driver's side:** ○ Terminal 1I (main switch)-terminal G (motor) ○ Terminal 1J (main switch)-terminal A (motor) **Power retractable hardtop model passenger's side:** ○ Terminal 1D (main switch)-terminal G (motor) ○ Terminal 1F (main switch)-terminal A (motor) **Soft-top model driver's side:**	Yes	Repair or replace for open or short circuit.
		No	Go to the next step.

	○ Terminal G (main switch)-terminal G (motor) ○ Terminal B (main switch)-terminal A (motor) **Soft-top model passenger's side:** ○ Terminal A (main switch)-terminal G (motor) ○ Terminal D (main switch)-terminal A (motor) • Is the open or short circuit detected?		
7	• Inspect suspected side power window motor. (See **POWER WINDOW MOTOR INSPECTION** .) • Is the power window motor normal?	Yes	Replace the power window main switch. (power window control unit malfunction, auto switch malfunction) (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
		No	Replace the power window motor. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)

NO.2 THE DRIVER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]

DRIVER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] POSSIBLE CAUSES

2	**The driver's side power window is inoperative.**
POSSIBLE CAUSE	• Power supply circuit or ground circuit malfunction ○ Burnt fuse (B+) ○ Open or short circuit in wiring harness between fuse (B+) and power window main switch ○ Open or short circuit in wiring harness between power window main switch and power window motor ○ Open or short circuit in wiring harness between power window main switch and ground • Power window main switch malfunction • Power window motor malfunction • Power window regulator malfunction

DIAGNOSTIC PROCEDURE

DRIVER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Does the LED on the power window main switch illuminate?	Yes	Go to step 6.
		No	Go to the next step.
2	• Operate the passenger's side power window using the power window main switch. • Does the power window operate properly?	Yes	Go to the next step.
		No	Inspect for an open or short circuit in the following wiring harnesses. Inspect the connector connections (damage/ pulled-out pins, corrosion): • P.WIND 20 A fuse-Power window main switch terminal 1B (power retractable hardtop model)/I (soft-top model) • Power window main switch terminal 1G (power retractable hardtop model)/terminal J (soft-top model)-ground. Repair or replace if necessary.
3	• Is the P.WIND 20 A fuse normal?	Yes	Go to step 5. (power retractable hardtop model with exterior open function) Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .) (power retractable hardtop model without exterior open function/soft-top model)
		No	Inspect the following: • Short circuit in B+ power supply wiring harness • Short circuit in power window motor Repair or replace if necessary. Replace with the appropriate standard fuse. Then, go to the next step.
4	• Operate the power window	Yes	Troubleshooting is completed.

	system. • Do the power windows operate properly?	No	Re-confirm the symptom and go to step 1.
5	• Measure the voltage at the power window main switch terminal 1A. • Is the voltage B+?	Yes	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
		No	Inspect for an open or short circuit in the power window main switch wiring harness (battery power supply). Inspect the power window main switch connector connection. (damage/pulled-out pins, corrosion) Repair or replace if necessary.
6	• Measure the voltage at the power window main switch. (power window motor output terminal) while operating the power window using the power window main switch. • Is the voltage B+? **Power retractable hardtop model:** Open: terminal 1 J/close: terminal 1I**Soft-top model:** Open: terminal B/close: terminal G	Yes	Go to the next step.
		No	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
7	• Measure the voltage at the power window motor, (battery power supply terminal) while operating the power window using the power window main switch. • Is the voltage B+? (Open: terminal A/close: terminal G)	Yes	Go to the next step.
		No	Inspect for an open or short circuit in the wiring harness between the power window main switch and the power window motor. Inspect the power window main switch and power window motor connector connections, (damage/pulled-out pins, corrosion) Repair or replace if necessary.
8	• Operate the driver's side power window using the power window main switch. • Does the power window motor operate (rotate)? **CAUTION:** • **If the power window motor temperature is**	Yes	Go to the next step.
		No	Replace the power window motor. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)

	high, the motor may not rotate due to the motor internal bimetal function. Leave it untouched for about 3 min to cool it down, then reinspect.		
9	• Remove the door glass from the carrier plate. • Make sure that the door glass moves smoothly using your hand. • Does the door glass move smoothly?	Yes	Replace the power window regulator. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
		No	Inspect for a bent regulator guide or other possible malfunction. If normal, replace the door glass run-channel.

NO.3 THE PASSENGER'S SIDE POWER WINDOW IS INOPERATIVE[POWER WINDOW SYSTEM]

PASSENGER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] POSSIBLE CAUSES

3	**The passenger's side power window is inoperative.**
POSSIBLE CAUSE	• Power supply circuit malfunction ○ Open or short circuit in wiring harness between power window main switch and passenger's side power window motor • Power window main switch malfunction • The passenger's side power window motor malfunction • The passenger's side power window regulator malfunction

DIAGNOSTIC PROCEDURE

PASSENGER'S SIDE POWER WINDOW INOPERATIVE[POWER WINDOW SYSTEM] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Turn the ignition switch to the ON position. • Operate the driver's side power window using the power window main switch. • Does the power window operate properly?	Yes	Go to the next step.
		No	Go to the **No.4 ALL POWER WINDOWS ARE INOPERATIVE [POWER WINDOW SYSTEM]** .
2	• Measure the voltage at the power window main switch (power window motor output terminal) while operating the passenger's	Yes	Go to the next step.

	side power window using the power window main switch. • Is the voltage B+? **Power retractable hardtop model:** ○ Open: terminal 1F/close: terminal 1D **Soft-top model:** ○ Open: terminal D/close: terminal A	No	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
3	• Measure the voltage at the power window motor (battery power supply terminal) while operating the passenger's side power window using the power window main switch. • Is the voltage B+? (Open: terminal A/close: terminal G)	Yes	Go to the next step.
		No	Inspect for an open or short circuit in the wiring harness between the power window main switch and the power window motor. Inspect the power window main switch and power window motor connector connections. (damage/pulled-out pins, corrosion) Repair or replace as necessary.
4	• Operate the passenger's side power window using the power window main switch. • Does the power window motor operate (rotate)? **CAUTION:** • **If the power window motor temperature is high, the motor may not rotate due to the motor internal bimetal function. Leave it untouched for about 3 min to cool it, then reinspect.**	Yes	Go to the next step.
		No	Replace the power window motor. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
5	• Remove the door glass from carrier plate. • Make sure that the door glass moves smoothly using your hand. • Does the door glass move	Yes	Replace the power window regulator. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
		No	Inspect for a bent regulator guide or other possible malfunction. If normal, replace the door glass run-

	smoothly?		channel.

NO.4 ALL POWER WINDOWS ARE INOPERATIVE[POWER WINDOW SYSTEM]

ALL POWER WINDOWS ARE INOPERATIVE[POWER WINDOW SYSTEM] POSSIBLE CAUSES

4	**All power windows are inoperative.**

POSSIBLE CAUSE	• Power supply circuit or ground circuit malfunction
	  ○ Burnt fuse (B+)
	  ○ Open or short circuit in wiring harness between ignition switch (IG1) and power window main switch
	  ○ Open or short circuit in wiring harness between power window main switch and power window motor
	  ○ Open or short circuit in wiring harness between power window main switch and ground
	• Power window main switch malfunction (switch malfunction)
	• Power window motor malfunction

DIAGNOSTIC PROCEDURE

ALL POWER WINDOWS ARE INOPERATIVE[POWER WINDOW SYSTEM] DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	• Operate the passenger's side power window using the power window main switch. • Does any power window operate?	Yes	Go to step 5.
		No	Go to the next step.
2	• Operate the driver's side power window using the power window main switch. • Does the power window operate?	Yes	Go to the next step.
		No	Inspect for an open circuit in the wiring harness between the power window main switch and the body ground. Inspect the power window main switch connector connection. (damage/pulled-out pins, corrosion) Repair or replace if necessary
3	• Is the P.WIND 20 A fuse normal?	Yes	Replace with the appropriate standard fuse. If the fuse is melted, inspect the wiring harness for a short to ground. Repair or replace the wiring harness, then replace the fuse.
		No	Go to the next step. (power retractable hardtop model with exterior open

			function.) Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .) (power retractable hardtop model without exterior open function/soft-top model.)
4	• Measure the voltage at the power window main switch terminal 1A. • Is the voltage B+?	Yes	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)
		No	Inspect for an open or short circuit in the power window main switch wiring harness (battery power supply). Inspect the power window main switch connector connection. (damage/pulled-out pins, corrosion) Repair or replace if necessary.
5	• Operate the power window using the power window main switch • Does the power window motor operate (rotate)? **CAUTION:** • **If the power window motor temperature is high, the motor may not rotate due to the motor internal bimetal function. Leave it untouched for about 3 min to cool it down, then reinspect.**	Yes	Go to the next step.
		No	Replace the power window motor. (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
6	• Remove the door glass from the carrier plate. • Make sure that the door glass moves smoothly using your hand. • Does the door glass move smoothly?	Yes	Replace the power window regulator guide.
		No	Inspect for a bent regulator guide or other possible malfunction. If normal, replace the glass run channel
7	**NOTE:** • **Do not operate the power window main switch during the following inspection.** • Inspect the continuity between power window main switch	Yes	Go to the next step.
		No	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)

	terminal (up-side 1I, 1D (power retractable hardtop model)/G, A (soft-top model) and ground. • Is there continuity?		
8	**NOTE:** • **Do not operate the power window main switch during the following inspection.** • Inspect the continuity between power window main switch terminal (down-side 1J, 1F (power retractable hardtop model)/B, D (soft-top model) and ground. • Is there continuity?	Yes	Inspect the power window main switch connector connections. (damage/pulled-out pins, corrosion) Repair or replace if necessary.
		No	Replace the power window main switch. (See **POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION** .)

NO.5 ABNORMAL NOISE WHILE THE DOOR GLASS IS OPENIGN OR CLOSING[POWER WINDOW SYSTEM]

ABNORMAL NOISE WHILE DOOR GLASS OPENIGN OR CLOSING[POWER WINDOW SYSTEM] POSSIBLE CAUSES

5	Abnormal noise while the door glass is opening or closing
POSSIBLE CAUSE	• Installation screw is loose between the door glass and carrier plate. • Deformity in the power window regulator plastic part due to use. o Scratching, wear marks to the power window regulator resin part due to twisting of the cable. o Gear deformity in the power window motor. **NOTE:** • **Identify the location of the noise using a stethoscope or similar device.**

DIAGNOSTIC PROCEDURE

ABNORMAL NOISE WHILE DOOR GLASS OPENIGN OR CLOSING[POWER WINDOW SYSTEM] DIAGNOSTIC PROCEDURE

Noise type	Time of occurrence	Possible cause	Location of noise	Action
Clanking noise	Door glass begins to move	Insufficiently tightened installation screw between the door glass and carrier plate.	Between door glass lower edge and carrier plate.	Securely tighten the installation screw.

Groaning noise (Sound increases due to use)	While door glass is operating	Vibration caused by wear on the resin part from cable twisting due to use of the power window regulator. **NOTE:** • **Noise does not occur if a roller is equipped to power window regulator resin part.**	Power window regulator	Replace the power window regulator (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
Whining noise		Gear inside power window motor is deformed due to use.	Gear in power window motor	Replace the power window motor (See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION** .)
Clicking noise (Periodic noise)				

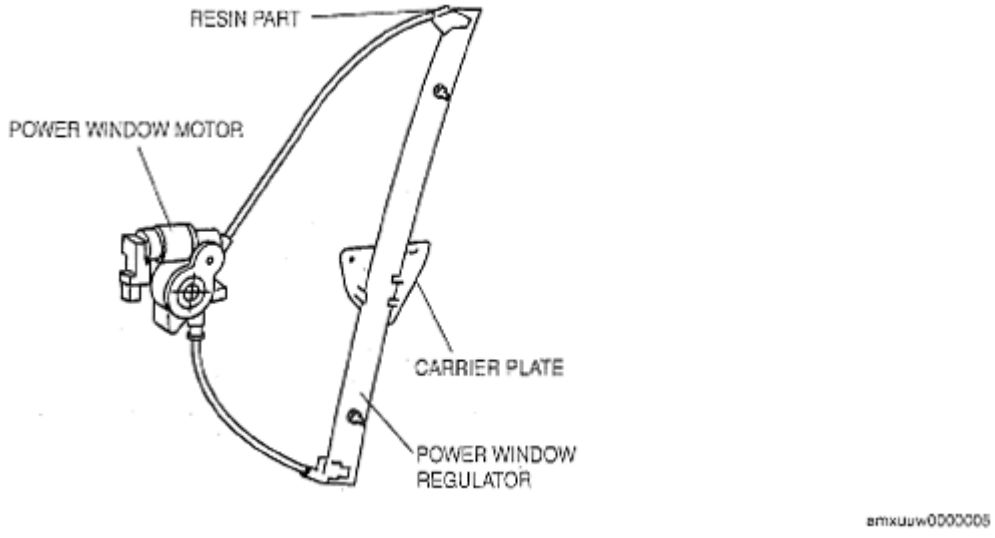
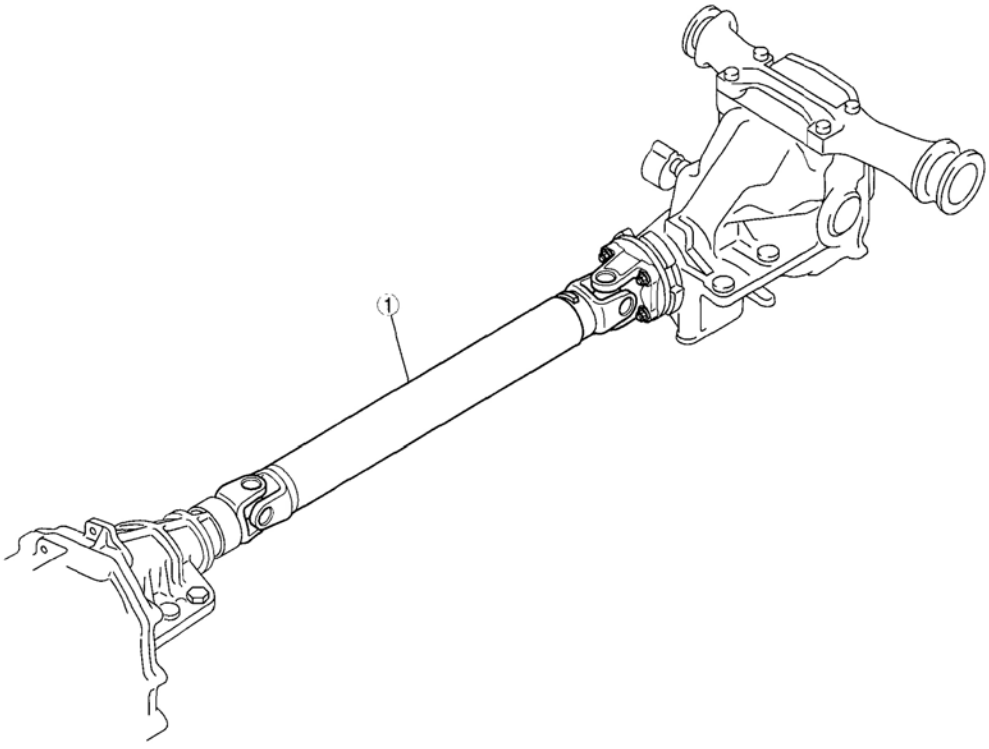


Fig. 6: Identifying Power Window Motor, Regulator And Carrier Plate
Courtesy of MAZDA MOTORS CORP.

2007 DRIVELINE/AXLES

Propeller Shaft - MX-5 Miata

PROPELLER SHAFT LOCATION INDEX



1	Propeller shaft

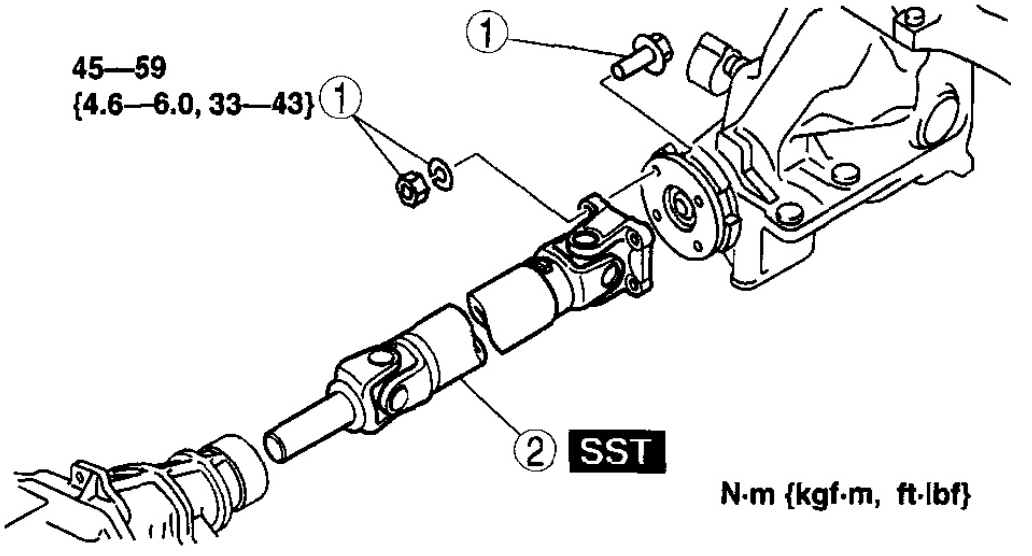
Fig. 1: Identifying Propeller Shaft
Courtesy of MAZDA MOTORS CORP.

PROPELLER SHAFT REMOVAL/INSTALLATION

1. Remove the member and the middle pipe.

   (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)

2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Bolt, nut
2	Propeller shaft

Fig. 2: Identifying Propeller Shaft Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

PROPELLER SHAFT REMOVAL NOTE

CAUTION:
- **When replacing with a new propeller shaft, mark the companion flange to match the position of the tag on the propeller shaft.**

1. Before removing the propeller shaft, make alignment marks on the yoke and differential companion flange.

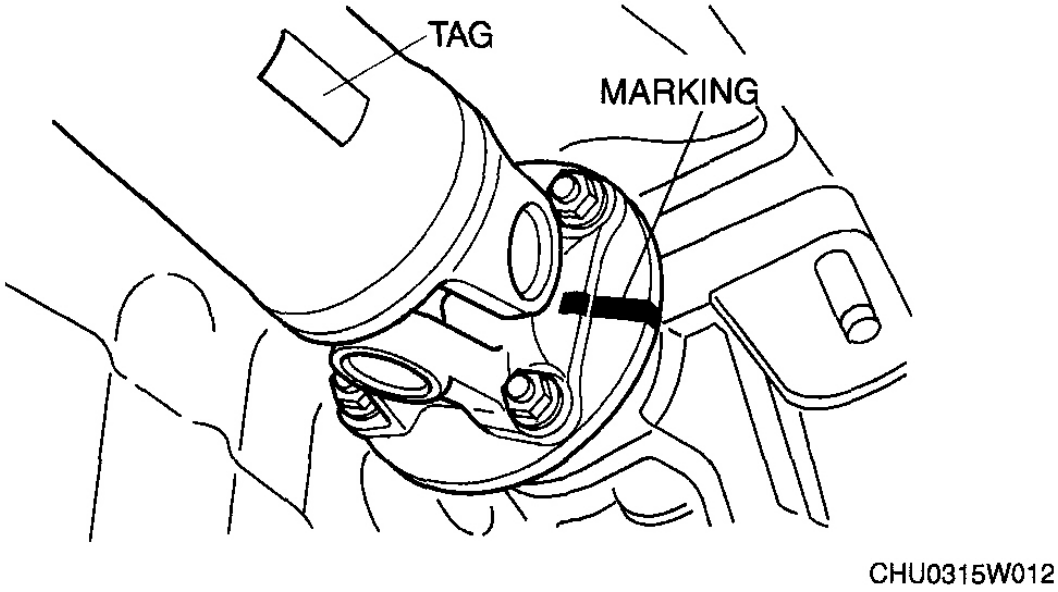


Fig. 3: Removing Propeller Shaft
Courtesy of MAZDA MOTORS CORP.

2. Install the **SST** to the extension housing.

Fig. 4: Identifying SST To Extension Housing
Courtesy of MAZDA MOTORS CORP.

PROPELLER SHAFT INSTALLATION NOTE

1. Align the marks and install the propeller shaft.
2. When installing a new propeller shaft, align the differential companion flange mark with the tag on the propeller shaft and assemble.

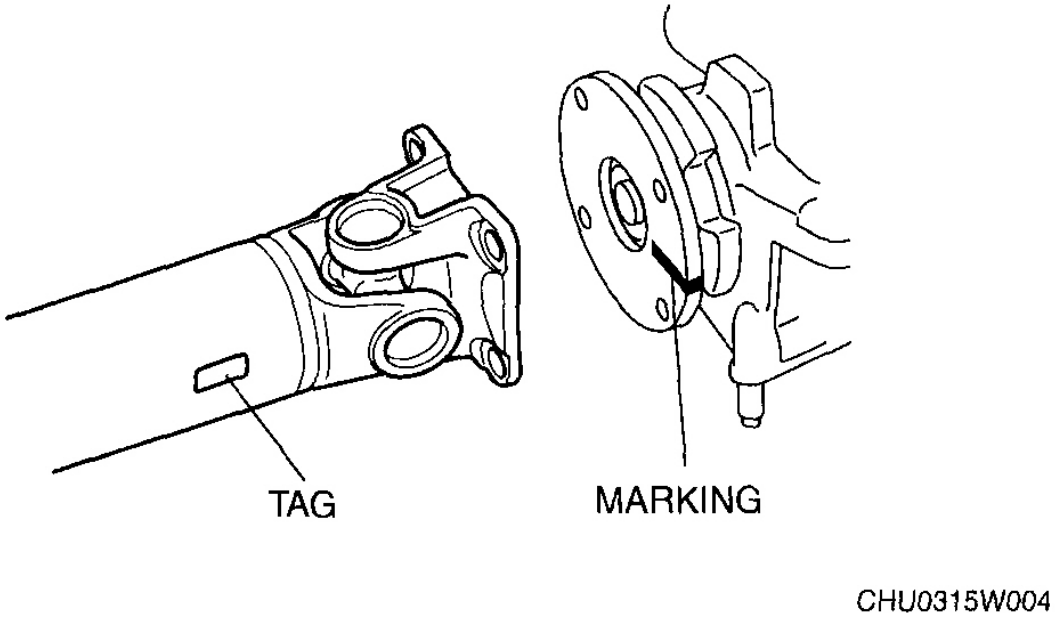


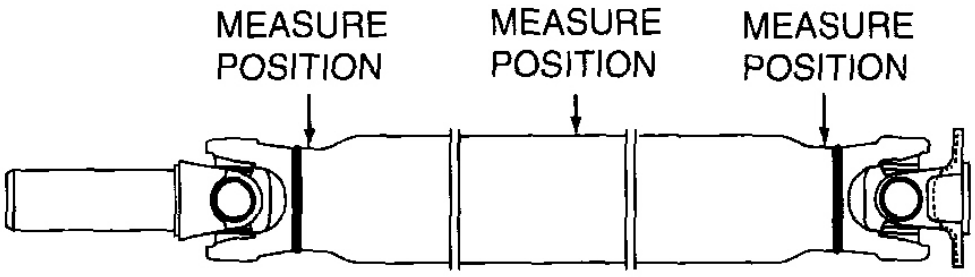
Fig. 5: Identifying Differential Companion Flange Mark And Tag
Courtesy of MAZDA MOTORS CORP.

PROPELLER SHAFT INSPECTION

1. Use a dial gauge to measure the runout of the propeller shaft at each position.
   - If it exceeds the maximum specification, replace the propeller shaft.

Maximum runout

0.4 mm {0.016 in}



CHU0315W009

Fig. 6: Identifying Runout Measuring Points
Courtesy of MAZDA MOTORS CORP.

2. Inspect the play and rotation of the joint by turning the universal joint in the direction shown by the arrow

   Initial torque (Reference value)

   0.29-0.98 N.m

   {3.0-10 kgf.cm, 2.7-8.6 in.lbf}

   - If there is excessive play or initial torque, replace the propeller shaft.

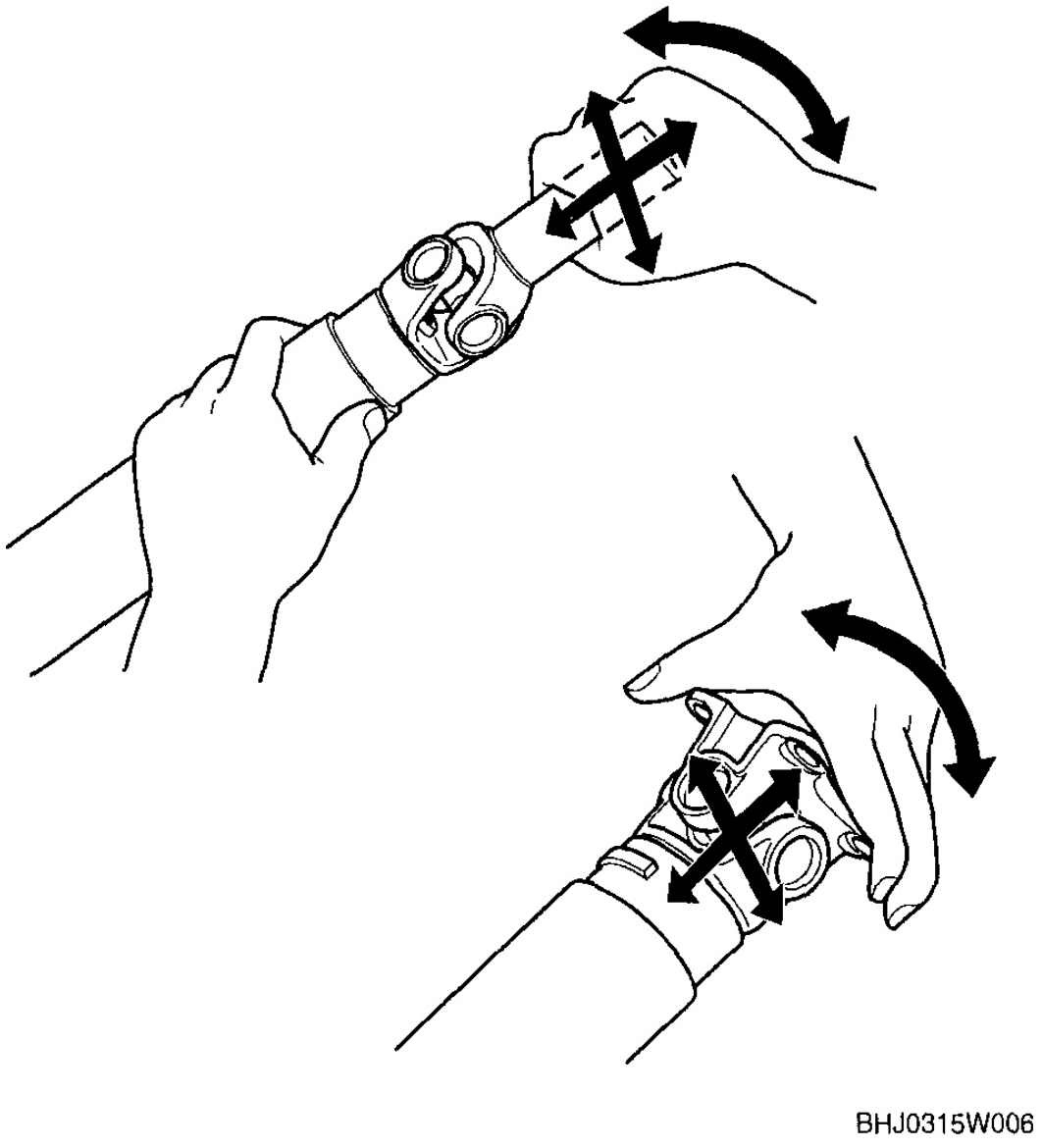
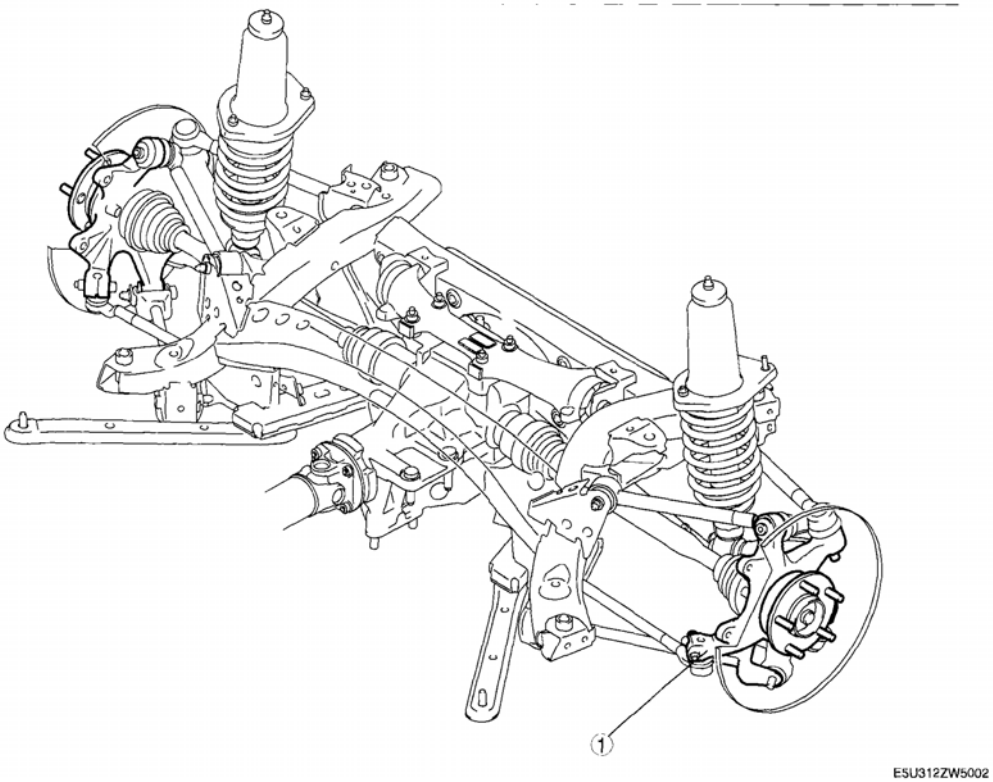


Fig. 7: Inspecting Play & Rotation Of Joint By Turning Universal Joint In Direction
Courtesy of MAZDA MOTORS CORP.

2007 DRIVELINE/AXLES

Rear Axle - MX-5 Miata

REAR AXLE LOCATION INDEX



1	Wheel hub, rear knuckle

Fig. 1: Identifying Rear Axle Assembly
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB COMPONENT INSPECTION

WHEEL BEARING LOOSENESS INSPECTION

1. Install the magnetic vase and dial gauge as shown in **Fig. 2** , and inspect the wheel bearing for axial looseness.
   - If it exceeds the maximum specification, replace the wheel hub component.

   Maximum rear wheel bearing play

   0.05 mm {0.002 in}

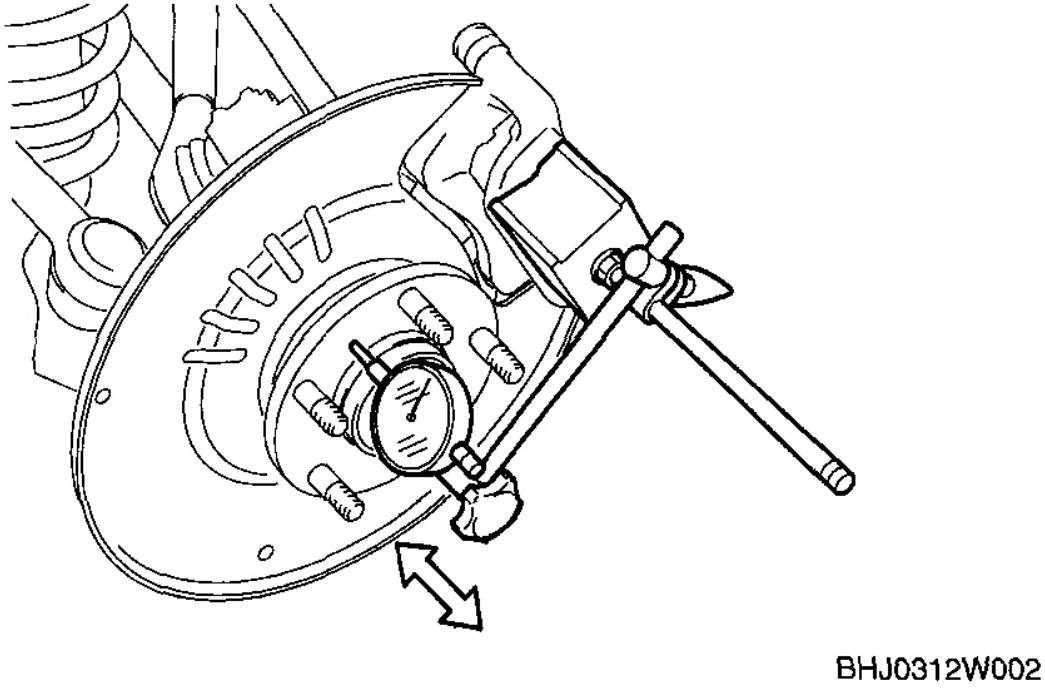


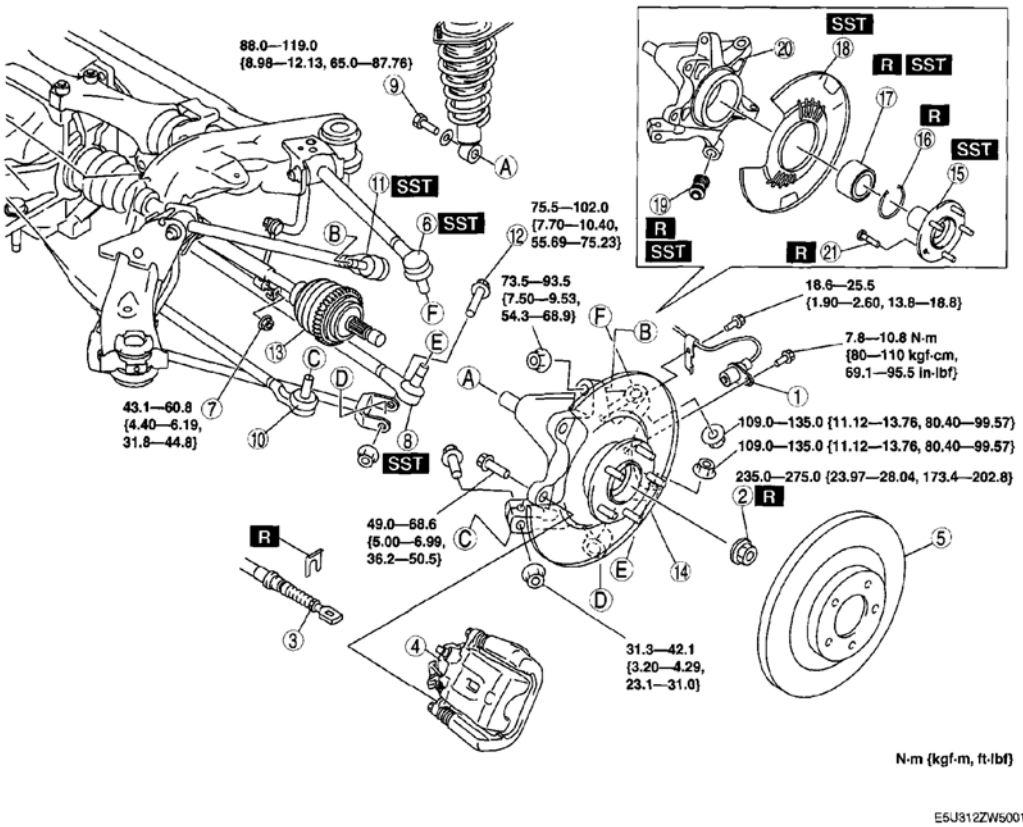
Fig. 2: Installing Magnetic Vase & Dial Gauge & Inspecting Wheel Bearing For Axial Looseness
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB COMPONENT REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.**

1. Remove in the order indicated in **Fig. 3** .
2. Install in the reverse order of removal.
3. After installation, inspect rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	ABS wheel-speed sensor
2	Locknut
3	Parking brake cable
4	Brake caliper component
5	Disc plate
6	Rear lateral link (upper) ball joint
7	Stabilizer control link nut (lower)
8	Rear lateral link (lower) ball joint
9	Shock absorber bolt (lower)
10	Toe control link ball joint
11	Rear trailing link (upper) ball joint

12	Rear trailing link (lower) bolt (outer side)
13	Rear drive shaft
14	Rear knuckle component
15	Wheel hub component
16	Retaining ring
17	Wheel bearing
18	Dust cover
19	Bushing
20	Rear knuckle
21	Wheel hub bolt

Fig. 3: Identifying Wheel Hub Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

LOCKNUT REMOVAL NOTE

1. Lock the disc plate by applying the brakes.
2. Knock the crimped portion of the locknut outward using a chisel and a hammer.
3. Remove the locknut.

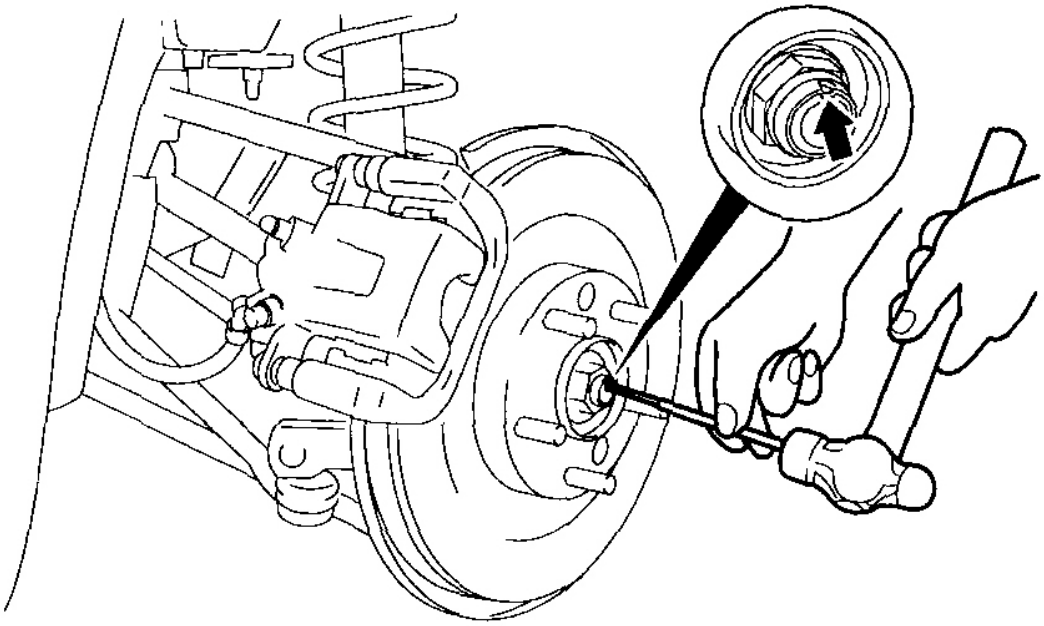


Fig. 4: Knocking Out Crimped Portion Of Locknut Outward Using Chisel & Hammer
Courtesy of MAZDA MOTORS CORP.

BRAKE CALIPER COMPONENT REMOVAL NOTE

1. Suspend the brake caliper component using a cable or equivalent.

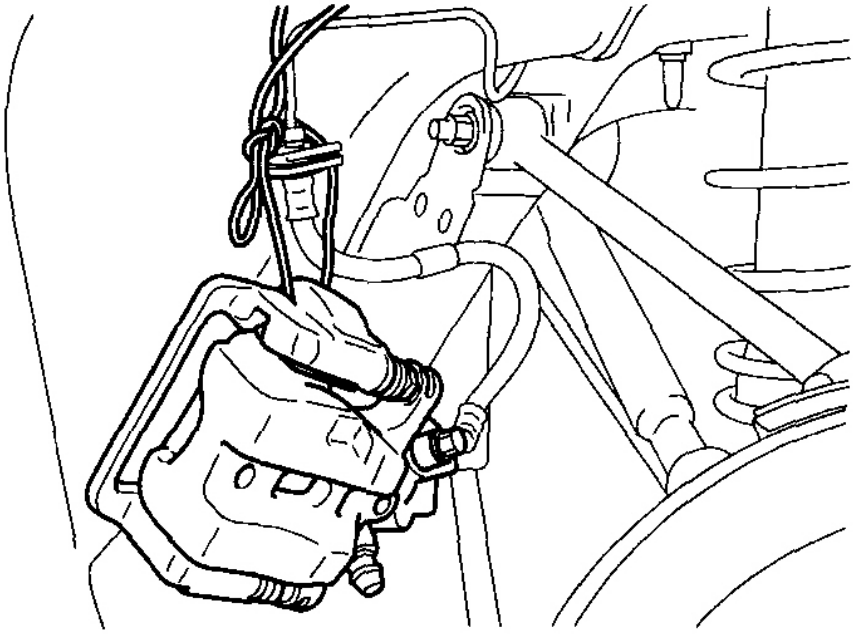
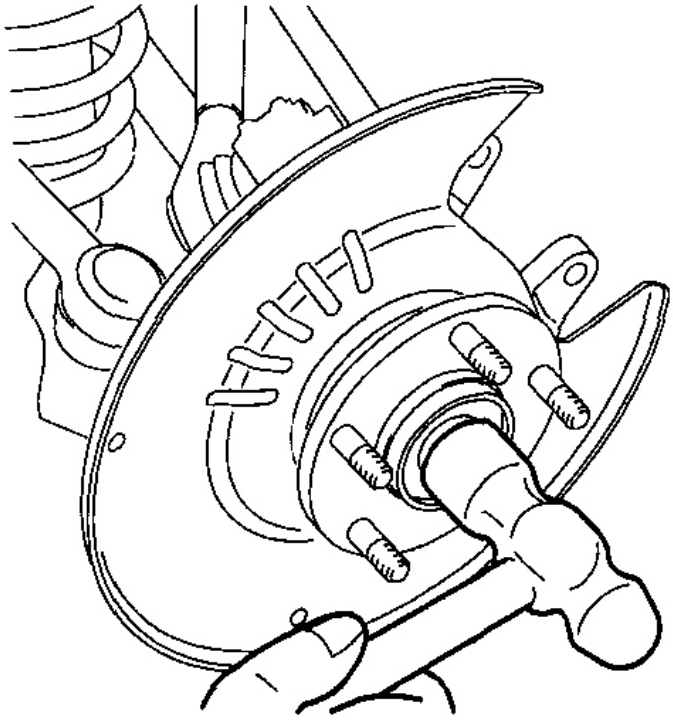


Fig. 5: Removing Brake Caliper Components
Courtesy of MAZDA MOTORS CORP.

REAR DRIVE SHAFT REMOVAL NOTE

1. Temporarily install a spare nut onto the end of the rear drive shaft.
2. Tap the nut with a copper hammer to loosen the drive shaft from the wheel hub.
3. Separate the rear drive shaft from the wheel hub.



BHJ0312W005

Fig. 6: Separating Rear Drive Shaft From Wheel Hub
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB COMPONENT REMOVAL NOTE

1. Wind the **SST** and backing plate contact area with packing tape two times.
2. Remove the wheel hub component using the **SSTs.**

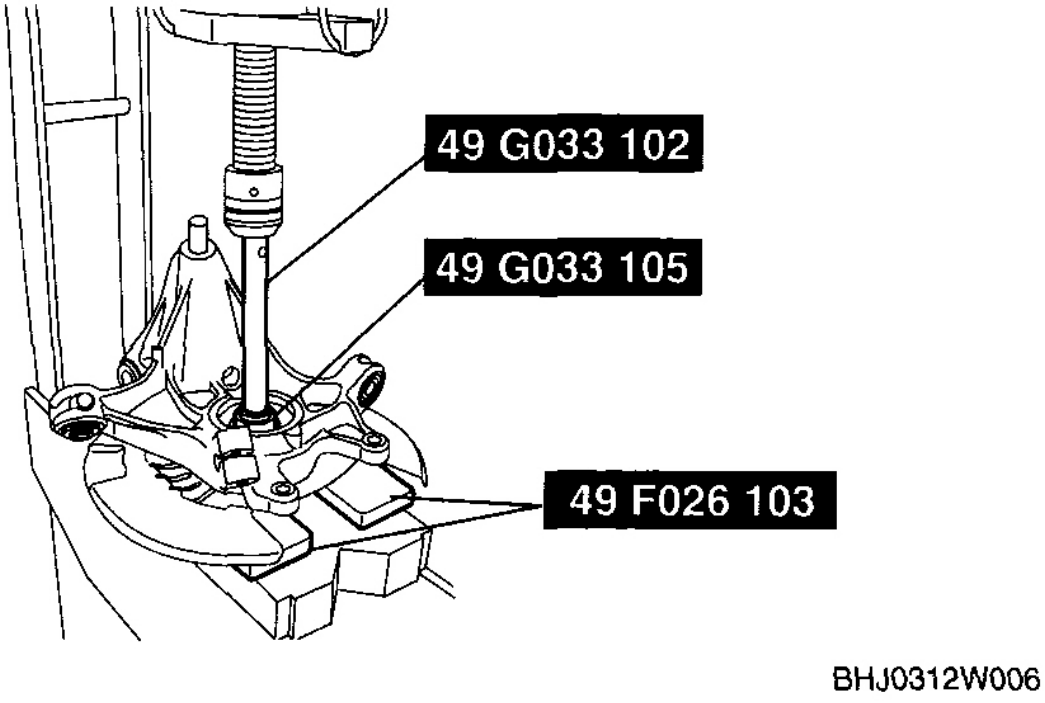
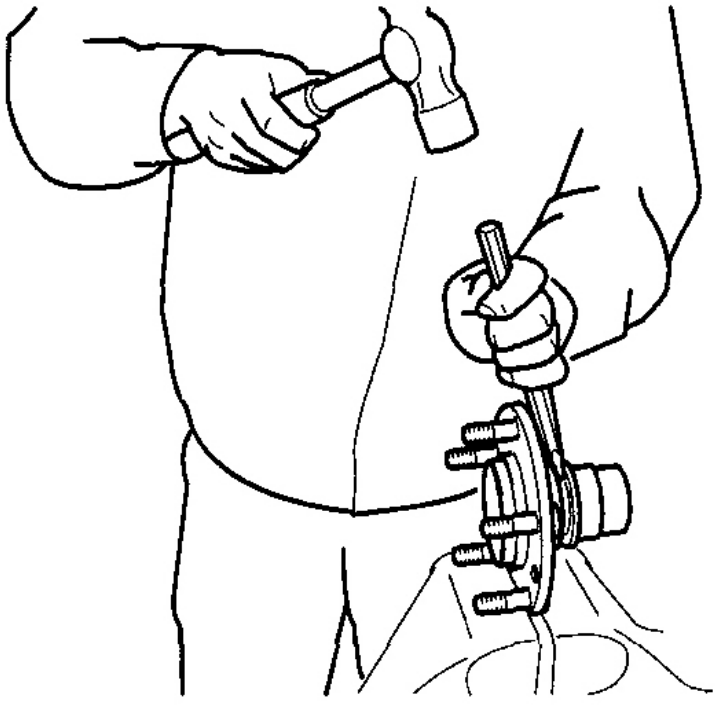


Fig. 7: Removing Wheel Hub Component Using SST's
Courtesy of MAZDA MOTORS CORP.

3. If the bearing inner race remains on the wheel hub component, use a chisel to secure a sufficient space for installing the **SST** between wheel hub component and bearing inner race.



BHJ0312W007

Fig. 8: Removing Inner Race Remains On Wheel Hub Component
Courtesy of MAZDA MOTORS CORP.

4. Remove the bearing inner race using the **SST.**
5. After removing the bearing, repair any backing plate deformation.

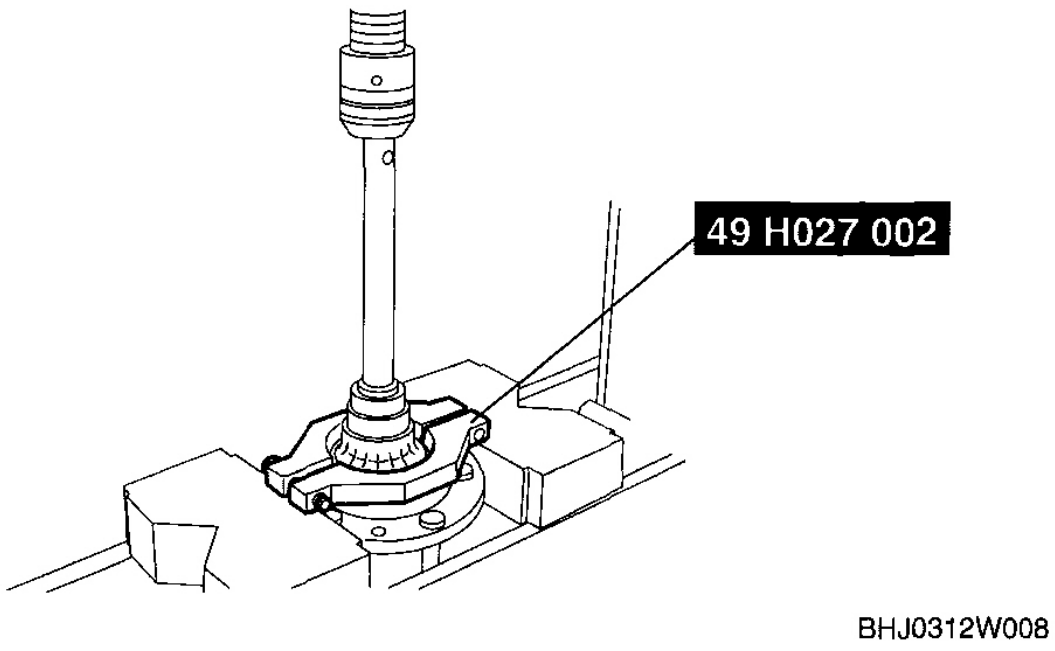


Fig. 9: Removing Bearing Inner Race Using SST
Courtesy of MAZDA MOTORS CORP.

WHEEL BEARING REMOVAL NOTE

1. Wind the **SST** and backing plate contact area with packing tape two times.
2. Remove the wheel bearing from the rear knuckle using the **SSTs.**
3. After removing the bearing, repair any backing plate deformation.

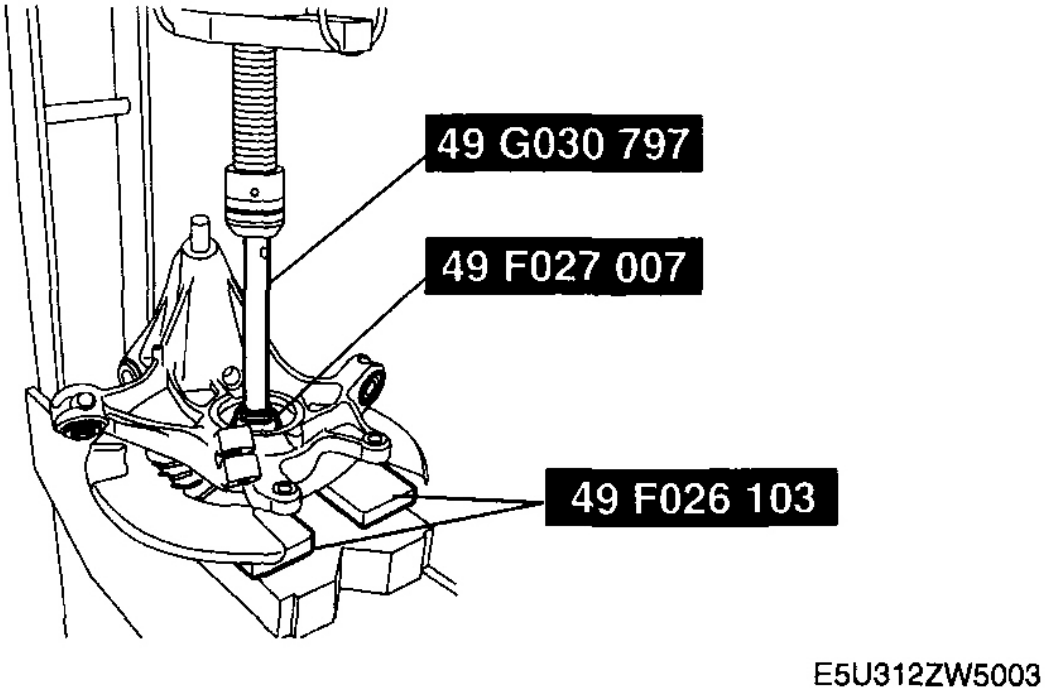


Fig. 10: Removing Wheel Bearing From Rear Knuckle Using SST's
Courtesy of MAZDA MOTORS CORP.

DUST COVER REMOVAL NOTE

NOTE:

- **Remove the dust cover only if there is an abnormality.**

1. Place an alignment mark on the dust cover and rear knuckle for proper installation.

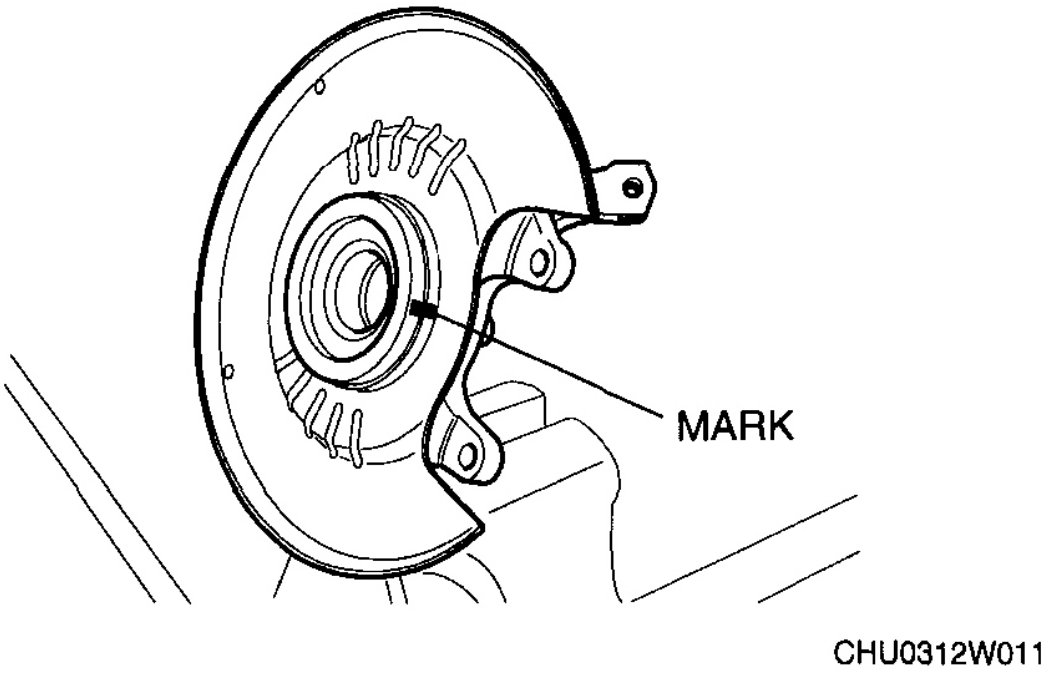
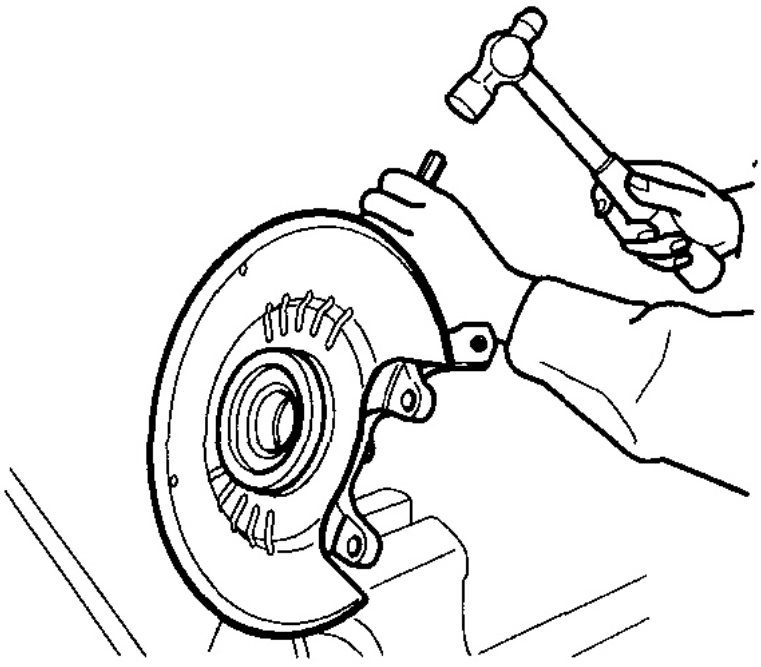


Fig. 11: Placing Alignment Mark On Dust Cover & Rear Knuckle
Courtesy of MAZDA MOTORS CORP.

2. Remove the dust cover using a chisel.



BHJ0312W011

Fig. 12: Removing Dust Cover Using Chisel
Courtesy of MAZDA MOTORS CORP.

BUSHING REMOVAL NOTE

1. Remove the bushing from the rear knuckle using the **SSTs.**

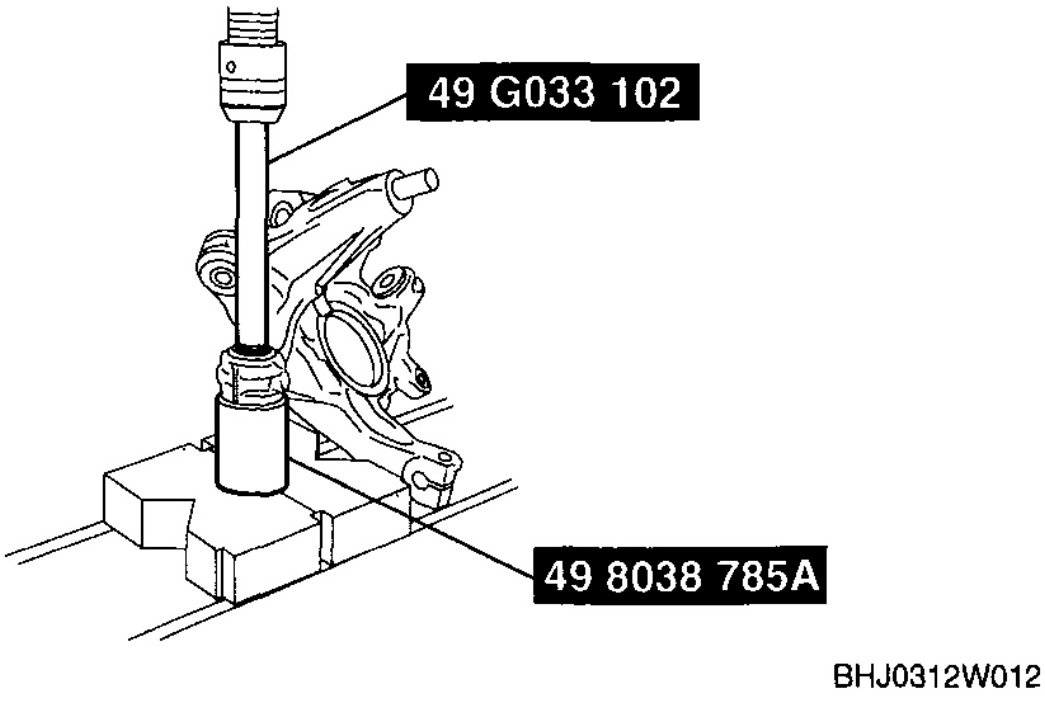


Fig. 13: Removing Bushing From Rear Knuckle Using SST's
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT REMOVAL NOTE

NOTE:

- **Remove the wheel hub bolt only if there is an abnormality.**

1. Remove the wheel hub bolts from the wheel hub using a press.

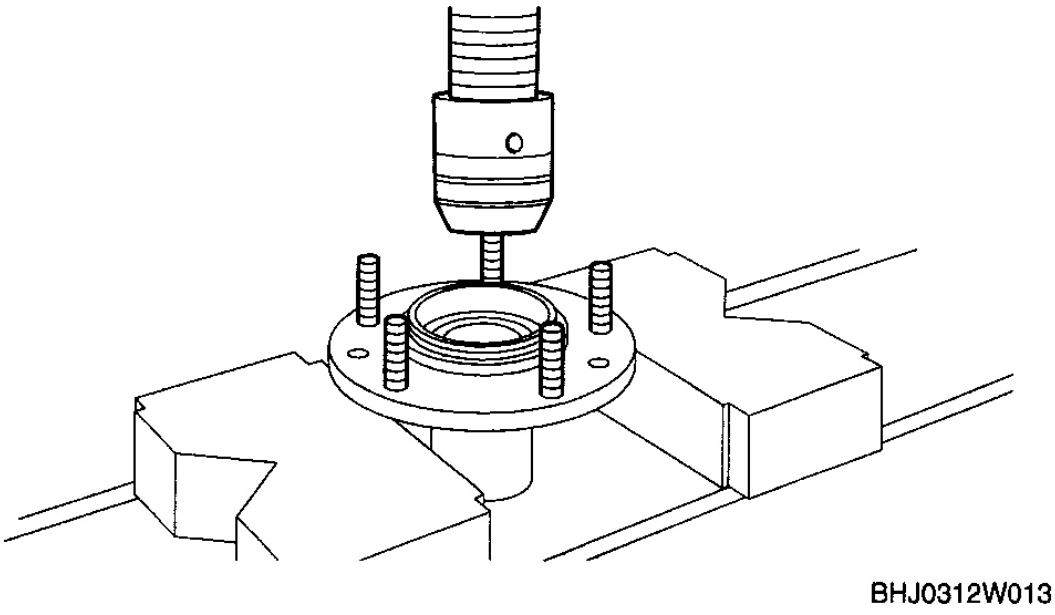


Fig. 14: Removing Wheel Hub Bolts From Wheel Hub Using Press
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB BOLT INSTALLATION NOTE

1. Press in new wheel hub bolts into the wheel hub using a press.

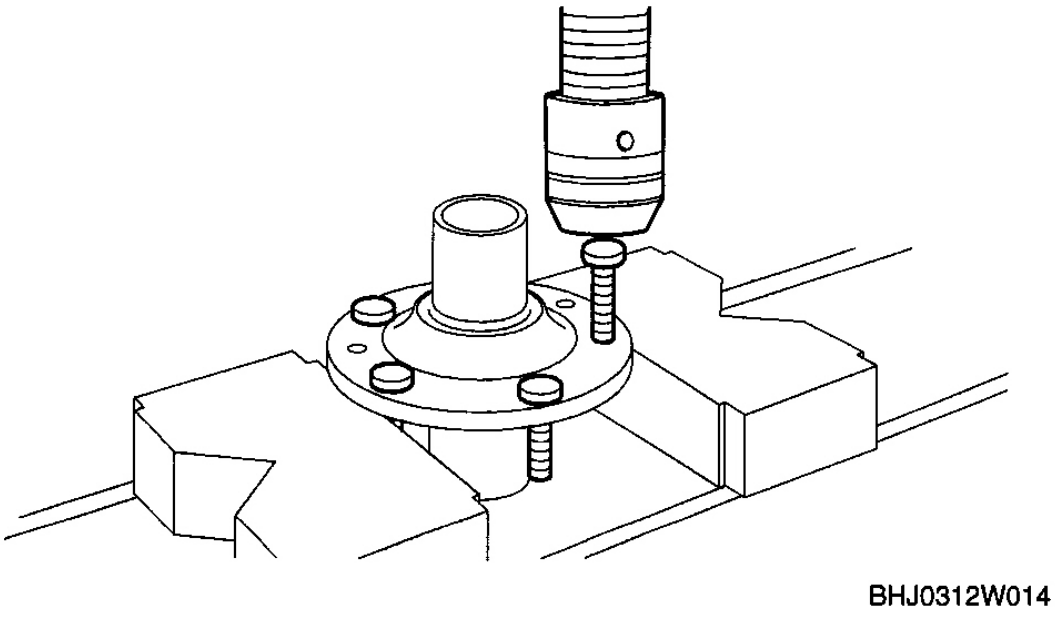


Fig. 15: Pressing In New Wheel Hub Bolts Into Wheel Hub Using Press
Courtesy of MAZDA MOTORS CORP.

BUSHING INSTALLATION NOTE

1. Press the new bushing into the rear knuckle using the **SSTs.**

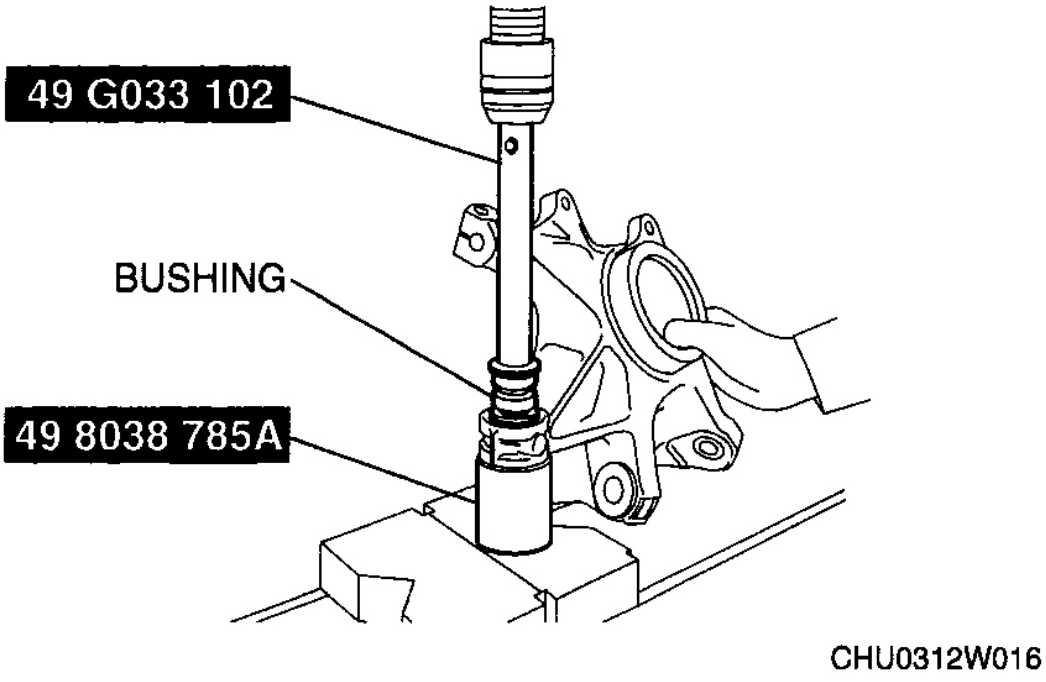


Fig. 16: Pressing In New Bushing Into Rear Knuckle Using SST's
Courtesy of MAZDA MOTORS CORP.

DUST COVER INSTALLATION NOTE

1. Align the new and old dust covers and place alignment marks on the new dust cover.
2. Align the marks on the new dust cover and rear knuckle.

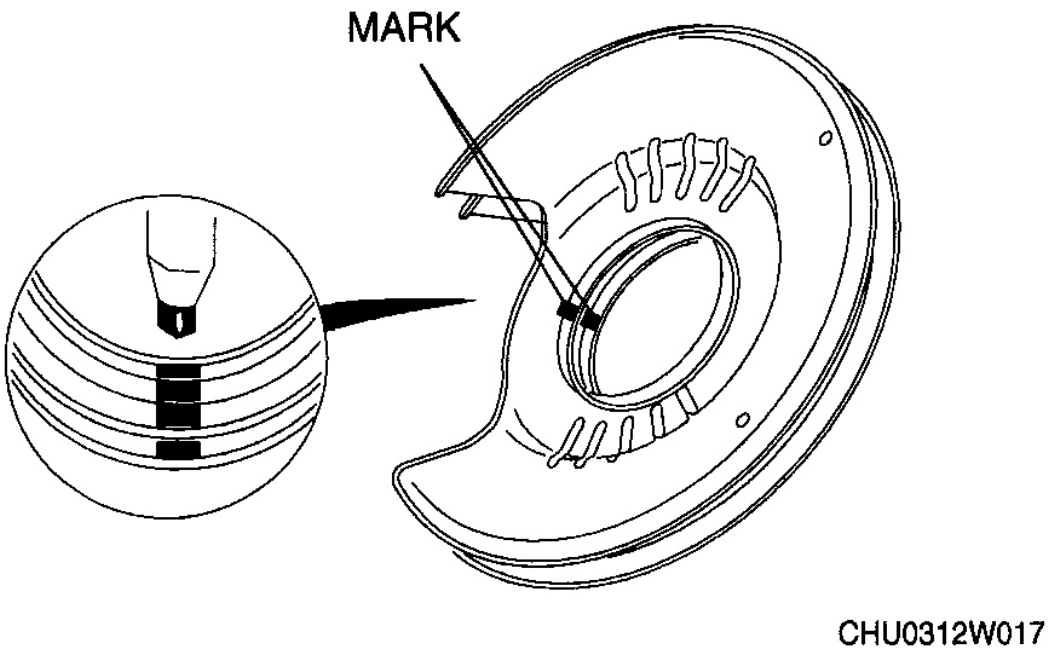


Fig. 17: Aligning Marks On New Dust Cover & Rear Knuckle
Courtesy of MAZDA MOTORS CORP.

3. Press the new dust cover onto the rear knuckle using the **SSTs.**

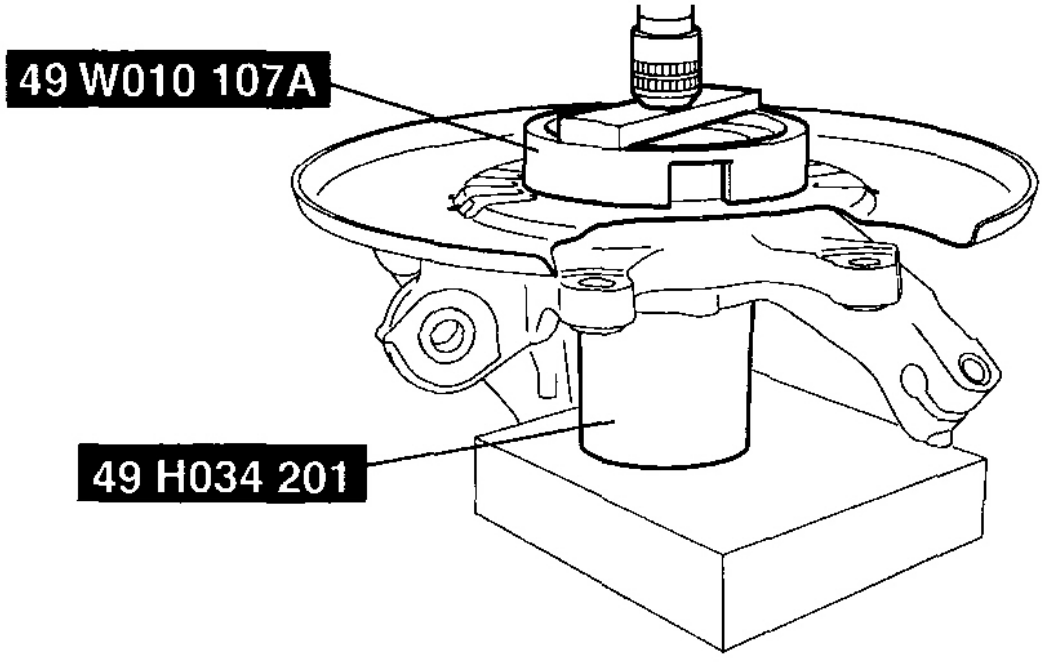


Fig. 18: Pressing New Dust Cover Onto Rear Knuckle Using SST's
Courtesy of MAZDA MOTORS CORP.

WHEEL BEARING INSTALLATION NOTE

1. Install a new wheel bearing using the **SSTs.**

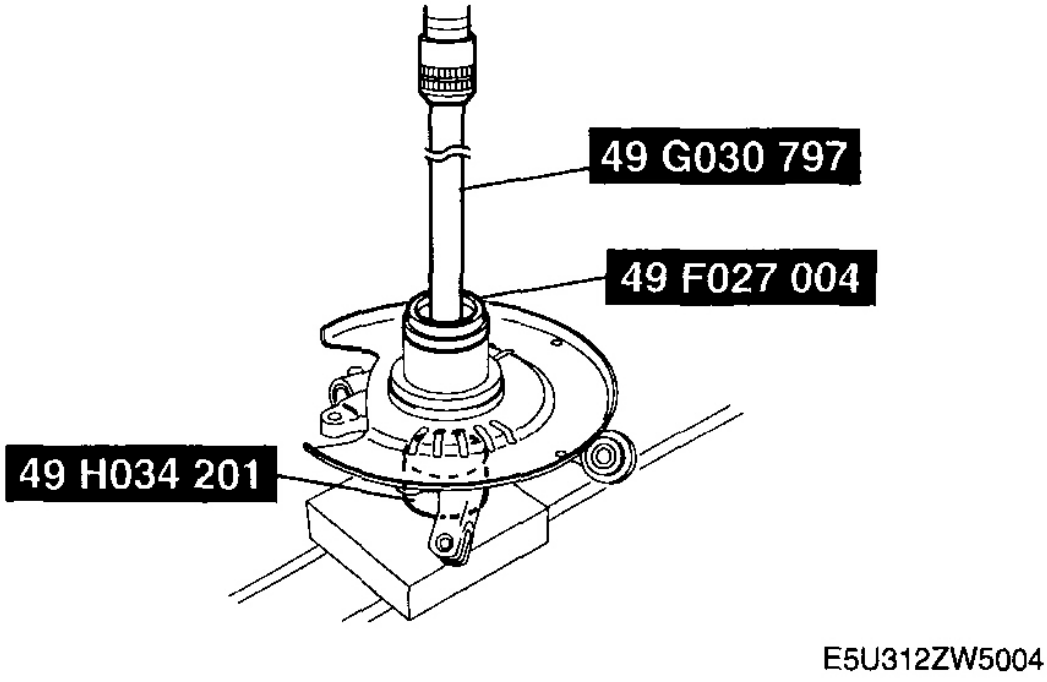


Fig. 19: Installing New Wheel Bearing Using SST's
Courtesy of MAZDA MOTORS CORP.

WHEEL HUB COMPONENT INSTALLATION NOTE

1. Install the wheel hub component using the **SSTs.**

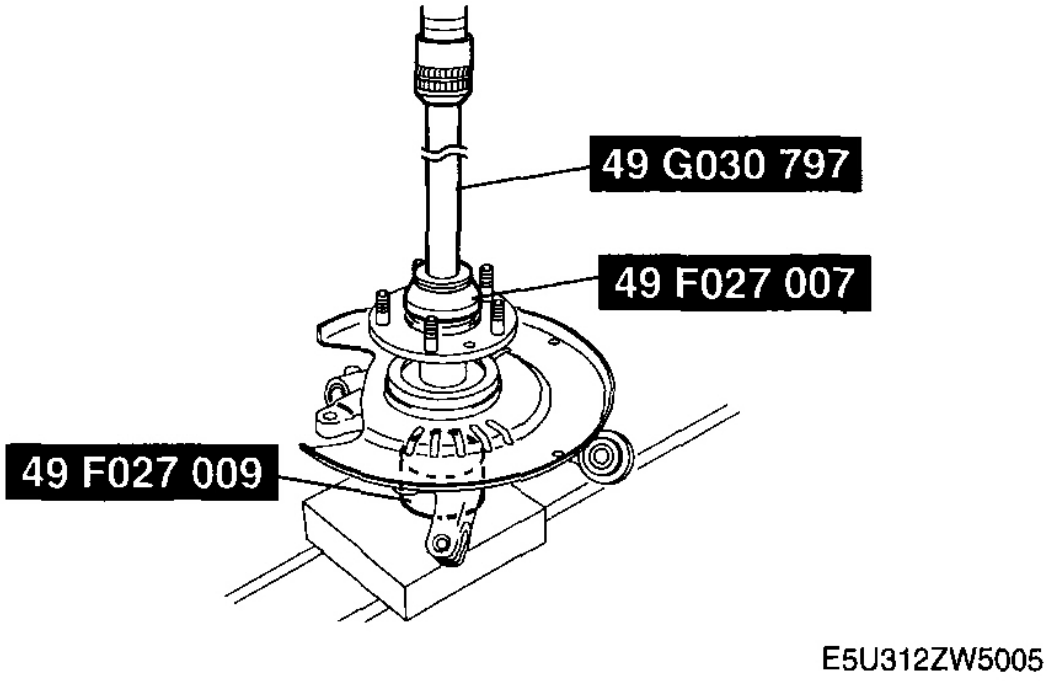


Fig. 20: Installing Wheel Hub Components Using SST's
Courtesy of MAZDA MOTORS CORP.

LOCKNUT INSTALLATION NOTE

1. Tighten a new locknut.
2. Install a new locknut and indent as shown to crimp the locknut, using a chisel and hammer.

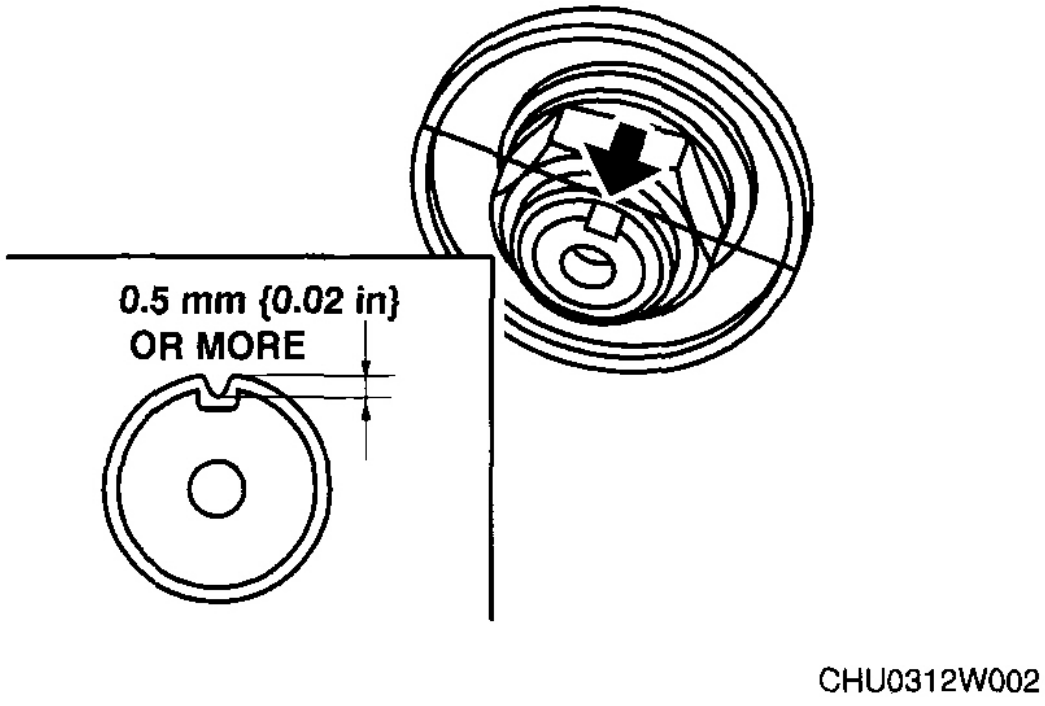
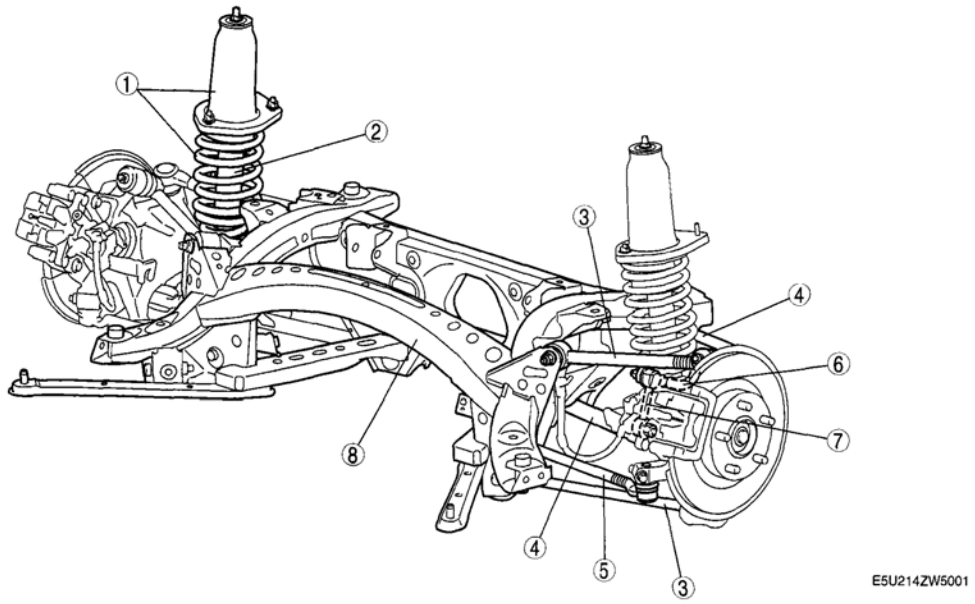


Fig. 21: Installing New Locknut
Courtesy of MAZDA MOTORS CORP.

2007 SUSPENSION

Rear Suspension - MX-5 Miata

REAR SUSPENSION LOCATION INDEX



1	Rear shock absorber and coil spring
2	Rear shock absorber
3	Rear trailing link
4	Rear lateral link
5	Toe control link
6	Rear stabilizer
7	Stabilizer control link
8	Rear crossmember

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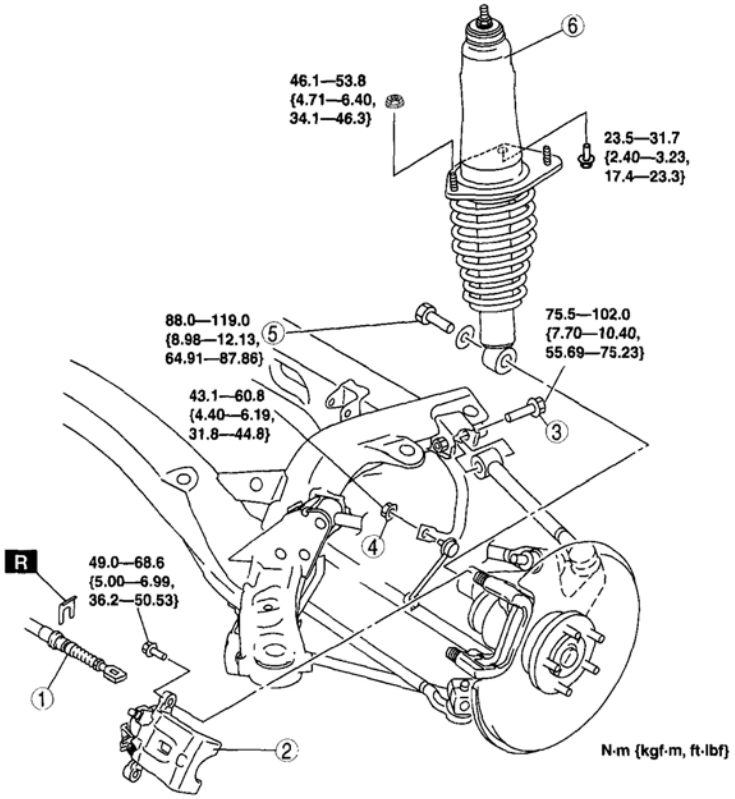
Fig. 1: Identifying Location Of Rear Suspension Components
Courtesy of MAZDA MOTORS CORP.

REAR SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before operations, remove the ABS wheel-speed sensor (axle side), and move the sensor away from the harnesses.**

1. When working on the left side, remove the fuel tank protector. (See **FUEL TANK REMOVAL/INSTALLATION [LF]** .)
2. Remove in the order indicated in **Fig. 2** .
3. Install in the reverse order of removal.



1	Parking brake cable	4	Stabilizer control link upper nut
2	Caliper	5	Rear shock absorber lower bolt
3	Rear lateral link (upper) bolt	6	Rear shock absorber and coil spring

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Fig. 2: Identifying Rear Shock Absorber & Coil Spring (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

CALIPER REMOVAL NOTE

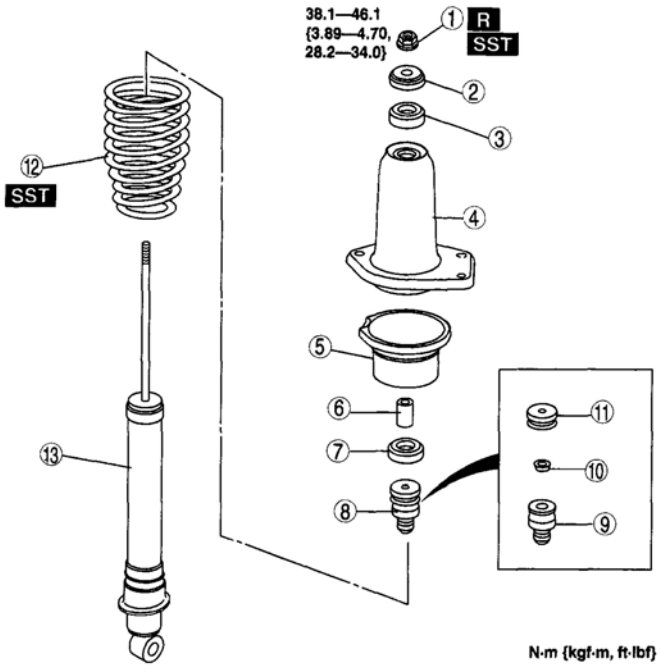
1. Remove the caliper, and hang the cable out of the way.

REAR SHOCK ABSORBER AND COIL SPRING DISASSEMBLY/ASSEMBLY

WARNING:

- **Removing/installing the shock absorber and coil spring is dangerous. The shock absorber and coil spring could fly off and cause injury or death, and damage the vehicle.**

1. Remove the rear shock absorber and coil spring. (See **REAR SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION** .)
2. Remove in the order indicated in **Fig. 3** .
3. Install in the reverse order of removal.



1	Piston rod nut
2	Retainer
3	Bushing
4	Upper spring seat
5	Spring seat rubber
6	Spacer
7	Bushing
8	Bound stopper and stopper casing
9	Bound stopper
10	Collar
11	Stopper casing
12	Coil spring
13	Rear shock absorber

Fig. 3: Identifying Rear Shock Absorber & Coil Spring Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

PISTON ROD NUT REMOVAL NOTE

WARNING:

- **Before removing the piston rod nut, secure the shock absorber and spring in the SSTs. Otherwise, the shock absorber and spring could fly off under tremendous pressure and cause serious injury or death, or damage to the vehicle.**

1. Set the **SSTs** using cloth to prevent the spring from being damaged.
2. Using the **SSTs,** compress the coil spring and remove the piston rod nut.

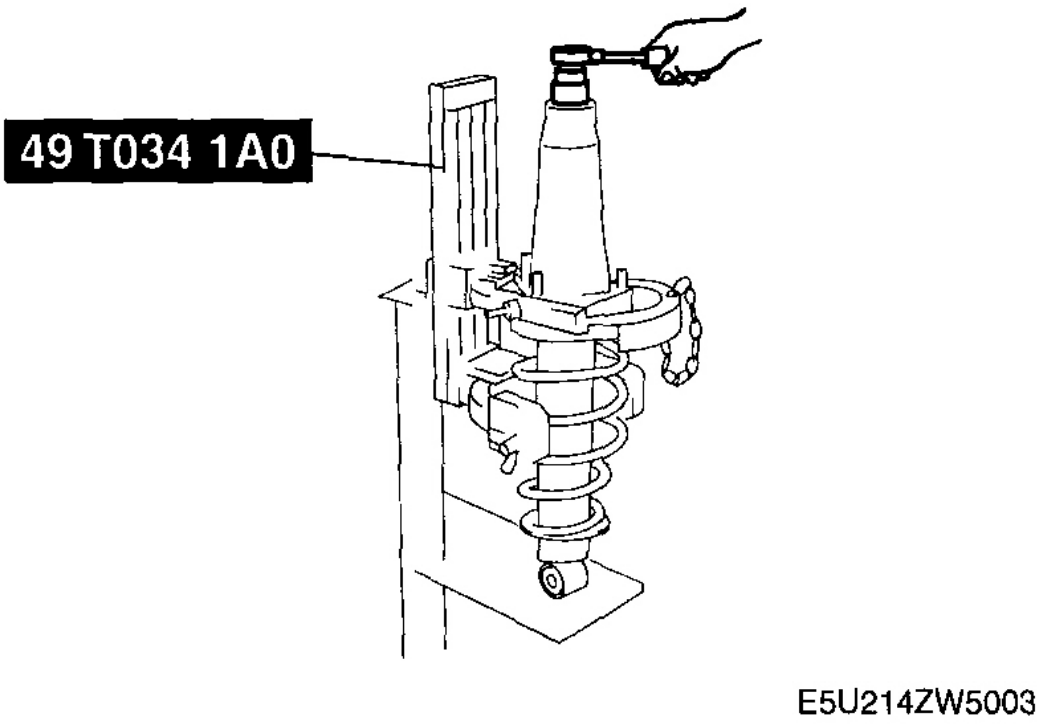


Fig. 4: Removing Piston Rod Nut
Courtesy of MAZDA MOTORS CORP.

COIL SPRING INSTALLATION NOTE

1. Set the coil spring to the **SSTs** using cloth.
2. Using the **SSTs,** compress the coil spring.
3. Install the shock absorber so that the lower end of the coil spring is seated on the step of the lower spring seat.

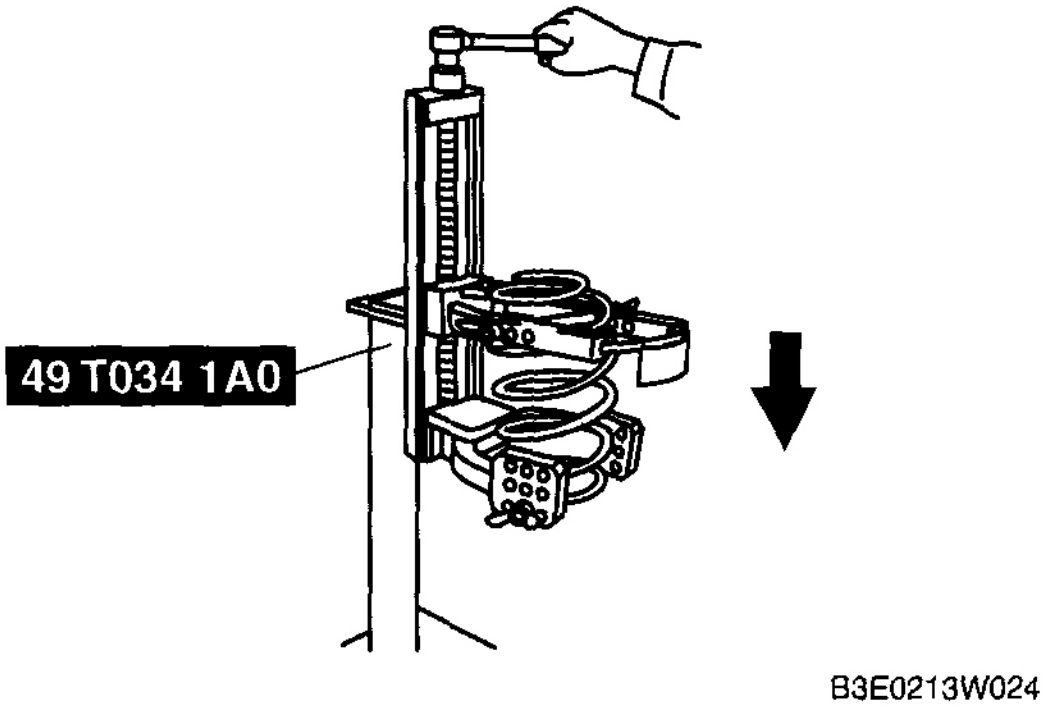


Fig. 5: Compressing Coil Spring Using SSTs
Courtesy of MAZDA MOTORS CORP.

COLLAR INSTALLATION NOTE

1. Install the collar so that the tapered side is facing downward as shown in **Fig. 6** .

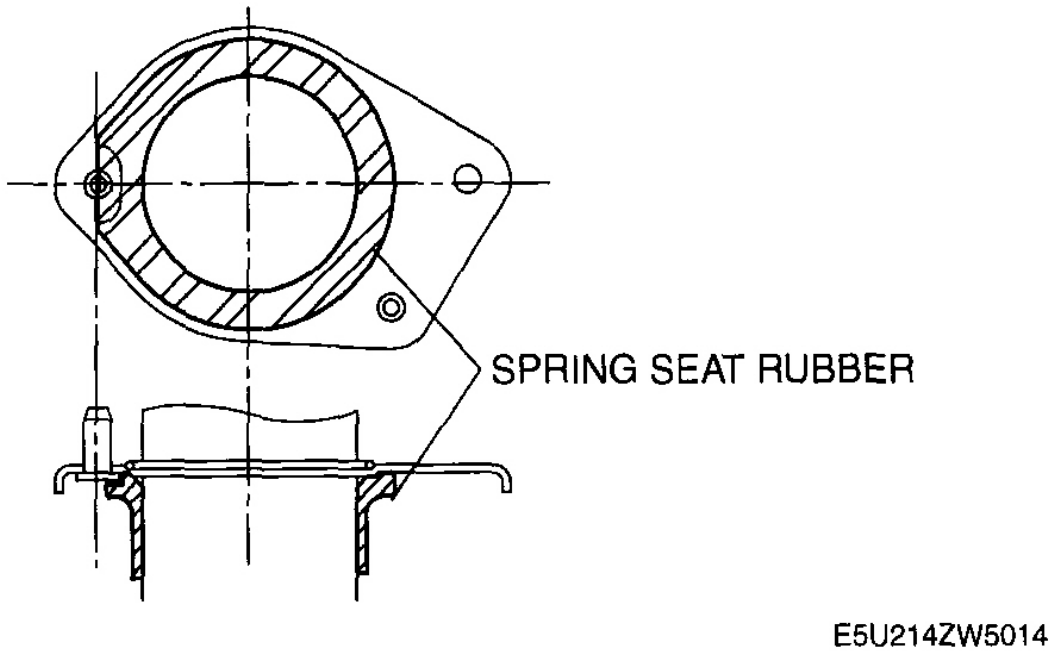


Fig. 6: Installing Collar Tapered Side Down
Courtesy of MAZDA MOTORS CORP.

SPRING SEAT RUBBER INSTALLATION NOTE

1. Install the spring seat rubber to the upper spring seat as shown in **Fig. 7** .

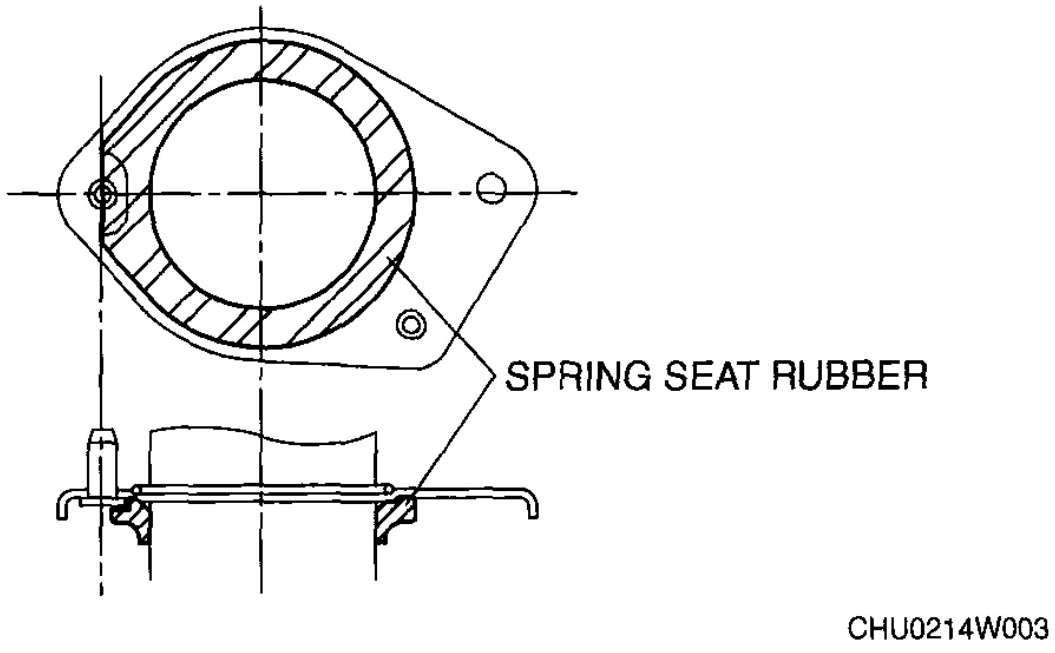


Fig. 7: Installing Spring Seat Rubber To Upper Spring Seat
Courtesy of MAZDA MOTORS CORP.

UPPER SPRING SEAT INSTALLATION NOTE

1. Install the coil spring with the lead lower end of the lower spring seat facing the direction shown in **Fig. 8** .

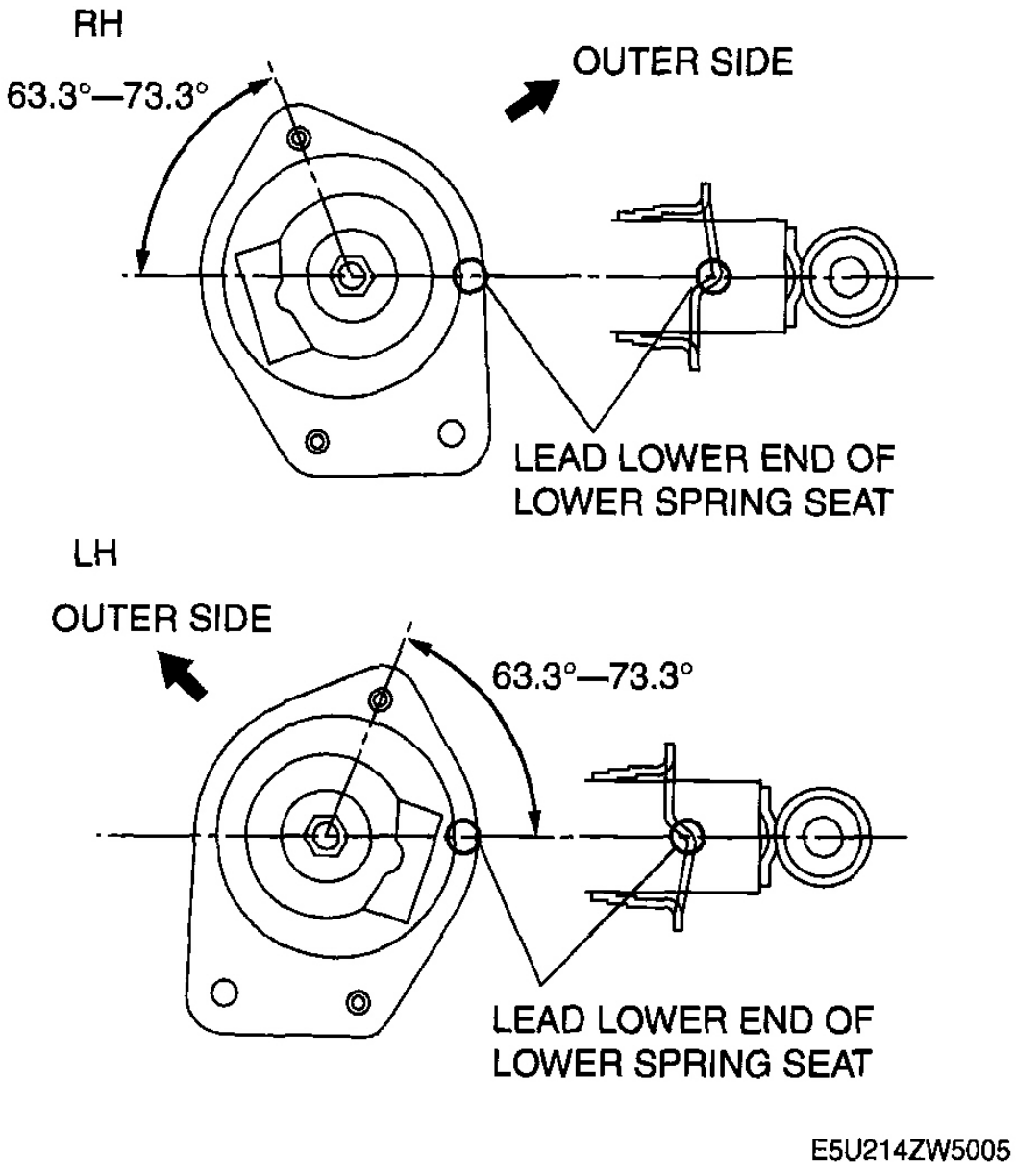


Fig. 8: Installing Coil Spring
Courtesy of MAZDA MOTORS CORP.

REAR SHOCK ABSORBER INSPECTION

1. Inspect the rear shock absorber in the same way as the front shock absorber. (See **FRONT SHOCK ABSORBER INSPECTION** .)

REAR SHOCK ABSORBER DISPOSAL

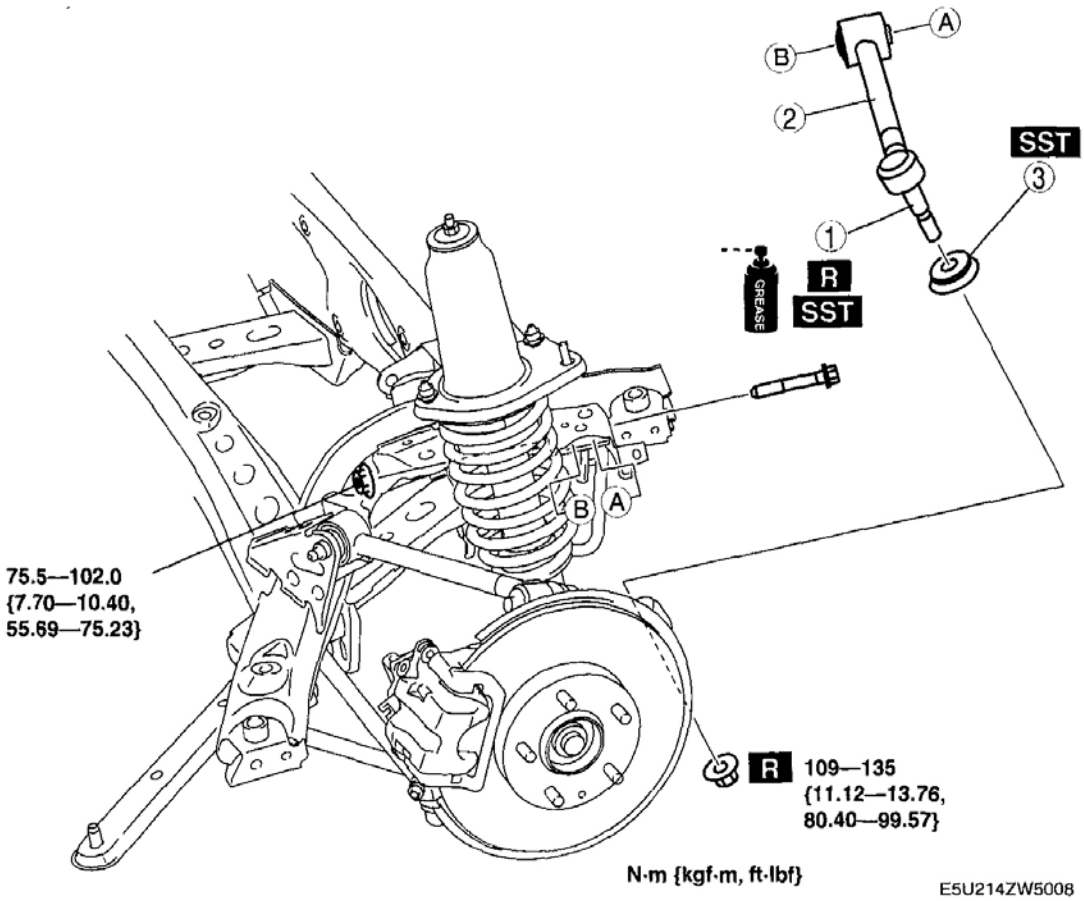
1. Dispose of the rear shock absorber in the same way as the front shock absorber. (See **FRONT SHOCK ABSORBER DISPOSAL**)

REAR LATERAL LINK (UPPER) REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before operations, remove the ABS wheel-speed sensor (axle side) and move the sensor away from the harnesses.**

1. Remove in the order indicated in **Fig. 9** .
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	Rear lateral link (upper) ball joint
2	Rear lateral link (upper)
3	Dust boot

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Fig. 9: Identifying Rear Lateral Link (Upper) Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR LATERAL LINK (UPPER) BALL JOINT REMOVAL NOTE

1. Using the **SST** , disconnect the rear lateral link (upper) ball joint.

NOTE:

- **When removing the rear lateral link (upper) ball joint, the rear knuckle bushing may also come off. If it comes off, replace the rear knuckle.**

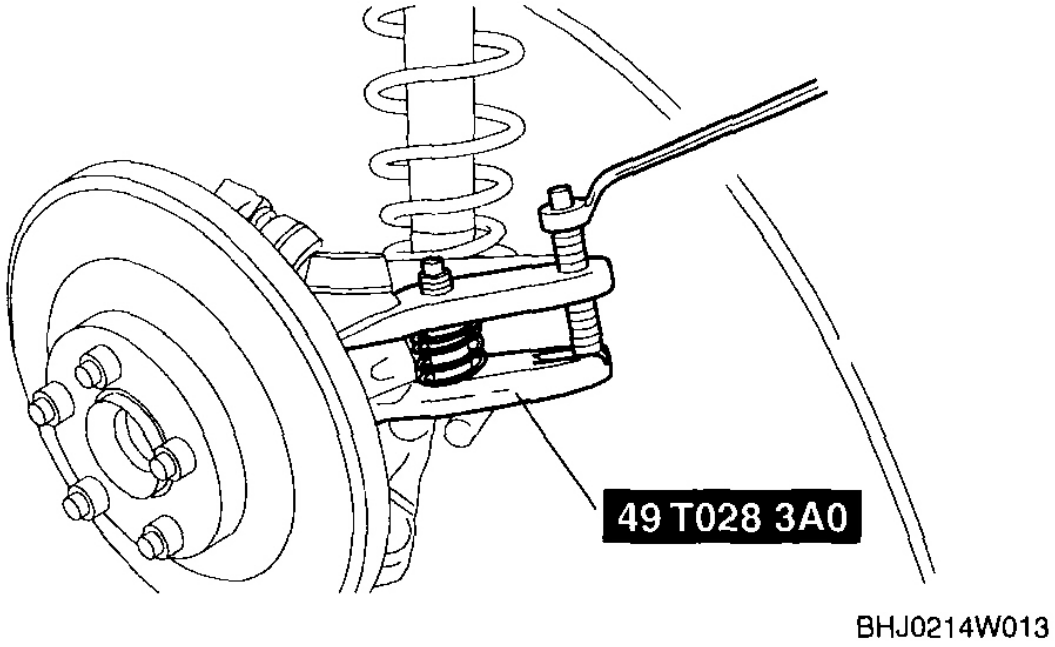


Fig. 10: Disconnecting Rear Lateral Link (Upper) Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Wipe the grease off the ball joint stud.
2. Fill the inside of the new dust boot with grease.
3. Using the **SST** , install the dust boot to the ball joint.
4. Wipe off the excess grease.

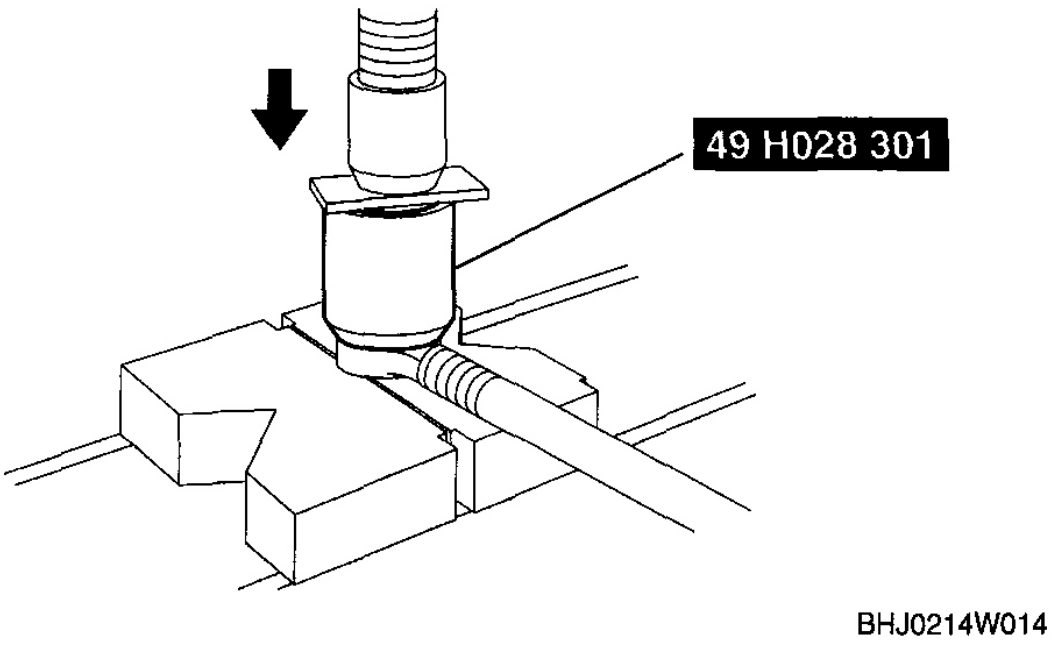


Fig. 11: Installing Dust Boot To Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

REAR LATERAL LINK (UPPER) INSPECTION

1. Remove the rear lateral link (upper) from the vehicle. (See **REAR LATERAL LINK (UPPER) REMOVAL/INSTALLATION** .)
2. Inspect the link for bending or damage. If there is any malfunction, replace the link.
3. Inspect the ball joint for looseness. If there is any malfunction, replace the ball joint.
4. Rotate the ball joint **5 times.**
5. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Rear lateral link (upper) ball joint rotational torque

   0.4-2.8 N.m {5-28 kgf.cm, 4-24 in.lbf}

   - If not within the specification, replace the rear lateral link (upper). (See **REAR LATERAL LINK (UPPER) REMOVAL/INSTALLATION** .)

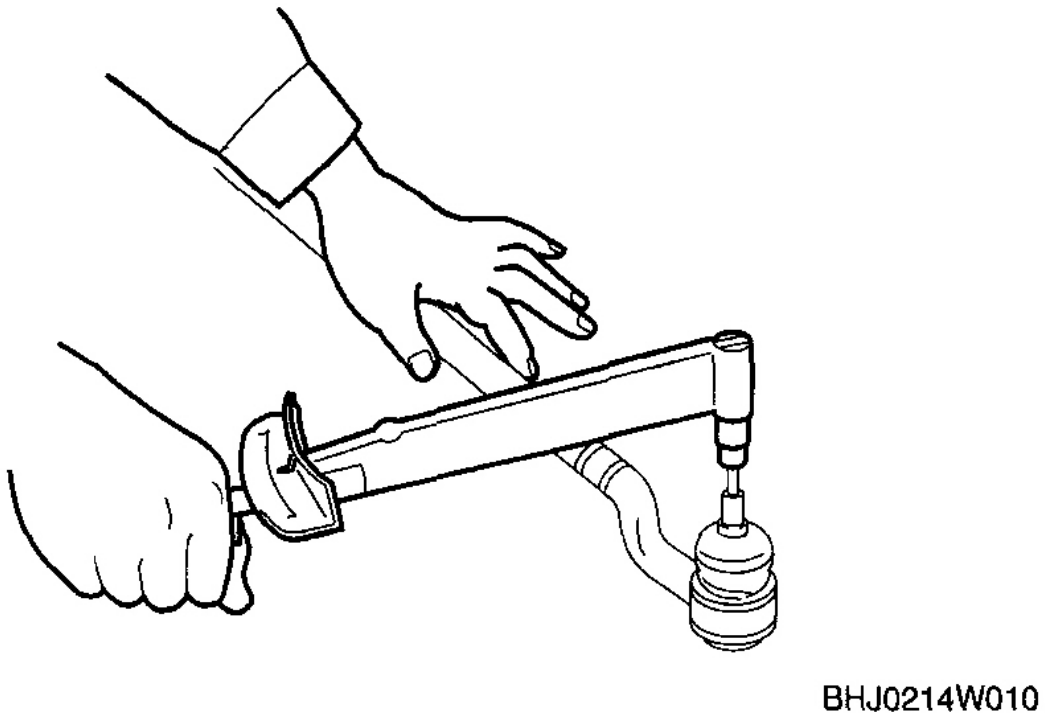
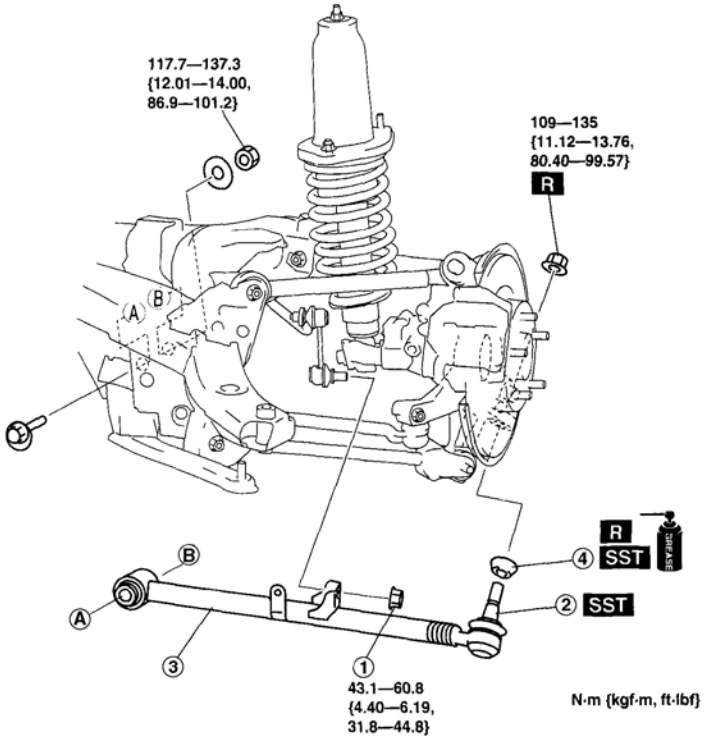


Fig. 12: Measuring Ball-Joint Rotational Torque Using Allen Wrench & Torque Wrench
Courtesy of MAZDA MOTORS CORP.

REAR LATERAL LINK (LOWER) REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 13** .
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	Stabilizer control link lower nut	3	Rear lateral link (lower)
2	Rear lateral link (lower) ball joint	4	Dust boot

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Fig. 13: Identifying Rear Lateral Link (Lower) Components (With Torque Specifications) Courtesy of MAZDA MOTORS CORP.

REAR LATERAL LINK (LOWER) BALL JOINT REMOVAL NOTE

1. Using the **SST** , disconnect the ball joint.

NOTE:

- **When removing the rear lateral link (lower) ball joint, the rear knuckle bushing may also come off. If it comes off, replace the rear knuckle.**

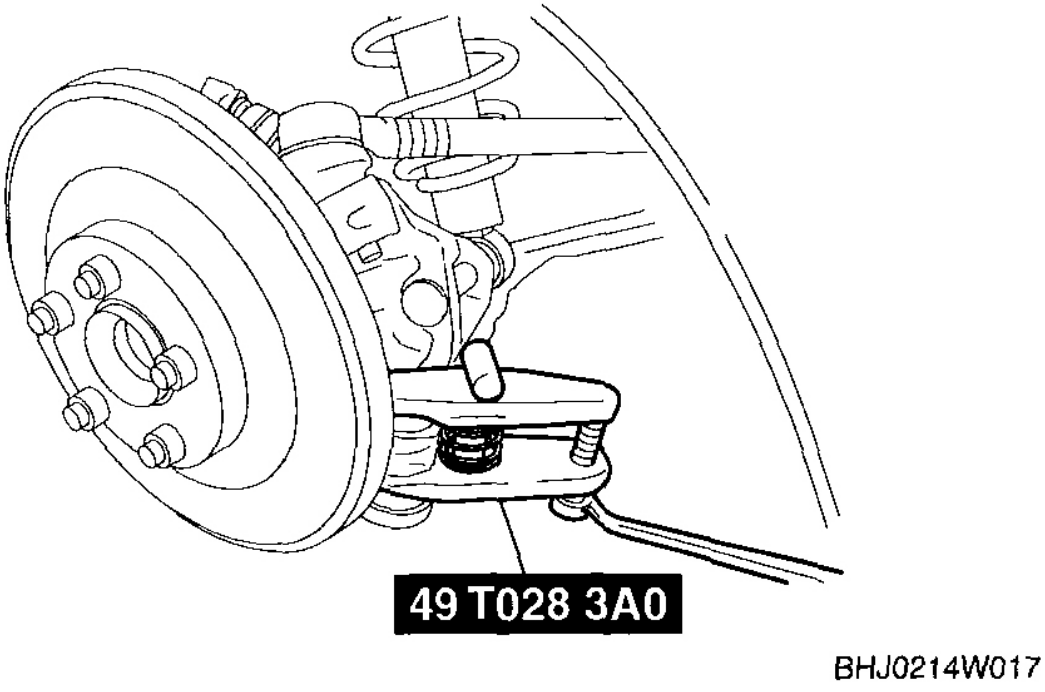


Fig. 14: Disconnecting Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Wipe the grease off the ball joint stud.
2. Fill the inside of the new dust boot with grease.
3. Using the **SST** , install the dust boot to the ball joint.
4. Wipe off the excess grease.

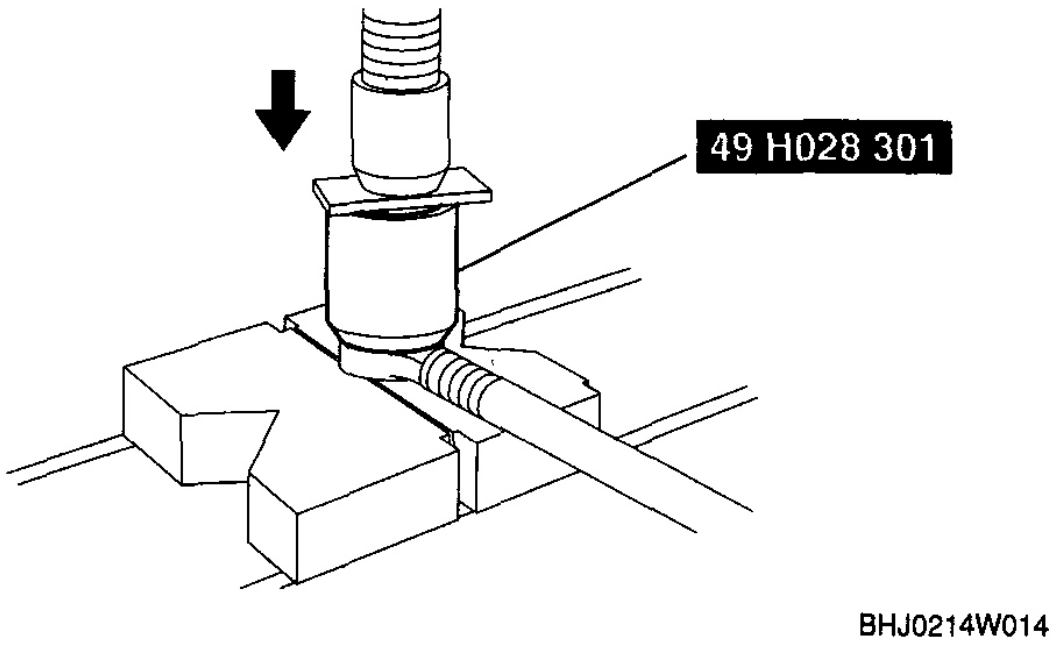


Fig. 15: Installing Dust Boot To Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

REAR LATERAL LINK (LOWER) INSPECTION

1. Remove the rear lateral link (lower) from the vehicle. (See **REAR LATERAL LINK (LOWER) REMOVAL/INSTALLATION** .)
2. Inspect the link for bending or damage. If there is any malfunction, replace the link.
3. Inspect the ball joint for looseness. If there is any malfunction, replace the ball joint.
4. Rotate the ball joint **5 times.**
5. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Rear lateral link (lower) ball joint rotational torque

   0.4-2.8 N.m {5-28 kgf.cm, 4-24 in.lbf}

   - If not within the specification, replace the rear lateral link (lower). (See **REAR LATERAL LINK (LOWER) REMOVAL/INSTALLATION** .)

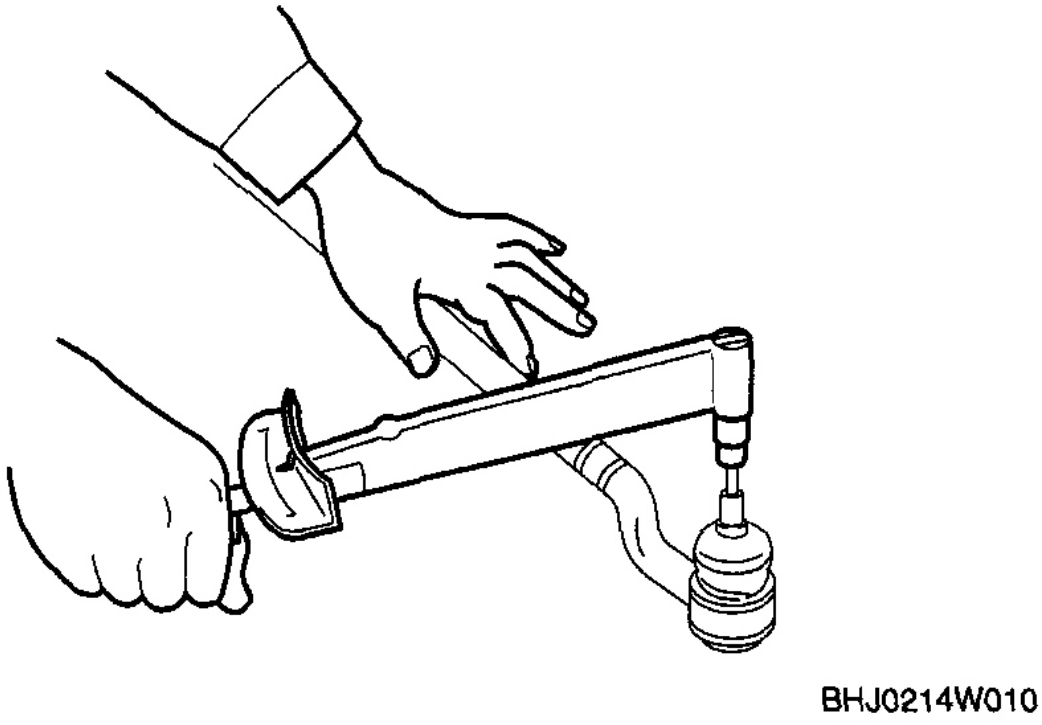
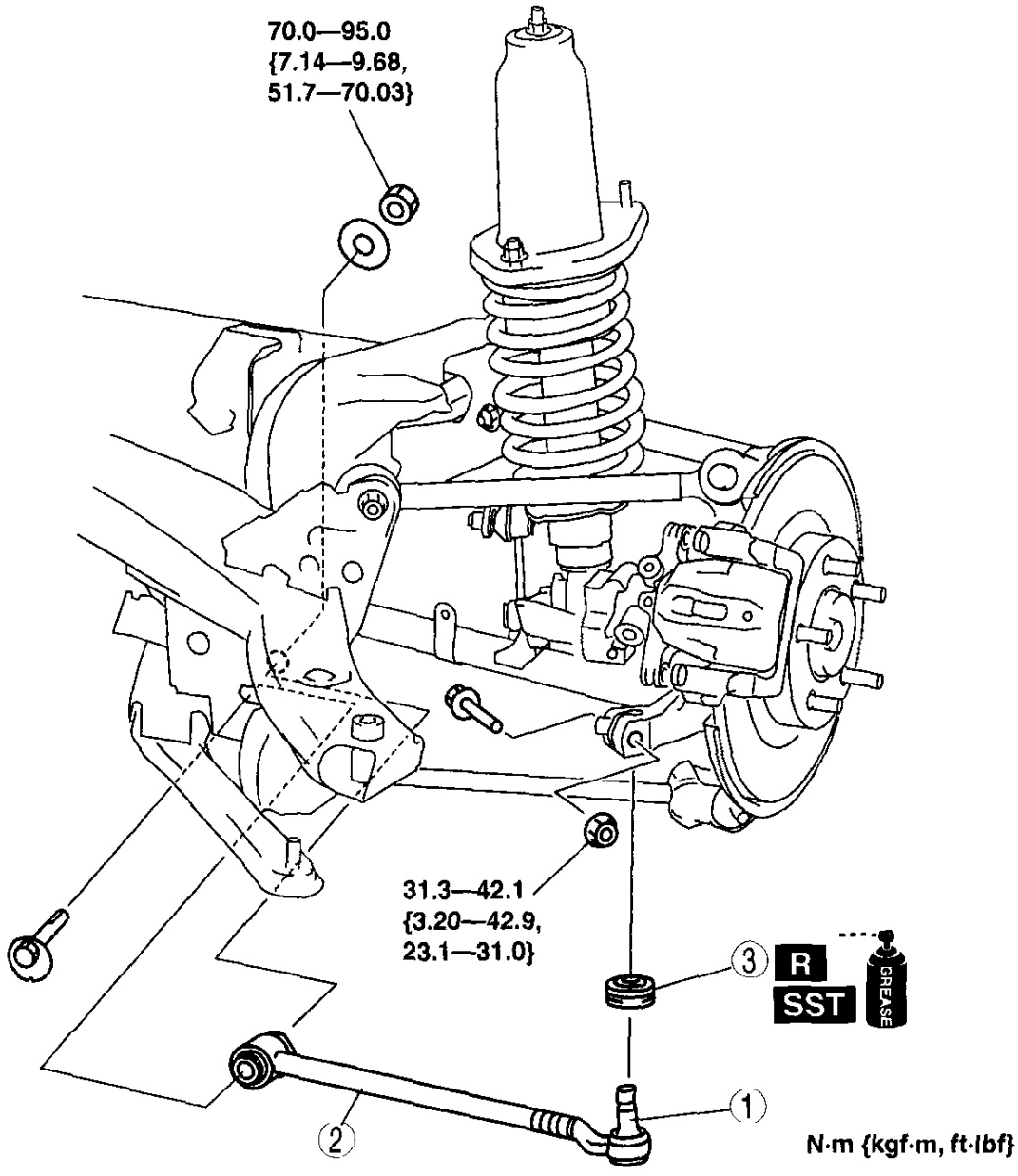


Fig. 16: Measuring Ball-Joint Rotational Torque Using Allen Wrench & Torque Wrench
Courtesy of MAZDA MOTORS CORP.

TOE CONTROL LINK REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 17** .
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	Toe control link ball joint
2	Toe control link
3	Dust boot

G04318169

Fig. 17: Identifying Toe Control Link (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Wipe the grease off the ball joint stud.
2. Fill the inside of the new dust boot with grease.
3. Using the **SST** , install the dust boot to the ball joint.
4. Wipe off the excess grease.

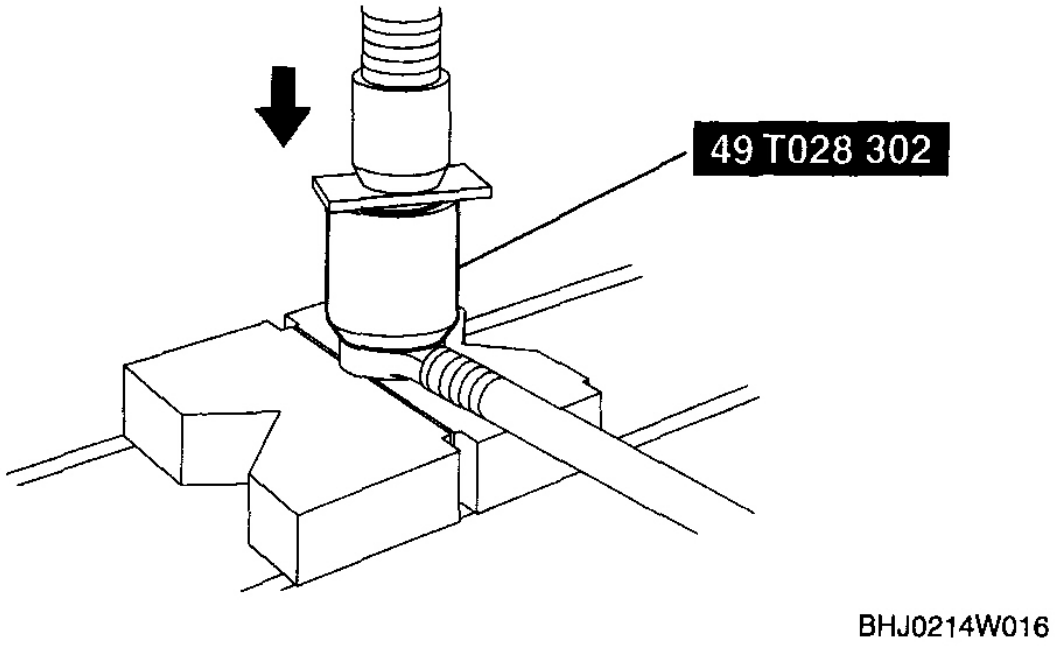


Fig. 18: Installing Dust Boot To Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

TOE CONTROL LINK BALL JOINT INSTALLATION NOTE

1. Install the toe control link ball joint so that the ball joint stud projection is within **-2-4 mm {-0.08-0.15 in}.**

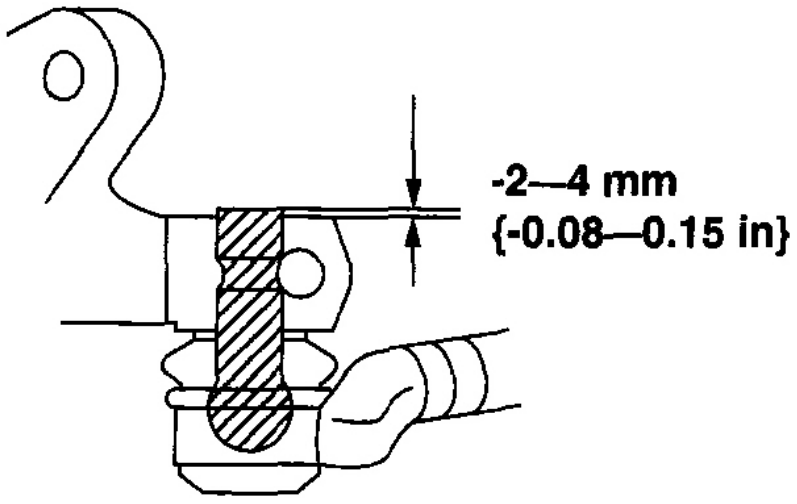


Fig. 19: Installing Toe Control Link Ball Joint
Courtesy of MAZDA MOTORS CORP.

TOE CONTROL LINK INSPECTION

1. Remove the toe control link from the vehicle. (See **TOE CONTROL LINK REMOVAL/INSTALLATION** .)
2. Inspect the lateral link for bending or damage. If there is any malfunction, replace the lateral link.
3. Inspect the ball joint for looseness. If there is any malfunction, replace the ball joint.
4. Rotate the ball joint **5 times.**
5. Install the **SST** to the ball stud, and measure the ball joint rotational torque using a pull scale.

   Toe control link ball joint rotational torque 0.3-2.2 N.m {4-22 kgf.cm, 3-19 in.lbf}

   Pull scale reading: 3-22 N {0.3-2.2 kgf, 0.7-4.9 lbf}

   - If not within the specification, replace the toe control link. (See **TOE CONTROL LINK REMOVAL/INSTALLATION** .)

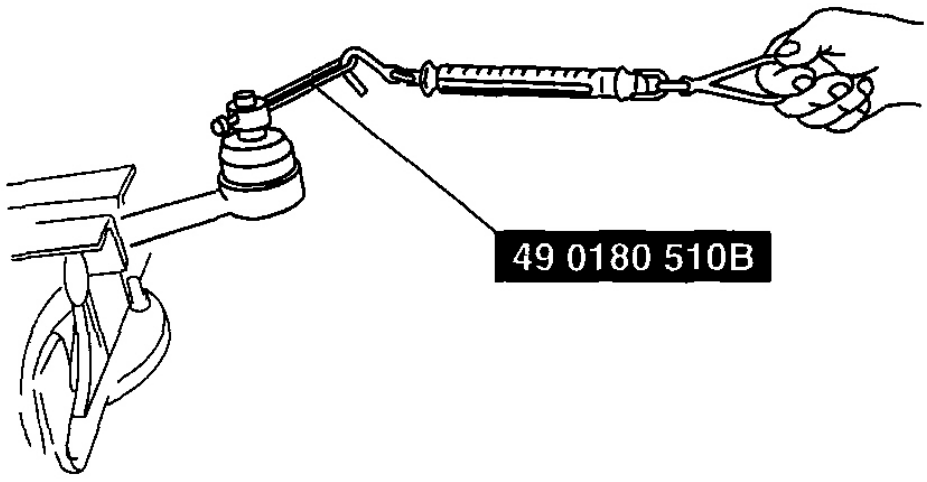
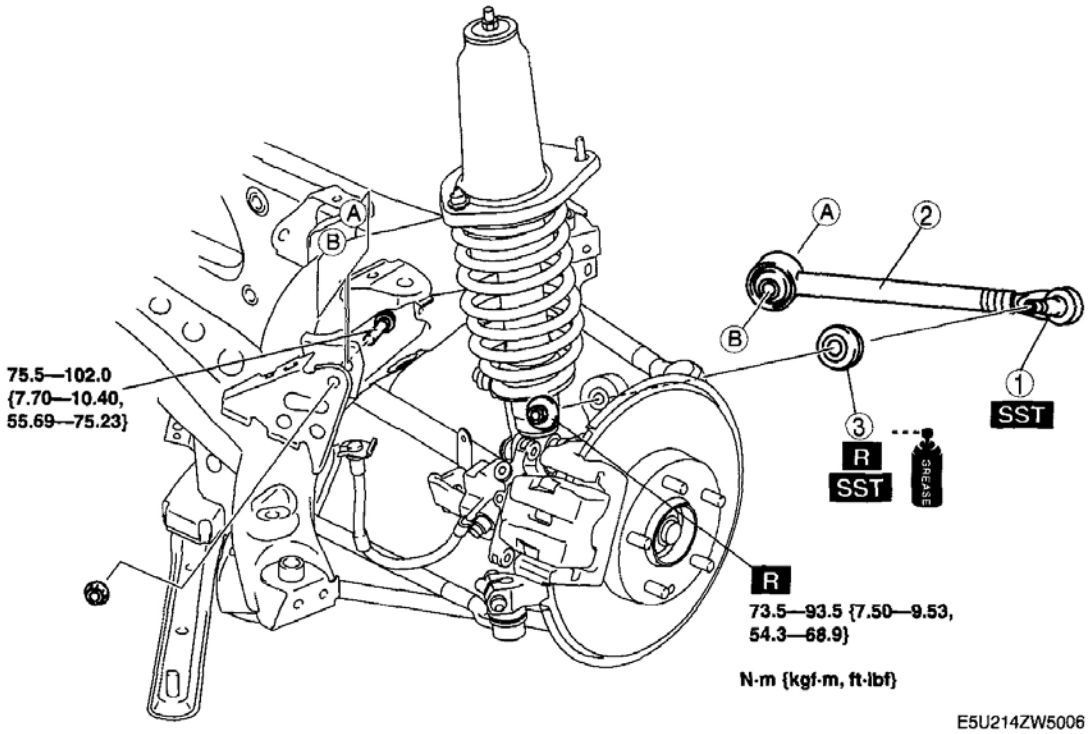


Fig. 20: Measuring Ball Joint Rotational Torque Using Pull Scale
Courtesy of MAZDA MOTORS CORP.

REAR TRAILING LINK (UPPER) REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 21** .
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	Rear trailing link (upper) ball joint
2	Rear trailing link (upper)
3	Dust boot

G04318156

Fig. 21: Identifying Rear Trailing Link (Upper) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR TRAILING LINK (UPPER) BALL JOINT REMOVAL NOTE

1. Using the **SST,** disconnect the ball joint.

NOTE:

- **When removing the rear trailing link (upper) ball joint, the rear knuckle bushing may also come off. If it comes off, replace the rear knuckle.**

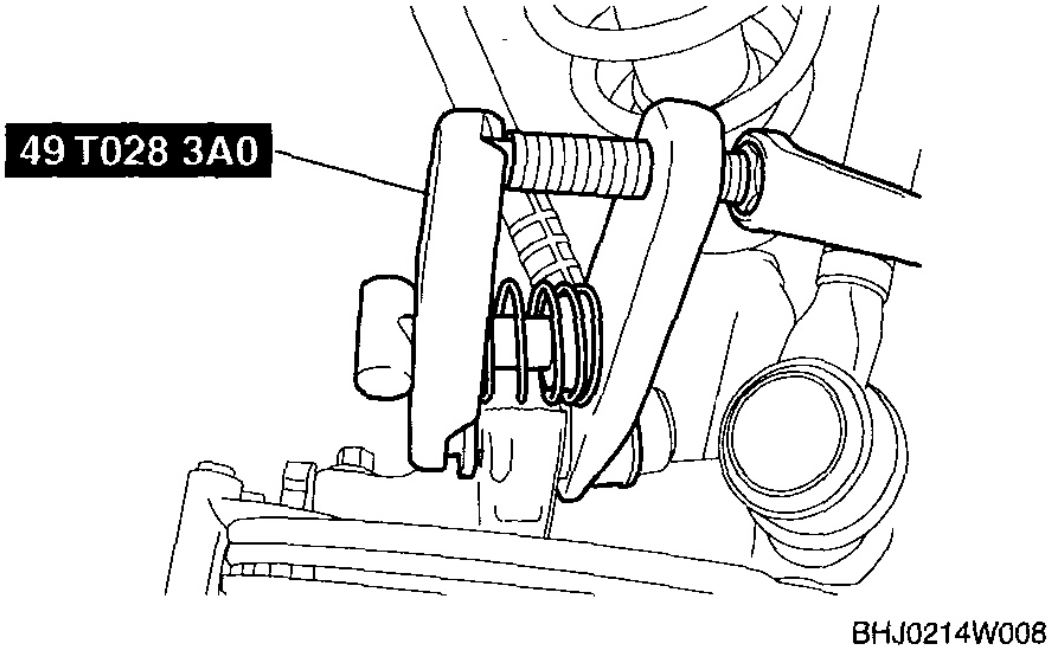


Fig. 22: Disconnecting Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

DUST BOOT INSTALLATION NOTE

1. Wipe the grease off the ball joint stud.
2. Fill the inside of the new dust boot with grease.
3. Using the **SST,** install the dust boot to the ball joint.
4. Wipe off the excess grease.

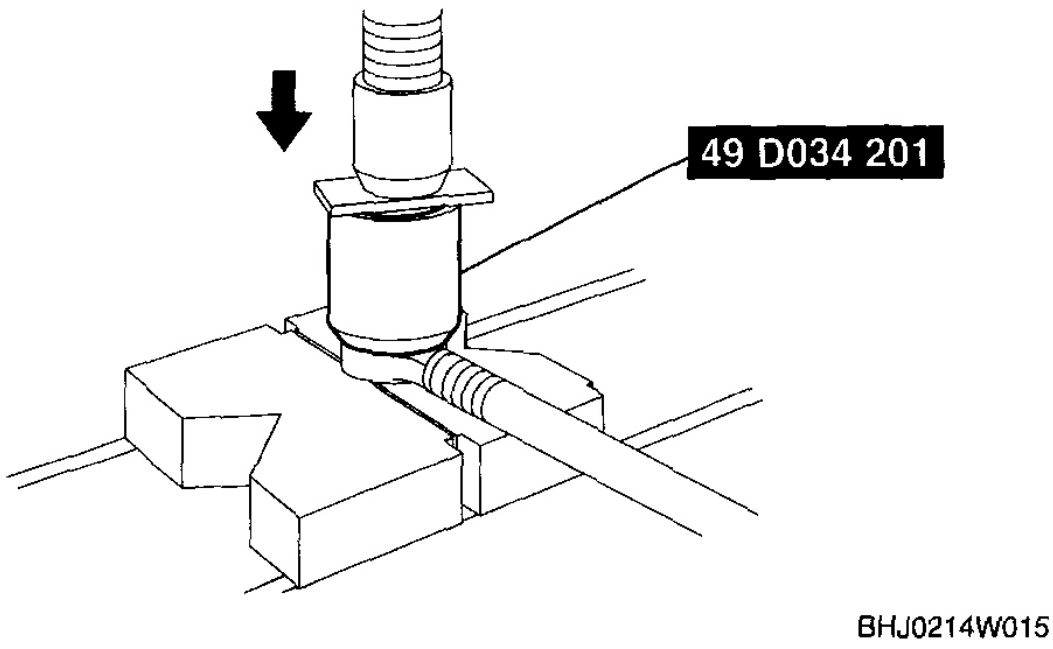


Fig. 23: Installing Dust Boot To Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

REAR TRAILING LINK (UPPER) INSPECTION

1. Remove the rear trailing link (upper) from the vehicle. (See **REAR TRAILING LINK (UPPER) REMOVAL/INSTALLATION** .)
2. Inspect the link or bending or damage. If there is any malfunction, replace the rear trailing link (upper).
3. Inspect the ball joint for looseness. If there is any malfunction, replace the ball joint.
4. Rotate the ball joint **5 times.**
5. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Rear trailing link (upper) ball joint rotational torque

   0.4-3.3 N.m {5-33 kgf.cm, 4-29 in.lbf}

   - If not within the specification, replace the rear trailing link (upper). (See **REAR TRAILING LINK (UPPER) REMOVAL/INSTALLATION** .)

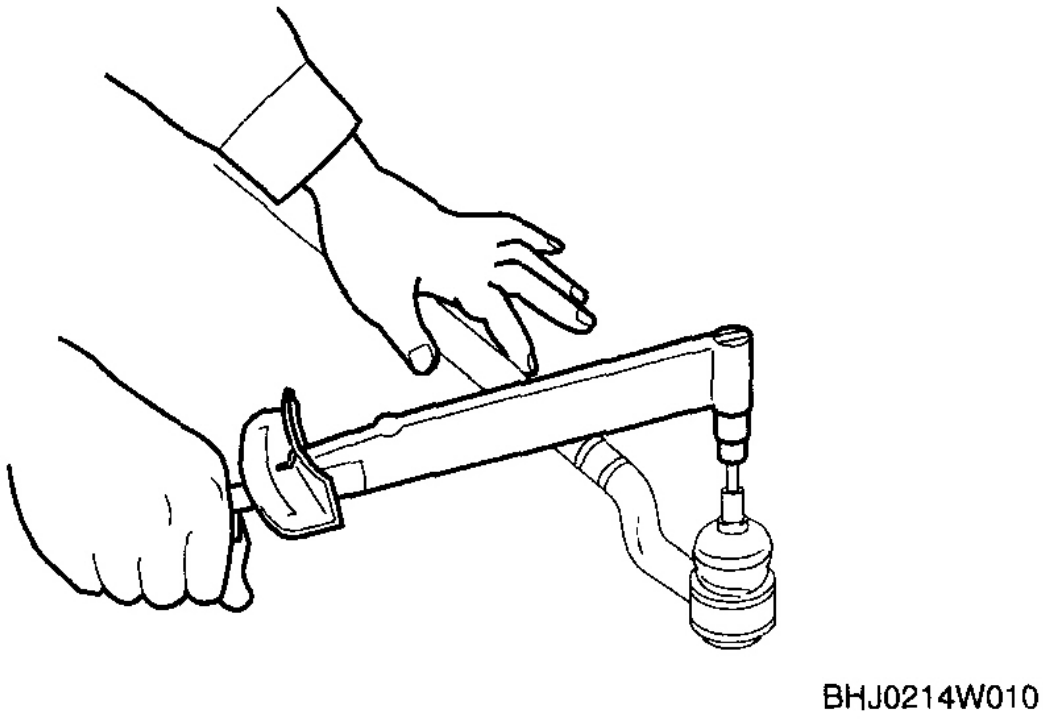
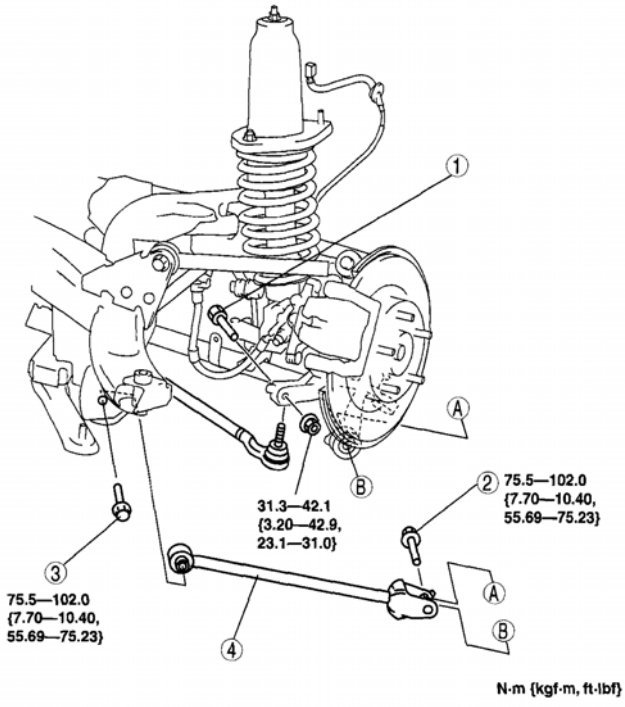


Fig. 24: Measuring Ball-Joint Rotational Torque Using Allen Wrench & Torque Wrench
Courtesy of MAZDA MOTORS CORP.

REAR TRAILING LINK (LOWER) REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 25** .
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



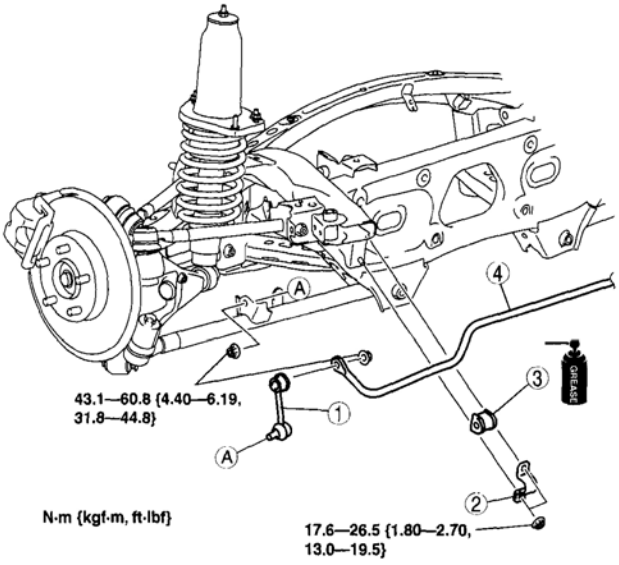
1	Toe control link outer bolt
2	Rear trailing link (lower) outer bolt

3	Rear trailing link (lower) inner bolt
4	Rear trailing link (lower)

Fig. 25: Identifying Rear Trailing Link (Lower) (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR STABILIZER REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 26**.
2. Install in the reverse order of removal.



1	Stabilizer control link	3	Bushing
2	Stabilizer bracket	4	Rear stabilizer

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Fig. 26: Identifying Rear Stabilizer (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR STABILIZER INSTALLATION NOTE

1. Install the rear stabilizer so that the identification mark is on the right side of the vehicle.

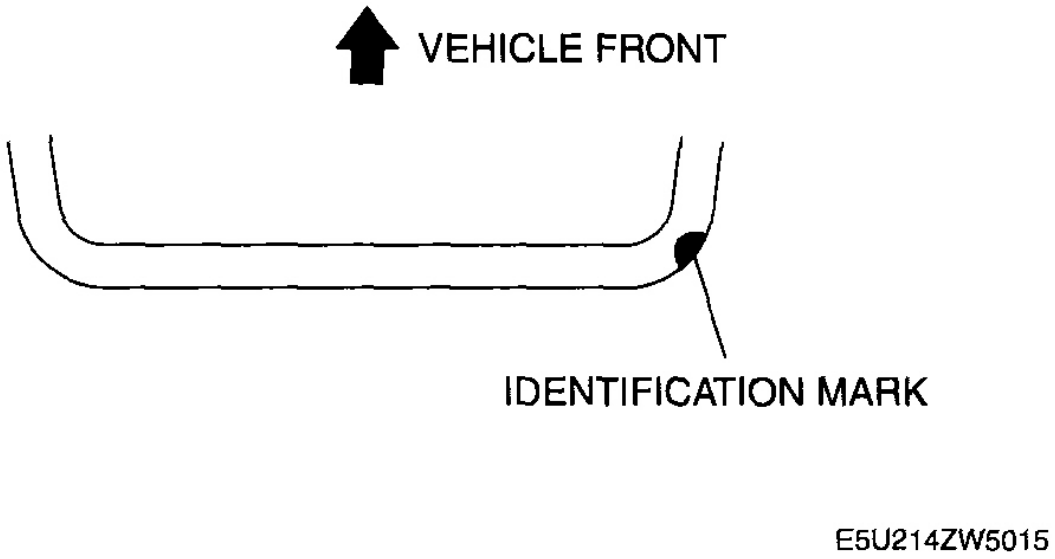


Fig. 27: Identifying Identification Mark
Courtesy of MAZDA MOTORS CORP.

STABILIZER CONTROL LINK INSTALLATION NOTE

1. Install the stabilizer control link in the proper angle as shown in **Fig. 28** .

CAUTION:

- **Be sure to install the stabilizer control link in the proper position. If it is not installed properly, the stabilizer control link may interfere with peripheral components when driving, causing damage to each other.**

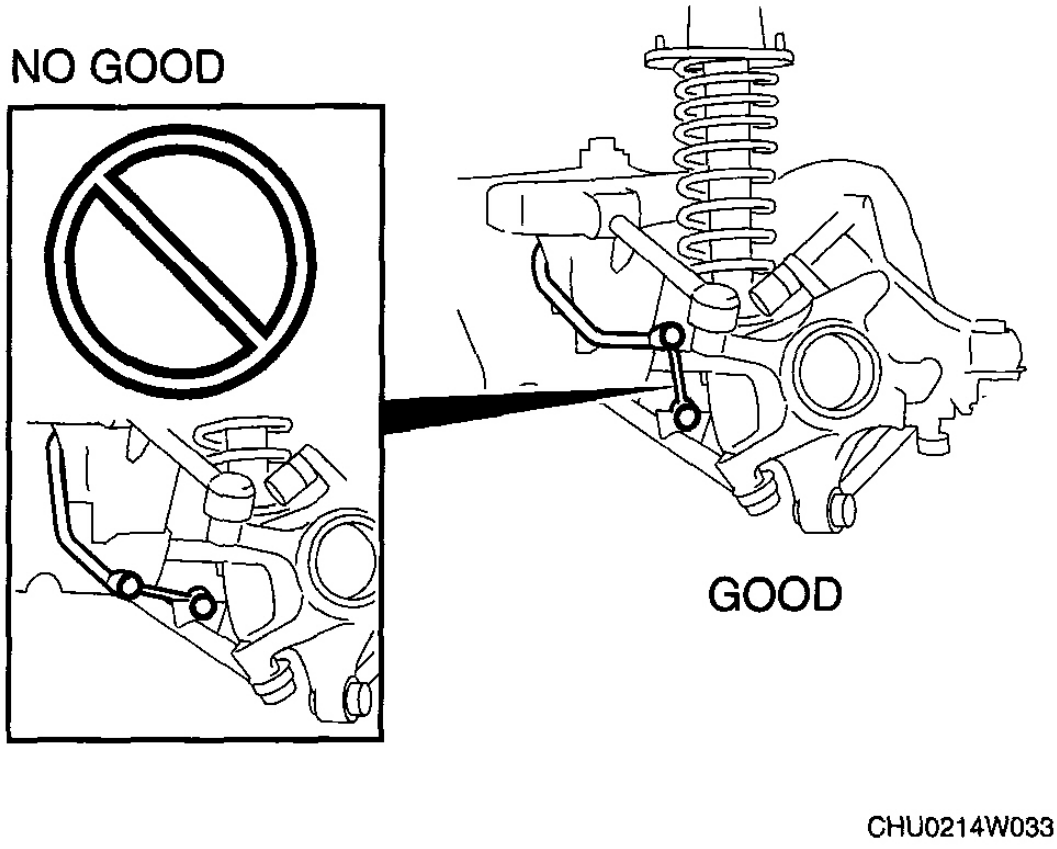


Fig. 28: Precaution For Stabilizer Control Link (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

2. Place the vehicle on, the ground and verify that the stabilizer control link is installed in the angle shown in **Fig. 29** .

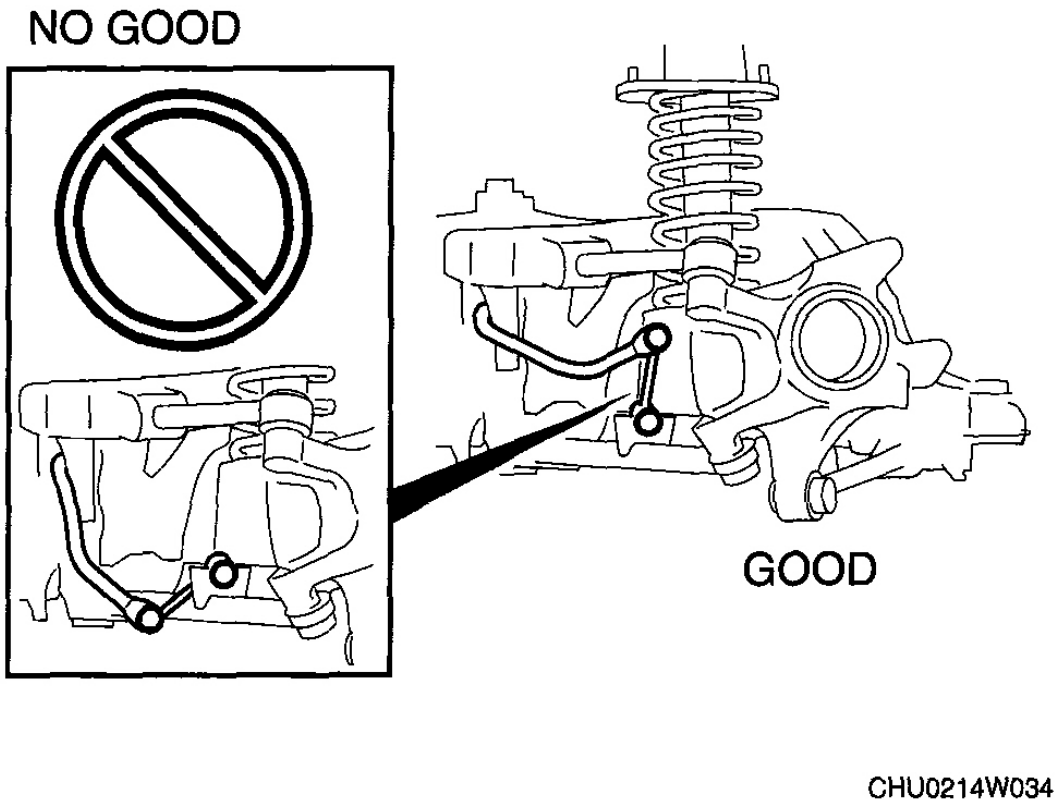


Fig. 29: Precaution For Stabilizer Control Link (2 Of 2)
Courtesy of MAZDA MOTORS CORP.

REAR STABILIZER CONTROL LINK INSPECTION

1. Remove the stabilizer control link from the vehicle. (See **REAR STABILIZER REMOVAL/INSTALLATION** .)
2. Inspect the link for bending or damage. If there is any malfunction, replace the link.
3. Rotate the ball joint **10 times,** and rock the ball joint **10 times.**
4. Measure the ball-joint rotational torque using an Allen wrench and a torque wrench.

   Stabilizer control link ball joint rotational torque

   0.23-0.47 N.m {2.35-4.79 kgf.cm, 2.04-4.15 in.lbf}

   - If not within the specification, replace the stabilizer control link ball joint. (See **REAR STABILIZER REMOVAL/INSTALLATION** .)

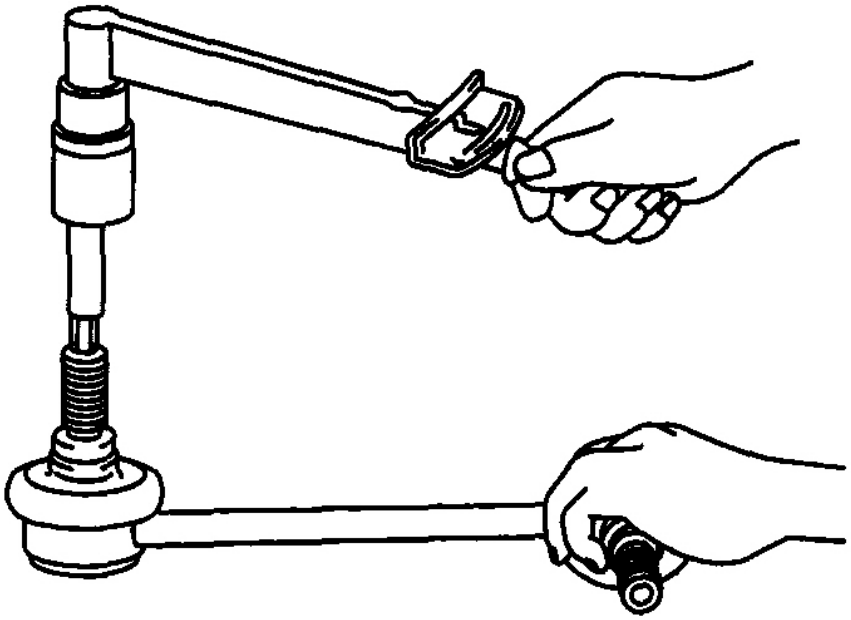


Fig. 30: Measuring Ball-Joint Rotational Torque Using Allen Wrench & Torque Wrench
Courtesy of MAZDA MOTORS CORP.

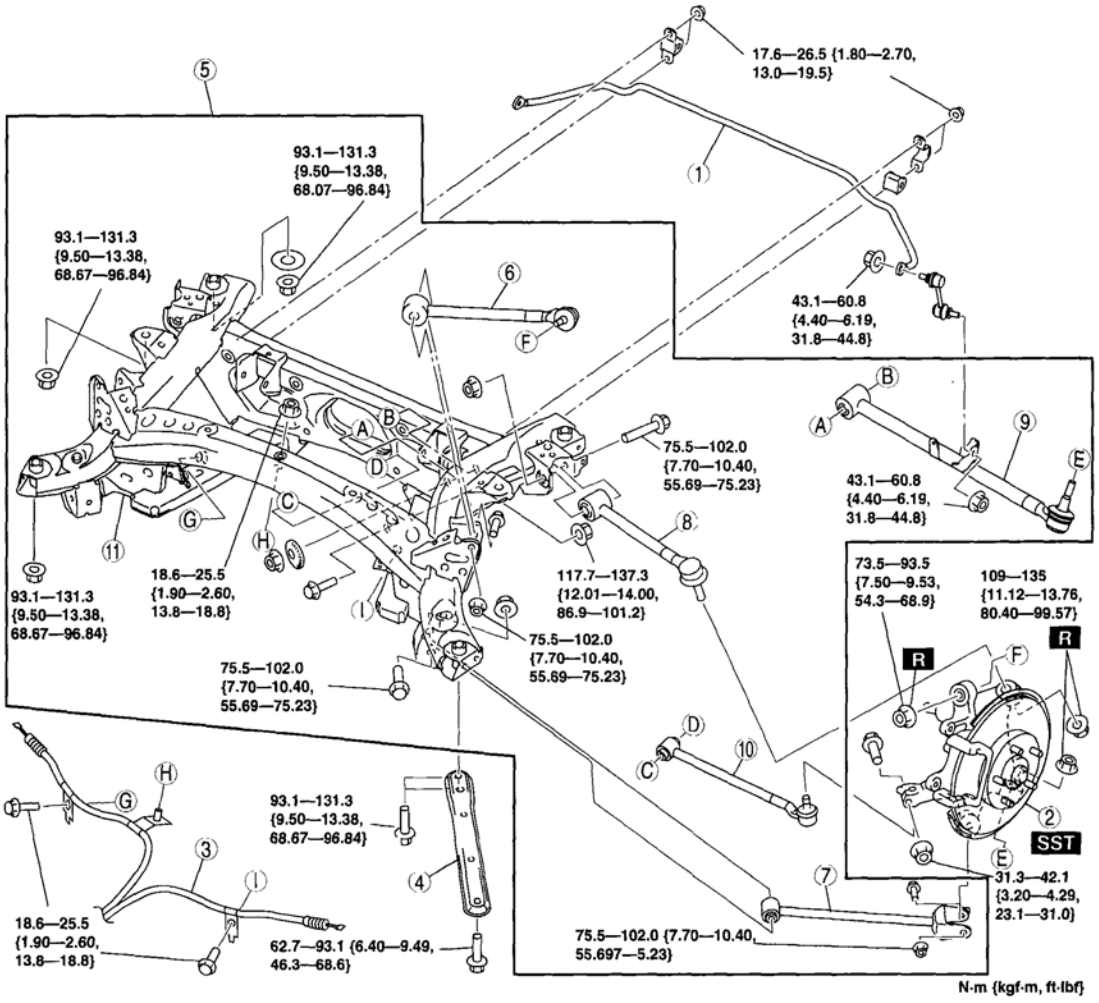
REAR CROSSMEMBER REMOVAL/INSTALLATION

CAUTION:

- **Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the wiring harness if it is pulled by mistake. Before operations, remove the ABS wheel-speed sensor (axle side) and move the sensor away from the harnesses.**

1. Remove the exhaust pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [LF]** .)
2. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
3. Remove the power plant frame. (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .) (See **AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION [SJ6A-EL]** .)
4. Remove the rear drive shaft. (See **REAR DRIVE SHAFT REMOVAL/INSTALLATION** .)
5. Remove the rear differential. (See **REAR DIFFERENTIAL REMOVAL/INSTALLATION** .)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.

8. Inspect the rear wheel alignment. (See **REAR WHEEL ALIGNMENT** .)



1	Rear stabilizer	7	Rear trailing link (lower)
2	Rear axle component	8	Rear lateral link (upper)
3	Parking brake cable	9	Rear lateral link (lower)
4	Stopper plate	10	Toe control link
5	Rear crossmember component	11	Rear crossmember
6	Rear trailing link (upper)		

Fig. 31: Identifying Rear Crossmember Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

REAR AXLE COMPONENT REMOVAL NOTE

NOTE:

- **When removing the ball joints, the rear knuckle bushings may also come off. If they come off, replace the rear knuckle.**

1. Support the knuckle using a jack.
2. Using the **SST** , disconnect the rear trailing link (upper) ball joint.
3. Remove the rear trailing link (lower) outer bolt.

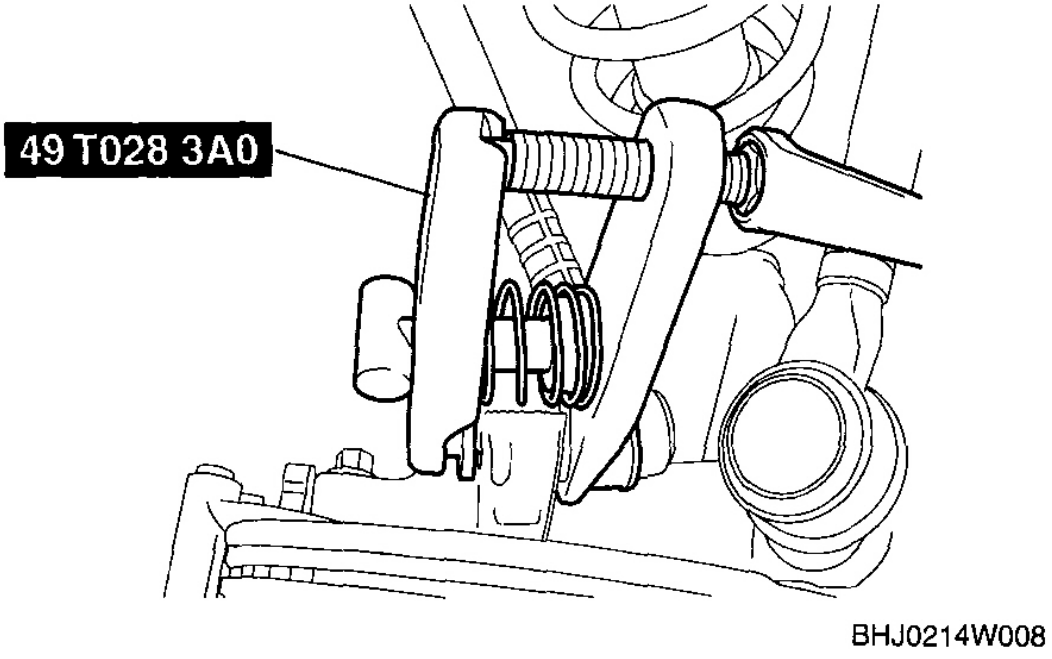


Fig. 32: Disconnecting Rear Trailing Link (Upper) Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

4. Using the **SST** , disconnect the rear lateral link (upper) ball joint.

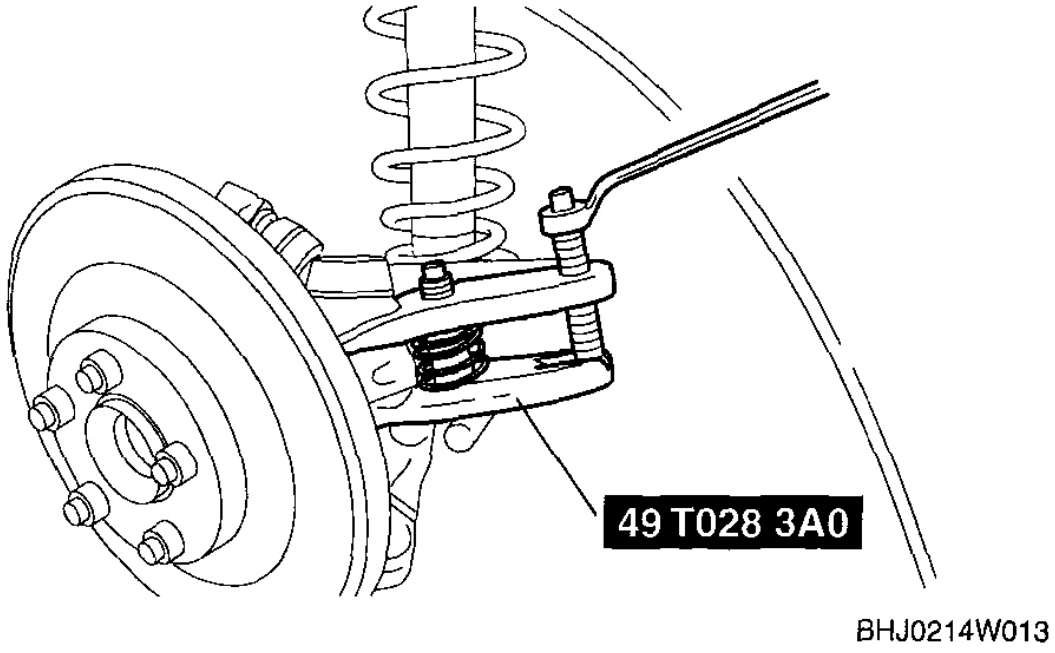


Fig. 33: Disconnecting Rear Lateral Link (Upper) Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

5. Using the **SST** , disconnect the rear lateral link (lower) ball joint.
6. Remove the toe control link outer bolt.
7. Remove the shock absorber lower bolt.
8. Remove the rear axle component.

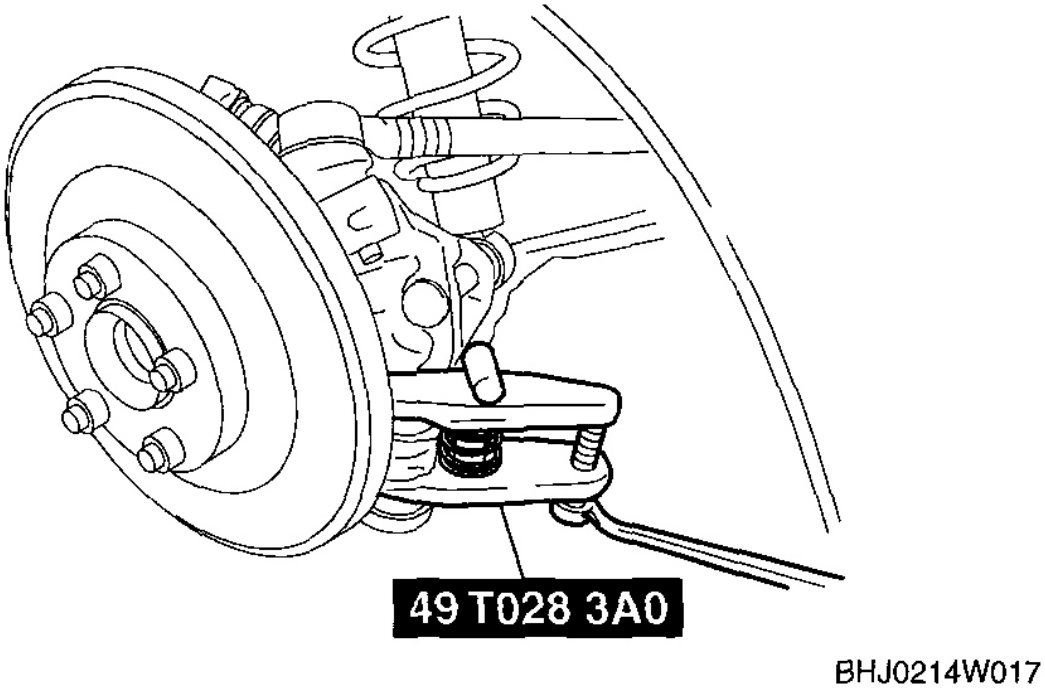


Fig. 34: Disconnecting Rear Lateral Link (Lower) Ball Joint Using SST
Courtesy of MAZDA MOTORS CORP.

REAR CROSSMEMBER COMPONENT REMOVAL NOTE

WARNING:

- **Be sure that the crossmember component is securely supported by the jack. If not securely supported, the crossmember component could fall, resulting in serious injury or death, and damage to the vehicle.**

1. Support the rear crossmember with the jack, and remove the bolt.

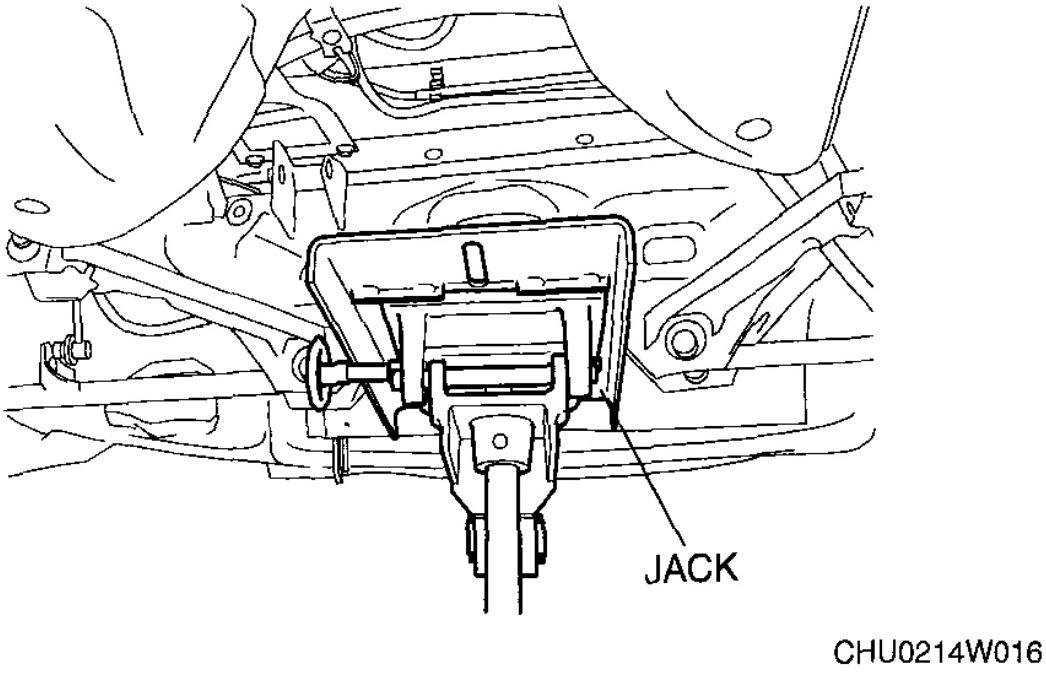


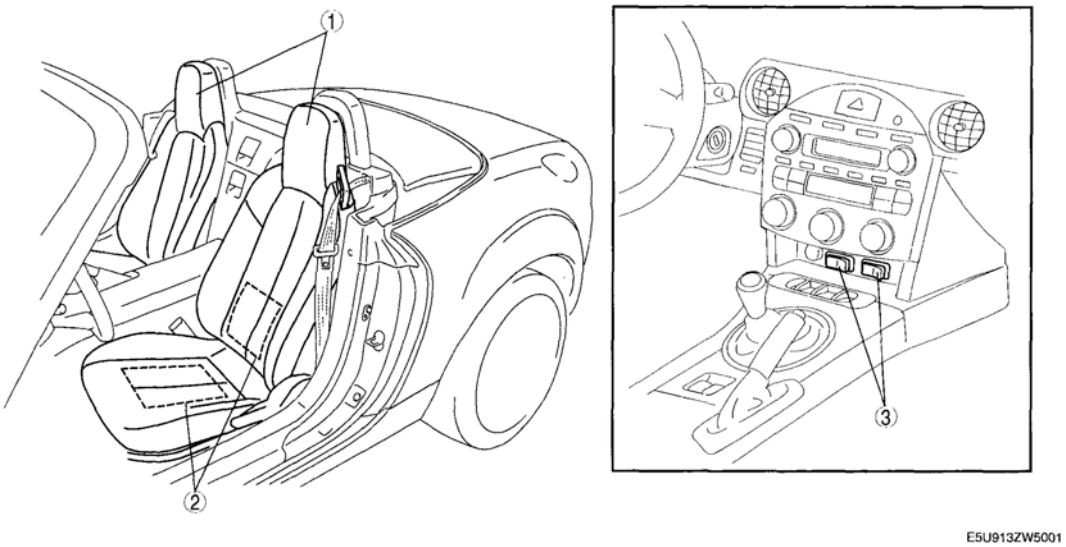
Fig. 35: Supporting Rear Crossmember With Jack
Courtesy of MAZDA MOTORS CORP.

2. Remove the rear crossmember component.

2007 ACCESSORIES & BODY, CAB

Seats - MX-5 Miata

SEAT LOCATION INDEX



1	Seat
2	Seat warmer unit
3	Seat warmer switch

Fig. 1: Identifying Location Of Seat Components
Courtesy of MAZDA MOTORS CORP.

SEAT REMOVAL/INSTALLATION

WARNING:

- **Handling the seat (side air bag) improperly can accidentally deploy the side air bag module, which may seriously injure you. Read the air bag system service warnings and cautions before handling the seat. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

CAUTION:

- **When the passenger's seat is removed, perform the seat weight sensor inspection using the WDS or equivalent after installing the passenger's seat. (See SEAT WEIGHT SENSOR INSPECTION .)**
- **When the passenger's seat is replaced with a new one, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**

1. Turn the ignition switch to the LOCK position.
2. Remove the battery cover.
3. Disconnect the negative battery cable and wait for **1 min or more** . (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Press connector tab A in the direction of the arrow.

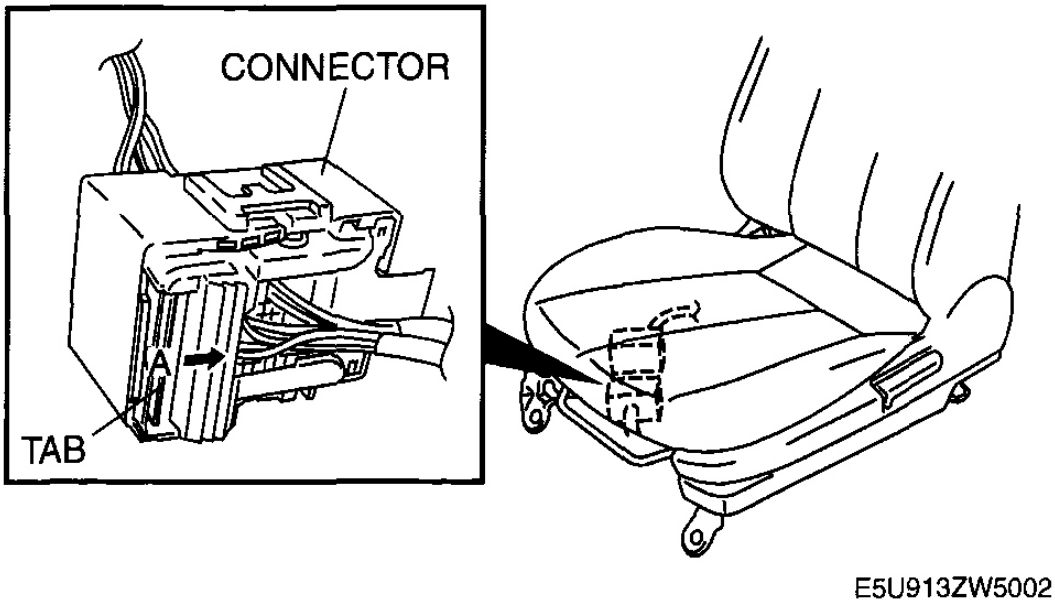


Fig. 2: Pressing Connector Tab A
Courtesy of MAZDA MOTORS CORP.

5. Pull out the connector lock in the direction of the arrow and disconnect the connector.

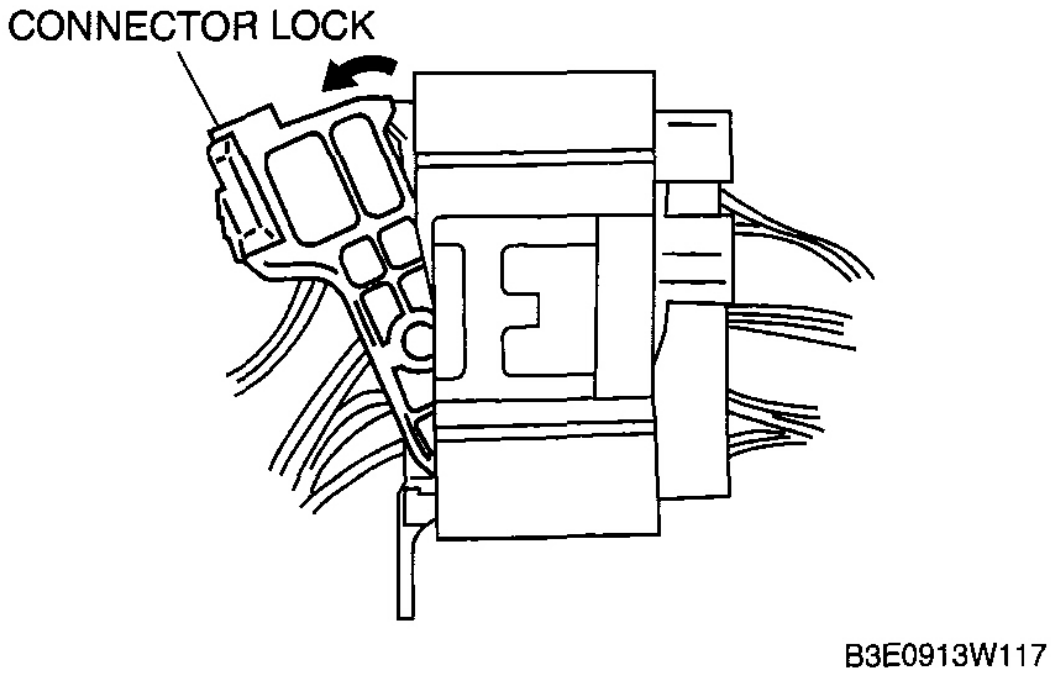


Fig. 3: Pulling Out Connector Lock
Courtesy of MAZDA MOTORS CORP.

6. Insert your hand through part as shown in **Fig. 4** the figure and pull the anchor cover outward, (passenger's seat)
7. Detach the clip tabs and slide the anchor cover to the vehicle front and remove it. (passenger's seat)
8. Remove the lower anchor installation bolt of the seat belt, (passenger's seat) (See **SEAT BELT REMOVAL/INSTALLATION** .)

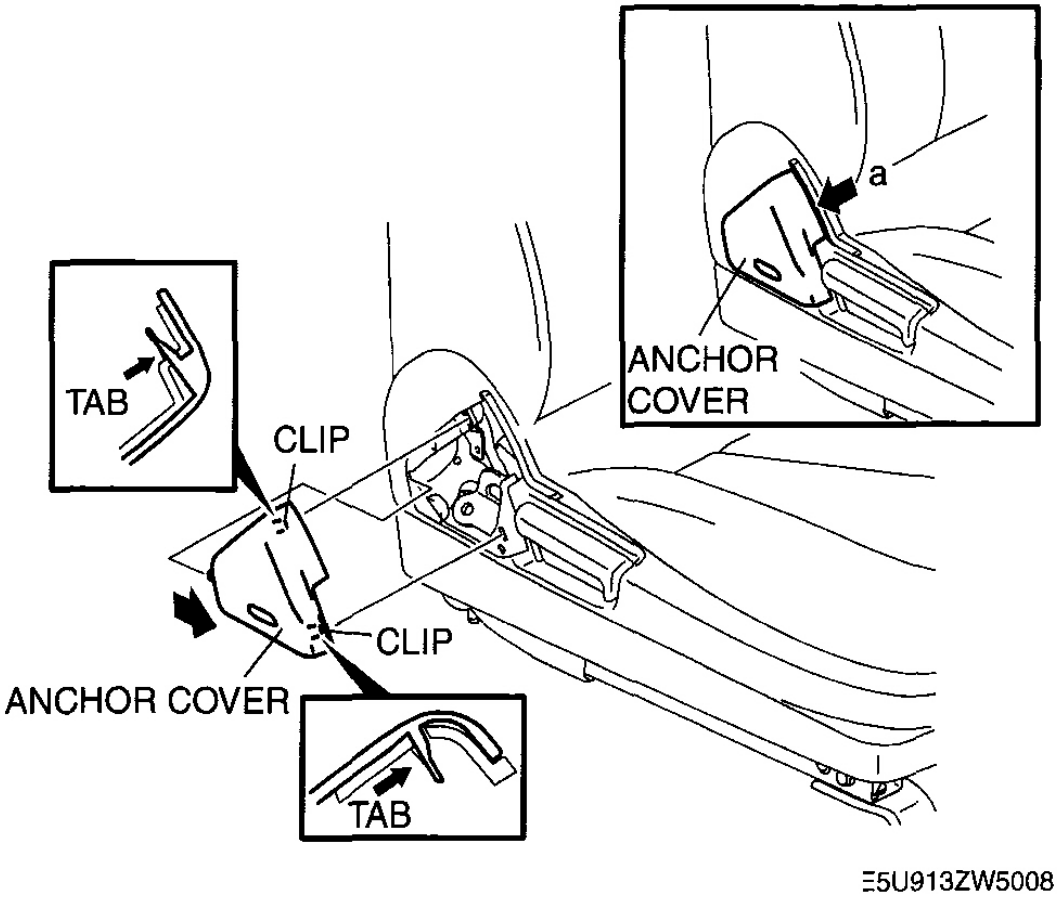


Fig. 4: Pulling Anchor Cover Outward
Courtesy of MAZDA MOTORS CORP.

9. Remove the bolts, then remove the seat.
10. Install in the reverse order of removal.
11. Perform the weight sensor initialization procedure. (See **SEAT WEIGHT SENSOR CALIBRATION** .)

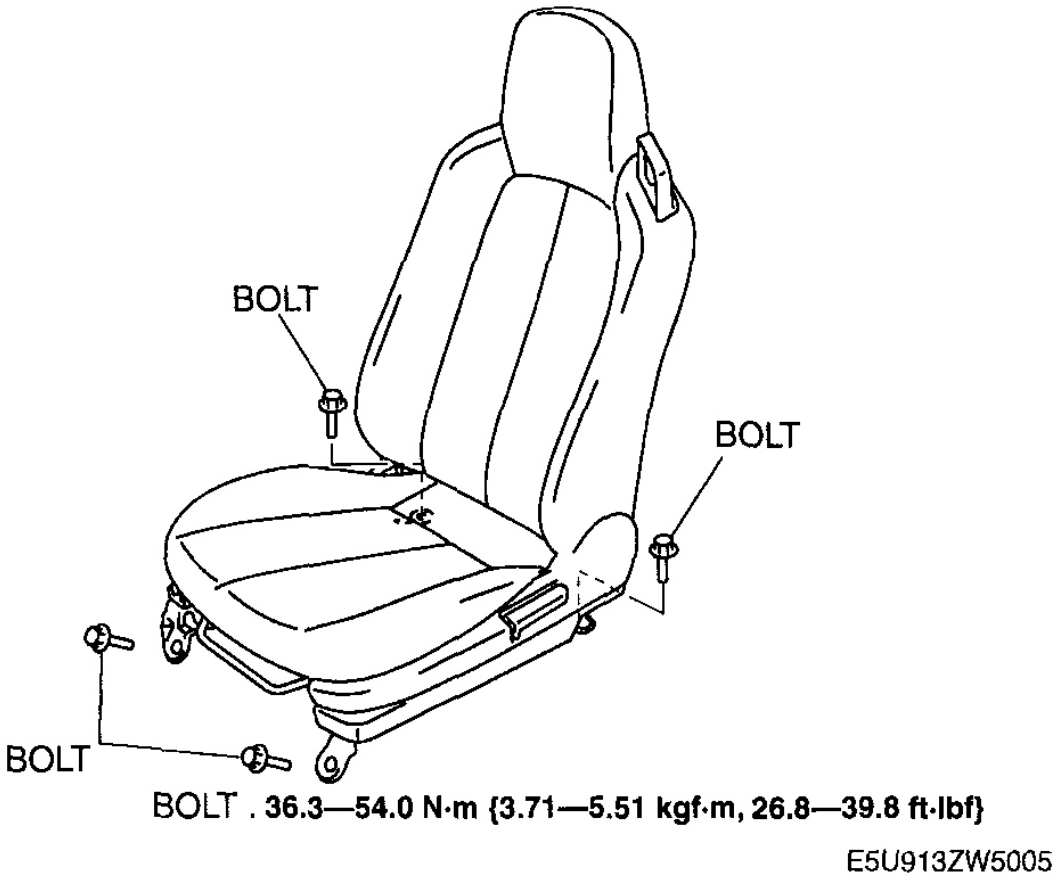


Fig. 5: Removing Seat Bolts (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

SEAT DISASSEMBLY/ASSEMBLY

WARNING:

- **Handling the seat (side air bag, seat weight sensor) improperly can accidentally deploy the side air bag, which may seriously injure you. Read the service warnings and cautions before handling the seat. (See AIR BAG SYSTEM SERVICE WARNINGS .) (See AIR BAG SYSTEM SERVICE CAUTIONS .)**

CAUTION:

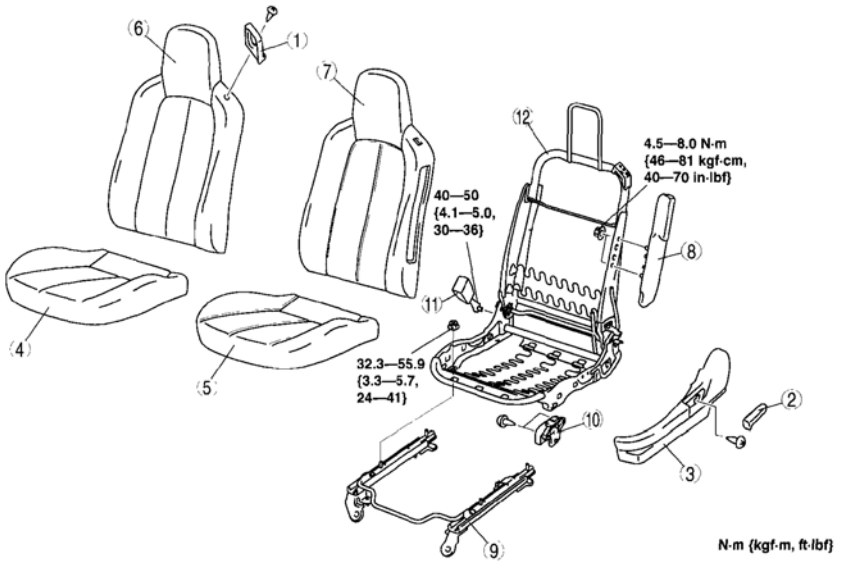
- **If any of the following work is performed, perform the seat weight sensor calibration using the WDS or equivalent. (See SEAT WEIGHT SENSOR CALIBRATION .)**
  - **Replacement with a new seat weight sensor**
  - **Replacement with a new seat weight sensor control module**

- **Replacement with new passenger-side seat parts**
- **Disassembly of the passenger-side seat**

- **If any of the following work is performed, perform the seat weight sensor inspection using the WDS or equivalent. (See SEAT WEIGHT SENSOR INSPECTION .)**
  - **Removal of the passenger-side seat**
  - **Loosening and retightening of passenger's seat fixing bolts**

1. Disassemble in the order indicated in **Fig. 6** .
2. Assemble in the reverse order of disassembly.

DRIVER'S SEAT

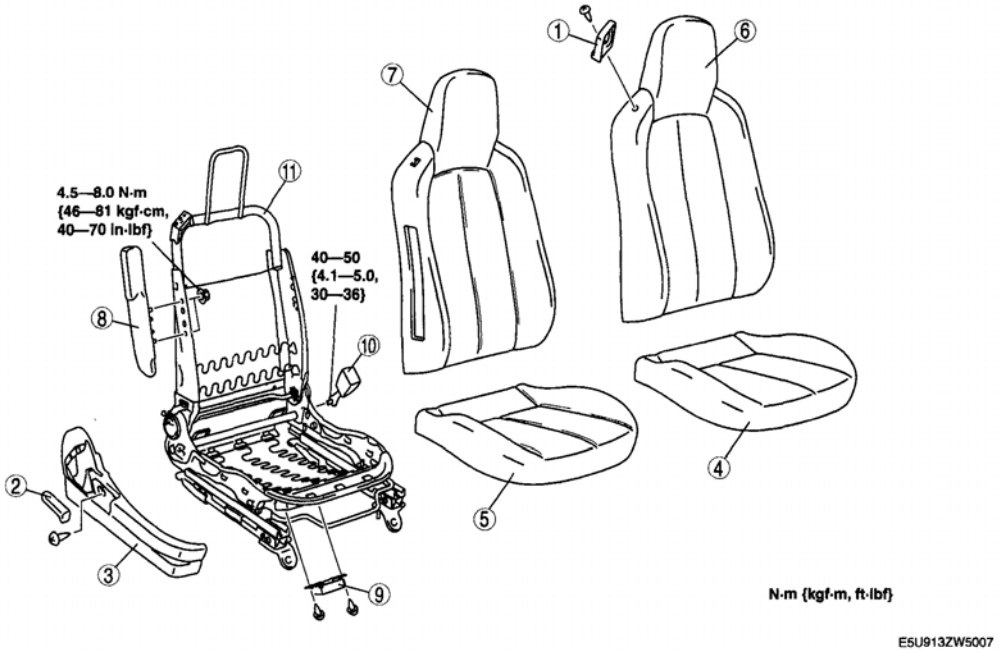


1	Seat belt guide
2	Recliner lever
3	Side cover
4	Seat cushion trim
5	Seat cushion pad
6	Seat back trim
7	Seat back pad
8	Side air bag module

9	Slide adjuster
10	Seat track position sensor
11	Buckle
12	Seat frame

Fig. 6: Identifying Driver's Seat Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

PASSENGER'S SEAT



1	Seat belt guide
2	Recliner lever
3	Side cover
4	Seat cushion trim
5	Seat cushion pad
6	Seat back trim
7	Seat back pad

8	Side air bag module
9	Seat weight sensor control module
10	Buckle
11	Seat frame

Fig. 7: Identifying Passenger's Seat Components (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

SEAT WARMER SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the console. (See **CONSOLE REMOVAL/INSTALLATION** .)
4. Remove the side wall. (See **SIDE WALL REMOVAL/INSTALLATION** .)
5. Remove the console panel. (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
6. Squeeze the tabs of seat warmer switch and pull it outward to remove it.
7. Install in the reverse order of removal.

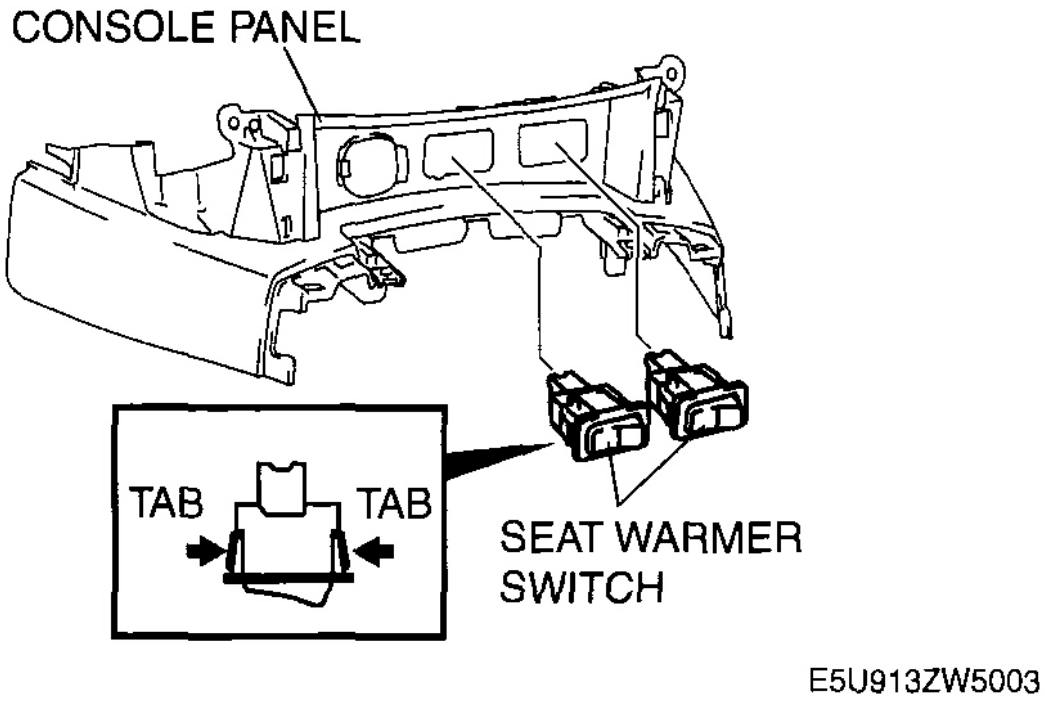


Fig. 8: Squeezing Tabs To Remove Seat Warmer Switch
Courtesy of MAZDA MOTORS CORP.

SEAT WARMER SWITCH INSPECTION

DRIVER'S SIDE

1. Verify that the continuity between the seat warmer switch terminals is as indicated in **Fig. 9** .
   - If not as indicated in **Fig. 9** , replace the seat warmer switch.

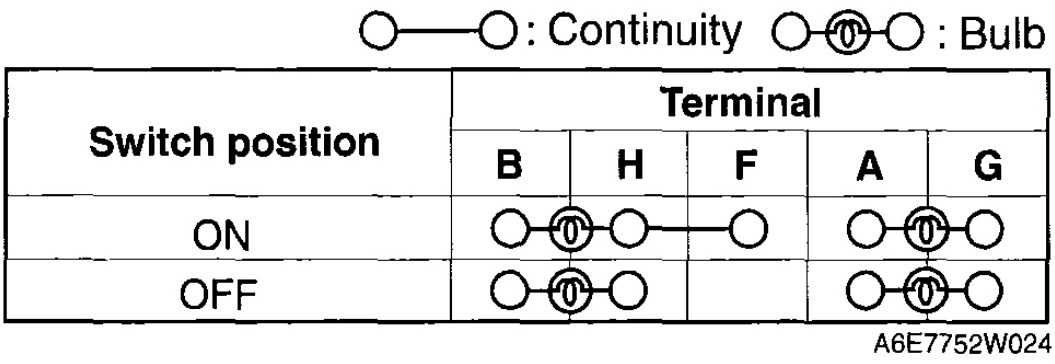


Fig. 9: Drivers Seat Warmer Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

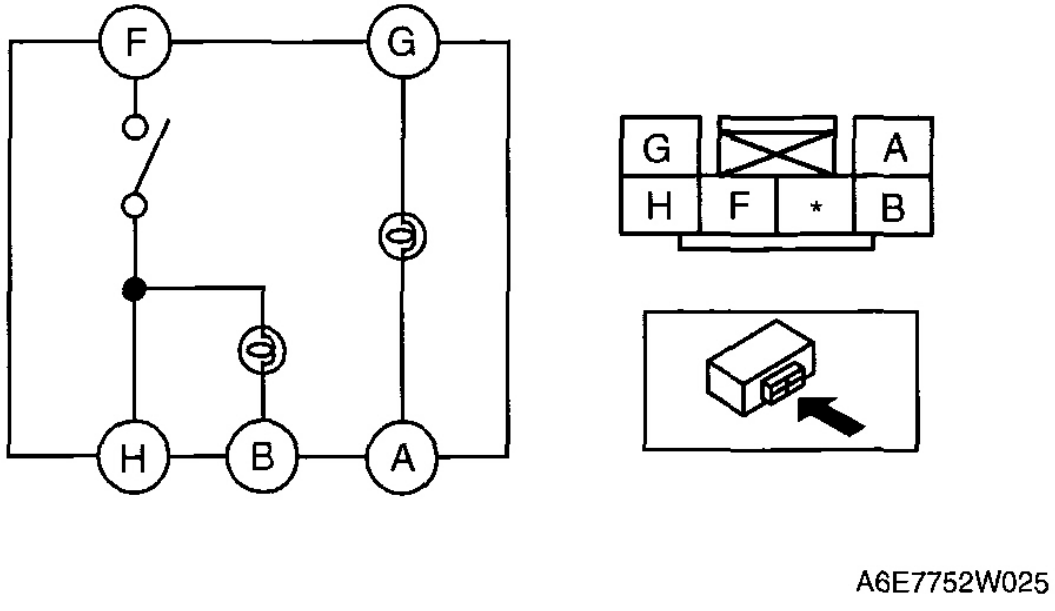


Fig. 10: Identifying Seat Warmer Switch Connector
Courtesy of MAZDA MOTORS CORP.

PASSENGER'S SIDE

1. Verify that the continuity between the seat warmer switch terminals is as indicated in **Fig. 11** .
   - If not as indicated in **Fig. 11** , replace the seat warmer switch.

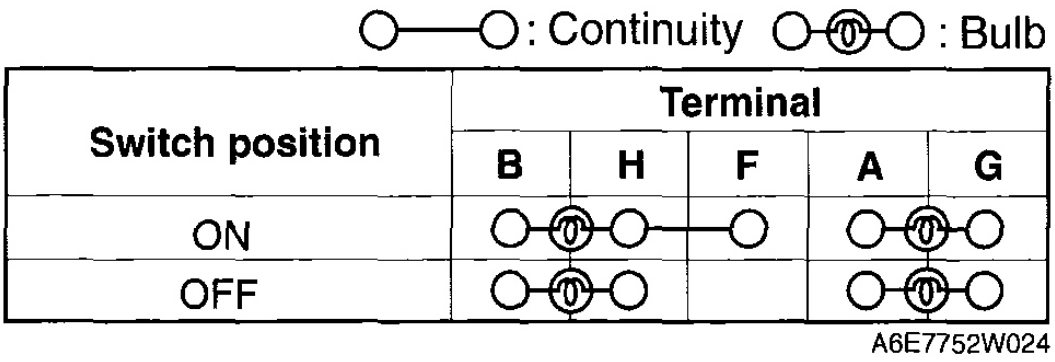


Fig. 11: Passengers Seat Warmer Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

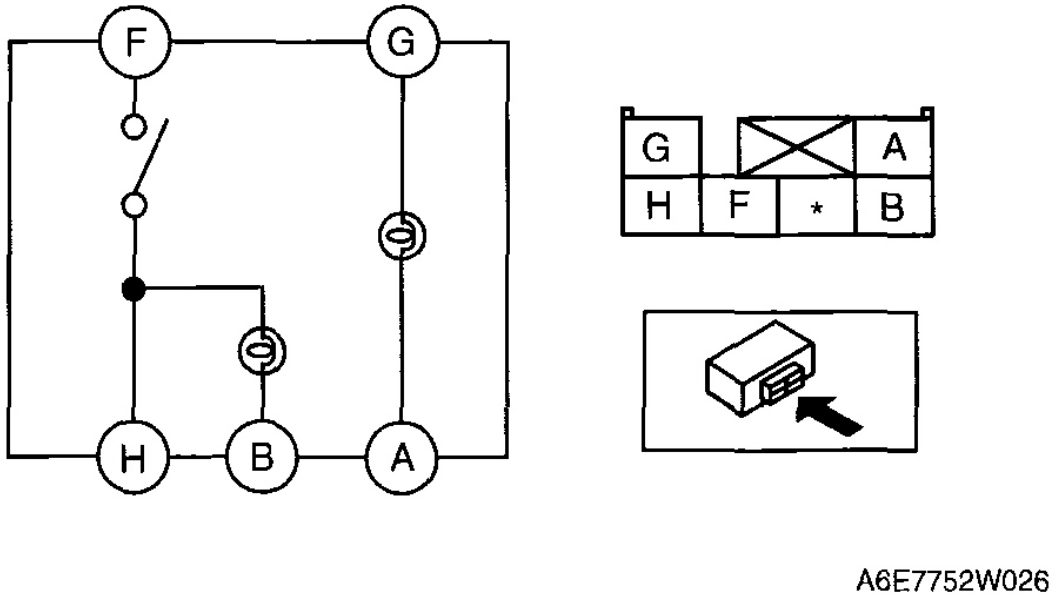


Fig. 12: Identifying Seat Warmer Switch Connector (Passenger's Side)
Courtesy of MAZDA MOTORS CORP.

SEAT WARMER UNIT INSPECTION

1. Remove the seat. (See **SEAT REMOVAL/INSTALLATION** .)
2. Remove the seat cushion trim. (See **SEAT DISASSEMBLY/ASSEMBLY** .)

3. While inspecting for continuity between the terminals A and B of the connector, use a dryer to warm the thermostat of the seat warmer unit on seat cushion.

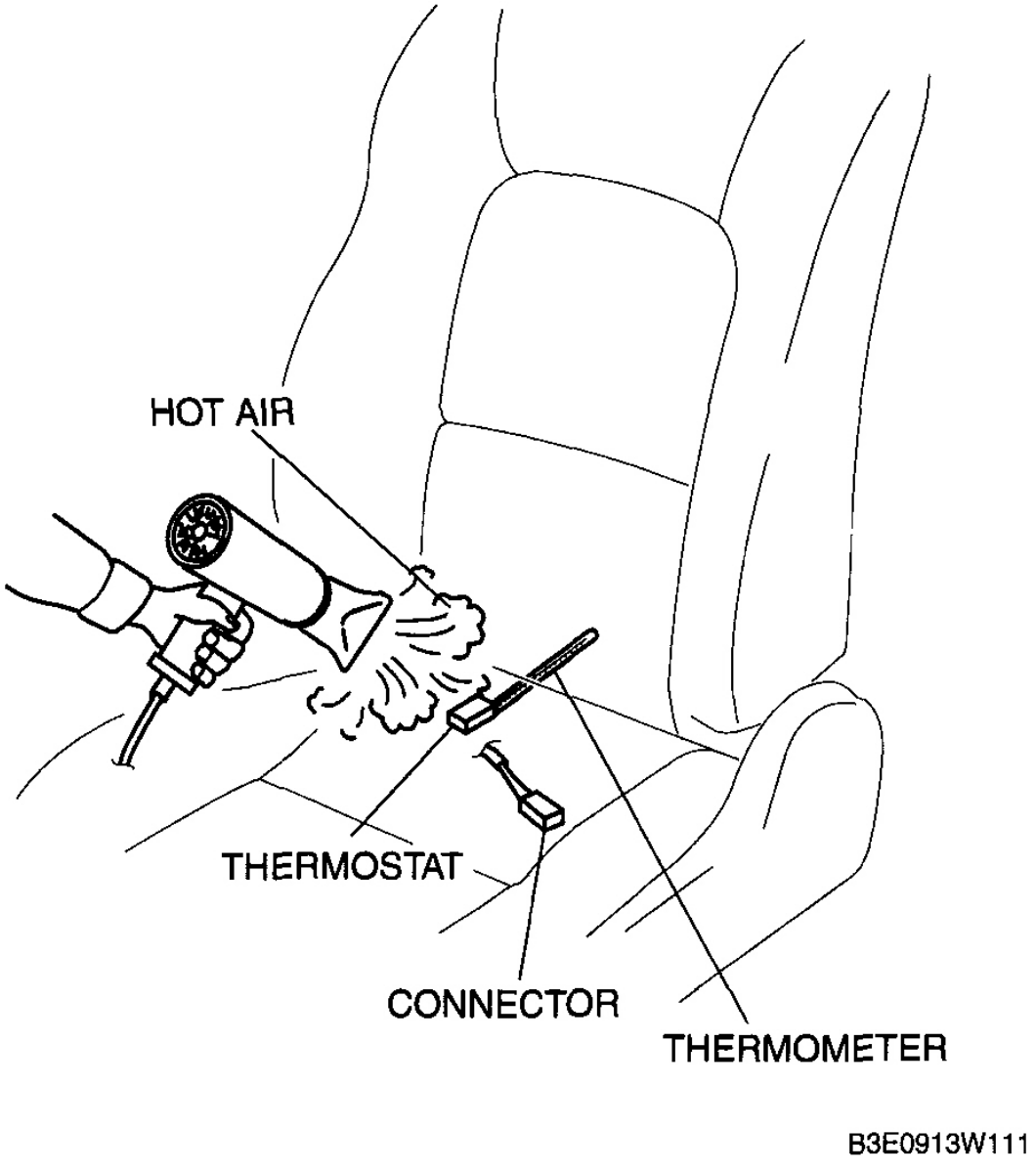


Fig. 13: Applying Hot Air To Thermostat Of Seat Warmer Unit On Seat Cushion
Courtesy of MAZDA MOTORS CORP.

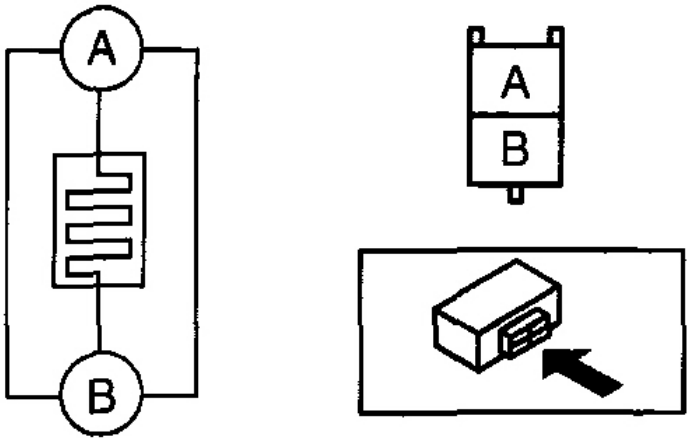
4. Verify that the continuity between the seat warmer terminals is as indicated in **Fig. 14** .
   - If not as indicated in **Fig. 14** , replace the seat warmer unit.

: Continuity

Thermostat temperature	Terminal	
	A	B
More than approx. 37—43 °C {99—109 °F}		
Less than approx. 27—33 °C {81—91 °F}	○——	——○

E5U913ZW5004

Fig. 14: Seat Warmer Unit Continuity Table
Courtesy of MAZDA MOTORS CORP.



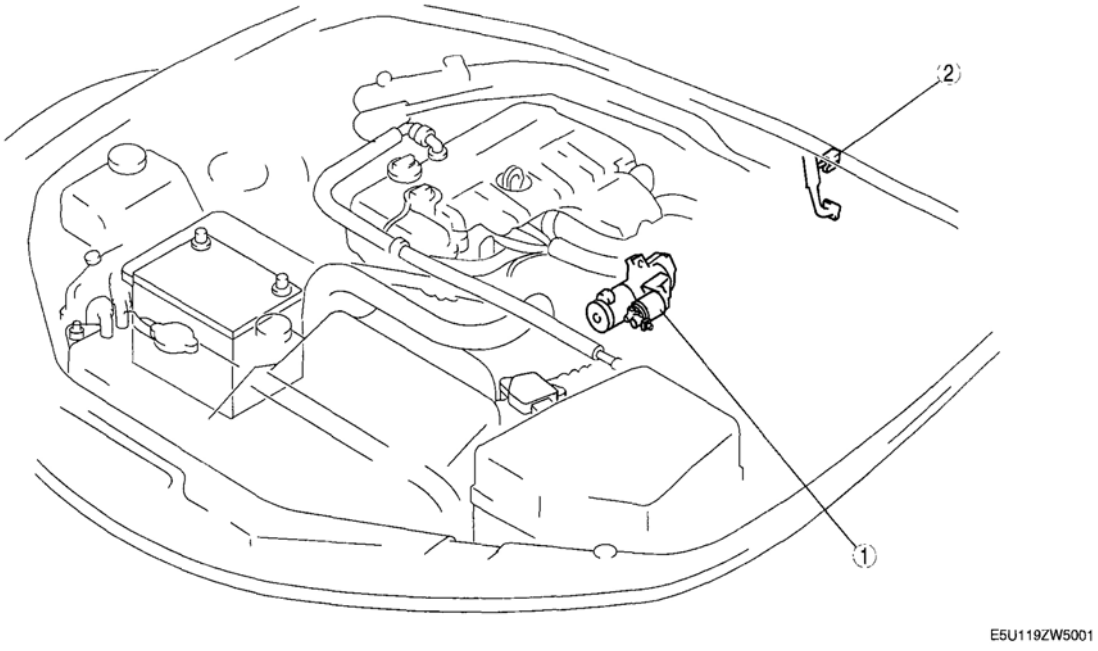
B3E0913W112

Fig. 15: Identifying Seat Warmer Connector
Courtesy of MAZDA MOTORS CORP.

2007 ENGINE

Starting System - MX-5 Miata

STARTING SYSTEM LOCATION INDEX [LF]



1	Starter
2	Starter interlock switch (MT)

Fig. 1: Identifying Location Of Starting System Components
Courtesy of MAZDA MOTORS CORP.

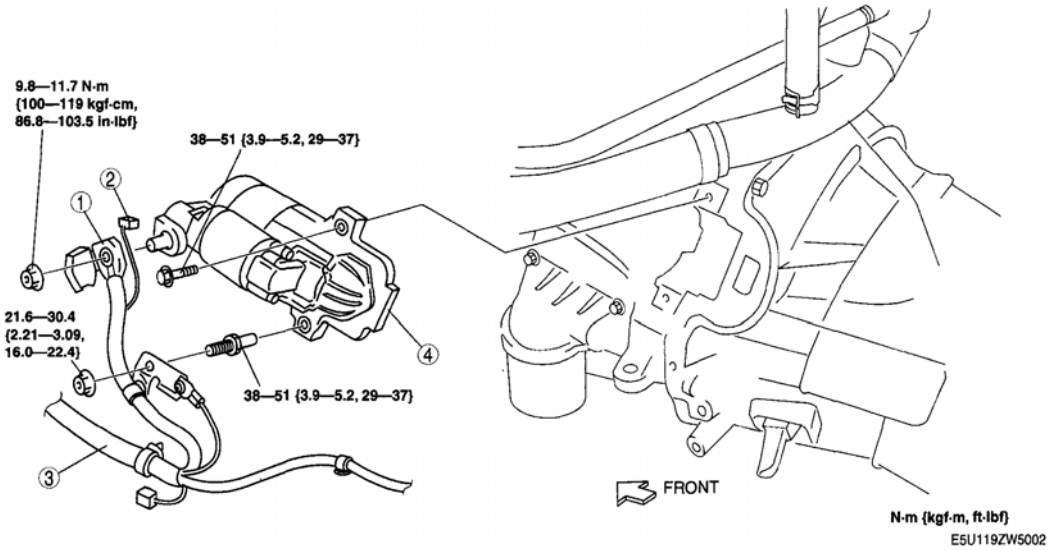
STARTER REMOVAL/INSTALLATION [LF]

WARNING:

- **Remove and install all parts when the engine is cold, otherwise they can cause severe burns or serious injury.**
- **When the battery cables are connected, touching the vehicle body with starter terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the negative battery cable before performing the following operation.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the side cover. (LH)

4. Remove the under cover. (MT) (See **TRANSVERSE MEMBER REMOVAL/INSTALLATION** .)
5. Remove the clutch release cylinder with the pipes still connected. Position the clutch release cylinder so that it is out of the way. (MT) (See **TRANSMISSION REMOVAL/INSTALLATION [M15M-D]** .) (See **TRANSMISSION REMOVAL/INSTALLATION [P66M-D]** .)
6. Remove in the order indicated in **Fig. 2** .
7. Install in the reverse order of removal.



1	Terminal B cable	3	Wiring harness and bracket
2	Terminal S connector	4	Starter

Fig. 2: Identifying Removal Order Of Starter (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

STARTER INSTALLATION NOTE

NOTE:

- **If there is peeling on or damage to the insulator, attach a new insulator using the following procedure:**

1. Peel off the insulator from the starter completely using a scraper.

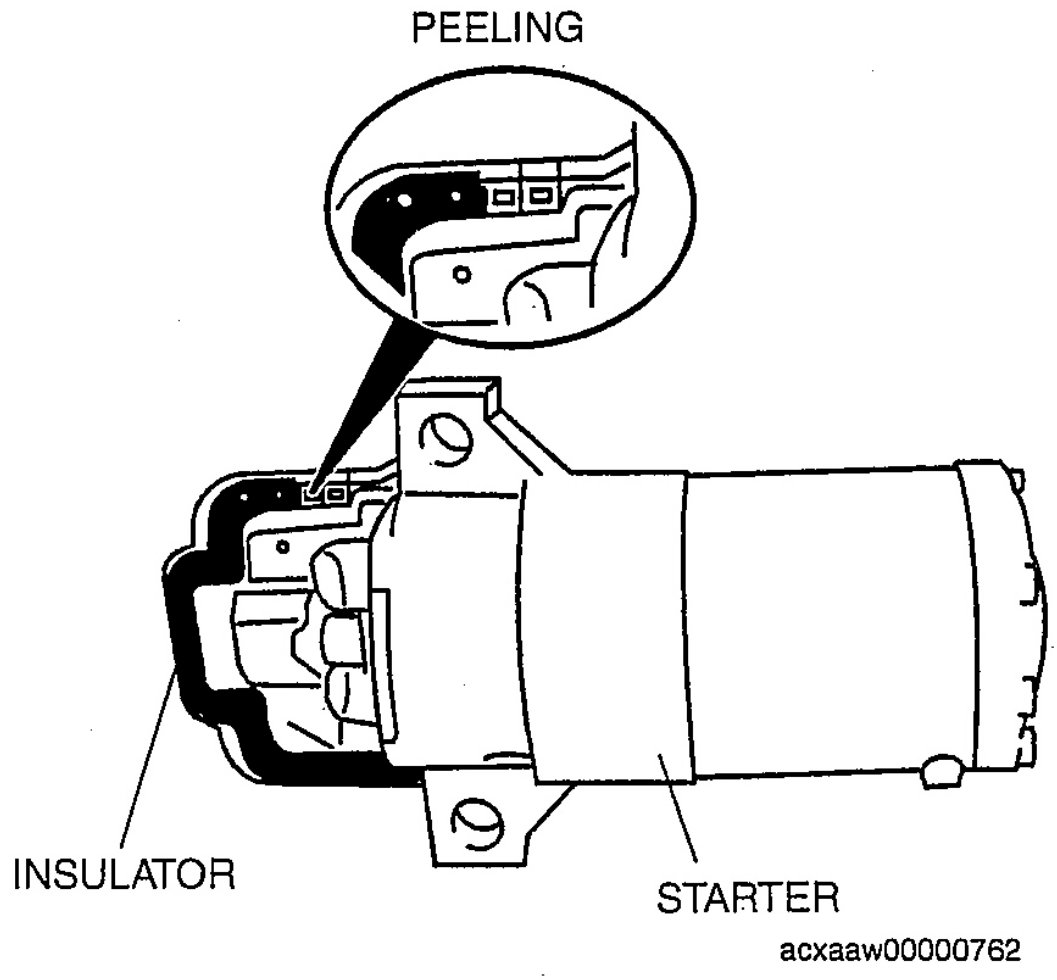


Fig. 3: Identifying Starter Insulator

2. Degrease the insulator attachment area.

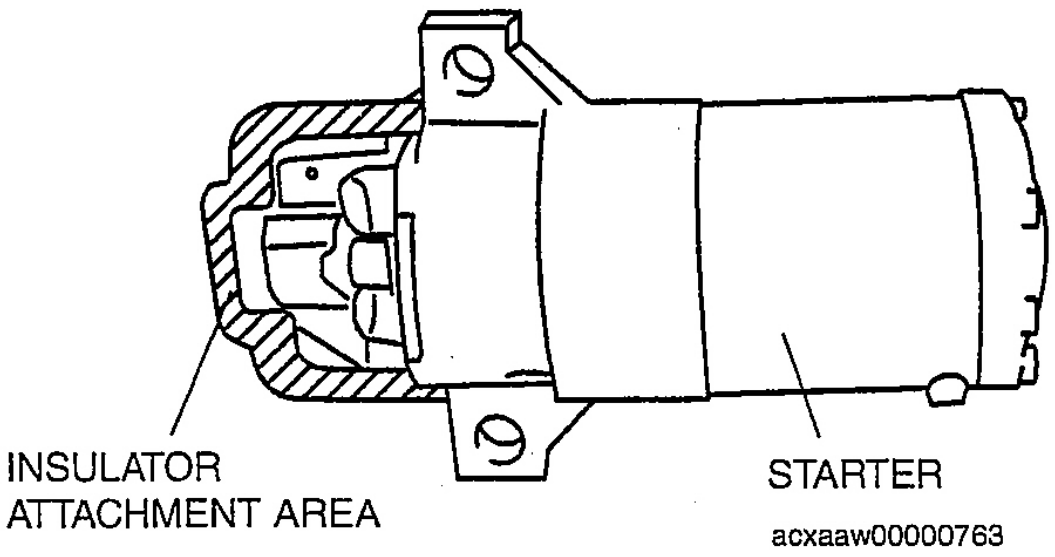


Fig. 4: Identifying Insulator Attachment Area

3. Attach a new insulator to the starter.

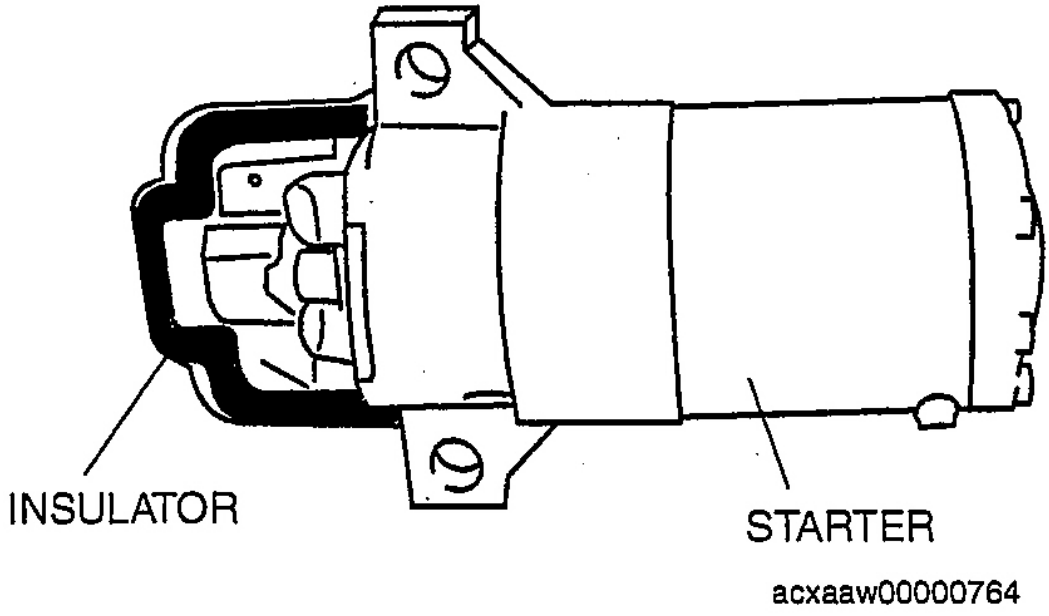


Fig. 5: Identifying New Starter Insulator

STARTER INSPECTION [LF]

ON-VEHICLE INSPECTION

1. Verify that the battery is fully charged.
2. The starter is normal if it rotates smoothly and without any noise when the engine is cranked.
    - If the starter does not operate, inspect the following:
        - Remove the starter, and inspect the starter unit.
        - Inspect the related wiring harnesses, the ignition switch, and the transmission range switch (AT).

NO-LOAD TEST

1. Verify that the battery is fully charged.
2. Connect the starter, battery and a tester as shown in **Fig. 6** .
3. Operate the starter and verify that it rotates smoothly.
    - If the starter does not rotate smoothly, inspect the starter unit.
4. Measure the voltage and current while the starter is operating.
    - If not within the specification, replace the starter.

    Starter no load test voltage

    11 V

    Starter no load test current

    90 A or less

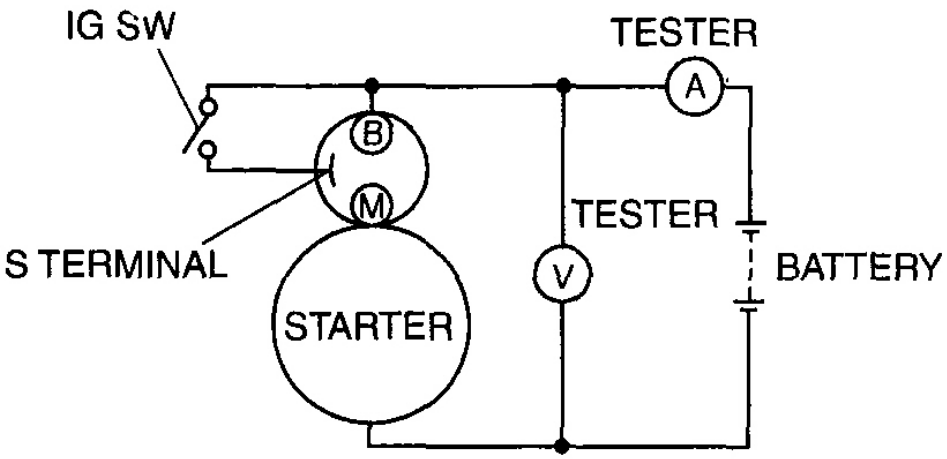


Fig. 6: No-Load Test - Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

MAGNETIC SWITCH OPERATION INSPECTION

Pull-out Test

NOTE:

- **Depending on the battery charge condition, the starter motor pinion may rotate while in an extended state. This is due to current flowing to the starter motor through the pull-in coil to turn the starter motor, and does not indicate an abnormality.**

1. Verify that the starter motor pinion is extended while battery positive voltage is connected to terminal S and the starter body is grounded.
   - If the starter motor pinion is not extended, repair or replace the starter.

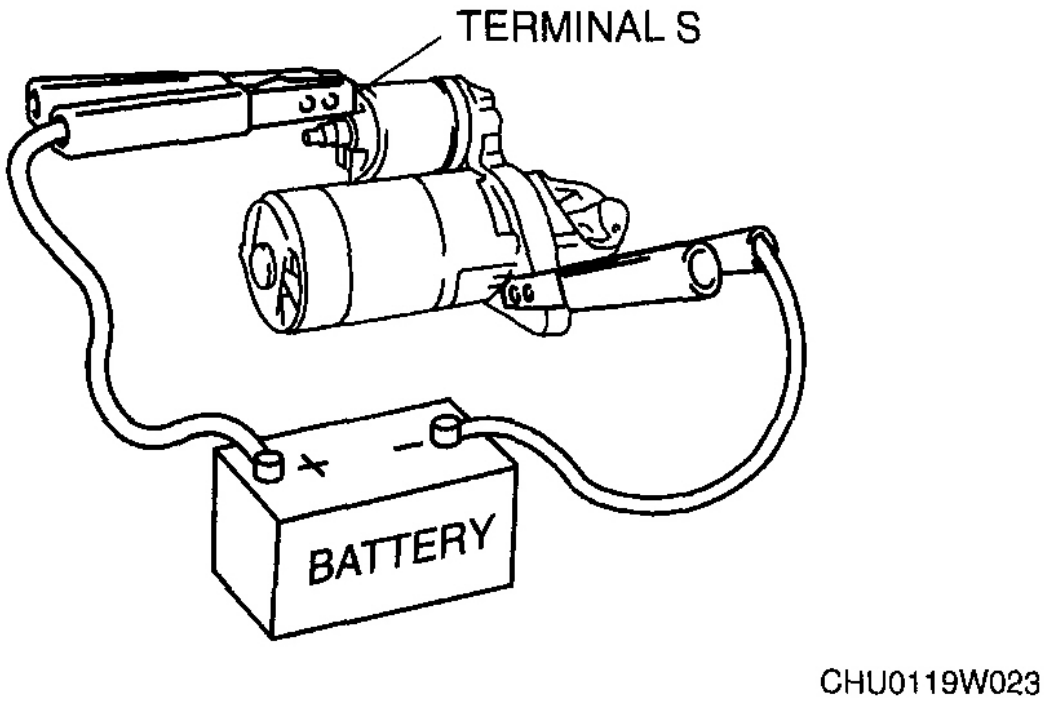


Fig. 7: Energizing Starter S Terminal
Courtesy of MAZDA MOTORS CORP.

Return test

1. Disconnect the motor wire from terminal M.
2. Connect battery positive voltage to terminal M and ground the starter body.

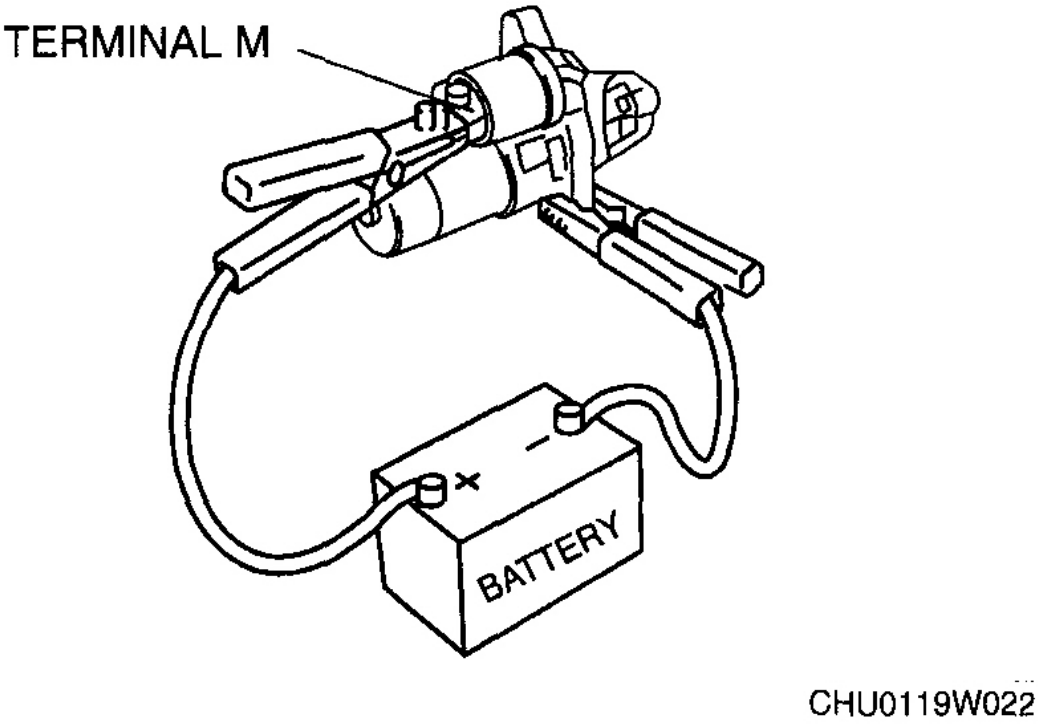


Fig. 8: Connecting Battery Positive Voltage To Terminal M And Ground Starter Body
Courtesy of MAZDA MOTORS CORP.

3. Pull out the drive pinion with a screwdriver. Verify that it returns to its original position when released.
   - If it does not return, repair or replace the starter.

PINION GAP INSPECTION

1. Pull out the drive pinion with the battery positive voltage connected to terminal S and the starter body grounded.

CAUTION:
- **Applying power for more than 10 s can damage the starter. Do not apply power for more than 10s.**

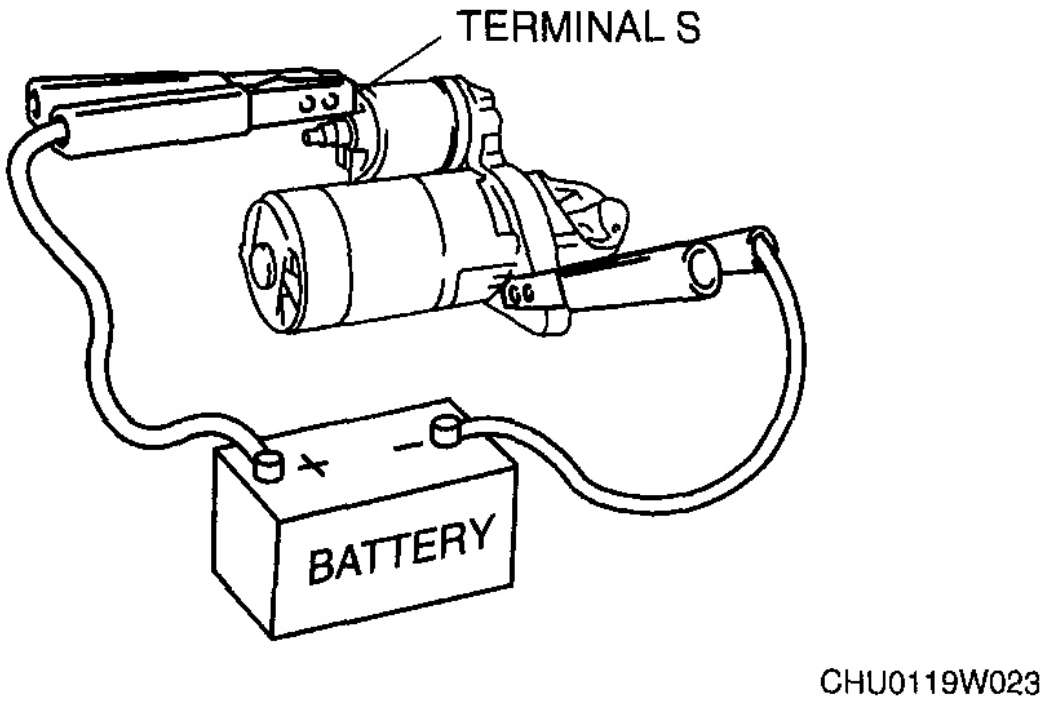


Fig. 9: Energizing Starter S Terminal
Courtesy of MAZDA MOTORS CORP.

2. Measure the pinion gap while the drive pinion is extended.
    - If not as specified, adjust with an adjustment washer (between drive housing front cover and magnetic switch).

Starter pinion gap

0.5-2.0 mm {0.02-0.07 in}

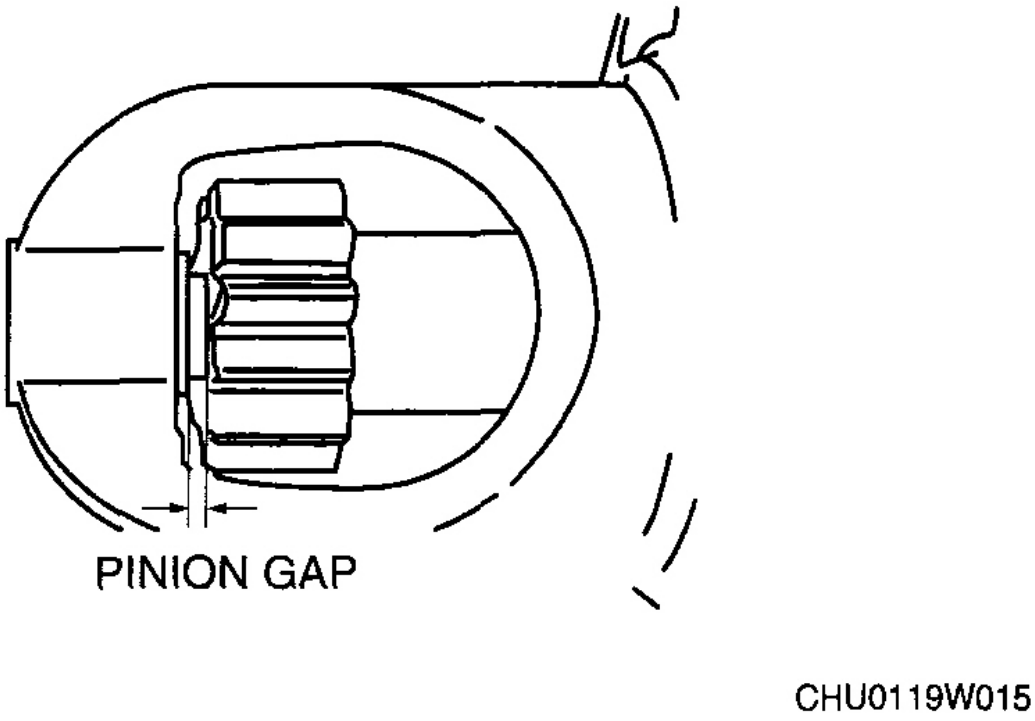


Fig. 10: Measuring Pinion Gap While Drive Pinion Is Extended
Courtesy of MAZDA MOTORS CORP.

STARTER INNER PARTS INSPECTION

Armature

1. Verify that there is no continuity between the commutator and the core at each segment using a tester.
    - If there is continuity, replace the armature.

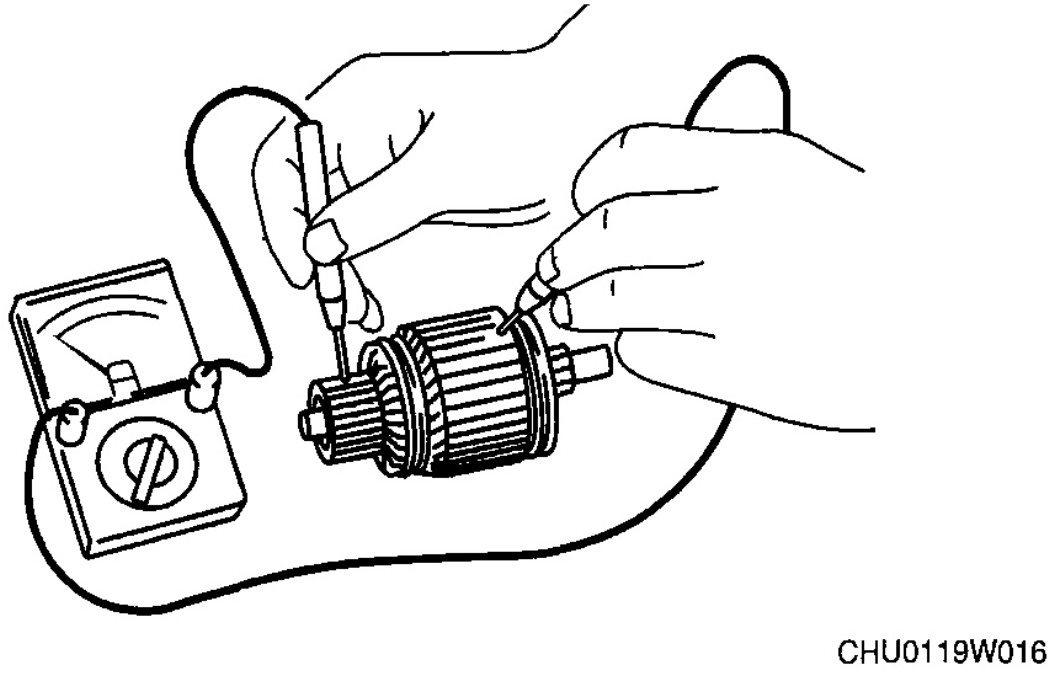


Fig. 11: Verifying If There Is No Continuity Between Commutator & Core
Courtesy of MAZDA MOTORS CORP.

2. Verify that there is no continuity between the commutator and the shaft using a tester.
    - If there is continuity, replace the armature.

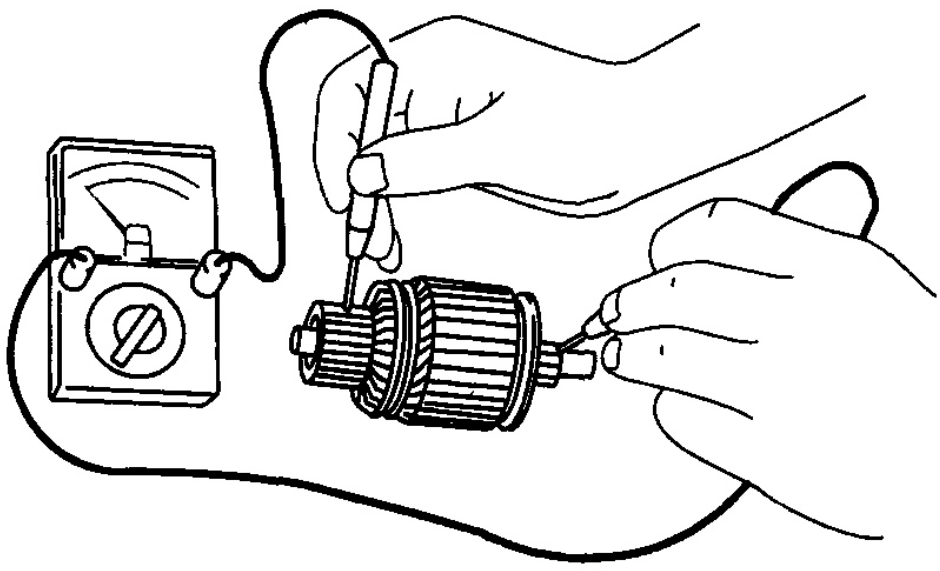


Fig. 12: Verifying There Is No Continuity Between Commutator & Shaft
Courtesy of MAZDA MOTORS CORP.

3. Place the armature on V-blocks, and measure the runout using a dial indicator.

   Starter armature runout

   0.1 mm {0.004 in} max.

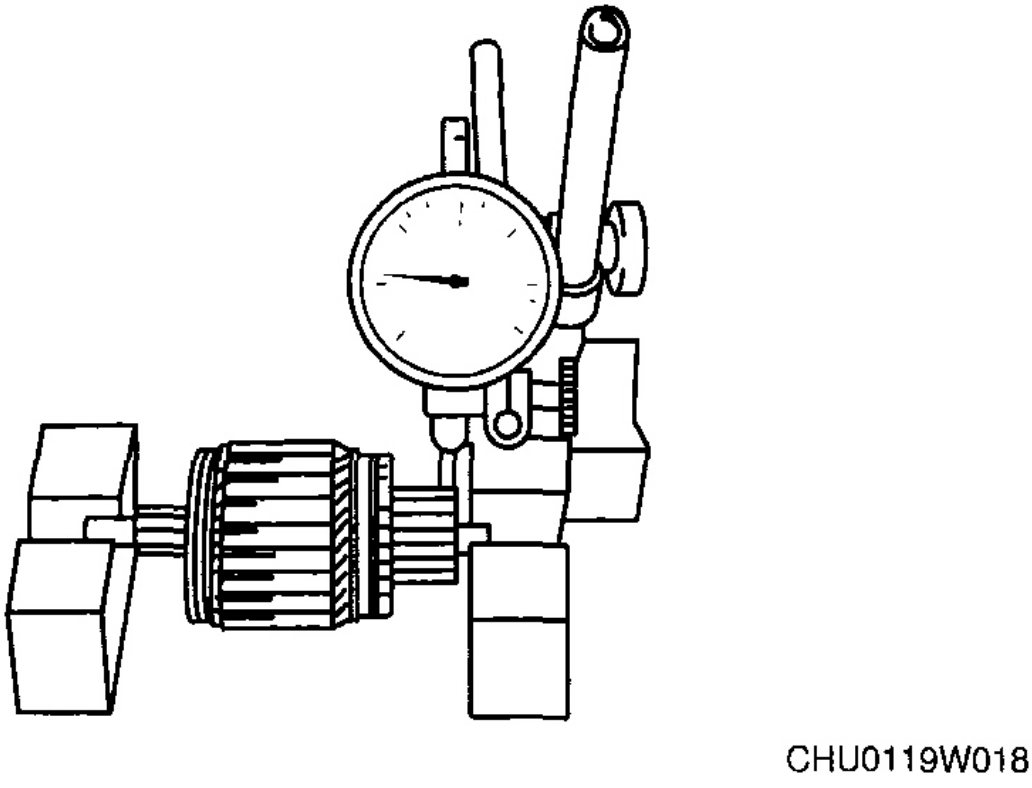


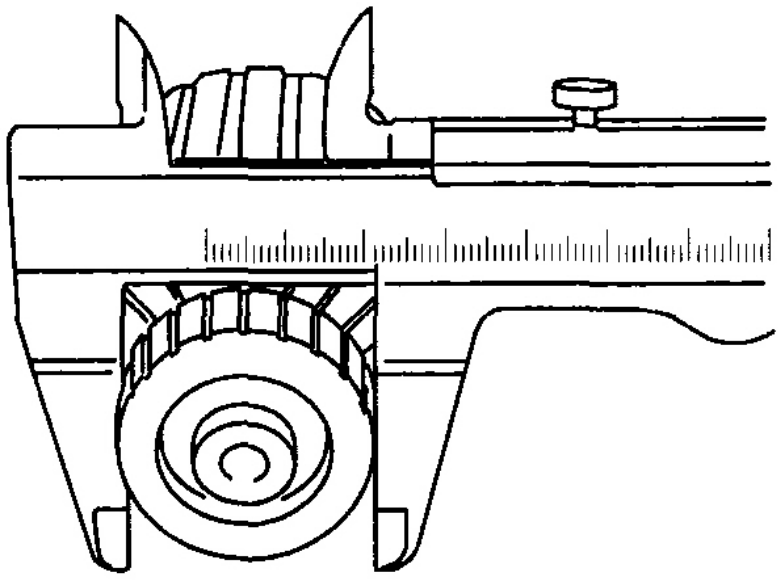
Fig. 13: Measuring Armature Runout Using Dial Indicator
Courtesy of MAZDA MOTORS CORP.

4. Measure the commutator diameter.
    - If not within the minimum specification, replace the armature.

Starter commutator diameter

Standard: 29.4 mm {1.16 in}

Minimum: 28.8 mm {1.13 in}



CHU0119W019

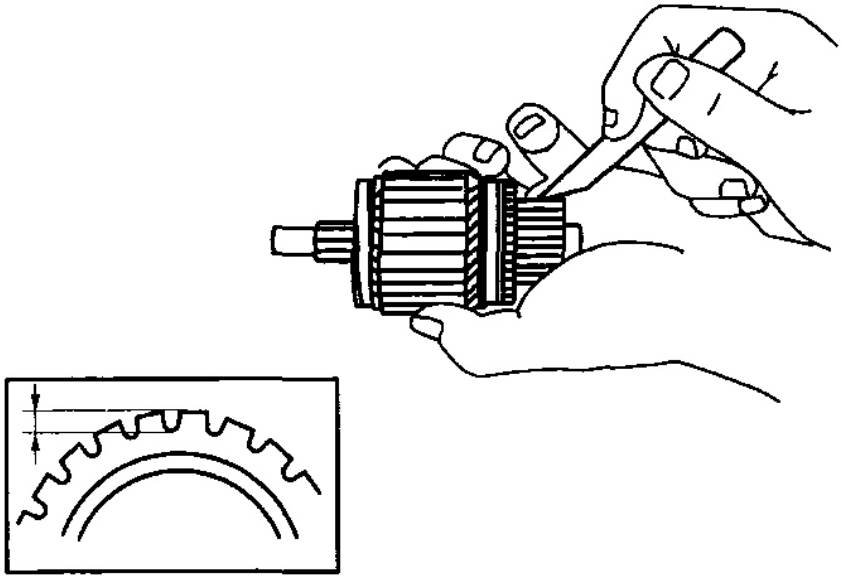
Fig. 14: Measuring Commutator Diameter
Courtesy of MAZDA MOTORS CORP.

5. Measure the segment groove depth of the commutator.
   - If not within the minimum specification, undercut the grooves to the standard depth.

Segment groove depth of starter commutator

Standard: 0.5 mm {0.02 in}

Minimum: 0.2 mm {0.008 in}



CHU0119W020

Fig. 15: Measuring Segment Groove Depth Of Commutator
Courtesy of MAZDA MOTORS CORP.

Magnetic Switch

1. Inspect for continuity between terminals S and M using a tester.
    - If there is no continuity, replace the magnetic switch.

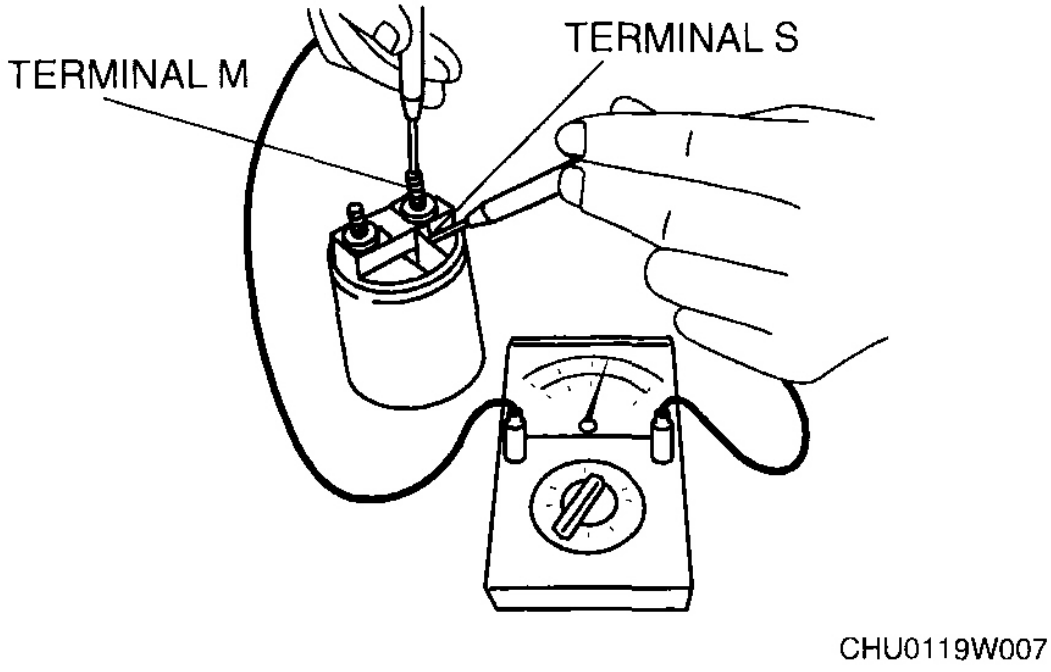


Fig. 16: Verifying If There Is Continuity Between Terminals S & M
Courtesy of MAZDA MOTORS CORP.

2. Inspect for continuity between terminal S and the body using a tester.
    - If there is no continuity, replace the magnetic switch.

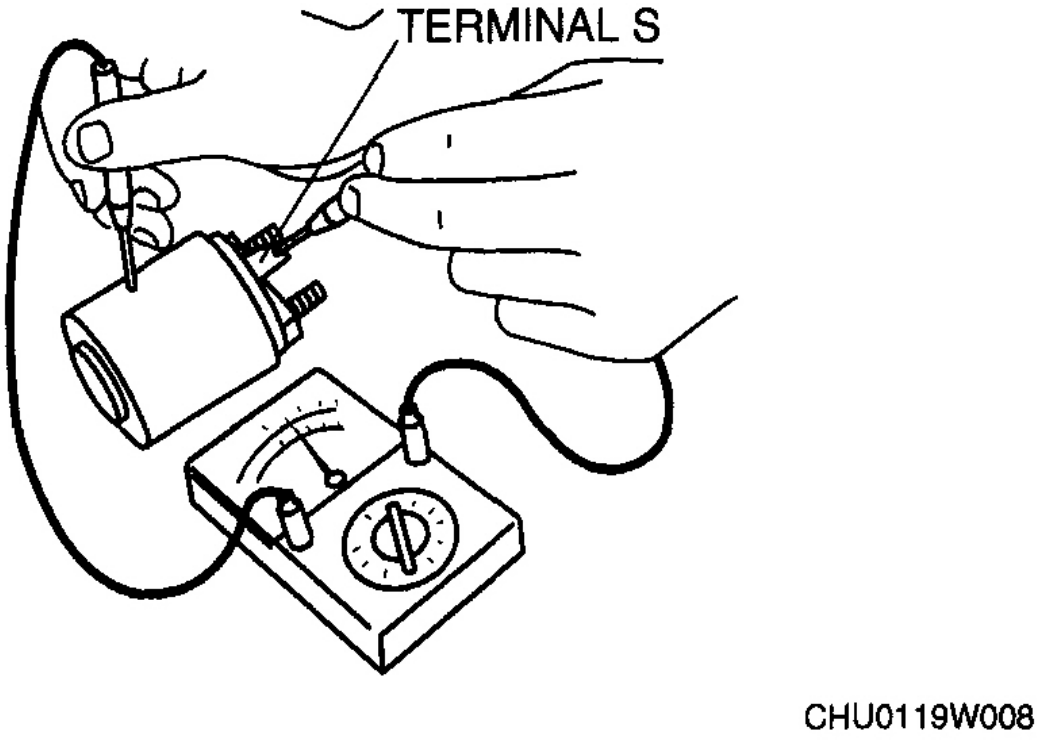


Fig. 17: Verifying If There Is Continuity Between Terminal S & Body
Courtesy of MAZDA MOTORS CORP.

3. Verify that there is no continuity between terminals M and B using a tester.
    - If there is continuity, replace the magnetic switch.

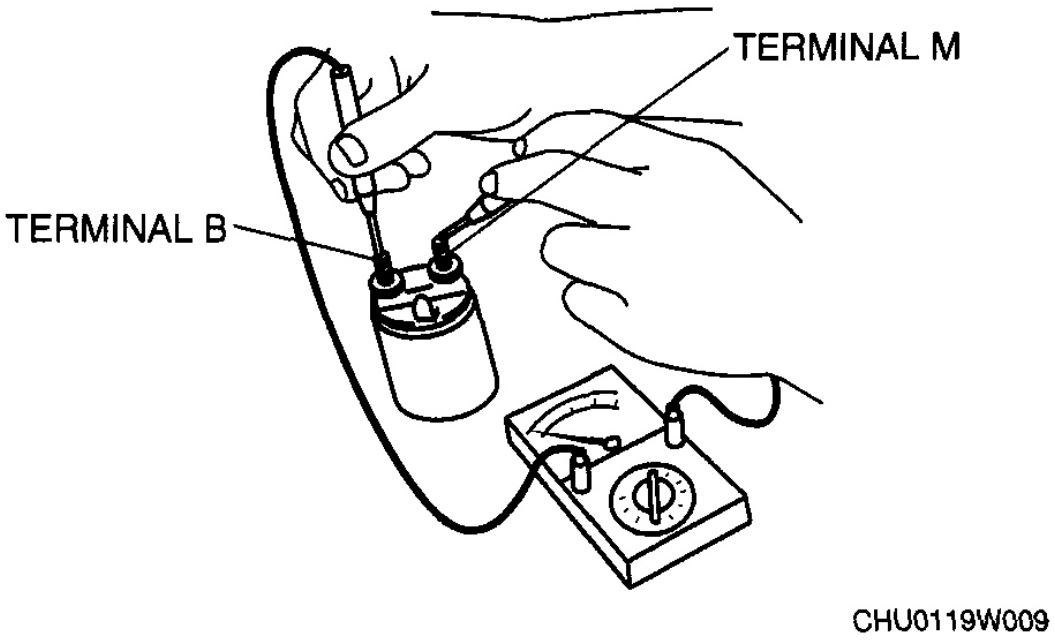
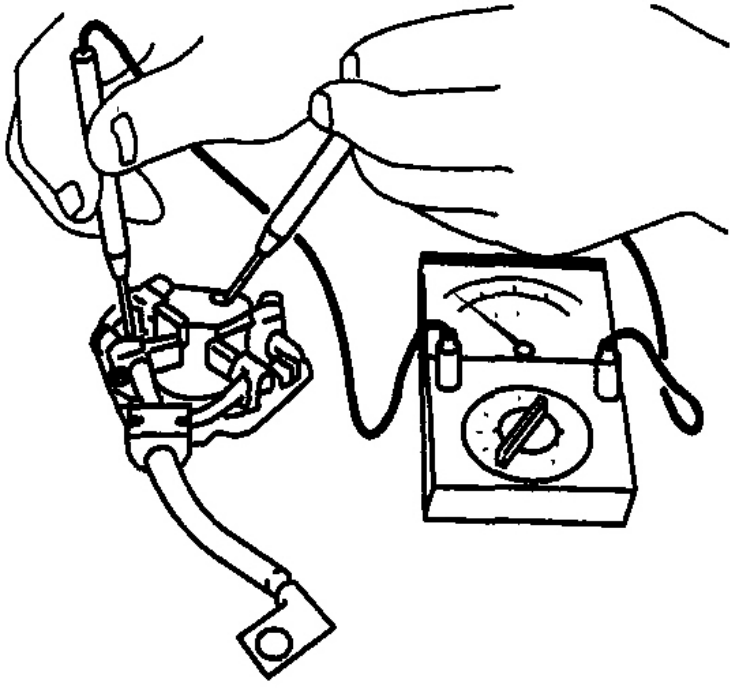


Fig. 18: Verifying If There Is No Continuity Between Terminals M & B
Courtesy of MAZDA MOTORS CORP.

Brush And Brush Holder

1. Verify that there is no continuity between each insulated brush and plate using a tester.
    - If there is continuity, replace the brush holder.



CHU0119W012

Fig. 19: Verifying If There Is No Continuity Between Insulated Brush & Plate
Courtesy of MAZDA MOTORS CORP.

2. Measure the brush length.
   - If any brush is worn almost to or beyond the minimum specification, replace all of the brushes.

     Starter brush length

     Standard: 12.3 mm {0.48 in}

     Minimum: 5.5 mm {0.22 in}

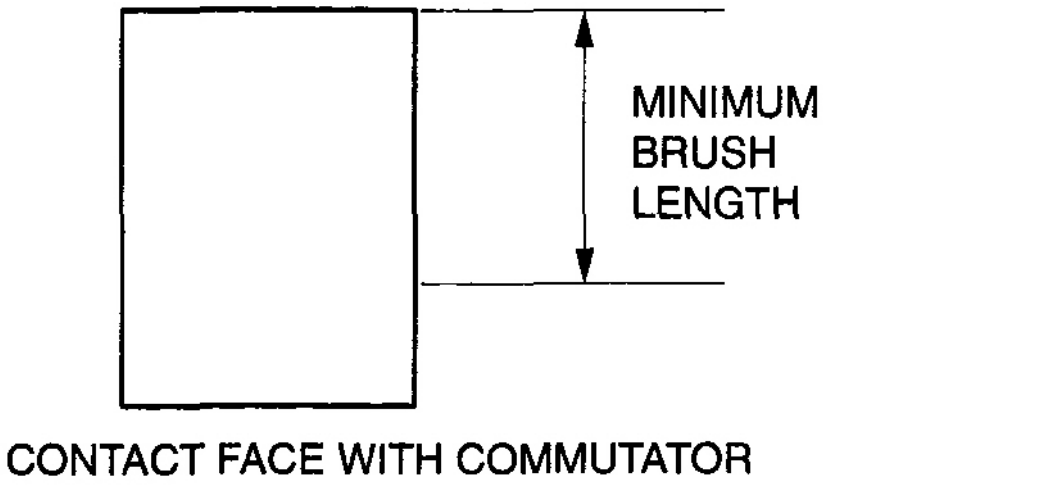


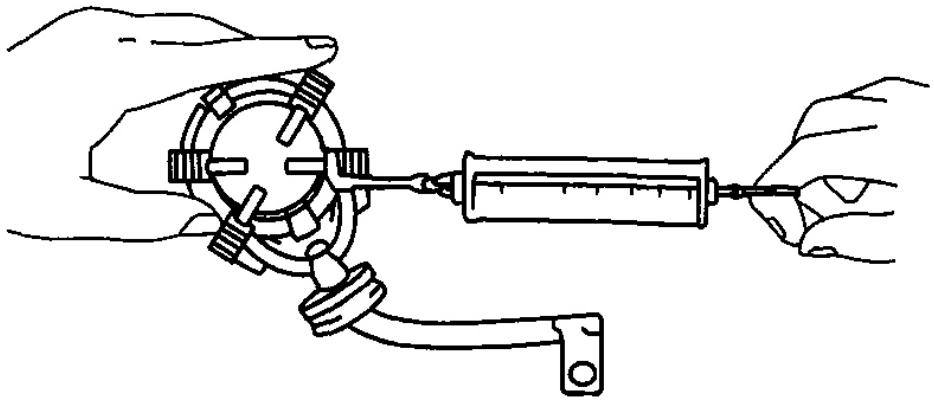
Fig. 20: Measuring Brush Length
Courtesy of MAZDA MOTORS CORP.

3. Measure the brush spring force using a spring balance.
   - If not within the minimum specification, replace the brush and brush holder component.

Starter brush spring force

Standard: 15.0-20.4 N {1.53-2.08 kgf, 3.38-4.58 lbf}

Minimum: 2.75 N {0.28 kgf, 0.62 lbf}

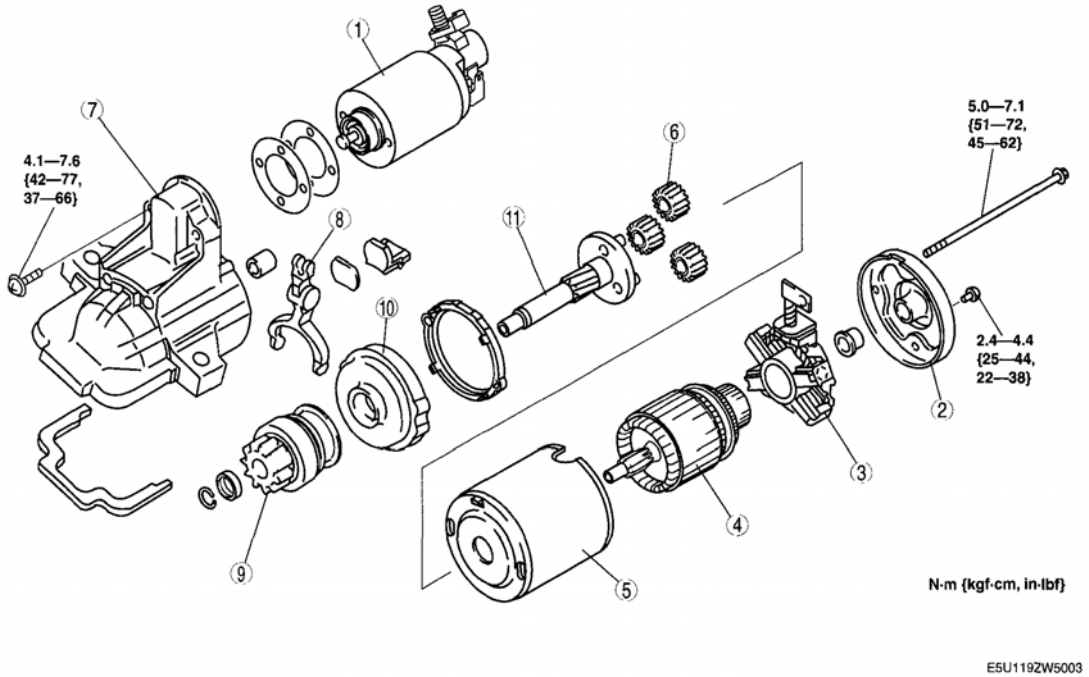


CHU0119W014

Fig. 21: Measuring Brush Spring Force Using Spring Balance
Courtesy of MAZDA MOTORS CORP.

STARTER DISASSEMBLY/ASSEMBLY [LF]

1. Disassemble in the order indicated in **Fig. 22** .
2. Assemble in the reverse order of disassembly.



1	Magnetic switch
2	Rear housing
3	Brush and brush holder
4	Armature
5	Yoke
6	Planetary gear

7	Front cover
8	Lever
9	Drive pinion
10	Internal gear
11	Gear shaft

Fig. 22: Identifying Disassemble Order Of Starter (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

STARTER INTERLOCK SWITCH INSPECTION [MT]

CAUTION:
- **Do not reuse the starter interlock switch if it is removed from the vehicle even once. Replace with a new starter interlock switch when installing.**

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the starter interlock switch connector.
4. Verify that the continuity is as indicated in **Fig. 23** using a tester.
   - If the continuity is not as indicated in **Fig. 23** , replace the starter interlock switch.

○—○ : Continuity

Condition	Terminal	
	A	B
Clutch pedal is depressed	○	○
Clutch pedal is not depressed		

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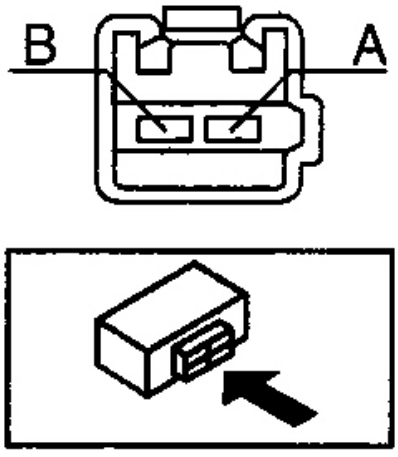
Fig. 23: Starter Interlock Switch Continuity Check Table
Courtesy of MAZDA MOTORS CORP.



B3J0119W006

Fig. 24: Identifying Starter Interlock Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

2007 SUSPENSION

Symptom Troubleshooting - MX-5 Miata

TIRE PRESSURE MONITORING SYSTEM (TPMS) WIRING DIAGRAM

WITH ADVANCED KEYLESS SYSTEM OR KEYLESS ENTRY SYSTEM

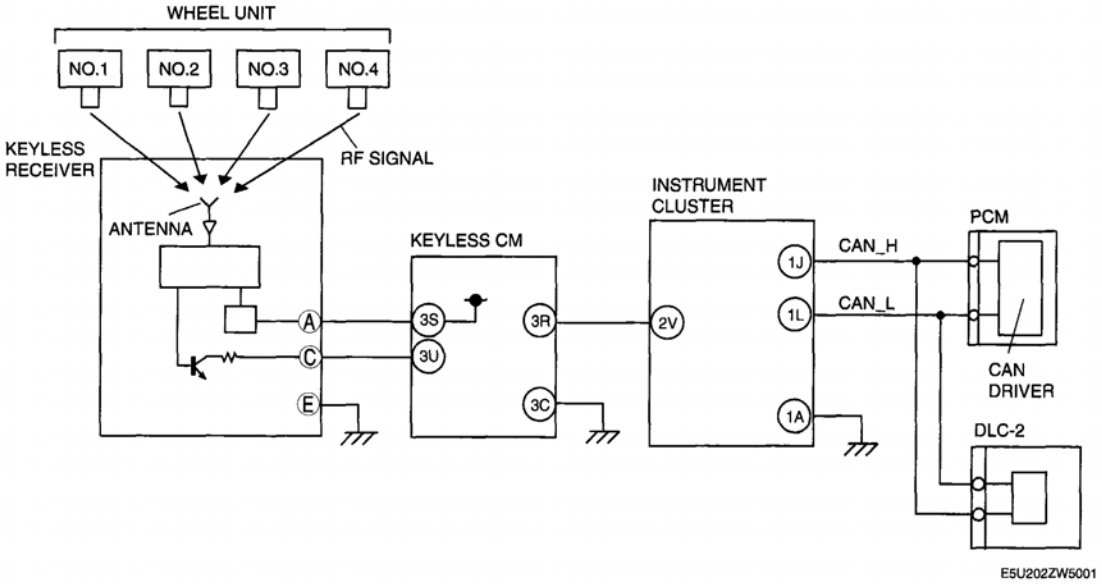


Fig. 1: Tire Pressure Monitoring System (TPMS) Wiring Diagram (With Advanced Keyless System Or Keyless Entry System)
Courtesy of MAZDA MOTORS CORP.

WITHOUT ADVANCED KEYLESS SYSTEM AND KEYLESS ENTRY SYSTEM

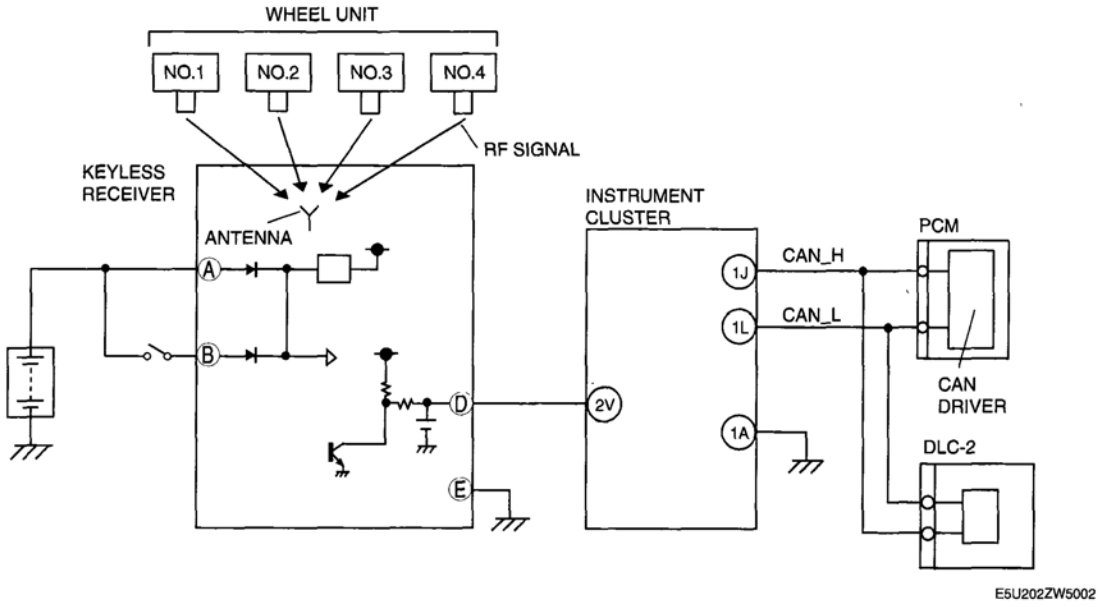


Fig. 2: Tire Pressure Monitoring System (TPMS) Wiring Diagram (Without Advanced Keyless System And Keyless Entry System)
Courtesy of MAZDA MOTORS CORP.

FOREWORD

- Before performing the steps in Symptom Troubleshooting, perform the On-board Diagnostic Inspection. To check the DTC, follow the DTC Inspection steps. (See **DTC TABLE** .)

PRECAUTION

INTERMITTENT CONCERN TROUBLESHOOTING

Vibration Method

- If malfunction occurs or becomes worse while driving on a rough road or when the engine is vibrating, perform the steps below.

NOTE:

- **There are several reasons why vehicle or engine vibration could cause an electrical malfunction. Some of the things to check for are:**
  - **Connectors not fully seated.**
  - **Wire harnesses not having full play.**
  - **Wires laying across brackets or moving parts.**
  - **Wires routed too close to hot parts.**

- An improperly routed, improperly clamped, or loose harness can cause wiring to become pinched

between parts.

- The connector joints, points of vibration, and places where wire harnesses pass through the firewall, body panels and other panels are the major areas to be checked.

Inspection Method for Switch and/or Sensor Connectors or Wires

1. Connect M-MDS or equivalent to DLC-2.
2. Turn the ignition switch to the ON position (engine off).

NOTE:
- **If engine starts and runs, perform the following steps at idle.**

3. Access PIDs for the switch you are inspecting.
4. Turn switch on manually.
5. Shake each connector or wire harness a bit vertically and horizontally while monitoring the PID.
    - If PID value is unstable, check for poor connection.

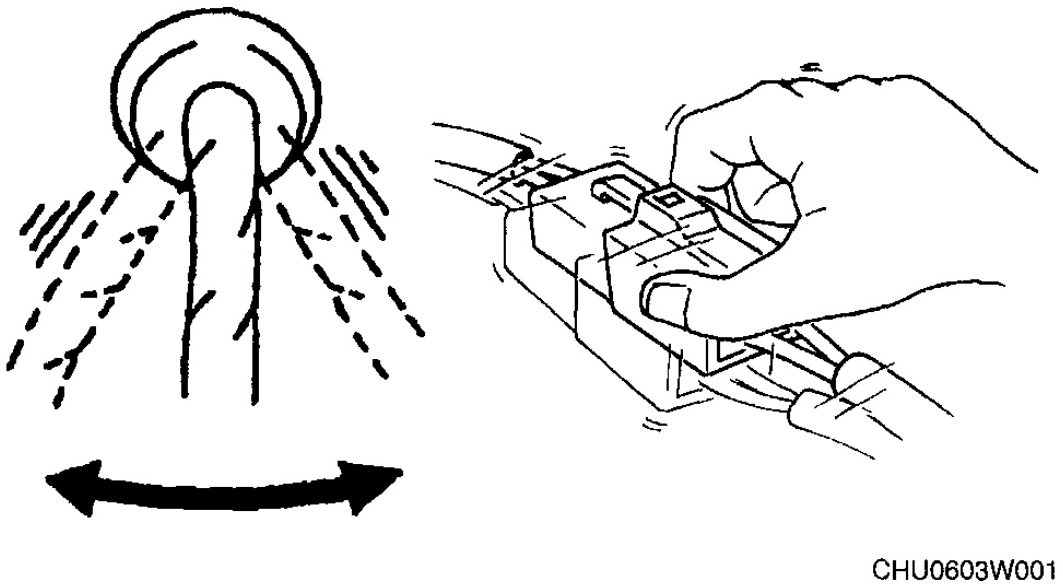


Fig. 3: Shaking Connector Or Wire Harness
Courtesy of MAZDA MOTORS CORP.

Inspection Method for Sensors

1. Connect M-MDS or equivalent to DLC-2.
2. Turn the ignition switch to the ON position (engine off).

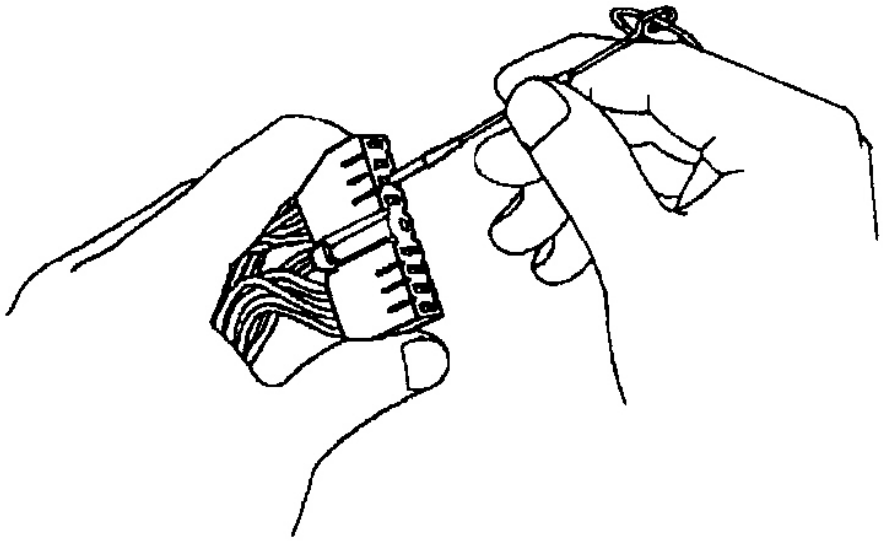
NOTE:

- **If engine starts and runs, perform the following steps at idle.**

3. Access PIDs for the switch you are inspecting.
4. Vibrate the sensor slightly with your finger.
    - If PID value is unstable or malfunction occurs, check for poor connection and/or poorly mounted sensor.

Connector Terminal Check Method

1. Check the connection condition of each female terminal.
2. Insert male terminal; fit the female terminal side to female terminal and check to see whether the malfunction is in the female terminal or not.



CHU0603W002

Fig. 4: Checking Connection Condition Of Female Terminal
Courtesy of MAZDA MOTORS CORP.

SYMPTOM TROUBLESHOOTING

SYMPTOM TROUBLESHOOTING CHART

No.	Symptom
1	TPMS warning light illuminates continuously.
	TPMS warning light (low pressure warning) illuminates after engine start and turns off after driving

2	for a period of time.
3	Flat tire warning light (flat tire warning) illuminates.
4	Wheel unit ID registration cannot be performed (TPMS warning light flashes).

NO.1 TPMS WARNING LIGHT ILLUMINATES CONTINUOUSLY

CAUTION:

- **The tire pressure cannot be measured accurately after driving for a long period due to the internal temperature and pressure. Stop the vehicle for approx. 1 hour and then perform the tire pressure measurement and adjustment.**
- **Use a high accuracy digital gauge for measurement of the tire pressure.**

NOTE:

- **If the DTC clearing procedure is implement, the TPMS warning light turns off.**

SYMPTOM TROUBLESHOOTING HINTS

1	**TPMS warning light illuminates continuously**
[TROUBLESHOOTING HINTS] • Tire pressure is lower than the specification.	

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**INSPECT THE TIRE** • Is there any foreign object adhering to the tire?	Yes	Remove any foreign object. Replace the tire if necessary, and then go to the next step.
		No	Go to the next step.
2	**INSPECT THE TIRE PRESSURE** • Is the tire pressure lower than the specification?	Yes	Adjust the tire pressure to the specification when the engine is cold, and then go tot the next step.
		No	Go to the next step.
3	**DOES THE TPMS WARNING LIGHT TURN OFF?**	Yes	Troubleshooting completed. Explain to the customer what has been repaired.
		No	Go to the next step.
4	**DRIVE THE VEHICLE AT 25 KM/H FOR 10 MIN.** • Does the TPMS warning light turn off?	Yes	Troubleshooting completed. Explain to the customer what has been repaired.
		No	Adjust the tire pressure to the specification, and then return to Step 1. **NOTE:** • **If the TPMS warning light does not turn off**

			after repeating this step, the tire may be flat.

NO. 2 TPMS WARNING LIGHT (LOW PRESSURE WARNING) ILLUMINATES AFTER ENGINE START AND TURNS OFF AFTER DRIVING FOR PERIOD OF TIME

CAUTION:

- **The tire pressure cannot be measured accurately after driving for a long period due to increased internal temperature and pressure. Stop the vehicle for approx. 1 hour and then perform the tire pressure measurement and adjustment.**
- **Use a high accuracy digital gauge for measurement of the tire pressure.**

NOTE:

- **The tire pressure decreases spontaneously by approx. 7 kPa {0.07 kgf/cm^2 , 1.02 psi} per month even if the tire is normal.**
- **The FFD (temperature and pressure) stored when the TPMS warning light is turned on or off can be verified by operating the M-MDS or equivalent.**

SYMPTOM TROUBLESHOOTING HINTS

2	**TPMS warning light (low pressure warning) illuminates after engine start and turns off after driving for a period of time.**
[TROUBLESHOOTING HINTS] • The tire pressure decreases (approaches value to illuminate TPMS warning light) when the internal temperature of the tire is low.	

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**INSPECT THE TIRE** • Is there any foreign object adhering to the tire?	Yes	Remove any foreign object. Replace the tire if necessary, and then go to the next step.
		No	Go to the next step.
2	**MEASURE THE TIRE PRESSURE WHEN THE ENGINE IS COLD** • Has the tire pressure decreased (approaches value to illuminate TPMS warning light)?	Yes	Adjust the tire pressure to the specification, and then go to the next step.
		No	Go to the next step.
3	**IS THE MALFUNCTION CORRECTED?**	Yes	Troubleshooting completed.
		No	Verify troubleshooting again and return to Step 1 if the malfunction recurs.

NO. 3 FLAT TIRE WARNING LIGHT (FLAT TIRE WARNING) ILLUMINATES

NOTE:

- **When the DTC clear command of the M-MDS or equivalent is operated, the flat tire warning light can be turned off.**
- **The FFD (temperature and pressure) stored when the flat tire warning light is turned on or off can be verified by operating the M-MDS or equivalent.**

SYMPTOM TROUBLESHOOTING HINTS

3	**Flat tire warning light (flat tire warning) illuminates.**
[TROUBLESHOOTING HINTS] • Flat tire	

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**IDENTIFY THE FLAT TIRE** • Can the flat tire be identified by a visual check or using a digital gauge?	Yes	Replace the flat tire, and then go tot the next step.
		No	Go to the next step.
2	**DOES THE FLAT TIRE WARNING LIGHT TURN OFF?** • Adjust the tire pressure, and then drive the vehicle at **25 km/h {15.5 mph}** or **more for 10 min of more** .	Yes	Troubleshooting completed.
		No	Verify troubleshooting again and return to Step 1 if the malfunction recurs.

NO.4 WHEEL UNIT ID REGISTRATION CANNOT BE PERFORMED (TPMS WARNING LIGHT FLASHES)

CAUTION:

- **Active the wheel unit ID registration mode using the M-MDS or equivalent, and perform the following steps if the TPMS warning light does not turn off after driving at 25 km/h {15.5 mph} or more for 10 min or more.**

SYMPTOM TROUBLESHOOTING HINTS

4	**Wheel unit ID registration cannot be performed (TPMS warning light flashes).**
[TROUBLESHOOTING HINTS] • New wheel unit malfunction (caused when installing to wheel) • Any malfunction on an old wheel unit which has not been replaced.	

DIAGNOSTIC PROCEDURE

STEP	INSPECTION		ACTION
1	**CAN THE WHEEL UNIT ID REGISTERED?** • Connect the M-MDS or equivalent. • Display the wheel unit ID registration condition (ID and tire pressure table) using the M-MDS or equivalent. • Temporarily remove the battery and reinstall it immediately. **NOTE:** • **If the battery is removed, the tire pressure data for WU_1 to WU_4 stored in the instrument cluster is reset.** • **Pressure is 0 kPa {0 kgf/cm^2 , 0 psi} when it is displayed again using the M-MDS or equivalent.**	Yes	Trouble shooting completed. (Adjust the tire pressure on four wheels, and then return the vehicle to the customer.)
	• Set tire pressure for the four wheels separately. • Perform the wheel unit ID registration again. • Can the ID be registered?	No	Go to the next step.
2	**VERIFY THE WHEEL UNIT ID REGISTRATION CONDITIONS (ID AND TIRE PRESSURE TABLE) USING THE M-MDS OR EQUIVALENT** • Refer to [M-MDS display (example)] to specify wheel unit for which the ID could not be registered. (See **Display Of M-MDS (Example)** .) • Is the wheel unit for which the ID could not be registered a new wheel unit? **CAUTION:** • **ID numbers of WU_1 to WU_4 are updated when wheel on all of four wheels are registered.**	Yes	Replace with a new wheel unit, and then go to Step 4.
		No	Go to the next step.
3	Replace the old wheel unit, and then go to the next step (any malfunction on an old wheel unit which has not been replaced).		
4	**CAN THE WHEEL UNIT ID REGISTERED?** • Perform the wheel unit ID registration using the M-MDS or equivalent.	Yes	Troubleshooting completed.
		No	Verify troubleshooting again and return to Step 1 if the malfunction recurs.

DISPLAY OF M-MDS (EXAMPLE)

Registered ID: 0xAAAAAAAA, 0xBBBBBBBB, 0xCCCCCCCC, and 0xDDDDDDDD (AAAAAAAA, BBBBBBBB, CCCCCCCC, and DDDDDDDD mean arbitrary numbers.) Unregistered ID: 0x00000000

Tire pressure: aaa kPa, bbb kPa, ccc kPa, ddd kPa (aaa, bbb, ccc, and ddd mean measurement value.)

*The battery is removed, the stored tire pressure is reset to 0 kPa.

THREE REGISTERED WHEEL UNITS AND A REPLACED WHEEL UNIT

WHEN A REPLACED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	bbb kPa	ccc kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

WHEN A REGISTERED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	bbb kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN TWO REGISTERED WHEEL UNIT MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN A REPLACED WHEEL UNIT AND A REGISTERED WHEEL UNIT MALFUNCTION

	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	bbb kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

WHEN A REPLACED WHEEL UNIT AND TWO REGISTERED WHEEL UNITS MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD

ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

WHEN THREE REGISTERED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

TWO REGISTERED WHEEL UNITS AND TWO REPLACED WHEEL UNITS

WHEN A REPLACED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	bbb kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN A REGISTERED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0xFFFFFFFF	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	fff kPa	0 kPa	0 kPa

WHEN TWO REPLACED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	bbb kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

WHEN TWO REGISTERED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0xFFFFFFFF	0x00000000	0x00000000
Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	fff kPa	0 kPa	0 kPa

WHEN A REPLACED WHEEL UNIT AND A REGISTERED WHEEL UNIT MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN TWO REPLACED WHEEL UNITS AND A REGISTERED WHEEL UNIT MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

WHEN A REPLACED WHEEL UNIT AND TWO REGISTERED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

A REGISTERED WHEEL UNIT AND THREE REPLACED WHEEL UNITS

WHEN A REGISTERED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0xFFFFFFFF	0xGGGGGGGG	0x00000000
Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	fff kPa	ggg kPa	0 kPa

WHEN A REPLACED WHEEL UNIT MALFUNCTIONS

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0xFFFFFFFF	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	fff kPa	0 kPa	0 kPa

WHEN A REPLACED WHEEL UNIT AND A REGISTERED WHEEL UNIT MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0xFFFFFFFF	0x00000000	0x00000000

Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	fff kPa	0 kPa	0 kPa

WHEN TWO REPLACED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN TWO REPLACED WHEEL UNITS AND A REGISTERED WHEEL UNIT MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0xEEEEEEEE	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	0 kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	eee kPa	0 kPa	0 kPa	0 kPa

WHEN THREE REPLACED WHEEL UNITS MALFUNCTION

-	WU_1	WU_2	WU_3	WU_4
ID Number (Stored)	0xAAAAAAAA	0xBBBBBBBB	0xCCCCCCCC	0xDDDDDDDD
ID Number (Candidate)	0x00000000	0x00000000	0x00000000	0x00000000
Tire Pressure (Stored)	aaa kPa	0 kPa	0 kPa	0 kPa
Tire Pressure (Candidate)	0 kPa	0 kPa	0 kPa	0 kPa

2007 ENGINE PERFORMANCE

Symptom Troubleshooting - MX-5 Miata

SYMPTOM TROUBLESHOOTING WIRING DIAGRAM [LF]

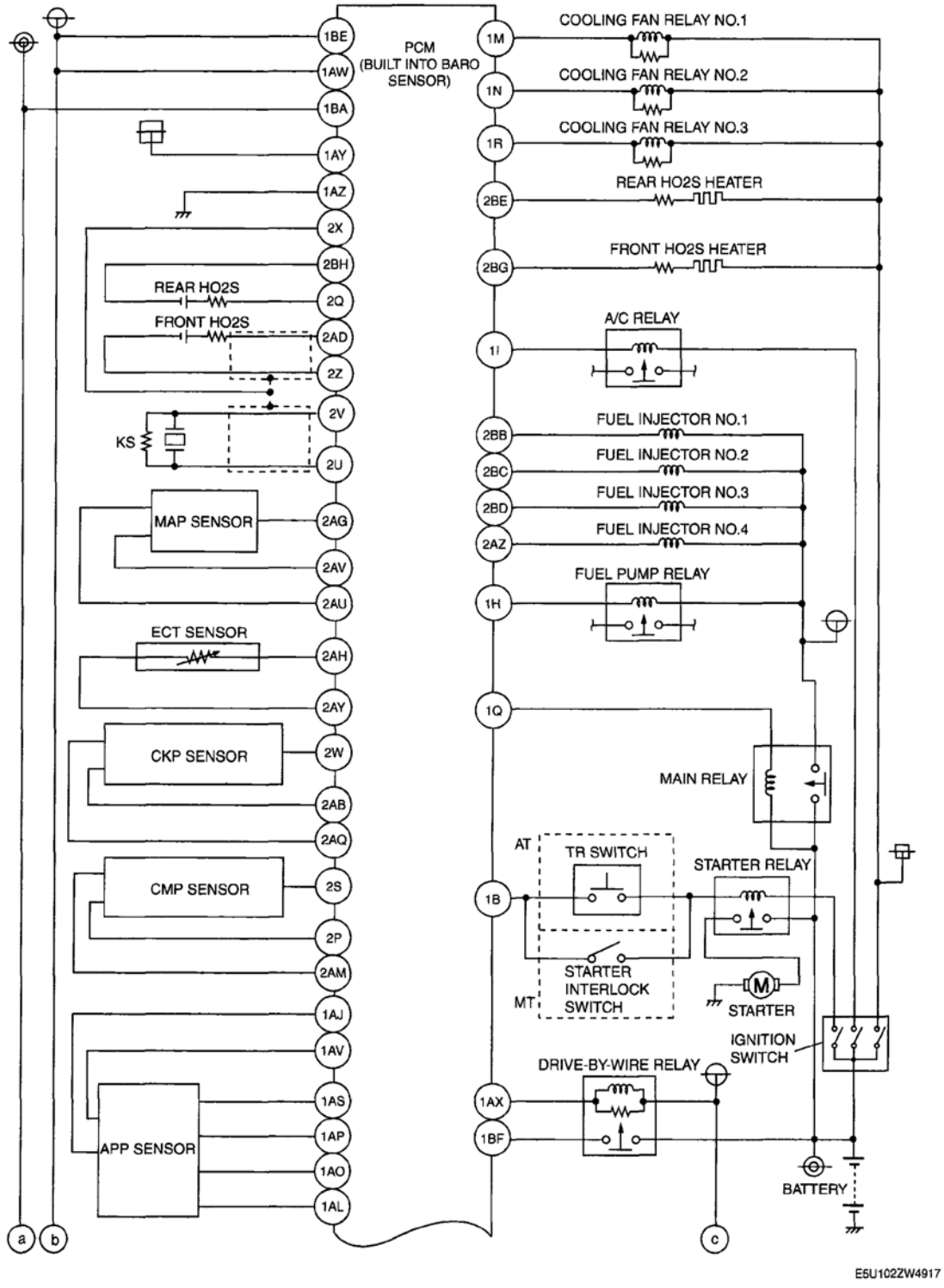


Fig. 1: Symptom Troubleshooting - Wiring Diagram [LF] (1 Of 2)
Courtesy of MAZDA MOTORS CORP.

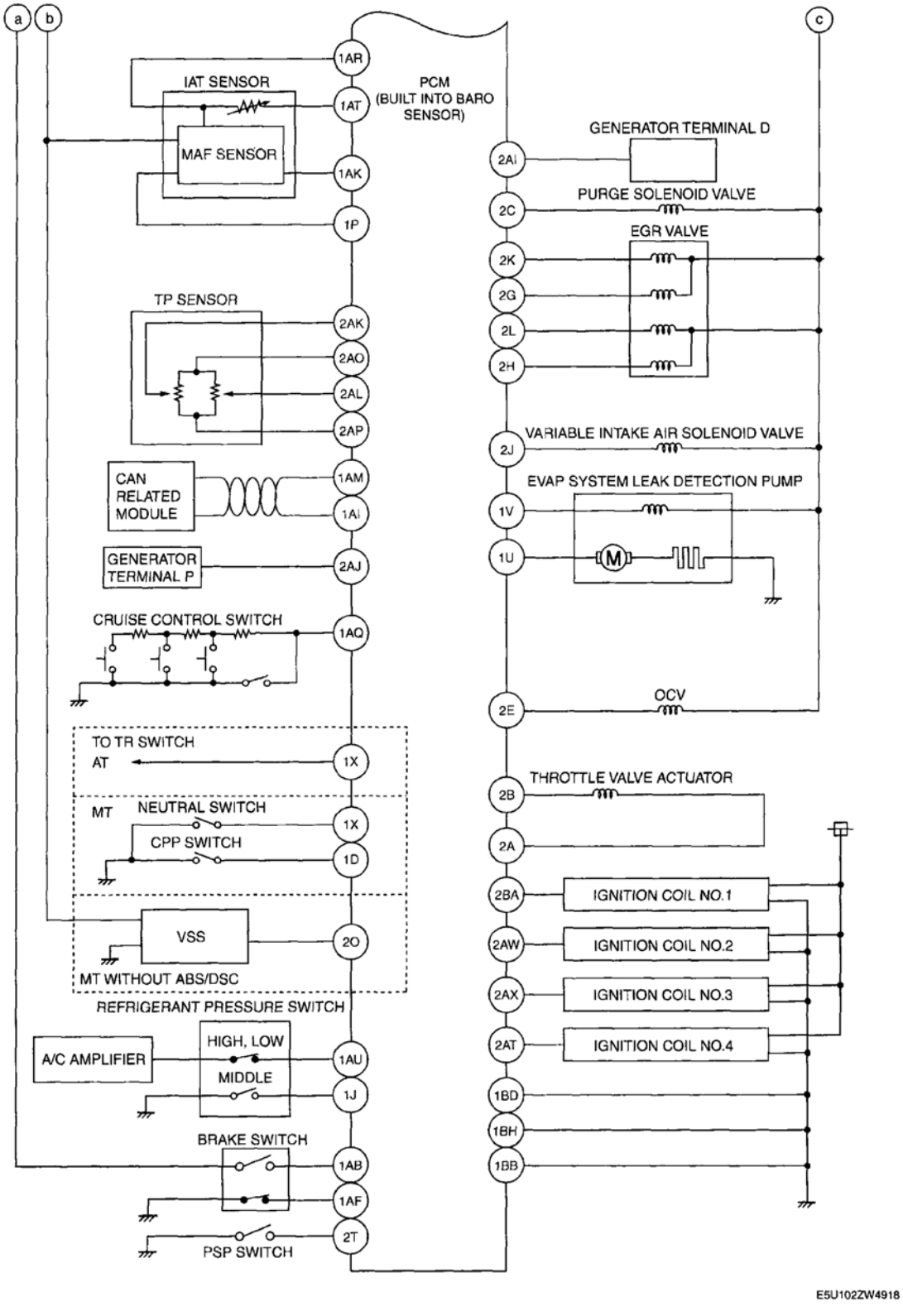


Fig. 2: Symptom Troubleshooting - Wiring Diagram [LF] (2 Of 2)

Courtesy of MAZDA MOTORS CORP.

FOREWORD [LF]

- When the customer reports a vehicle malfunction, check the malfunction indicator lamp (MIL) indication and diagnostic trouble code (DTC), then diagnose the malfunction according to **Fig. 3** :
  - If a DTC exists, diagnose the applicable DTC inspection. (See **DTC TABLE [LF]** .)
  - If no DTC exists and the MIL does not illuminate or flash, diagnose the applicable symptom troubleshooting. (See **QUICK DIAGNOSTIC TABLE [LF]** .)

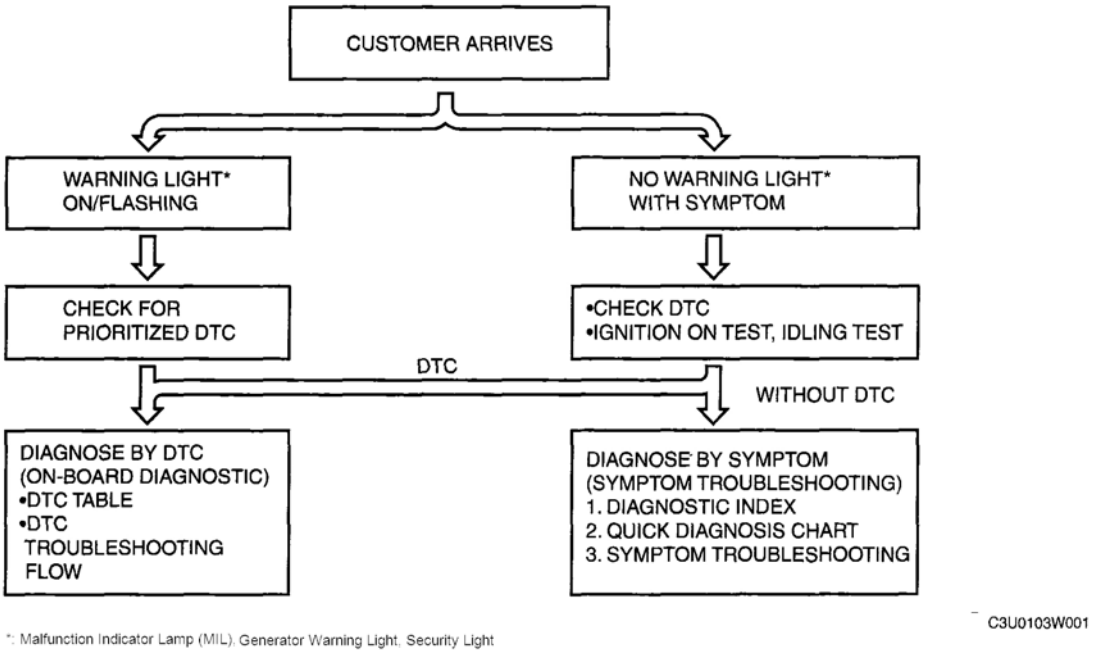


Fig. 3: Malfunction Flow Diagram
Courtesy of MAZDA MOTORS CORP.

ENGINE SYMPTOM TROUBLESHOOTING [LF]

- Confirm trouble symptom using the following diagnostic index, then go to appropriate troubleshooting table.

DIAGNOSTIC INDEX

DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEM	DESCRIPTION	REFERENC
1	Melting of main or other fuses	-	(See **NO.1 MELTIN MAIN OR OTHER [LF]** .)

2	MIL illuminates		The MIL is illuminated incorrectly.	(See **NO.2 MIL ILLUMINATES [LF**
3	Will not crank		The starter does not work.	(See **NO.3 WILL NO CRANK [LF]** .)
4	Hard to start/long crank/erratic start/erratic crank		The starter cranks the engine at normal speed but the engine requires excessive cranking time before starting.	(See **NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC [LF]** .)
5	Engine stalls.	After start/at idle	The engine stops unexpectedly at idle and/or after start or both.	(See **NO.5 ENGINE AFTER START/AT [LF]** .)
6	Cranks normally but will not start		The starter cranks engine at normal speed but the engine will not run.	(See **NO.6 CRANKS NORMALLY BUT NOT START [LF]** .)
7	Slow return to idle		The engine takes more time than normal to return to idle speed.	(See **NO.7 SLOW RE TO IDLE [LF]** .)
8	Engine runs rough/rolling idle		The engine speed fluctuates between the specified idle speed and lower speed and the engine shakes excessively.	(See **NO.8 ENGINE ROUGH/ROLLING [LF]** .)
9	Fast idle/runs on		The engine speed continues at fast idle after warm-up. The engine runs after the ignition switch is turned off.	(See **NO.9 FAST IDI ON [LF]** .)
10	Low idle/stalls during deceleration		The engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.	(See **NO.10 LOW IDLE/STALLS DUR DECELERATION [**
	Engine stalls/quits.	Acceleration/cruise	The engine stops unexpectedly at the beginning of acceleration or during acceleration. The engine stops	

			unexpectedly while cruising.	
	Engine runs rough.	Acceleration/cruise	The engine speed fluctuates during acceleration or cruising.	
	Misses	Acceleration/cruise	The engine misses during acceleration or cruising.	(See **NO.11 ENGINE STALLS/QUITS, EN RUNS ROUGH, MIS BUCK/JERK, HESITATION/STUI SURGES [LF]** .)
11	Buck/jerk	Acceleration/cruise/deceleration	The vehicle bucks/jerks during acceleration, cruising, or deceleration.	
	Hesitation/stumble	Acceleration	A momentary pause at the beginning of acceleration or during acceleration.	
	Surges	Acceleration/cruise	A momentary minor irregularity in engine output.	
12	Lack/loss of power	Acceleration/cruise	The performance is poor under load (such as power down when climbing hills).	(See **NO.12 LACK/L POWER-ACCELERATION/C [LF]** .)
13	Knocking/pinging/detonation	Acceleration/cruise	Sound is produced when the air/fuel mixture is ignited by something other than the spark plug (such as hot spot in combustion chamber).	(See **NO.13 KNOCKING/PINGI ACCELERATION/C [LF]** .)
14	Poor fuel economy		The fuel economy is unsatisfactory.	(See **NO.14 POOR F ECONOMY [LF]** .)
15	Emission compliance		Fails emissions test.	(See **NO.15 EMISSIC COMPLIANCE [LF**
16	High oil consumption/leakage		The oil consumption is excessive.	(See **NO.16 HIGH O CONSUMPTION/LI [LF]** .)
17	Cooling system concerns	Overheating	The engine runs at higher than normal temperature/overheats.	(See **NO.17 COOLIN SYSTEM CONCER OVERHEATING [L**
18	Cooling system concerns	Runs cold	The engine does not reach normal operating temperature.	(See **NO.18 COOLIN SYSTEM CONCER RUNS COLD [LF]** .)
19	Exhaust smoke		Blue, black, or white	(See **NO.19 EXHAUS**

			smoke from exhaust system	**SMOKE [LF]** .)
20	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leakage	(See **NO.20 FUEL O ENGINE COMPAR [LF]** .)
21	Engine noise		Engine noise from under hood	(See **NO.21 ENGINE [LF]** .)
22	Vibration concerns (engine)		Vibration from under hood or driveline	(See **NO.22 VIBRAT CONCERNS (ENGI [LF]** .)
23	A/C does not work sufficiently.		The A/C compressor magnetic clutch does not engage when A/C is turned on.	(See **NO.23 A/C DOI WORK SUFFICIEN [LF]** .)
24	A/C is always on or A/C compressor runs continuously.		The A/C compressor magnetic clutch does not disengage.	(See **NO.24 A/C IS A ON OR A/C COMPI RUNS CONTINUOU [LF]** .)
25	A/C does not cut off under wide open throttle conditions.		The A/C compressor magnetic clutch does not disengage under wide open throttle.	(See **NO.25 A/C DOI CUT OFF UNDER V OPEN THROTTLE CONDITIONS [LF]**
26	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust	(See **NO.26 EXHAU SULPHUR SMELL**
27	Fuel refill concerns		The fuel tank does not fill smoothly.	(See **NO.27 FUEL R CONCERNS [LF]** .)
28	Fuel filling shut off issues		The fuel does not shut off properly.	(See **NO.28 FUEL FI SHUT OFF CONCE [LF]** .)
29	Spark plug condition		An incorrect spark plug condition.	(See **NO.29 SPARK CONDITION [LF]** .)
30	AT concerns	Upshift/downshift engagement	AT concerns not related to engine performance.	(See **SYMPTOM TROUBLESHOOTI ITEM TABLE [SJ6A**

QUICK DIAGNOSTIC TABLE [LF]

X: Applicable

	Troubleshooting item		Possible factor	Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch is open.	Starter interlock switch malfunction (MT)	Improper engine oil level	Low or dead battery	Charging system malfunction	Improper engine compression	Improper valve timing	Hydrolocked engine	Improper engine oil viscosity	Improper dipstick	Base engine malfunction	Drive plate or flywheel are seized.	Improper tension or damaged drive belts	Improper engine coolant level	Water and anti-freeze mixture is improper.	Cooling system malfunction (Radiator, hoses, overflow system, thermostat, etc)	Cooling fan system malfunction	Engine or transaxle mounts are improperly installed.	Cooling fan seat is improper.	Cruise control system operation improperly	Fuel quality
1	Melting of main or other fuses																								
2	MIL illuminates																								
3	Will not crank			x	x	x		x	x			x				x									
4	Hard to start/long crank/erratic start/erratic crank			x																					x
5	Engine stalls.	After start/at idle								x	x														x
6	Cranks normally but will not start									x	x														x
7	Slow return to idle																			x					
8	Engine runs rough/rolling idle									x	x														x
9	Fast idle/runs on																							x	
10	Low idle/stalls during deceleration																							x	
11	Engine stalls/quits.	Acceleration/cruise								x	x													x	x
	Engine runs rough.	Acceleration/cruise								x	x														x
	Misses	Acceleration/cruise								x	x														x
	Buck/jerk	Acceleration/cruise/ deceleration								x	x														x
	Hesitation/stumble	Acceleration								x	x														x
	Surges	Acceleration/cruise								x	x														x
12	Lack/loss of power	Acceleration/cruise								x	x														x
13	Knocking/pinging	Acceleration/cruise								x										x					
14	Poor fuel economy									x	x									x	x				x
15	Emission compliance									x	x				x					x					
16	High oil consumption/leakage												x	x	x										
17	Cooling system concerns	Overheating															x	x	x	x	x				
18	Cooling system concerns	Runs cold																		x	x				
19	Exhaust smoke									x					x					x					
20	Fuel odor (in engine compartment)																								
21	Engine noise					x									x		x								
22	Vibration concerns (engine)																x					x	x		
23	A/C does not work sufficiently.																								
24	A/C is always on or A/C compressor runs continuously.																								
25	A/C does not cut off under WOT conditions.																							x	
26	Exhaust sulfur smell																								x
27	Fuel refill concerns																								
28	Fuel filling shut off issues																								
29	Spark plug condition									x															
30	AT concerns	Upshift/downshift engagement		See TROUBLESHOOTING																					

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Fig. 4: Quick Diagnostic Table (1 Of 4)
Courtesy of MAZDA MOTORS CORP.

X: Applicable

	Troubleshooting item		Variable valve timing system malfunction	Engine overheating	Air cleaner element clogging or restriction	Air leakage from intake-air system (Loose tubes, cracks, gaskets breakage)	Intake air temperature is too hot	Idle learning of electronic throttle control system is not completed	Electronic throttle control improper operation	Throttle body malfunction	Variable intake air system malfunction	Vacuum leakage (Vacuum hose damage, misrouting)	Ignition coil malfunction (e.g. open, short or cracks)	Initial ignition timing misadjustment (CKP sensor &crankshaft pulley misadjustment)	Spark plug malfunction	Erratic signal to ignition coil	CKP sensor is damaged. (e.g. open or short circuits)	Crankshaft pulley is damaged	Improper gap between CKP sensor and crankshaft	Fuel pump malfunction (Mechanically or electrically)	Pressure regulator malfunction	Fuel hoses restriction or clogging
	Possible factor																					
1	Melting of main or other fuses																					
2	MIL illuminates		x						x		x						x					
3	Will not crank																					
4	Hard to start/long crank/erratic start/erratic crank				x	x			x			x			x	x	x	x	x	x	x	x
5	Engine stalls.	After start/at idle	x	x	x	x			x			x	x	x	x	x	x	x	x	x	x	x
6	Cranks normally but will not start		x	x	x	x			x			x	x	x	x	x	x	x	x	x	x	x
7	Slow return to idle									x												
8	Engine runs rough/rolling idle		x	x	x	x		x	x			x		x	x	x	x	x	x	x	x	x
9	Fast idle/runs on					x			x	x												
10	Low idle/stalls during deceleration					x			x			x										
11	Engine stalls/quits.	Acceleration/cruise		x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Engine runs rough.	Acceleration/cruise		x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Misses	Acceleration/cruise		x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Buck/jerk	Acceleration/cruise/ deceleration		x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Hesitation/stumble	Acceleration		x	x	x			x	x		x			x	x	x	x	x	x	x	x
	Surges	Acceleration/cruise		x	x	x			x	x		x			x	x	x	x	x	x	x	x
12	Lack/loss of power	Acceleration/cruise	x	x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x
13	Knocking/pinging	Acceleration/cruise		x																x	x	
14	Poor fuel economy		x		x						x				x	x					x	
15	Emission compliance				x	x				x		x			x	x				x	x	x
16	High oil consumption/leakage																					
17	Cooling system concerns	Overheating																				
18	Cooling system concerns	Runs cold																				
19	Exhaust smoke				x								x		x	x				x	x	x
20	Fuel odor (in engine compartment)																				x	
21	Engine noise					x						x										
22	Vibration concerns (engine)																					
23	A/C does not work sufficiently.																					
24	A/C is always on or A/C compressor runs continuously.																					
25	A/C does not cut off under WOT conditions.																					
26	Exhaust sulfur smell											x								x	x	x
27	Fuel refill concerns																					
28	Fuel filling shut off issues																					
29	Spark plug condition				x										x	x				x	x	x
30	AT concerns	Upshift/downshift engagement	See TROUBLESHOOTING																			

E5U103ZW4002

Fig. 5: Quick Diagnostic Table (2 Of 4)
Courtesy of MAZDA MOTORS CORP.

X: Applicable

	Possible factor / Troubleshooting item		Injectors malfunction (Leakage or clogging, inoperative)	Fuel leakage from fuel system (including insulator, injector O-	Fuel filters restriction or clogging	CMP sensor is damaged. (e.g. open or short circuit)	Camshaft is damaged	Improper air/fuel mixture ratio control	Exhaust system restriction or clogging	Catalytic converter malfunction	EGR system malfunction	EVAP control system malfunction	Fuel-filler cap malfunction	Fuel into evaporative purge hose	Check valve (two-way) malfunction	PCV valve malfunction	Constant voltage supply circuit malfunction	Main relay malfunction (Mechanically or electrically)	PCM or sensor GND circuit open or short	ECT sensor malfunction	TR switch misadjustment (AT)	TR switch malfunction (AT)	Brake switch and related circuit malfunction	Manifold absolute pressure sensor and related circuit malfunction	HO2S and related circuit malfunction
1	Melting of main or other fuses																									
2	MIL illuminates					x		x													x	x		x	x	x
3	Will not crank																					x	x			
4	Hard to start/long crank/erratic start/erratic crank				x	x	x	x	x		x	x				x			x							x
5	Engine stalls.	After start/at idle	x	x		x	x	x	x		x	x				x		x								x
6	Cranks normally but will not start		x	x				x	x		x	x				x	x	x								x
7	Slow return to idle																			x						
8	Engine runs rough/rolling idle		x		x	x	x	x	x		x	x				x			x							x
9	Fast idle/runs on																			x						
10	Low idle/stalls during deceleration							x				x											x	x		x
11	Engine stalls/quits.	Acceleration/cruise	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
	Engine runs rough.	Acceleration/cruise	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
	Misses	Acceleration/cruise	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
	Buck/jerk	Acceleration/cruise/ deceleration	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
	Hesitation/stumble	Acceleration	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
	Surges	Acceleration/cruise	x		x	x	x	x	x		x	x		x	x	x	x	x							x	x
12	Lack/loss of power	Acceleration/cruise	x			x	x		x		x	x				x										
13	Knocking/pinging	Acceleration/cruise				x														x						
14	Poor fuel economy				x	x	x		x							x										
15	Emission compliance				x	x	x	x	x	x	x	x	x			x										x
16	High oil consumption/leakage															x										
17	Cooling system concerns	Overheating																								
18	Cooling system concerns	Runs cold																								
19	Exhaust smoke		x		x											x										
20	Fuel odor (in engine compartment)			x								x														
21	Engine noise																									
22	Vibration concerns (engine)																									
23	A/C does not work sufficiently																									
24	A/C is always on or A/C compressor runs continuously.																									
25	A/C does not cut off under WOT																									
26	Exhaust sulfur smell				x							x														
27	Fuel refill concerns											x														
28	Fuel filling shut off issues											x														
29	Spark plug condition		x	x				x	x			x								x						x
30	AT concerns	Upshift/downshift engagement	See TROUBLESHOOTING																							

E5U103ZW4003

Fig. 6: Quick Diagnostic Table (3 Of 4)
Courtesy of MAZDA MOTORS CORP.

X: Applicable

	Troubleshooting Item		Possible factor: IAT sensor and related circuit malfunction	Barometric pressure sensor malfunction	Neutral or clutch pedal position switch and related circuit malfunction (MTX)	MAF sensor and related circuit malfunction	Knock sensor and related circuit malfunction	TP sensor and related circuit malfunction	Accelerator pedal position sensor and related circuit malfunction	EHPAS and related circuit malfunction	Improper refrigerant charging amount	A/C relay (A/C control signal circuit malfunction)	A/C compressor magnetic clutch malfunction	Condenser fan system malfunction	Improper load signal input	Clutch slippage (MT)	AT related parts malfunction (AT)	VSS and related circuit malfunction	Improper ATF level (AT)	Brake dragging	Loose parts	Improper balance of wheels and tires	Drive line malfunction	Suspension malfunction	Immobilizer system operating (if equipped)	Immobilizer system or related circuit malfunction (if equipped)
1	Melting of main or other fuses																									
2	MIL illuminates		x	x	x	x	x	x		x								x								
3	Will not crank																								x	x
4	Hard to start/long crank/erratic start/erratic crank					x																				
5	Engine stalls.	After start/at idle		x							x	x													x	x
6	Cranks normally but will not start																								x	x
7	Slow return to idle																									
8	Engine runs rough/rolling idle			x						x	x	x		x	x											
9	Fast idle/runs on														x											
10	Low idle/stalls during deceleration				x	x		x	x			x	x													
11	Engine stalls/quits.	Acceleration/cruise		x		x		x	x		x	x				x	x	x								
	Engine runs rough.	Acceleration/cruise		x		x		x	x		x	x				x	x	x								
	Misses	Acceleration/cruise				x		x	x		x	x				x	x	x								
	Buck/jerk	Acceleration/cruise/deceleration				x		x	x		x	x				x	x	x								
	Hesitation/stumble	Acceleration		x		x		x	x		x	x				x	x	x								
	Surges	Acceleration/cruise				x		x	x		x	x				x	x	x								
12	Lack/loss of power	Acceleration/cruise				x		x	x		x	x				x	x	x		x						
13	Knocking/pinging	Acceleration/cruise	x			x	x									x	x	x								
14	Poor fuel economy					x										x			x	x						
15	Emission compliance																									
16	High oil consumption/leakage																									
17	Cooling system concerns	Overheating									x	x		x												
18	Cooling system concerns	Runs cold												x												
19	Exhaust smoke																									
20	Fuel odor (in engine compartment)																									
21	Engine noise																			x						
22	Vibration concerns (engine)																			x	x	x	x			
23	A/C does not work sufficiently.										x	x	x													
24	A/C is always on or A/C compressor runs continuously.											x	x													
25	A/C does not cut off under WOT conditions.								x																	
26	Exhaust sulfur smell																									
27	Fuel refill concerns																									
28	Fuel filling shut off issues																									
29	Spark plug condition					x																				
30	AT concerns	Upshift/downshift engagement	See TROUBLESHOOTING																							

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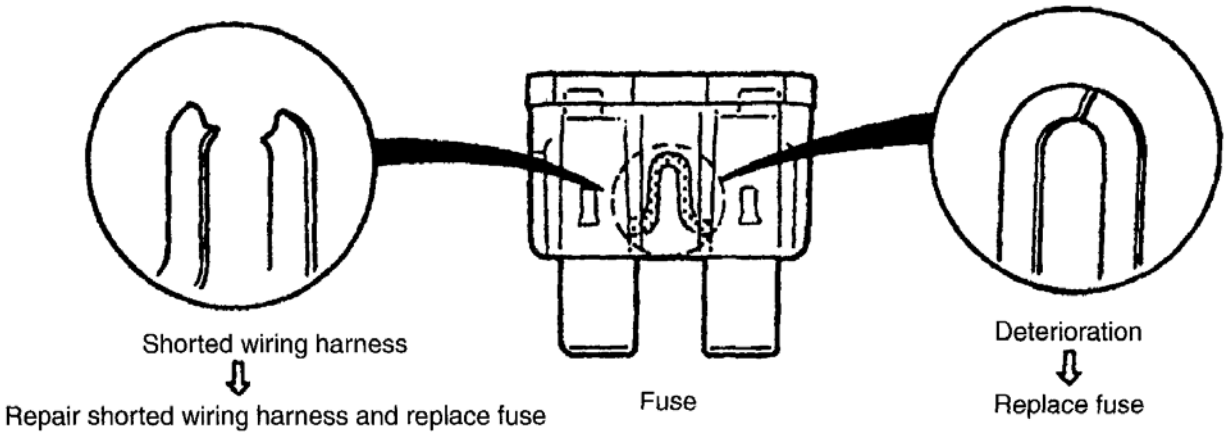
Fig. 7: Quick Diagnostic Table (4 Of 4)
Courtesy of MAZDA MOTORS CORP.

NO.1 MELTING OF MAIN OR OTHER FUSES [LF]

MELTING OF MAIN OR OTHER FUSES POSSIBLE CAUSE

1	**Related wiring harness**

[TROUBLESHOOTING HINTS]
Inspect condition of fuse.



DAMAGED FUSE & RELATED WIRING HARNESS

Damaged fuse	Related wiring harness
MAIN	**MAIN fuse** • ROOM fuse • IG KEY2 fuse • ST fuse • FAN fuse (1) • Generator
ROOM	**ROOM fuse** • DLC-2 • PCM
IG KEY2	**IG KEY2 fuse** • Ignition switch
ST	**ST fuse** • Starter relay

FAN(1)	**FAN fuse**
	• Cooling fan relay No.1
	  ○ Cooling fan motor
	• Cooling fan relay No.2
	  ○ Cooling fan motor

FAN(1)	**FAN fuse**
	• Cooling fan relay No.1
	  ○ PCM
	• Cooling fan relay No.2
	  ○ PCM
	• Cooling fan relay No.3
	  ○ PCM

FUEL PUMP	**FUEL PUMP fuse** • Fuel pump relay ○ Fuel pump
IG KEY1	**IG KEY1 fuse** • Ignition switch ○ METER fuse
METER	**METER fuse** • Ignition relay
ETV	**ETV fuse** • Drive-by-wire relay ○ PCM
EGI COMP1	**EGI COMP1 fuse** • Oil control valve • Purge solenoid valve • Variable intake air control solenoid valve • EGR valve
EGI COMP2	**EGI COMP2 fuse** • Drive-by-wire relay ○ PCM • Evaporative leak detection pump • MAF sensor • VSS (MT without ABS/DSC)
EGI INJ	**EGI INJ fuse** • Fuel injector No.1 • Fuel injector No.2 • Fuel injector No.3

	• Fuel injector No.4
(1) Two FAN fuses differs in a current valve.	

NO.2 MIL ILLUMINATES [LF]

POSSIBLE CAUSE & DESCRIPTION (MIL ILLUMINATES [LF])

2	MIL ILLUMINATES
DESCRIPTION	The MIL is illuminated incorrectly.
POSSIBLE CAUSE	• The PCM illuminates for emission-related concern (DTC is stored in PCM) • Instrument cluster malfunction **NOTE:** • **If the MIL blinks at steady rate, misfire condition could possibly exist.**

DIAGNOSTIC PROCEDURE

MIL ILLUMINATES DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** • Go to appropriate the DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** • Inspect instrument cluster operation. (See **INSTRUMENT CLUSTER INSPECTION** .)
2	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms.		

	(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. ○ If vehicle is repaired, troubleshooting completed. ○ If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.3 WILL NOT CRANK [LF]

POSSIBLE CAUSE & DESCRIPTION (WILL NOT CRANK [LF])

3	WILL NOT CRANK
DESCRIPTION POSSIBLE CAUSE	The starter does not work.
POSSIBLE CAUSE	• Open starter circuit between ignition switch and starter • TR switch malfunction (AT) • TR switch misadjustment (AT) • Low or dead battery • Charging system malfunction. • Starter interlock switch malfunction (MT) • Starter malfunction • Seized/hydrolocked engine, flywheel (MT) or drive plate (AT) • Immobilizer system and/or circuit malfunction • Immobilizer system operating properly. (Ignition key is not registered) • Advanced keyless entry system malfunction

DIAGNOSTIC PROCEDURE

WILL NOT CRANK DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following: • Battery connection • Battery condition • Transaxle is in Park or Neutral.	Yes	Go to the next step.
		No	Service if necessary Repeat Step 1.

	(AT) • Clutch is fully depressed. (MT) • Fuses Are all items normal		
2	**NOTE:** • **The following test should be performed on the advanced keyless entry system. If not equipped, go to the next step.** Start the engine using the mechanical ignition key.Does the engine start?	Yes	Inspect advanced keyless entry system and repair or replace according to inspection result. (See **SYMPTOM TROUBLESHOOTING TABLE [KEYLESS ENTRY SYSTEM]** .)
		No	Go to the next step.
3	Connect the M-MDS or equivalent to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 4.
		No	**Either or other condition appears:** Go to the next step.
4	Turn the ignition switch to the ON position. Is the coil connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 1.
5	Does the security light flush?	Yes	Go to the next step.
		No	Inspect and repair or replace the following: • Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F

			• Instrument cluster (See **INSTRUMENT CLUSTER INSPECTION** .)
6	Connect the M-MDS or equivalent to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module. **DTC** **PCM: B1342, U0073, U0155** **Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214** **Keyless control module (with advanced keyless entry system): B1681, B2103, B1213**	Yes	Go to appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	Go to the next step.
7	Inspect for the following wiring harnesses and connectors: **With advanced keyless entry system** • Between coil terminal A and keyless control module terminal 2S • Between coil terminal B and keyless control module terminal 2Q **Without advanced keyless entry system** • Between coil	Yes	Repair or replace suspected wiring harness and connector.
		No	Go to the next step, (with advanced keyless entry system) Go to the Step 8. (without advanced keyless entry system)

	terminal A and instrument cluster terminal 3AA • Between coil terminal B and instrument cluster terminal 3Y Is there any malfunction?		
8	Inspect the following wiring harnesses and connectors for an open or short circuit: • Between keyless control module terminal 4A and instrument cluster terminal 2Q • Between keyless control module terminal 4C and instrument cluster terminal 2S Is there any malfunction?	Yes	Repair or replace wiring harness and connectors.
		No	Go to the next step.
9	Is there continuity between PCM terminal 1B and starter relay with clutch pedal depressed (MT with starter interlock system), P or N position (AT)?	Yes	Go to the next step.
		No	Repair or replace wiring harness.
10	Is clicking sound heard from starter when the ignition switch is turned to START?	Yes	Go to the next step.
		No	Go to Step 13.
11	Inspect the starting system. (See **STARTER INSPECTION [LF]** .) Is starting system normal?	Yes	Inspect for seized/hydrolocked engine, flywheel or drive plate. (See **FLYWHEEL INSPECTION** .)
		No	Repair or replace components if required.

12	Do any other electrical accessories function?	Yes	Go to the next step.
		No	Inspect the charging system. (See **BATTERY INSPECTION [LF]** .) (See **GENERATOR INSPECTION [LF]** .)
13	**NOTE:** • **The following test should be performed on AT only. For MT, go to the next step.** Connect the M-MDS or equivalent to the DLC-2. Access TR PID.Turn the ignition switch to the ON position.Is TR PID indicated P/N when selecting P or N position?	Yes	Go to the next step.
		No	Inspect adjustment of TR switch. If TR switch is adjusted properly, inspect for open circuit between TR switch and PCM terminal 1B or starter.
14	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See **DTC TABLE [LF]** .) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE • Open circuit in wiring harness between main relay terminal E and PCM terminal 1Q • Main relay is stuck open. • Open or short circuit in wiring harness between

			DLC and PCM terminals 1AM or 1AI • Open or poor GND circuit (PCM terminal 1AZ, 1BH, 1BD, 1BB) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Inspect the following: • START circuit in ignition switch • Open circuit in wiring harness between ignition switch and starter • Starter interlock switch (MT)
15	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.4 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF]

POSSIBLE CAUSE & DESCRIPTION (HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [LF])

4	**HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK**
DESCRIPTION	• The starter cranks engine at normal speed but engine requires excessive cranking time

	before starting. • The battery is in normal condition.
POSSIBLE CAUSE	• Erratic signal to ignition coil • Vacuum leakage • Poor fuel quality • Starting system malfunction • Spark plug malfunction • Air leakage from intake-air system • Erratic signal from CKP sensor • Erratic signal from CMP sensor • Improper air/fuel mixture ratio control • Air cleaner restriction • Improper operation of electronic throttle control system • PCV valve malfunction • Inadequate fuel pressure • Purge solenoid valve malfunction • MAF sensor contamination • Incorrect MAF sensor GND voltage • Restriction in exhaust system • EGR valve malfunction • Pressure regulator malfunction (built-in fuel pump unit) **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.**

	(See BEFORE SERVICE PRECAUTION [LF] .) **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Vacuum leakage • Proper fuel quality (such as proper octane, contamination, winter/summer blend) • Loose bands on intake-air system • Cracks on intake-air system parts • Intake-air system restriction (such as air cleaner element, fresh air duct.) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS or equivalent to the DLC-	Yes	**DTC is displayed:** Go to the appropriate DTC

	2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?		inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting "No.17 Cooling system concerns-Overheating". (See **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]** .)
		No	Go to the next step.
4	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
5	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from fuel injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
6	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
8	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect the electronic throttle control system operation. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .)

		No	Go to the next step.
9	Install the fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and the fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
10	Is the fuel line pressure held after ignition switch is turned off? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See **FUEL INJECTOR INSPECTION [LF]** .) If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
11	Disconnect a vacuum hose from purge solenoid valve and plug opening end of vacuum hose. Start engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open.
		No	Go to the next step.
12	Inspect the MAF sensor for following: • Contamination • MAF sensor terminal B voltage (GND circuit) Is there any contamination?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.

13	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
14	Inspect engine condition while tapping EGR valve housing. Does engine condition improve?	Yes	Replace the EGR valve. (See **EGR VALVE REMOVAL/INSTALLATION [LF]** .)
		No	Go to the next step.
15	Inspect the starting system. (See **STARTER INSPECTION [LF]** .) Is starting system normal?	Yes	Inspect for loose connectors or poor terminal contact. If there is no malfunction, remove EGR valve and visually inspect for mechanically stuck EGR valve.
		No	Repair or replace components as required.
16	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, Replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.5 ENGINE STALLS-AFTER START/AT IDLE [LF]

POSSIBLE CAUSE & DESCRIPTION (ENGINE STALLS-AFTER START/AT IDLE [LF])

5	ENGINE STALLS-AFTER START/AT IDLE
DESCRIPTION	• Engine stops unexpectedly.
	• A/C system operation is improper • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • EGR valve malfunction

POSSIBLE CAUSE	• No signal from CKP sensor due to sensor, related wire or wrong installation • Vacuum leakage • Engine overheating • Low engine compression • Erratic signal to ignition coil • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Electrical connector disconnection • Open or short circuit in fuel pump body and related wiring harness • No battery power supply to PCM or poor GND • Inadequate fuel pressure • Fuel pump body mechanical malfunction • Fuel leakage from fuel injector • Fuel injector clogging • Ignition coil malfunction • Improper air/fuel mixture ratio control • Improper valve timing • Improper operation variable valve timing control system • Immobilizer system and/or circuit malfunction • Immobilizer system operating property. (Ignition key is not registered.) • Pressure regulator malfunction (built-in fuel pump unit) **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.**

  (See BEFORE SERVICE PRECAUTION [LF] .)

  (See AFTER SERVICE PRECAUTION [LF] .)

CAUTION:

- **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

ENGINE STALLS-AFTER START/AT IDLE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Do the following conditions appear? • The engine is not completely started. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 3.
		No	**Either or other condition appears:** Go to the next step.
2	Does the engine stall after **approx. 2s** since the engine is started?	Yes	Go to the next step.
		No	Immobilizer system is normal. Go to Step 8.
3	Is coil connector securely connected to coil?	Yes	Go to the next step.
		No	Connect the coil connector securely.

			Return to Step 2.
4	Does the security light flush?	Yes	Go to the next step.
		No	Inspect and repair or replace the following: • Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F • Instrument Cluster (See **INSTRUMENT CLUSTER INSPECTION**)
5	Connect the M-MDS or equivalent to the DLC-2 and retrieve DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system). Are any of the following DTCs displayed? **DTC** **PCM: B1342, U0073, U0155** **Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, 2139, B2431, U0110, U0214** **Keyless control module (with advanced keyless entry system): B1681, B2103, B1213**	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	Go to the next step.
6	Inspect for the following wiring harnesses and connectors: **With advanced keyless entry system:** • Between coil	Yes	Repair or replace the suspected wiring harness and connector.

	terminal A and keyless control module terminal 3Y • Between coil terminal B and keyless control module terminal 3AA • Between keyless control module terminal 4A and instrument cluster terminal 2Q • Between keyless control module terminal 4C and instrument cluster terminal 2S **Without advanced keyless entry system:** • Between coil terminal A and instrument cluster terminal 2S • Between coil terminal B and instrument cluster terminal 2Q Is there any malfunction?	No	Go to the next step
7	Inspect for the following wiring harnesses and connectors: • Between PCM terminal 1AM and instrument cluster terminal 1J	Yes	Repair or replace the suspected wiring harness and connector.

	• Between PCM terminal 1AI and instrument cluster terminal 1L Is there any malfunction?	No	Go to the next step.
8	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Fuel quality: proper octane, contamination, winter/summer blend • Electrical connections • Smooth operation of throttle valve Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 9.
9	Connect the M-MDS or equivalent to the DLC-2. Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released.	Yes	Go to the next step.
		No	Inspect for the following: • APP sensor • Wiring harnesses and connectors for following:

	Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?		○ PCM terminal 1AJ-APP sensor terminal A ○ PCM terminal 1AV-APP sensor terminal B ○ PCM terminal 1AP-APP sensor terminal C ○ PCM terminal 1AL-APP sensor terminal D ○ PCM terminal 1AS-APP sensor terminal E ○ PCM terminal 1AO-APP sensor terminal F
10	Connect the M-MDS or equivalent to the DLC-2. Access the TP PID. Crank the engine with accelerator pedal released. Are the TP PID indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: • TP sensor • Wiring harnesses and connectors for following: ○ PCM terminal 2AK-TP sensor terminal F ○ PCM terminal 2AO-TP sensor terminal E ○ PCM terminal 2AP-TP sensor terminal C ○ PCM terminal 2AL-TP sensor terminal D
11	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See **DTC TABLE [LF]** .) **Communication error message is displayed:** Inspect for the following:

			• Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE • Open main relay GND circuit • Main relay is stuck open. • Open or short circuit in wiring harness between DLC and PCM terminals 1AM or 1AI • Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BD, 1BH) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
12	Attempt to start engine at part throttle. Does engine run smoothly at part throttle?	Yes	Inspect electronic throttle control system operation. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .)
		No	Go to the next step.
13	Connect the M-MDS or equivalent to the DLC-2. Access RPM PID. Is RPM PID indicating engine speed during engine cranking?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2AB • Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W • Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ • Open or short circuit in CKP sensor wiring harnesses

			If CKP sensor and wiring harness are normal, go to the next step.
14	Visually inspect CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
15	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
16	Perform the spark test. (See **SPARK TEST** .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step. If symptoms occurs with the A/C on, go to Step 24.
		No	Repair or replace the malfunctioning part according to spark test result.
17	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install spark plugs on original cylinders. Go to the next step.
18	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
19	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
20	Install the fuel pressure gauge between the fuel pipe and the fuel distributor.	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit.

	Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct with ignition switch ON? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)		Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
21	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition switch is turned off? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
22	**NOTE:** • **The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step.** Connect pressure gauges to A/C low and high pressure side lines.Turn A/C on and measure low side and high side pressures.Are pressures within specifications?(See **REFRIGERANT PRESSURE CHECK** .)	Yes	Go to the next step.
		No	If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]** .) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
23	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid side.	Yes	Inspect if purge solenoid valve is stuck open. Inspect evaporative emission control system.

	Plug opening end of vacuum hose. Start the engine. Is the engine stall now eliminated?	No	Go to the next step.
24	Is air leakage felt or heard at intake-air system components while racing the engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
25	Inspect the engine condition while tapping EGR valve housing. Does the engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.
26	Inspect variable valve timing control system operation. (See **VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION** .) Does variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning parts according to variable valve timing control system operation inspection results.
27	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
28	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.6 CRANKS NORMALLY BUT WILL NOT START [LF]

POSSIBLE CAUSE & DESCRIPTION (CRANKS NORMALLY BUT WILL NOT START [LF])

6	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	• The starter cranks engine at normal speed but the engine will not run. • Refer to symptom troubleshooting **NO.5 ENGINE STALLS-AFTER START/AT IDLE [LF]** if this symptom appears after engine stall. • Fuel is in tank. • Battery is in normal condition.
	• No battery power supply to PCM • Air leakage from intake-air system • Open PCM GND or vehicle body GND • Improper operation of electronic throttle control system • EGR valve malfunction • No signal from CKP sensor due to sensor, related wire or incorrect installation • No signal from CMP sensor due to sensor, related wire or incorrect installation • Low engine compression • Engine overheating • Vacuum leakage • Erratic signal to ignition coil • Improper air/fuel mixture ratio control • Poor fuel quality • PCV valve malfunction • Restriction in intake-air system • Restriction in exhaust system • Disconnected electrical connector • Open or short circuit in fuel pump body and related wiring harness • Inadequate fuel pressure • Fuel pump mechanical malfunction • Fuel leakage from injector • Fuel injector is clogged. • Purge solenoid valve malfunction • Spark plug malfunction • Ignition coil malfunction

POSSIBLE CAUSE	• Improper variable valve timing control system operation • Improper valve timing • Immobilizer system and/or circuit malfunction • Immobilizer system operating properly. (Ignition key is not registered.) • Pressure regulator malfunction (built-in fuel pump unit) **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

CRANKS NORMALLY BUT WILL NOT START DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Do any of the following conditions appear? • Engine does not completely start. • DTC P1260 is displayed.	Yes	**Both conditions appear:** Go to Step 3.
		No	**Either or other condition appears:** Go to the next step.
2	Does engine stall after **approx. 2 s** from when it is started?	Yes	Go to the next step.
		No	Immobilizer system is normal. Go to Step 8.
3	Is the coil connector securely connected to the coil?	Yes	Go to the next step.
		No	Connect the coil connector securely. Return to Step 2.
4	Does the security light flush?	Yes	Go to the next step.
		No	Inspect and repair or replace the following: • Wiring harnesses and connectors from keyless control module terminal 3F and instrument cluster terminal 2F • Instrument cluster (See **INSTRUMENT CLUSTER INSPECTION** .)
5	Connect the M-MDS equivalent to the DLC-2 and retrieve the DTC for PCM, instrument cluster and keyless control module (with advanced keyless entry system). Are any of the following DTCs displayed? **DTC PCM: B1342,**	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)

	U0073, U0155 Instrument cluster: B1213, B1600, B1601, B1602, B1681, B2103, B2139, B2431, U0100, U0214 Keyless control module (with advanced keyless entry system): B1681, B2103, B1213	No	Go to the next step.
6	Inspect the following wiring harnesses and connectors: **With advanced keyless entry system:** • Between coil terminal A and keyless control module terminal 3Y • Between coil terminal B and keyless control module terminal 3AA • Between keyless control module terminal 4A and instrument cluster terminal 2Q • Between keyless control module terminal 4C and instrument cluster terminal 2S	Yes	Repair or replace the suspected wiring harness and connector.
	Without advanced keyless entry system: • Between coil terminal A and instrument cluster terminal 2S	No	Go to the next step.

	• Between coil terminal B and instrument cluster terminal 2Q Is there any malfunction?		
7	Inspect the following wiring harnesses and connectors: • Between PCM terminal 1AM and instrument cluster terminal 1J • Between PCM terminal 1AI and instrument cluster terminal 1L Is there any malfunction?	Yes	Repair or replace the suspected wiring harness and connector.
		No	Go to the next step.
8	Verify the following: • Vacuum connection • External fuel shut off or accessory (such as kill switch, alarm) • Fuel quality: proper octane, contamination, winter/summer blend • No air leakage from intake-air system • Intake-air system restriction (such as air cleaner element, fresh air	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 9.

	duct) • Proper sealing of intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve Are all items normal?		
9	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .) **Communication error message is displayed:** Inspect for the following: • Open circuit in wiring harness between main relay and PCM terminal 1AW or 1BE • Open main relay GND circuit • Open or short circuit in wiring harness between DLC and PCM terminal 1AM or 1AI • Main relay is stuck open. • Open or poor GND circuit (PCM terminal 1AZ, 1BB, 1BD, 1BH) • Poor connection of vehicle body GND
		No	**No DTC is displayed:** Go to the next step.
10	Connect the M-MDS or equivalent to the DLC-	Yes	Go to the next step.
		No	Inspect for the following:

	2. Access the APP1 and APP2 PIDs. Crank the engine with accelerator pedal released. Are the APP1 and APP2 PIDs indicating that the accelerator pedal is in the released position?		• APP sensor • Wiring harnesses and connectors for following: ○ PCM terminal 1AJ-APP sensor terminal A ○ PCM terminal 1AV-APP sensor terminal B ○ PCM terminal 1AP-APP sensor terminal C ○ PCM terminal 1AL-APP sensor terminal D ○ PCM terminal 1AS-APP sensor terminal E ○ PCM terminal 1AO-APP sensor terminal F
11	Connect the M-MDS or equivalent to the DLC-2. Access the TP PID. Crank the engine with accelerator pedal released. Are the TP PID indicates the closed throttle position?	Yes	Go to the next step.
		No	Inspect for the following: • TP sensor • Wiring harnesses and connectors for following: ○ PCM terminal 2AK-TP sensor terminal F ○ PCM terminal 2AO-TP sensor terminal E ○ PCM terminal 2AP-TP sensor terminal C ○ PCM terminal 2AL-TP sensor terminal D
12	Does the engine start with the throttle valve closed?	Yes	Go to Step 29.
		No	Go to the next step.
13	Will the engine start	Yes	Inspect the electronic throttle

	and run smoothly at part throttle?		control system operation. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .)
		No	Go to the next step.
14	Connect the M-MDS or equivalent to the DLC-2. Access RPM PID. Is RPM PID indicating the engine speed when cranking the engine?	Yes	Go to the next step.
		No	Inspect for the following: • Open or short circuit in CKP sensor • Open or short circuit in wiring harness between CKP sensor terminal A and PCM terminal 2AB • Open or short circuit in wiring harness between CKP sensor terminal B and PCM terminal 2W • Open or short circuit in wiring harness between CKP sensor terminal C and PCM terminal 2AQ • Open or short circuit in CKP sensor wiring harnesses If CKP sensor and wiring harness are normal, go to the next step.
15	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
16	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
17	Perform the spark test. (See **SPARK TEST** .)	Yes	Go to the next step.
		No	Repair or replace the

	Is strong blue spark visible at each cylinder?		malfunctioning part according to spark test result.
18	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
19	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
20	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
21	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure correct when ignition switch is turned on/off **five times?** (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
22	Visually inspect the fuel injector O-ring and fuel line for fuel leakage. Service if necessary. Is the fuel line pressure held after the ignition switch is turned off? (See **FUEL LINE PRESSURE**	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)

	INSPECTION [LF] .)		
23	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Is starting condition improved?	Yes	Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
24	Is air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
25	Inspect the engine condition while tapping EGR valve housing. Is engine condition improved?	Yes	Replace the EGR valve.
		No	Go to the next step.
26	Inspect the variable valve timing control system operation. (See **VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION** .) Does variable valve timing control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
27	Is the engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for causes.
28	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information		

	is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.7 SLOW RETURN TO IDLE [LF]

POSSIBLE CAUSE & DESCRIPTION (SLOW RETURN TO IDLE [LF])

7	SLOW RETURN TO IDLE
DESCRIPTION	Engine takes more time than normal to return to idle speed.
POSSIBLE CAUSE	• ECT sensor malfunction • Thermostat is stuck open. • Throttle body malfunction • Air leakage from intake-air system

DIAGNOSTIC PROCEDURE

SLOW RETURN TO IDLE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
2	Remove thermostat and inspect operation. (See **THERMOSTAT REMOVAL/INSTALLATION [LF]** .) (See **THERMOSTAT INSPECTION [LF]** .) Is thermostat normal?	Yes	ECT and thermostat are normal. Go to the next step.
		No	Access ECT PID on the M-MDS or equivalent. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor. If temperature gauge on instrument cluster

			indicates cold range but ECT PID is normal, inspect temperature gauge and heat gauge unit.
3	Is throttle body free of contamination?	Yes	Inspect for air leakage from the intake-air system components while racing the engine to higher speed.
		No	Clean or replace throttle body.
4	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF]

POSSIBLE CAUSE & DESCRIPTION (ENGINE RUNS ROUGH/ROLLING IDLE [LF])

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively. • Idle speed is too slow and engine shakes excessively.
	• Air leakage from intake-air system parts • A/C system operation is improper • Erratic signal to ignition coil • Spark plug malfunction • Purge solenoid valve malfunction • Improper operation of electronic throttle control system

POSSIBLE CAUSE	• Idle learning of electronic throttle control system is not completed • EGR valve malfunction • Erratic or no signal from CMP sensor • Low engine compression • Improper valve timing • Improper variable valve timing control system operation • Erratic signal from CKP sensor • Improper air/fuel mixture ratio control operation (abnormal signal form MAF sensor or HO2S) • Open or short circuit in PCM GND circuit • Poor fuel quality • PCV valve malfunction • Air cleaner restriction • Restriction in exhaust system • Disconnected electrical connectors • Inadequate fuel pressure • Fuel pump body mechanical malfunction • Improper load signal input • Fuel line restriction or clogging • Improper fuel injection control operation • Fuel leakage from fuel injector • Fuel injector clogging • Engine overheating • Vacuum leakage • Pressure regulator malfunction (built-in fuel pump unit) **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous.**

	Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article. **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

ENGINE RUNS ROUGH/ROLLING IDLE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Warm up the engine. Idle the engine for **5 min.** Is the symptom disappeared?	Yes	Troubleshooting completed. (Cause of this symptom is that the idle learning of electronic throttle control system is not completed.)
		No	Go to the next step.
2	Verify the following: • External fuel shut off or accessory (such as kill switch, alarm) • Fuel quality (such as proper octane, contamination, winter/summer blend) • No air leakage from intake-air system • Proper sealing of	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.

	intake manifold and components attached to intake manifold: EGR valve • Ignition wiring • Electrical connections • Fuses • Smooth operation of throttle valve • PCM GND circuit (1AZ, 1BB, 1BD, 1BH) Are all items normal?		
3	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
4	Is the engine overheating?	Yes	Go to symptom troubleshooting **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]** .
		No	Go to the next step.
5	Connect the M-MDS or equivalent to the DLC-2. Access MAF PID. Drive vehicle with monitoring PID. Is MAF PID within specification?	Yes	Go to the next step.
		No	Inspect for open or short circuit of MAF sensor and related wiring harness.
6	**NOTE:** • **The following test is for engine running at rough idle with A/C on. If**	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR**

	other symptoms exist, go to the next step. Connect pressure gauge to A/C low and high pressure side lines.Start engine and idle it.Turn the A/C switch on.Measure low side and high side pressures.Are pressures within specifications? (See **REFRIGERANT PRESSURE CHECK** .)		**RUNS CONTINUOUSLY [LF]** . For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
7	**NOTE:** • **The following test is for engine running rough with P/S on. If other symptoms exist, go to the next step.** Connect the M-MDS or equivalent to the DLC-2.Start the engine and idle it.Retrieve any DTCs for EPS.Is there any EPS DTC displayed?	Yes	Go to appropriate the DTC inspection. (See **DTC TABLE [LF]** .)
		No	Go to the next step.
8	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
9	Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. Are wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair the wiring harnesses.
10	Inspect the spark plug	Yes	**Spark plug is wet or covered**

	condition. Is the spark plug wet, covered with carbon or grayish white?		**with carbon:** Inspect for fuel leakage from injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
11	Perform the electronic throttle control system operation inspection. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
12	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and run it at idle. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. If there is no malfunction, replace fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
13	Visually inspect for fuel leakage at fuel injector, O-ring, and fuel line. Service if necessary. Does fuel line pressure hold after ignition switch is turned off? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Inspect fuel injector. If fuel injector is normal, replace fuel pump unit.
14	Connect the M-MDS or equivalent to the DLC-2.	Yes	Go to the next step.
		No	LONG FT1 PID is out of specification.

	Start the engine and idle it.
	Access LONG FT1 PID.
	Measure LONG FT1 PID at idle.
	Is PID value normal? (See **PCM INSPECTION [LF]** .)
			Less than specification (too rich):
			• Inspect EVAP control system.
			  ○ If system is normal, go to Step 14.
			
			Greater than specification (too lean):
			• Inspect for air leakage at intake-air system components.
			  ○ If system is normal, go to the next step.

15	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Start the engine. Does the engine condition improve?	Yes	Check if purge solenoid valve is stuck open mechanically. Inspect EVAP control system.
		No	Go to the next step.
16	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
17	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
18	Visually inspect the CMP sensor and teeth of camshaft. Are the CMP sensor and teeth of camshaft normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
19	Inspect the engine condition while tapping EGR valve housing. Does the engine condition improve?	Yes	Replace the EGR valve.
		No	Go to the next step.

20	Inspect variable valve timing control system operation. (See **VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION** .) Does variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
21	Is engine compression correct?	Yes	Inspect the valve timing. (See **VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF]** .)
		No	Inspect for causes.
22	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.9 FAST IDLE/RUNS ON [LF]

POSSIBLE CAUSE & DESCRIPTION (FAST IDLE/RUNS ON [LF])

9	FAST IDLE/RUNS ON
DESCRIPTION	• The engine speed continues at fast idle after warm-up. • The engine runs after the ignition switch is turned off.
POSSIBLE CAUSE	• ECT sensor malfunction • Air leakage from intake-air system • Throttle body malfunction • Accelerator pedal position sensor misadjustment

	• Cruise control system operation improperly • Improper load signal input • Improper operation of electronic throttle control system

DIAGNOSTIC PROCEDURE

FAST IDLE/RUNS ON DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Access ECT PID. Start and warm up engine to normal operating temperature. Is ECT PID between **82-112°C {180-234°F}** ?	Yes	Go to the next step.
		No	**ECT PID is higher than 112°C {234°F}:** Go to symptom troubleshooting **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]** . **ECT PID is less than 82°C {180°F}:** Go to symptom troubleshooting **NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF]** .
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Access and monitor AC_REQ, CPP (MT), CPP/PNP (MT), and TR (AT) PIDs. Are PIDs values normal? (See **PCM INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**If the AC_REQ PID is not normal:** • Inspect A/C switch, refrigerant pressure switch, and fan switch, and related wiring harness for vibration or intermittent open/short circuit.

			If the CPP PID is not normal: • Inspect clutch position switch and related wiring harness for vibration or intermittent open/short circuit. **If the CPP/PNP PID is not normal:** • Inspect neutral position switch and related wiring harness for vibration or intermittent open/short circuit. **If the TR PID is not normal:** • Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit.
4	Connect the M-MDS or equivalent to the DLC-2. Start the engine and idle it. Retrieve any DTCs for EHPAS. Is there any EHPAS DTC displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection.
		No	**No DTC is displayed:** Go to the next step.
5	Is there air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace parts if necessary.
		No	Inspect the following:

			• Electronic throttle control system operation • Accelerator pedal position sensor
6	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.10 LOW IDLE/STALLS DURING DECELERATION [LF]

POSSIBLE CAUSE & DESCRIPTION (LOW IDLE/STALLS DURING DECELERATION [LF])

10	**LOW IDLE/STALLS DURING DECELERATION**
DESCRIPTION	• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
POSSIBLE CAUSE	• Vacuum leakage • Improper operation of electronic throttle control system • Air leakage from intake-air system • Improper air/fuel mixture ratio control • Evaporative emission control system malfunction • Accelerator pedal position sensor or related circuit malfunction • Accelerator pedal position sensor misadjustment • TP sensor or related circuit malfunction • MAF sensor or related circuit malfunction • Brake switch or related circuit malfunction • Neutral/clutch pedal position switch or related

	circuit malfunction (MT) • TR switch or related circuit malfunction (AT) • Improper A/C magnetic clutch operation

DIAGNOSTIC PROCEDURE

LOW IDLE/STALLS DURING DECELERATION DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Does the engine idle roughly?	Yes	Go to symptom troubleshooting "No.8 Engine runs rough/rolling idle". (See **NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [LF]** .)
		No	Go to the next step.
2	Turn off the A/C switch and fan switch. Does the A/C magnetic clutch engage?	Yes	Go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously." (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]** .)
		No	Go to the next step.
3	Verify the following: • Proper routing of and no damage to vacuum lines • No air leakage from intake-air system Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 3.
4	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs.	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)

	Are there any DTCs displayed?	No	**No DTC is displayed:** Go to the next step.
5	Perform the electronic throttle control system operation inspection. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
6	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Inspect the evaporative emission control system.
		No	Go to the next step.
7	Connect the M-MDS or equivalent to the DLC-2. Access APP1, APP2, TP, MAF and VSS PIDs. Monitor each PID while driving vehicle. (See **PCM INSPECTION [LF]** .) Are PIDs normal?	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect the accelerator pedal position sensor. **TP PID:** Inspect TP sensor. **MAF PID:** Inspect MAF sensor. **VSS PID:** Inspect VSS.
8	Access and monitor BOO, CPP (MT), CPP/PNP (MT), and TR (AT) PIDs. Are PIDs values normal? (See **PCM INSPECTION [LF]** .)	Yes	Go to the next step.
		No	If the BOO PID is not normal: • Inspect brake switch, and related wiring harness for vibration or intermittent open/short circuit. If the CPP PID is not normal:

			• Inspect clutch position switch and related wiring harness for vibration or intermittent open/short circuit. If the CPP/PNP PID is not normal: • Inspect neutral position switch and related wiring harness for vibration or intermittent open/short circuit. If the TR PID is not normal: • Inspect TR switch and related wiring harness for vibration or intermittent open/short circuit.
9	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM INSPECTION [LF]** .)		

NO.11 ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES,

BUCK/JERK, HESITATION/STUMBLE, SURGES [LF]

POSSIBLE CAUSE & DESCRIPTION (ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES)

11	**ENGINE STALLS/QUITS-ACCELERATION/CRUISE** **ENGINE RUNS ROUGH-ACCELERATION/CRUISE** **MISSES-ACCELERATION/CRUISE** **BUCK/JERK-ACCELERATION/CRUISE/DECELERATION** **HESITATION/STUMBLE-ACCELERATION** **SURGES-ACCELERATION/CRUISE**
DESCRIPTION	• Engine stops unexpectedly at the beginning of acceleration or during acceleration. • Engine stops unexpectedly while cruising. • Engine speed fluctuates during acceleration or cruising. • Engine misses during acceleration or cruising. • Vehicle bucks/jerks during acceleration, cruising, or deceleration. • Momentary pause at beginning of acceleration or during acceleration • Momentary minor irregularity in engine output
	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Purge solenoid valve malfunction • Improper operation of electronic throttle control system • EGR valve malfunction • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage • Poor fuel quality • Main relay intermittent malfunction • Throttle body malfunction • Engine overheating • Spark plug malfunction • Improper air/fuel mixture ratio control

POSSIBLE CAUSE	operation • Erratic signal to ignition coil • Air cleaner restriction • PCV valve malfunction • Fuel flow into evaporative purge hose • Improper valve timing due to jumping out timing belt • Restriction in exhaust system • Intermittent open or short circuit in fuel body pump circuit • Inadequate fuel pressure • Fuel pump mechanical malfunction • Check valve (two-way) malfunction integrated with fuel tank • Fuel leakage from fuel injector • Fuel injector clogging • Fuel line restriction or clogging • Pressure regulator malfunction (built-in fuel pump unit) • Erratic signal form Accelerator pedal position sensor • Erratic signal form TP sensor • Intermittent open or short circuit of MAF sensor, TP sensor, Accelerator pedal position sensor and VSS • AT malfunction (AT) • Clutch slippage (MT) • Improper variable intake air control operation • Loose attaching bolts or worn engine mounts **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate**

	skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article. **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

ENGINE STALLS/QUITS, ENGINE RUNS ROUGH, MISSES, BUCK/JERK, HESITATION/STUMBLE, SURGES DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Air cleaner element • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold: such as EGR valve • Ignition wiring • Fuel quality (such as proper octane, contamination, winter/summer	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	blend) • Electrical connections • Smooth operation of throttle valve Are all items normal?		
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Is engine overheating?	Yes	Go to symptom troubleshooting **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]** .
		No	Go to the next step.
4	Connect the M-MDS or equivalent to the DLC-2. Access APP1, APP2, RPM, VPWR, MAF, TP and VSS PIDs. Drive the vehicle with monitoring PIDs. Are PIDs within specifications? (See **PCM INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect if output signal from accelerator pedal position sensor changes smoothly. **RPM PID:** Inspect the CKP sensor and related wiring harness for vibration or intermittent open/short circuit. **VPWR PID:** Inspect for open circuit intermittently. **MAF PID:** Inspect for open circuit of the MAF sensor and related wiring harness intermittently. **TP PID:** Inspect if output signal from TP sensor changes smoothly. **VSS PID:** Inspect for open circuit of VSS and related wiring harness intermittently.

5	Visually inspect the CKP sensor and teeth of crankshaft pulley. Are CKP sensor and teeth of crankshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
6	Inspect the spark plug conditions. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect for fuel leakage from fuel injector. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
8	Perform the electronic throttle control system operation inspection. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .) Does the electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle system operation inspection results.
9	Visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Install fuel pressure gauge between the fuel pipe and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)

	correct with ignition switch to ON position? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)		**High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
11	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Is fuel line pressure held after ignition switch is turned off? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Inspect the fuel injector. If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
12	**NOTE:** • **The following test is for engine stall with the A/C on. If other symptom exists, go to the next step.** Connect a pressure gauge to A/C low and high pressure side lines.Turn the A/C on and measure low side and high side pressure.Are pressures within specifications? (See **REFRIGERANT PRESSURE CHECK** .)	Yes	Go to the next step.
		No	If the A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]** .) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
13	**NOTE:** • **The following test should be performed for symptom with cruise control ON. If other symptoms exist, go to the next step.** Inspect cruise control	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.

	system.Is cruise control system normal?		
14	Inspect the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]** .) Is the front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)
15	Inspect the evaporative purge hose between the fuel tank and the purge valve. Does fuel flow into evaporative purge hose?	Yes	Inspect the check valve (two-way). (See **FUEL TANK INSPECTION [LF]** .)
		No	Go to the next step.
16	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from the purge solenoid valve side. Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	Yes	Go to the next step. Inspect if the purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system.
		No	Go to the next step.
17	Visually inspect the CMP sensor and projections of camshaft pulley. Are CMP sensor and projections of camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
18	Inspect the EGR system. (See **EGR CONTROL SYSTEM INSPECTION** .) Is the EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
19	Is the engine compression correct?	Yes	Inspect the following: • Valve timing • Internal transaxle part (AT) • Clutch (MT)

			• EGR valve (mechanical stuck) • Engine mounts • Check valve (two-way)
		No	Inspect for cause.
20	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.12 LACK/LOSS OF POWER-ACCELERATION/CRUISE [LF]

POSSIBLE CAUSE & DESCRIPTION (LACK/LOSS OF POWER-ACCELERATION/CRUISE)

12	**LACK/LOSS OF POWER-ACCELERATION/CRUISE**
DESCRIPTION	Performance is poor under load (such as power down when climbing hills).
	• Improper A/C system operation • Erratic signal or no signal from CMP sensor • Air leakage from intake-air system parts • Restriction in intake-air system • Intake air temperature too hot • Improper variable intake air control operation • Improper operation of electronic throttle control system • Purge control solenoid malfunction • Improper EGR valve operation • Brake dragging • Erratic signal from CKP sensor • Low engine compression • Vacuum leakage

POSSIBLE CAUSE	• Poor fuel quality • Erratic signal to ignition coil • Engine overheating • Throttle body malfunction • Spark plug malfunction • PCV valve malfunction • Improper valve timing due to jumping out of timing belt • Improper variable valve timing control operation • Restriction in exhaust system • Intermittent open or short in fuel pump related circuit • Inadequate fuel pressure • Fuel pump mechanical malfunction • Fuel line restriction or clogging • Fuel leakage from fuel injector • Fuel injector clogging • Erratic signal from accelerator pedal position sensor • Erratic signal from TP sensor • Intermittent open or short circuit in MAF sensor, Accelerator pedal position sensor, TP sensor, IAT sensor and VSS • AT malfunction (AT) • Clutch slippage (MT) **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always**

	complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE MANUAL" described in this article. **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

LACK/LOSS OF POWER-ACCELERATION/CRUISE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Verify the following: • Vacuum connection • Restriction in intake-air system (such as air cleaner element, fresh air duct) • No air leakage from intake-air system • No restriction of intake-air system • Proper sealing of intake manifold and components attached to intake manifold; such as EGR valve • Fuel quality (such as proper octane,	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.

	contamination, winter/summer blend) Are all items normal?		
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**DTC is displayed:** Go to the next step.
3	Is the engine overheating?	Yes	Go to symptom troubleshooting **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]** .
		No	Go to the next step.
4	Connect the M-MDS or equivalent to the DLC-2. Access APP1, APP2, RPM, MAF, TP, IAT and VSS PIDs. Drive vehicle while monitoring PIDs. Are PIDs within specifications? (See **PCM INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**APP1, APP2 PIDs:** Inspect if output signal accelerator pedal position sensor changes smoothly. **RPM PID:** Inspect CKP sensor and related wiring harness for vibration or intermittent open/short circuit or both. **MAF PID:** Inspect for intermittent open circuit of MAF sensor and related wiring harness. **TP PID:** Inspect if output signal TP sensor changes smoothly. **IAT PID:** Inspect for air suction in intake-air system. If normal, inspect intermittent short circuit of IAT sensor and related wiring harnesses. **VSS PID:** Inspect for intermittent open circuit of VSS and related wiring harness.
5	Visually inspect the CKP sensor and teeth of	Yes	Go to the next step.

	crankshaft pulley. Are the CKP sensor and teeth of crankshaft pulley normal?	No	Replace the malfunctioning part.
6	Inspect the spark plug condition. Is spark plug wet, covered with carbon or grayish white?	Yes	**Spark plug is wet or covered with carbon:** Inspect the fuel injector for fuel leakage. Inspect spark plug and high-tension lead. **Spark plug is grayish white:** Inspect the fuel injector for clogging.
		No	Install the spark plugs on original cylinders. Go to the next step.
7	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace PCV valve.
8	Perform electronic throttle control system operation inspection. (See **ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION** .) Does electronic throttle control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to electronic throttle control system operation inspection results.
9	Visually inspect deformed exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position. Is fuel line pressure	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:**

	correct with ignition switch to ON position? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)		Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
11	Inspect variable intake air control operation. (See **VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION** .) Does VIS function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
12	**NOTE:** • **The following test is for engine stalling with the A/C on concern. If other symptoms exist, go to the next step.** Connect pressure gauge to the A/C low and high side pressure lines.Turn the A/C on and measure low side and high side pressures.Are pressures within specifications? (See **REFRIGERANT PRESSURE CHECK** .)	Yes	Go to the next step.
		No	If A/C is always on, go to symptom troubleshooting "No.24 A/C is always on or A/C compressor runs continuously". (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]** .) For other symptoms, inspect the following: • Refrigerant charging amount • Condenser fan operation
13	Inspect for A/C cut-off operation. (See **A/C Cut-off Control System Inspection** .) Does the A/C cut-off function properly?	Yes	Go to the next step.
		No	Inspect A/C cut-off system components.
14	Disconnect the vacuum hose between the purge solenoid valve and the intake manifold from purge solenoid valve side.	Yes	Inspect if purge solenoid valve is stuck open mechanically. Inspect the evaporative emission control system. (See **PURGE CONTROL SYSTEM INSPECTION** .)

	Plug opening end of vacuum hose. Drive the vehicle. Does the engine condition improve?	No	Go to the next step.
15	Visually inspect the CMP sensor and projections of camshaft pulley. Are the CMP sensor and projections of camshaft pulley normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part.
16	Inspect EGR system. (See **EGR CONTROL SYSTEM INSPECTION** .) Is EGR system normal?	Yes	Go to the next step.
		No	Replace the malfunctioning part according to EGR control system operation inspection results.
17	Inspect the variable valve timing control system operation. (See **VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION** .) Does the variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to variable valve timing control system inspection results.
18	Is the engine compression correct?	Yes	Inspect the following: • Valve timing • Internal transaxle components (AT) • Clutch (MT) • Brake system for dragging
		No	Inspect for cause.
19	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.		

	• If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF]

POSSIBLE CAUSE & DESCRIPTION (KNOCKING/PINGING-ACCELERATION/CRUISE)

13	**KNOCKING/PINGING-ACCELERATION/CRUISE**
DESCRIPTION	Sound is heard when air/fuel mixture is ignited by something other than spark plug (such as hot spot in combustion chamber).
POSSIBLE CAUSE	• Engine overheating due to cooling system malfunction • ECT sensor malfunction • IAT sensor malfunction • MAF sensor malfunction • Knock sensor malfunction • Erratic signal from CMP sensor • Inadequate engine compression • Inadequate fuel pressure **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE**

	PRECAUTION [LF] .) **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

KNOCKING/PINGING-ACCELERATION/CRUISE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Access ECT PID. Verify ECT PID is **less than 116°C {241°F}** during driving. Is ECT PID less than specification?	Yes	Go to the next step.
		No	Inspect the cooling system for cause of overheating.
2	Connect the M-MDS or equivalent to the DLC-2. Access IAT and MAF PIDs. Monitor each PID. (See **PCM INSPECTION [LF]** .) Are PIDs normal?	Yes	Go to the next step.
		No	**IAT PID** : Inspect IAT sensor **MAF PID** : Inspect MAF sensor
3	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (engine off). Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
4	Is engine compression	Yes	Go to the next step.

	correct?	No	Inspect for cause.
5	Install fuel pressure gauge between fuel pipe and fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Inspect the ignition timing.
		No	**Low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
6	Inspect the knock sensor. Is the knock sensor normal?	Yes	Inspect ignition timing.
		No	Replace the knock sensor.
7	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.14 POOR FUEL ECONOMY [LF]

POSSIBLE CAUSE & DESCRIPTION (POOR FUEL ECONOMY)

14	**POOR FUEL ECONOMY**
DESCRIPTION	Fuel economy is unsatisfactory.
	• Contaminated air cleaner element • Variable intake air control malfunction • Engine cooling system malfunction

POSSIBLE CAUSE	
	• Improper ATF level (AT) • Weak spark • Poor fuel quality • Erratic or no signal from CMP sensor • Clutch slippage (MT) • Improper variable valve timing control system operation • Improper coolant level • Inadequate fuel pressure • Spark plug malfunction • PCV valve malfunction • Brake dragging • Improper valve timing due to jumping out of timing belt • Contaminated MAF sensor • Improper engine compression • Exhaust system clogging **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)**

	CAUTION: • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

POOR FUEL ECONOMY DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Air cleaner element for contamination • ATF level (AT) • Fuel quality • Coolant level • Brake dragging • Clutch slippage (MT) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Access ECT PID. Drive vehicle while monitoring PID. (See **PCM INSPECTION [LF]** .) Is PID within specification?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operations or thermostat operation.

4	Perform the spark test. (See **SPARK TEST** .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
5	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
6	Inspect for variable valve timing control system operation. (See **VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION** .) Does the variable valve timing control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
7	Inspect for the variable intake air control operation. (See **VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION** .) Does variable intake air control function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
8	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.

9	Visually inspect the exhaust system part. Is there any deformed exhaust system?	Yes	Replace the suspected part.
		No	Go to the next step.
10	Inspect for contaminated MAF sensor. Is there any contamination?	Yes	Go to the next step.
		No	Inspect for cause.
11	Inspect the MAF sensor for contamination. Is there any contamination?	Yes	Replace MAF sensor.
		No	Go to the next step.
12	Is engine compression correct?	Yes	Inspect the valve timing.
		No	Inspect for cause.
13	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.15 EMISSION COMPLIANCE [LF]

POSSIBLE CAUSE & DESCRIPTION (EMISSION COMPLIANCE)

15	EMISSION COMPLIANCE
DESCRIPTION	Fails emissions test.
	• Vacuum lines leakage or blockage • Cooling system malfunction • Spark plug malfunction • Leakage from intake manifold • Erratic or no signal from CMP sensor • Inadequate fuel pressure • PCV valve malfunction or incorrect valve installation

POSSIBLE CAUSE	• EGR valve malfunction • Exhaust system clogging • Fuel tank ventilation system malfunction • Fuel-filler cap malfunction • Charcoal canister damage • Air cleaner element clogging or restriction • Throttle body malfunction • Erratic signal to ignition coil • Improper air/fuel mixture ratio control operation • Bend or open circuit HO2S wiring harness • Catalyst converter malfunction • Engine internal parts malfunction • Excessive carbon is built up in combustion chamber • Improper engine compression • Improper valve timing **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)**

	CAUTION: • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

EMISSION COMPLIANCE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect for the following: • Vacuum lines for leakage or blockage • Electrical connections • Proper maintenance schedule followed • Intake-air system and air cleaner element concerns: obstructions, leakage or dirtiness Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Is any other driveability	Yes	Go to appropriate symptom

	concern present?		troubleshooting.
		No	Go to the next step.
4	Connect the M-MDS or equivalent to the DLC-2. Access ECT PID. Warm up the engine and idle it. Verify ECT PID is correct. (See **PCM INSPECTION [LF]** .) Is ECT PID correct?	Yes	Go to the next step.
		No	Inspect for coolant leakage, cooling fan and condenser fan operation or thermostat operation.
5	Inspect fuel-filler cap. (See **FUEL-FILLER CAP INSPECTION [LF]** .) Is there any leakage at fuel-filler cap?	Yes	Replace the fuel-filler cap.
		No	Go to the next step.
6	Inspect the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) INSPECTION [LF]** .) Is front HO2S normal?	Yes	Go to the next step.
		No	Replace the front HO2S. (See **FRONT HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [LF]** .)
7	Perform spark test. (See **SPARK TEST** .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to spark test result.
8	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Low:** Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
9	Remove and shake the PCV valve. Does the PCV valve	Yes	Go to the next step.
		No	Replace the PCV valve.

	rattle?		
10	Inspect for fuel saturation inside charcoal canister. Is excess amount of liquid fuel present in canister?	Yes	Replace the charcoal canister.
		No	Inspect the fuel tank vent system. Then, go to the next step. (See **FUEL TANK INSPECTION [LF]** .)
11	Visually inspect the exhaust system part. Is there any deformed exhaust system part?	Yes	Replace the part.
		No	Go to the next step.
12	Inspect the three-way catalytic converter. (See **EXHAUST SYSTEM INSPECTION [LF]** .) Is the three-way catalytic converter normal?	Yes	Inspect the EGR system. (See **EGR CONTROL SYSTEM INSPECTION** .)
		No	Replace the three-way catalytic converter.
13	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.16 HIGH OIL CONSUMPTION/LEAKAGE [LF]

POSSIBLE CAUSE & DESCRIPTION (HIGH OIL CONSUMPTION/LEAKAGE)

16	HIGH OIL CONSUMPTION/LEAKAGE
DESCRIPTION	Oil consumption is excessive.
POSSIBLE CAUSE	• PCV valve malfunction • Improper dipstick • Improper engine oil viscosity • Engine internal parts malfunction

DIAGNOSTIC PROCEDURE

HIGH OIL CONSUMPTION/LEAKAGE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Go to the next step.
		No	Replace the PCV valve.
2	Inspect for the following: • External leakage • Proper dipstick • Proper engine oil viscosity Are all items normal?	Yes	Inspect the internal engine parts such as valves, valve guides, valve stem seals, cylinder head drain passage, and piston rings.
		No	Service if necessary. Repeat Step 2.
3	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [LF]

POSSIBLE CAUSE & DESCRIPTION (COOLING SYSTEM CONCERNS-OVERHEATING)

17	COOLING SYSTEM CONCERNS-OVERHEATING
DESCRIPTION	Engine runs at higher than normal temperature/overheats.
	• Improper coolant level • Blown fuses • Coolant leakage • Excessive A/C system pressure

POSSIBLE CAUSE	• A/C system operation is improper • Improper water/anti-freeze mixture • Fans reverse rotation • Poor radiator condition • Thermostat malfunction • Radiator hoses damage • Improper or damaged radiator cap • Cooling fan is inoperative. • Coolant overflow system malfunction • Improper tension of drive belt • Drive belt damage

DIAGNOSTIC PROCEDURE

COOLING SYSTEM CONCERNS-OVERHEATING DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following: • Engine coolant level • Coolant leakage • Water and anti-freeze mixture • Radiator condition • Collapsed or restricted radiator hoses • Radiator pressure cap • Overflow system • Fan rotational direction • Fuses Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
3	Start the engine and idle it. Turn the A/C switch on and set	Yes	Go to Step 5.
		No	Inspect for the

	blower fan to any speed. Does the A/C compressor engage?		following and repair or replace if necessary: • Refrigerant charging amount • Open circuit in wiring harness between A/C relay and PCM terminal 11 • Seized A/C magnetic clutch • A/C magnetic clutch malfunction If all items are normal, go to the next step.
4	Connect the M-MDS or equivalent to DLC-2. Access AC_REQ PID. Start the engine and idle it. Turn the A/C switch and fan switch on. Does AC_REQ PID read on?	Yes	Go to the next step.
		No	Inspect the following: • Refrigerant pressure switch operation • The A/C switch is stuck open. • Open or short circuit between refrigerant pressure switch and PCM terminal 1AU • Open circuit of blower motor fan switch and resistor (if blower motor does not operate) • The evaporator temperature sensor and A/C amplifier
5	Inspect cooling fan control system operation.	Yes	Go to the next step.

	(See **COOLING FAN CONTROL SYSTEM INSPECTION** .) Does the cooling fan control system function properly?	No	Repair or replace the malfunctioning part.
6	Is the drive belt normal?	Yes	Go to the next step.
		No	Replace the drive belt.
7	Is there leakage around the heater unit in passenger compartment?	Yes	Inspect and service heater for leakage.
		No	Go to the next step.
8	Is there leakage at the coolant hoses and/or radiator?	Yes	Replace the malfunctioning part.
		No	Go to the next step.
9	Cool down the engine. Remove thermostat and inspect operation. (See **THERMOSTAT REMOVAL/INSTALLATION [LF]** .) (See **THERMOSTAT INSPECTION [LF]** .) Is thermostat normal?	Yes	The engine coolant temperature and thermostat are normal, inspect engine block for leakage or blockage.
		No	Access ECT PID. Inspect for both ECT PID and temperature gauge readings. If temperature gauge on instrument cluster indicates normal range but ECT PID is not same as temperature gauge reading, inspect ECT sensor. If temperature gauge on instrument cluster indicates overheating but ECT PID is normal, inspect temperature gauge and heat gauge unit.

10	• Verify test results.
	  ○ If normal, return to diagnostic index to service any additional symptoms.
	
	(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .)
	
	  ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.
	  • If vehicle is repaired, troubleshooting completed.		

	• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.18 COOLING SYSTEM CONCERNS-RUNS COLD [LF]

POSSIBLE CAUSE & DESCRIPTION (COOLING SYSTEM CONCERNS-RUNS COLD)

18	COOLING SYSTEM CONCERNS-RUNS COLD
DESCRIPTION	Engine takes excessive time to reach normal operating temperature.
POSSIBLE CAUSE	• Thermostat malfunction • Cooling fan system malfunction

DIAGNOSTIC PROCEDURE

COOLING SYSTEM CONCERNS-RUNS COLD DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Is customer complaint "Lack of passenger compartment heat" only?	Yes	Inspect A/C and heater system.
		No	Go to the next step.
2	Does the engine speed continue at fast idle?	Yes	Go to symptom troubleshooting "No.9 Fast idle/runs on". (See **NO.9 FAST IDLE/RUNS ON [LF]** .)
		No	Go to the next step.
3	Remove the thermostat and inspect operation. (See **THERMOSTAT REMOVAL/INSTALLATION [LF]** .) (See **THERMOSTAT INSPECTION [LF]** .) Is thermostat normal?	Yes	Go to the next step.
		No	Replace the thermostat.
4	Inspect cooling fan control system operation. (See **COOLING FAN CONTROL SYSTEM INSPECTION** .) Does the cooling fan control system function properly?	Yes	Access ECT PID. Inspect for both ECT PID and temperature gauge on instrument cluster readings. If the temperature gauge on the

			instrument cluster indicates normal range but ECT PID is not the same as temperature gauge reading, inspect the ECT sensor. If the temperature gauge on the instrument cluster indicates cold range but ECT PID is normal, inspect the temperature gauge and heat gauge unit.
		No	Repair or replace the malfunctioning part.
5	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.19 EXHAUST SMOKE [LF]

POSSIBLE CAUSE & DESCRIPTION (EXHAUST SMOKE)

19	EXHAUST SMOKE
DESCRIPTION	Blue, black, or white smoke from exhaust system
	Blue smoke (Burning oil): • PCV valve malfunction • Engine internal oil leakage **White smoke (Water in combustion):** • Cooling system malfunction (coolant loss)

POSSIBLE CAUSE	• Engine internal coolant leakage **Black smoke (Rich fuel mixture):** • Air cleaner restriction • Intake-air system is collapsed or restricted. • Fuel return line is restricted. • Excessive fuel pressure • Improper engine compression • Injector fuel leakage • Ignition system malfunction **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make**

	sure that it is free of foreign material.

DIAGNOSTIC PROCEDURE

EXHAUST SMOKE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	What color is smoke coming from the exhaust system?	Blue	Burning oil is indicated. Go to the next step.
		White	Water in combustion is indicated. Go to Step 3.
		Black	Rich fuel mixture is indicated. Go to Step 4.
2	Remove and shake the PCV valve. Does the PCV valve rattle?	Yes	Inspect for the following: • Damaged valve guide, stems or valve seals • Blocked oil drain passage in cylinder head • Piston ring is not seated, seized or worn. • Damaged cylinder bore If other driveability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Replace the PCV valve.
3	Does the cooling system hold pressure?	Yes	Inspect for the following: • Cylinder head gasket leakage • Intake manifold gasket leakage • Cracked or porous engine block If other driveability symptoms are present, return to diagnostic index to service any additional symptoms.
		No	Inspect for cause.
4	Inspect for the following: • Air cleaner restriction	Yes	Go to the next step.

	• Collapsed or restricted intake-air system • Restricted fuel return line Are all items normal?	No	Service if necessary. Repeat Step 4.
5	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
6	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start the engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Low:** • Inspect the fuel line for clogging. • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
7	Perform the spark test. (See **SPARK TEST** .) Is strong blue spark visible at each cylinder?	Yes	Inspect the CMP sensor. (See **CAMSHAFT POSITION (CMP) SENSOR INSPECTION [LF]** .)
		No	Repair or replace the malfunctioning part according to spark test result.
8	• Verify test results.		

	○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [LF]

POSSIBLE CAUSE & DESCRIPTION (FUEL ODOR (IN ENGINE COMPARTMENT))

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	Gasoline fuel smell or visible leakage
POSSIBLE CAUSE	• Excessive fuel pressure • Purge solenoid valve malfunction • Fuel tank vent system blockage • Charcoal canister malfunction • Fuel leakage from fuel system **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE**

	PRECAUTION [LF] .) **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

FUEL ODOR (IN ENGINE COMPARTMENT) DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Visually inspect for fuel leakage at fuel injector O-ring and fuel line. Service if necessary. Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Measure fuel line pressure during idle. Is fuel line pressure correct during idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
2	Inspect for blockage/restriction or open circuit in wiring harness between the engine vacuum port and the charcoal canister. Inspect for blockage in fuel tank vent system. Is malfunction indicated?	Yes	Replace vacuum hose.
		No	Go to the next step.
3	Inspect the purge	Yes	Go to the next step.

	solenoid valve. (See **PURGE SOLENOID VALVE INSPECTION [LF]** .) Is the solenoid operating properly?	No	Replace the purge solenoid valve. (See **PURGE SOLENOID VALVE REMOVAL/INSTALLATION [LF]** .)
4	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Inspect charcoal canister for fuel saturation. If excess amount of liquid fuel is present, replace the charcoal canister.
5	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.21 ENGINE NOISE [LF]

POSSIBLE CAUSE & DESCRIPTION (ENGINE NOISE)

21	ENGINE NOISE
DESCRIPTION	Engine noise from under hood
	Squeal, click or chirp noise: • Improper engine oil level • Improper drive belt tension • Generator installation (alignment) • Splash shield or under cover looseness (splashed water to drive belts)

POSSIBLE CAUSE	**Rattle sound noise:** • Loose parts **Hiss sound noise:** • Vacuum leakage • Loose spark plug • Air leakage from intake-air system **Rumble or grind noise:** • Improper drive belt tension • Improper P/S fluid level **Rap or roar noise:** • Dynamic dumper looseness • Exhaust system looseness • Intake-air system looseness **Other noise:** • Camshaft friction gear noise or MLA noise • Timing chain noise

DIAGNOSTIC PROCEDURE

ENGINE NOISE DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Is a squealing, click or chirping sound present?	Yes	Inspect for the followings: • Engine oil level • Drive belt tension • Splash shield or under cover looseness • Generator installation (alignment)

		No	Go to the next step.
2	Is a rumbling or grinding noise present?	Yes	Inspect for the followings: • Drive belt tension • P/S fluid level
		No	Go to the next step.
3	Is a rattling noise present?	Yes	Inspect rattling location for loose parts.
		No	Go to the next step.
4	Is a hissing noise present?	Yes	Inspect for the following: • Vacuum leakage • Spark plug looseness • Intake-air system leakage
		No	Go to the next step.
5	Is a rapping or roar noise present?	Yes	Inspect looseness for followings: • Dynamic dumper • Intake-air system • Exhaust system
		No	Go to the next step.
6	Is a knocking noise present?	Yes	Go to symptom troubleshooting "No.13 Knocking/pinging". (See **NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [LF]** .)
		No	If the noise comes from the engine internal, inspect for friction gear, timing chain or MLA noise.
7	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed.		

	• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.22 VIBRATION CONCERNS (ENGINE) [LF]

POSSIBLE CAUSE & DESCRIPTION (VIBRATION CONCERNS (ENGINE))

22	VIBRATION CONCERNS (ENGINE)
DESCRIPTION	• Vibration from under hood or driveline
POSSIBLE CAUSE	• Loose attaching bolts or worn parts • Components malfunction such as worn parts

DIAGNOSTIC PROCEDURE

VIBRATION CONCERNS (ENGINE) DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following components for loose attaching bolts or worn parts: • Cooling fan • Drive belt and pulleys • Generator • Engine mounts • Exhaust system mounts All items normal?	Yes	Inspect the following systems: • Wheels • AT • Driveline • Suspension
		No	Readjust or retighten engine mount installation position. Service if necessary for other parts.
2	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic		

	information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.23 A/C DOES NOT WORK SUFFICIENTLY [LF]

POSSIBLE CAUSE & DESCRIPTION (A/C DOES NOT WORK SUFFICIENTLY)

23	**A/C DOES NOT WORK SUFFICIENTLY.**
DESCRIPTION	A/C compressor magnetic clutch does not engage when the A/C switch is turned on.
POSSIBLE CAUSE	• Improper refrigerant charging amount • Open the A/C magnetic clutch • Open circuit in wiring harness between A/C relay and A/C magnetic clutch • Poor GND of A/C magnetic clutch • Refrigerant pressure switch is stuck open. • A/C relay is stuck open. • Seized A/C compressor • Open circuit in wiring harness between A/C switch and PCM through both refrigerant pressure switch and A/C amplifier

DIAGNOSTIC PROCEDURE

A/C DOES NOT WORK SUFFICIENTLY DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
2	Disconnect A/C compressor connector. Start engine and turn A/C switch on. Is there correct voltage at A/C compressor magnetic clutch terminal? **Specification** **10.5 V or more**	Yes	Inspect for GND condition of magnetic clutch on A/C compressor. If GND condition is normal, inspect for open circuit magnetic clutch coil.
		No	Go to the next step.

3	Disconnect refrigerant pressure switch connector. Connect jumper wiring between A/C high pressure switch terminal. Connect jumper wiring between refrigerant pressure switch terminal. Turn the ignition switch to the ON position. Turn A/C switch on and set blower fan to any speed. Does A/C work?	Yes	Inspect refrigerant pressure switch operation. If switch is normal, go to the next step.
		No	Inspect for the following: • A/C switch is stuck open. • Open circuit in wiring harness between refrigerant pressure switch and PCM terminal 1AU • Open circuit in wiring harness between blower motor fan switch and resistor (if blower motor does not operate) • Evaporator temperature sensor and A/C amplifier
4	Remove jumper wiring from the switch connector. Reconnect connector to refrigerant pressure switch. Start the engine and turn the A/C switch on. Does the fan operate?	Yes	Inspect whether A/C relay is stuck open. Replace if necessary.
		No	Inspect the following and repair or replace if necessary: • Refrigerant charging amount • A/C compressor for seizure
5	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed.		

	• If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF]

POSSIBLE CAUSE & DESCRIPTION (A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY)

24	**A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY.**
DESCRIPTION	A/C compressor magnetic clutch does not disengage.
POSSIBLE CAUSE	• A/C compressor magnetic clutch engagement is stuck. • A/C relay is stuck closed. • Short to GND in wiring harness between A/C switch and PCM • Short to GND in wiring harness between A/C relay and PCM • Short circuit to battery power in A/C relay to magnetic clutch

DIAGNOSTIC PROCEDURE

A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
2	Start the engine and idle it. Turn the A/C switch on. Remove the A/C relay. Does the A/C magnetic clutch disengage?	Yes	Inspect for the following: • A/C relay is stuck closed. • Short to GND in wiring harness

			between A/C relay and PCM terminal 11. If both items normal, go to the next step.
		No	Inspect if circuit between the A/C relay and magnetic clutch shorts to battery power circuit. If the circuit is normal, inspect the magnetic clutch for stuck engagement or clearance.
3	Disconnect refrigerant pressure switch connector. Start the engine and turn A/C switch on. **NOTE:** • **A/C should not work when disconnecting connector. If A/C remains working, short to GND circuit may be present.** Does the A/C remain working?	Yes	Inspect for short to GND in wiring harness between refrigerant pressure switch and PCM terminal 1AU.
		No	Go to the next step.
4	Reconnect refrigerant pressure switch connector. Turn off A/C switch. **NOTE:** • **A/C should not work when turning A/C switch off. If A/C remains working, short to GND circuit may be**	Yes	Inspect following: • Short to GND in wiring harness between A/C switch and A/C amplifier • Short to GND circuit between A/C amplifier and refrigerant pressure switch

	present. Does A/C remain working?	No	Inspect whether A/C switch is stuck closed.
5	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.25 A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS [LF]

POSSIBLE CAUSE & DESCRIPTION (A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS)

25	**A/C DOES NOT CUT OFF UNDER WOT CONDITIONS.**
DESCRIPTION	A/C compressor magnetic clutch does not disengage under WOT.
POSSIBLE CAUSE	• Accelerator pedal position sensor malfunction • Accelerator pedal position sensor misadjustment • Loosely installed accelerator pedal position sensor

DIAGNOSTIC PROCEDURE

A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Does A/C compressor disengage when the A/C switch is turned off?	Yes	Go to the next step.
		No	Go to symptom troubleshooting **NO.24 A/C IS ALWAYS ON**

			OR A/C COMPRESSOR RUNS CONTINUOUSLY [LF] .
2	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Inspect accelerator pedal position sensor.
3	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) o If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.26 EXHAUST SULPHUR SMELL [LF]

POSSIBLE CAUSE & DESCRIPTION (EXHAUST SULPHUR SMELL)

26	**EXHAUST SULPHUR SMELL**
DESCRIPTION	Rotten egg smell (sulphur) from exhaust
	• Electrical connectors are disconnected or connected poorly • Charcoal canister malfunction • Vacuum lines are disconnected or connected improperly. • Improper fuel pressure • Poor fuel quality **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains fuel system diagnosis and repair procedures. Read following**

POSSIBLE CAUSE	**warnings before servicing fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

EXHAUST SULPHUR SMELL DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Are any driveability or exhaust smoke concerns present?	Yes	Go to the appropriate flow table.
		No	Go to the next step.
2	Inspect the following: • Electrical connections • Vacuum lines • Fuel quality	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.

	Are all items normal?		
3	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
4	Install the fuel pressure gauge between the fuel pipe and the fuel distributor. Start engine and idle it. Is fuel line pressure correct at idle? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Low:** Inspect fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
5	Inspect the charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?	Yes	Replace the charcoal canister.
		No	Inspect the fuel tank vent system. If the fuel tank vent system is normal, suggest trying a different brand since sulphur content can vary in different fuels. If the fuel tank vent system is not normal, repair or replace the malfunctioning part.
6	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.		

	• If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.27 FUEL REFILL CONCERNS [LF]

POSSIBLE CAUSE & DESCRIPTION (FUEL REFILL CONCERNS)

27	FUEL REFILL CONCERNS
DESCRIPTION	• Fuel tank is not filled smoothly.
POSSIBLE CAUSE	• Clogged EVAP pipes • Non-return valve malfunction • Improper use of fuel nozzle • Inadequate fuel filling speed **WARNING:** • **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** ○ **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** ○ **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)**

	CAUTION: • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

FUEL REFILL CONCERNS DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
2	Remove the fuel-filler pipe. Make sure the non-return valve is installed properly. Inspect non-return valve operation. Is the non-return valve normal?	Yes	Inspect for the following: • Improper use of fuel nozzle • Inadequate fuel filling speed
		No	**Non-return valve is installed improperly:** • Reinstall non-return valve to proper position. **Non-return valve does not operate properly:** • Replace non-return valve.
3	• Verify test results. o If normal, return to diagnostic index to service any additional symptoms.		

	(See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)

NO.28 FUEL FILLING SHUT OFF CONCERNS [LF]

POSSIBLE CAUSE & DESCRIPTION (FUEL FILLING SHUT OFF CONCERNS)

28	FUEL FILLING SHUT OFF CONCERNS
DESCRIPTION	• Fuel does not shut off properly.
POSSIBLE CAUSE	• Clogged EVAP pipes • Non-return valve malfunction • Fuel shut-off valve malfunction • Fuel nozzle malfunction • Fuel nozzle is not inserted correctly. **WARNING:** • **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** ○ **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** ○ **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE**

	PRECAUTION [LF] .) **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

FUEL FILLING SHUT OFF CONCERNS DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION		ACTION
1	Connect the M-MDS or equivalent to the DLC-2. Turn the ignition switch to the ON position (Engine off). Retrieve any DTCs. Are there any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC inspection. (See **DTC TABLE [LF]** .)
		No	**No DTC is displayed:** Go to the next step.
2	Remove the fuel-filler pipe. Make sure the non-return valve is installed properly. Inspect non-return valve operation. Is the non-return valve normal?	Yes	Inspect for the following: • Improper use of fuel nozzle • Fuel is not inserted correctly. • Inspect fuel shut-off valve.
		No	**non-return valve is installed improperly:** • Reinstall the non-return valve to proper position. **non-return valve does not operate properly:**

			• Replace the non-return valve.
3	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)		

NO.29 SPARK PLUG CONDITION [LF]

POSSIBLE CAUSE & DESCRIPTION (SPARK PLUG CONDITION)

29	SPARK PLUG CONDITION
DESCRIPTION	Incorrect spark plug condition
	NOTE: • **Inspecting spark plugs condition can determine whether problem is related to a specific cylinder or possibly all cylinders.** **Wet/carbon stuck on specific plug:** • Spark-Weak, not visible • Air/fuel mixture-Excessive fuel injection volume • Compression-No compression, low compression • Malfunction spark plug **Grayish white with specific plug:** • Air/fuel mixture-Insufficient fuel injection volume • Malfunction spark plug **Wet/carbon is stuck on all plugs:**

POSSIBLE CAUSE	• Spark-Spark weak • Air/fuel mixture-Too rich • Compression-Low compression • Clogging in intake/exhaust system **Grayish white with all plugs:** • Air/fuel mixture-Too lean **WARNING:** **The following DIAGNOSTIC PROCEDURE TABLE contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this article.** **(See BEFORE SERVICE PRECAUTION [LF] .)** **(See AFTER SERVICE PRECAUTION [LF] .)** **CAUTION:** • **Disconnecting/connecting quick release connector without cleaning it may cause damage to fuel pipe and quick release connector. Always clean quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign material.**

DIAGNOSTIC PROCEDURE

SPARK PLUG CONDITION DIAGNOSTIC PROCEDURE TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Remove all the spark plugs.	Yes	Troubleshooting completed.

	Inspect spark plug condition. Is spark plug condition normal?	No	**Specific plug is wet or covered with carbon:** Go to the next step. **Specific plug looks grayish white:** Go to Step 7. **All plugs are wet or covered with carbon:** Go to Step 9. **All plugs look grayish white:** Go to Step 15.
2	Are the spark plug wet/covered with carbon by the engine oil?	Yes	Inspect all areas related to oil, working up and down.
		No	Go to the next step.
3	Inspect the spark plug for the following: • Cracked insulator • Heat range • Air gap • Worn electrode Is the spark plug normal?	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/INSTALLATION [LF]** .)
4	Inspect compression pressure at suspected malfunctioning cylinder. Is compression pressure correct? (See **COMPRESSION INSPECTION [LF]** .)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
5	Install all spark plugs. Perform the spark test at suspected malfunctioning cylinder. Is strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
6	Install the fuel pressure gauge between fuel filter and fuel	Yes	Inspect fuel injector for the following:

	distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with the ignition switch at ON? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)		• Open or short circuit in injector • Leakage • Injection volume
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
7	Inspect the spark plug for the following. • Heat range • Air gap Is the spark plug normal?	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/INSTALLATION [LF]** .)
8	Remove the suspected fuel injector. Inspect the following: • Resistance (See **FUEL INJECTOR INSPECTION [LF]** .) • Fuel injection volume (See **FUEL INJECTOR INSPECTION [LF]** .)	Yes	Inspect for open circuit in wiring harness between fuel injector connector terminal B and PCM at the following terminals: • **For No.1 cylinder: 2BB** • **For No.2 cylinder: 2BC** • **For No.3 cylinder: 2BD** • **For No.4 cylinder: 2AZ**

	Are all above items normal?	No	Replace the fuel injector.
9	Is the air cleaner element free of clogging?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	Perform the spark test. (See **SPARK TEST** .) Is strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
11	Install the fuel pressure gauge between the fuel filter and fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is the fuel line pressure correct with ignition switch at ON? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Go to the next step.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .)
12	Inspect the following PIDs: • ECT • O2S11 (When engine can be started.) • O2S12 (When engine can be started.) • MAF (See **PCM INSPECTION [LF]** .) Are PIDs normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part.
13	Perform the purge control inspection. (When engine can be	Yes	Go to the next step.

	started.) (See **PURGE CONTROL SYSTEM INSPECTION** .) Is the purge control correct?	No	Repair or replace the malfunctioning part.
14	Perform compression inspection. (See **COMPRESSION INSPECTION [LF]** .) Is compression correct?	Yes	Visually inspect for deformed exhaust system part.
		No	Repair or replace the malfunctioning part.
15	When the engine cannot be started, inspect the intake-air system for air leakage. When the engine can be started, perform intake manifold vacuum inspection. Is air sucked in from intake-air system?	Yes	Repair or replace the malfunctioning part.
		No	Go to the next step.
16	Install the fuel pressure gauge between the fuel filter and the fuel distributor. Short check connector terminal F/P to body GND using a jumper wiring. Turn the ignition switch to the ON position (Engine off). Is fuel line pressure correct with the ignition switch at ON? (See **FUEL LINE PRESSURE INSPECTION [LF]** .)	Yes	Inspect the following PIDs: • ECT • O2S11 • O2S12 • MAF (See **PCM INSPECTION [LF]** .) Inspect PCM GND condition.
		No	**Zero or low:** Inspect the fuel pump relay and fuel pump circuit. Inspect the fuel line for clogging. If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [LF]** .) **High:** Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION**

		[LF] .)
17	• Verify test results. ○ If normal, return to diagnostic index to service any additional symptoms. (See **ENGINE SYMPTOM TROUBLESHOOTING [LF]** .) ○ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See **PCM REMOVAL/INSTALLATION [LF]** .)	

INTERMITTENT CONCERN TROUBLESHOOTING [LF]

VIBRATION METHOD

- If malfunction occurs or becomes worse while driving on a rough road or when the engine is vibrating, perform the steps below.

NOTE:

- **There are several reasons vehicle or engine vibration could cause an electrical malfunction. Inspect the following:**
  - **Connectors not fully seated**
  - **Wiring harnesses not having full play**
  - **Wiring harnesses laying across brackets or moving parts**
  - **Wiring harnesses routed too close to hot parts**
- **An improperly routed, improperly clamped, or loose wiring harness can cause wiring to become pinched between parts.**
- **The connector joints, points of vibration, and places where wiring harnesses pass such as through the firewall and body panels are the major areas to be checked.**

Inspection Method for Switch Connectors or Wiring Harnesses

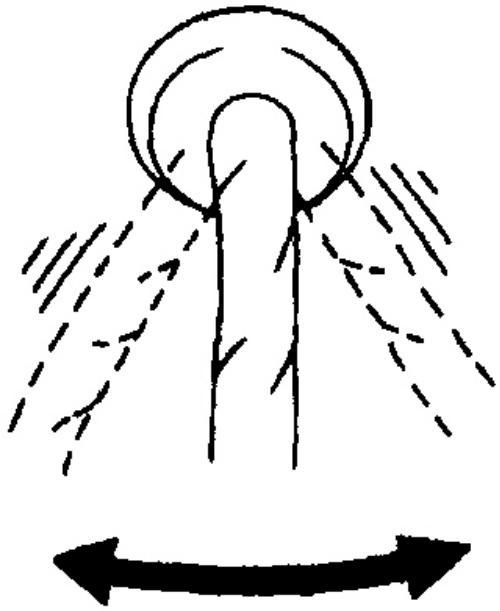
1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:

- **If the engine starts and runs, perform the following steps during idle.**

3. Access PIDs for the switch you are inspecting.

4. Turn the switch on manually.
5. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.
    - If PID value is unstable, inspect for poor connection.



YMU103WC0

Fig. 8: Inspecting Wiring Harnesses
Courtesy of MAZDA MOTORS CORP.

Inspection Method for Sensor Connectors or Wiring Harnesses

1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:
- **If the engine starts and runs, perform the following steps during idle.**

3. Access PIDs for the switch you are inspecting.
4. Slightly shake each connector or wiring harness vertically and horizontally while monitoring the PID.
    - If PID value is unstable, inspect for poor connection.

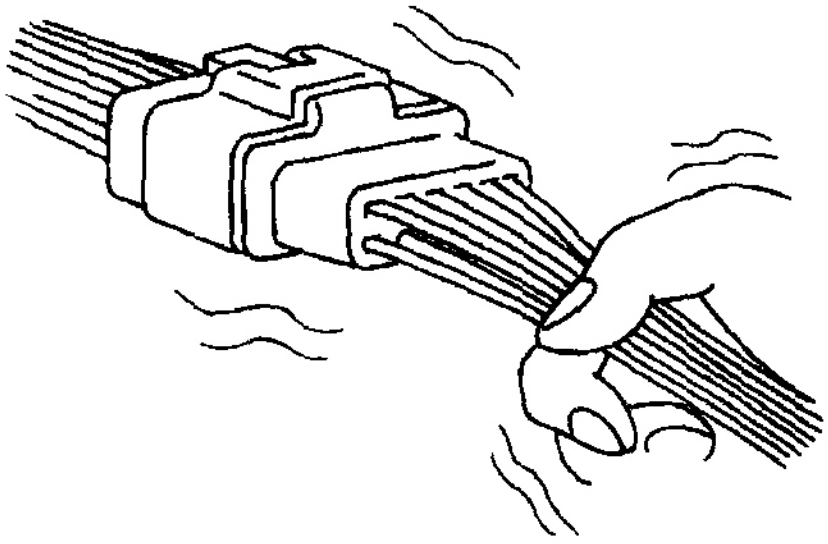


Fig. 9: Inspecting For Poor Connection
Courtesy of MAZDA MOTORS CORP.

Inspection Method for Sensors

1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:
- **If the engine starts and runs, perform the following steps during idle.**

3. Access PIDs for the switch you are inspecting.
4. Vibrate the sensor slightly with your finger.
   - If PID value is unstable or malfunction occurs, check for poor connection or poorly mounted sensor or both

Inspection Method for Actuators or Relays

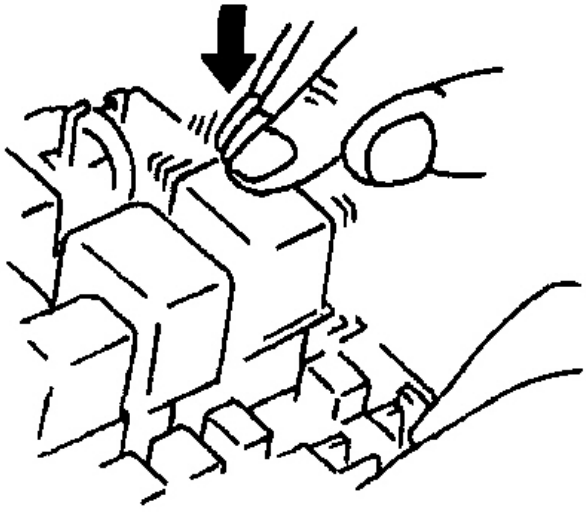
1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:
- **If the engine starts and runs, perform the following steps during idle.**

3. Prepare the output state control function for actuators or relays that you are inspecting.
4. Vibrate the actuator or relay with your finger for **3s** after output state control function is activated.
    - If variable click sound is heard, check for poor connection or poorly mounted actuator or both, or the relay.

NOTE:

- **Vibrating relays too strongly may result in open relays.**



YMU103WC2

Fig. 10: Vibrating Actuator Or Relay
Courtesy of MAZDA MOTORS CORP.

WATER SPRINKLING METHOD

If malfunction occurs only under high humidity or rainy/snowy weather, perform the following steps:

CAUTION:

- **Indirectly change the temperature and humidity by spraying water onto the front of the radiator.**
- **If a vehicle is subject to water leakage, the leakage may damage the control module. When testing a vehicle with a water leakage problem, special caution must be used.**

1. Connect the M-MDS or equivalent to the DLC-2 if you are inspecting sensors or switches.
2. Turn the ignition switch to the ON position (Engine off).

NOTE:
- **If the engine starts and runs, perform the following steps at idle.**

3. Access PIDs for sensor or switch if you are inspecting sensors or switches.
4. If you are inspecting the switch, turn it on manually.
5. Spray water onto the vehicle or run it through a car wash.
    - If PID value is unstable or malfunction occurs, repair or replace part if necessary.

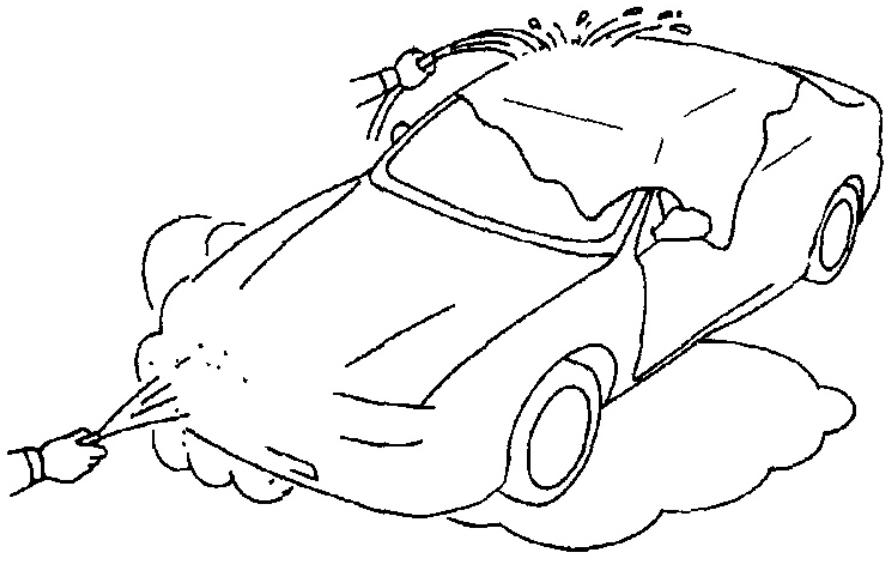


Fig. 11: Identifying Water Sprinkling Method
Courtesy of MAZDA MOTORS CORP.

ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF]

INPUT SIGNAL SYSTEM INSPECTION PROCEDURE

1. Find an irregular signal. (See **FINDING IRREGULAR SIGNALS** .)
2. Locate source. (See **LOCATING THE SOURCE OF UNUSUAL SIGNALS** .)
3. Repair or replace the malfunctioning part.
4. Confirm that the irregular signal is no longer detected.

Finding Irregular Signals

While referring to **ON-BOARD DIAGNOSTIC TEST [LF]** , use the PID/DATA monitor and record function to inspect the input signal system relating to the problem.

1. Start the engine and idle the vehicle. You can assume that any signals that are out of specification by a wide margin are irregular.
2. When recreating the problem, any sudden change in monitor input signals that is not intentionally created by the driver can be determined as irregular.

Locating the Source Of Unusual Signals

CAUTION:

- **Compare the M-MDS or equivalent monitor voltage with the measurement voltage using the digital measurement system function. If you use another tester, misreading may occur.**
- **When measuring voltage, attach the tester GND to the GND of the PCM that is being tested, or to the engine itself. If this is not performed, the measured voltage and actual voltage may differ.**
- **After connecting the pin to a waterproof coupler, confirming continuity and measuring the voltage, inspect the waterproof connector for cracks. If there are any, use sealant to fix them. Failure to do this may result in deterioration of the wiring harness or terminal from water damage, leading to problems with the vehicle.**

Variable Resistance Type 1 (TP Sensor and EGR Boost Sensor)

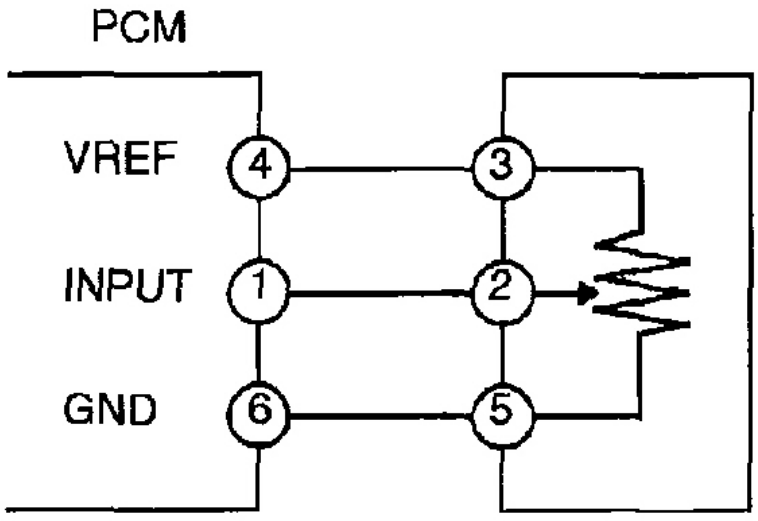


Fig. 12: TP Sensor & EGR Boost Sensor - Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

Input Signal System Inspection For Variable Resistance Type 1

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
   - If the #1 terminal voltage and the M-MDS or equivalent monitor voltage are the same, proceed to the next step.
   - If there is a difference of **0.5 V or more** , inspect for the following points concerning the PCM connector:
     - Female terminal opening is loose.
     - Coupler (pin holder) damage
     - Pin discoloration (blackness)
     - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
   - If there is a **0.5 V or more** difference between the sensor and the M-MDS or equivalent voltages, inspect the wiring harness for open or short circuits.
   - If the sensor and the M-MDS or equivalent voltages are the same, inspect for the following points concerning the sensor connector:
     - Female terminal opening is loose.

        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
    - If there are no problems, proceed to next investigation below.

Standard Power Supply System Inspection For Variable Resistance Type 1

- Confirm that the #3 terminal is at **5 V** .
    - If the measured voltage on the #3 terminal is **5 V** , inspect the following points on the sensor connector.
    - If there is no problem, inspect for the following:
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
    - If the #3 terminal measures other than **5 V** , inspect for the following:
        - Open or short circuit in wiring harness
        - Harness/pin crimp is loose or disconnected.

GND System Inspection For Variable Resistance Type 1

- Confirm that terminal sensor #5 is at **0 V** .
    - If it is at **0 V** , inspect the sensor.
        - If necessary, replace the sensor.
    - If not, inspect for the following:
        - Open or short circuit in wiring harness
        - Female terminal opening is loose causing an open or short circuit in wiring harness
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.

Variable Resistance Type 2 (Mass Air Flow (MAF) Sensor and VSS)

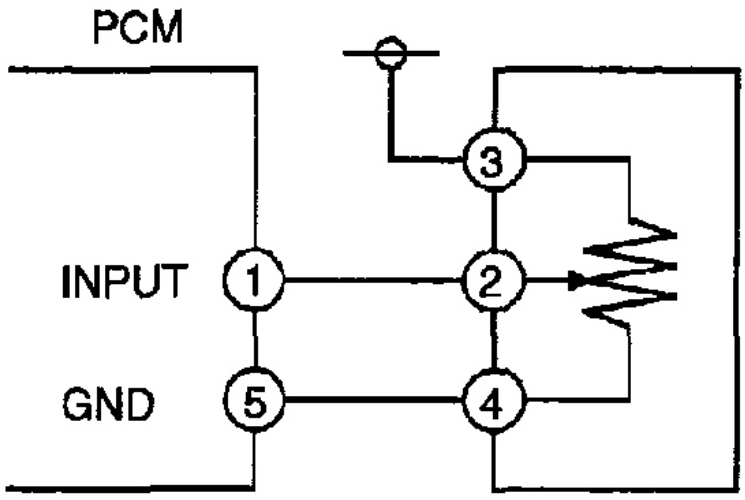


Fig. 13: Mass Air Flow (MAF) Sensor & VSS - Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

GND System Inspection For Variable Resistance Type 2

- Confirm that terminal sensor #4 is at **0 V** .
  - If it is at **0 V** , inspect the sensor.
    - If necessary, replace the sensor.
  - If not at **0 V** , inspect for the following:
    - Open circuit in wiring harness
    - Female terminal opening is loose.
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin crimp is loose or disconnected.

Input Signal System Inspection For Variable Resistance Type 2

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
   - If the #1 terminal voltage and the M-MDS or equivalent monitor voltage are the same, proceed to the next step.
   - If there is a difference of **0.5 V or more** , inspect for the following points concerning the PCM

connector:
    - Female terminal opening is loose.
    - Coupler (pin holder) damage
    - Pin discoloration (blackness)
    - Harness/pin crimp is loose or disconnected.

2. Measure the #2 sensor terminal voltage.
    - If there is a **0 V or more** difference between the sensor and the M-MDS or equivalent voltages, inspect the wiring harness for open or short circuits.
    - If the sensor and the M-MDS or equivalent voltages are the same, inspect the following points concerning the sensor connector:
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
    - If there are no problems, proceed to next investigation below.

Electrical Supply System Inspection For Variable Resistance Type 2

- Confirm that the sensor #3 terminal is **B+** .
    - If the measured voltage on the #3 terminal is **B+** , inspect the following points on the sensor connector.
    - If there is no problem, inspect for the following:
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
    - If the #3 terminal measures other than **B+** , inspect the following:
        - Open or short circuit in wiring harness
        - Harness/pin crimp is loose or disconnected.

Thermistor Type (IAT Sensor and ECT Sensor)

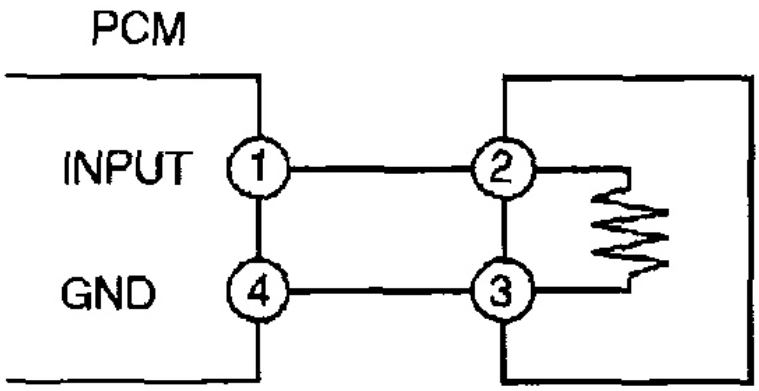


Fig. 14: IAT Sensor & ECT Sensor - Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

Input Signal System Inspection For Thermistor Type

1. When an irregular signal is detected, measure the #1 PCM terminal voltage.
   - If the #1 terminal voltage and the M-MDS or equivalent monitor voltage are the same, proceed to the next step.
   - If there is a difference of **0.5 V or more** , inspect the following points concerning the PCM connector:
     - Female terminal opening loose
     - Coupler (pin holder) damage
     - Pin discoloration (blackness)
     - Harness/pin crimp is loose or disconnected.
2. Measure the #2 sensor terminal voltage.
   - If there is a **0.5 V or more** difference between the sensor and the M-MDS or equivalent voltages, inspect the wiring harness for open or short circuits.
   - If the sensor and the M-MDS or equivalent voltages are the same, inspect the following points concerning the sensor connector:
     - Female terminal opening is loose.
     - Coupler (pin holder) damage

        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.
    - If there are no problems, proceed to next investigation below.

GND System Inspection For Thermistor Type

- Confirm that terminal sensor #3 is at **0 V** .
    - If it is at **0 V** , inspect the sensor. If necessary, replace the sensor.
    - If not, inspect for the following:
        - Open circuit in wiring harness
        - Female terminal opening is loose.
        - Coupler (pin holder) damage
        - Pin discoloration (blackness)
        - Harness/pin crimp is loose or disconnected.

MAIN RELAY OPERATION INSPECTION

1. Verify that the main relay clicks when the ignition switch is turned to ON position and off.
    - If there is no operation sound, inspect the following:
        - Main relay (See **RELAY INSPECTION** .)
        - Harness and connector between battery and main relay terminal A.
        - Harness and connector between PCM terminal 1Q and main relay terminal E.

INTAKE MANIFOLD VACUUM INSPECTION

1. Verify that the intake air hoses are installed securely.
2. Disconnect the vacuum hose connecting the intake manifold and the purge solenoid valve (purge solenoid valve side) and install the vacuum gauge.
3. Warm up the engine.
4. Measure the intake manifold vacuum while idling (no load) using the vacuum gauge. (See **INTAKE MANIFOLD VACUUM INSPECTION [LF]** .)
    - If not within the specification, perform the following inspections.
        - Compression pressure (See **COMPRESSION INSPECTION [LF]** .)
        - Air intake
            - Each hose installation part
            - Throttle body installation part
            - Fuel injector installation part
            - PCV valve installation part
            - Dynamic chamber installation port
            - Intake manifold installation part

ELECTRONIC THROTTLE CONTROL SYSTEM INSPECTION

Engine Coolant Temperature Compensation Inspection

1. Connect the M-MDS or equivalent to the DLC-2.
2. Access the following PIDs:
   - ECT
   - IAT
   - RPM
3. Verify that the engine is cold, then start the engine.
4. Verify that the engine speed decreases as the engine warms up
   - If the engine speed does not decrease or decreases slowly, inspect the following:
     - ECT sensor and related wiring harness

       (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF]** .)

     - Electronic throttle body and related wiring harness

       (See **THROTTLE BODY INSPECTION [LF]** .)

Load Compensation Inspection

1. Start the engine and idle it.
2. Connect the M-MDS or equivalent to the DLC-2.
3. Verify that P0506, P0507, or P0511 is not displayed.
   - If P0506, P0507 or P0511 are displayed, perform DTC inspection.

     (See **DTC TABLE [LF]** .)

4. Access the RPM PID.

   NOTE:
   - **Excludes temporary idle speed drop just after the loads are turned on.**

5. Verify that the engine speed is within the specification under each load condition. (See **ENGINE TUNE-UP [LF]** .)
   - If load condition is not as specified, inspect the following:
     - A/C switch and related wiring harness

       (See **CLIMATE CONTROL UNIT INSPECTION** .)

     - Fan switch and related wiring harness

(See **CLIMATE CONTROL UNIT INSPECTION** .)

Throttle Position (TP) Sweep Inspection

1. Connect the M-MDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position.
3. Verify that none of the following DTC are displayed:
   - P0122, P0123, P0222, P0223, P0638, P2101, P2107, P2108, P2109, P2112, P2119, P2122, P2123, P2127, P2128, P2135, P2138
     - If any one DTC is displayed, perform DTC inspection.
4. Access TP_REL PID.
5. Verify that the PID reading is within the CTP value. (See **PCM INSPECTION [LF]** .)
   - If the PID reading is out of range, perform the following:
     - Remove the air duct from the throttle valve body.
     - Verify that the throttle valve opens when the accelerator pedal is depressed.
       - If the throttle valve opens, inspect the throttle position sensor and related wiring harness.
       - If the throttle valve does not open, inspect the throttle actuator control motor and related wiring harness.
6. Gradually depress the throttle pedal and verify that the PID reading increases accordingly.
   - If the PID reading drops momentarily, inspect the following:
     - Throttle position sensor
7. Fully depress the throttle pedal and verify that the PID reading is within WOT value. (See **PCM INSPECTION [LF]** .)
   - If the PID reading is out of range, perform the followings:
     - Remove the air duct from throttle valve body.
     - Verify that the throttle valve opens when throttle pedal is depressed.
       - If the throttle valve opens, inspect the throttle position sensor and related wiring harness.
       - If the throttle valve does not open, inspect the throttle actuator control motor and related wiring harness.

VARIABLE INTAKE AIR CONTROL OPERATION INSPECTION

1. Start the engine.
2. Inspect the rod operation. (See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]** .)
   - If the rod operation is not as specified, inspect as follows:
   1. Stop the engine.
   2. Connect the M-MDS or equivalent to the DLC-2.

3. Verify that DTC P0661 or P0662 is not displayed.
   - If DTC P0661 or P0662 is shown, perform DTC inspection.

     (See **DTC TABLE [LF]** .)

4. Inspect the variable intake air solenoid valve.

   (See **VARIABLE INTAKE AIR SOLENOID VALVE INSPECTION [LF]** .)

   - If the variable intake air solenoid valve is not normal, replace the variable intake air solenoid valve.

     (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)

   - If the variable intake air solenoid valve is normal, inspect the following:
     - Vacuum hose and vacuum chamber for looseness or damage
     - Shutter valve actuator

       (See **VARIABLE INTAKE AIR SHUTTER VALVE ACTUATOR INSPECTION [LF]** .)

     - Shutter valve stuck open or closed

FUEL INJECTOR OPERATION INSPECTION

If simulation function of M-MDS is used:

FUEL INJECTOR OPERATION INSPECTION TABLE

STEP	INSPECTION	RESULTS	ACTION
1	Start the engine and warm it up until normal operating temperature. Connect the M-MDS or equivalent to DLC-2. Select the INJ_1, INJ_2, INJ_3, and INJ_4 PIDs Turn the fuel injector from on to off using the PIDs for each cylinder. Does the engine speed drop?	Yes	Fuel injector work properly.
		No	Engine speed does not drop any cylinders: Go to the next step. Engine speed drop some cylinders: Go to Step 3.
2	Perform main relay operation inspection. (See **MAIN RELAY**	Yes	Go to the next step.
		No	Repair or replace

	OPERATION INSPECTION .) Does the main relay work properly?		malfunctioning parts.
3	Inspect the fuel injector for suspected cylinder. (See **FUEL INJECTOR INSPECTION [LF]** .) Is the fuel injector okay?	Yes	Inspect the following for suspected cylinder: • Fuel injector power and/or GND systems related harness and connectors.
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)
4	Perform KOER self-test function using M-MDS or equivalent. (See **KOEO/KOER SELF TEST [LF]** .) Are DTC P0201, P0202, P0203 and/or P0204 present?	Yes	Go to appropriate DTC test. (See **DTC TABLE [LF]** .)
		No	Go to the next step.
5	Inspect the fuel injector for suspected cylinder. (See **FUEL INJECTOR INSPECTION [LF]** .) Is the fuel injector okay?	Yes	Inspect the following for suspected cylinder: • PCM terminals (pulled-out pins, corrosion) • Fuel injector terminals (pulled-out pins, corrosion)
		No	Replace the fuel injector. (See **FUEL INJECTOR REMOVAL/INSTALLATION [LF]** .)

If simulation function of M-MDS or equivalent is not used:

FUEL INJECTOR OPERATION INSPECTION TABLE

STEP	INSPECTION	RESULTS	ACTION
1	While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. Is operation sound heard?	Yes	Fuel injector operation is normal.
		No	**All cylinders not heard:** Go to the next step. **Some cylinders not heard:**

			Go to Step 3.
2	Perform main relay operation inspection. Is main relay operation normal?	Yes	Inspect the following: • Fuel injector power system related wiring harness and connectors • PCM connectors • Fuel injector GND and related wiring harness and connectors
		No	Repair or replace malfunctioning parts.
3	Switch fuel injector connector of not operating fuel injector with operating fuel injector. Is operation sound heard?	Yes	Go to the next step.
		No	Replace the fuel injector.
4	Are wiring harness and connectors of not operation fuel injector normal? (Open or short)	Yes	Inspect PCM terminal voltage of fuel injector signal.
		No	Repair or replace malfunctioning parts.

FUEL CUT CONTROL SYSTEM INSPECTION

NOTE:

- **This inspection has to perform after the Fuel Injector Operation Inspection.**

If simulation function of M-MDS is used:

1. Warm up the engine and idle it.
2. Connect the M-MDS or equivalent to DLC-2.
3. Select the RPM and FUELPW1 PIDs.
4. Monitor the both PIDs while performing the following steps.
    1. Depress the accelerator pedal and increase the RPM PID to **4,000 rpm.**
    2. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the FUELPW1 PID is **0 ms.** , and **2-5 ms.** when the RPM PID drops **below 1,200 rpm.**
        - If not as specified, inspect the following.
            - ECT sensor and related harness

(See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION**

[LF] .)

- Neutral switch and related harness

  (See **NEUTRAL SWITCH INSPECTION [LF]** .)

- Clutch switch and related harness

  (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF]** .)

If simulation function of M-MDS is not used:

1. Warm up the engine and idle it.
2. Measure the fuel injector control signal wave profile using the oscilloscope while performing the following steps.
   1. Depress the accelerator pedal and increase the engine speed to **4,000 rpm.**
   2. Quickly release the accelerator pedal (brake pedal is not depressed) and verify that the wave profile constant **B+** , and appears wave, when the engine speed drops **below 2,200 rpm.**

      (See **PCM INSPECTION [LF]** .)

      - If not as specified, inspect the following.
        - ECT sensor and related harness

          (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [LF]** .)

        - Neutral switch and related harness (MT)

          (See **NEUTRAL SWITCH INSPECTION [LF]** .)

        - Clutch switch and related harness (MT)

          (See **CLUTCH PEDAL POSITION (CPP) SWITCH INSPECTION [LF]** .)

        - TR switch and related wiring harness (AT)

          (See **TRANSMISSION RANGE (TR) SWITCH INSPECTION [SJ6A-EL]** .)

FUEL PUMP OPERATION INSPECTION

1. Remove the fuel-filler cap.
2. Turn the ignition switch to the ON position.
3. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard.
   - If no operation sounds is heard, proceed to next step.

4. Measure voltage at wiring harness side fuel pump connector terminal B.

   Specification

   B+ (Ignition switch at on)

   - If the voltage is as specified, inspect the following:
     - Fuel pump continuity
     - Fuel pump GND
     - Wiring harness between fuel pump relay and PCM terminal 1H
   - If not as specified, inspect the following:
     - Fuel pump relay
     - Wiring harness connector (Main relay-fuel pump relay-fuel pump.)

FUEL PUMP CONTROL SYSTEM INSPECTION

1. Crank the engine and verify that fuel pump relay operation sound is heard.
2. If operation sound is not heard, inspect the following:
   - Fuel pump relay

     (See **RELAY INSPECTION** .)

   - Wiring harness and connectors (Main relay-fuel pump relay-PCM terminal 1H

SPARK TEST

1. Disconnect the fuel pump relay.
2. Verify that each ignition coil and connector is connected properly.
3. Inspect the ignition system in the following procedure.

WARNING:

- **High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.**

IGNITION SYSTEM INSPECTION TABLE

STEP	INSPECTION		ACTION
1	• Disconnect the ignition coil from the spark plugs. • Remove the spark plugs. ○ Verify that	Yes	Go to the next step.
		No	Perform no-load racing at 4,000 rpm for 2 min, 2 times to burn off the carbon deposits.

	the spark plugs do not have carbon deposits. • Are the spark plugs normal?		Repeat Step 1.
2	• Inspect the spark plugs for damage, wear, carbon deposits and proper plug gap. • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace spark plugs, then go to Step 1.
3	• Reconnect the spark plugs to the ignition coil. • Ground the spark plugs to the engine. • Is a strong blue spark visible at each cylinder while cranking the engine?	Yes	Ignition system is normal
		No	**Some cylinders do not spark:** • Go to the next step. **All cylinders do not spark:** • Go to Step 5.
4	• Inspect the following wiring harnesses for open or short: ○ Ignition coil No.1 terminal C-PCM terminal 2BA ○ Ignition coil No.2 terminal C-PCM terminal 2AW ○ Ignition coil No.3 terminal C-PCM	Yes	Inspect and replace the ignition coil. (See **IGNITION COIL INSPECTION [LF]** .)
		No	Repair or replace the malfunctioning part, then go to Step 1.

	terminal 2AX ○ Ignition coil No.4 terminal C-PCM terminal 2AT • Are the wiring harnesses normal?		
5	• Measure the voltage at terminal A in each ignition coils. • Is the voltage **B+** ?	Yes	Go to the next step.
		No	Inspect power supply circuit of ignition coils.
6	Verify continuity between each ignition coils terminal B and battery negative post. Is there any continuity?	Yes	Go to the next step.
		No	Inspect GND circuit of ignition coils.
7	• Does the PCM connector or ignition coil connectors have poor connection?	Yes	Repair or replace the connector, then go to Step 1.
		No	Go to the next step.
8	• Are the following parts normal? ○ CKP sensor and crankshaft pulley	Yes	Inspect for open or short circuit in wiring harness and connector of CKP sensor.
		No	Repair or replace the malfunctioning part, then go to Step 1.

EGR CONTROL SYSTEM INSPECTION

If simulation function of M-MDS is used:

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.
   - If the operation sound is not heard, connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform the DTC inspection. (See **DTC TABLE [LF]** .)
2. Start the engine run it at idle.
3. Increase the step value of EGR valve **from 0 to 52** using SEGR PID of simulation function.
4. Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.
   - If the engine speed will not change, proceed to following.

1. Stop the engine.
2. Remove the EGR valve.
3. Connect the EGR valve connector.
4. Turn the ignition switch to the ON position.
5. Increase the step value of EGR valve **from 0 to 52** using SEGRP PID.
6. Verify that the EGR valve operates according to SEGRP PID.
    - If the EGR valve is operated, clean the EGR valve and EGR gas passage.
    - If the EGR valve will not operate, replace the EGR valve.

5. Start the engine and warm it up completely.
6. Access the following PIDs.
    - ECT, RPM, SEGRP, APP1, APP2, TP, VSS
7. Idle the vehicle and verify that the SEGRP value is **0.**
8. Put the vehicle drive.
9. Depress the accelerator pedal and verify that the SEGRP value is increased.
    - If the SEGRP value will not increase, inspect the VSS, TP and ECT PIDs.

      (See **PCM INSPECTION [LF]** .)

10. Stop the vehicle and verify that the SEGRP value is returned to **0.**

If simulation function of M-MDS is not used:

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.
    - If the operation sound is not heard, connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform DTC inspection. (See **DTC TABLE [LF]** .)
2. Start the engine and idle it.
3. Warm up the engine to normal operating temperature.
4. Access the following PIDs:
    - ECT, RPM, SEGRP_DSD, APP1, APP2, VSS
5. Idle the vehicle and verify that the SEGRP value is 0.
6. Put the vehicle in drive.
7. Depress the accelerator pedal and verify that the SEGRP_DSD value is increased.
    - If the EGR valve increases, inspect the following:
        - EGR valve (stuck open or close)
        - Wiring harness and connectors (Main relay-EGR valve-PCM)
    - If the SEGRP_DSD value does not increase, inspect the VSS, APP1, APP2, TP and ECT PIDs. (See **PCM INSPECTION [LF]** .)
8. Stop the vehicle and verify that the SEGRP value returns to 0.

PURGE CONTROL SYSTEM INSPECTION

If simulation function of M-MDS is used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put the finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
   - If there is a vacuum, inspect the following:
     - Wiring harness and connectors (Purge solenoid valve-PCM terminal 2C)
     - Purge solenoid vale (stuck open)
4. Connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection.

   (See **DTC TABLE [LF]** .)

5. Select EVAPCP PID.
6. Increase the duty value of the purge valve to **50%** and inspect if the operation sound of the valve is heard.
   - If the operation sound is heard, inspect for the loose or damaged vacuum hose. (Intake manifold-purge solenoid valve-charcoal canister)
   - If the operation sound is not heard, perform the purge solenoid valve inspection.

     (See **PURGE SOLENOID VALVE INSPECTION [LF]** .)

7. Warm up the engine to normal operating temperature.
8. Monitor the EVAPCP PID using the M-MDS or equivalent, and drive the vehicle **approx. 2,000 rpm for 30 sec.** or more.
   - If the EVAPCP PID is **0%** , inspect the following.
     - MAF, APP1, APP2, TP_REL and LOAD PIDs.

If simulation function of M-MDS or equivalent is not used:

1. Start the engine.
2. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
3. Put the finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
   - If there is a vacuum, inspect the following:
     - Wiring harness and connectors (Purge solenoid valve-PCM terminal 2C)
     - Purge solenoid vale (stuck open)
4. Connect the M-MDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection.

   (See **DTC TABLE [LF]** .)

5. Access EVAPCP and ECT PIDs.
6. Verify that the ECT PID is **more than 78°C {173°F}.**
   - If the ECT PID reading indicates **less than 78°C {173°F}** , perform the ECT inspection.
7. Set the vehicle on the dynamometer or chassis roller.

WARNING:

- **When the dynamometer or chassis roller is operating, there is a possibility that the operator may come into contact with or be caught up in the rotating parts, leading to serious injuries or death. When performing work while the dynamometer or chassis roller is operating, be careful not to come into contact with or caught up in any of the rotating parts.**

8. Drive the vehicle **approx. 2,000 rpm for 30 sec.** or more.
   - If there is no vacuum, inspect the following:
     - Wiring harness and connector (Main relay-purge solenoid valve-PCM terminal 2C)
     - Purge solenoid valve
     - MAF, APP1, APP2, TP and LOAD PISs
   - If there is vacuum, inspect the following:
     - Vacuum hose (Purge solenoid valve-charcoal canister)

A/C CUT-OFF CONTROL SYSTEM INSPECTION

1. Start the engine.
2. Turn the A/C switch and the fan switch on.
3. Verify that the A/C compressor magnetic clutch actuates.
   - If it does not actuate, go to symptom troubleshooting **NO.23 A/C DOES NOT WORK SUFFICIENTLY [LF]** .
4. Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for **2-5 s.**
   - If it actuates, inspect as follows:
     - A/C relay
     - Open or short to GND circuit in wiring harness and connectors (Ignition switch-A/C relay-PCM terminal 11)
     - A/C related parts
     - APP1, APP2 PIDs

COOLING FAN CONTROL SYSTEM INSPECTION

If simulation function of M-MDS is used:

1. Connect the M-MDS or equivalent to DLC-2.

2. Start the engine and warm it up to normal operating temperature.
3. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan operating while the KOER self-test or the KOER self-test. (See **KOEO/KOER SELF TEST [LF]** .)
4. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan while operating the KOER self-test.
    - If the DTC P0480 is shown, perform the DTC troubleshooting procedure. (See **DTC P0480 [LF]** .) (See **DTC P0481 [LF]** .) (See **DTC P0482 [LF]** .)
    - If the cooling fans do not operate while KOER self-test, proceed the followings:
    1. Inspect the cooling fan motor and wiring harness between cooling fan motor and GND.
    2. Select FAN1, FAN2 and FAN3 PIDs.
    3. Turn ignition switch off and disconnect the cooling fan motor connector.
    4. Verify that each cooling fan relay operating sound is heard, when turn each cooing fan relay to on from off using simulation function of FAN1, FAN2 and FAN3 PIDs.
        - If the operation sound is not heard, inspect for suspected cooling fan relay is stuck open or close.
        - If the operation sound is heard, inspect wiring harness and connector between all cooling fan relays and cooling fan motor.

If simulation function of M-MDS is not used:

1. Connect the M-MDS or equivalent to DLC-2.
2. Start the engine and warm it up to normal operating temperature.
3. Perform the KOER self-test. (See **KOEO/KOER SELF TEST [LF]** .)
4. Verify that the DTC P0480, P0481 or P0482 is not shown and cooling fan operating while the KOER self-test.
    - If the DTC P0480 is shown, perform the DTC troubleshooting procedure. (See **DTC P0480 [LF]** .) (See **DTC P0481 [LF]** .) (See **DTC P0482 [LF]** .)
    - If the cooling fans do not operate while KOER self-test, proceed the followings:
    1. Inspect the cooling fan motor and wiring harness between cooling fan motor and GND.
    2. Turn the ignition switch to off.
    3. Disconnect ECT sensor connector.
    4. Verify that the operation sound heard form all cooling fan relays (No.1, No.2 and No.3), when the ignition switch to ON position.
        - If the operation sound is not heard, inspect for suspected cooling fan relay is stuck open or close.
        - If the operation sound is heard, inspect wiring harness and connector between all cooling fan relays and cooling fan motor.
    5. Turn the ignition switch off and disconnect the ECT sensor connector.
    6. Reconnect the ECT sensor and clear the DTC from PCM memory using the M-MDS or equivalent.

VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION INSPECTION

If simulation function of M-MDS is used:

1. Warm up the engine to normal operating temperature.
2. Connect the M-MDS or equivalent to DLC-2.
3. Start the engine and run it at idle.
4. Select VT DUTY1 PID.
5. Increase the oil control valve (OCV) duty value and verify that the engine idles roughly or stalls.
   - If as specified, inspect the timing belt component (valve timing deviation).
   - If not as specified, go to the next step.
6. Remove the oil control valve (OCV) with connector is connected.
7. Turn the ignition switch to the ON position.
8. Select VT DUTY1 PID.
9. Increase the oil control valve (OCV) duty value and verify that the spool valve operates in the advance direction.
   - If as specified, inspect the following hydraulic passage for clogging and/or leakage.
     - Oil pressure switch-oil control valve (OCV)
     - Oil control valve (OCV)-camshaft
     - Camshaft internal passage
   - If not as specified, inspect the following:
     - Oil control valve (OCV) operation
     - Harness and connectors for open or short (Oil control valve (OCV)-PCM terminal 2E)
10. If they are okay, replace the intake camshaft pulley (with a built-in variable valve timing actuator).

If simulation function of M-MDS is not used:

1. Start the engine and run it at idle.
   - If idling cannot be continued, go to Step 2.
   - If idling can be continued, go to Step 7.
2. Remove the oil control valve (OCV) and verify that the spool valve is at maximum retard position.
3. Connect the oil control valve (OCV).
4. Turn the ignition switch to the ON position.
5. Verify that the spool valve is at maximum retard position.
   - If the spool valve is stuck in the advance direction, inspect for the following:
     - Short circuit in wiring harnesses or connectors between the oil control valve (OCV) and the PCM.
6. Inspect the variable valve timing actuator.

   (See **VARIABLE VALVE TIMING ACTUATOR INSPECTION [LF]** .)

7. Disconnect oil control valve (OCV) connector.

8. Warm up the engine and idle it.
9. Apply battery voltage to the oil control valve (OCV) and verify that the engine idles roughly or stalls.
   - If the engine idles roughly or stalls, inspect the timing belt component (valve timing deviation).
   - If the engine does not idle roughly or stalls, go to the next step.
10. Remove the oil control valve (OCV) and perform spool valve operation inspection.

    (See **OIL CONTROL VALVE (OCV) INSPECTION [LF]** .)

    - If not as specified, inspect the following:
      - Oil control valve (OCV)
      - Harnesses and connectors between oil control valve (OCV) and PCM open or short.
    - If as specified, inspect the following hydraulic passages for clogging or leakage or both:
      - Oil pressure switch-oil control valve (OCV)
      - Oil control valve (OCV)-camshaft
      - Camshaft internal passage
11. If they are normal, replace the camshaft pulley (with built-in variable valve timing actuator).

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK INSPECTION

- To verify that the problem has been fixed properly after repairs, the run drive cycle or EVAP system leak inspection must be performed.

EVAP System Leak Inspection Using M-MDS or Equivalent

NOTE: EVAP system test outline

- **The EVAP system test, which can substituted for the run drive cycle as an EVAP control system repair confirmation method, can be done while operating the M-MDS in the KOEO (Key On Engine Off) condition instead of actually driving the vehicle.**

EVAP System Test Description

- The EVAP system test finds gas leaks in the system using the PCM to monitor changes in the air pump load current of the EVAP system leak detection pump. This test starts after sending an on-demand test signal from the M-MDS to the PCM. The PCM controls the air pump and change-over-valve operation and also stores the load current of the air pump as follows:
  i. The PCM commands turn the air pump on and retrieve the air pump load current value (LDP_MON PID) as a reference current (LDP_REF PID).
  ii. After retrieving a reference current value, the PCM commands the change-over-valve to open, then captures the air pump load current value (LDP_MON PID) as idle current (LDP_IDL PID). The EVAP system will be pressurized from this phase.
  iii. The PCM continues to monitor the air pump load current value (LDP_MON PID) until the end of

the test.

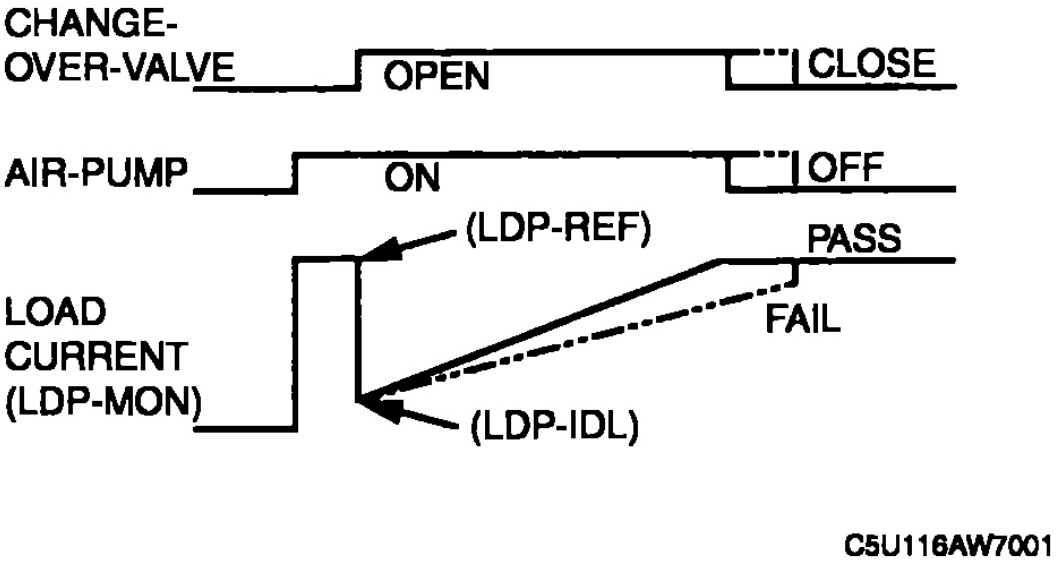


Fig. 15: EVAP System PCM Test Description
Courtesy of MAZDA MOTORS CORP.

- You can confirm whether any evaporative gas leak occurred or not by reading the test results.

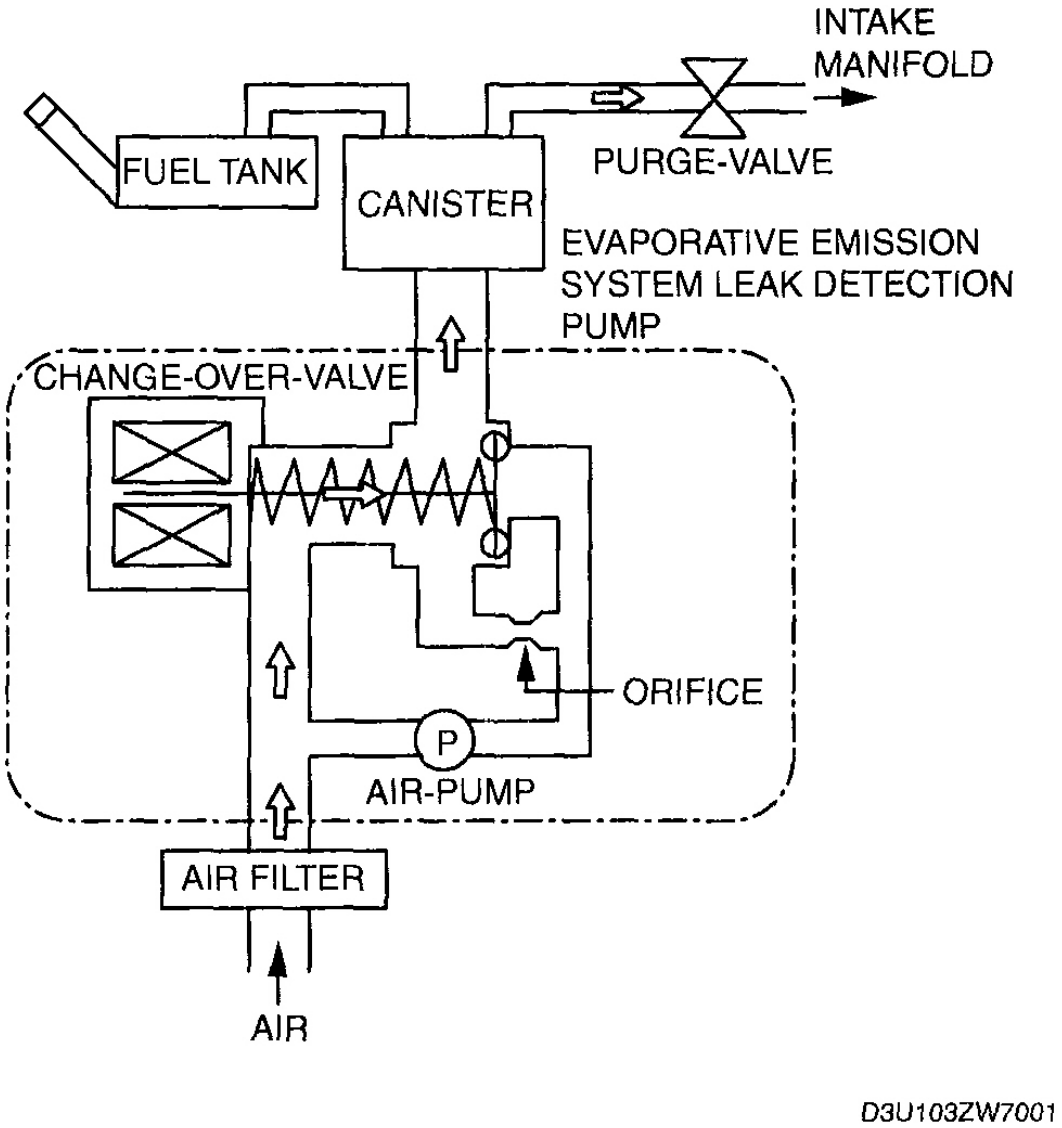


Fig. 16: System Diagram - EVAP System
Courtesy of MAZDA MOTORS CORP.

EVAP System Malfunction Judgment

- The PCM calculates the stored air pump load current value and send the results to the M-MDS as DTCs:

DTC & CONDITION TABLE

DTC No.	Condition
P0442	Evaporative emission control system leak detected (small leak)

P0446	Change over valve (COV) (EVP system leak detection pump) stuck close
P0455	Evaporative emission control system leak detected (gross leak)
P0456	Evaporative emission system leak detected (very small leak)
P2401	EVAP system leak detection pump motor circuit low
P2402	EVAP system leak detection pump motor circuit high
P2404	EVAP system leak detection pump sense circuit problem
P2405	EVAP system leak detection pump sense circuit low input
P2407	EVAP system leak detection pump sense circuit intermittent

Evaporative System Test Procedure

1. Select the EVAP system test from the toolbox on the M-MDS display and follow the instructions.
2. Verify that all of the following PIDs are within the specifications at the pre-test confirmation screen.

NOTE:

- **To successfully perform this procedure, all PIDs must be within the following specifications before proceeding to the next step.**
- **The PCM will cancel the EVAP system test if the VPWR PID value falls lower than 11.0 V during the test.**

PID SPECIFICATION

PID	PID Range
BARO	72.2 kPa {543 mmHg, 21.3 inHg} or more
FLI	15-85%
IAT	5-45°C {41-113°F}
VPWR	11.0 V or more

3. Start the engine.
4. Drive the vehicle or let the engine idle more than **20 min.**
5. Turn ignition switch off, then turn it to the ON position again (Key On Engine Off).
6. Press the tick icon to start the test.
7. Verify that no DTCs present after the completion of the test.

- If any test result is indicated with red, diagnose the problem using the following DTC troubleshooting procedure or component inspection procedure.

- If any DTCs are detected, diagnose the problem using the appropriate DTC troubleshooting procedure.

EVAP System Leak Inspection Using Leak Tester

1. Perform the following **SST** (EVAP System Tester 134-01049) self-test:

NOTE:

- **If the tester does not work correctly during the self-test, refer to the tester operators manual for a more detailed self-test procedure.**

1. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.
2. Connect the vehicle interface hose (part of the **SST**) to the SELF-TEST port located on the control panel. Hand tighten the fitting. (Do not overtighten.)
3. Turn the control valve to the TEST position.
4. The gauge should read **331-381 mm {13-15 in}** of water.
    - If the gauge is not reading in this range, adjust the pressure by turning the black knob on the low pressure regulator at the nitrogen bottle.
5. Turn the control valve to the HOLD position.
6. Verify that the gauge holds pressure and that the flow meter reads no flow.
    - If there is no drop in pressure and no flow, the tester passes the self-test.
    - If the gauge leaks down, refer to the tester operators manual.

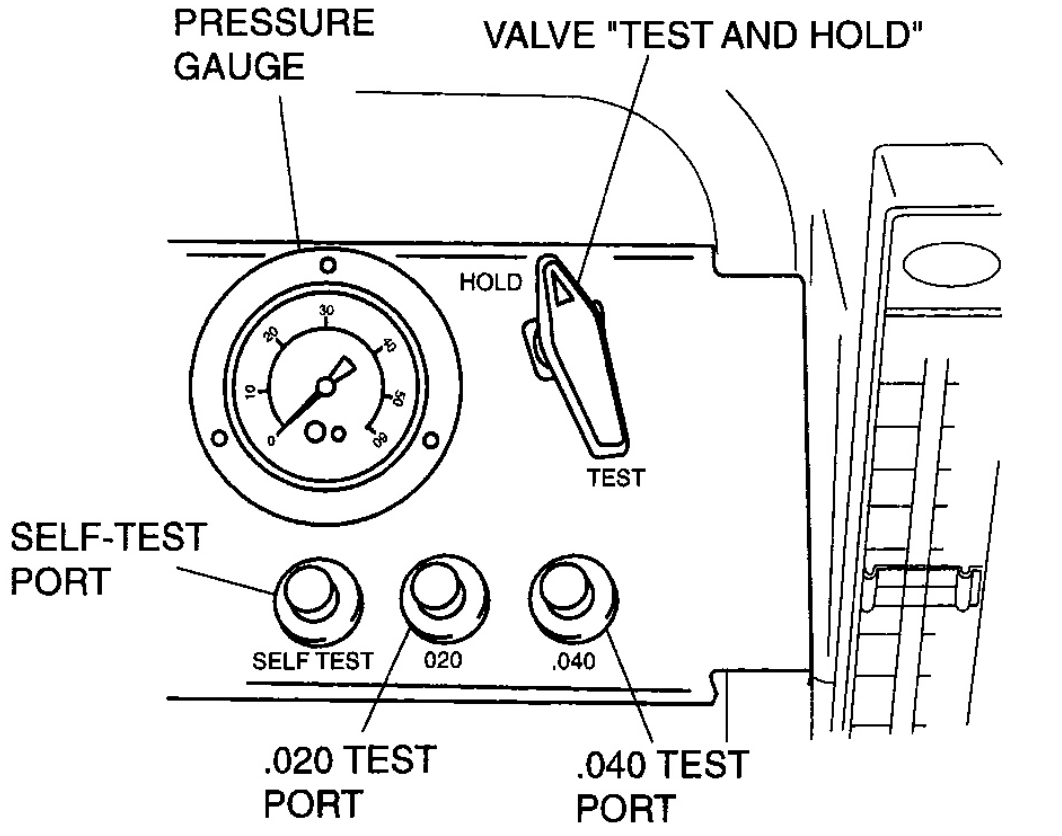


Fig. 17: Identifying EVAP Leak Tester Control Panel
Courtesy of MAZDA MOTORS CORP.

2. Connect the **SST** to the vehicle.
    1. Verify that the control valve on the panel is in the HOLD position then open the nitrogen bottle valve.
    2. Remove the fuel-filler cap from the vehicle.
        - If the fuel-filler cap is not a MAZDA part or equivalent, replace it.
    3. Connect the receiver assembly (**SST:** AKS441130) to the vehicle cap test hose assembly (part of the **SST**) and the fuel-filler cap from the vehicle.
    4. Connect the cap adaptor (**SST:** AKS441131) to the vehicle cap test hose assembly (part of the **SST**) and to the fuel-filler neck.

5. Connect the vehicle interface hose (part of the **SST**) to the center fitting of the vehicle cap test hose assembly (part of the **SST**).

3. Connect the M-MDS or equivalent to the DLC-2.
4. Turn the ignition switch to the ON position (Engine off).
5. Request the PCM on-board device control (Mode 08) using the M-MDS or equivalent to close the change-over valve (COV) in the EVAP system leak detection pump.

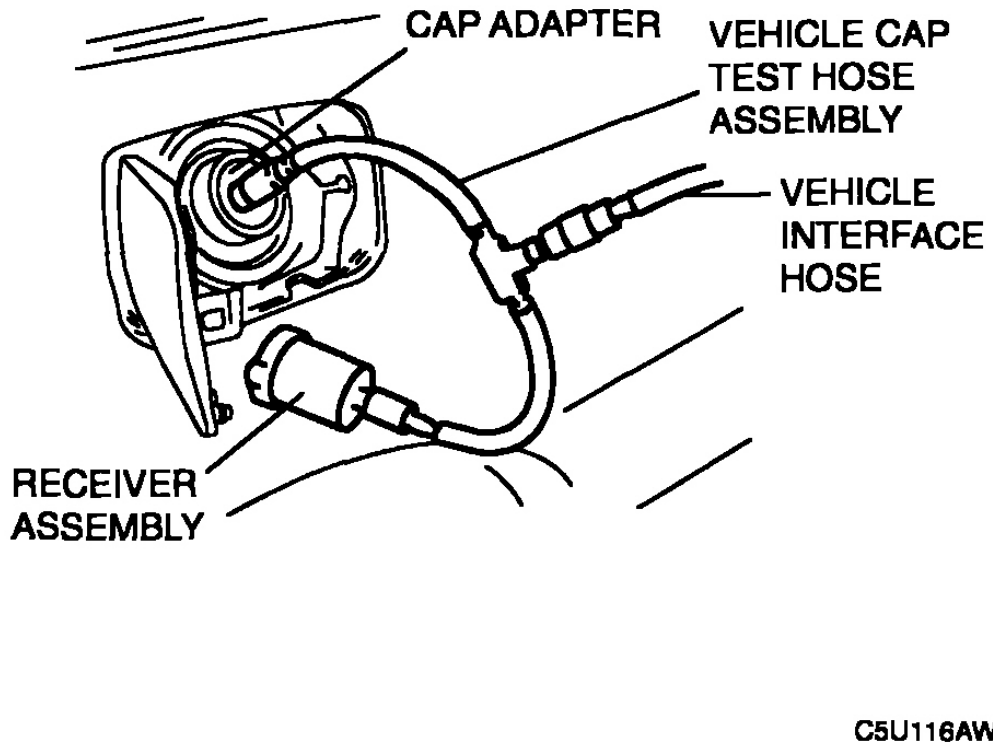


Fig. 18: Connecting Cap Adaptor To Vehicle Cap Test Hose Assembly
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **The COV is closed for 10 min unless the following any actions are done:**
  - **The engine is started.**
  - **The ignition switch is turned off position.**

6. Make sure the control valve on the 134-01049 is in the HOLD position and that the valve on the cylinder of nitrogen gas is open.
7. Turn the control valve to the open position and let the system fill. You should note a drop in the gauge pressure along with the flow meter being pegged at maximum flow for several minutes depending on how

full or empty the fuel tank is, and how long it takes to completely fill and pressurize the evaporative emissions system hoses.

8. If the gauge and the flow meter do not settle to a measurable level after **2-3 min** , then refer to the appropriate service article to verify that the cut or vent valve is properly closed.
9. Verify the pressure gauge and flow meter reading to determine if there is an evaporative emissions leak:

NO EVAPORATIVE LEAK:

- The flow meter registers "zero flow" and the pressure gauge returns to the pre-set pressure of **356 mm {14 in}** of water (H2O).

EVAPORATIVE LEAK:

- The pressure does not return to the preset level of **356 mm {14 in}** of water (H2O) when measuring the flow. See "SETTING LEAK STANDARD FOR TESTING" (.020 to .040 inch H2O) of the Evaporative Emissions Tester operators manual (134-01067).

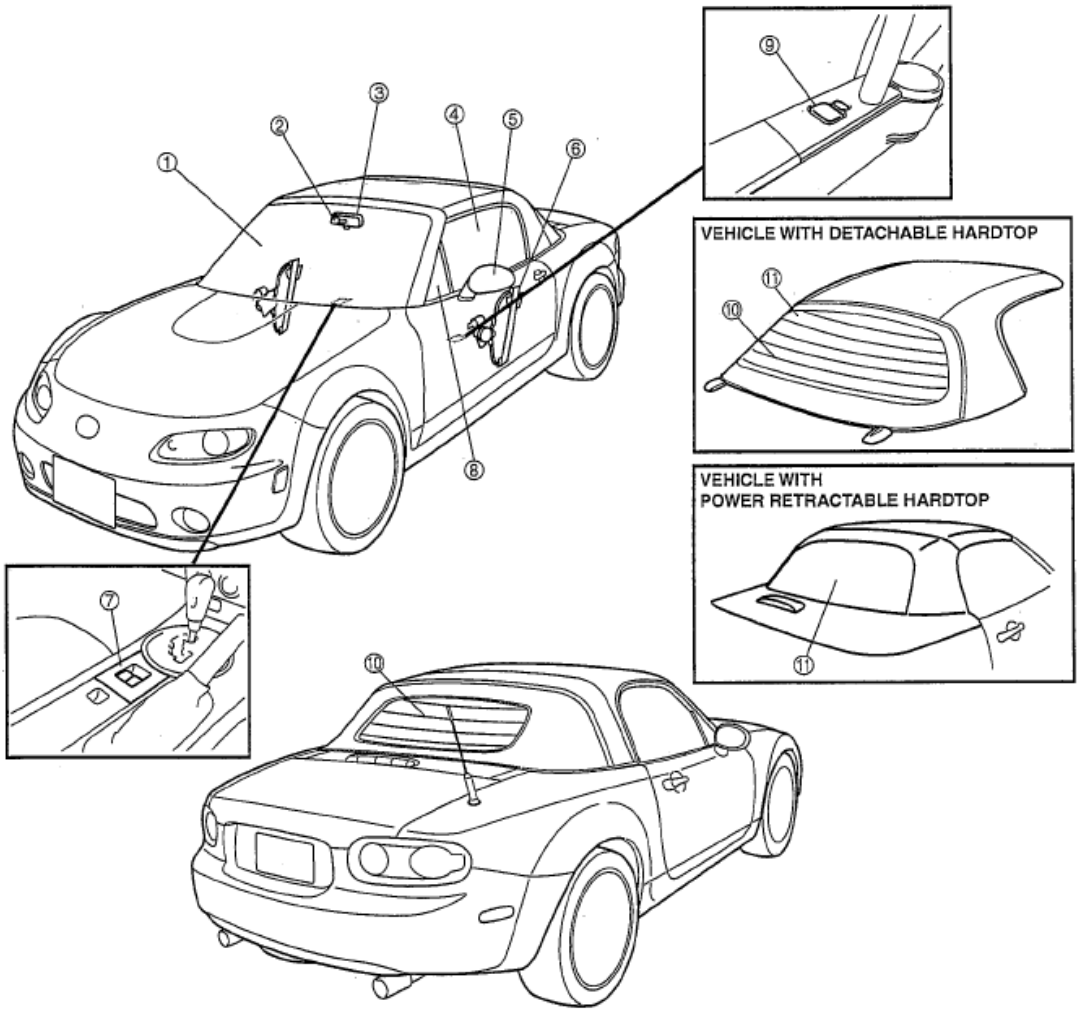
NOTE:

- **Turn the control valve to the HOLD position then disconnect the SST.**

2007 ACCESSORIES & BODY, CAB

Glass/Windows/Mirrors - MX-5 Miata

GLASS/WINDOWS/MIRRORS LOCATION INDEX



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1	Windshield (See WINDSHIELD REMOVAL.) (See WINDSHIELD INSTALLATION.)
2	Base (See REMOVAL.) (See INSTALLATION.)
3	Rearview mirror (See REARVIEW MIRROR REMOVAL/INSTALLATION.)
4	Door glass (See DOOR GLASS REMOVAL/INSTALLATION.) (See DOOR GLASS ADJUSTMENT.)
5	Power outer mirror (See POWER OUTER MIRROR REMOVAL/INSTALLATION.) (See POWER OUTER MIRROR DISASSEMBLY/ASSEMBLY.) (See POWER OUTER MIRROR INSPECTION.)
6	Power window regulator (See POWER WINDOW REGULATOR REMOVAL/INSTALLATION.) (See POWER WINDOW REGULATOR DISASSEMBLY/ASSEMBLY.) (See POWER WINDOW MOTOR INSPECTION.)
7	Power window main switch (See POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION.) (See POWER WINDOW MAIN SWITCH INSPECTION.)
8	Door quarter glass (See DOOR QUARTER GLASS REMOVAL/INSTALLATION.)
9	Power outer mirror switch (See POWER OUTER MIRROR SWITCH REMOVAL/INSTALLATION.) (See POWER OUTER MIRROR SWITCH INSPECTION.)
10	Rear window defroster filament (See REAR WINDOW DEFROSTER FILAMENT INSPECTION.) (See REAR WINDOW DEFROSTER FILAMENT REPAIR.)
11	Rear window glass (See REAR WINDOW GLASS REMOVAL[DETACHABLE HARDTOP].) (See REAR WINDOW GLASS INSTALLATION[DETACHABLE HARDTOP].) (See REAR WINDOW GLASS REMOVAL/INSTALLATION[POWER RETRACTABLE HARDTOP].)

Fig. 1: Identifying Glass/Windows/Mirrors Location
Courtesy of MAZDA MOTORS CORP.

DOOR GLASS REMOVAL/INSTALLATION

1. Position the door glass so that the distance between the top of the front door glass and top of the front beltline molding is **110 mm {4.33 in}.**
2. Remove the battery cover.
3. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the door trim. (See **DOOR TRIM REMOVAL/INSTALLATION** .)
5. Remove the door unit. (See **DOOR UNIT REMOVAL/INSTALLATION** .)

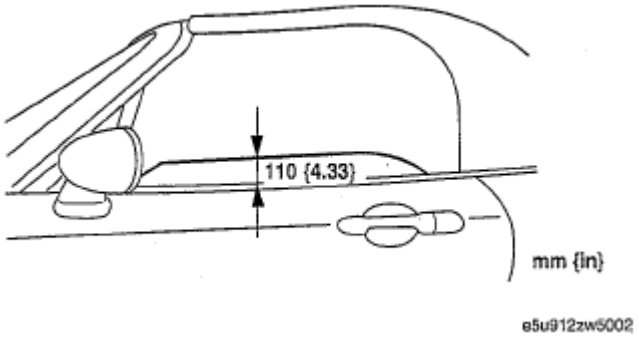


Fig. 2: Identifying Distance Between Top Of Front Door Glass & Top Of Front Belt Line Molding
Courtesy of MAZDA MOTORS CORP.

6. Remove the glass stopper.

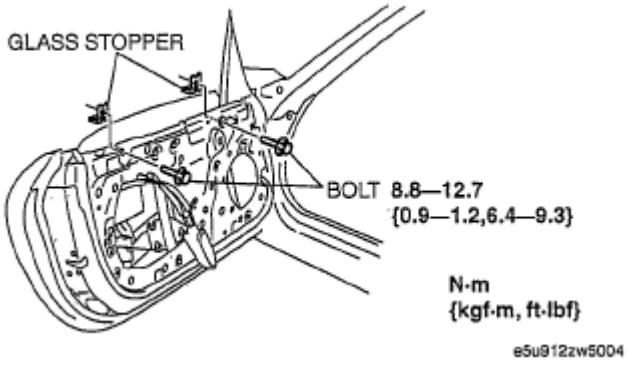


Fig. 3: Identifying Glass Stopper And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

7. Remove the nuts attaching door glass to regulator.
8. Lift the door glass up, then remove it while tilting it in the direction of the arrow.
9. Install in the reverse order of removal.

10. Adjust the door glass. (See **DOOR GLASS ADJUSTMENT**.)

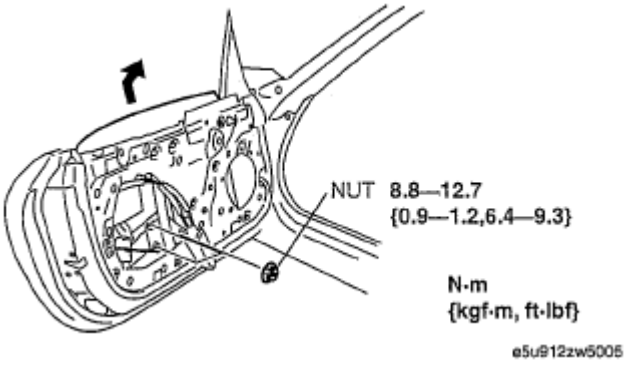


Fig. 4: Lifting Door Glass Up With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

DOOR GLASS ADJUSTMENT

1. Fully close the door glass.
2. Remove the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
3. Remove the door unit.(See **DOOR UNIT REMOVAL/INSTALLATION** .)
4. Connect the power window regulator connector.
5. Loosen the glass stopper installation bolts.
6. Loosen the power window regulator and door glass tightening nuts.
7. Align the door glass with the rear edge of the front beltline molding.

NOTE:

- **The standard position for the rear edge of the front beltline molding is 1 mm from the rear edge of the door panel. If the standard position for the rear edge of the front beltline molding has deviated, align the rear edge of the door glass to the standard position for the rear edge position of the front beltline molding.**

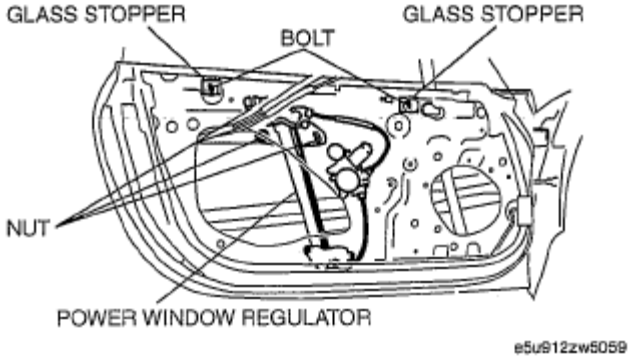


Fig. 5: Identifying Glass Stopper, Power Window Regulator With Bolt And Nut

Courtesy of MAZDA MOTORS CORP.

8. Lightly tighten the power window regulator and door glass tightening nuts.

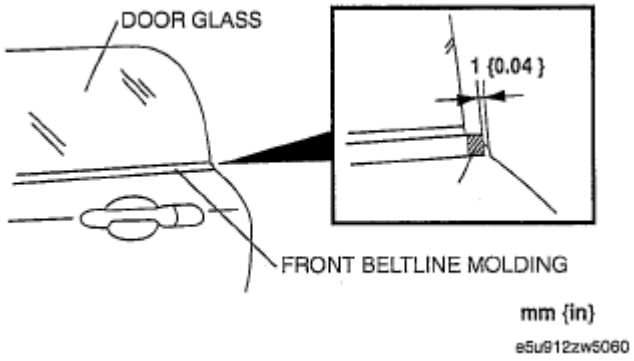


Fig. 6: Identifying Door Glass With Clearance
Courtesy of MAZDA MOTORS CORP.

9. Adjust the clearance between the upper edge of the door glass and the door glass guide.

DOOR GLASS CLEARANCE SPECIFICATIONS

Clearance	Standard	Minimum	Maximum
a	1.0 mm {0.04 in}	0 mm {0 in}	1.5 mm {0.06 in}

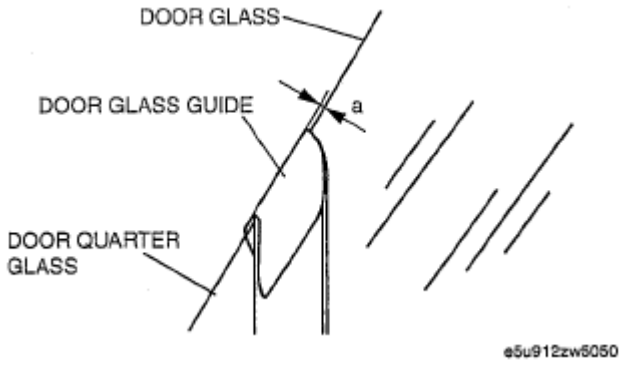


Fig. 7: Identifying Door Glass, Door Glass Guide With Clearance
Courtesy of MAZDA MOTORS CORP.

10. Adjust the door glass position.

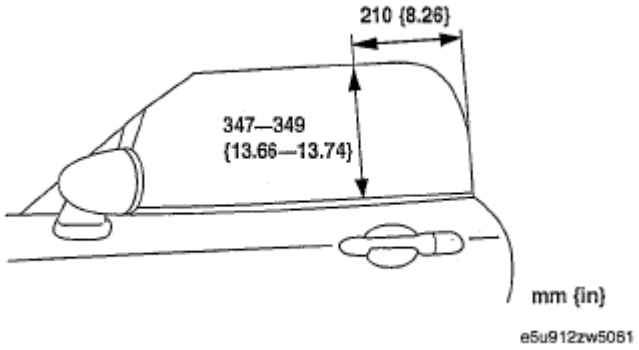


Fig. 8: Identifying Door Glass Position
Courtesy of MAZDA MOTORS CORP.

11. Tighten the power window regulator and door glass tightening nuts.

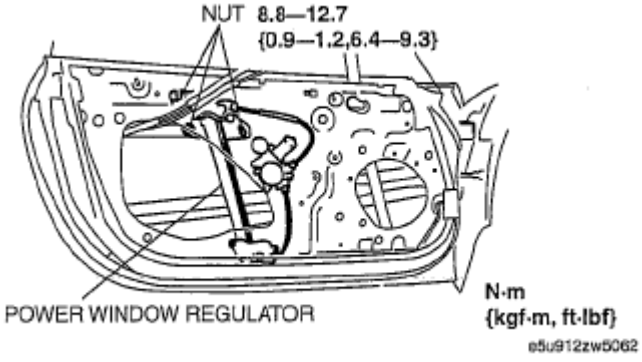


Fig. 9: Identifying Power Window Regulator & Door Glass Tightening Nuts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

12. Tighten the bolts while pressing the glass stopper in the direction of the arrows.
13. Verify that the door glass opens and closes smoothly.
14. Install the door unit.(See **DOOR UNIT REMOVAL/INSTALLATION** .)
15. Install the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
16. Close the door with the convertible top, detachable hardtop, or power retractable hardtop closed and verify that the door glass opens and closes smoothly.

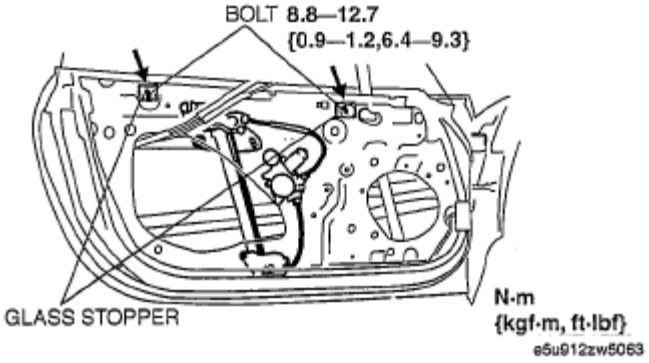


Fig. 10: Identifying Glass Stopper With Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

DOOR QUARTER GLASS REMOVAL/INSTALLATION

1. Position the door glass so that the distance between the top of the front door glass and top of the front beltline molding is **110 mm {4.33 in}.**
2. Remove the battery cover.
3. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
5. Remove the door unit.(See **DOOR UNIT REMOVAL/INSTALLATION** .)
6. Remove the door glass.(See **DOOR GLASS REMOVAL/INSTALLATION**.)
7. Remove the power window regulator.(See **POWER WINDOW REGULATOR REMOVAL/INSTALLATION**.)
8. Remove the nut and bolt, then remove the door glass guide.(See **DOOR GLASS GUIDE INSTALLATION NOTE**.)

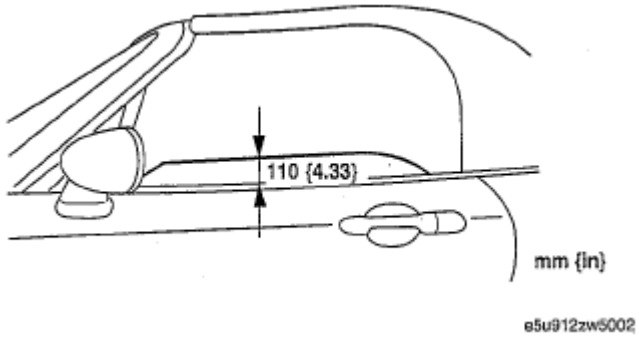


Fig. 11: Identifying Distance Between Top Of Front Door Glass & Top Of Front Belt Line Molding
Courtesy of MAZDA MOTORS CORP.

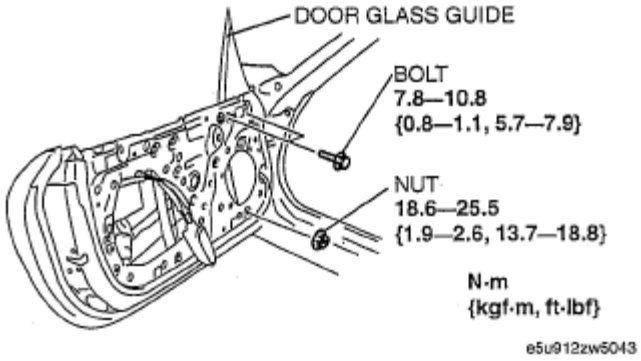


Fig. 12: Identifying Door Glass Guide With Bolt And Nut With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

9. Remove the nuts, then remove the door quarter glass.
10. Install in the reverse order of removal.

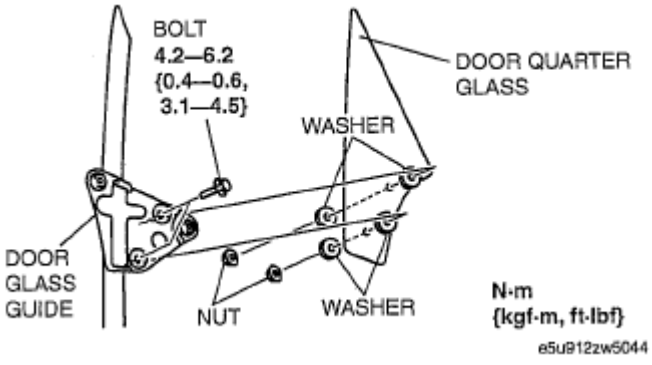


Fig. 13: Identifying Door Quarter Glass Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

DOOR GLASS GUIDE INSTALLATION NOTE

1. Adjust the adjustment bolt as shown in the figure.

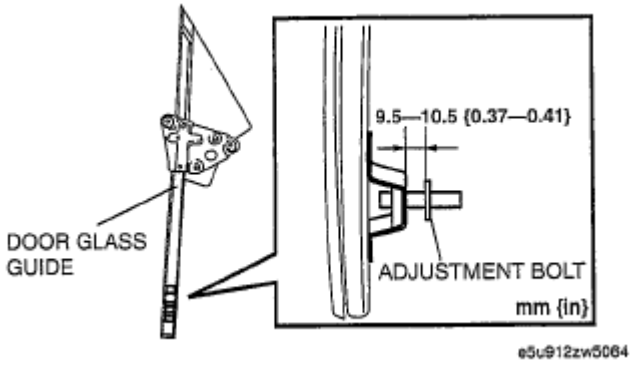


Fig. 14: Identifying Door Glass Guide With Adjustment Bolt

Courtesy of MAZDA MOTORS CORP.

POWER WINDOW REGULATOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
4. Remove the door unit.(See **DOOR UNIT REMOVAL/INSTALLATION** .)
5. Remove the door glass.(See **DOOR GLASS REMOVAL/INSTALLATION**..)
6. Remove the nuts.

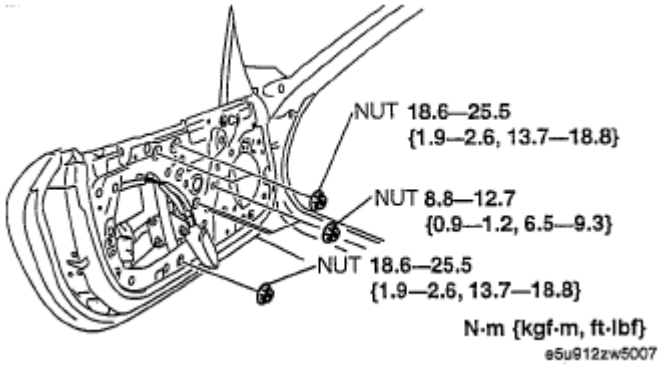


Fig. 15: Identifying Regulator Nuts With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

7. Remove the power window regulator.
8. Install in the reverse order of removal.

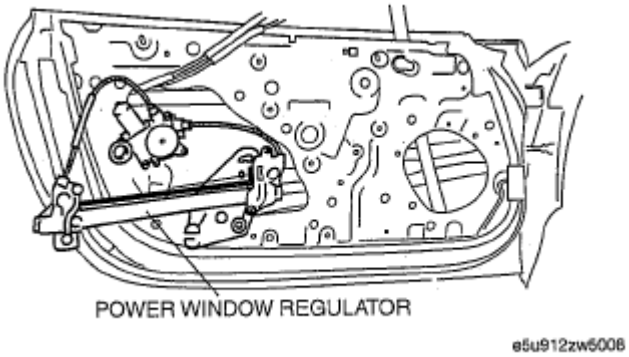


Fig. 16: Identifying Power Window Regulator
Courtesy of MAZDA MOTORS CORP.

POWER WINDOW REGULATOR DISASSEMBLY/ASSEMBLY

1. Remove in the order indicated in the table.

Power Window Regulator Disassembly/Assembly Table

1	Cover (See **Cover Disassembly Note**)
2	Power window motor
3	Frame

2. Assemble in the reverse order of disassembly.

NOTE:

- **When installing the power window motor, be careful that the cable does not become unwounded from the drum.**

1	Cover
2	Power window motor
3	Frame

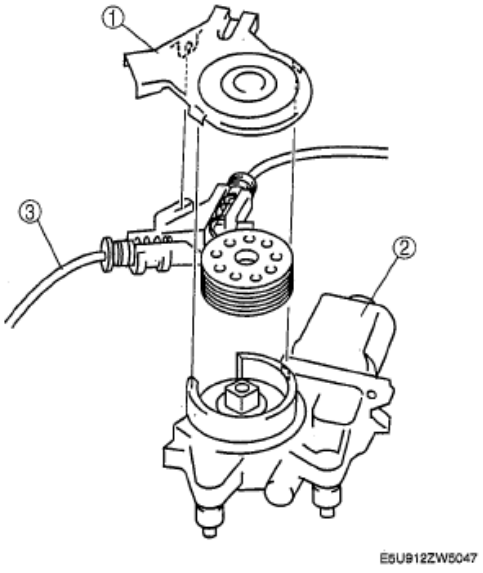


Fig. 17: Power Window Regulator Disassembly/Assembly View
Courtesy of MAZDA MOTORS CORP.

COVER DISASSEMBLY NOTE

1. Carefully bend away the crimp of the cover using long nose pliers.

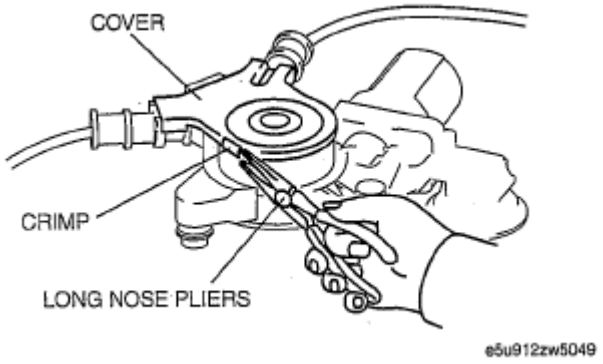


Fig. 18: Crimping Cover Using Long Nose Pliers

Courtesy of MAZDA MOTORS CORP.

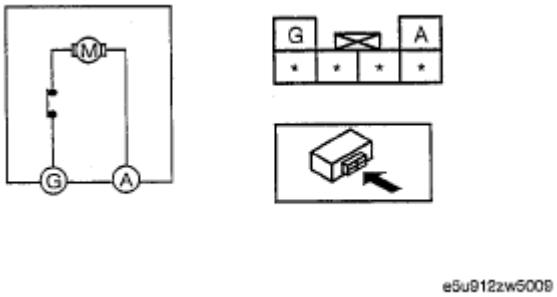


Fig. 19: Identifying Power Window Motor Connector
Courtesy of MAZDA MOTORS CORP.

POWER WINDOW MOTOR INSPECTION

1. Apply battery positive voltage to the power window motor terminals, and inspect the power window motor operation.

- If the power window motor does not operate as indicated in the table, replace it.

POWER WINDOW MOTOR OPERATION REFERENCE

Operation	Terminal	
	G	A
Open	Ground	B+
Close	B+	Ground

POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the console.(See **CONSOLE REMOVAL/INSTALLATION** .)
4. Depress the tab and remove the power window main switch.
5. Install in the reverse order of removal.

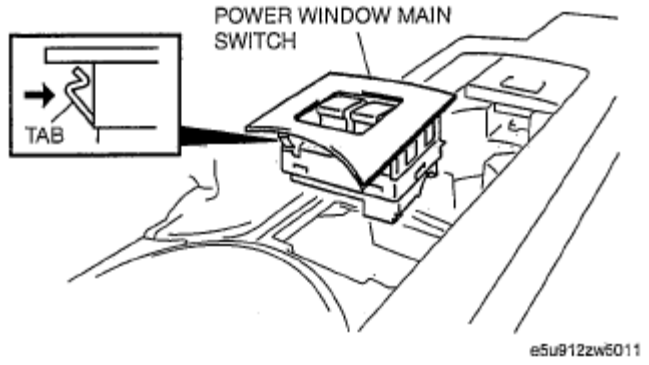


Fig. 20: Locating Tab And Power Window Main Switch
Courtesy of MAZDA MOTORS CORP.

POWER WINDOW MAIN SWITCH INSPECTION

DRIVER'S SIDE

1. Measure the voltage at each terminal (other than terminal J).
   - If the voltage is not as specified in the Terminal Voltage Table, inspect the parts under "Inspection item (s)" and related wiring harnesses.
2. Remove the battery cover.
3. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Inspect the power window main switch connector for continuity at terminal J.
5. If the system does not work properly even though the inspection items or related wiring harnesses do not have any malfunction, replace the power window main switch.

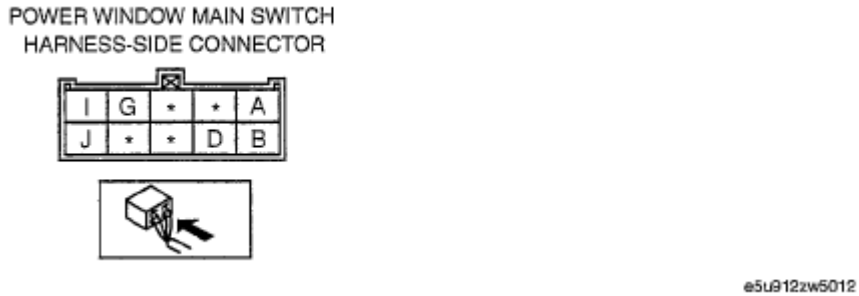


Fig. 21: Identifying Power Window Main Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

POWER WINDOW MAIN SWITCH INSPECTION CHART

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/Continuity	Inspection item (s)
B	Open	Power window	While door glass is opening	B+	• Power window motor (See **POWER WINDOW**

	output	motor	While door glass is closing	1.0 or less	**MOTOR INSPECTION**..) • Related wiring harnesses
G	Close output	Power window motor	While door glass is opening	1.0 or less	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	B+	
I	Power supply	P/WIND 20A fuse	Ignition switch at ON	B+	• P/WIND 20A fuse • Related wiring harnesses
J	GND	Body ground	Under any condition: Inspect for continuity to ground	Continuity detected	• GND

PASSENGER'S SIDE

1. Verify that the continuity between the power window main switch terminals is as indicated in the table.

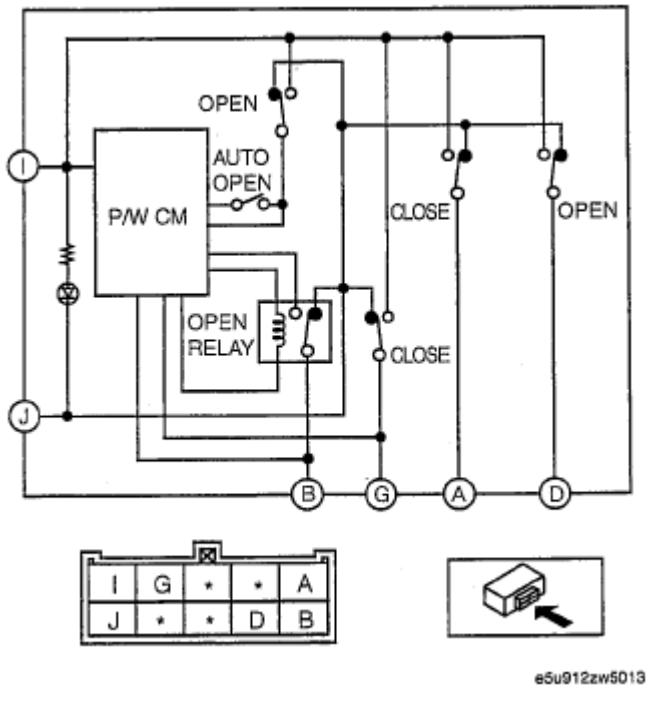


Fig. 22: Power Window Main Switch Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

   - If not as indicated in the table, replace the power window main switch.
2. Apply battery positive voltage to terminal I, and connect the ground to terminal J, and then verify that the light emitting diode illuminates.
   - If not as specified, replace the power window main switch.

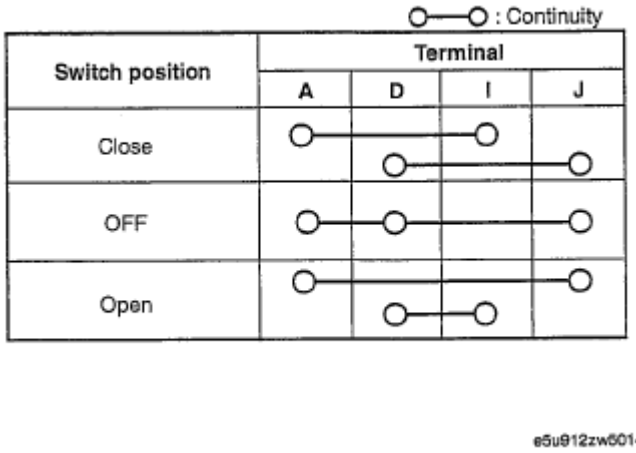


Fig. 23: Power Window Main Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

POWER WINDOW MAIN SWITCH INSPECTION[POWER RETRACTABLE HARDTOP]

WITH EXTERIOR OPEN FUNCTION

1. Measure the voltage at each terminal (other than terminals 1G, 1H, 2B and 2C).
   - If the voltage is not as specified in the Terminal Voltage Table, inspect the parts under "inspection item(s)" and related wiring harnesses.
2. Disconnect the negative battery cable.
3. Inspect the power window main switch connector for continuity at terminal 1G.
4. If the system does not work properly even though the inspection items or related wiring harnesses do not have any malfunction, replace the power window main switch.

POWER WINDOW MAIN SWITCH INSPECTION CHART (WITH EXTERIOR OPEN FUNCTION)

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/Continuity	Inspection item (s)
1A	Power supply	P/W 20 A fuse	Under any condition	B+	• P/W 20 A fuse • Related wiring harnesses
1B	IG 1	IG KEY1 20 A fuse	Ignition switch is at ON position	B+	• Inspect IG KEY1 20 A fuse • Related wiring harnesses
			Ignition switch is at LOCK position	1.0 or less	
1D	Close output	Power	While door glass is opening	1.0 or less	• Power window motor (See **POWER WINDOW MOTOR**

		window motor	While door glass is closing	B+	**INSPECTION**..) • Related wiring harnesses
1F	Open output	Power window motor	While door glass is opening	B+	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	1.0 or less	
1G	GND	Body ground	Under any condition: Inspect for continuity to ground	Continuity detected	• GND
1H	Communication	Keyless control module	Under any condition: Inspect for continuity to keyless control modul	Continuity detected	• Keyless control module
1I	Close output	Power window motor	While door glass is opening	1.0 or less	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	B+	
1J	Open output	Power window motor	While door glass is opening	B+	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	1.0 or less	
2C	Communication	Power retractable hardtop control module	Under any condition: Inspect for continuity to power retractable hardtop	Continuity detected	• Power retractable hard top control module
2B	Communication	Power retractable hardtop control module	Under any condition: Inspect for continuity to power retractable hardtop	Continuity detected	• Power retractable hard top control module

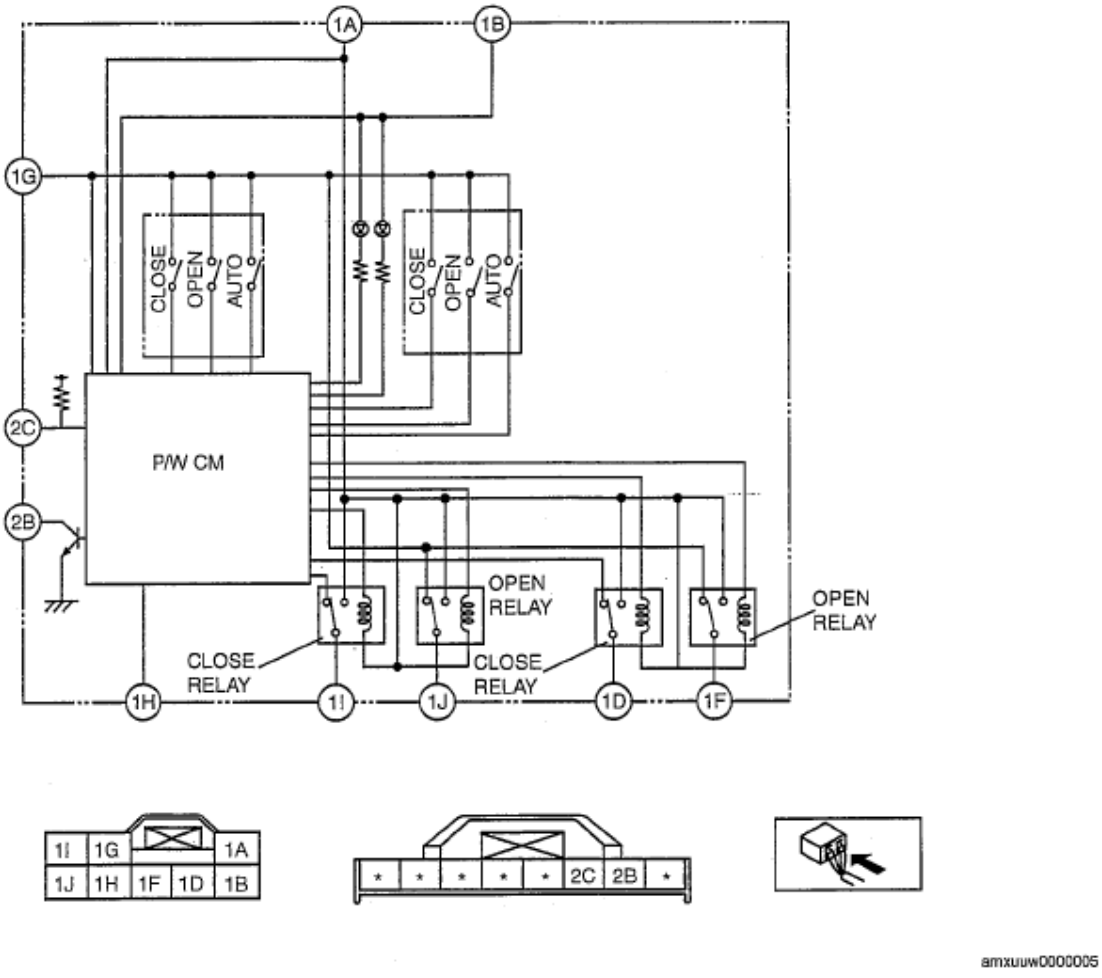


Fig. 24: Power Window Main Switch Circuit Diagram (With Exterior Open Function)
Courtesy of MAZDA MOTORS CORP.

WITHOUT EXTERIOR OPEN FUNCTION

1. Measure the voltage at each terminal (other than terminals A, H and G).
   - If the voltage is not as specified in the Terminal Voltage Table, inspect the parts under "inspection item(s)" and related wiring harnesses.
2. Disconnect the negative battery cable.
3. Inspect the power window main switch connector for continuity at terminal G.
4. If the system does not work properly even though the inspection items or related wiring harnesses do not have any malfunction, replace the power window main switch.

POWER WINDOW MAIN SWITCH INSPECTION CHART (WITHOUT EXTERIOR OPEN FUNCTION)

Terminal	Signal name	Connected to	Measured condition	Voltage (V)/Continuity	Inspection item (s)

B	IG 1	IG KEY1 20 A fuse	Ignition switch is at ON position	B+	• Inspect IG KEY1 20 A fuse • Related wiring harnesses
			Ignition switch is at LOCK position	1.0 or less	
D	Close output	Power window motor	While door glass is opening	1.0 or less	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	B+	
F	Open output	Power window motor	While door glass is opening	B+	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	1.0 or less	
G	GND	Body ground	Under any condition: Inspect for continuity to ground	Continuity detected	• GND
I	Close output	Power window motor	While door glass is opening	1.0 or less	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	B+	
J	Open output	Power window motor	While door glass is opening	B+	• Power window motor (See **POWER WINDOW MOTOR INSPECTION**..) • Related wiring harnesses
			While door glass is closing	1.0 or less	
A	Communication	Power retractable hardtop	Under any condition: Inspect for continuity to power retractable hardtop	Continuity detected	• Power retractable hard top control module
H	Communication	Power retractable hardtop	Under any condition: Inspect for continuity to power retractable hardtop	Continuity detected	• Power retractable hard top control module

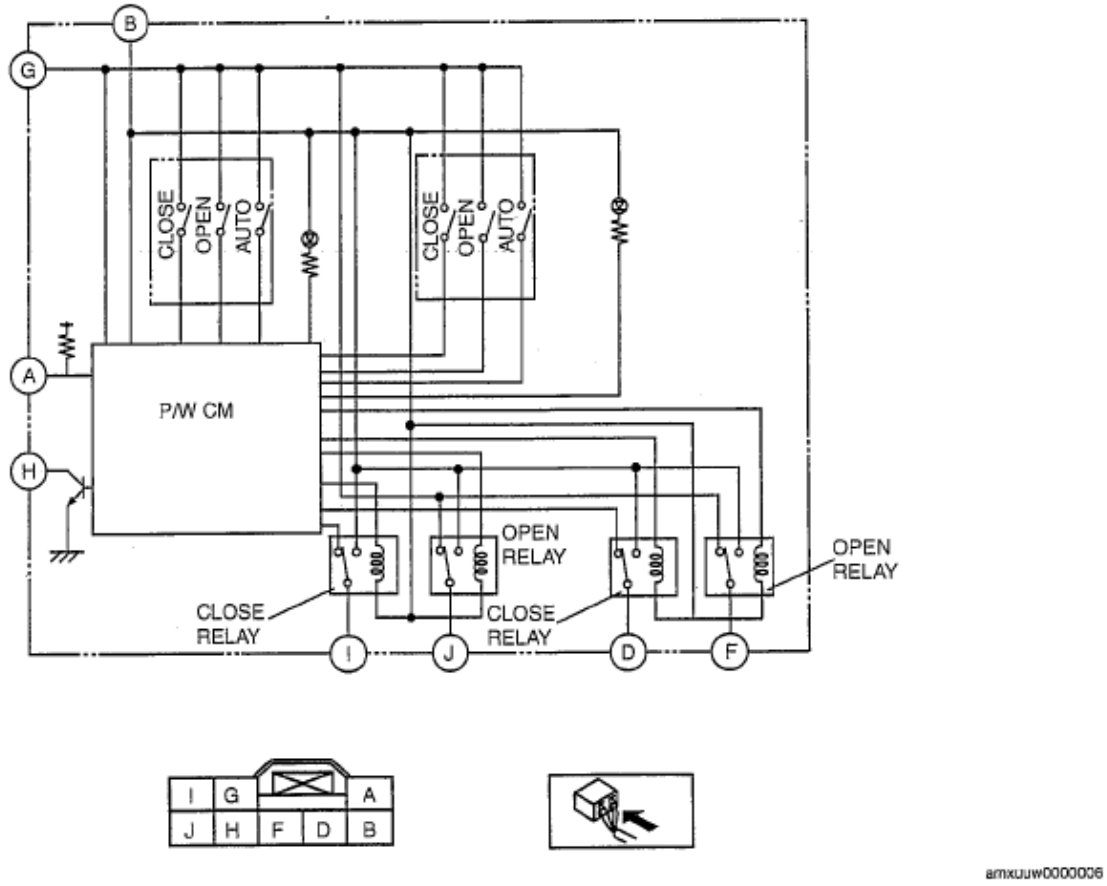


Fig. 25: Power Window Main Switch Circuit Diagram (Without Exterior Open Function)
Courtesy of MAZDA MOTORS CORP.

WINDSHIELD REMOVAL

1. Remove the battery cover.
2. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Wiper arm and blade (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
    2. Cowl grille (See **COWL GRILLE REMOVAL/INSTALLATION** .)
    3. Side cowl grille (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
    4. Windshield garnish (See **WINDSHIELD GARNISH REMOVAL** .)
    5. Rearview mirror (See **REARVIEW MIRROR REMOVAL/INSTALLATION**.)
    6. Front header trim (See **FRONT HEADER TRIM REMOVAL/INSTALLATION** .)
    7. Map light (See **MAP LIGHT REMOVAL/INSTALLATION** .)
    8. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
4. Apply protective tape along the edge of the body.

NOTE:

- **Overlap and adhere the protective tape to the corners to prevent damage.**

5. Remove the windshield molding by pulling it outward.

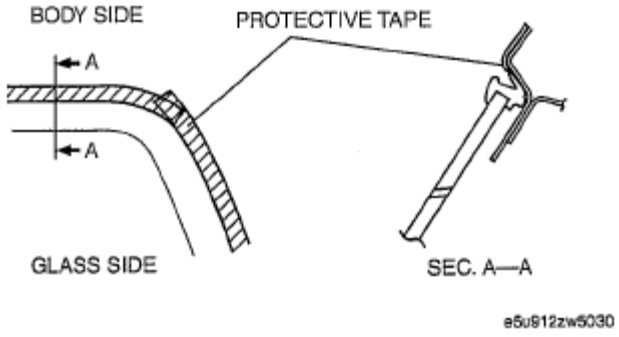


Fig. 26: Identifying Protective Tape
Courtesy of MAZDA MOTORS CORP.

NOTE:

- **If the windshield molding is difficult to remove, warm the windshield molding using a hot air blower.**
- **The windshield molding is a replacement part.**

NOT REUSING WINDSHIELD

NOTE:

- **For the areas of the sealant that are difficult to cut, use the SST (piano wire) and follow the procedure under "Reusing Windshield".**

WARNING:

- **Using the SST (piano wire) with bare hands can cause injury. Always wear gloves when using the SST (piano wire).**

1. Cut out the sealant all around the glass using a sealant remover.
2. Remove the windshield.

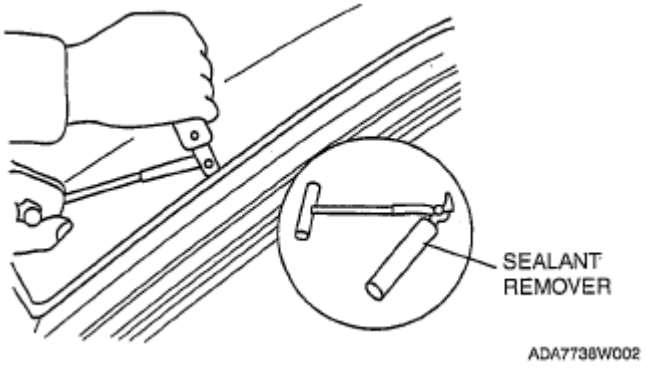


Fig. 27: Cutting Glass Sealant
Courtesy of MAZDA MOTORS CORP.

REUSING WINDSHIELD

WARNING:

- **Using the SST (piano wire) with bare hands can cause injury. Always wear gloves when using the SST (piano wire).**

NOTE:

- **Before removing the windshield from the body, mark the position of the windshield by affixing tape to the windshield and body panel.**

1. Avoiding the pin on the inside of the vehicle, insert the **SST** (piano wire) which has been cut to sufficient length.

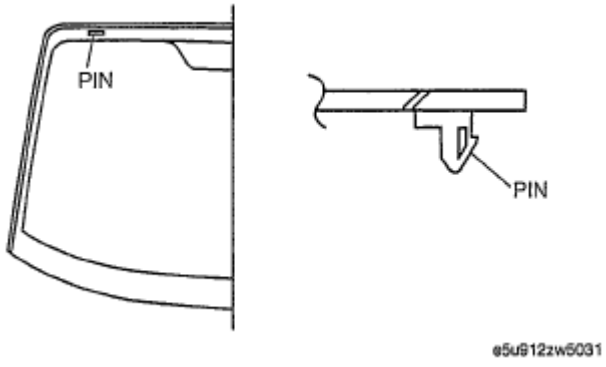


Fig. 28: Identifying Pin Position
Courtesy of MAZDA MOTORS CORP.

2. Wind each end of the **SST** (piano wire) around a bar.

NOTE:

- **Use a long sawing action to spread the work over the whole length of the SST (piano wire) to prevent it from breaking due to localized heating.**

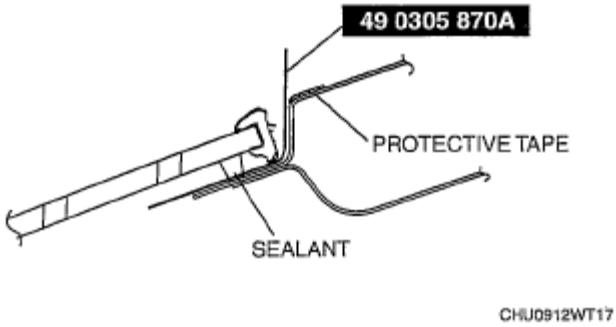


Fig. 29: Identifying SST
Courtesy of MAZDA MOTORS CORP.

3. Secure one end of the **SST** (piano wire), and while pulling the other end, cut the sealant around the windshield.
4. Pinch the pin from the inside of the vehicle and detach it.
5. Remove the windshield.
6. If the pin is damaged, remove the pin.

NOTE:

- **Before removing the pin from the windshield glass, place an alignment mark on the windshield.**

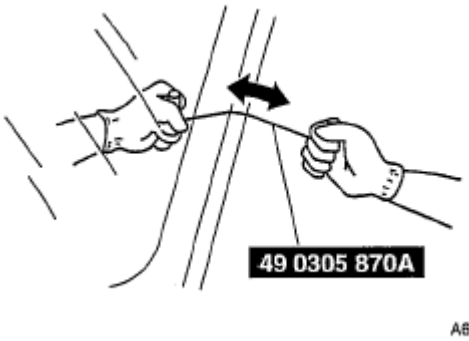


Fig. 30: Cutting Sealant Around Window Glass
Courtesy of MAZDA MOTORS CORP.

WINDSHIELD INSTALLATION

WARNING:

- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

CAUTION:

- **If a door is opened or closed when all the window glass is closed, the resulting change in air pressure could cause the sealant to crack preventing the proper installation of the glass. Keep the door glass opened until the windshield installation is completed.**

1. Remove the sealant along the perimeter of the glass using a cutting a razor. (When reusing the glass)
2. Clean and degrease an **approx. 50 mm {2.0 in}** wide strip along the perimeter of the windshield.
3. Inspect the glass for cracks. If it is cracked, chamfer it using sandpaper.
4. Align the marks made before removal and install the pin to the windshield referring to the figure. (when reusing the glass, and the pin was removed)

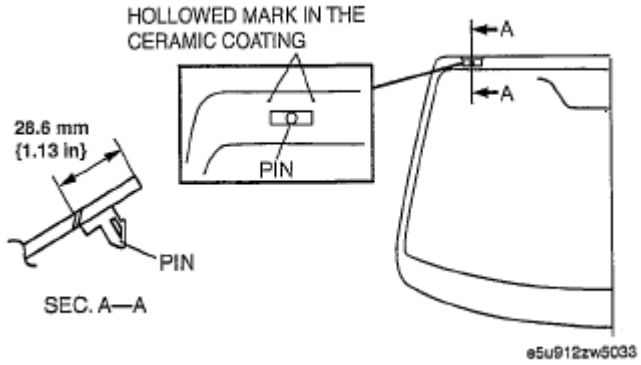


Fig. 31: Positions For Installing Pin To Windshield
Courtesy of MAZDA MOTORS CORP.

5. Install the windshield molding.
6. Use glass primer on the glass, then allow it to dry for **approx. 30 min.**

CAUTION:
- **To prevent weakening of the primer adhesion, keep the bonding surface free of dirt, moisture, and grease. Do not touch the surface with your hand.**

NOTE:
- **Make sure to apply primer to the hollowed marks in the ceramic coating.**

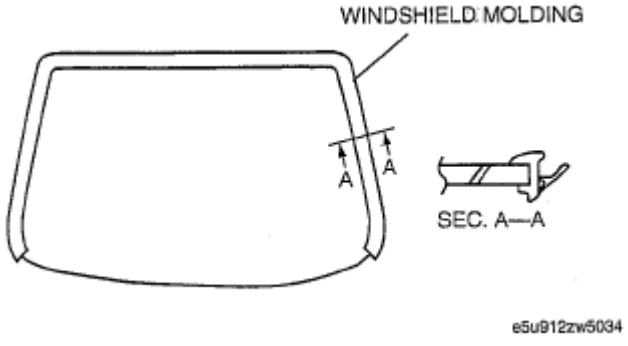


Fig. 32: Identifying Windshield Molding
Courtesy of MAZDA MOTORS CORP.

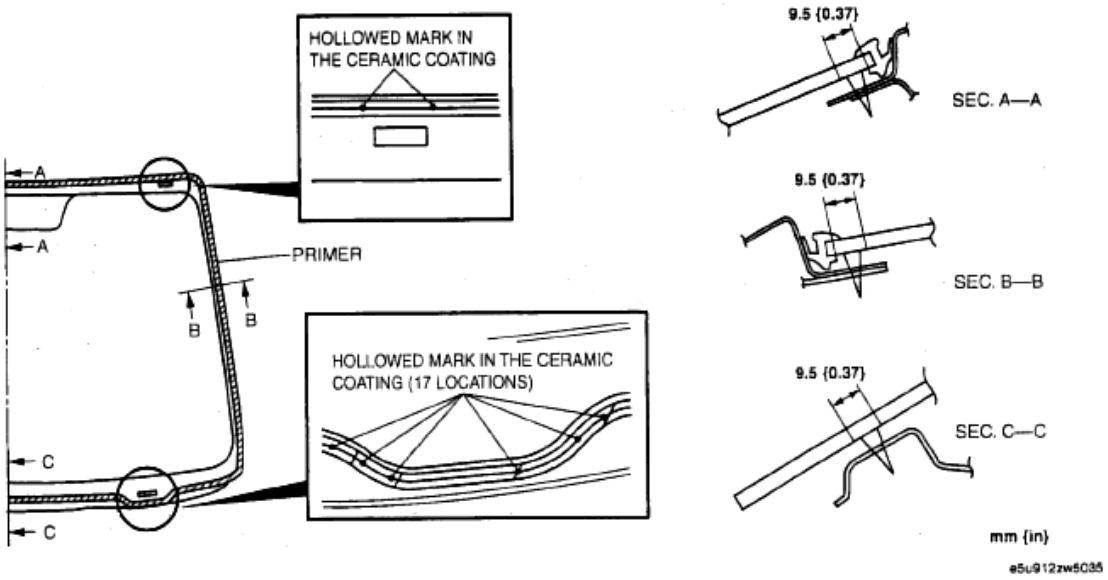


Fig. 33: Identifying Hollowed Mark With Sections For Applying Primer
Courtesy of MAZDA MOTORS CORP.

7. Cut away the old sealant using a razor or scraper so that 1-2 mm {0.04-0.07 in} thickness of sealant remains along the perimeter of the frame.
8. If the sealant has come off completely in any one place, apply some primer after degreasing, and allow it **approx. 30 min** to dry. Then apply **2 mm {0.07 in}** thickness of new sealant.

CAUTION:
- **To prevent weakening of the primer adhesion, keep the bonding surface free of dirt, moisture, and grease. Do not touch the surface with your hand.**

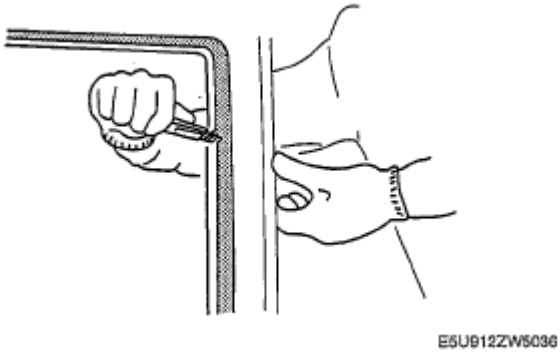


Fig. 34: Cutting Old Sealant Using Razor Or Scraper
Courtesy of MAZDA MOTORS CORP.

9. Clean and degrease along the perimeter of the bonding area on the body.
10. Apply body primer on the body as shown in the figure, then allow it to dry for **approx. 30 min.**

CAUTION:

- **To prevent weakening of the primer adhesion, keep the bonding surface free of dirt, moisture, and grease. Do not touch the surface with your hand.**

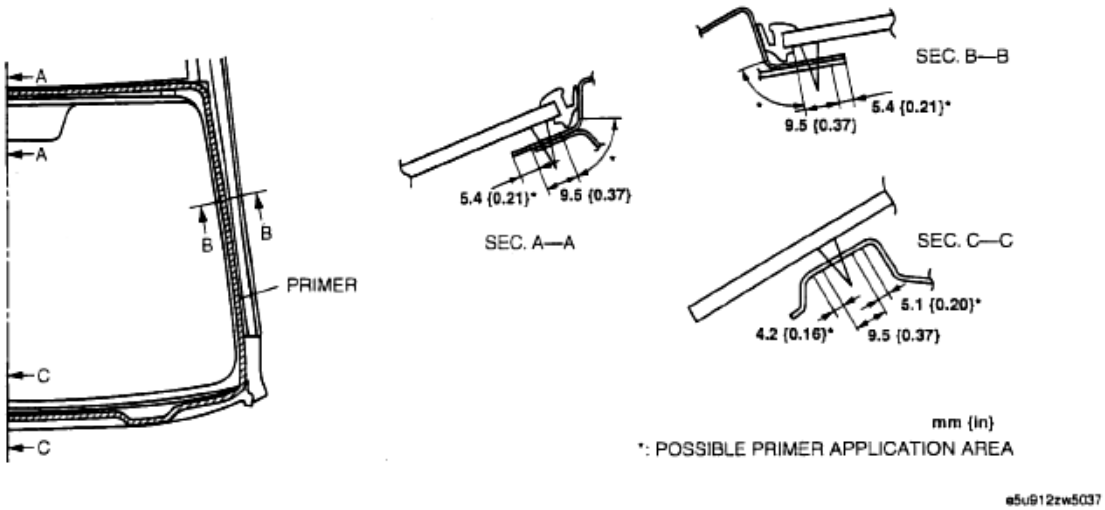


Fig. 35: Identifying Sections For Applying Primer
Courtesy of MAZDA MOTORS CORP.

11. Apply sealant to the area of the glass surface as shown in the figure.
12. Insert the windshield locator pins to the body and install the windshield.

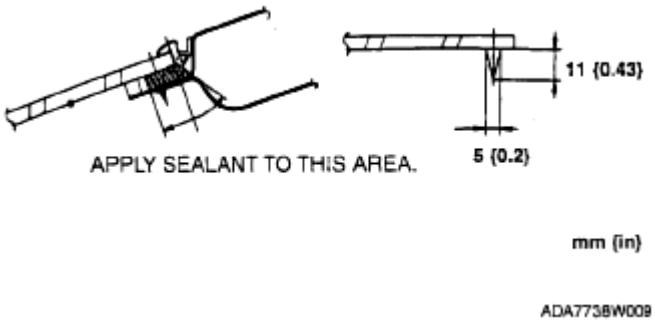


Fig. 36: Applying Sealant To Glass Surface
Courtesy of MAZDA MOTORS CORP.

13. Verify that the clearance of the A-pillar is within the range shown in the figure, and press along the perimeter of the glass.
14. Install the following parts:
    1. A-pillar trim (See **A-PILLAR TRIM REMOVAL/INSTALLATION** .)
    2. Map light (See **MAP LIGHT REMOVAL/INSTALLATION** .)
    3. Front header trim (See **FRONT HEADER TRIM REMOVAL/INSTALLATION** .)
    4. Rearview mirror (See **REARVIEW MIRROR REMOVAL/INSTALLATION**..)

5. Windshield garnish (See **WINDSHIELD GARNISH INSTALLATION** .)
6. Cowl grille (See **COWL GRILLE REMOVAL/INSTALLATION** .)
7. Side cowl grille (See **SIDE COWL GRILLE REMOVAL/INSTALLATION** .)
8. Wiper arm and blade (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)

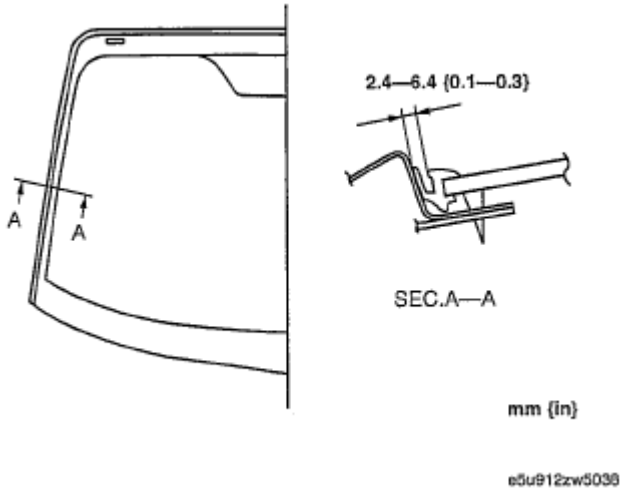


Fig. 37: Identifying Clearance Of A-Pillar
Courtesy of MAZDA MOTORS CORP.

15. Allow the sealant to harden completely.

Sealant hardening time: 24 h

REAR WINDOW GLASS REMOVAL[DETACHABLE HARDTOP]

1. Remove the battery cover.
2. Remove the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the detachable hardtop.
4. Remove the B-pillar garnish.
5. Remove the side lock.
6. Remove the B-pillar upper trim. (See **B-PILLAR UPPER TRIM REMOVAL [DETACHABLE HARDTOP]** .)
7. Remove the rear trim. (See **REAR TRIM REMOVAL [DETACHABLE HARDTOP]** .)
8. Remove the rear deck lock. (See **DETACHABLE HARDTOP ADJUSTMENT** .)
9. Cut the rear window molding lip using a razor.

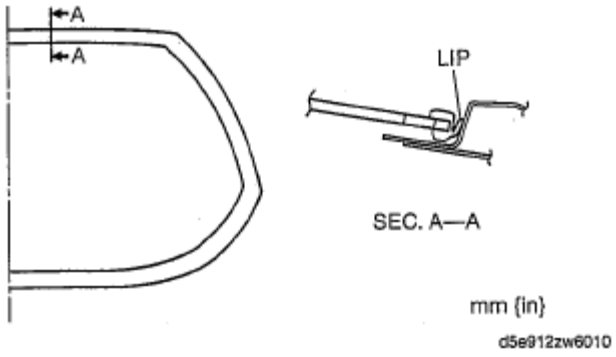


Fig. 38: Identifying Lip With Section A-A
Courtesy of MAZDA MOTORS CORP.

10. Apply protective tape along the edge of the body.

NOTE:

- **Overlap and adhere the protective tape to the corners to prevent damage.**

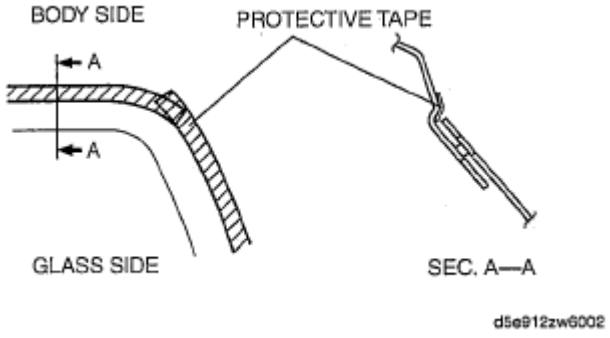


Fig. 39: Identifying Protective Tape On Edge Of Body
Courtesy of MAZDA MOTORS CORP.

11. Insert the SST (piano wire), which has been cut to sufficient length from inside the vehicle.

WARNING:

- **Using the SST (piano wire) with bare hands can cause injury. Always wear gloves when using the SST (piano wire).**

NOTE:

- **Before removing the rear window glass from the body, mark the position of the glass by affixing tape to the glass and body panel.**

Fig. 40: Identifying SST (Piano Wire)
Courtesy of MAZDA MOTORS CORP.

12. Wind each end of the **SST** (piano wire) around a bar.

NOTE:

- **Use a long sawing action to spread the work over the whole length of the SST (piano wire) to prevent it from breaking due to localized heating.**

13. Secure one end of the **SST** (piano wire), and while pulling the other end, cut the sealant around the rear window glass.

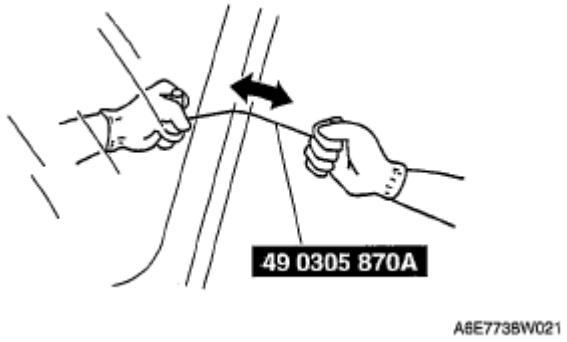


Fig. 41: Cutting Sealant Around Window Glass
Courtesy of MAZDA MOTORS CORP.

14. Cut the pins out.
15. Remove the rear window glass.
16. Mark the seating positions of the pins and remove the pins from the rear window glass.
17. Remove the rear window molding from the rear window glass.

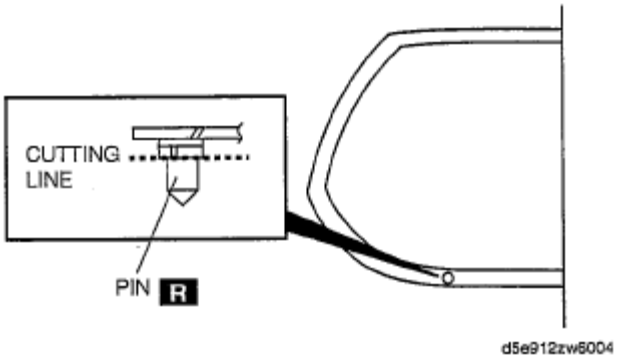


Fig. 42: Identifying Cutting Line And Pin
Courtesy of MAZDA MOTORS CORP.

REAR WINDOW GLASS INSTALLATION[DETACHABLE HARDTOP]

CAUTION:
- **Proper installation of the rear window glass may be difficult if sealant is cracked or the glass is pushed out by air pressure when a door is opened/closed with all the window glass closed. Leave all the windows open until the rear window glass is installed completely.**

1. Cut away the old sealant using a razor so that a **1-2 mm {0.04-0.07 in}** thickness of sealant remains along the perimeter of the frame.

WARNING:
- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

2. If the sealant has come off completely in any one place, apply some primer after degreasing, and allow it to dry for **approx. 30 min.** Then apply a **2 mm {0.08 in}** thickness of sealant.
3. Clean and degrease the perimeter **approx. 50 mm {1.97 in}** from the glass end and the bonding area on the body.
4. Apply glass primer on the rear window glass, and body primer as shown in the figure. Allow it to dry for **approx. 30 min.**

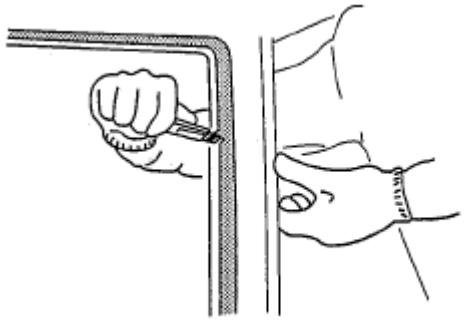


Fig. 43: Cutting Sealant Using Razor
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- **Keep the area free of dirt and grease, and do not touch the surface. Otherwise, the primer may not properly bond to the surface of the glass and body, which may cause leakage.**

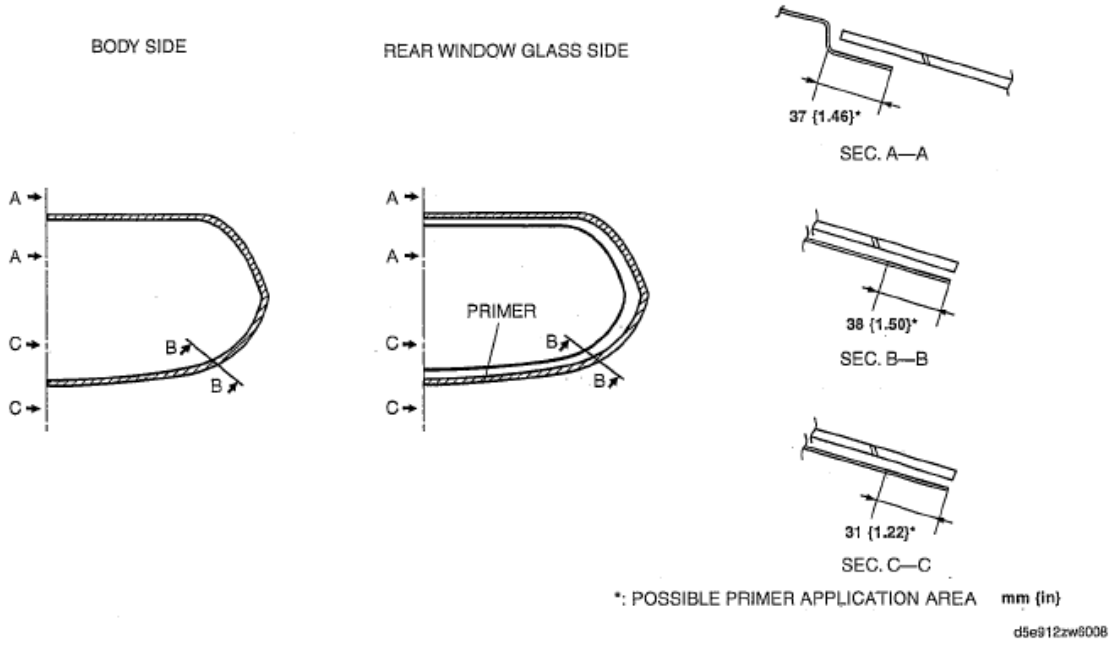


Fig. 44: Identifying Primer Application Area With Specifications
Courtesy of MAZDA MOTORS CORP.

5. Apply sealant to the area of the glass surface as shown in the figure.
6. Insert the positioning pins into the body, then install the rear window.

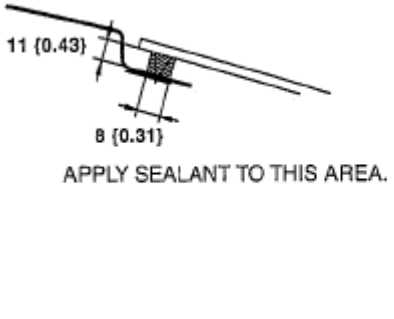


Fig. 45: Identifying Sealant Applying Area On Glass Surface
Courtesy of MAZDA MOTORS CORP.

7. Press the rear window pins to engage the tabs to the body.

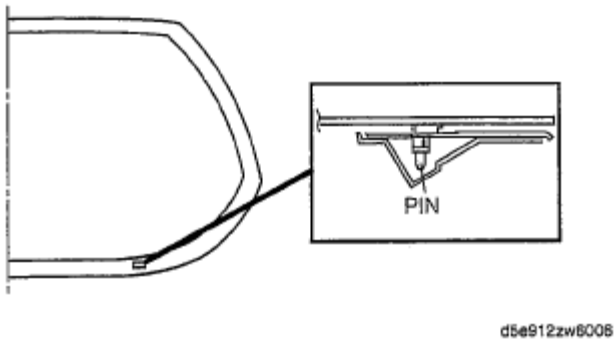


Fig. 46: Identifying Rear Window Pin
Courtesy of MAZDA MOTORS CORP.

8. Press completely along the perimeter of the glass so that the measurement of the molding lip gap is within the specification.
9. Connect the filament connector.
10. Install the following parts:
    1. Rear deck lock cover (See **DETACHABLE HARDTOP ADJUSTMENT** .)
    2. Rear trim (See **REAR TRIM INSTALLATION [DETACHABLE HARDTOP]** .)
    3. B-pillar upper trim (See **B-PILLAR UPPER TRIM INSTALLATION [DETACHABLE HARDTOP]** .)
    4. Side lock
    5. B-pillar garnish
    6. Detachable hardtop
11. Allow the sealant to harden completely.

Sealant hardening time: 24 h

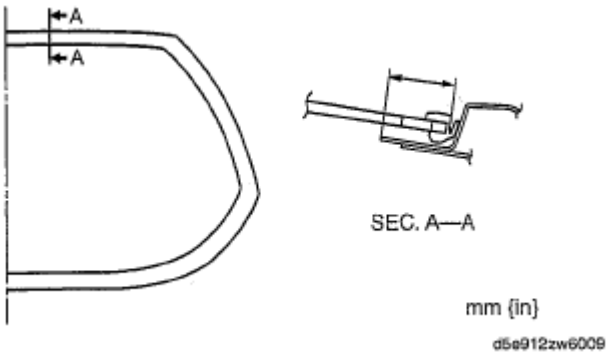


Fig. 47: Identifying Molding Lip Gap
Courtesy of MAZDA MOTORS CORP.

REAR WINDOW GLASS REMOVAL/INSTALLATION[POWER RETRACTABLE HARDTOP]

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the following parts:
    1. Console (See **CONSOLE PANEL REMOVAL/INSTALLATION** .)
    2. Quarter trim (See **QUARTER TRIM REMOVAL/INSTALLATION** .)
    3. Scuff plate (See **SCUFF PLATE REMOVAL/INSTALLATION** .)
    4. Tire house trim (See **TIRE HOUSE TRIM REMOVAL/INSTALLATION** .)
    5. Aeroboard (See **AEROBOARD REMOVAL/INSTALLATION** .)
    6. Front seat back bar garnish (See **SEAT BACK BAR GARNISH REMOVAL/INSTALLATION** .)
    7. Back trim (See **BACK TRIM REMOVAL/INSTALLATION** .)
    8. Seat belt upper anchor installation bolt (See **SEAT BELT REMOVAL/INSTALLATION** .)
    9. Power retractable hardtop link bracket (See **POWER RETRACTABLE HARDTOP LINK BRACKET REMOVAL/INSTALLATION** .)
    10. Rear side trim (See **REAR SIDE TRIM REMOVAL/INSTALLATION** .)
    11. Cab-side weatherstrip (See **CONVERTIBLE TOP DISASSEMBLY/ASSEMBLY** .)
    12. Power retractable hardtop (See **POWER RETRACTABLE HARDTOP REMOVAL/INSTALLATION** .)

NOTE:

- **The number of shims varies depending on the location of the rear window glass installation nut. Adjustment will be easier by verifying the number of shims to be used before removing the rear window glass.**

4. Disconnect the filament connector.
5. If the rear window glass or the middle roof panel is to be reused, remove it using the following procedure.

NOTE:

- **If the rear window glass or middle roof panel is to be used, positioning and adjustment during installation will be easier by placing marks for the installation before removal.**
- **Placing marks is not necessary if the rear window glass or middle roof panel is to be replaced with a new one because there will be no marked positions.**

    1. Affix masking tape to the position shown in the figure.

NOTE:

- **Mark the roof link and rear window glass at 4 locations as shown in the figure.**

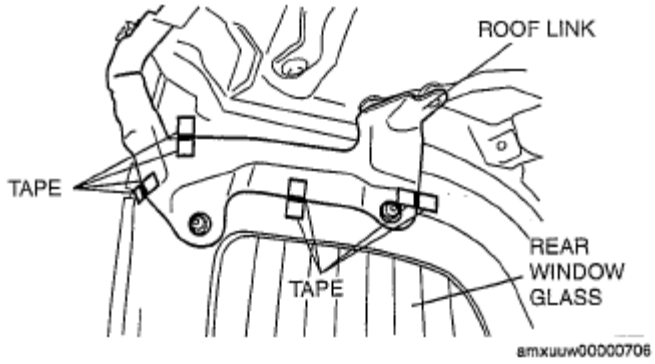


Fig. 48: Identifying Masking Tape
Courtesy of MAZDA MOTORS CORP.

2. Apply positioning marks to the masking tape.
3. Apply a positioning mark to the exterior circumference of the nuts.

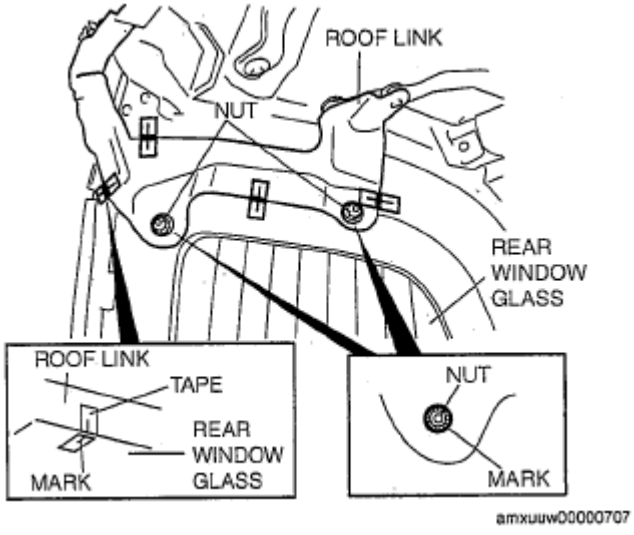


Fig. 49: Identifying Marks
Courtesy of MAZDA MOTORS CORP.

6. Move the power retractable hardtop in the open direction as shown in the figure until it is separated from the middle roof panel.

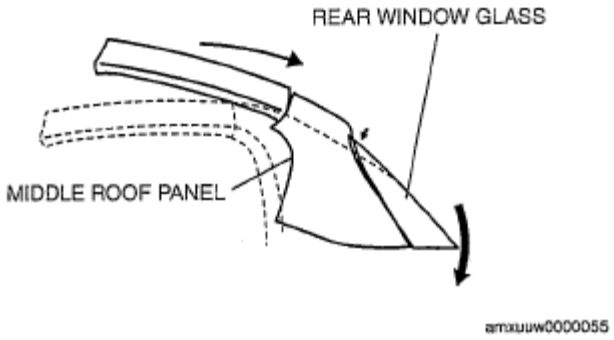


Fig. 50: Moving Power Retractable Hardtop
Courtesy of MAZDA MOTORS CORP.

7. Remove the cap.
8. Remove the nuts and washers.
9. Remove the shims.
10. Remove the rear window glass.
11. Remove the rear window defroster.
12. Install in the reverse order of removal.

(See **REAR WINDOW GLASS INSTALLATION NOTE**..)

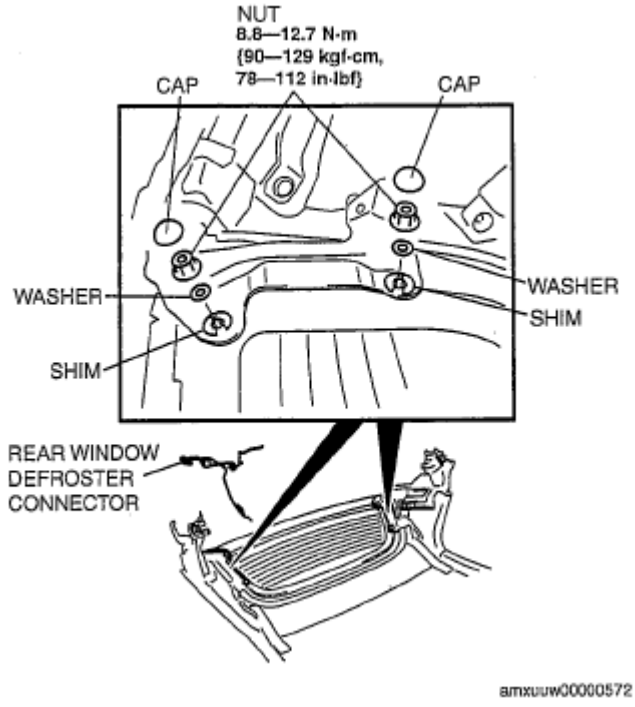


Fig. 51: Identifying Rear Window Defroster Remove/Install Components With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

REAR WINDOW DEFROSTER INSTALLATION NOTE

1. Remove the connector from the roof motor bracket.
2. Remove the wiring harness from clip A.
3. Remove clip B, then remove clip C while pulling it in the direction shown by the arrow avoiding the tab.

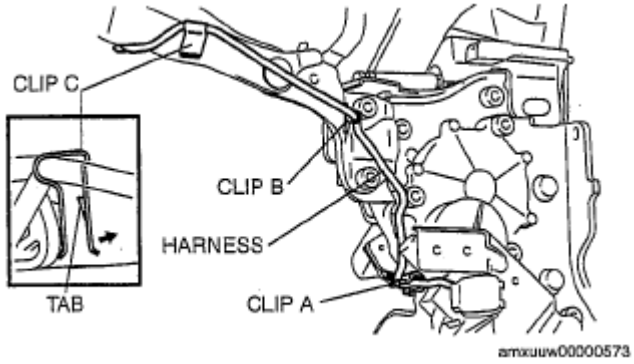


Fig. 52: Identifying Wiring Harness Clips
Courtesy of MAZDA MOTORS CORP.

4. Remove the wiring harness from the roof link lock groove.

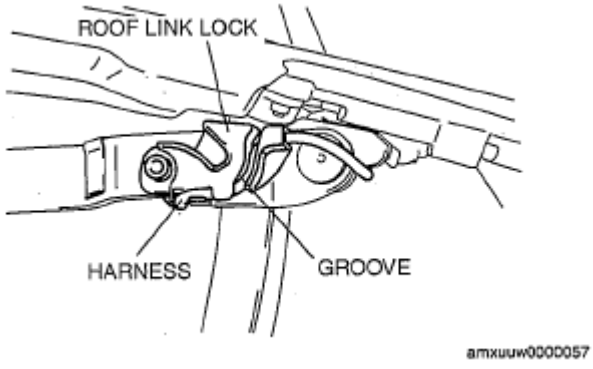


Fig. 53: Identifying Harness, Groove And Roof Link Lock
Courtesy of MAZDA MOTORS CORP.

5. Remove clip D while pulling it in the direction shown by the arrow avoiding the tab.

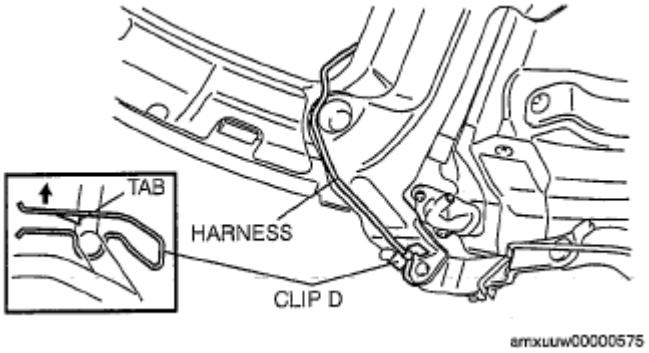


Fig. 54: Removing Clip D
Courtesy of MAZDA MOTORS CORP.

REAR WINDOW GLASS INSTALLATION NOTE

Rear window glass or middle roof panel is newly replaced

1. Adjust the rear window glass and middle roof panel gap and height difference so that it is within the specification. (See **POWER RETRACTABLE HARDTOP ADJUSTMENT** .)

Rear window glass or middle roof panel is reused

1. Install the shim according to the number verified prior to removal.
2. Align the alignment marks applied before the rear window glass removal, install the rear window glass, and then remove the masking tape.
3. Refer to POWER RETRACTABLE HARDTOP ADJUSTMENT and verify that the gap and height difference between the rear window glass and middle roof panel are within the specifications. Adjust the power retractable hardtop if necessary. (See **POWER RETRACTABLE HARDTOP ADJUSTMENT** .)

REAR WINDOW DEFROSTER FILAMENT INSPECTION

1. Turn the ignition switch to the ON position.
2. Turn the rear window defroster switch on.

CAUTION:
- **Directly touching the rear window defroster filament with the lead of the voltmeter could damage it. Wrap aluminum foil around the end of the lead and test the rear window defroster filament by touching it with the foil.**

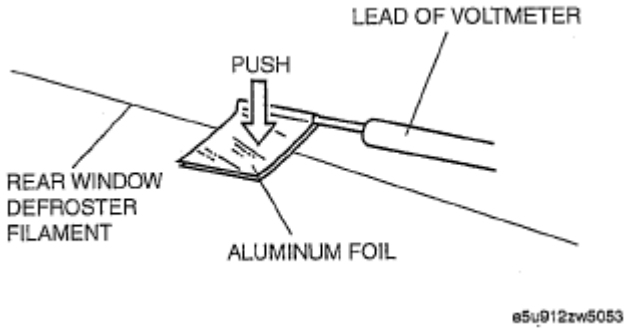


Fig. 55: Touching Rear Window Defroster Filament With Lead Of Voltmeter
Courtesy of MAZDA MOTORS CORP.

3. Connect the positive lead of the tester to the positive side of each rear window defroster filament and the negative lead to ground.
4. Gradually slide the positive lead from the positive side to the negative side and verify that the voltage decreases accordingly.

- If the voltage changes rapidly, the rear window defroster filament has a malfunction. Repair the rear window defroster filament.

VOLTAGE (REFERENCE)

Measured part	Voltage (Reference)
(1) to (2)	Approx. 12 V to 0 V

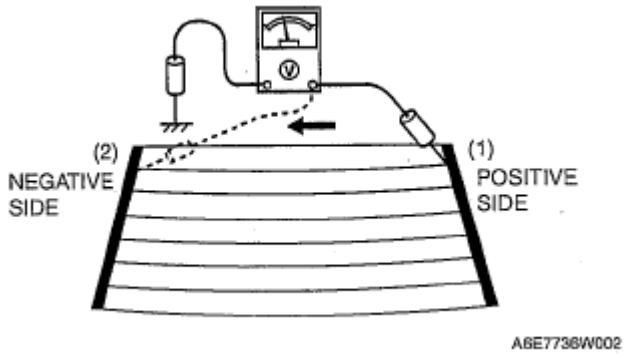


Fig. 56: Checking Voltage Drop In Filament
Courtesy of MAZDA MOTORS CORP.

REAR WINDOW DEFROSTER FILAMENT REPAIR

1. Clean the rear window defroster filament using isopropyl alcohol.
2. Attach tape to both sides of the rear window defroster filament.
3. Using a small brush or marking pen, apply silver paint.
4. After 2-3 min, carefully remove the tape without damaging the applied area.

CAUTION:

- **Do not operate the rear window defroster until the paint is completely dry. It may be cause other malfunctions if it is used before paint is dry.**

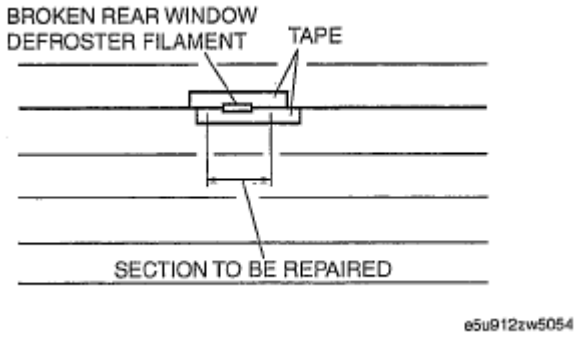


Fig. 57: Identifying Tape On Rear Window Defroster Filament
Courtesy of MAZDA MOTORS CORP.

5. Dry the repaired part using the following procedure.
   - When the room temperature is **25 °C {77 °F}** , leave as it is for **24 h.**
   - When a hot air blower is used, dry with the temperature of **150 °C {302 °F}** for **30 min.**

POWER OUTER MIRROR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
4. Remove the door speaker.(See **DOOR SPEAKER REMOVAL/INSTALLATION** .)
5. Remove the door unit.(See **DOOR UNIT REMOVAL/INSTALLATION** .)
6. Remove clips.

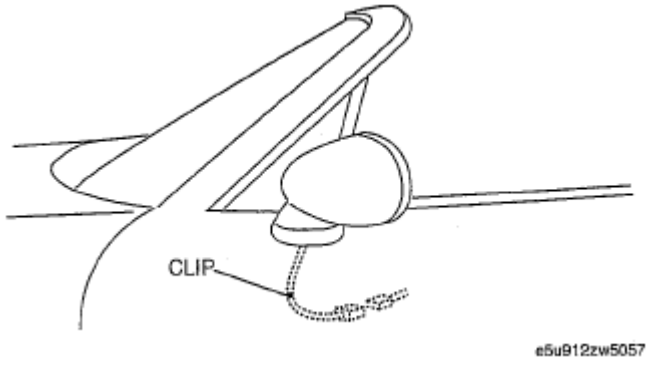


Fig. 58: Identifying Clip
Courtesy of MAZDA MOTORS CORP.

7. Rotate the power outer mirror in the direction shown by the arrow.

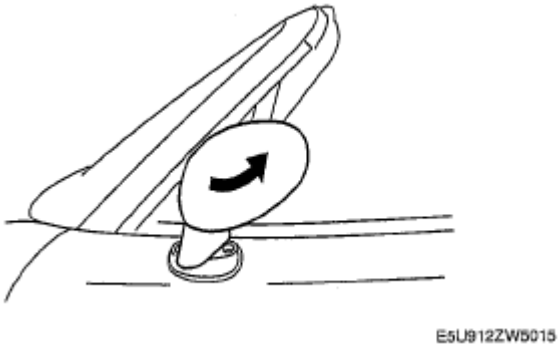


Fig. 59: Rotating Power Outer Mirror
Courtesy of MAZDA MOTORS CORP.

8. Remove the bolt.

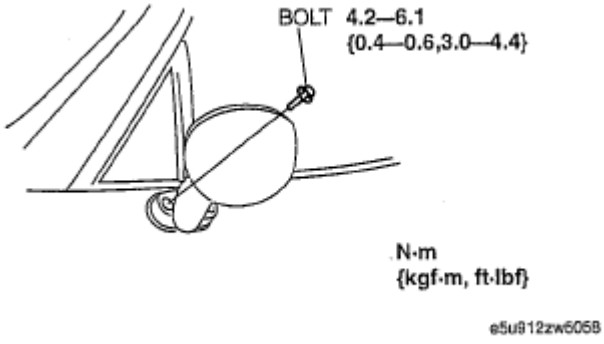


Fig. 60: Identifying Mirror Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

9. Rotate the power outer mirror in the direction shown by the arrow.

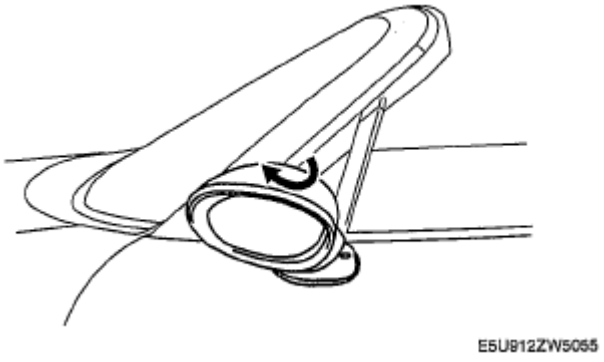


Fig. 61: Rotating Power Outer Mirror
Courtesy of MAZDA MOTORS CORP.

10. Remove the bolt and the power outer mirror.
11. Install in the reverse order of removal.

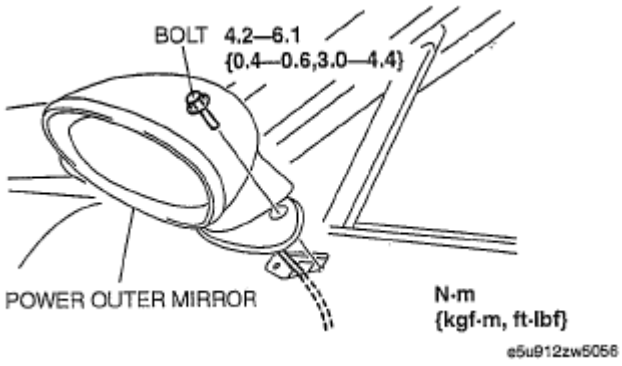


Fig. 62: Identifying Power Outer Mirror And Bolt With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

POWER OUTER MIRROR DISASSEMBLY/ASSEMBLY

1. Remove the outer mirror glass.(See **OUTER MIRROR GLASS DISASSEMBLY NOTE**.)(See **OUTER MIRROR GLASS ASSEMBLY NOTE**.)
2. Assemble in the reverse order of disassembly.

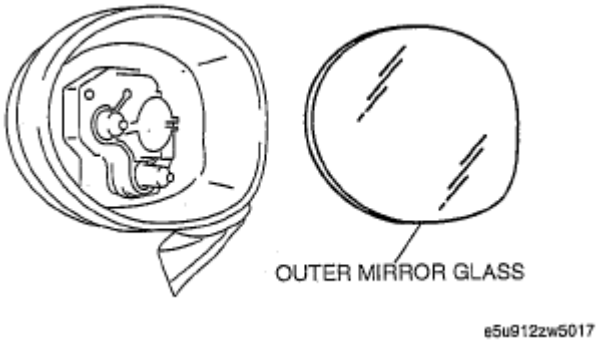


Fig. 63: Identifying Outer Mirror Glass
Courtesy of MAZDA MOTORS CORP.

OUTER MIRROR GLASS DISASSEMBLY NOTE

1. Press area A of the outer mirror glass so that area B moves outward.

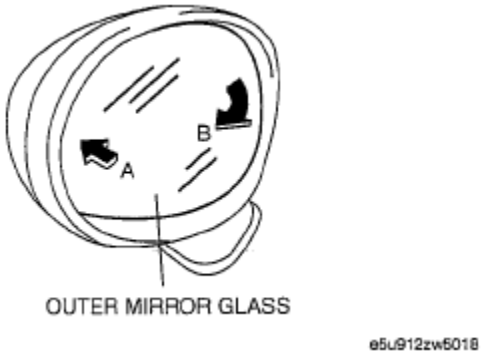


Fig. 64: Identifying Area A And B
Courtesy of MAZDA MOTORS CORP.

2. Detach pin A while lifting up the inside of the outer mirror glass holder.
3. Pull out the outer mirror glass holder and detach pins B.
4. Remove the outer mirror glass holder and the outer mirror glass as a single unit.

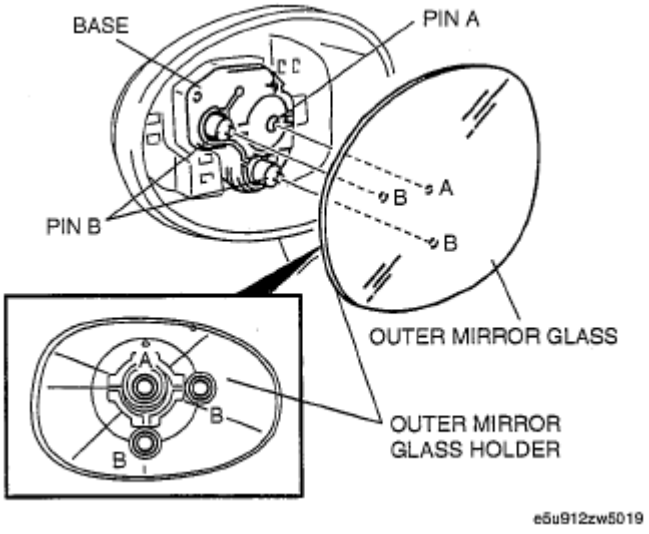


Fig. 65: Identifying Outer Mirror Glass Holder & Pins
Courtesy of MAZDA MOTORS CORP.

OUTER MIRROR GLASS ASSEMBLY NOTE

1. Press area A of the mirror glass into the base to attach pin A.
2. Press areas B of the outer mirror glass into the base to attach pins B.

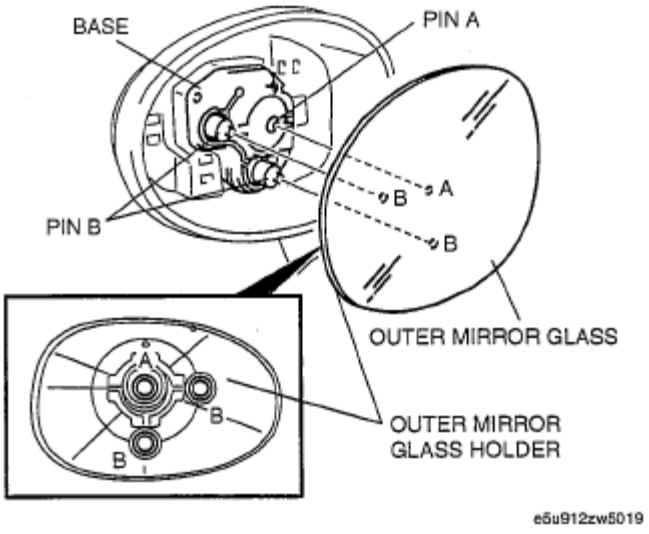


Fig. 66: Identifying Outer Mirror Glass Holder & Pins
Courtesy of MAZDA MOTORS CORP.

POWER OUTER MIRROR INSPECTION

1. Apply battery positive voltage and connect the ground to the corresponding power outer mirror terminals, and then inspect the operation of the power outer mirror.

- If not as specified, replace the power outer mirror.

POWER OUTER MIRROR OPERATION REFERENCE

Operation	Terminal	
	B+	GND
Up	B	D
Down	D	B
Left	F	D
Right	D	F

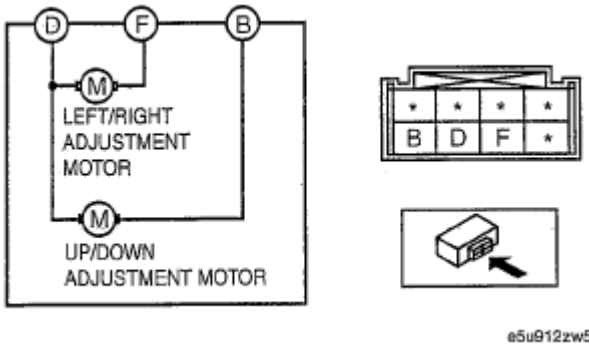


Fig. 67: Identifying Power Outer Mirror Connector Terminals

Courtesy of MAZDA MOTORS CORP.

POWER OUTER MIRROR SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable.(See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the handle pull.(See **DOOR TRIM DISASSEMBLY/ASSEMBLY** .)
4. Remove the armrest.(See **DOOR TRIM DISASSEMBLY/ASSEMBLY** .)
5. Remove the door trim.(See **DOOR TRIM REMOVAL/INSTALLATION** .)
6. Remove the switch panel from the door trim by depressing the tab.
7. Remove the screws and the power outer mirror switch.
8. Install in the reverse order of removal.

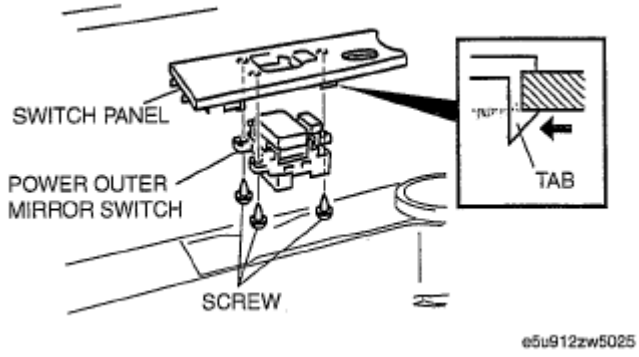


Fig. 68: Power Outer Mirror Switch Remove/Install Components
Courtesy of MAZDA MOTORS CORP.

POWER OUTER MIRROR SWITCH INSPECTION

1. Inspect for continuity between the power outer mirror switch terminals using an ohmmeter.

- If not as specified, replace the power outer mirror switch.

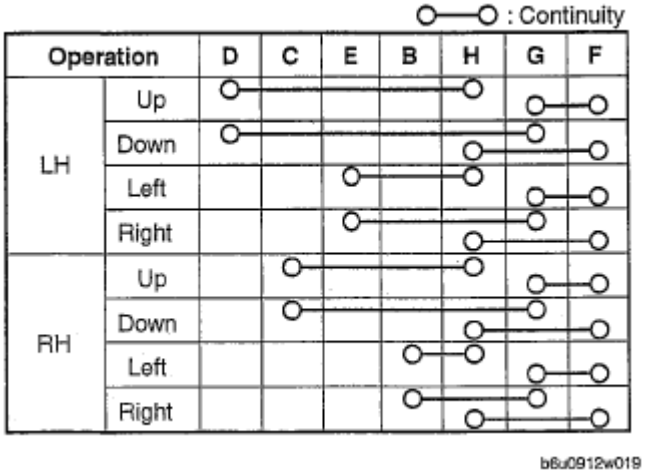


Fig. 69: Power Outer Mirror Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

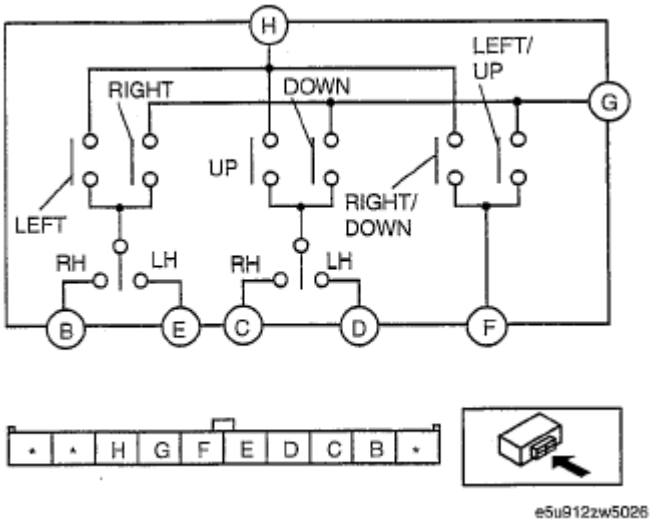


Fig. 70: Power Outer Mirror Switch Circuit Diagram
Courtesy of MAZDA MOTORS CORP.

BASE REMOVAL

1. Remove the rearview mirror.
2. Wind each end of a wire around a bar.

WARNING:

- **Using the SST (piano wire) with bare hands can cause injury. Always wear gloves when using the SST (piano wire).**

NOTE:

- **Use a long sawing action to spread the work over the whole length of**

the SST (piano wire) to prevent it from breaking. Do not pull too hard to prevent damage to windshield.

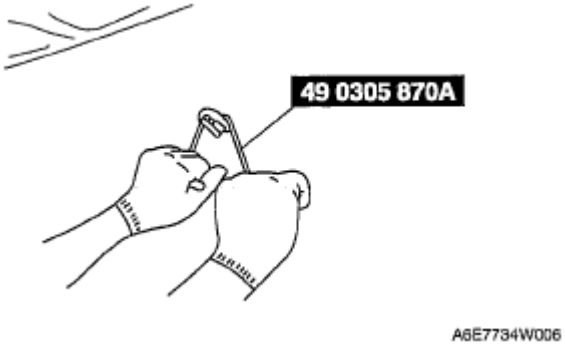


Fig. 71: Identifying SST
Courtesy of MAZDA MOTORS CORP.

3. Saw through the sealant to remove the base.

BASE INSTALLATION

1. Cut away all of the original sealant using a razor.

WARNING:
- **Using a razor with bare hands can cause injury. Always wear gloves when using a razor.**

2. Clean and degrease the ceramic coating on the glass and the base.

CAUTION:
- **Keep the area free of dirt and grease, and do not touch the surface. Otherwise, the primer may not properly bond to the surface of the glass.**

3. Apply primer to the bonding area of the glass and the base.
4. Use only glass primer on the glass, and body primer on the base. Allow the primer to dry for **approx. 30 min.**
5. Apply **3.0 mm {0.12 in}** layer of sealant to the base.

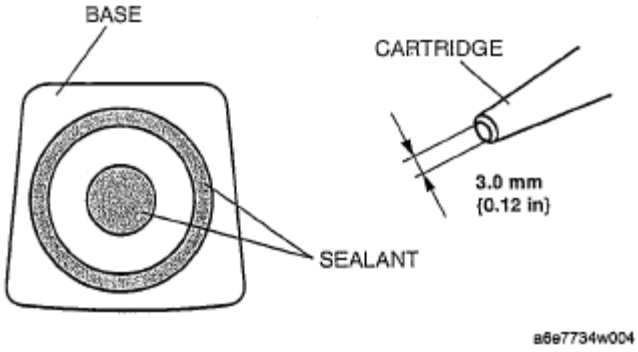


Fig. 72: Identifying Sealant Applying Area With Specification
Courtesy of MAZDA MOTORS CORP.

6. Center the base in the ceramic coating and press it onto the glass.
7. Use isopropyl alcohol to remove any excess repair sealant.

Hardening time of sealant

SEALANT HARDENING TIME

Temperature	Surface hardening time	Time required until vehicle can be put into service
5 °C {41 °F}	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F}	Approx. 1 h	Approx. 4 h
35 °C {95 °F}	Approx. 10 min.	Approx. 2 h

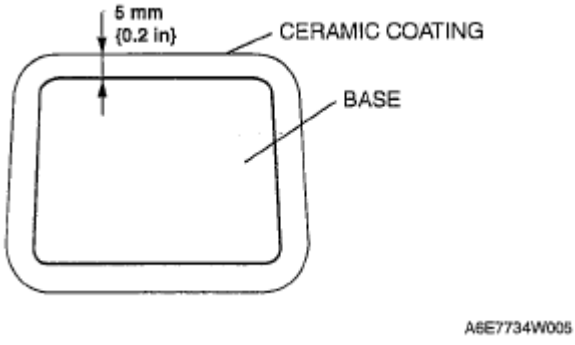


Fig. 73: Identifying Ceramic Coating And Base
Courtesy of MAZDA MOTORS CORP.

8. Install the rearview mirror.

REARVIEW MIRROR REMOVAL/INSTALLATION

1. Insert a flathead screwdriver between the rearview mirror and base.
2. Press the base pin downward and remove the rearview mirror.

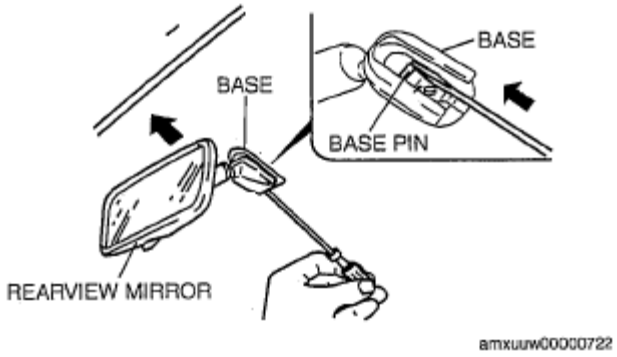
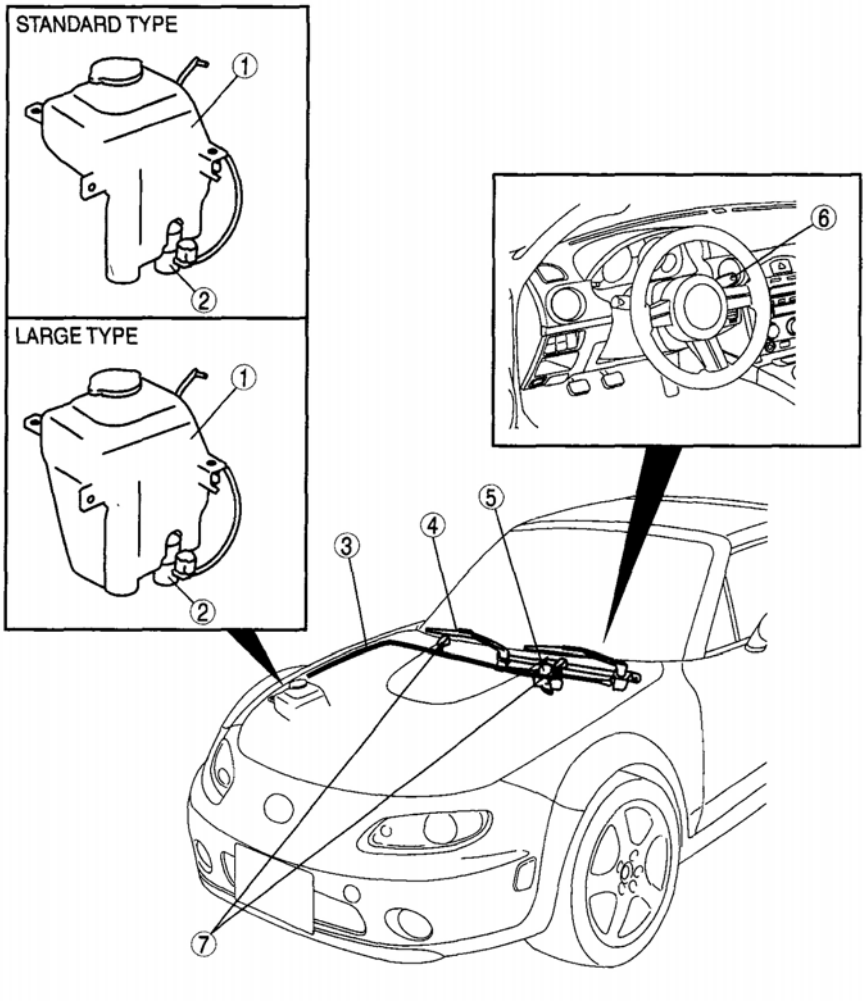


Fig. 74: Removing/Installing Rearview Mirror
Courtesy of MAZDA MOTORS CORP.

2007 ACCESSORIES & BODY, CAB

Wiper/Washer System - MX-5 Miata

WIPER/WASHER SYSTEM LOCATION INDEX



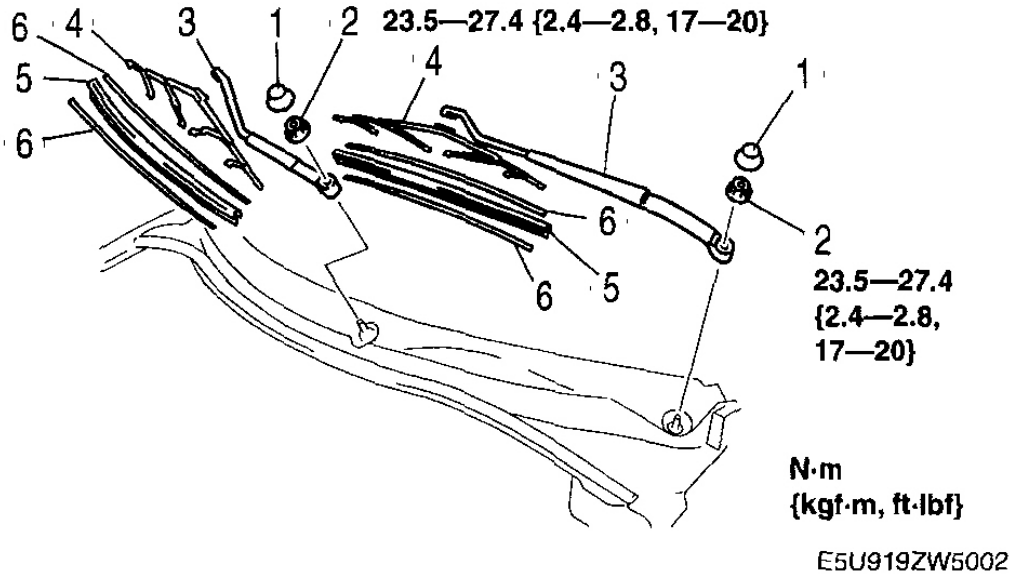
E5U919ZW5001

1	Washer tank
2	Washer motor
3	Washer hose
4	Wiper arm and blade
5	Wiper motor
6	Wiper and washer switch
7	Washer nozzle

Fig. 1: Identifying Location Of Wiper/Washer System Components
Courtesy of MAZDA MOTORS CORP.

WIPER ARM AND BLADE REMOVAL/INSTALLATION

1. Remove in the order indicated in **Fig. 2**.



1	Cap
2	Nut
3	Wiper arm
4	Wiper blade
5	Rubber brush
6	Backing plate

Fig. 2: Removing/Installing Wiper Arm & Blade (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Install in the reverse order of removal.
3. Adjust the wiper arm and blade. (See **WIPER ARM AND BLADE ADJUSTMENT** .)

WIPER ARM INSTALLATION NOTE

1. Clean the wiper arm connector shafts using a wire brush before installing the wiper arms.

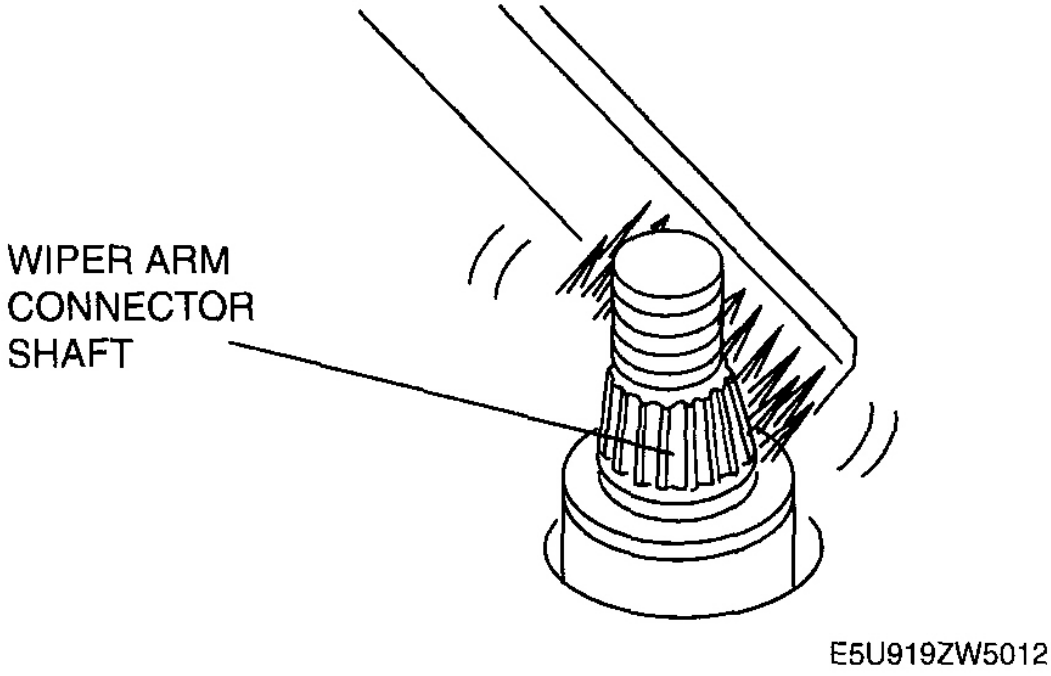


Fig. 3: Cleaning Wiper Arm Connector Shafts Using Wire Brush
Courtesy of MAZDA MOTORS CORP.

WIPER ARM AND BLADE ADJUSTMENT

1. Operate the wipers, and then turn off the wiper motor to set the wipers in the park position.
2. Slide the serrated connecting part and adjust the wiper arm and blade so that its end is aligned with the clear dot in the black ceramic coating on the inside of the windshield.

NOTE:

- **If the hollowed mark in the ceramic coating cannot be located, measure the distance from the cowl grille end line, and adjust the wiper arm and blade.**

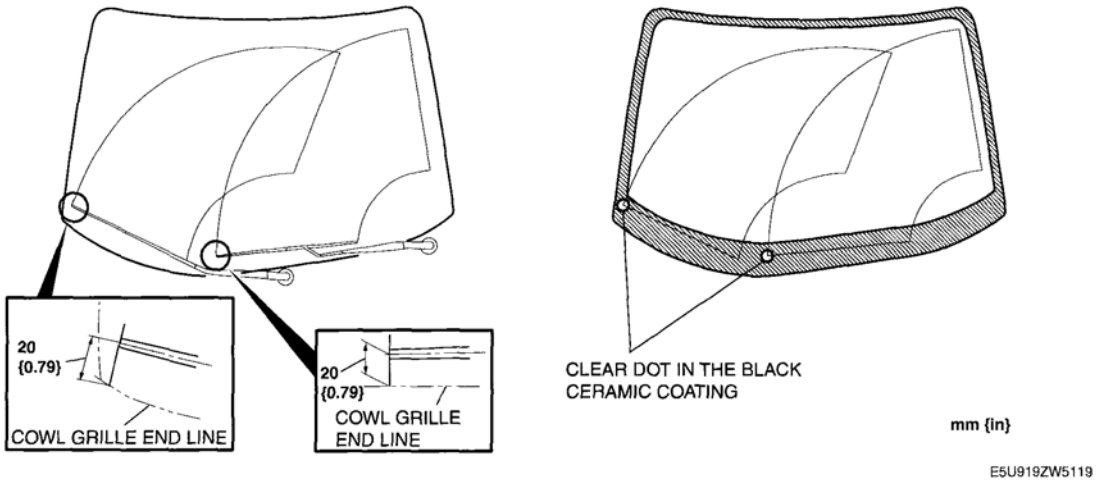


Fig. 4: Identifying Wiper Arm & Blade Slide Area
Courtesy of MAZDA MOTORS CORP.

WIPER MOTOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the wiper arm and blade. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
4. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
5. Disconnect the connector.
6. Remove the bolts.
7. Remove the nut.
8. Install in the reverse order of removal.

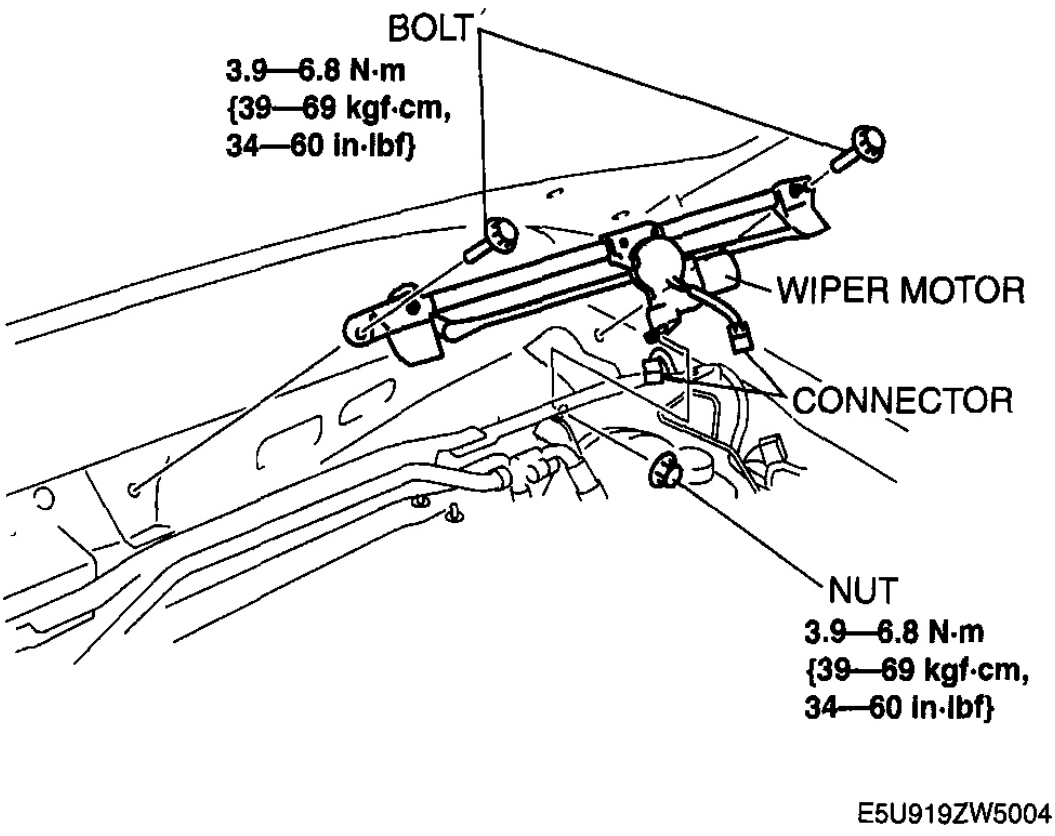
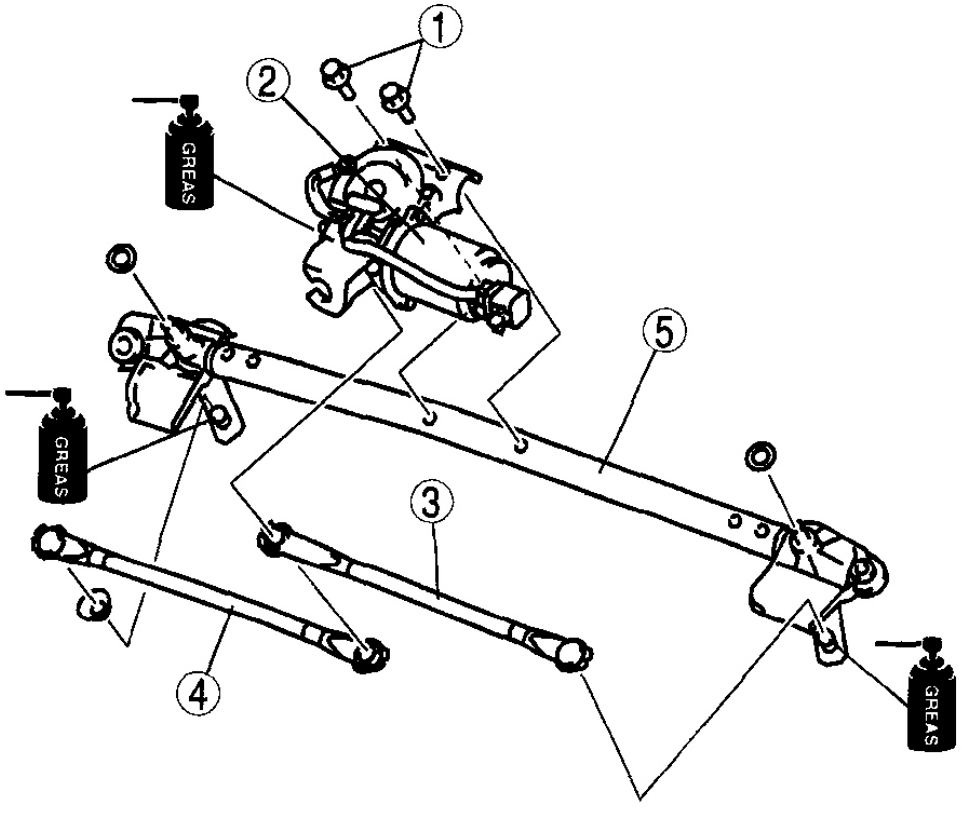


Fig. 5: Removing/Installing Wiper Motor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

WIPER MOTOR DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in **Fig. 6** .



1	Bolt
2	Wiper motor
3	Wiper link No.1
4	Wiper link No.2
5	Main link

Fig. 6: Disassembling/Assembling Wiper Motor (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

2. Assemble in the reverse order of disassembly.

BALL JOINT ASSEMBLY NOTE

1. Use a clean rag to protect the link, and squeeze using pliers.

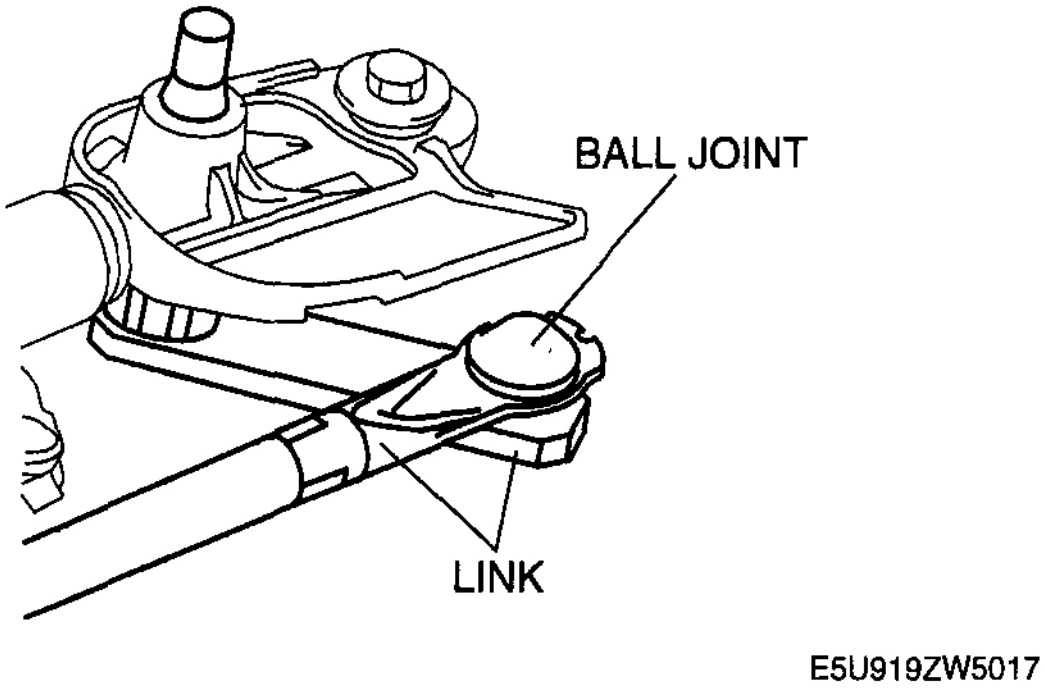


Fig. 7: Identifying Ball Joint Assembly
Courtesy of MAZDA MOTORS CORP.

WIPER MOTOR ASSEMBLY NOTE

1. Connect the wiper motor to the vehicle wiring harness connector, operate the wipers, and then stop them at the auto-stop position.
2. Adjust the motor crank, wiper link No.1 and wiper link No.2 so that they are parallel as shown in **Fig. 8** .
3. Assemble the wiper motor.

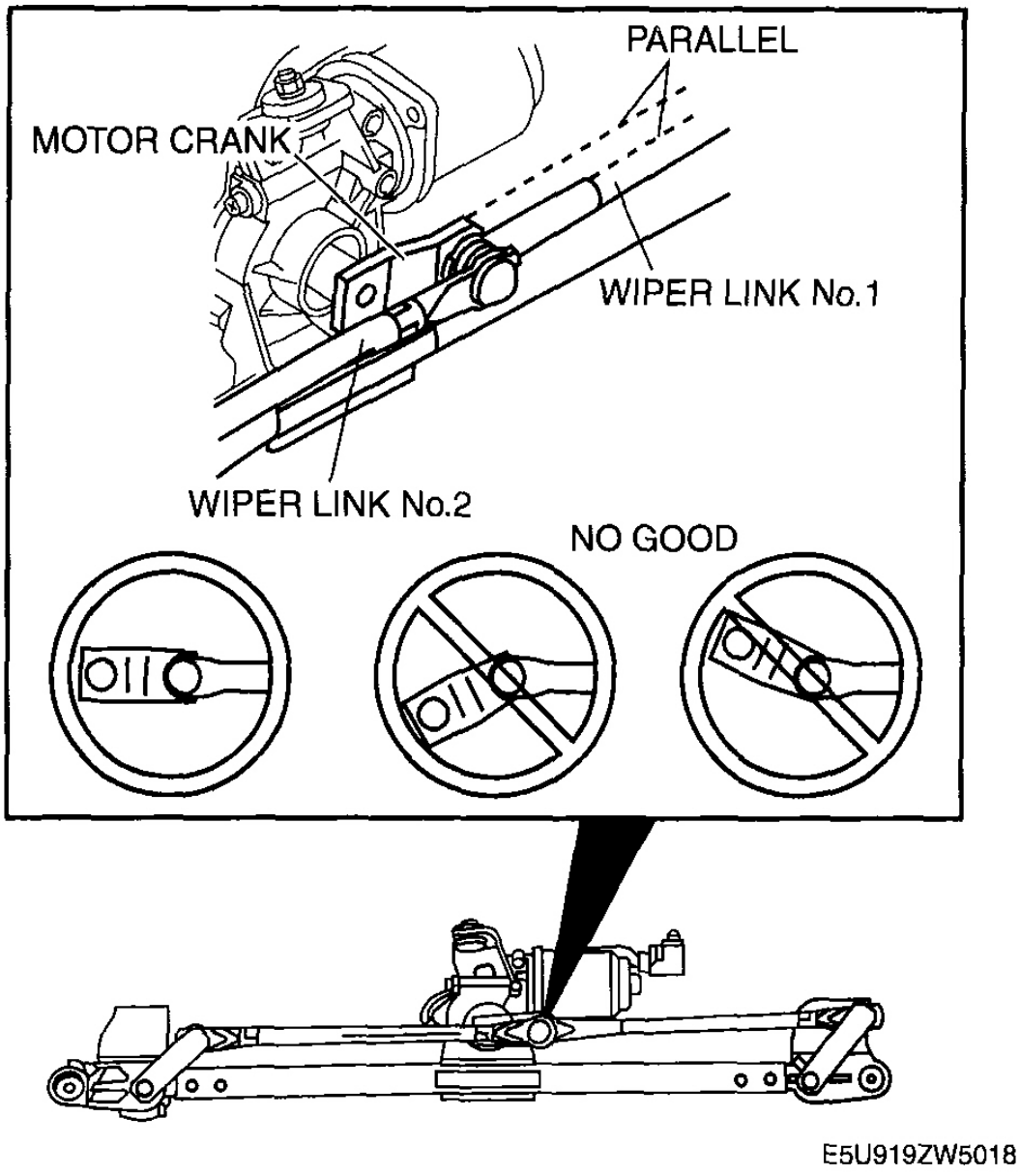


Fig. 8: Identifying Propper Wiper Link Adjustment
Courtesy of MAZDA MOTORS CORP.

WIPER MOTOR INSPECTION

1. Disconnect the wiper motor connector.
2. Connect battery positive voltage to wiper motor terminal A or C, and ground to terminal F, then verify that the wipers operate as shown in **Fig. 9** .

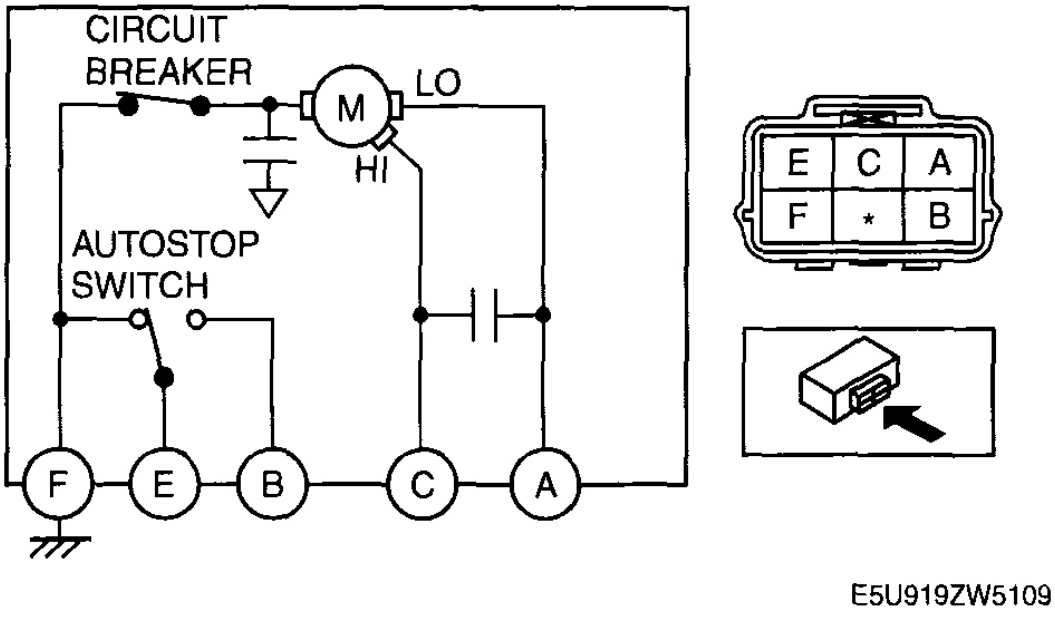


Fig. 9: Identifying Wiper Motor Circuit
Courtesy of MAZDA MOTORS CORP.

- If the wipers do not operate as indicated in **Fig. 9** , replace the wiper motor.

3. Operate the wipers, disconnect battery positive voltage from terminal C, and then verify that the wipers stop.
4. Connect wiper motor terminals E and A, and apply battery positive voltage to terminal B.
5. Operate the wipers at low speed, and verify that they stop in the park position.
   - If there is any malfunction, replace the wiper motor.

Terminal connected to battery positive voltage	Operation condition
C	HI
A	LO

E5U919ZW5010

Fig. 10: Wiper Operation Condition Table
Courtesy of MAZDA MOTORS CORP.

WASHER TANK REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Disconnect the washer hose from joint pipe A.
4. Remove the bolt and nut, then remove the washer tank.
5. Disconnect the washer motor connector.
6. Install in the reverse order of removal.

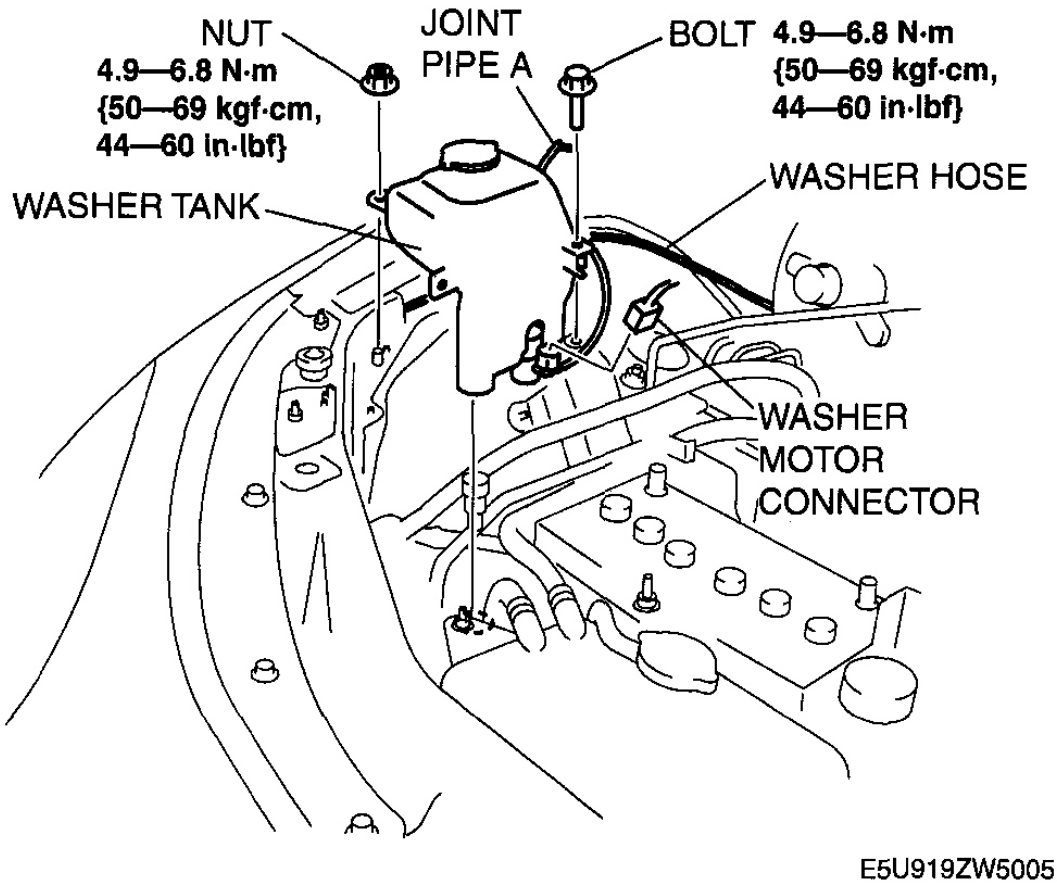


Fig. 11: Washer Tank (With Torque Specifications)
Courtesy of MAZDA MOTORS CORP.

WASHER MOTOR REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the washer tank. (See **WASHER TANK REMOVAL/INSTALLATION** .)
4. Remove the washer motor, then remove the grommet.
5. Install in the reverse order of removal.

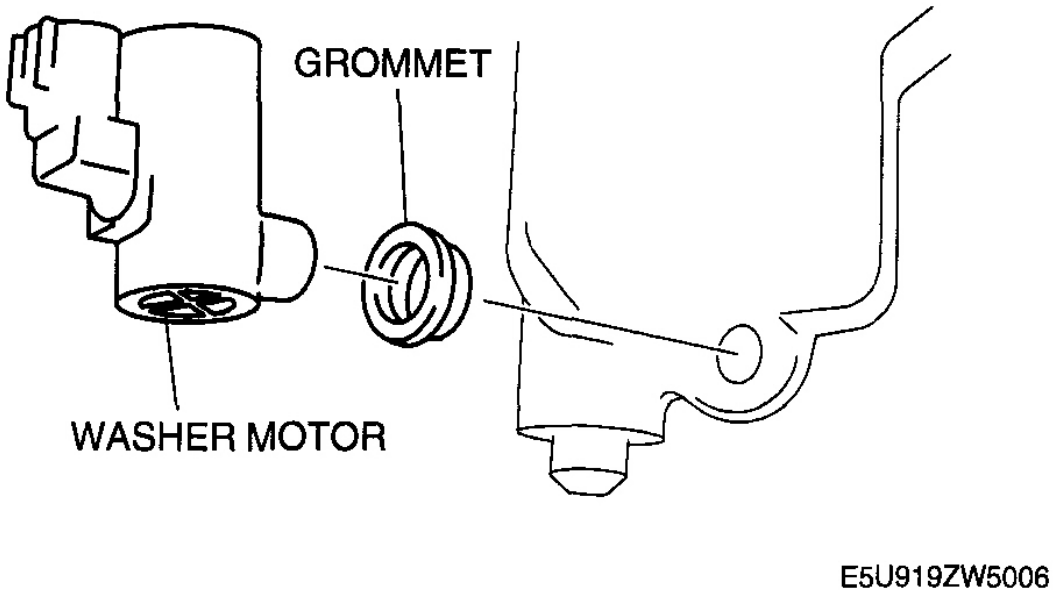


Fig. 12: Washer Motor & Grommet
Courtesy of MAZDA MOTORS CORP.

WASHER MOTOR INSPECTION

1. Connect battery positive voltage to washer motor terminal A and terminal B to ground.
2. Verify that the washer motor operates normally.
    - If there is any malfunction, replace the washer motor.

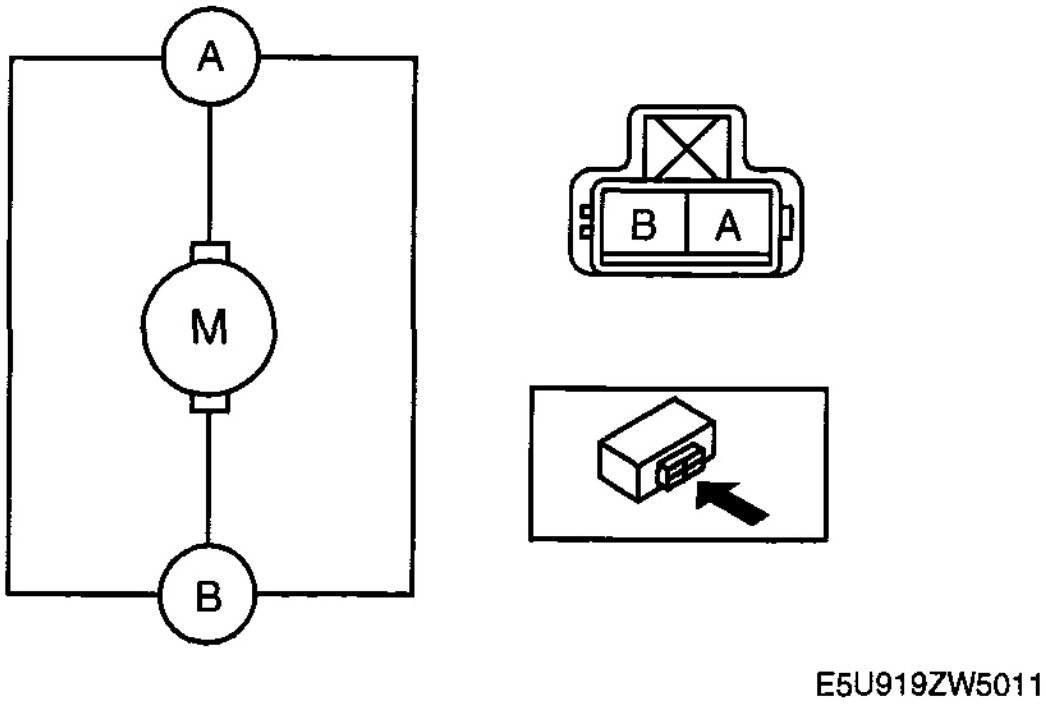


Fig. 13: Identifying Washer Motor Connector
Courtesy of MAZDA MOTORS CORP.

WASHER NOZZLE REMOVAL/INSTALLATION

1. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
2. Remove the washer hose from the washer nozzle.
3. Squeeze the tabs of the washer nozzle.
4. Pull the washer nozzle out to remove it.
5. Install in the reverse order of removal.

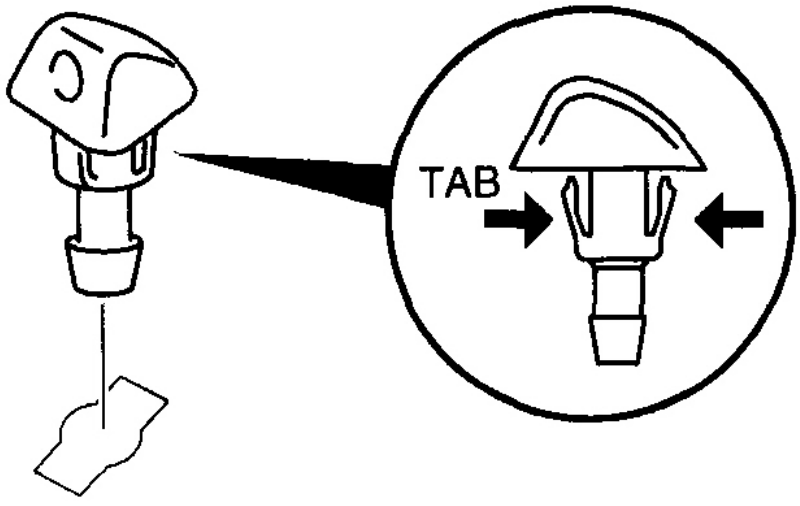


Fig. 14: Removing/Installing Washer Nozzle
Courtesy of MAZDA MOTORS CORP.

WASHER HOSE REMOVAL/INSTALLATION

1. Remove the wiper arm and blade. (See **WIPER ARM AND BLADE REMOVAL/INSTALLATION** .)
2. Disconnect joint pipe A, then remove washer hose A from clip.
3. Remove the cowl grille. (See **COWL GRILLE REMOVAL/INSTALLATION** .)
4. Remove clip.
5. Disconnect joint pipe B, then remove washer hose A.
6. Disconnect washer hose B from the washer nozzle, then remove washer hose B.
7. Disconnect joint pipe C, then remove washer hose C.
8. Remove washer hose D from clips.
9. Disconnect washer hose D from the washer nozzle, then remove washer hose D.
10. Install in the reverse order of removal.

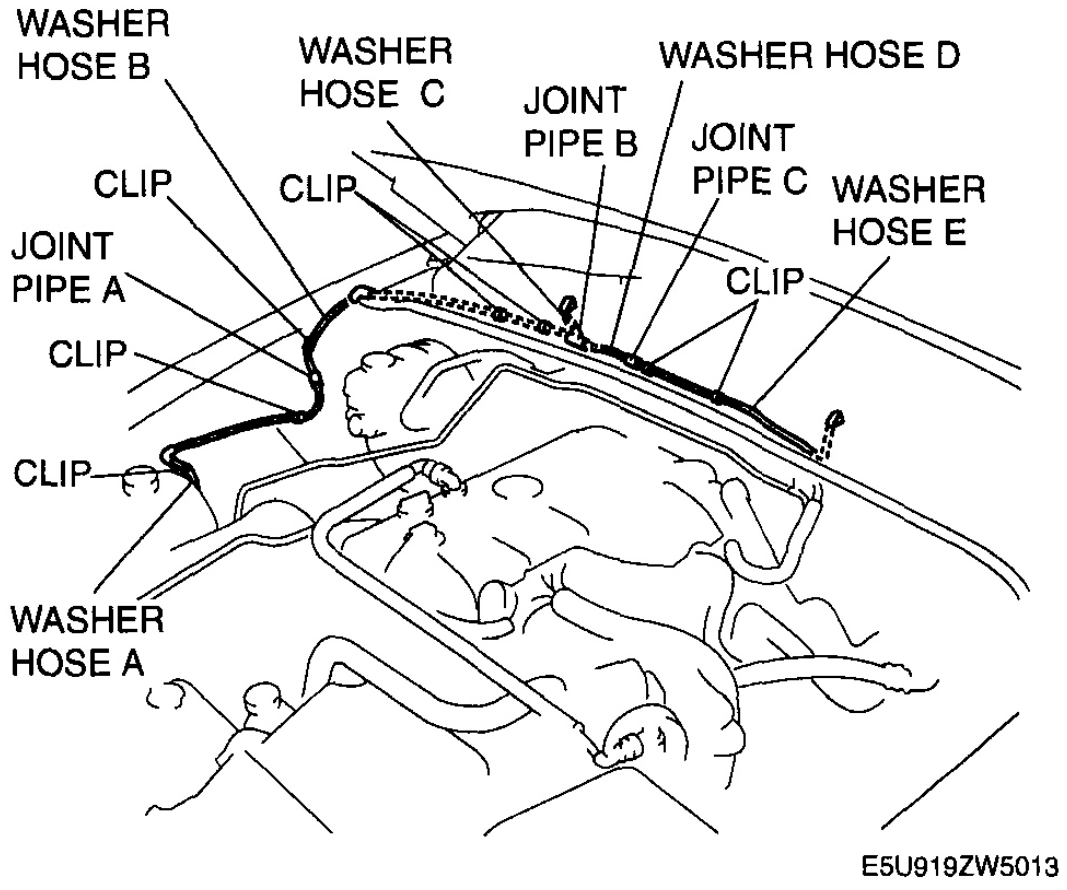


Fig. 15: Removing/Installing Washer Hose
Courtesy of MAZDA MOTORS CORP.

WIPER AND WASHER SWITCH REMOVAL/INSTALLATION

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Remove the column cover. (See **COLUMN COVER REMOVAL/INSTALLATION** .)
4. Disconnect the wiper and washer switch connector.
5. Remove the screws, then remove the wiper and washer switch.
6. Install in the reverse order of removal.

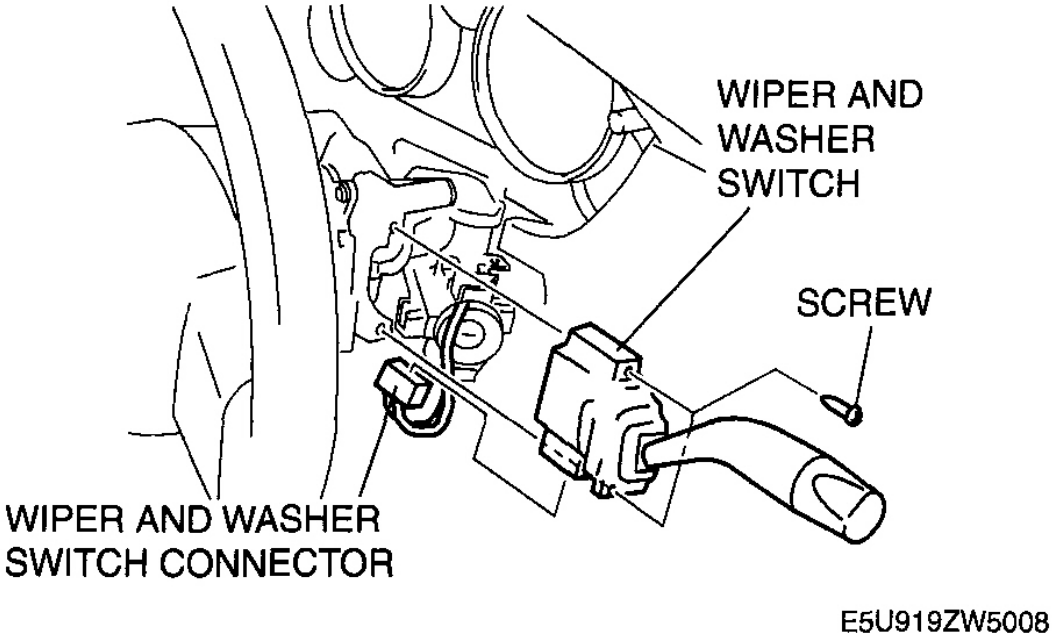


Fig. 16: Removing Wiper & Washer Switch
Courtesy of MAZDA MOTORS CORP.

WIPER AND WASHER SWITCH INSPECTION

1. Verify that the continuity between the wiper and washer switch is as indicated in **Fig. 17** .
    - If not as indicated in **Fig. 17** , replace the wiper and washer switch.

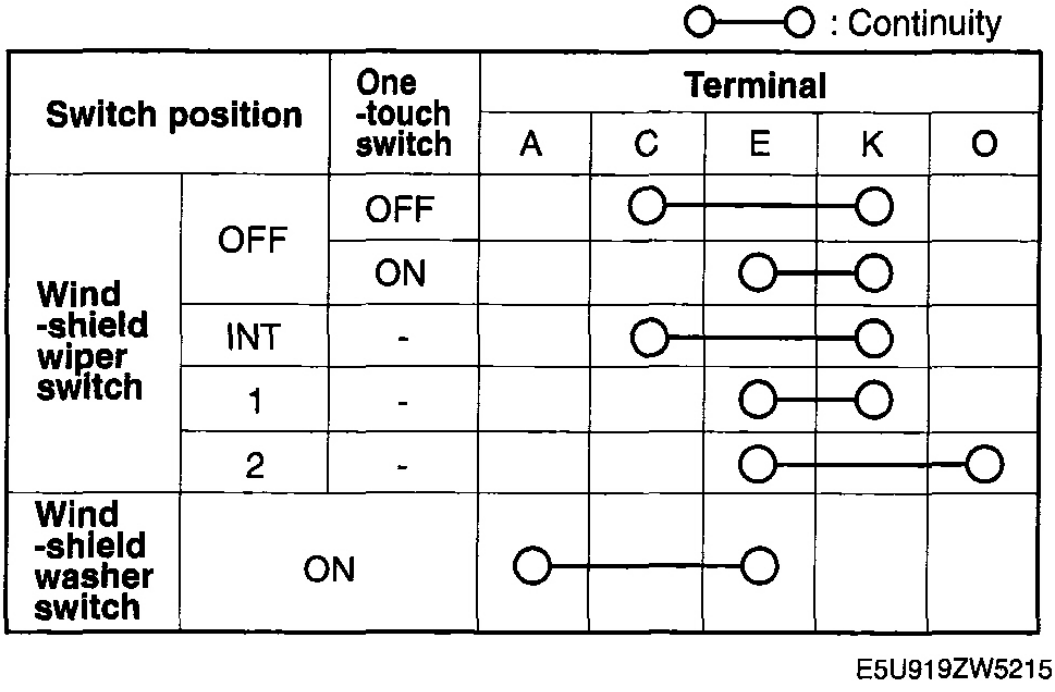


Fig. 17: Wiper/Washer Switch Continuity Table
Courtesy of MAZDA MOTORS CORP.

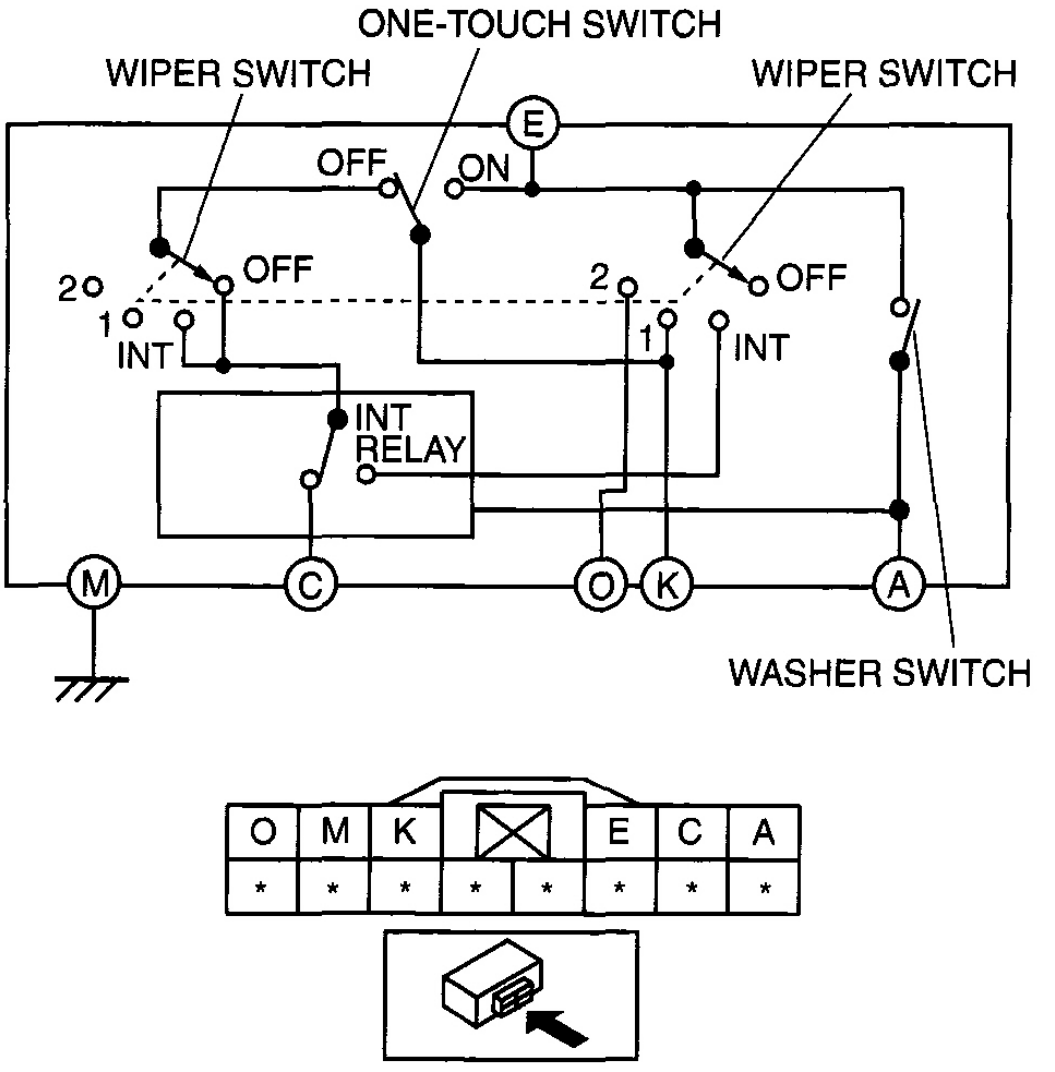
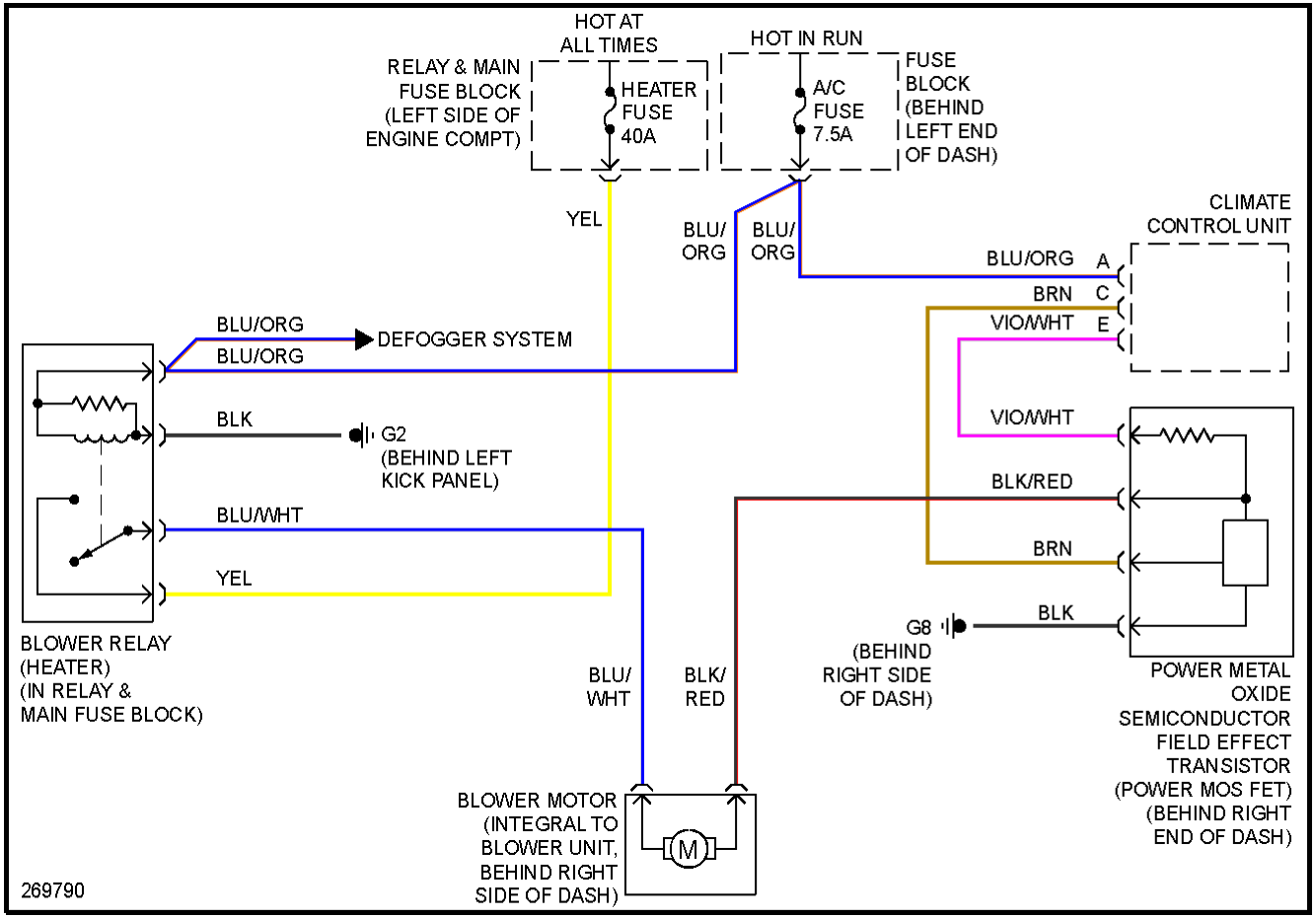
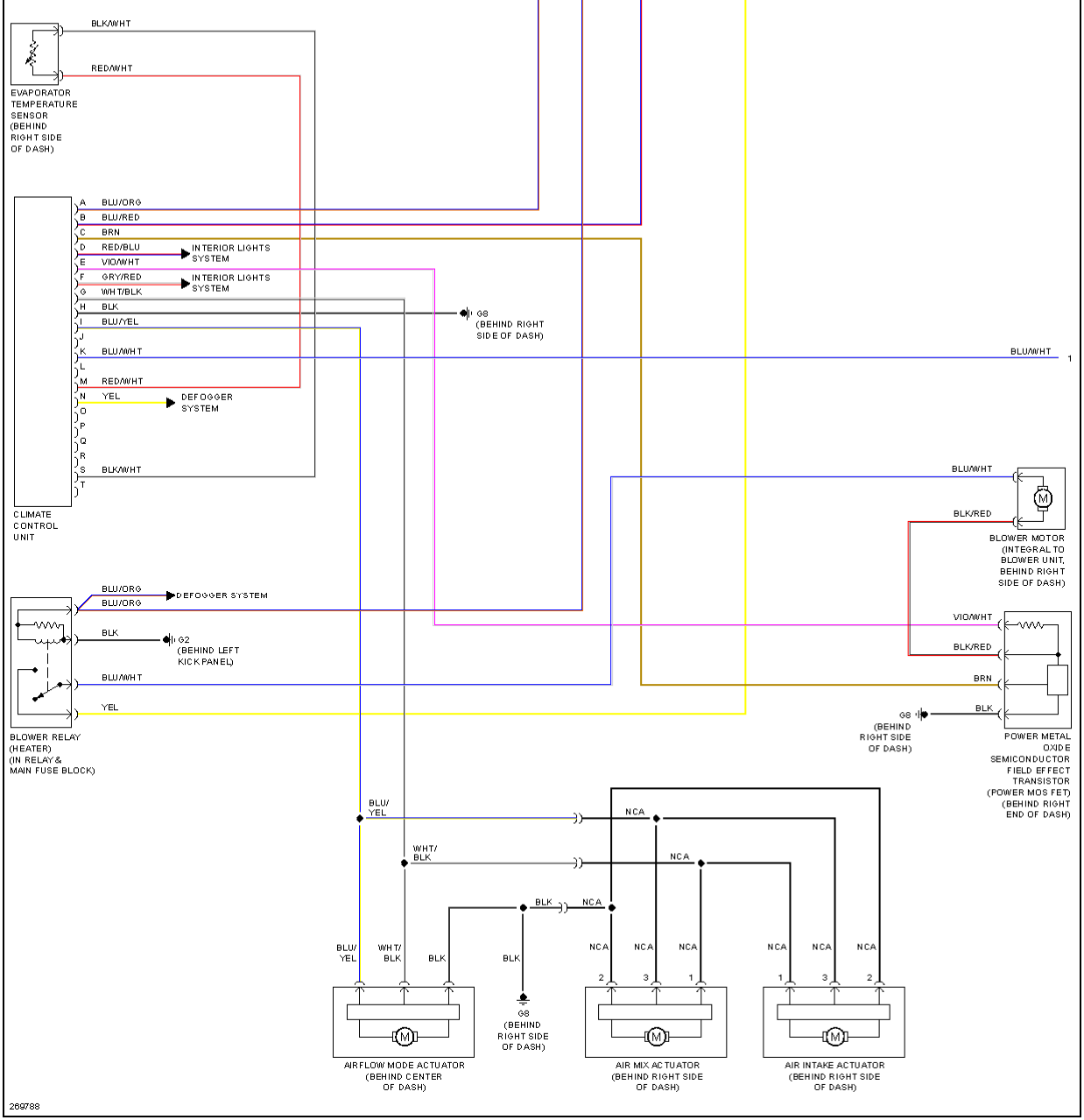
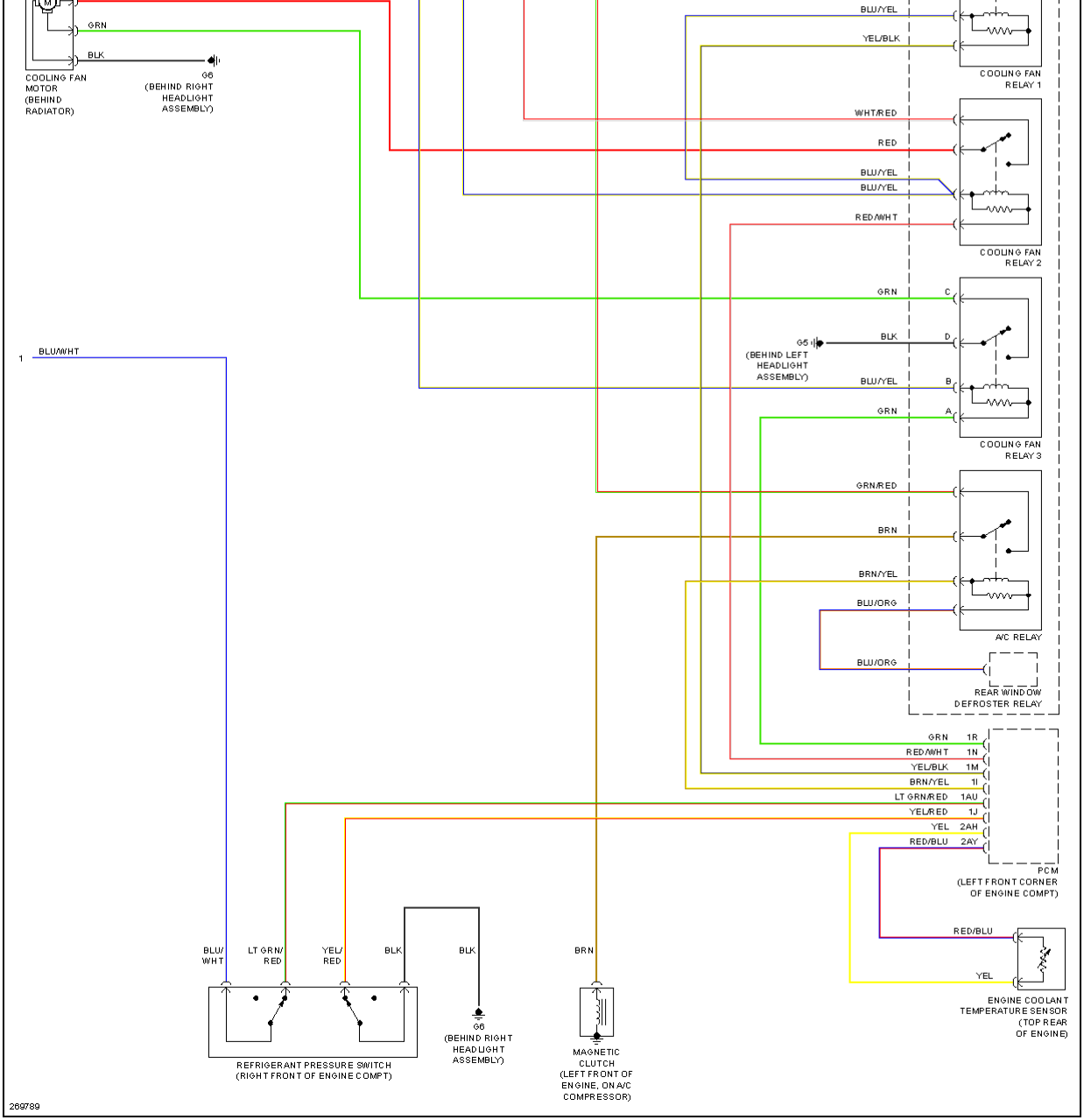


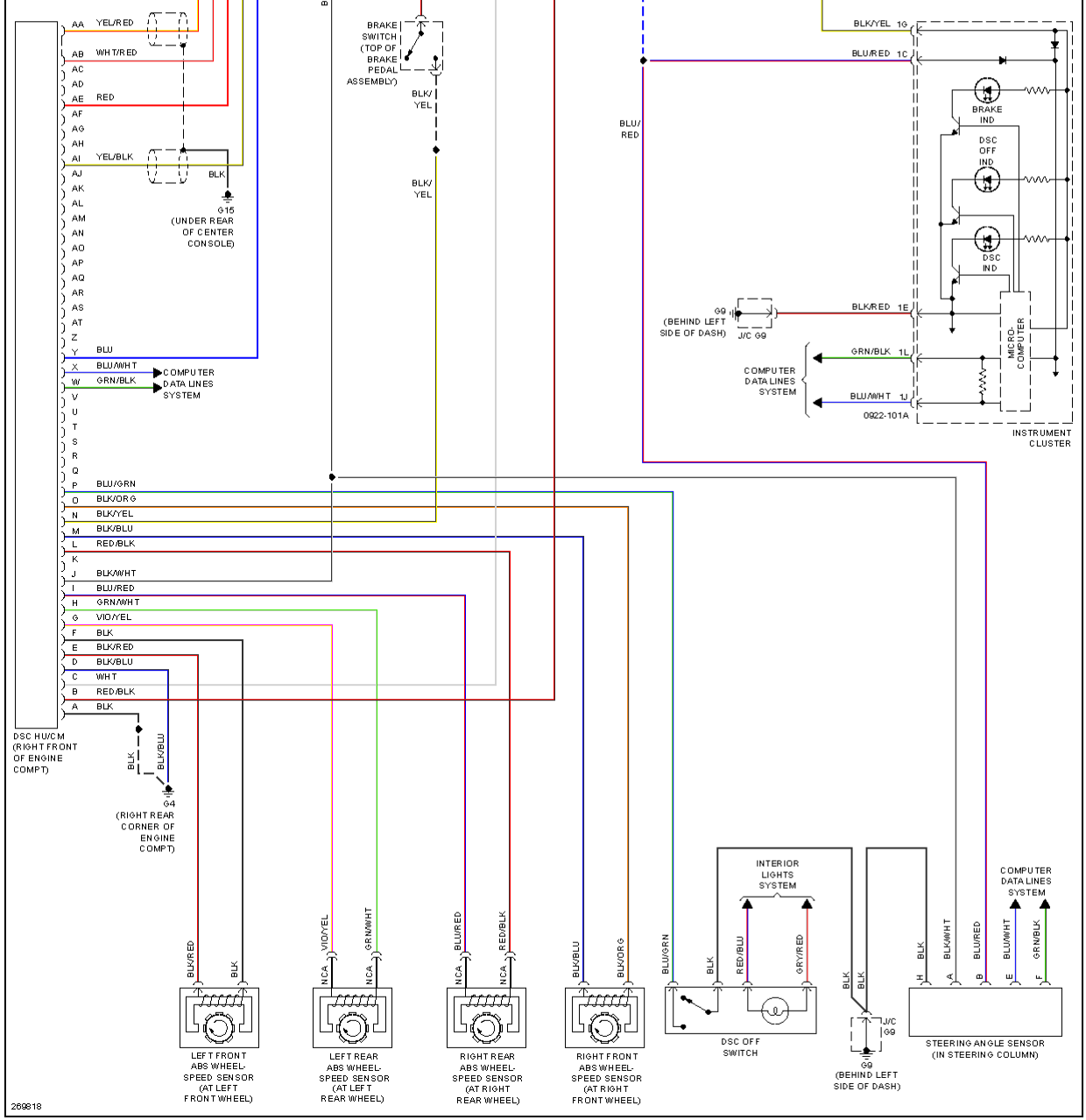
Fig. 18: Identifying Wiper & Washer Switch Circuit
Courtesy of MAZDA MOTORS CORP.

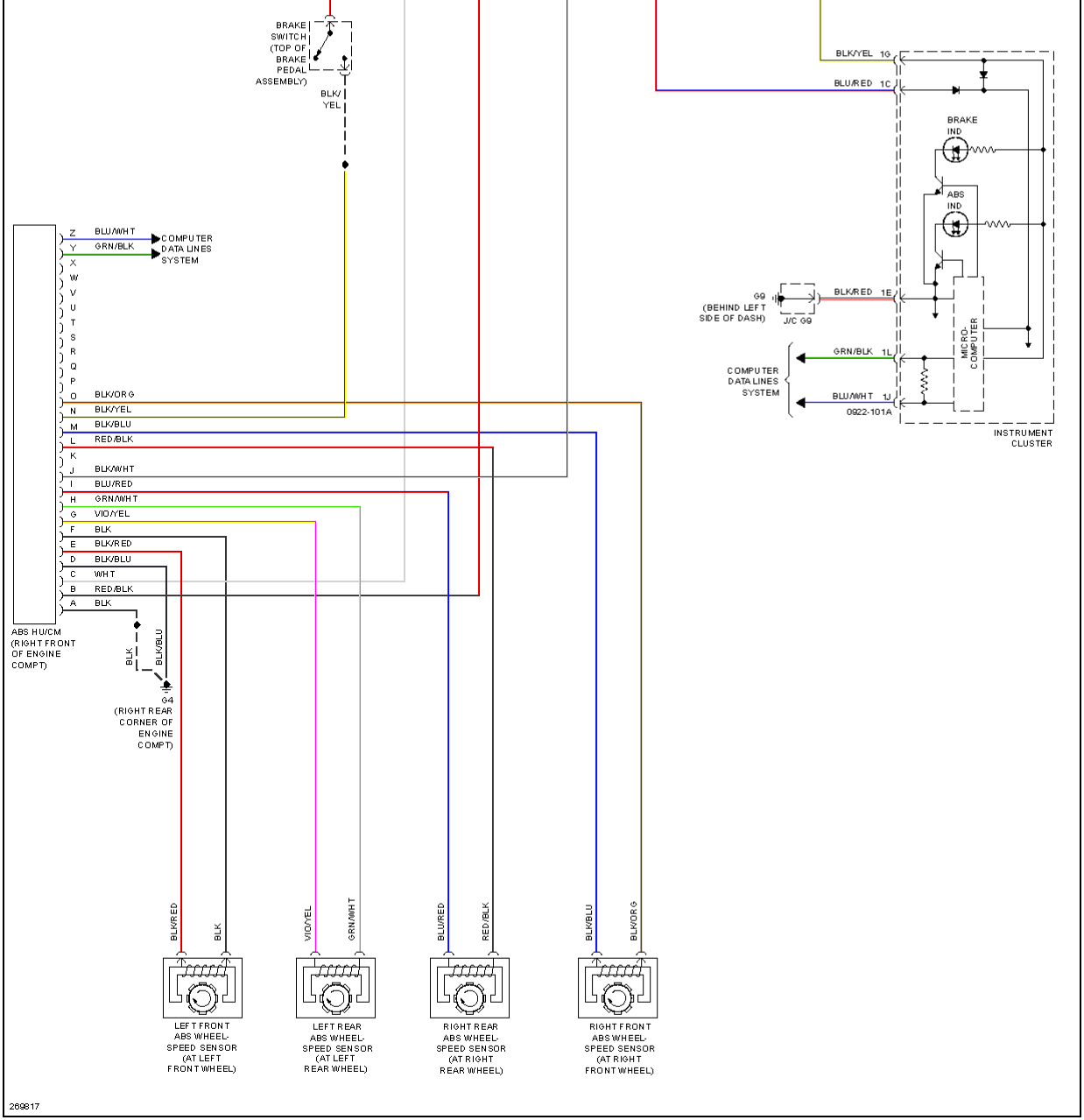
AIR CONDITIONING

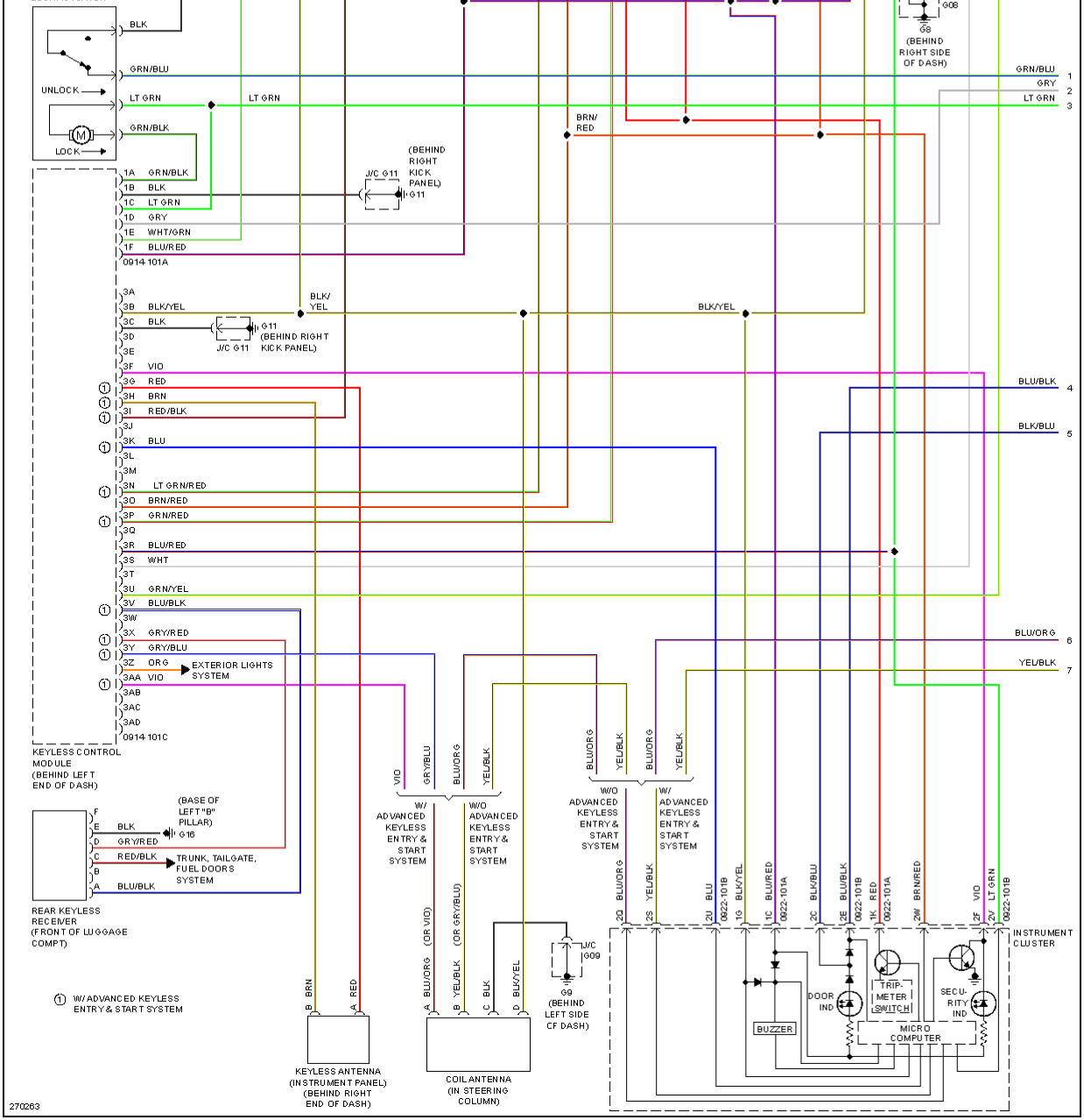

HOT AT ALL TIMES
HOT IN RUN
RELAY & MAIN FUSE BLOCK (LEFT SIDE OF ENGINE COMPT)
HEATER FUSE 40A
A/C FUSE 7.5A
FUSE BLOCK (BEHIND LEFT END OF DASH)
CLIMATE CONTROL UNIT
YEL
BLU/ ORG
BLU/ ORG
BLU/ORG A
BRN C
VIO/WHT E
BLU/ORG
BLU/ORG
DEFOGGER SYSTEM
BLK
G2 (BEHIND LEFT KICK PANEL)
VIO/WHT
BLK/RED
BRN
BLU/WHT
YEL
G8 (BEHIND RIGHT SIDE OF DASH)
BLK
BLOWER RELAY (HEATER) (IN RELAY & MAIN FUSE BLOCK)
BLU/ WHT
BLK/ RED
POWER METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR (POWER MOS FET) (BEHIND RIGHT END OF DASH)
BLOWER MOTOR (INTEGRAL TO BLOWER UNIT, BEHIND RIGHT SIDE OF DASH)
M
269790

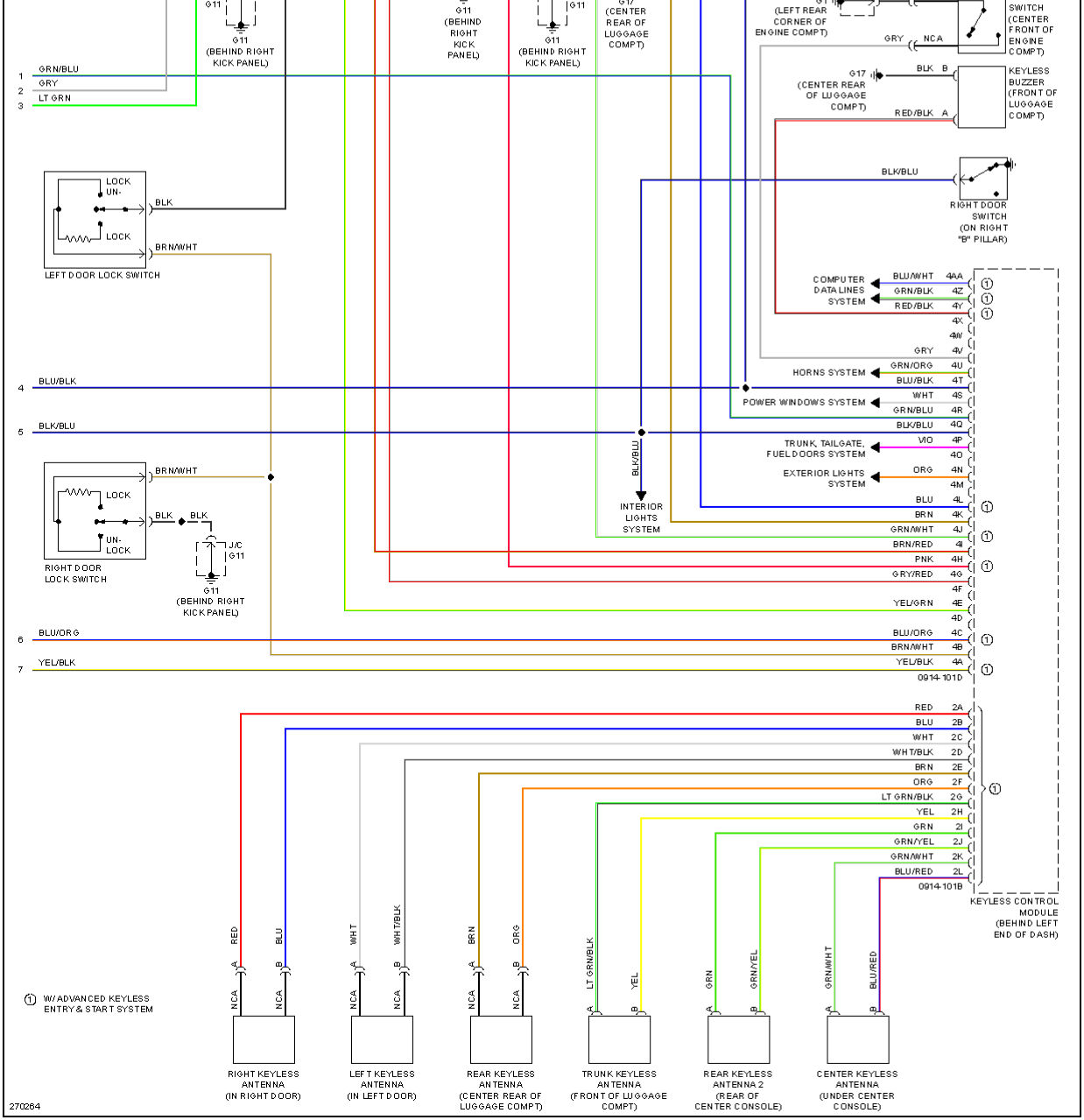

BLK/WHT
RED/WHT
EVAPORATOR TEMPERATURE SENSOR (BEHIND RIGHT SIDE OF DASH)
A BLU/ORG
B BLU/RED
C BRN
D RED/BLU
E VIO/WHT
F GRY/RED
G WHT/BLK
H BLK
I BLU/YEL
J
K BLU/WHT
L
M RED/WHT
N YEL
O
P
Q
R
S BLK/WHT
T
INTERIOR LIGHTS SYSTEM
INTERIOR LIGHTS SYSTEM
DEFOGGER SYSTEM
G8 (BEHIND RIGHT SIDE OF DASH)
CLIMATE CONTROL UNIT
BLU/WHT
1
BLU/WHT
BLK/RED
BLOWER MOTOR (INTEGRAL TO BLOWER UNIT, BEHIND RIGHT SIDE OF DASH)
BLU/ORG
BLU/ORG
DEFOGGER SYSTEM
BLK
G2 (BEHIND LEFT KICK PANEL)
BLU/WHT
YEL
BLOWER RELAY (HEATER) (IN RELAY & MAIN FUSE BLOCK)
VIO/WHT
BLK/RED
BRN
BLK
G8 (BEHIND RIGHT SIDE OF DASH)
POWER METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR (POWER MOS FET) (BEHIND RIGHT END OF DASH)
BLU/ YEL
WHT/ BLK
BLK
NCA
NCA
NCA
BLU/ YEL
WHT/ BLK
BLK
BLK
NCA
NCA
NCA
NCA
NCA
NCA
2
3
1
1
3
2
G8 (BEHIND RIGHT SIDE OF DASH)
AIRFLOW MODE ACTUATOR (BEHIND CENTER OF DASH)
AIR MIX ACTUATOR (BEHIND RIGHT SIDE OF DASH)
AIR INTAKE ACTUATOR (BEHIND RIGHT SIDE OF DASH)
269788

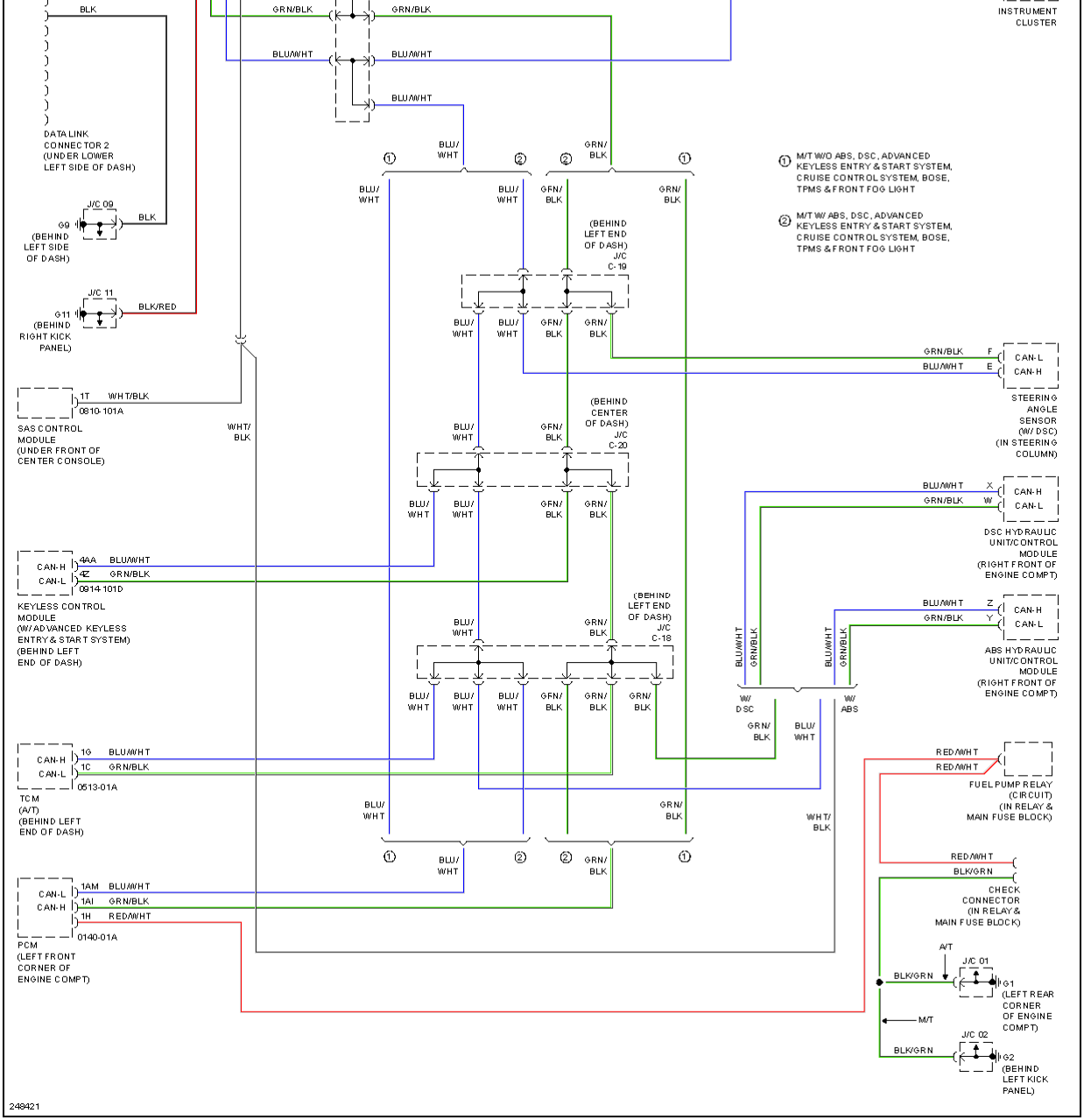

GRN
BLK
COOLING FAN MOTOR (BEHIND RADIATOR)
G6 (BEHIND RIGHT HEADLIGHT ASSEMBLY)
BLU/YEL
YEL/BLK
COOLING FAN RELAY 1
WHT/RED
RED
BLU/YEL
BLU/YEL
RED/WHT
COOLING FAN RELAY 2
GRN
C
BLK
D
G5 (BEHIND LEFT HEADLIGHT ASSEMBLY)
BLU/YEL
B
GRN
A
COOLING FAN RELAY 3
1
BLU/WHT
GRN/RED
BRN
BRN/YEL
BLU/ORG
A/C RELAY
BLU/ORG
REAR WINDOW DEFROSTER RELAY
GRN 1R
RED/WHT 1N
YEL/BLK 1M
BRN/YEL 1I
LT GRN/RED 1AU
YEL/RED 1J
YEL 2AH
RED/BLU 2AY
PCM (LEFT FRONT CORNER OF ENGINE COMPT)
BLU/ WHT
LT GRN/ RED
YEL/ RED
BLK
BLK
BRN
RED/BLU
YEL
ENGINE COOLANT TEMPERATURE SENSOR (TOP REAR OF ENGINE)
G6 (BEHIND RIGHT HEADLIGHT ASSEMBLY)
REFRIGERANT PRESSURE SWITCH (RIGHT FRONT OF ENGINE COMPT)
MAGNETIC CLUTCH (LEFT FRONT OF ENGINE, ON A/C COMPRESSOR)
269789

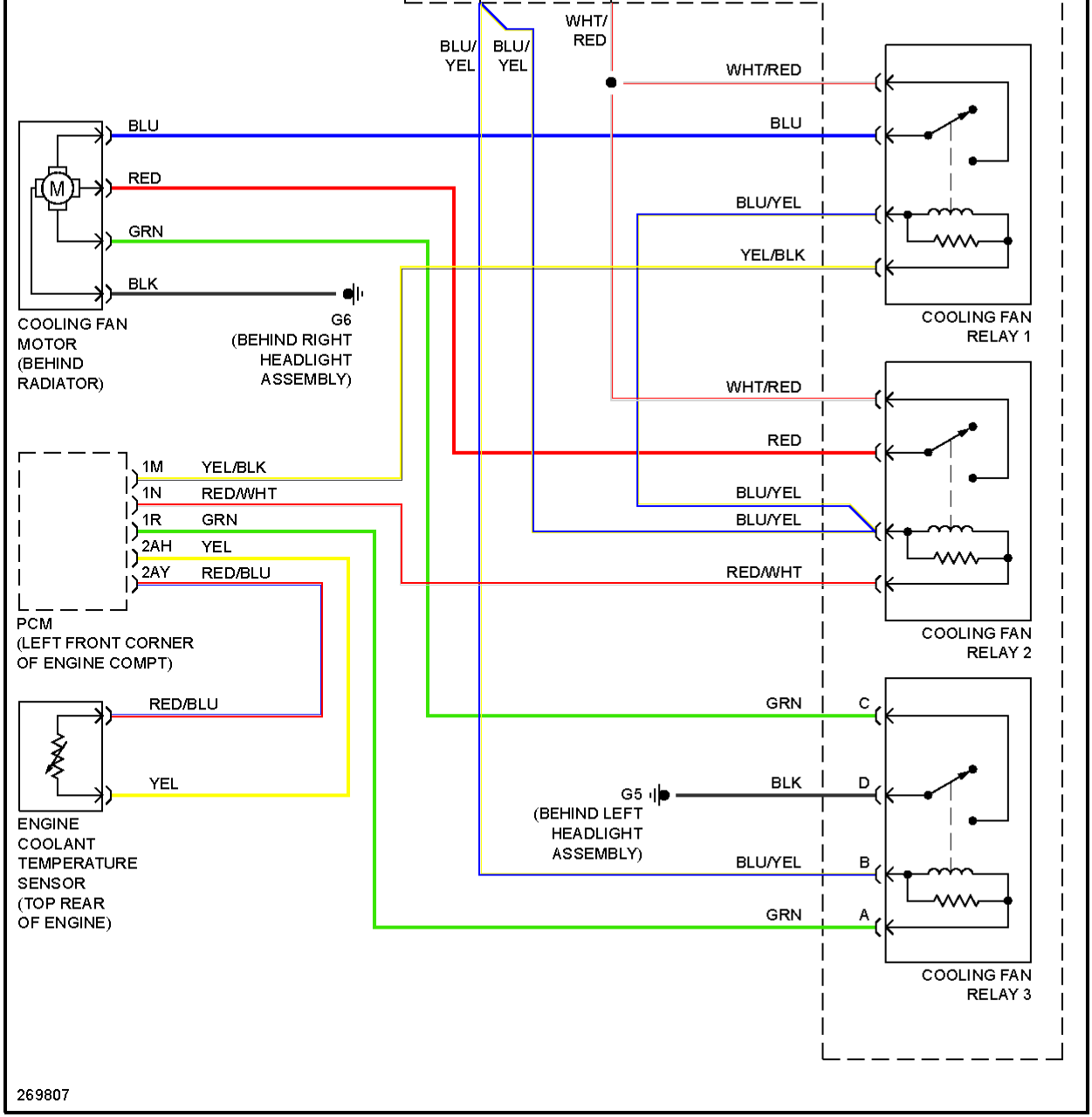

AA YEL/RED
AB WHT/RED
AC
AD
AE RED
AF
AG
AH
AI YEL/BLK
AJ
AK
AL
AM
AN
AO
AP
AQ
AR
AS
AT
Z
Y BLU
X BLU/WHT
W GRN/BLK
V
U
T
S
R
Q
P BLU/GRN
O BLK/ORG
N BLK/YEL
M BLK/BLU
L RED/BLK
K
J BLK/WHT
I BLU/RED
H GRN/WHT
G VIO/YEL
F BLK
E BLK/RED
D BLK/BLU
C WHT
B RED/BLK
A BLK
BLK
G15
(UNDER REAR OF CENTER CONSOLE)
COMPUTER DATA LINES SYSTEM
BRAKE SWITCH (TOP OF BRAKE PEDAL ASSEMBLY)
BLK/YEL
BLK/YEL
BLK/YEL 1G
BLU/RED 1C
BLU/RED
BRAKE IND
DSC OFF IND
DSC IND
G9
(BEHIND LEFT SIDE OF DASH)
J/C G9
BLK/RED 1E
GRN/BLK 1L
BLU/WHT 1J
COMPUTER DATA LINES SYSTEM
MICRO COMPUTER
0922-101A
INSTRUMENT CLUSTER
DSC HU/CM
(RIGHT FRONT OF ENGINE COMPT)
BLK
BLK/BLU
G4
(RIGHT REAR CORNER OF ENGINE COMPT)
BLU/RED
BLK
LEFT FRONT ABS WHEEL-SPEED SENSOR (AT LEFT FRONT WHEEL)
NCA
VIO/YEL
GRN/WHT
NCA
LEFT REAR ABS WHEEL-SPEED SENSOR (AT LEFT REAR WHEEL)
NCA
BLU/RED
RED/BLK
NCA
RIGHT REAR ABS WHEEL-SPEED SENSOR (AT RIGHT REAR WHEEL)
BLU/BLU
BLU/ORG
RIGHT FRONT ABS WHEEL-SPEED SENSOR (AT RIGHT FRONT WHEEL)
BLU/GRN
BLK
INTERIOR LIGHTS SYSTEM
RED/BLU
GRY/RED
DSC OFF SWITCH
BLK
BLK
J/C G9
G9
(BEHIND LEFT SIDE OF DASH)
H BLK
A BLK/WHT
B BLU/RED
COMPUTER DATA LINES SYSTEM
E BLU/WHT
F GRN/BLK
STEERING ANGLE SENSOR (IN STEERING COLUMN)
269818

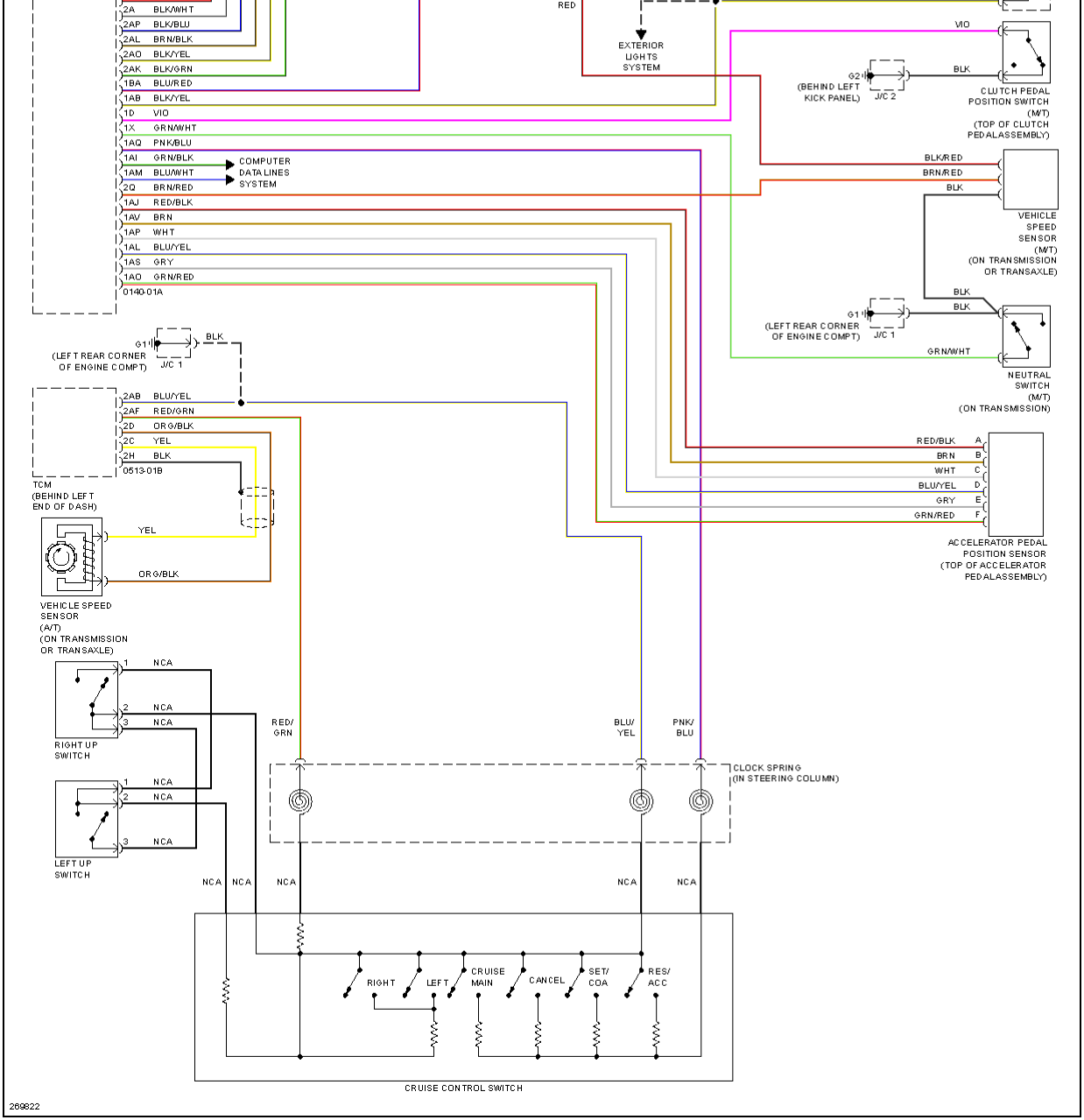

BRAKE SWITCH (TOP OF BRAKE PEDAL ASSEMBLY)
BLK/YEL
BLK/YEL 1G
BLU/RED 1C
BRAKE IND
ABS IND
MICRO-COMPUTER
INSTRUMENT CLUSTER
0922-101A
GG (BEHIND LEFT SIDE OF DASH)
J/C GG
BLK/RED 1E
GRN/BLK 1L
BLU/WHT 1J
COMPUTER DATA LINES SYSTEM
Z BLU/WHT
Y GRN/BLK
COMPUTER DATA LINES SYSTEM
O BLK/ORG
N BLK/YEL
M BLK/BLU
L RED/BLK
J BLK/WHT
I BLU/RED
H GRN/WHT
G VIO/YEL
F BLK
E BLK/RED
D BLK/BLU
C WHT
B RED/BLK
A BLK
ABS HU/CM (RIGHT FRONT OF ENGINE COMPT)
BLK
BLK/BLU
G4 (RIGHT REAR CORNER OF ENGINE COMPT)
BLK/RED
BLK
VIO/YEL
GRN/WHT
BLU/RED
RED/BLK
BLK/BLU
BLK/ORG
LEFT FRONT ABS WHEEL-SPEED SENSOR (AT LEFT FRONT WHEEL)
LEFT REAR ABS WHEEL-SPEED SENSOR (AT LEFT REAR WHEEL)
RIGHT REAR ABS WHEEL-SPEED SENSOR (AT RIGHT REAR WHEEL)
RIGHT FRONT ABS WHEEL-SPEED SENSOR (AT RIGHT FRONT WHEEL)
269817

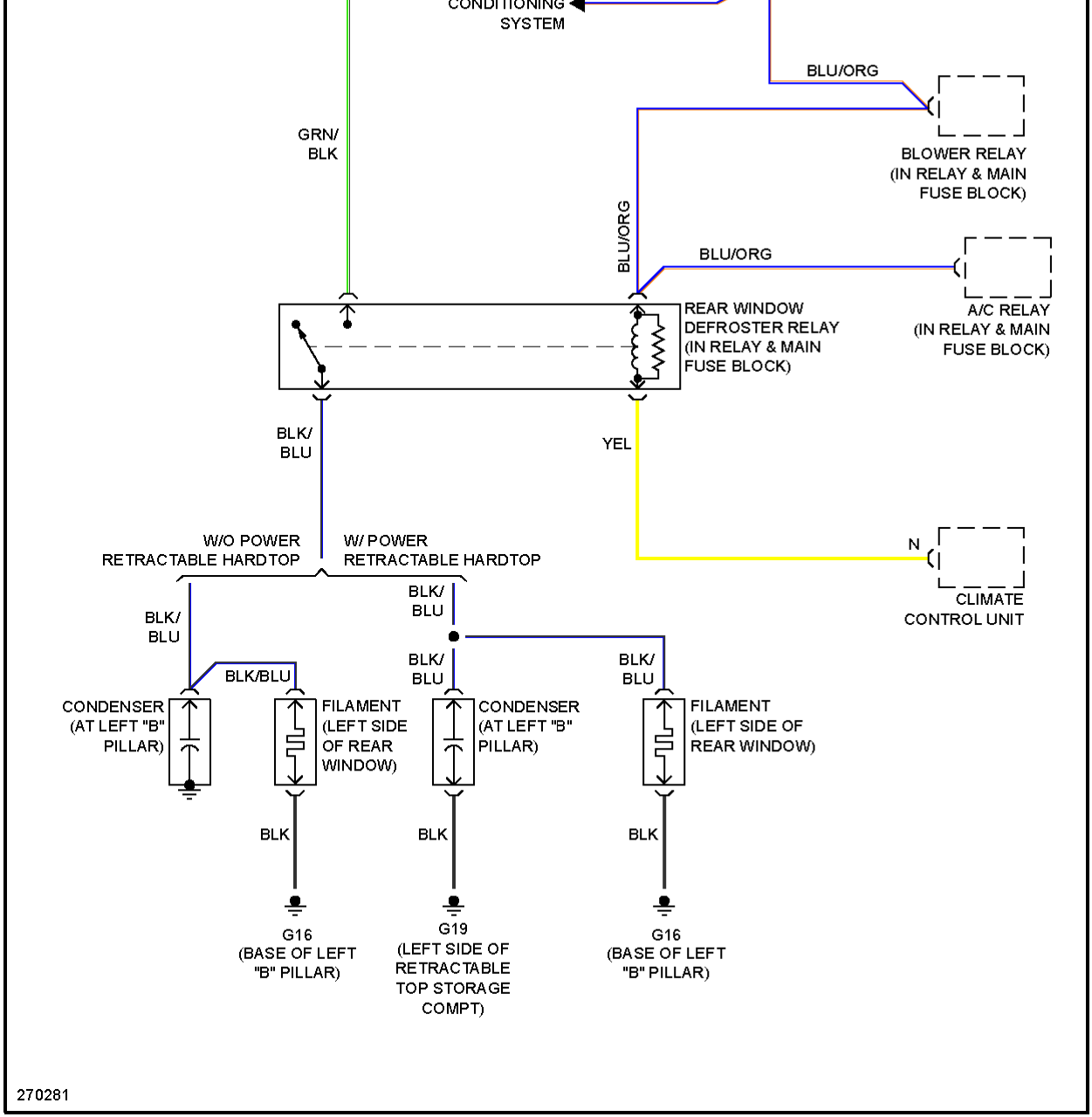

BLK
GRN/BLU
UNLOCK
LT GRN
GRN/BLK
LOCK
LT GRN
BRN/
RED
(BEHIND
RIGHT
KICK
PANEL)
J/C G11
G11
1A GRN/BLK
1B BLK
1C LT GRN
1D GRY
1E WHT/GRN
1F BLU/RED
0914-101A
3A
3B BLK/YEL
3C BLK
3D
3E
3F VIO
3G RED
3H BRN
3I RED/BLK
3J
3K BLU
3L
3M
3N LT GRN/RED
3O BRN/RED
3P GRN/RED
3Q
3R BLU/RED
3S WHT
3T
3U GRN/YEL
3V BLU/BLK
3W
3X GRY/RED
3Y GRY/BLU
3Z ORG
3AA VIO
3AB
3AC
3AD
0914-101C
BLK/
YEL
BLK/YEL
J/C G11
G11
(BEHIND RIGHT
KICK PANEL)
EXTERIOR LIGHTS
SYSTEM
KEYLESS CONTROL
MODULE
(BEHIND LEFT
END OF DASH)
(BASE OF
LEFT "B"
PILLAR)
G16
BLK
GRY/RED
RED/BLK
BLU/BLK
TRUNK, TAILGATE,
FUEL DOORS
SYSTEM
REAR KEYLESS
RECEIVER
(FRONT OF LUGGAGE
COMPT)
① W/ ADVANCED KEYLESS
ENTRY & START SYSTEM
G8
(BEHIND
RIGHT SIDE
OF DASH)
GRN/BLU
GRY
LT GRN
BLU/BLK
BLK/BLU
BLU/ORG
YEL/BLK
VIO
GRY/BLU
BLU/ORG
YEL/BLK
W/
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
W/O
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
BLU/ORG
YEL/BLK
BLU/ORG
YEL/BLK
W/O
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
W/
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
2G BLU/ORG
2S YEL/BLK
2U BLU
0922-101B
1G BLK/YEL
1C BLU/RED
0922-101A
2C BLK/BLU
2E BLU/BLK
0922-101B
1K RED
0922-101A
2W BRN/RED
2F VIO
2V LT GRN
0922-101B
INSTRUMENT
CLUSTER
DOOR
IND
TRIP-
METER
SWITCH
SECU-
RITY
IND
BUZZER
MICRO
COMPUTER
B BRN
A RED
KEYLESS ANTENNA
(INSTRUMENT PANEL)
(BEHIND RIGHT
END OF DASH)
A BLU/ORG (OR VIO)
B YEL/BLK (OR GRY/BLU)
C BLK
D BLK/YEL
COIL ANTENNA
(IN STEERING
COLUMN)
J/C
G9
G9
(BEHIND
LEFT SIDE
OF DASH)
270263

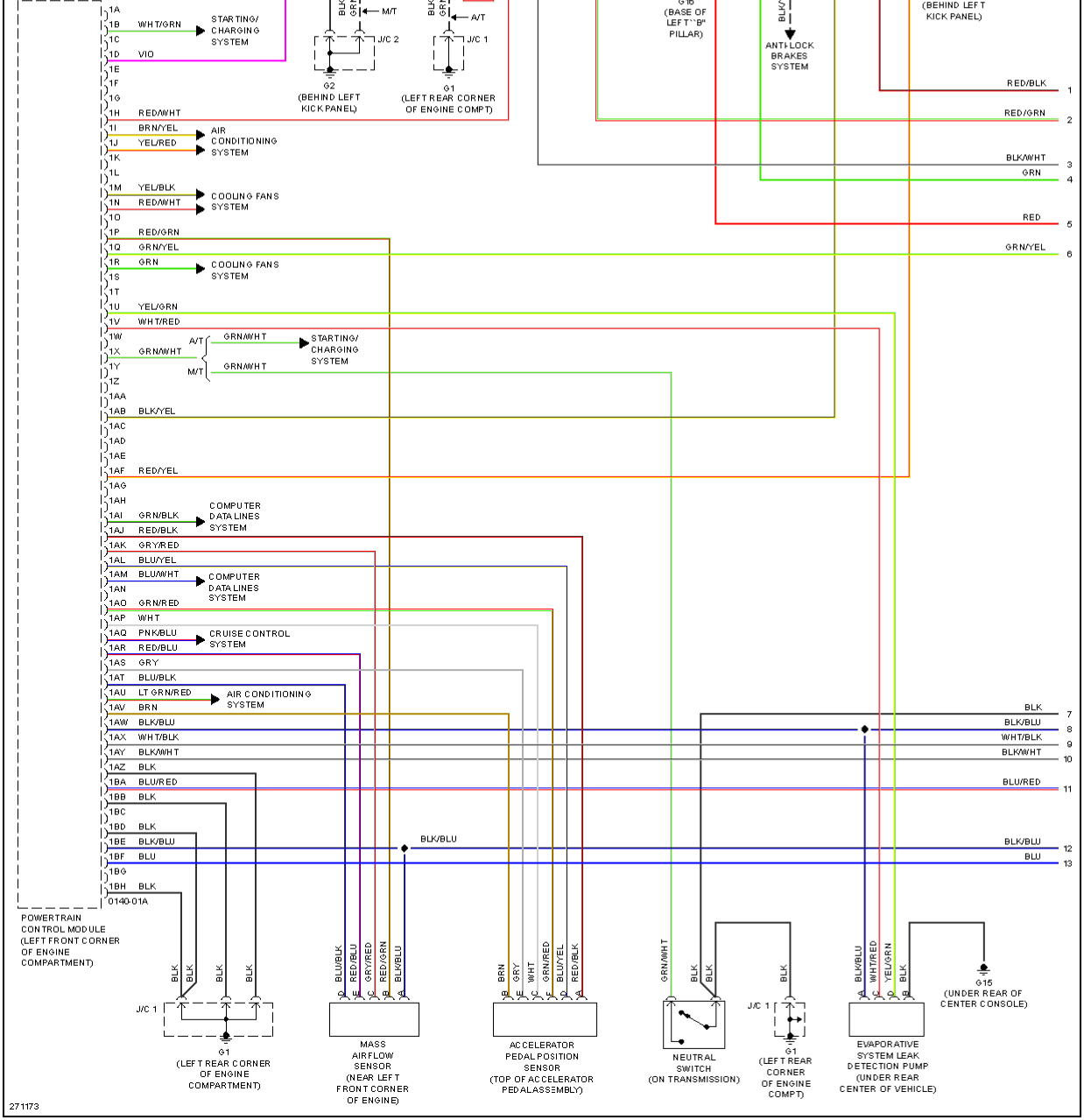

G11
(BEHIND RIGHT KICK PANEL)
G11
(BEHIND RIGHT KICK PANEL)
G17
(CENTER REAR OF LUGGAGE COMPT)
G17
(LEFT REAR CORNER OF ENGINE COMPT)
SWITCH
(CENTER FRONT OF ENGINE COMPT)
GRY
NCA
G17
(CENTER REAR OF LUGGAGE COMPT)
BLK B
KEYLESS BUZZER
(FRONT OF LUGGAGE COMPT)
RED/BLK A
BLK/BLU
RIGHT DOOR SWITCH
(ON RIGHT "B" PILLAR)
1 GRN/BLU
2 GRY
3 LT GRN
LOCK
UN-
LOCK
BLK
BRN/WHT
LEFT DOOR LOCK SWITCH
COMPUTER DATA LINES SYSTEM
BLU/WHT 4AA
GRN/BLK 4Z
RED/BLK 4Y
4X
4W
GRY 4V
HORNS SYSTEM
GRN/ORG 4U
BLU/BLK 4T
POWER WINDOWS SYSTEM
WHT 4S
GRN/BLU 4R
BLK/BLU 4Q
TRUNK, TAILGATE, FUEL DOORS SYSTEM
VIO 4P
4O
EXTERIOR LIGHTS SYSTEM
ORG 4N
4M
4 BLU/BLK
5 BLK/BLU
BLK/BLU
INTERIOR LIGHTS SYSTEM
BLU 4L
BRN 4K
GRN/WHT 4J
BRN/RED 4I
PNK 4H
GRY/RED 4G
4F
YEL/GRN 4E
4D
BRN/WHT
LOCK
BLK
BLK
UN-
LOCK
J/C
G11
RIGHT DOOR LOCK SWITCH
G11
(BEHIND RIGHT KICK PANEL)
6 BLU/ORG
7 YEL/BLK
BLU/ORG 4C
BRN/WHT 4B
YEL/BLK 4A
0914-101D
RED 2A
BLU 2B
WHT 2C
WHT/BLK 2D
BRN 2E
ORG 2F
LT GRN/BLK 2G
YEL 2H
GRN 2I
GRN/YEL 2J
GRN/WHT 2K
BLU/RED 2L
0914-101B
KEYLESS CONTROL MODULE (BEHIND LEFT END OF DASH)
RED
BLU
WHT
WHT/BLK
BRN
ORG
LT GRN/BLK
YEL
GRN
GRN/YEL
GRN/WHT
BLU/RED
A
B
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
RIGHT KEYLESS ANTENNA (IN RIGHT DOOR)
LEFT KEYLESS ANTENNA (IN LEFT DOOR)
REAR KEYLESS ANTENNA (CENTER REAR OF LUGGAGE COMPT)
TRUNK KEYLESS ANTENNA (FRONT OF LUGGAGE COMPT)
REAR KEYLESS ANTENNA 2 (REAR OF CENTER CONSOLE)
CENTER KEYLESS ANTENNA (UNDER CENTER CONSOLE)
1 W/ ADVANCED KEYLESS ENTRY & START SYSTEM
270264

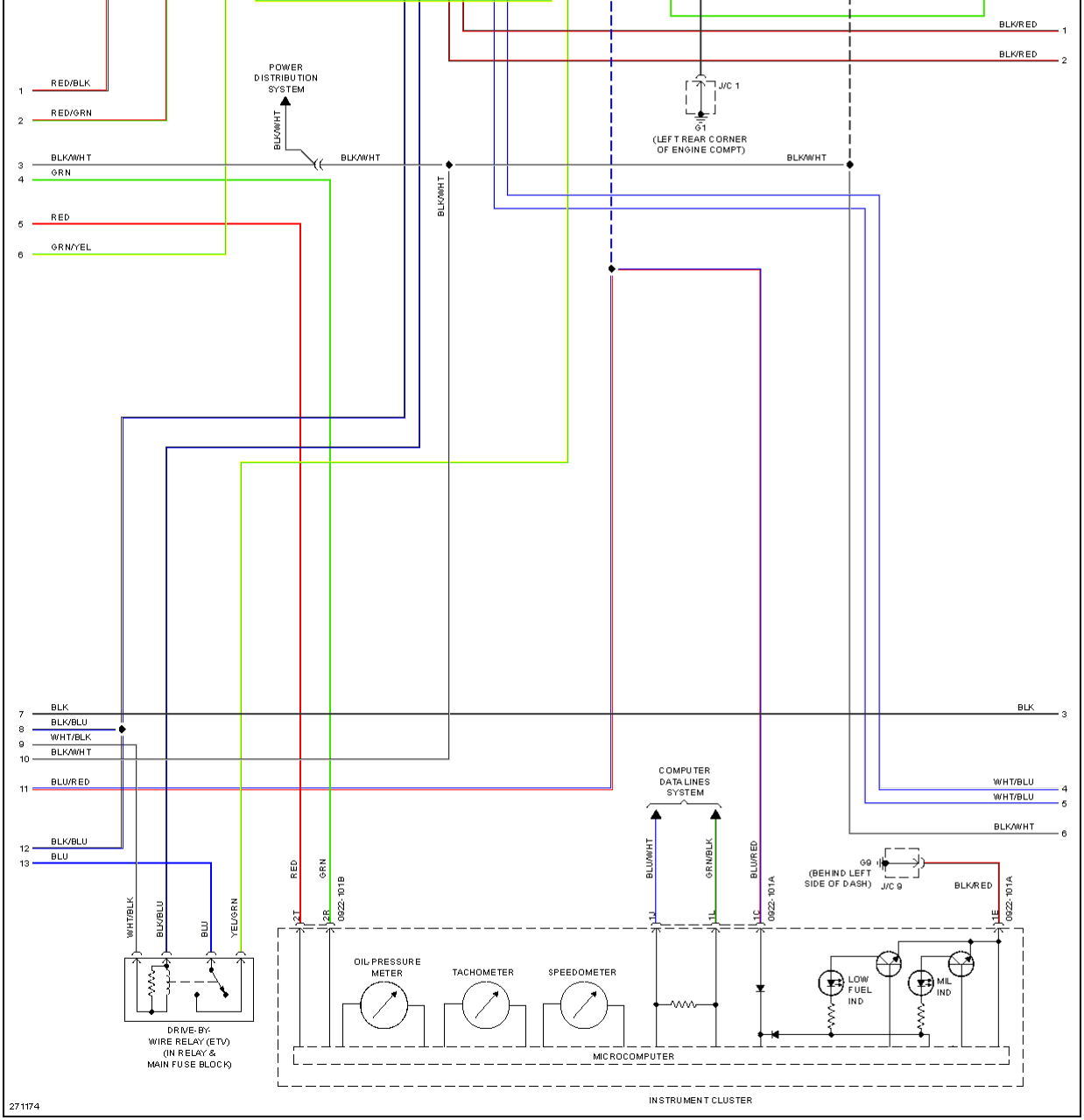

GRN/BLK
BLU/WHT
BLK
DATA LINK CONNECTOR 2 (UNDER LOWER LEFT SIDE OF DASH)
J/C 09
G9 (BEHIND LEFT SIDE OF DASH)
J/C 11
G11 (BEHIND RIGHT KICK PANEL)
BLK/RED
1T WHT/BLK
0810-101A
SAS CONTROL MODULE (UNDER FRONT OF CENTER CONSOLE)
WHT/BLK
4AA BLU/WHT
4Z GRN/BLK
0914-101D
KEYLESS CONTROL MODULE (W/ ADVANCED KEYLESS ENTRY & START SYSTEM) (BEHIND LEFT END OF DASH)
1G BLU/WHT
1C GRN/BLK
0513-01A
TCM (A/T) (BEHIND LEFT END OF DASH)
1AM BLU/WHT
1AI GRN/BLK
1H RED/WHT
0140-01A
PCM (LEFT FRONT CORNER OF ENGINE COMPT)
BLU/WHT
GRN/BLK
(BEHIND LEFT END OF DASH) J/C C-19
(BEHIND CENTER OF DASH) J/C C-20
(BEHIND LEFT END OF DASH) J/C C-18
① M/T W/O ABS, DSC, ADVANCED KEYLESS ENTRY & START SYSTEM, CRUISE CONTROL SYSTEM, BOSE, TPMS & FRONT FOG LIGHT
② M/T W/ ABS, DSC, ADVANCED KEYLESS ENTRY & START SYSTEM, CRUISE CONTROL SYSTEM, BOSE, TPMS & FRONT FOG LIGHT
INSTRUMENT CLUSTER
GRN/BLK F
BLU/WHT E
CAN-L
CAN-H
STEERING ANGLE SENSOR (W/ DSC) (IN STEERING COLUMN)
BLU/WHT X
GRN/BLK W
DSC HYDRAULIC UNIT/CONTROL MODULE (RIGHT FRONT OF ENGINE COMPT)
BLU/WHT Z
GRN/BLK Y
ABS HYDRAULIC UNIT/CONTROL MODULE (RIGHT FRONT OF ENGINE COMPT)
W/ DSC
W/ ABS
RED/WHT
FUEL PUMP RELAY (CIRCUIT) (IN RELAY & MAIN FUSE BLOCK)
BLK/GRN
CHECK CONNECTOR (IN RELAY & MAIN FUSE BLOCK)
A/T
M/T
J/C 01
G1 (LEFT REAR CORNER OF ENGINE COMPT)
J/C 02
G2 (BEHIND LEFT KICK PANEL)
248421

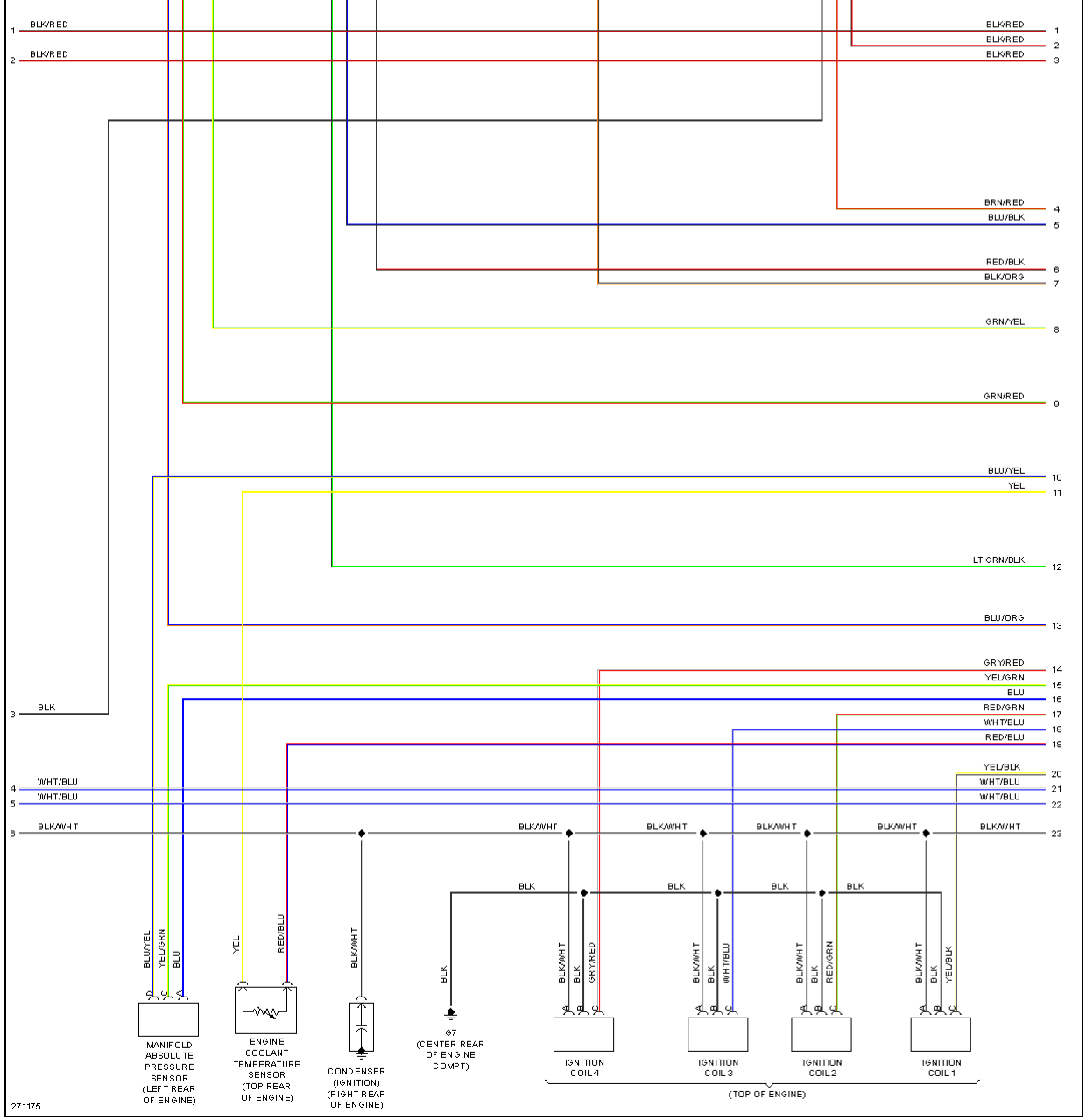

BLU/
YEL
BLU/
YEL
WHT/
RED
WHT/RED
BLU
BLU
RED
GRN
BLK
BLU/YEL
YEL/BLK
COOLING FAN
MOTOR
(BEHIND
RADIATOR)
G6
(BEHIND RIGHT
HEADLIGHT
ASSEMBLY)
COOLING FAN
RELAY 1
WHT/RED
RED
BLU/YEL
BLU/YEL
RED/WHT
COOLING FAN
RELAY 2
1M YEL/BLK
1N RED/WHT
1R GRN
2AH YEL
2AY RED/BLU
PCM
(LEFT FRONT CORNER
OF ENGINE COMPT)
RED/BLU
YEL
ENGINE
COOLANT
TEMPERATURE
SENSOR
(TOP REAR
OF ENGINE)
GRN
C
G5
(BEHIND LEFT
HEADLIGHT
ASSEMBLY)
BLK
D
BLU/YEL
B
GRN
A
COOLING FAN
RELAY 3
269807

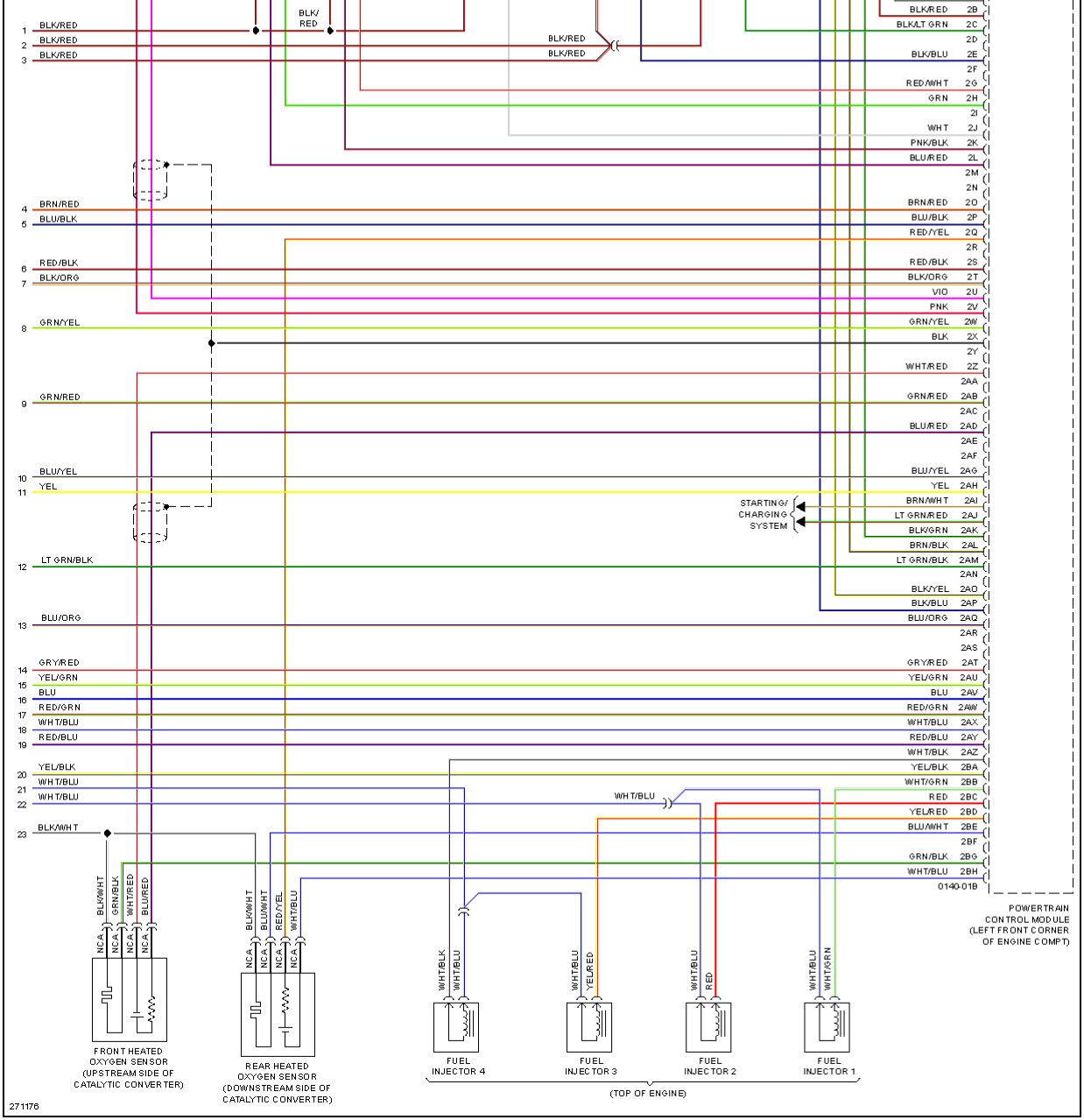

2A BLK/WHT
2AP BLK/BLU
2AL BRN/BLK
2AO BLK/YEL
2AK BLK/GRN
1BA BLU/RED
1AB BLK/YEL
1D VIO
1X GRN/WHT
1AQ PNK/BLU
1AI GRN/BLK
1AM BLU/WHT
COMPUTER DATA LINES SYSTEM
2Q BRN/RED
1AJ RED/BLK
1AV BRN
1AP WHT
1AL BLU/YEL
1AS GRY
1AO GRN/RED
0140-01A
RED
EXTERIOR LIGHTS SYSTEM
VIO
BLK
G2
(BEHIND LEFT KICK PANEL)
J/C 2
CLUTCH PEDAL POSITION SWITCH (M/T) (TOP OF CLUTCH PEDAL ASSEMBLY)
BLK/RED
BRN/RED
BLK
VEHICLE SPEED SENSOR (M/T) (ON TRANSMISSION OR TRANSAXLE)
BLK
BLK
G1
(LEFT REAR CORNER OF ENGINE COMPT)
J/C 1
GRN/WHT
NEUTRAL SWITCH (M/T) (ON TRANSMISSION)
G1
(LEFT REAR CORNER OF ENGINE COMPT)
J/C 1
BLK
2AB BLU/YEL
2AF RED/GRN
2D ORG/BLK
2C YEL
2H BLK
0513-01B
TCM (BEHIND LEFT END OF DASH)
RED/BLK A
BRN B
WHT C
BLU/YEL D
GRY E
GRN/RED F
ACCELERATOR PEDAL POSITION SENSOR (TOP OF ACCELERATOR PEDAL ASSEMBLY)
YEL
ORG/BLK
VEHICLE SPEED SENSOR (A/T) (ON TRANSMISSION OR TRANSAXLE)
1 NCA
2 NCA
3 NCA
RIGHT UP SWITCH
1 NCA
2 NCA
3 NCA
LEFT UP SWITCH
RED/ GRN
BLU/ YEL
PNK/ BLU
CLOCK SPRING (IN STEERING COLUMN)
NCA NCA NCA NCA NCA
RIGHT
LEFT
CRUISE MAIN
CANCEL
SET/ COA
RES/ ACC
CRUISE CONTROL SWITCH
269822

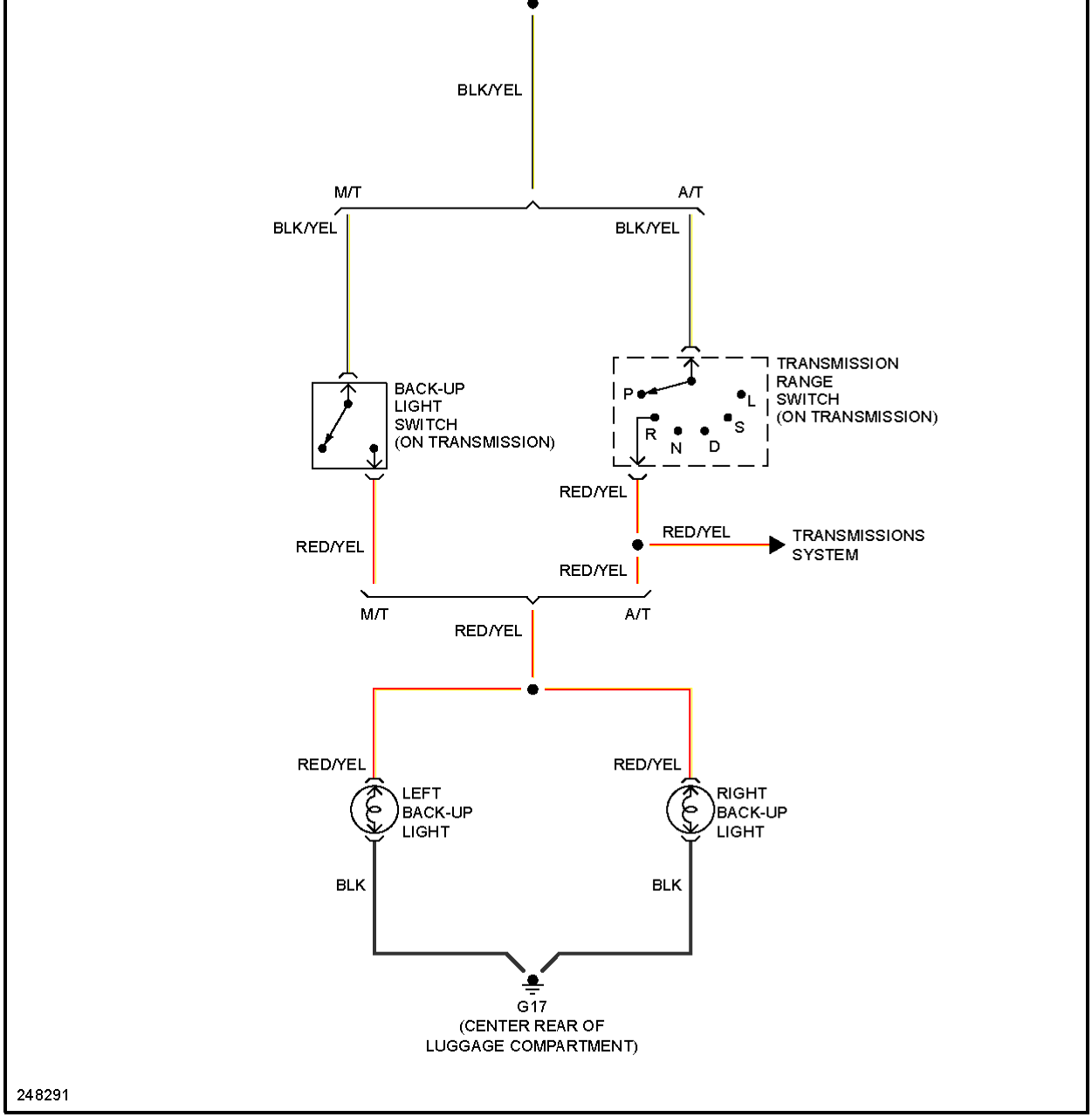

CONDITIONING
SYSTEM
BLU/ORG
GRN/
BLK
BLOWER RELAY
(IN RELAY & MAIN
FUSE BLOCK)
BLU/ORG
BLU/ORG
BLU/ORG
A/C RELAY
(IN RELAY & MAIN
FUSE BLOCK)
REAR WINDOW
DEFROSTER RELAY
(IN RELAY & MAIN
FUSE BLOCK)
BLK/
BLU
YEL
N
CLIMATE
CONTROL UNIT
W/O POWER
RETRACTABLE HARDTOP
W/ POWER
RETRACTABLE HARDTOP
BLK/
BLU
BLK/
BLU
BLK/
BLU
BLK/
BLU
BLK/BLU
CONDENSER
(AT LEFT "B"
PILLAR)
FILAMENT
(LEFT SIDE
OF REAR
WINDOW)
CONDENSER
(AT LEFT "B"
PILLAR)
FILAMENT
(LEFT SIDE OF
REAR WINDOW)
BLK
BLK
BLK
G16
(BASE OF LEFT
"B" PILLAR)
G19
(LEFT SIDE OF
RETRACTABLE
TOP STORAGE
COMPT)
G16
(BASE OF LEFT
"B" PILLAR)
270281

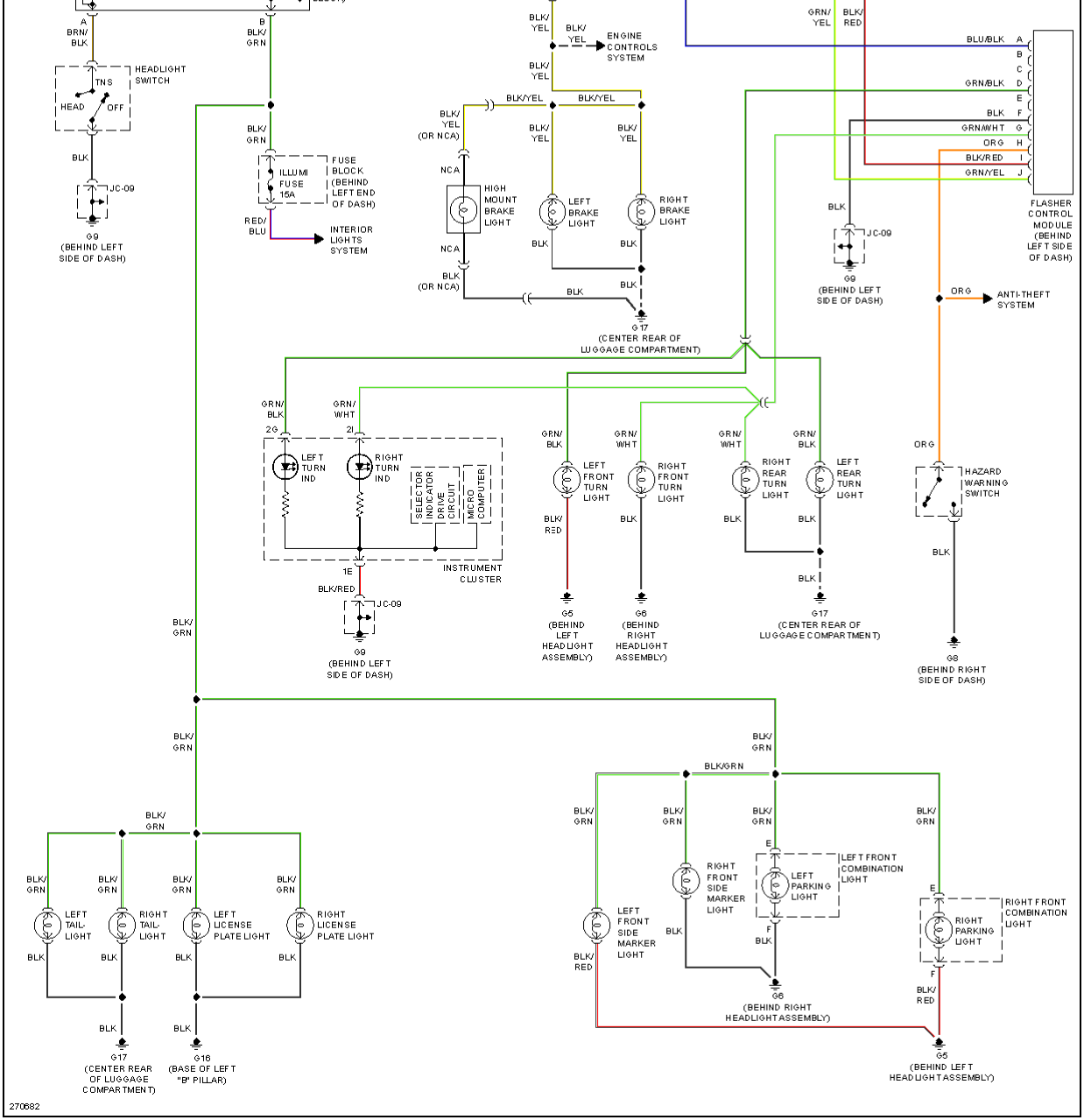

1A
1B WHT/GRN
STARTING/ CHARGING SYSTEM
1C
1D VIO
1E
1F
1G
1H RED/WHT
1I BRN/YEL
AIR CONDITIONING SYSTEM
1J YEL/RED
1K
1L
1M YEL/BLK
1N RED/WHT
COOLING FANS SYSTEM
1O
1P RED/GRN
1Q GRN/YEL
1R GRN
COOLING FANS SYSTEM
1S
1T
1U YEL/GRN
1V WHT/RED
1W
1X GRN/WHT
A/T
M/T
GRN/WHT
GRN/WHT
STARTING/ CHARGING SYSTEM
1Y
1Z
1AA
1AB BLK/YEL
1AC
1AD
1AE
1AF RED/YEL
1AG
1AH
1AI GRN/BLK
COMPUTER DATA LINES SYSTEM
1AJ RED/BLK
1AK GRY/RED
1AL BLU/YEL
1AM BLU/WHT
COMPUTER DATA LINES SYSTEM
1AN
1AO GRN/RED
1AP WHT
1AQ PNK/BLU
CRUISE CONTROL SYSTEM
1AR RED/BLU
1AS GRY
1AT BLU/BLK
1AU LT GRN/RED
AIR CONDITIONING SYSTEM
1AV BRN
1AW BLK/BLU
1AX WHT/BLK
1AY BLK/WHT
1AZ BLK
1BA BLU/RED
1BB BLK
1BC
1BD BLK
1BE BLK/BLU
1BF BLU
1BG
1BH BLK
0140-01A
POWERTRAIN CONTROL MODULE (LEFT FRONT CORNER OF ENGINE COMPARTMENT)
BLK/BLU
BLU/GRY
BLK/GRY
M/T
A/T
J/C 2
J/C 1
G2
(BEHIND LEFT KICK PANEL)
G1
(LEFT REAR CORNER OF ENGINE COMPT)
G16
(BASE OF LEFT "B" PILLAR)
BLU/WHT
ANTI-LOCK BRAKES SYSTEM
(BEHIND LEFT KICK PANEL)
RED/BLK 1
RED/GRN 2
BLK/WHT 3
GRN 4
RED 5
GRN/YEL 6
BLK 7
BLK/BLU 8
WHT/BLK 9
BLK/WHT 10
BLU/RED 11
BLK/BLU 12
BLU 13
BLK/BLU
J/C 1
BLK BLK BLK BLK
G1
(LEFT REAR CORNER OF ENGINE COMPARTMENT)
BLU/BLK RED/BLU GRY/RED RED/GRN BLK/BLU
MASS AIRFLOW SENSOR (NEAR LEFT FRONT CORNER OF ENGINE)
BRN GRY WHT GRN/RED BLU/YEL RED/BLK
ACCELERATOR PEDAL POSITION SENSOR (TOP OF ACCELERATOR PEDAL ASSEMBLY)
GRN/WHT BLK BLK
NEUTRAL SWITCH (ON TRANSMISSION)
BLK
J/C 1
G1
(LEFT REAR CORNER OF ENGINE COMPT)
BLK/BLU WHT/RED YEL/GRN BLK
EVAPORATIVE SYSTEM LEAK DETECTION PUMP (UNDER REAR CENTER OF VEHICLE)
G15
(UNDER REAR OF CENTER CONSOLE)
271173

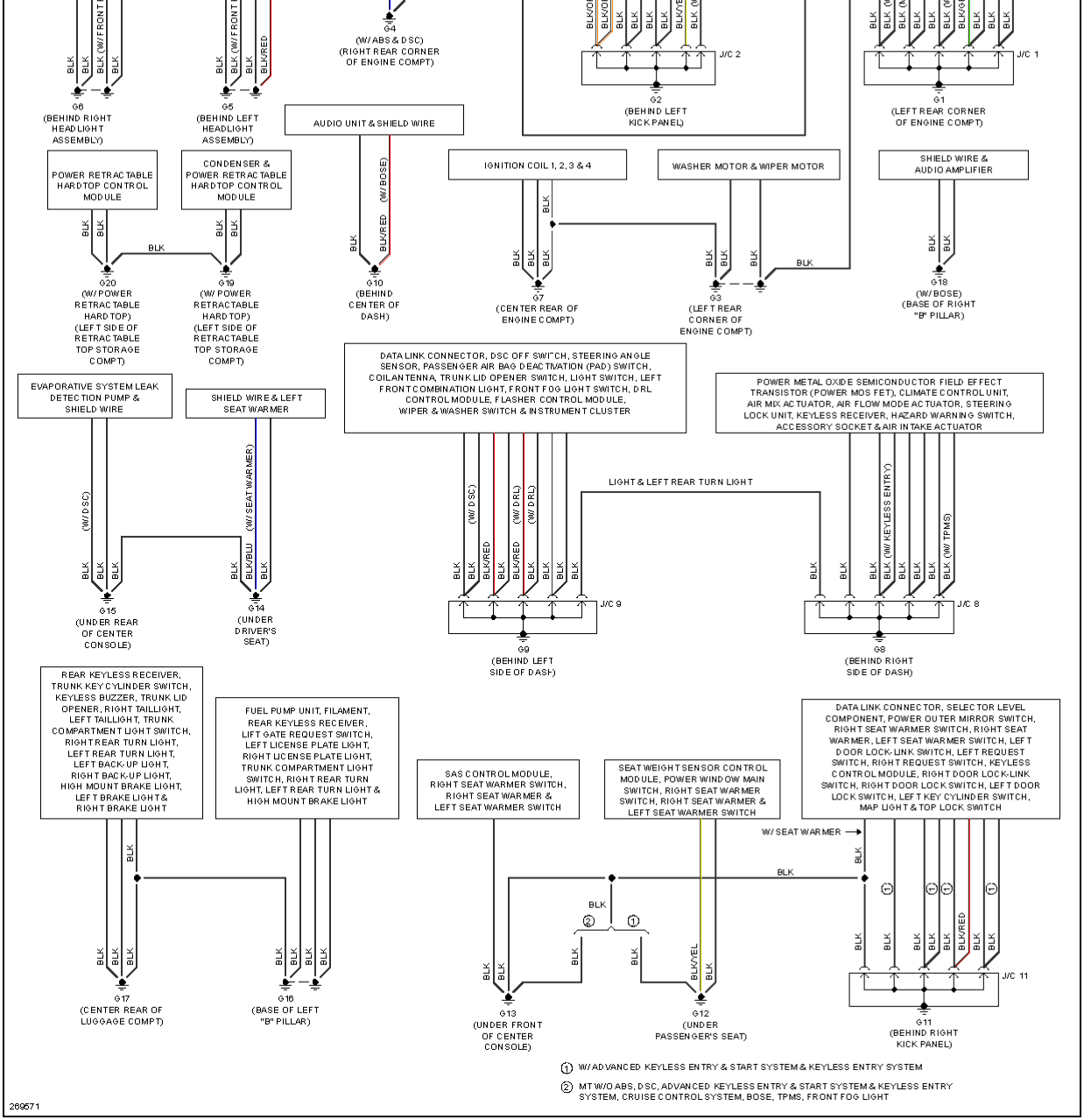

RED/BLK
RED/GRN
POWER DISTRIBUTION SYSTEM
BLK/WHT
GRN
RED
GRN/YEL
BLK/RED
BLK/RED
J/C 1
G1
(LEFT REAR CORNER OF ENGINE COMPT)
BLK/WHT
BLK/WHT
BLK/WHT
BLK
BLK/BLU
WHT/BLK
BLK/WHT
BLU/RED
BLK/BLU
BLU
WHT/BLU
WHT/BLU
BLK/WHT
BLK
COMPUTER DATA LINES SYSTEM
BLU/WHT
GRN/BLK
BLU/RED
GG
(BEHIND LEFT SIDE OF DASH)
J/C G
BLK/RED
WHT/BLK
BLK/BLU
BLU
YEL/GRN
RED
GRN
0922-101B
0922-101A
0922-101A
DRIVE-BY-WIRE RELAY (ETV) (IN RELAY & MAIN FUSE BLOCK)
OIL PRESSURE METER
TACHOMETER
SPEEDOMETER
LOW FUEL IND
MIL IND
MICROCOMPUTER
INSTRUMENT CLUSTER
271174

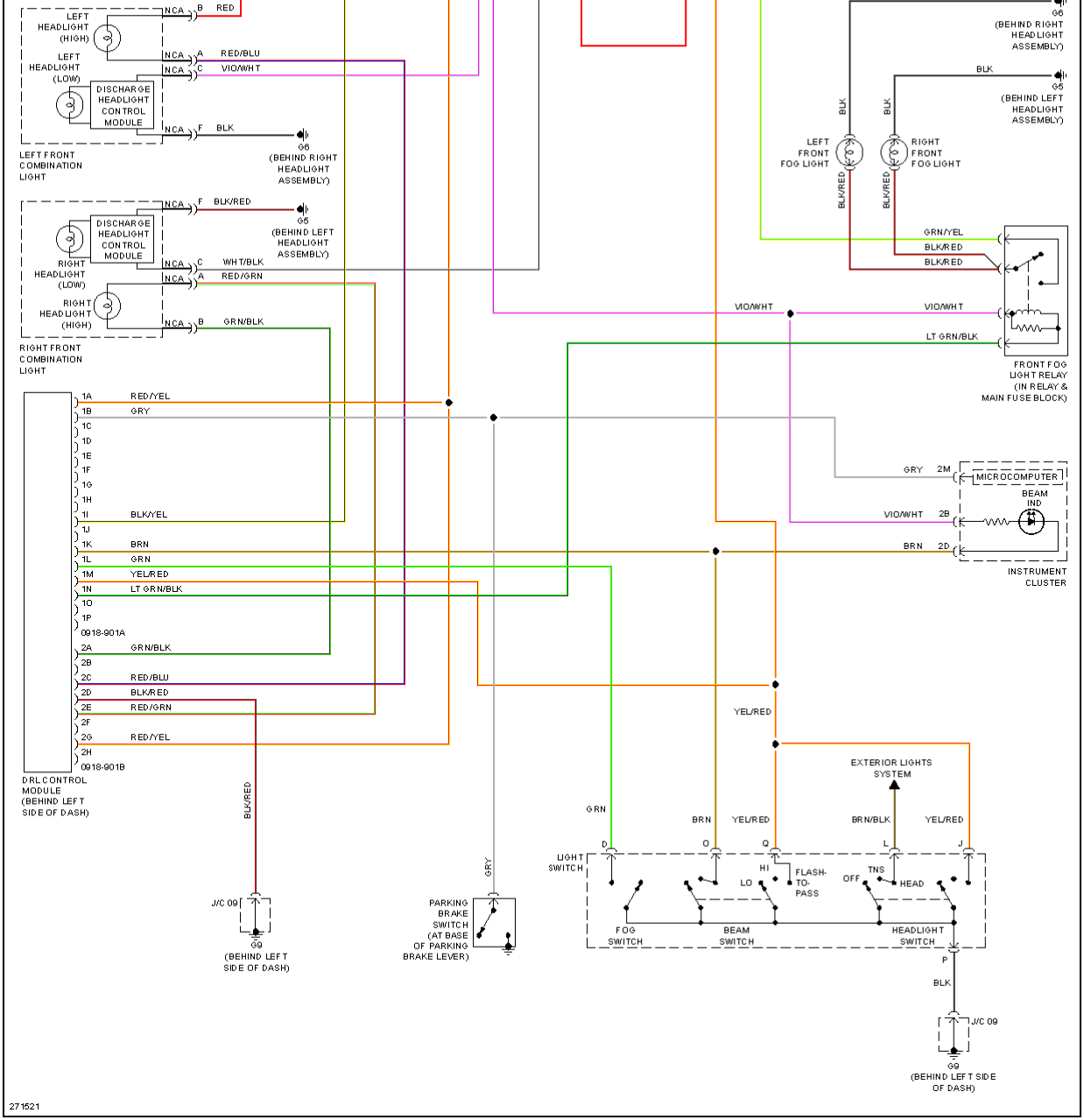

1 BLK/RED
2 BLK/RED
3 BLK
4 WHT/BLU
5 WHT/BLU
6 BLK/WHT
BLK/RED 1
BLK/RED 2
BLK/RED 3
BRN/RED 4
BLU/BLK 5
RED/BLK 6
BLK/ORG 7
GRN/YEL 8
GRN/RED 9
BLU/YEL 10
YEL 11
LT GRN/BLK 12
BLU/ORG 13
GRY/RED 14
YEL/GRN 15
BLU 16
RED/GRN 17
WHT/BLU 18
RED/BLU 19
YEL/BLK 20
WHT/BLU 21
WHT/BLU 22
BLK/WHT 23
BLU/YEL
YEL/GRN
BLU
YEL
RED/BLU
BLK/WHT
BLK
BLK/WHT
BLK
GRY/RED
BLK/WHT
BLK
WHT/BLU
BLK/WHT
BLK
RED/GRN
BLK/WHT
BLK
YEL/BLK
MANIFOLD ABSOLUTE PRESSURE SENSOR (LEFT REAR OF ENGINE)
ENGINE COOLANT TEMPERATURE SENSOR (TOP REAR OF ENGINE)
CONDENSER (IGNITION) (RIGHT REAR OF ENGINE)
G7 (CENTER REAR OF ENGINE COMPT)
IGNITION COIL 4
IGNITION COIL 3
IGNITION COIL 2
IGNITION COIL 1
(TOP OF ENGINE)
271175

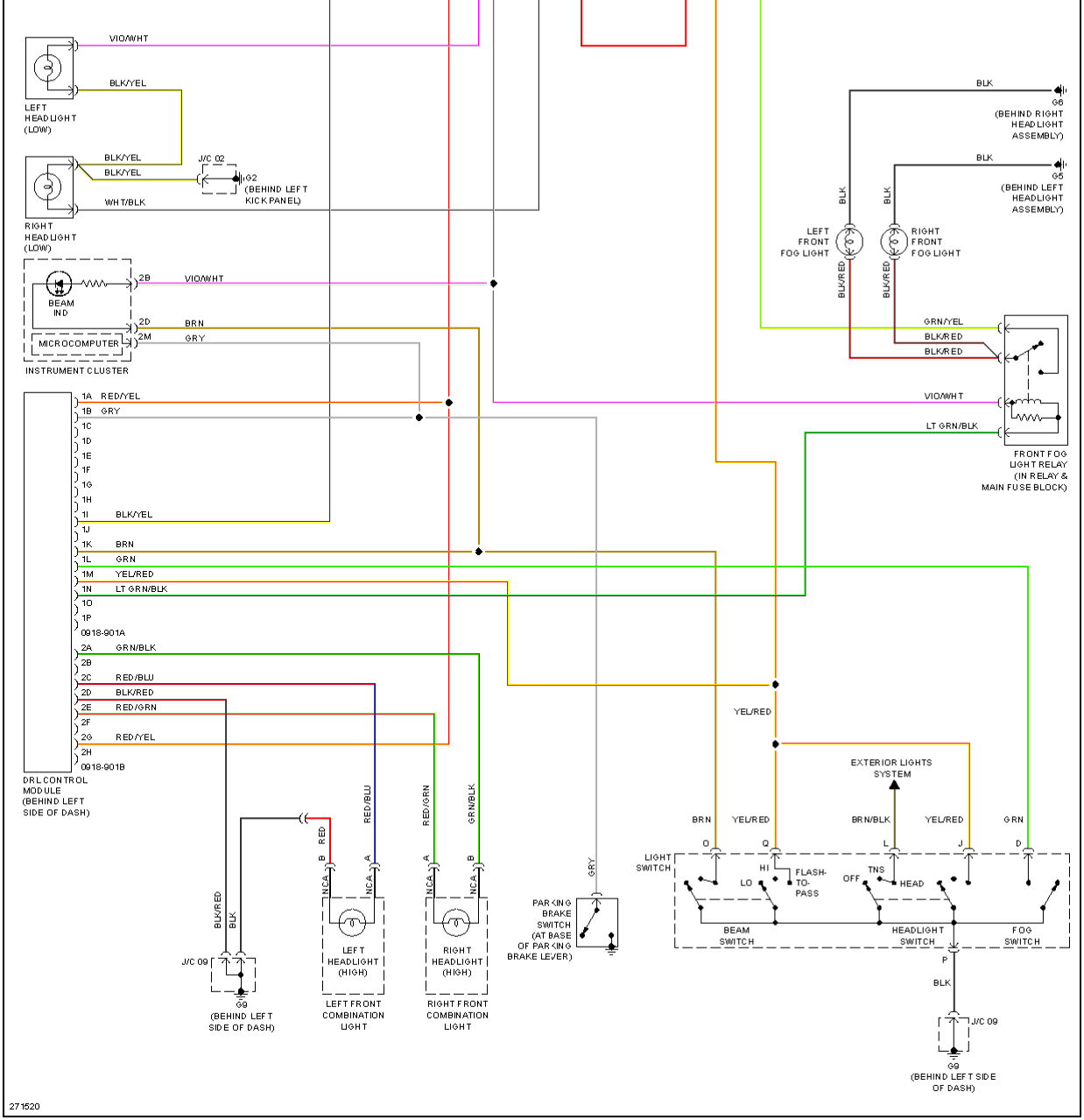

1 BLK/RED
2 BLK/RED
3 BLK/RED
BLK/RED
BLK/RED
BLK/RED
BLK/RED
BLK/LT GRN
BLK/BLU
RED/WHT
GRN
WHT
PNK/BLK
BLU/RED
BRN/RED
BLU/BLK
RED/YEL
RED/BLK
BLK/ORG
VIO
PNK
GRN/YEL
BLK
WHT/RED
GRN/RED
BLU/RED
BLU/YEL
YEL
BRN/WHT
LT GRN/RED
BLK/GRN
BRN/BLK
LT GRN/BLK
BLK/YEL
BLK/BLU
BLU/ORG
GRY/RED
YEL/GRN
BLU
RED/GRN
WHT/BLU
RED/BLU
WHT/BLK
YEL/BLK
WHT/GRN
RED
YEL/RED
BLU/WHT
GRN/BLK
WHT/BLU
0140-01B
POWERTRAIN CONTROL MODULE (LEFT FRONT CORNER OF ENGINE COMPT)
STARTING/ CHARGING SYSTEM
WHT/BLU
BLK/WHT
BLK/WHT
GRN/BLK
WHT/RED
BLU/RED
BLK/WHT
BLU/WHT
RED/YEL
WHT/BLU
NCA
FRONT HEATED OXYGEN SENSOR (UPSTREAM SIDE OF CATALYTIC CONVERTER)
REAR HEATED OXYGEN SENSOR (DOWNSTREAM SIDE OF CATALYTIC CONVERTER)
WHT/BLK
WHT/BLU
YEL/RED
RED
WHT/GRN
FUEL INJECTOR 4
FUEL INJECTOR 3
FUEL INJECTOR 2
FUEL INJECTOR 1
(TOP OF ENGINE)
271176

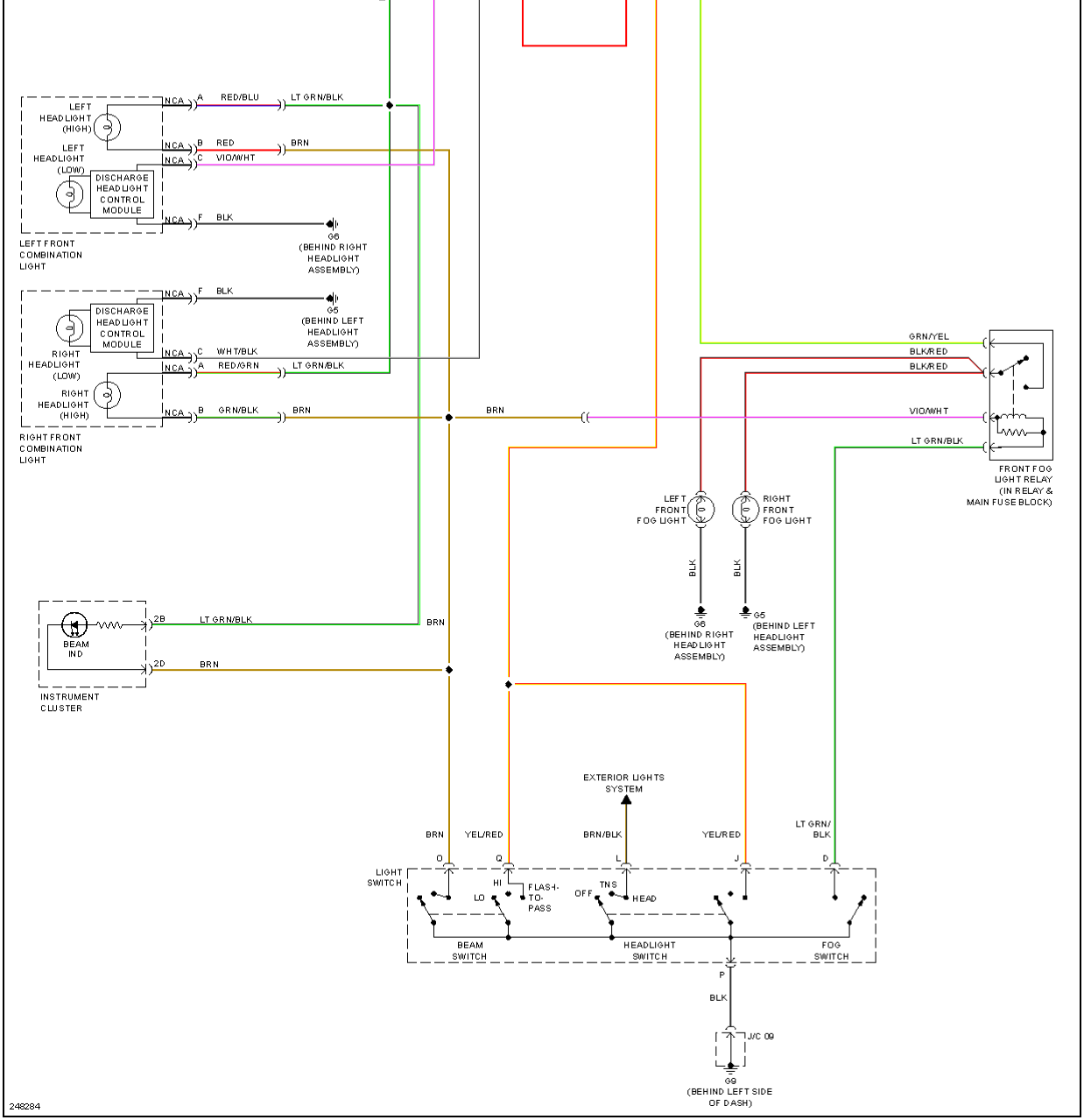

BLK/YEL
M/T
A/T
BLK/YEL
BLK/YEL
BACK-UP
LIGHT
SWITCH
(ON TRANSMISSION)
TRANSMISSION
RANGE
SWITCH
(ON TRANSMISSION)
P
L
R
N
D
S
RED/YEL
RED/YEL
RED/YEL
TRANSMISSIONS
SYSTEM
RED/YEL
M/T
A/T
RED/YEL
RED/YEL
RED/YEL
LEFT
BACK-UP
LIGHT
RIGHT
BACK-UP
LIGHT
BLK
BLK
G17
(CENTER REAR OF
LUGGAGE COMPARTMENT)
248291

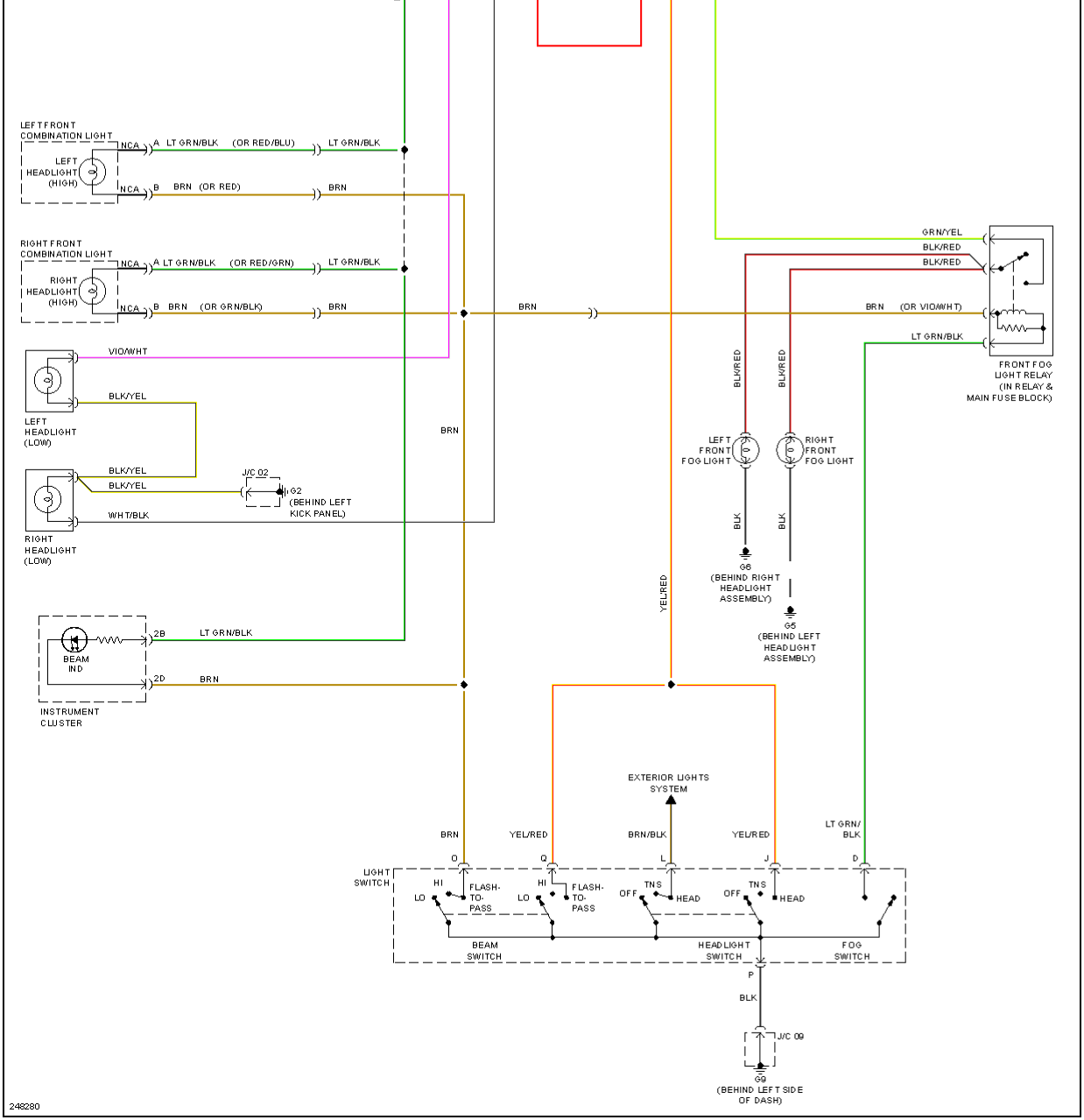

A
BRN/
BLK
B
BLK/
GRN
HEADLIGHT
SWITCH
TNS
HEAD
OFF
BLK
JC-09
G9
(BEHIND LEFT
SIDE OF DASH)
BLK/
GRN
ILLUMI
FUSE
15A
FUSE
BLOCK
(BEHIND
LEFT END
OF DASH)
RED/
BLU
INTERIOR
LIGHTS
SYSTEM
BLK/
YEL
BLK/
YEL
ENGINE
CONTROLS
SYSTEM
BLK/
YEL
BLK/YEL
BLK/YEL
BLK/
YEL
(OR NCA)
BLK/
YEL
BLK/
YEL
NCA
HIGH
MOUNT
BRAKE
LIGHT
LEFT
BRAKE
LIGHT
RIGHT
BRAKE
LIGHT
NCA
BLK
BLK
BLK
(OR NCA)
BLK
BLK
G17
(CENTER REAR OF
LUGGAGE COMPARTMENT)
GRN/
YEL
BLK/
RED
BLU/BLK
GRN/BLK
BLK
GRN/WHT
ORG
BLK/RED
GRN/YEL
A
B
C
D
E
F
G
H
I
J
FLASHER
CONTROL
MODULE
(BEHIND
LEFT SIDE
OF DASH)
BLK
JC-09
G9
(BEHIND LEFT
SIDE OF DASH)
ORG
ANTI-THEFT
SYSTEM
GRN/
BLK
GRN/
WHT
2G
2I
LEFT
TURN
IND
RIGHT
TURN
IND
SELECTOR
INDICATOR
DRIVE
CIRCUIT
MICRO
COMPUTER
INSTRUMENT
CLUSTER
1E
BLK/RED
JC-09
G9
(BEHIND LEFT
SIDE OF DASH)
GRN/
BLK
GRN/
WHT
LEFT
FRONT
TURN
LIGHT
RIGHT
FRONT
TURN
LIGHT
BLK/
RED
BLK
G5
(BEHIND
LEFT
HEADLIGHT
ASSEMBLY)
G6
(BEHIND
RIGHT
HEADLIGHT
ASSEMBLY)
GRN/
WHT
GRN/
BLK
RIGHT
REAR
TURN
LIGHT
LEFT
REAR
TURN
LIGHT
BLK
BLK
BLK
G17
(CENTER REAR OF
LUGGAGE COMPARTMENT)
ORG
HAZARD
WARNING
SWITCH
BLK
G8
(BEHIND RIGHT
SIDE OF DASH)
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
LEFT
TAIL-
LIGHT
RIGHT
TAIL-
LIGHT
LEFT
LICENSE
PLATE LIGHT
RIGHT
LICENSE
PLATE LIGHT
BLK
BLK
BLK
BLK
BLK
BLK
G17
(CENTER REAR
OF LUGGAGE
COMPARTMENT)
G16
(BASE OF LEFT
"B" PILLAR)
BLK/
GRN
BLK/GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
BLK/
GRN
E
F
LEFT
FRONT
SIDE
MARKER
LIGHT
RIGHT
FRONT
SIDE
MARKER
LIGHT
LEFT
PARKING
LIGHT
LEFT FRONT
COMBINATION
LIGHT
RIGHT
PARKING
LIGHT
RIGHT FRONT
COMBINATION
LIGHT
BLK
BLK
BLK/
RED
BLK/
RED
G6
(BEHIND RIGHT
HEADLIGHT ASSEMBLY)
G5
(BEHIND LEFT
HEADLIGHT ASSEMBLY)
270682

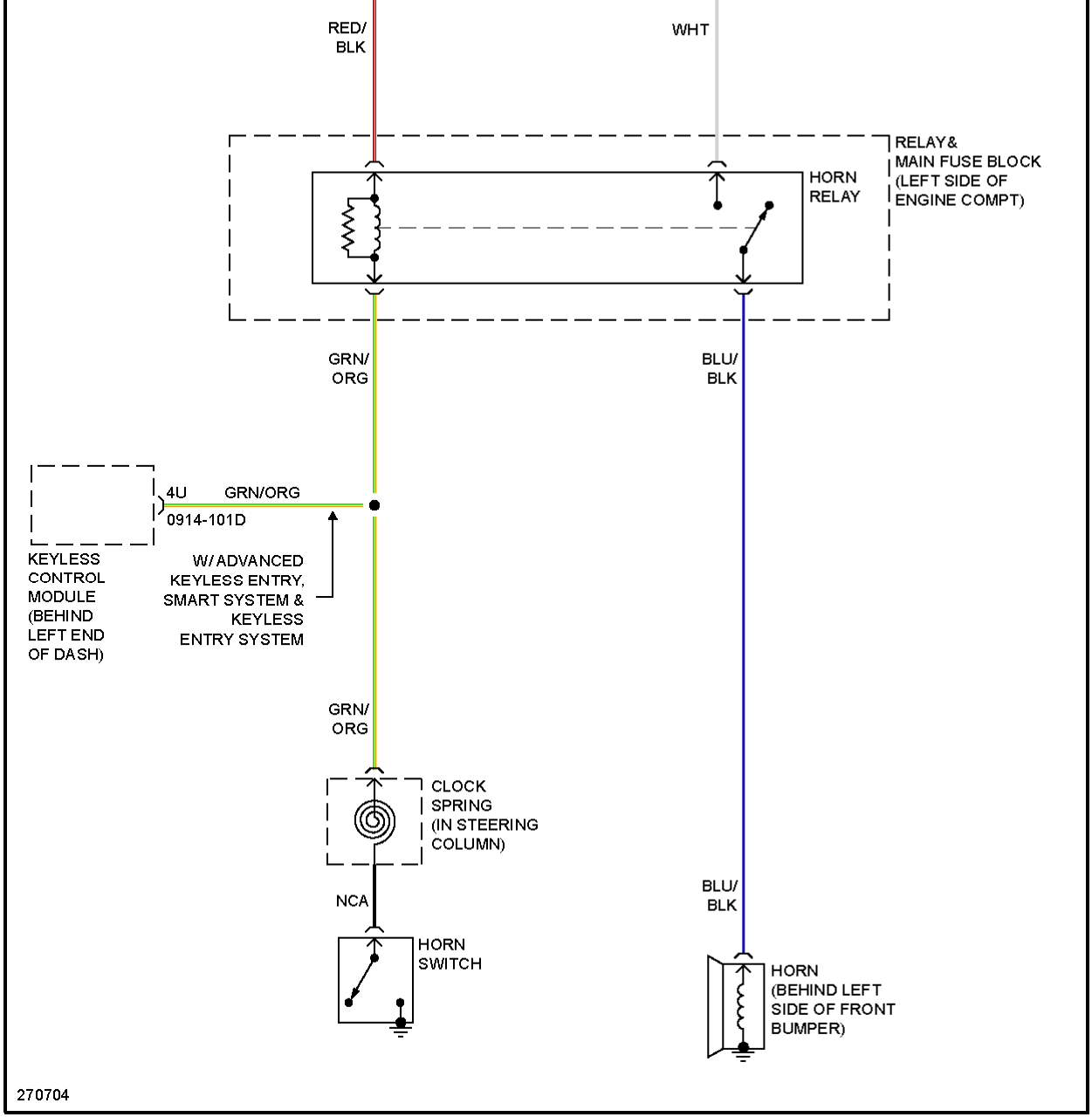

G6
(BEHIND RIGHT HEADLIGHT ASSEMBLY)
G5
(BEHIND LEFT HEADLIGHT ASSEMBLY)
G4
(W/ ABS & DSC)
(RIGHT REAR CORNER OF ENGINE COMPT)
J/C 2
G2
(BEHIND LEFT KICK PANEL)
J/C 1
G1
(LEFT REAR CORNER OF ENGINE COMPT)
AUDIO UNIT & SHIELD WIRE
POWER RETRACTABLE HARDTOP CONTROL MODULE
CONDENSER & POWER RETRACTABLE HARDTOP CONTROL MODULE
G20
(W/ POWER RETRACTABLE HARDTOP)
(LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
G19
(W/ POWER RETRACTABLE HARDTOP)
(LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
G10
(BEHIND CENTER OF DASH)
IGNITION COIL 1, 2, 3 & 4
G7
(CENTER REAR OF ENGINE COMPT)
WASHER MOTOR & WIPER MOTOR
G3
(LEFT REAR CORNER OF ENGINE COMPT)
SHIELD WIRE & AUDIO AMPLIFIER
G18
(W/ BOSE)
(BASE OF RIGHT "B" PILLAR)
EVAPORATIVE SYSTEM LEAK DETECTION PUMP & SHIELD WIRE
SHIELD WIRE & LEFT SEAT WARMER
G15
(UNDER REAR OF CENTER CONSOLE)
G14
(UNDER DRIVER'S SEAT)
DATA LINK CONNECTOR, DSC OFF SWITCH, STEERING ANGLE SENSOR, PASSENGER AIR BAG DEACTIVATION (PAD) SWITCH, COILANTENNA, TRUNK LID OPENER SWITCH, LIGHT SWITCH, LEFT FRONT COMBINATION LIGHT, FRONT FOG LIGHT SWITCH, DRL CONTROL MODULE, FLASHER CONTROL MODULE, WIPER & WASHER SWITCH & INSTRUMENT CLUSTER
LIGHT & LEFT REAR TURN LIGHT
J/C 9
G9
(BEHIND LEFT SIDE OF DASH)
POWER METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR (POWER MOS FET), CLIMATE CONTROL UNIT, AIR MIX ACTUATOR, AIR FLOW MODE ACTUATOR, STEERING LOCK UNIT, KEYLESS RECEIVER, HAZARD WARNING SWITCH, ACCESSORY SOCKET & AIR INTAKE ACTUATOR
J/C 8
G8
(BEHIND RIGHT SIDE OF DASH)
REAR KEYLESS RECEIVER, TRUNK KEY CYLINDER SWITCH, KEYLESS BUZZER, TRUNK LID OPENER, RIGHT TAILLIGHT, LEFT TAILLIGHT, TRUNK COMPARTMENT LIGHT SWITCH, RIGHT REAR TURN LIGHT, LEFT REAR TURN LIGHT, LEFT BACK-UP LIGHT, RIGHT BACK-UP LIGHT, HIGH MOUNT BRAKE LIGHT, LEFT BRAKE LIGHT & RIGHT BRAKE LIGHT
FUEL PUMP UNIT, FILAMENT, REAR KEYLESS RECEIVER, LIFT GATE REQUEST SWITCH, LEFT LICENSE PLATE LIGHT, RIGHT LICENSE PLATE LIGHT, TRUNK COMPARTMENT LIGHT SWITCH, RIGHT REAR TURN LIGHT, LEFT REAR TURN LIGHT & HIGH MOUNT BRAKE LIGHT
SAS CONTROL MODULE, RIGHT SEAT WARMER SWITCH, RIGHT SEAT WARMER & LEFT SEAT WARMER SWITCH
SEAT WEIGHT SENSOR CONTROL MODULE, POWER WINDOW MAIN SWITCH, RIGHT SEAT WARMER SWITCH, RIGHT SEAT WARMER & LEFT SEAT WARMER SWITCH
DATA LINK CONNECTOR, SELECTOR LEVEL COMPONENT, POWER OUTER MIRROR SWITCH, RIGHT SEAT WARMER SWITCH, RIGHT SEAT WARMER, LEFT SEAT WARMER SWITCH, LEFT DOOR LOCK-LINK SWITCH, LEFT REQUEST SWITCH, RIGHT REQUEST SWITCH, KEYLESS CONTROL MODULE, RIGHT DOOR LOCK-LINK SWITCH, RIGHT DOOR LOCK SWITCH, LEFT DOOR LOCK SWITCH, LEFT KEY CYLINDER SWITCH, MAP LIGHT & TOP LOCK SWITCH
W/ SEAT WARMER
J/C 11
G17
(CENTER REAR OF LUGGAGE COMPT)
G16
(BASE OF LEFT "B" PILLAR)
G13
(UNDER FRONT OF CENTER CONSOLE)
G12
(UNDER PASSENGER'S SEAT)
G11
(BEHIND RIGHT KICK PANEL)
① W/ ADVANCED KEYLESS ENTRY & START SYSTEM & KEYLESS ENTRY SYSTEM
② MT W/O ABS, DSC, ADVANCED KEYLESS ENTRY & START SYSTEM & KEYLESS ENTRY SYSTEM, CRUISE CONTROL SYSTEM, BOSE, TPMS, FRONT FOG LIGHT
269571

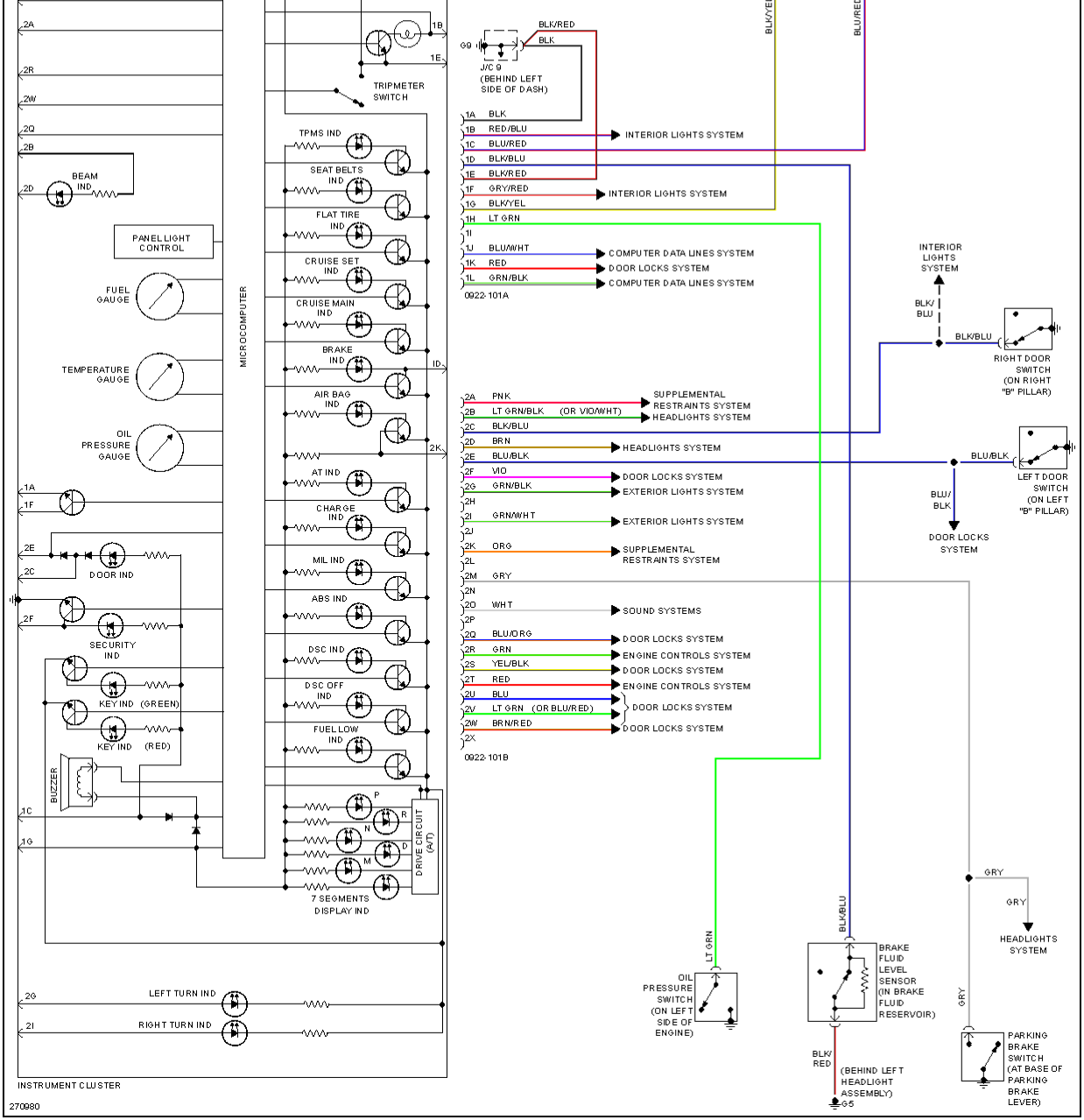

LEFT HEADLIGHT (HIGH)
LEFT HEADLIGHT (LOW)
DISCHARGE HEADLIGHT CONTROL MODULE
LEFT FRONT COMBINATION LIGHT
NCA
B RED
A RED/BLU
C VIO/WHT
F BLK
G6 (BEHIND RIGHT HEADLIGHT ASSEMBLY)
F BLK/RED
G5 (BEHIND LEFT HEADLIGHT ASSEMBLY)
RIGHT HEADLIGHT (LOW)
RIGHT HEADLIGHT (HIGH)
RIGHT FRONT COMBINATION LIGHT
C WHT/BLK
A RED/GRN
B GRN/BLK
G6 (BEHIND RIGHT HEADLIGHT ASSEMBLY)
BLK
G5 (BEHIND LEFT HEADLIGHT ASSEMBLY)
LEFT FRONT FOG LIGHT
RIGHT FRONT FOG LIGHT
BLK/RED
GRN/YEL
BLK/RED
BLK/RED
VIO/WHT
VIO/WHT
LT GRN/BLK
FRONT FOG LIGHT RELAY (IN RELAY & MAIN FUSE BLOCK)
1A RED/YEL
1B GRY
1I BLK/YEL
1K BRN
1L GRN
1M YEL/RED
1N LT GRN/BLK
0918-901A
2A GRN/BLK
2C RED/BLU
2D BLK/RED
2E RED/GRN
2G RED/YEL
0918-901B
DRL CONTROL MODULE (BEHIND LEFT SIDE OF DASH)
GRY 2M
MICROCOMPUTER
BEAM IND
VIO/WHT 2B
BRN 2D
INSTRUMENT CLUSTER
YEL/RED
EXTERIOR LIGHTS SYSTEM
GRN
BRN
YEL/RED
BRN/BLK
YEL/RED
D
O
Q
L
J
LIGHT SWITCH
HI
LO
FLASH-TO-PASS
OFF
TNS
HEAD
FOG SWITCH
BEAM SWITCH
HEADLIGHT SWITCH
P
BLK
J/C 09
G9 (BEHIND LEFT SIDE OF DASH)
BLK/RED
J/C 09
G9 (BEHIND LEFT SIDE OF DASH)
GRY
PARKING BRAKE SWITCH (AT BASE OF PARKING BRAKE LEVER)
271521

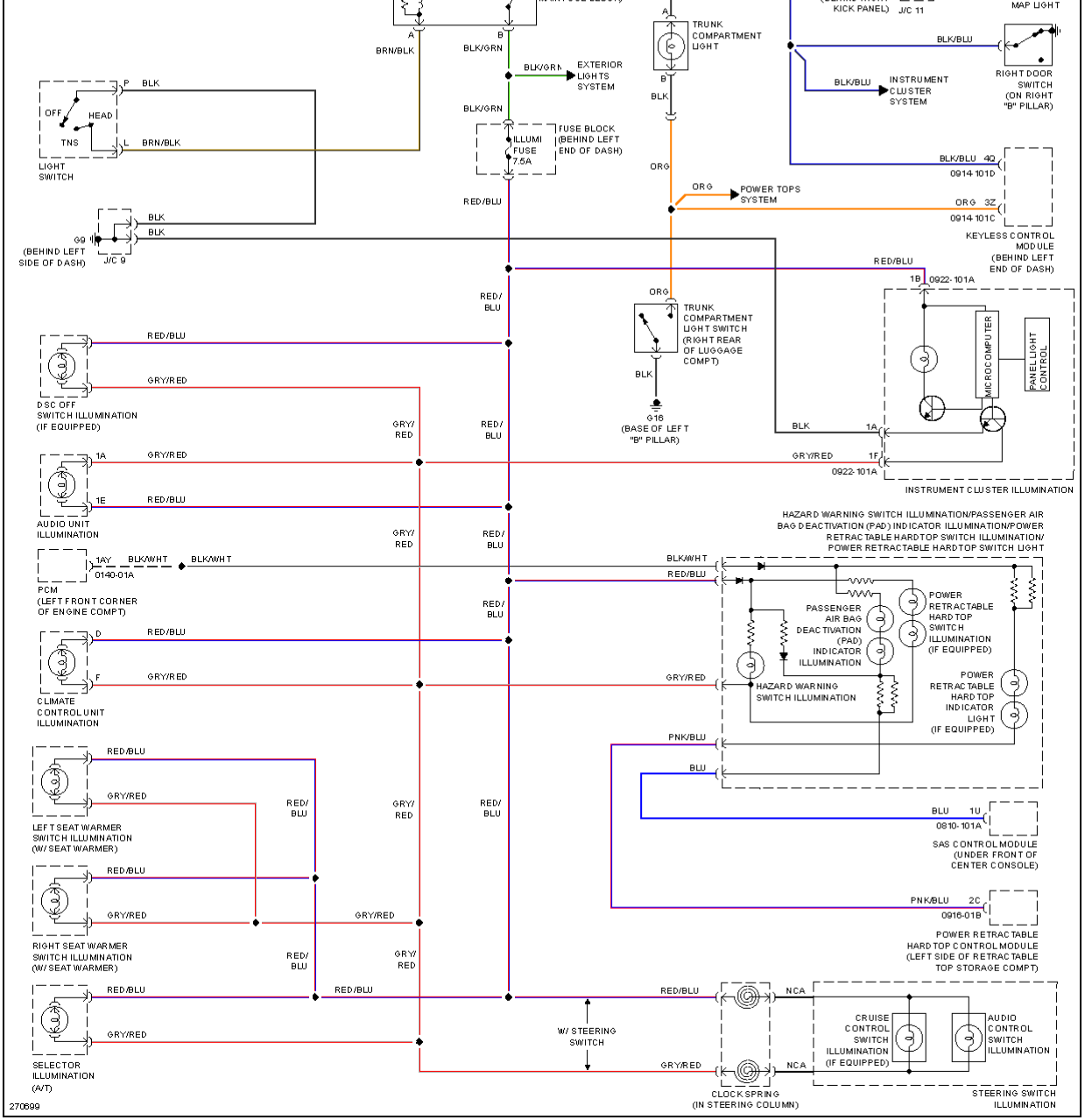

VIO/WHT
BLK/YEL
LEFT HEADLIGHT (LOW)
BLK/YEL
BLK/YEL
J/C 02
G2
(BEHIND LEFT KICK PANEL)
WHT/BLK
RIGHT HEADLIGHT (LOW)
BEAM IND
MICROCOMPUTER
2B
2D
2M
VIO/WHT
BRN
GRY
INSTRUMENT CLUSTER
1A RED/YEL
1B GRY
1C
1D
1E
1F
1G
1H
1I BLK/YEL
1J
1K BRN
1L GRN
1M YEL/RED
1N LT GRN/BLK
1O
1P
0918-901A
2A GRN/BLK
2B
2C RED/BLU
2D BLK/RED
2E RED/GRN
2F
2G RED/YEL
2H
0918-901B
DRL CONTROL MODULE (BEHIND LEFT SIDE OF DASH)
BLK
G6
(BEHIND RIGHT HEADLIGHT ASSEMBLY)
BLK
G5
(BEHIND LEFT HEADLIGHT ASSEMBLY)
LEFT FRONT FOG LIGHT
RIGHT FRONT FOG LIGHT
BLK
BLK
BLK/RED
BLK/RED
GRN/YEL
BLK/RED
BLK/RED
VIO/WHT
LT GRN/BLK
FRONT FOG LIGHT RELAY (IN RELAY & MAIN FUSE BLOCK)
YEL/RED
EXTERIOR LIGHTS SYSTEM
BRN
YEL/RED
BRN/BLK
YEL/RED
GRN
O
Q
L
J
D
LIGHT SWITCH
HI
LO
FLASH-TO-PASS
OFF
TNS
HEAD
BEAM SWITCH
HEADLIGHT SWITCH
FOG SWITCH
P
BLK
J/C 09
G9
(BEHIND LEFT SIDE OF DASH)
GRY
PARKING BRAKE SWITCH (AT BASE OF PARKING BRAKE LEVER)
RED
RED/BLU
RED/GRN
GRN/BLK
B
A
A
B
NCA
NCA
NCA
NCA
BLK/RED
BLK
J/C 09
G9
(BEHIND LEFT SIDE OF DASH)
LEFT HEADLIGHT (HIGH)
LEFT FRONT COMBINATION LIGHT
RIGHT HEADLIGHT (HIGH)
RIGHT FRONT COMBINATION LIGHT
271520

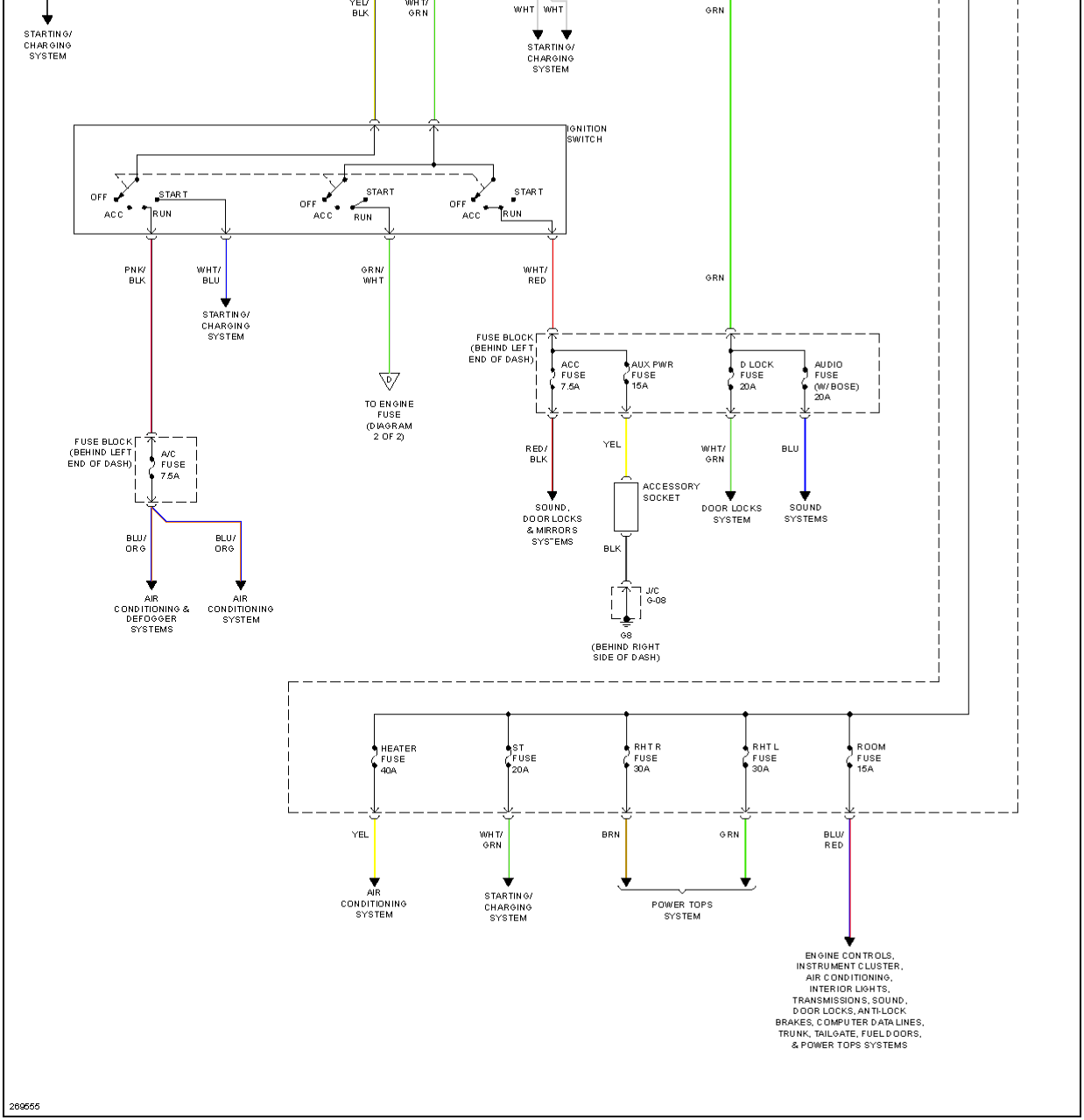

LEFT HEADLIGHT (HIGH)
LEFT HEADLIGHT (LOW)
DISCHARGE HEADLIGHT CONTROL MODULE
LEFT FRONT COMBINATION LIGHT
NCA
A RED/BLU
LT GRN/BLK
B RED
BRN
C VIO/WHT
F BLK
G6 (BEHIND RIGHT HEADLIGHT ASSEMBLY)
RIGHT HEADLIGHT (LOW)
RIGHT HEADLIGHT (HIGH)
RIGHT FRONT COMBINATION LIGHT
G5 (BEHIND LEFT HEADLIGHT ASSEMBLY)
C WHT/BLK
A RED/GRN
B GRN/BLK
BRN
GRN/YEL
BLK/RED
VIO/WHT
LT GRN/BLK
FRONT FOG LIGHT RELAY (IN RELAY & MAIN FUSE BLOCK)
LEFT FRONT FOG LIGHT
RIGHT FRONT FOG LIGHT
BLK
BEAM IND
2B LT GRN/BLK
2D BRN
INSTRUMENT CLUSTER
EXTERIOR LIGHTS SYSTEM
BRN
YEL/RED
BRN/BLK
YEL/RED
LT GRN/BLK
O
Q
L
J
D
LIGHT SWITCH
HI
LO
FLASH-TO-PASS
OFF
TNS
HEAD
BEAM SWITCH
HEADLIGHT SWITCH
FOG SWITCH
P
BLK
J/C 09
G9 (BEHIND LEFT SIDE OF DASH)
248284

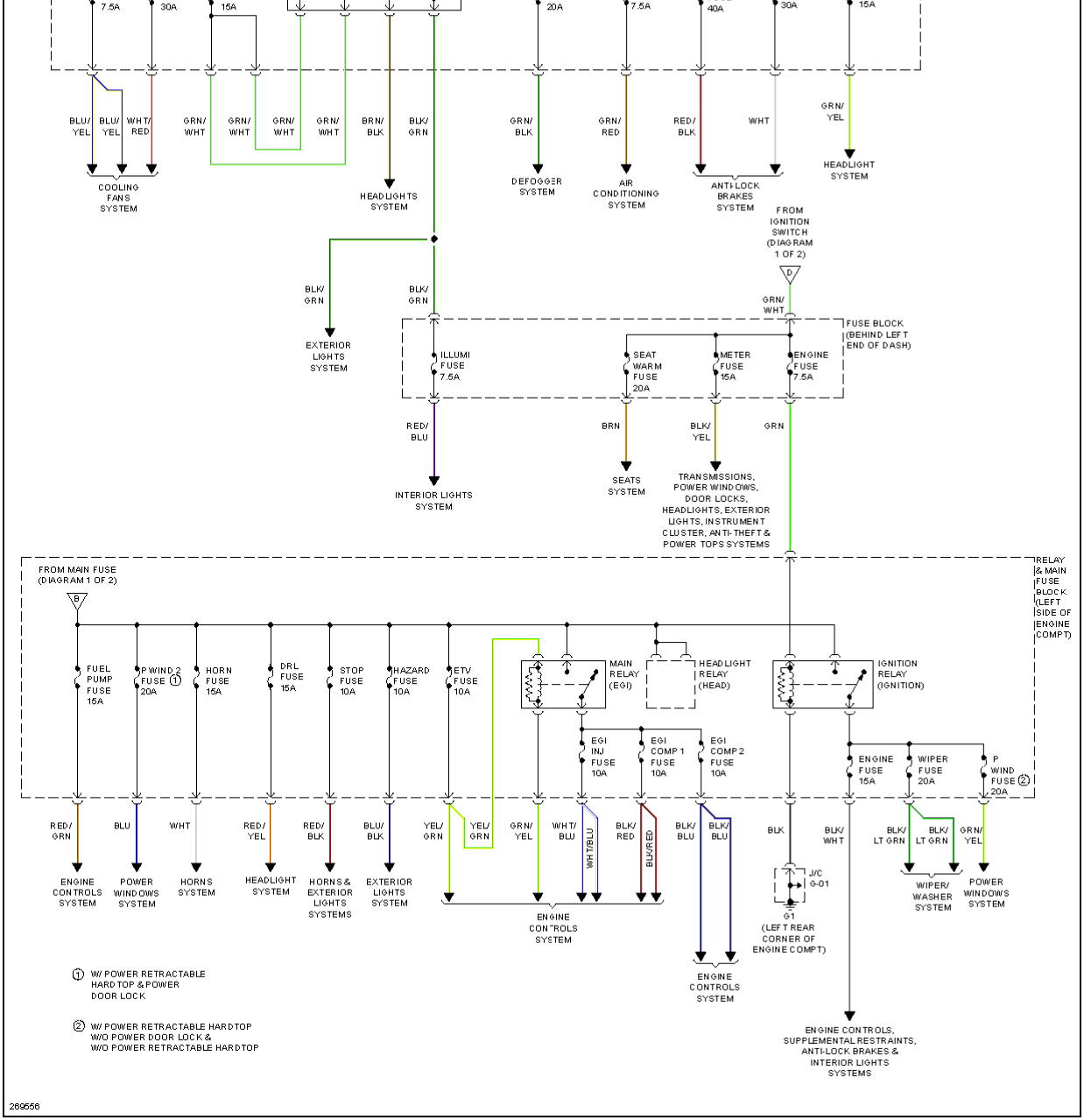

LEFT FRONT COMBINATION LIGHT
NCA
A LT GRN/BLK (OR RED/BLU)
LT GRN/BLK
LEFT HEADLIGHT (HIGH)
NCA
B BRN (OR RED)
BRN
RIGHT FRONT COMBINATION LIGHT
NCA
A LT GRN/BLK (OR RED/GRN)
LT GRN/BLK
RIGHT HEADLIGHT (HIGH)
NCA
B BRN (OR GRN/BLK)
BRN
BRN
BRN (OR VIO/WHT)
GRN/YEL
BLK/RED
BLK/RED
LT GRN/BLK
FRONT FOG LIGHT RELAY (IN RELAY & MAIN FUSE BLOCK)
VIO/WHT
BLK/YEL
LEFT HEADLIGHT (LOW)
BLK/YEL
BLK/YEL
J/C 02
G2
(BEHIND LEFT KICK PANEL)
WHT/BLK
RIGHT HEADLIGHT (LOW)
BRN
BLK/RED
BLK/RED
LEFT FRONT FOG LIGHT
RIGHT FRONT FOG LIGHT
BLK
BLK
G6
(BEHIND RIGHT HEADLIGHT ASSEMBLY)
G5
(BEHIND LEFT HEADLIGHT ASSEMBLY)
YEL/RED
2B
LT GRN/BLK
BEAM IND
2D
BRN
INSTRUMENT CLUSTER
EXTERIOR LIGHTS SYSTEM
BRN
YEL/RED
BRN/BLK
YEL/RED
LT GRN/ BLK
O
Q
L
J
D
LIGHT SWITCH
HI
LO
FLASH-TO-PASS
HI
LO
FLASH-TO-PASS
OFF
TAIL
HEAD
OFF
TAIL
HEAD
BEAM SWITCH
HEADLIGHT SWITCH
FOG SWITCH
P
BLK
J/C 09
G9
(BEHIND LEFT SIDE OF DASH)
248280

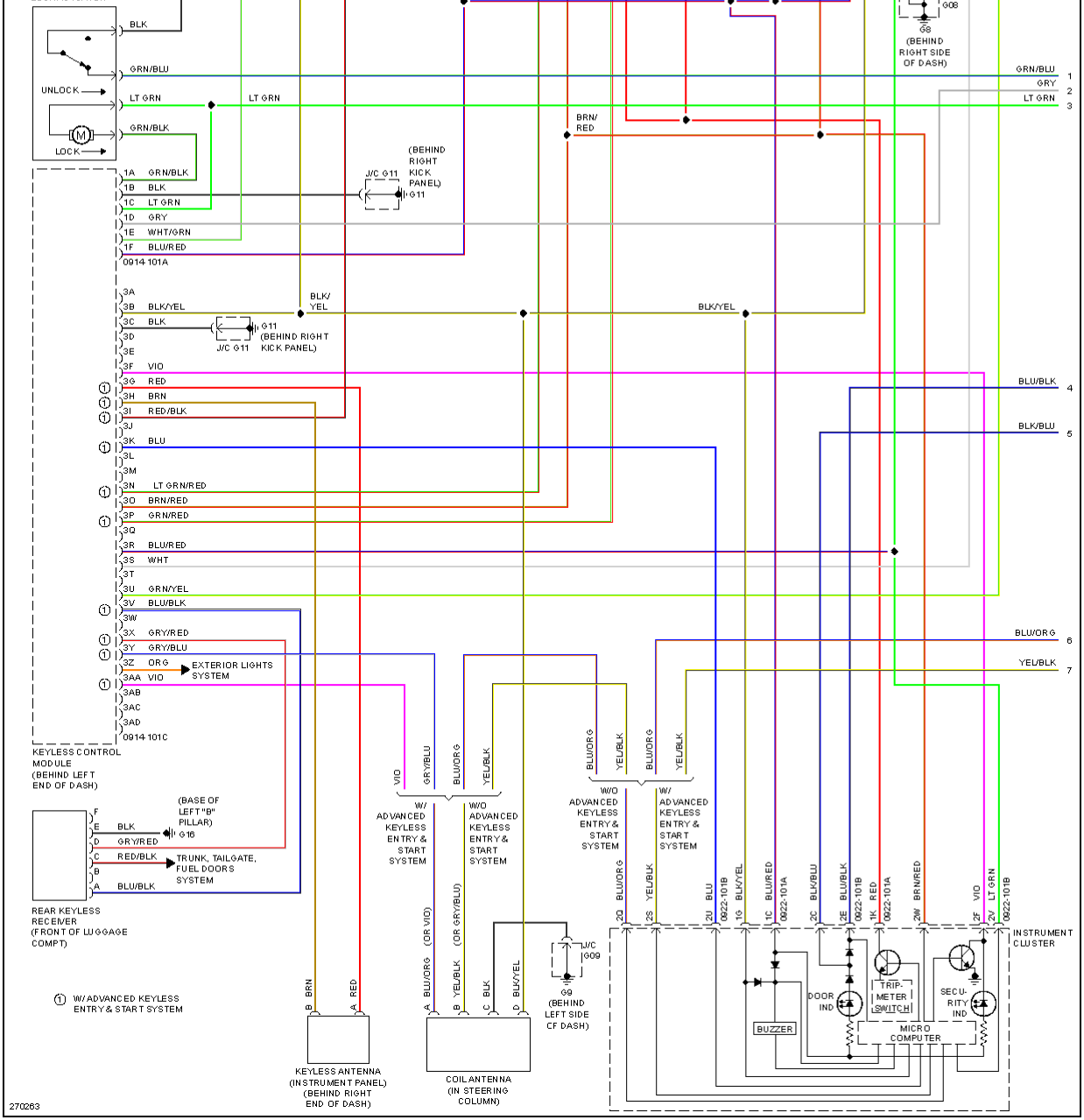

RED/
BLK
WHT
RELAY&
MAIN FUSE BLOCK
(LEFT SIDE OF
ENGINE COMPT)
HORN
RELAY
GRN/
ORG
BLU/
BLK
4U
GRN/ORG
0914-101D
KEYLESS
CONTROL
MODULE
(BEHIND
LEFT END
OF DASH)
W/ ADVANCED
KEYLESS ENTRY,
SMART SYSTEM &
KEYLESS
ENTRY SYSTEM
GRN/
ORG
CLOCK
SPRING
(IN STEERING
COLUMN)
NCA
HORN
SWITCH
BLU/
BLK
HORN
(BEHIND LEFT
SIDE OF FRONT
BUMPER)
270704

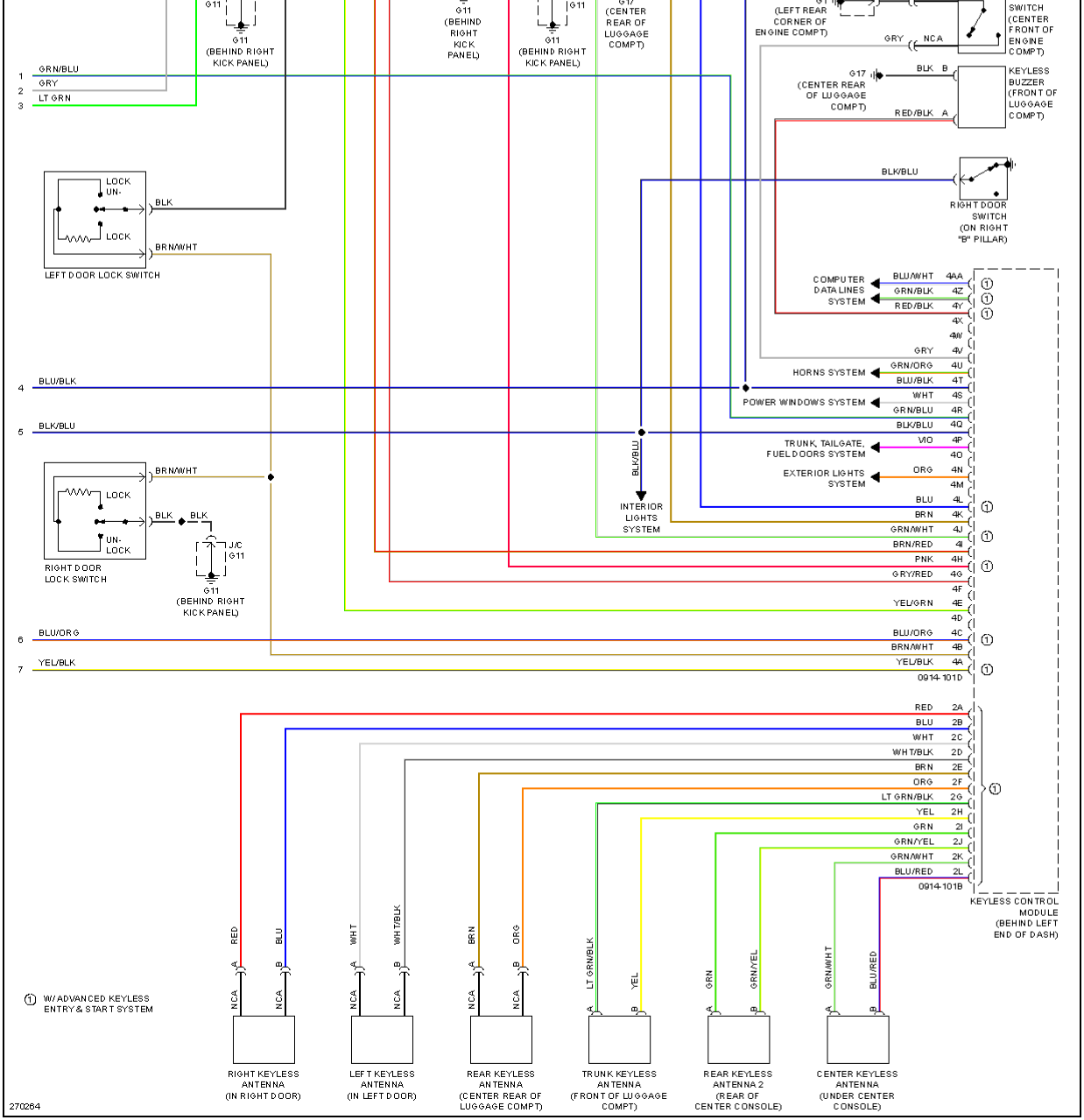

MICROCOMPUTER
TRIPMETER SWITCH
TPMS IND
SEAT BELTS IND
FLAT TIRE IND
CRUISE SET IND
CRUISE MAIN IND
BRAKE IND
AIR BAG IND
AT IND
CHARGE IND
MIL IND
ABS IND
DSC IND
DSC OFF IND
FUEL LOW IND
BEAM IND
PANEL LIGHT CONTROL
FUEL GAUGE
TEMPERATURE GAUGE
OIL PRESSURE GAUGE
DOOR IND
SECURITY IND
KEY IND (GREEN)
KEY IND (RED)
BUZZER
7 SEGMENTS DISPLAY IND
DRIVE CIRCUIT (A/T)
LEFT TURN IND
RIGHT TURN IND
INSTRUMENT CLUSTER
270980
J/C 9 (BEHIND LEFT SIDE OF DASH)
INTERIOR LIGHTS SYSTEM
COMPUTER DATA LINES SYSTEM
DOOR LOCKS SYSTEM
0922-101A
SUPPLEMENTAL RESTRAINTS SYSTEM
HEADLIGHTS SYSTEM
EXTERIOR LIGHTS SYSTEM
SOUND SYSTEMS
ENGINE CONTROLS SYSTEM
0922-101B
INTERIOR LIGHTS SYSTEM
RIGHT DOOR SWITCH (ON RIGHT "B" PILLAR)
LEFT DOOR SWITCH (ON LEFT "B" PILLAR)
OIL PRESSURE SWITCH (ON LEFT SIDE OF ENGINE)
BRAKE FLUID LEVEL SENSOR (IN BRAKE FLUID RESERVOIR)
(BEHIND LEFT HEADLIGHT ASSEMBLY)
G5
PARKING BRAKE SWITCH (AT BASE OF PARKING BRAKE LEVER)

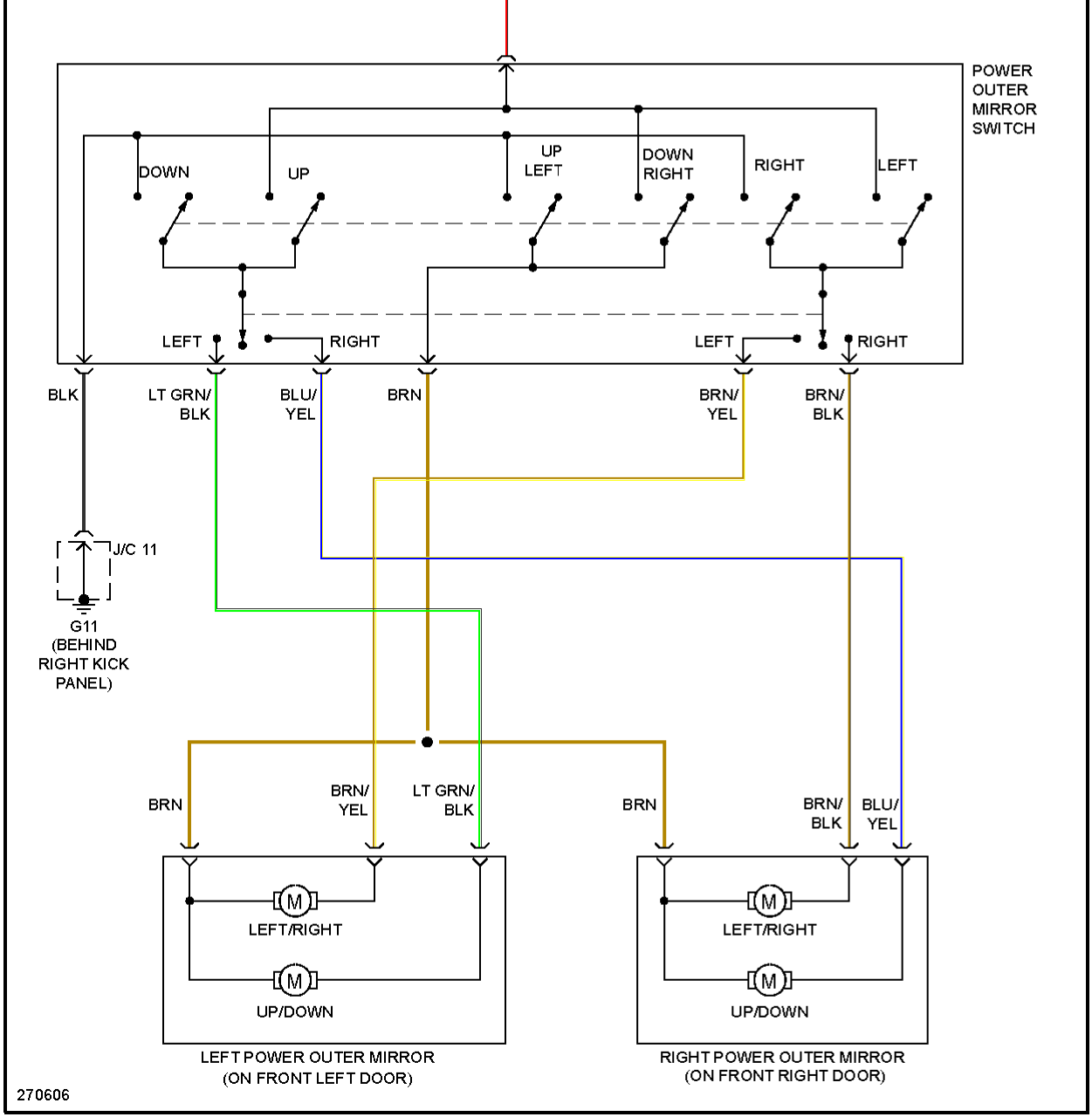

TRUNK COMPARTMENT LIGHT
MAP LIGHT
BLK/BLU
RIGHT DOOR SWITCH (ON RIGHT "B" PILLAR)
INSTRUMENT CLUSTER SYSTEM
BRN/BLK
BLK/GRN
EXTERIOR LIGHTS SYSTEM
FUSE BLOCK (BEHIND LEFT END OF DASH)
ILLUMI FUSE 7.5A
LIGHT SWITCH
OFF
HEAD
TNS
P
L
BLK
BRN/BLK
ORG
POWER TOPS SYSTEM
0914-101D
0914-101C
KEYLESS CONTROL MODULE (BEHIND LEFT END OF DASH)
J/C 9
(BEHIND LEFT SIDE OF DASH)
RED/BLU
RED/ BLU
TRUNK COMPARTMENT LIGHT SWITCH (RIGHT REAR OF LUGGAGE COMPT)
G16
(BASE OF LEFT "B" PILLAR)
0922-101A
MICROCOMPUTER
PANEL LIGHT CONTROL
INSTRUMENT CLUSTER ILLUMINATION
DSC OFF SWITCH ILLUMINATION (IF EQUIPPED)
GRY/RED
GRY/ RED
AUDIO UNIT ILLUMINATION
PCM (LEFT FRONT CORNER OF ENGINE COMPT)
0140-01A
BLK/WHT
HAZARD WARNING SWITCH ILLUMINATION/PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR ILLUMINATION/POWER RETRACTABLE HARDTOP SWITCH ILLUMINATION/ POWER RETRACTABLE HARDTOP SWITCH LIGHT
PASSENGER AIR BAG DEACTIVATION (PAD) INDICATOR ILLUMINATION
POWER RETRACTABLE HARD TOP SWITCH ILLUMINATION (IF EQUIPPED)
HAZARD WARNING SWITCH ILLUMINATION
POWER RETRACTABLE HARD TOP INDICATOR LIGHT (IF EQUIPPED)
PNK/BLU
BLU
SAS CONTROL MODULE (UNDER FRONT OF CENTER CONSOLE)
0810-101A
POWER RETRACTABLE HARD TOP CONTROL MODULE (LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
0916-018
CLIMATE CONTROL UNIT ILLUMINATION
LEFT SEAT WARMER SWITCH ILLUMINATION (W/ SEAT WARMER)
RIGHT SEAT WARMER SWITCH ILLUMINATION (W/ SEAT WARMER)
SELECTOR ILLUMINATION (A/T)
W/ STEERING SWITCH
CLOCK SPRING (IN STEERING COLUMN)
CRUISE CONTROL SWITCH ILLUMINATION (IF EQUIPPED)
AUDIO CONTROL SWITCH ILLUMINATION
STEERING SWITCH ILLUMINATION
270699

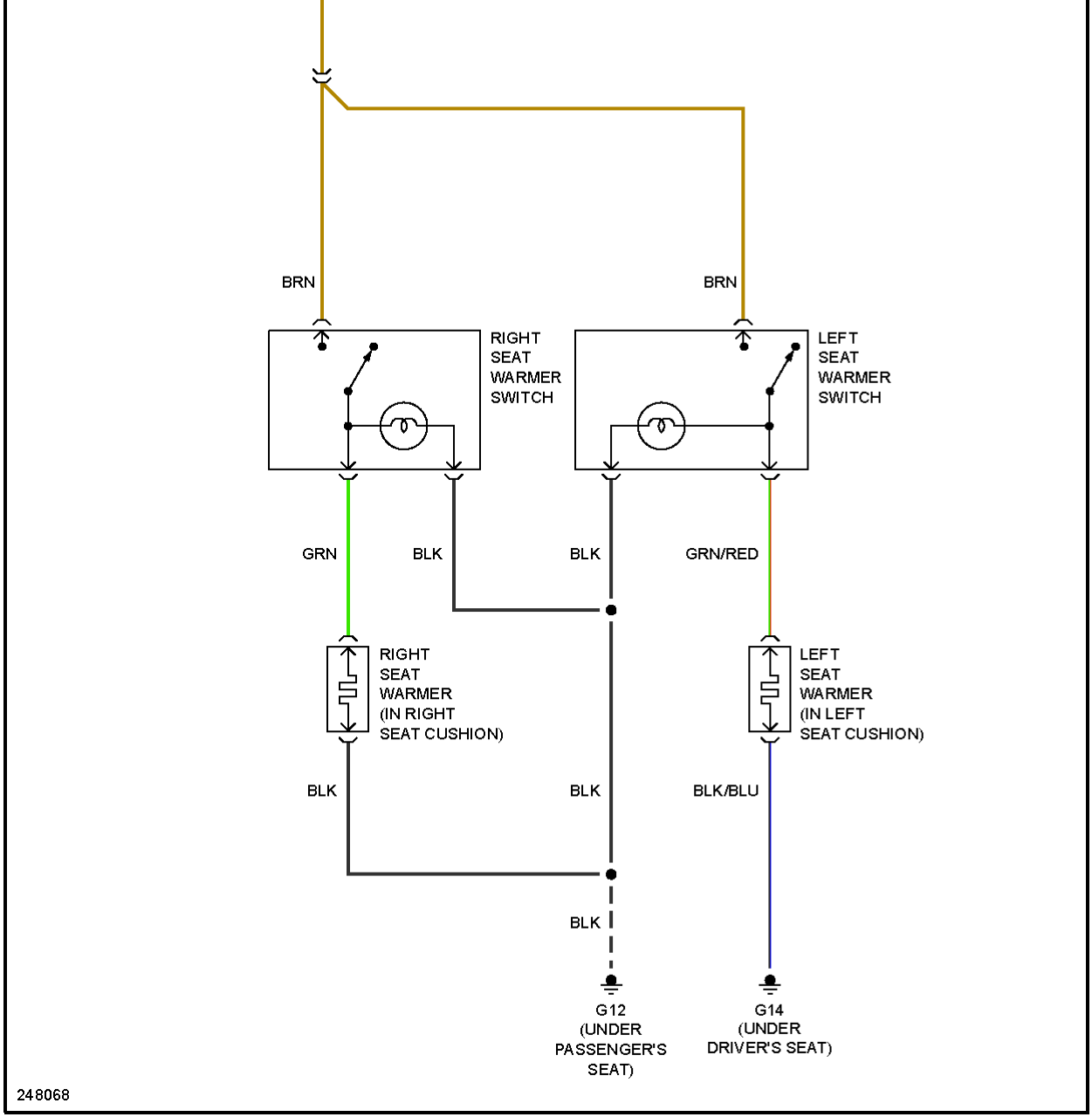

STARTING/ CHARGING SYSTEM
YEL/ BLK
WHT/ GRN
WHT
WHT
STARTING/ CHARGING SYSTEM
GRN
IGNITION SWITCH
OFF
ACC
START
RUN
PNK/ BLK
WHT/ BLU
GRN/ WHT
WHT/ RED
GRN
STARTING/ CHARGING SYSTEM
TO ENGINE FUSE (DIAGRAM 2 OF 2)
FUSE BLOCK (BEHIND LEFT END OF DASH)
ACC FUSE 7.5A
AUX PWR FUSE 15A
D LOCK FUSE 20A
AUDIO FUSE (W/ BOSE) 20A
FUSE BLOCK (BEHIND LEFT END OF DASH)
A/C FUSE 7.5A
RED/ BLK
YEL
WHT/ GRN
BLU
SOUND, DOOR LOCKS & MIRRORS SYSTEMS
ACCESSORY SOCKET
DOOR LOCKS SYSTEM
SOUND SYSTEMS
BLU/ ORG
BLU/ ORG
BLK
J/C G-08
AIR CONDITIONING & DEFOGGER SYSTEMS
AIR CONDITIONING SYSTEM
G8
(BEHIND RIGHT SIDE OF DASH)
HEATER FUSE 40A
ST FUSE 20A
RHT R FUSE 30A
RHT L FUSE 30A
ROOM FUSE 15A
YEL
WHT/ GRN
BRN
GRN
BLU/ RED
AIR CONDITIONING SYSTEM
STARTING/ CHARGING SYSTEM
POWER TOPS SYSTEM
ENGINE CONTROLS, INSTRUMENT CLUSTER, AIR CONDITIONING, INTERIOR LIGHTS, TRANSMISSIONS, SOUND, DOOR LOCKS, ANTI-LOCK BRAKES, COMPUTER DATA LINES, TRUNK, TAILGATE, FUEL DOORS, & POWER TOPS SYSTEMS
269555

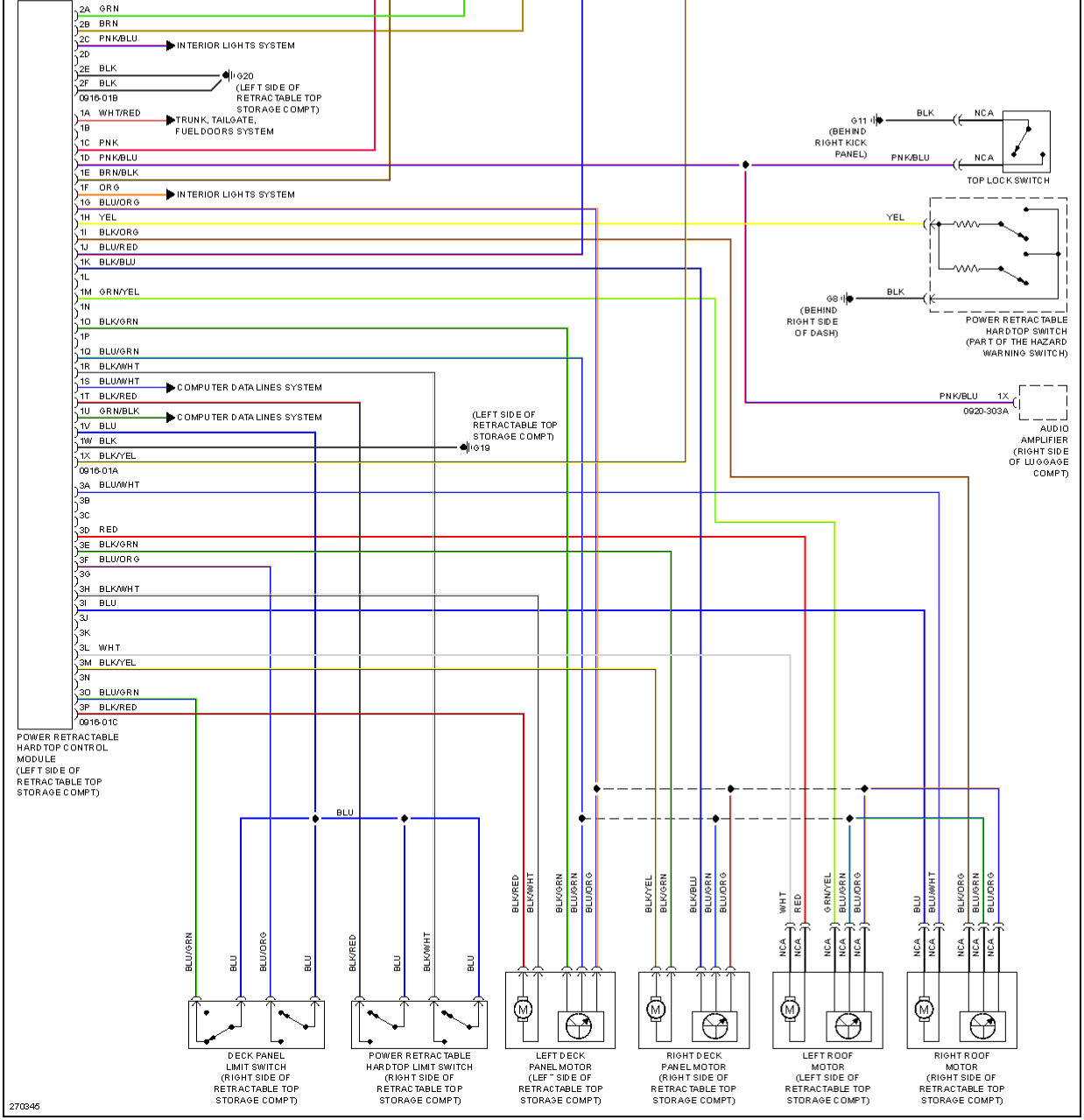

7.5A
30A
15A
20A
7.5A
40A
30A
15A
BLU/ YEL
BLU/ YEL
WHT/ RED
GRN/ WHT
GRN/ WHT
GRN/ WHT
GRN/ WHT
BRN/ BLK
BLK/ GRN
GRN/ BLK
GRN/ RED
RED/ BLK
WHT
GRN/ YEL
COOLING FANS SYSTEM
HEADLIGHTS SYSTEM
DEFOGGER SYSTEM
AIR CONDITIONING SYSTEM
ANTI-LOCK BRAKES SYSTEM
HEADLIGHT SYSTEM
FROM IGNITION SWITCH (DIAGRAM 1 OF 2)
D
BLK/ GRN
BLK/ GRN
GRN/ WHT
FUSE BLOCK (BEHIND LEFT END OF DASH)
EXTERIOR LIGHTS SYSTEM
ILLUMI FUSE 7.5A
SEAT WARM FUSE 20A
METER FUSE 15A
ENGINE FUSE 7.5A
RED/ BLU
BRN
BLK/ YEL
GRN
INTERIOR LIGHTS SYSTEM
SEATS SYSTEM
TRANSMISSIONS, POWER WINDOWS, DOOR LOCKS, HEADLIGHTS, EXTERIOR LIGHTS, INSTRUMENT CLUSTER, ANTI-THEFT & POWER TOPS SYSTEMS
RELAY & MAIN FUSE BLOCK (LEFT SIDE OF ENGINE COMPT)
FROM MAIN FUSE (DIAGRAM 1 OF 2)
B
FUEL PUMP FUSE 15A
P WIND 2 FUSE 1 20A
HORN FUSE 15A
DRL FUSE 15A
STOP FUSE 10A
HAZARD FUSE 10A
ETV FUSE 10A
MAIN RELAY (EGI)
HEADLIGHT RELAY (HEAD)
IGNITION RELAY (IGNITION)
EGI INJ FUSE 10A
EGI COMP 1 FUSE 10A
EGI COMP 2 FUSE 10A
ENGINE FUSE 15A
WIPER FUSE 20A
P WIND FUSE 2 20A
RED/ GRN
BLU
WHT
RED/ YEL
RED/ BLK
BLU/ BLK
YEL/ GRN
YEL/ GRN
GRN/ YEL
WHT/ BLU
WHT/BLU
BLK/ RED
BLK/RED
BLK/ BLU
BLK/ BLU
BLK
BLK/ WHT
BLK/ LT GRN
BLK/ LT GRN
GRN/ YEL
ENGINE CONTROLS SYSTEM
POWER WINDOWS SYSTEM
HORNS SYSTEM
HEADLIGHT SYSTEM
HORNS & EXTERIOR LIGHTS SYSTEMS
EXTERIOR LIGHTS SYSTEM
ENGINE CONTROLS SYSTEM
ENGINE CONTROLS SYSTEM
J/C G-01
G1
(LEFT REAR CORNER OF ENGINE COMPT)
WIPER/ WASHER SYSTEM
POWER WINDOWS SYSTEM
ENGINE CONTROLS, SUPPLEMENTAL RESTRAINTS, ANTI-LOCK BRAKES & INTERIOR LIGHTS SYSTEMS
1 W/ POWER RETRACTABLE HARDTOP & POWER DOOR LOCK
2 W/ POWER RETRACTABLE HARDTOP W/O POWER DOOR LOCK & W/O POWER RETRACTABLE HARDTOP
269556

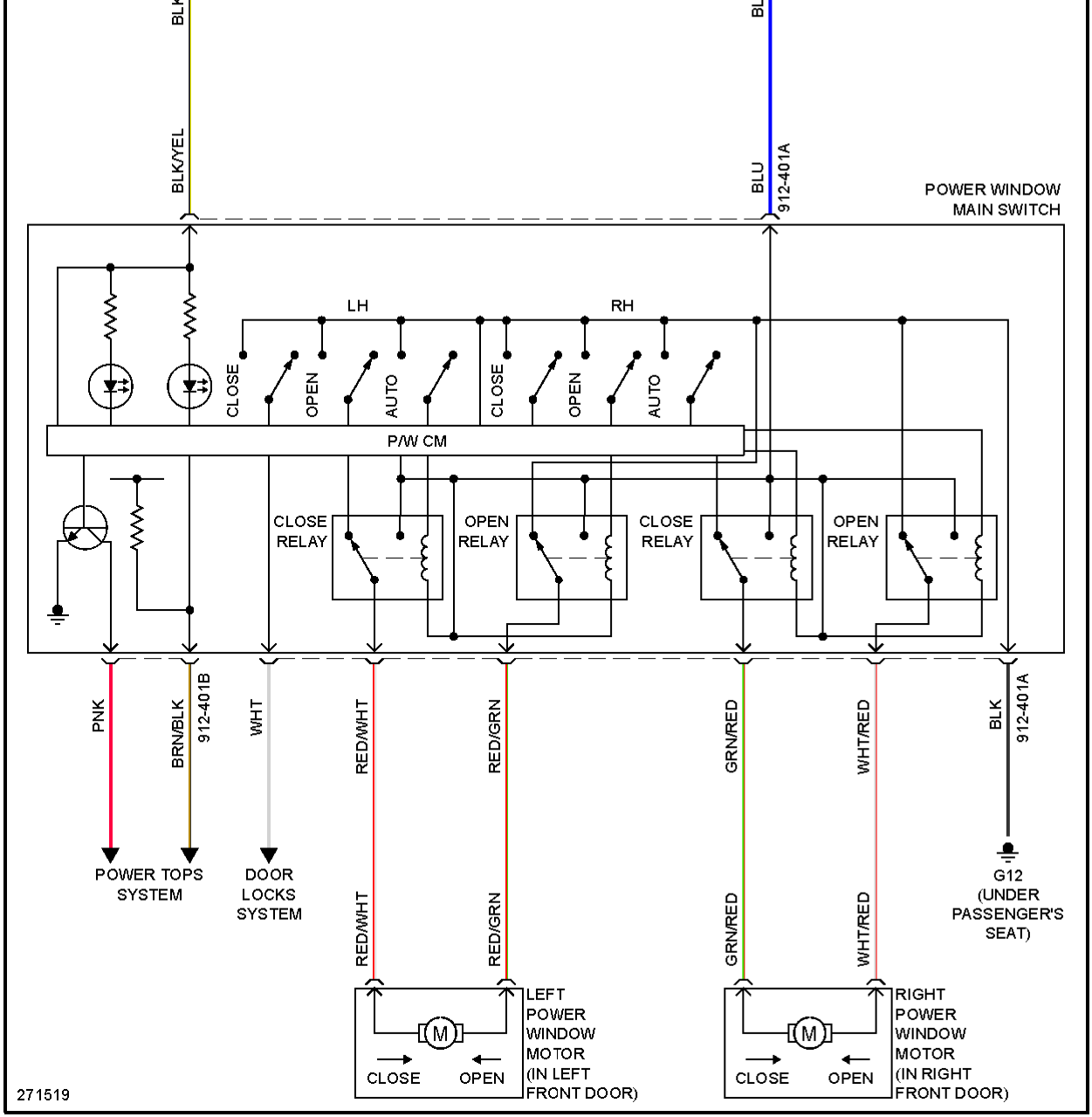

BLK
GRN/BLU
UNLOCK
LT GRN
GRN/BLK
LOCK
LT GRN
BRN/
RED
(BEHIND
RIGHT
KICK
PANEL)
J/C G11
G11
1A GRN/BLK
1B BLK
1C LT GRN
1D GRY
1E WHT/GRN
1F BLU/RED
0914-101A
3A
3B BLK/YEL
3C BLK
3D
3E
3F VIO
3G RED
3H BRN
3I RED/BLK
3J
3K BLU
3L
3M
3N LT GRN/RED
3O BRN/RED
3P GRN/RED
3Q
3R BLU/RED
3S WHT
3T
3U GRN/YEL
3V BLU/BLK
3W
3X GRY/RED
3Y GRY/BLU
3Z ORG
3AA VIO
3AB
3AC
3AD
0914-101C
BLK/
YEL
BLK/YEL
J/C G11
G11
(BEHIND RIGHT
KICK PANEL)
EXTERIOR LIGHTS
SYSTEM
KEYLESS CONTROL
MODULE
(BEHIND LEFT
END OF DASH)
(BASE OF
LEFT "B"
PILLAR)
G16
BLK
GRY/RED
RED/BLK
BLU/BLK
TRUNK, TAILGATE,
FUEL DOORS
SYSTEM
REAR KEYLESS
RECEIVER
(FRONT OF LUGGAGE
COMPT)
① W/ ADVANCED KEYLESS
ENTRY & START SYSTEM
G8
(BEHIND
RIGHT SIDE
OF DASH)
GRN/BLU
GRY
LT GRN
BLU/BLK
BLK/BLU
BLU/ORG
YEL/BLK
VIO
GRY/BLU
BLU/ORG
YEL/BLK
W/
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
W/O
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
BLU/ORG
YEL/BLK
BLU/ORG
YEL/BLK
W/O
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
W/
ADVANCED
KEYLESS
ENTRY &
START
SYSTEM
2G BLU/ORG
2S YEL/BLK
2U BLU
0922-101B
1G BLK/YEL
1C BLU/RED
0922-101A
2C BLK/BLU
2E BLU/BLK
0922-101B
1K RED
0922-101A
2W BRN/RED
2F VIO
2V LT GRN
0922-101B
INSTRUMENT
CLUSTER
DOOR
IND
TRIP-
METER
SWITCH
SECU-
RITY
IND
BUZZER
MICRO
COMPUTER
B BRN
A RED
KEYLESS ANTENNA
(INSTRUMENT PANEL)
(BEHIND RIGHT
END OF DASH)
A BLU/ORG (OR VIO)
B YEL/BLK (OR GRY/BLU)
C BLK
D BLK/YEL
COIL ANTENNA
(IN STEERING
COLUMN)
J/C
G9
G9
(BEHIND
LEFT SIDE
OF DASH)
270263

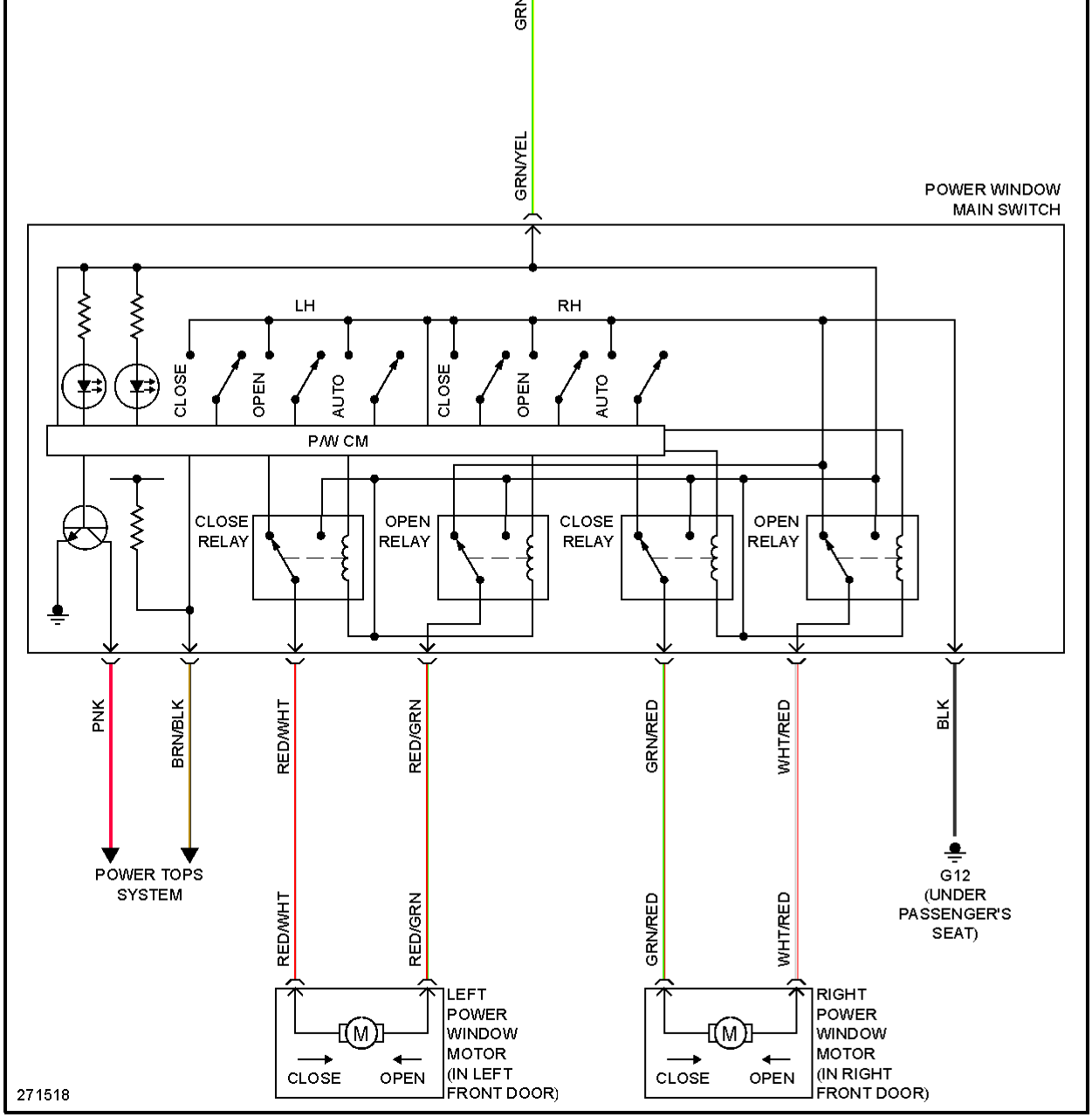

G11
(BEHIND RIGHT KICK PANEL)
G11
(BEHIND RIGHT KICK PANEL)
G17
(CENTER REAR OF LUGGAGE COMPT)
G17
(LEFT REAR CORNER OF ENGINE COMPT)
SWITCH
(CENTER FRONT OF ENGINE COMPT)
GRY
NCA
G17
(CENTER REAR OF LUGGAGE COMPT)
BLK B
KEYLESS BUZZER
(FRONT OF LUGGAGE COMPT)
RED/BLK A
BLK/BLU
RIGHT DOOR SWITCH
(ON RIGHT "B" PILLAR)
1 GRN/BLU
2 GRY
3 LT GRN
LOCK
UN-
LOCK
BLK
BRN/WHT
LEFT DOOR LOCK SWITCH
COMPUTER DATA LINES SYSTEM
BLU/WHT 4AA
GRN/BLK 4Z
RED/BLK 4Y
4X
4W
GRY 4V
HORNS SYSTEM
GRN/ORG 4U
BLU/BLK 4T
POWER WINDOWS SYSTEM
WHT 4S
GRN/BLU 4R
BLK/BLU 4Q
TRUNK, TAILGATE, FUEL DOORS SYSTEM
VIO 4P
4O
EXTERIOR LIGHTS SYSTEM
ORG 4N
4M
4 BLU/BLK
5 BLK/BLU
BLK/BLU
INTERIOR LIGHTS SYSTEM
BLU 4L
BRN 4K
GRN/WHT 4J
BRN/RED 4I
PNK 4H
GRY/RED 4G
4F
YEL/GRN 4E
4D
BRN/WHT
LOCK
BLK
BLK
UN-
LOCK
J/C
G11
RIGHT DOOR LOCK SWITCH
G11
(BEHIND RIGHT KICK PANEL)
6 BLU/ORG
7 YEL/BLK
BLU/ORG 4C
BRN/WHT 4B
YEL/BLK 4A
0914-101D
RED 2A
BLU 2B
WHT 2C
WHT/BLK 2D
BRN 2E
ORG 2F
LT GRN/BLK 2G
YEL 2H
GRN 2I
GRN/YEL 2J
GRN/WHT 2K
BLU/RED 2L
0914-101B
KEYLESS CONTROL MODULE (BEHIND LEFT END OF DASH)
RED
BLU
WHT
WHT/BLK
BRN
ORG
LT GRN/BLK
YEL
GRN
GRN/YEL
GRN/WHT
BLU/RED
A
B
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
NCA
RIGHT KEYLESS ANTENNA (IN RIGHT DOOR)
LEFT KEYLESS ANTENNA (IN LEFT DOOR)
REAR KEYLESS ANTENNA (CENTER REAR OF LUGGAGE COMPT)
TRUNK KEYLESS ANTENNA (FRONT OF LUGGAGE COMPT)
REAR KEYLESS ANTENNA 2 (REAR OF CENTER CONSOLE)
CENTER KEYLESS ANTENNA (UNDER CENTER CONSOLE)
1 W/ ADVANCED KEYLESS ENTRY & START SYSTEM
270264

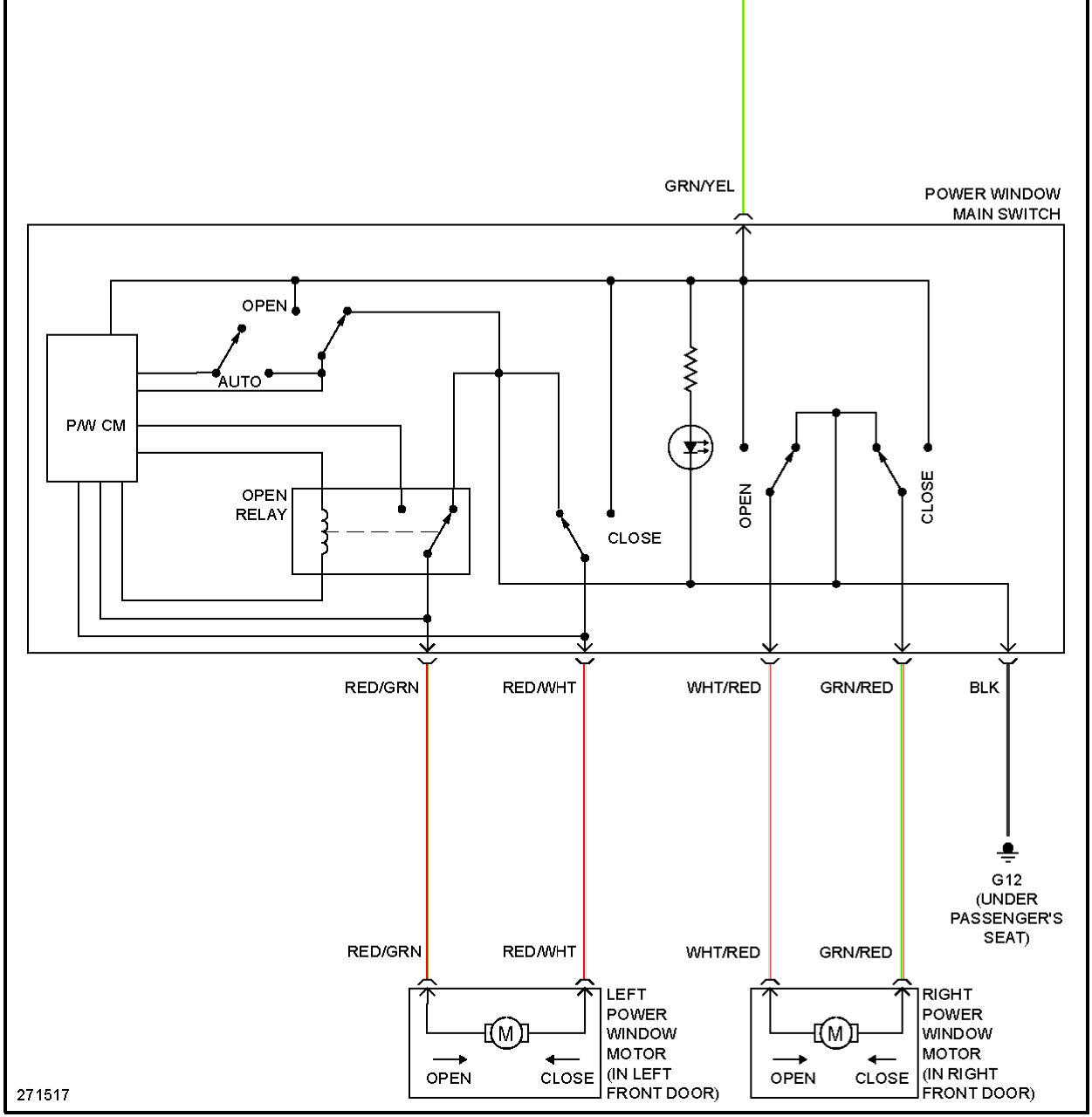

POWER
OUTER
MIRROR
SWITCH
DOWN
UP
UP
LEFT
DOWN
RIGHT
RIGHT
LEFT
LEFT
RIGHT
LEFT
RIGHT
BLK
LT GRN/
BLK
BLU/
YEL
BRN
BRN/
YEL
BRN/
BLK
J/C 11
G11
(BEHIND
RIGHT KICK
PANEL)
BRN
BRN/
YEL
LT GRN/
BLK
BRN
BRN/
BLK
BLU/
YEL
M
LEFT/RIGHT
M
UP/DOWN
LEFT POWER OUTER MIRROR
(ON FRONT LEFT DOOR)
M
LEFT/RIGHT
M
UP/DOWN
RIGHT POWER OUTER MIRROR
(ON FRONT RIGHT DOOR)
270606

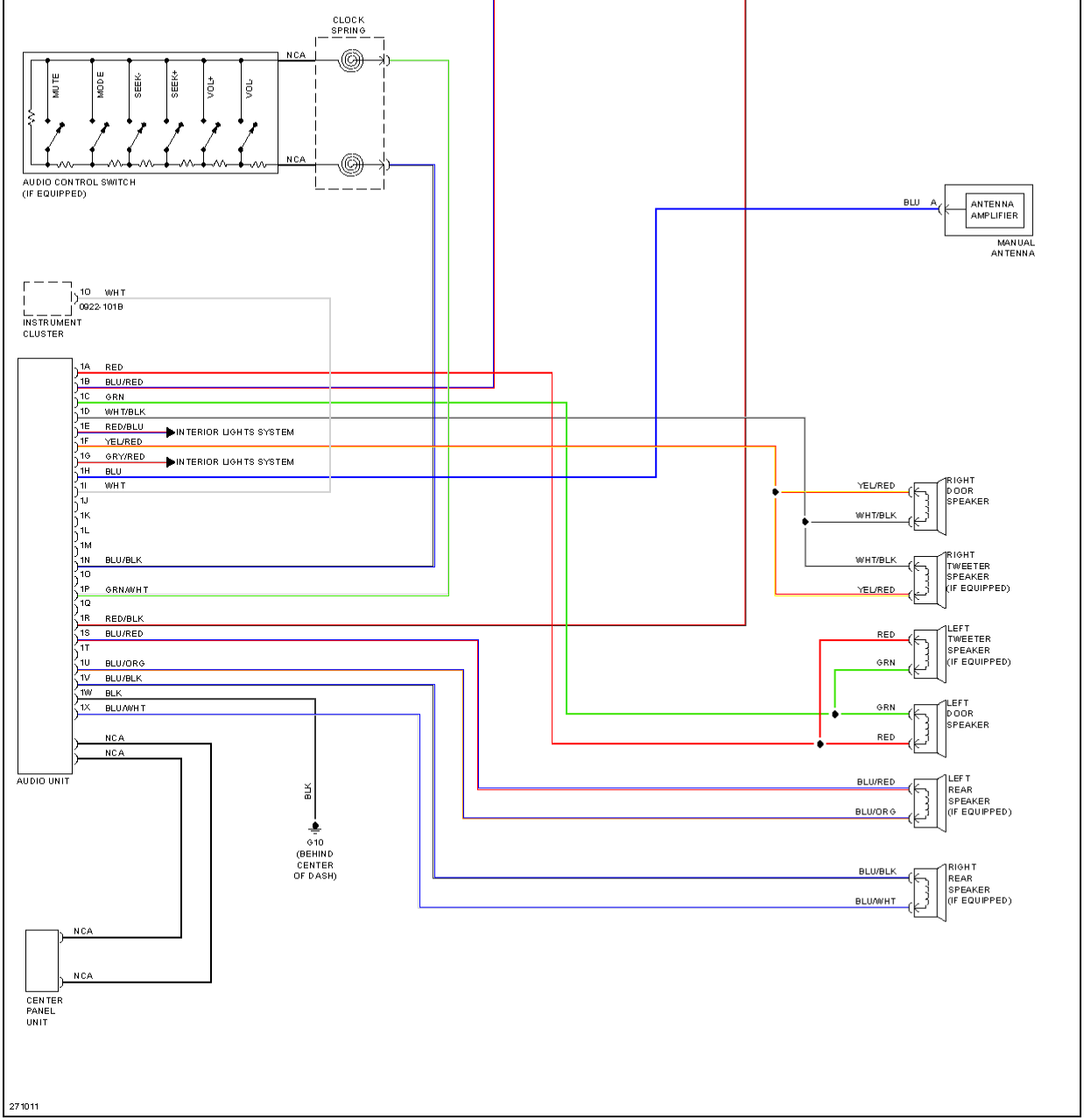

BRN
BRN
RIGHT SEAT WARMER SWITCH
LEFT SEAT WARMER SWITCH
GRN
BLK
BLK
GRN/RED
RIGHT SEAT WARMER (IN RIGHT SEAT CUSHION)
LEFT SEAT WARMER (IN LEFT SEAT CUSHION)
BLK
BLK
BLK/BLU
BLK
G12 (UNDER PASSENGER'S SEAT)
G14 (UNDER DRIVER'S SEAT)
248068

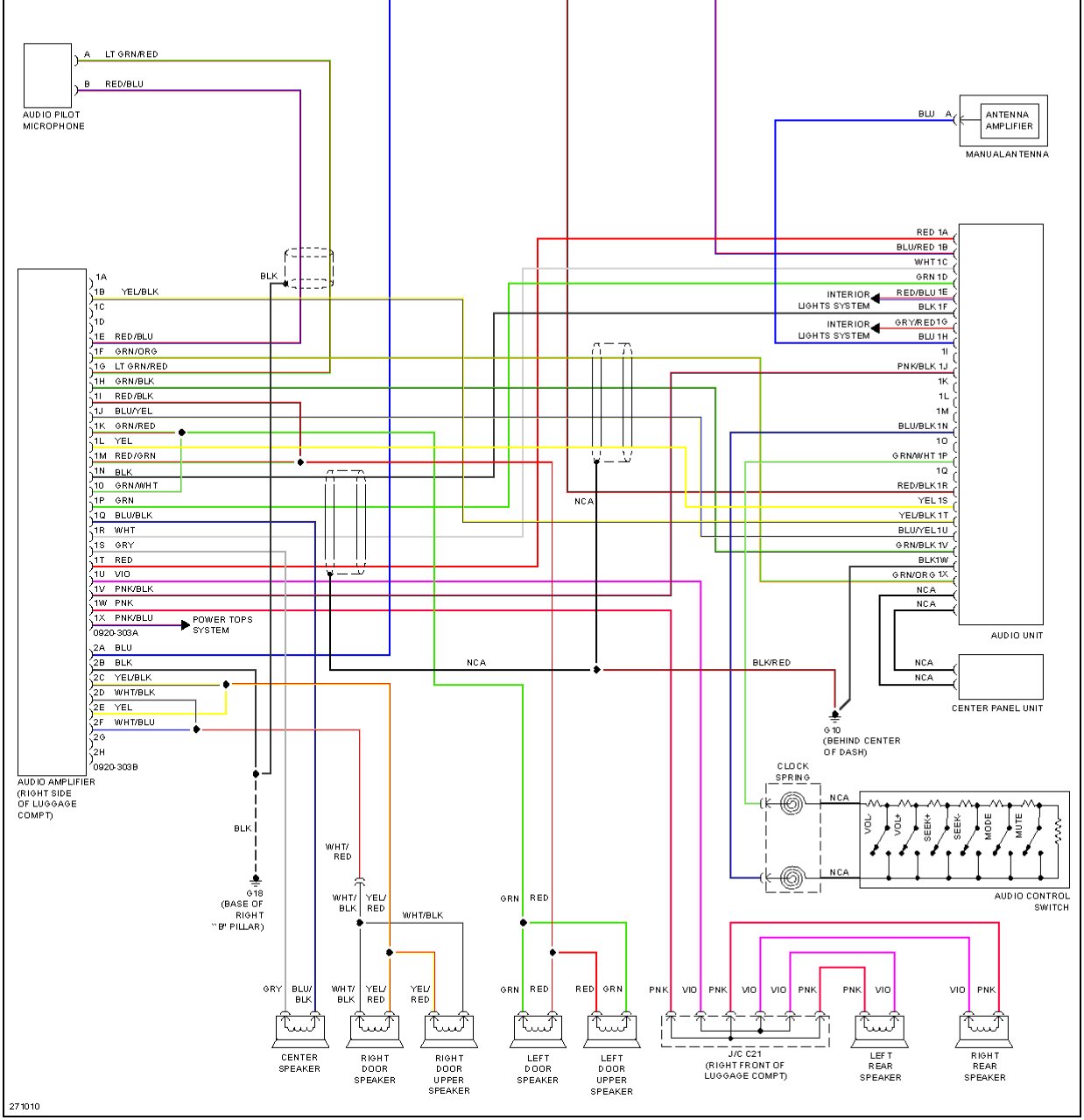

2A GRN
2B BRN
2C PNK/BLU
INTERIOR LIGHTS SYSTEM
2D
2E BLK
2F BLK
G20
(LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
0916-01B
1A WHT/RED
TRUNK, TAILGATE, FUEL DOORS SYSTEM
1B
1C PNK
1D PNK/BLU
1E BRN/BLK
1F ORG
INTERIOR LIGHTS SYSTEM
1G BLU/ORG
1H YEL
1I BLK/ORG
1J BLU/RED
1K BLK/BLU
1L
1M GRN/YEL
1N
1O BLK/GRN
1P
1Q BLU/GRN
1R BLK/WHT
1S BLU/WHT
COMPUTER DATA LINES SYSTEM
1T BLK/RED
1U GRN/BLK
COMPUTER DATA LINES SYSTEM
1V BLU
1W BLK
1X BLK/YEL
(LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
G19
0916-01A
3A BLU/WHT
3B
3C
3D RED
3E BLK/GRN
3F BLU/ORG
3G
3H BLK/WHT
3I BLU
3J
3K
3L WHT
3M BLK/YEL
3N
3O BLU/GRN
3P BLK/RED
0916-01C
POWER RETRACTABLE HARDTOP CONTROL MODULE (LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
G11
(BEHIND RIGHT KICK PANEL)
BLK
NCA
PNK/BLU
NCA
TOP LOCK SWITCH
YEL
G8
(BEHIND RIGHT SIDE OF DASH)
BLK
POWER RETRACTABLE HARDTOP SWITCH (PART OF THE HAZARD WARNING SWITCH)
PNK/BLU
1X
0920-303A
AUDIO AMPLIFIER (RIGHT SIDE OF LUGGAGE COMPT)
BLU
BLU/GRN
BLU
BLU/ORG
BLU
DECK PANEL LIMIT SWITCH (RIGHT SIDE OF RETRACTABLE TOP STORAGE COMPT)
BLK/RED
BLU
BLK/WHT
BLU
POWER RETRACTABLE HARDTOP LIMIT SWITCH (RIGHT SIDE OF RETRACTABLE TOP STORAGE COMPT)
BLK/RED
BLK/WHT
BLK/GRN
BLU/GRN
BLU/ORG
LEFT DECK PANEL MOTOR (LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
BLK/YEL
BLK/GRN
BLK/BLU
BLU/GRN
BLU/ORG
RIGHT DECK PANEL MOTOR (RIGHT SIDE OF RETRACTABLE TOP STORAGE COMPT)
WHT
RED
GRN/YEL
BLU/GRN
BLU/ORG
NCA
NCA
NCA
NCA
NCA
LEFT ROOF MOTOR (LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
BLU
BLU/WHT
BLK/ORG
BLU/GRN
BLU/ORG
NCA
NCA
NCA
NCA
NCA
RIGHT ROOF MOTOR (RIGHT SIDE OF RETRACTABLE TOP STORAGE COMPT)
270345

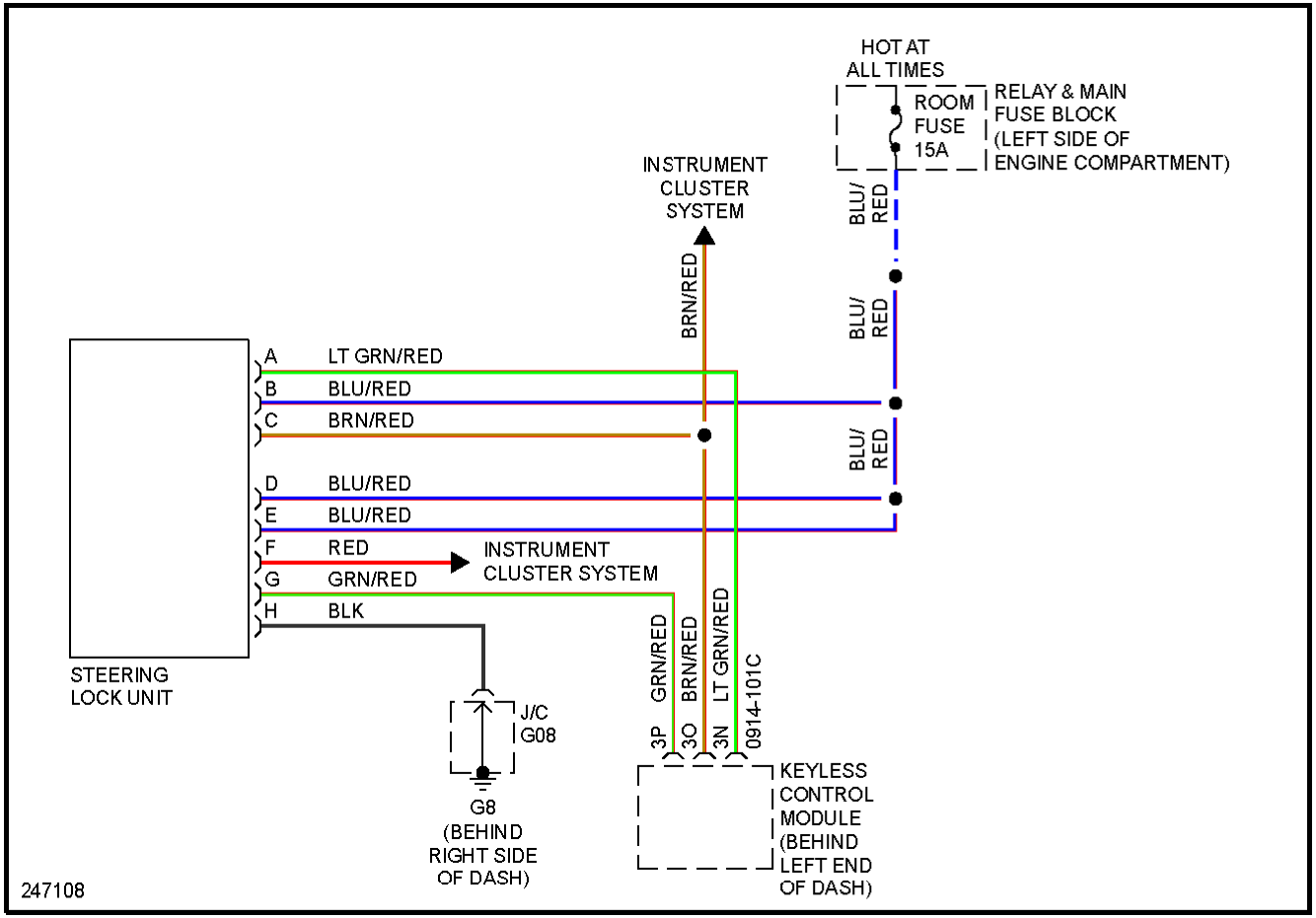

BLK/YEL
BLU
912-401A
POWER WINDOW
MAIN SWITCH
LH
RH
CLOSE
OPEN
AUTO
CLOSE
OPEN
AUTO
P/W CM
CLOSE
RELAY
OPEN
RELAY
CLOSE
RELAY
OPEN
RELAY
PNK
BRN/BLK
912-401B
WHT
RED/WHT
RED/GRN
GRN/RED
WHT/RED
BLK
912-401A
POWER TOPS
SYSTEM
DOOR
LOCKS
SYSTEM
G12
(UNDER
PASSENGER'S
SEAT)
M
CLOSE
OPEN
LEFT
POWER
WINDOW
MOTOR
(IN LEFT
FRONT DOOR)
RIGHT
POWER
WINDOW
MOTOR
(IN RIGHT
FRONT DOOR)
271519

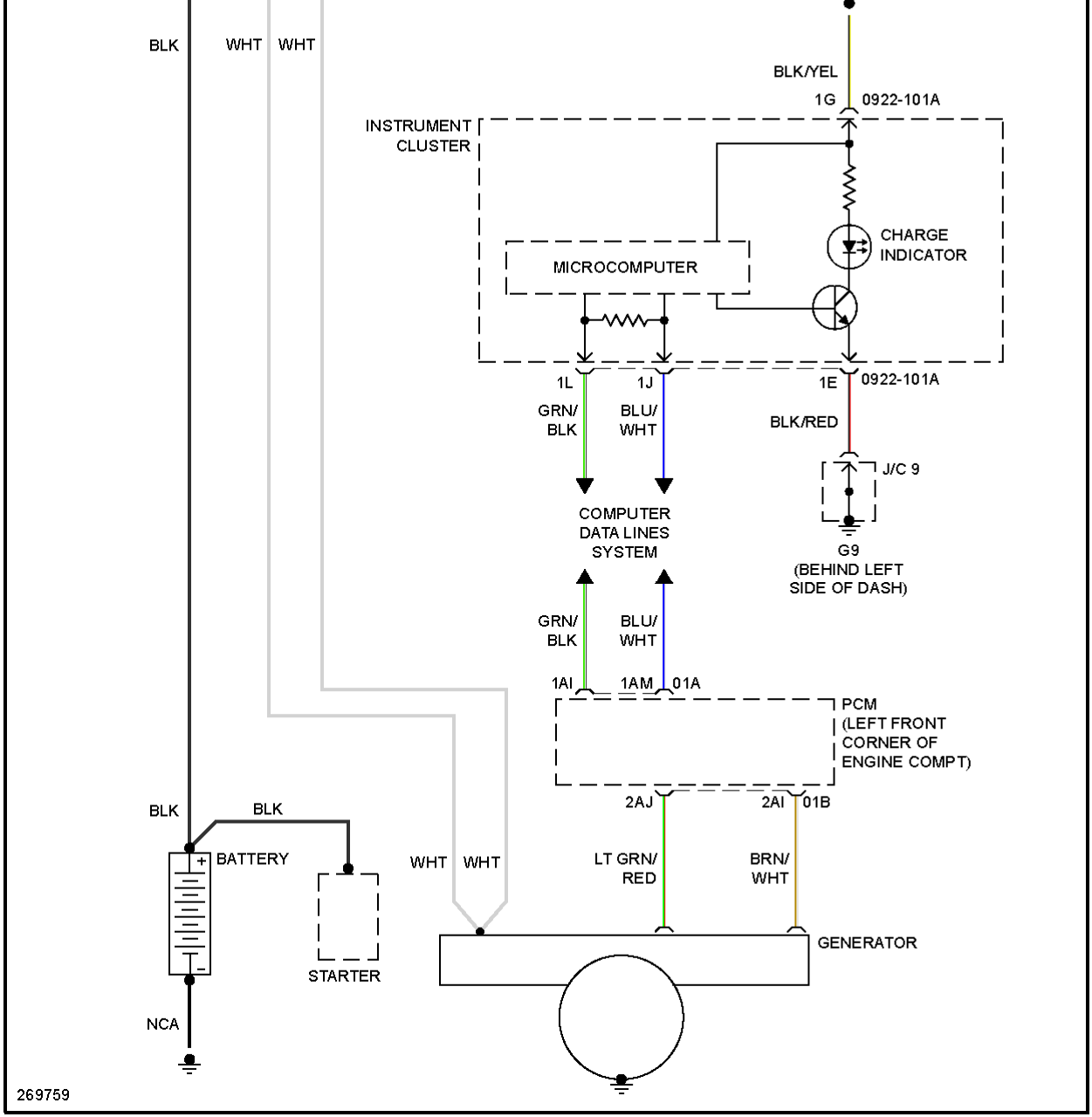

GRN
GRN/YEL
POWER WINDOW
MAIN SWITCH
LH
RH
CLOSE
OPEN
AUTO
CLOSE
OPEN
AUTO
P/W CM
CLOSE
RELAY
OPEN
RELAY
CLOSE
RELAY
OPEN
RELAY
PNK
BRN/BLK
RED/WHT
RED/GRN
GRN/RED
WHT/RED
BLK
POWER TOPS
SYSTEM
RED/WHT
RED/GRN
GRN/RED
WHT/RED
G12
(UNDER
PASSENGER'S
SEAT)
M
CLOSE
OPEN
LEFT
POWER
WINDOW
MOTOR
(IN LEFT
FRONT DOOR)
M
CLOSE
OPEN
RIGHT
POWER
WINDOW
MOTOR
(IN RIGHT
FRONT DOOR)
271518

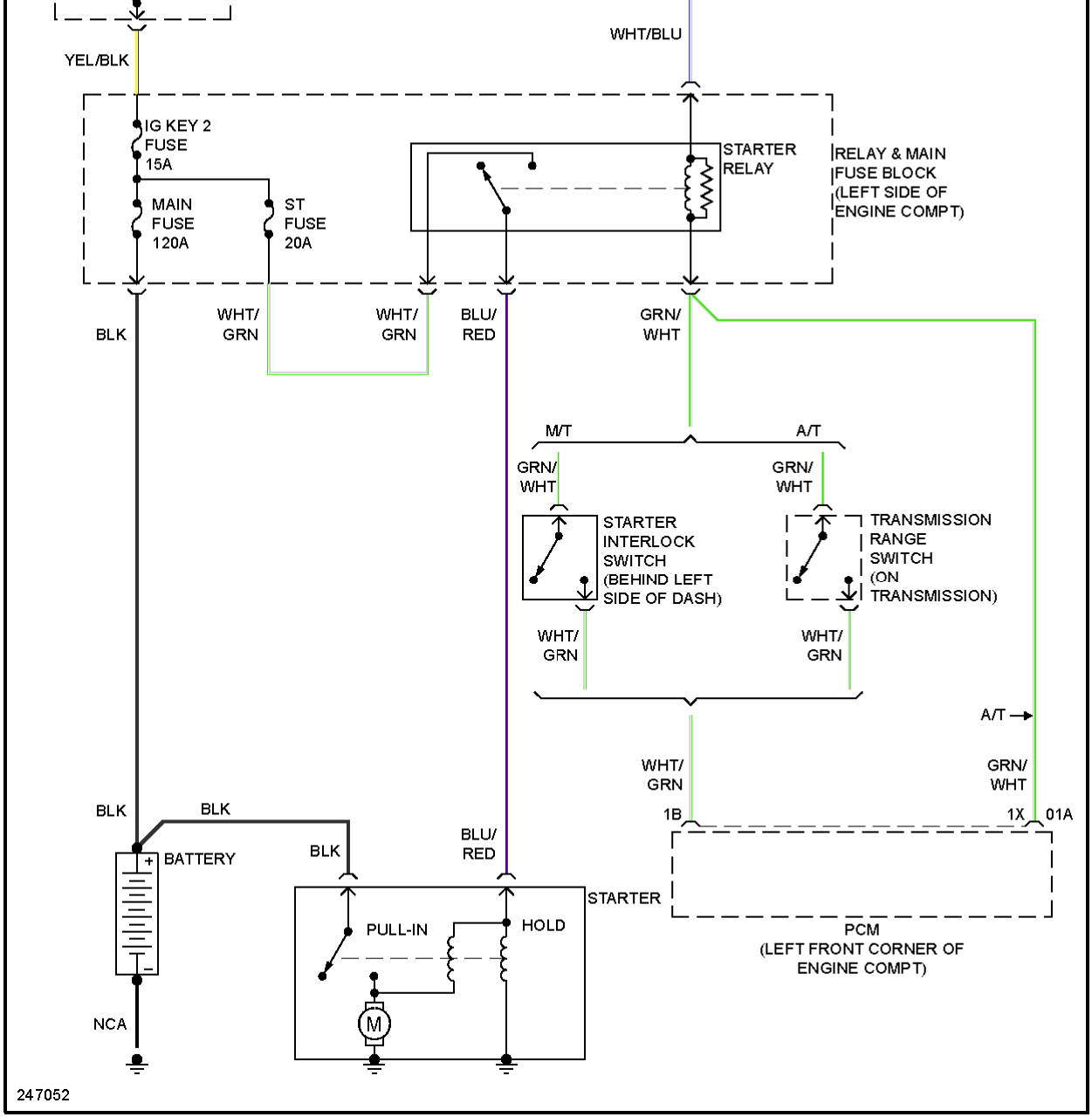

GRN/YEL
POWER WINDOW
MAIN SWITCH
OPEN
AUTO
P/W CM
OPEN
RELAY
CLOSE
OPEN
CLOSE
RED/GRN
RED/WHT
WHT/RED
GRN/RED
BLK
G12
(UNDER
PASSENGER'S
SEAT)
RED/GRN
RED/WHT
WHT/RED
GRN/RED
M
OPEN
CLOSE
LEFT
POWER
WINDOW
MOTOR
(IN LEFT
FRONT DOOR)
M
OPEN
CLOSE
RIGHT
POWER
WINDOW
MOTOR
(IN RIGHT
FRONT DOOR)
271517

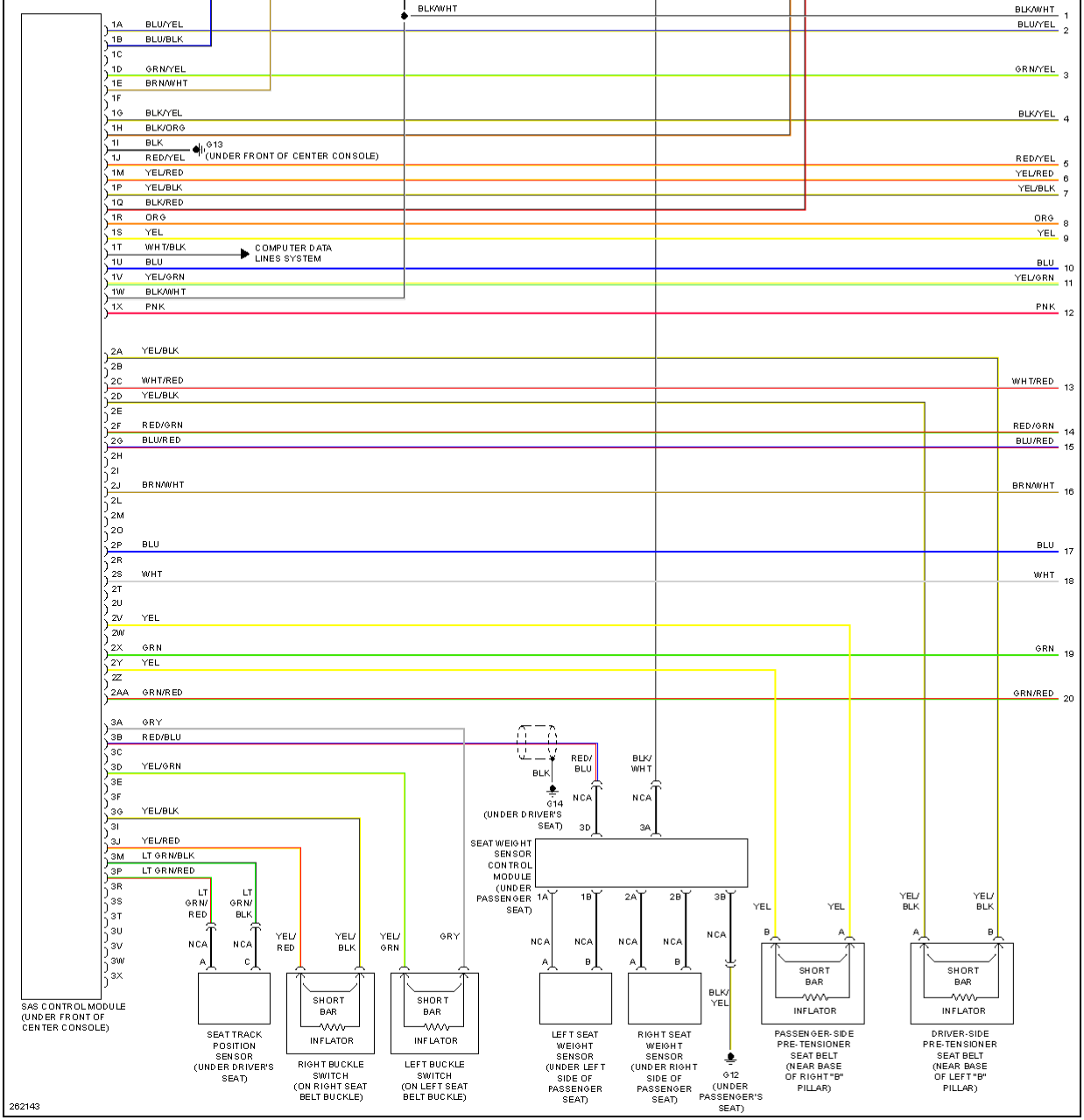

CLOCK SPRING
NCA
MUTE
MODE
SEEK-
SEEK+
VOL+
VOL-
NCA
AUDIO CONTROL SWITCH (IF EQUIPPED)
BLU A
ANTENNA AMPLIFIER
MANUAL ANTENNA
1O WHT
0922-101B
INSTRUMENT CLUSTER
1A RED
1B BLU/RED
1C GRN
1D WHT/BLK
1E RED/BLU
INTERIOR LIGHTS SYSTEM
1F YEL/RED
1G GRY/RED
INTERIOR LIGHTS SYSTEM
1H BLU
1I WHT
1J
1K
1L
1M
1N BLU/BLK
1O
1P GRN/WHT
1Q
1R RED/BLK
1S BLU/RED
1T
1U BLU/ORG
1V BLU/BLK
1W BLK
1X BLU/WHT
NCA
NCA
AUDIO UNIT
BLK
G10 (BEHIND CENTER OF DASH)
NCA
NCA
CENTER PANEL UNIT
YEL/RED
WHT/BLK
RIGHT DOOR SPEAKER
WHT/BLK
YEL/RED
RIGHT TWEETER SPEAKER (IF EQUIPPED)
RED
GRN
LEFT TWEETER SPEAKER (IF EQUIPPED)
GRN
RED
LEFT DOOR SPEAKER
BLU/RED
BLU/ORG
LEFT REAR SPEAKER (IF EQUIPPED)
BLU/BLK
BLU/WHT
RIGHT REAR SPEAKER (IF EQUIPPED)
271011

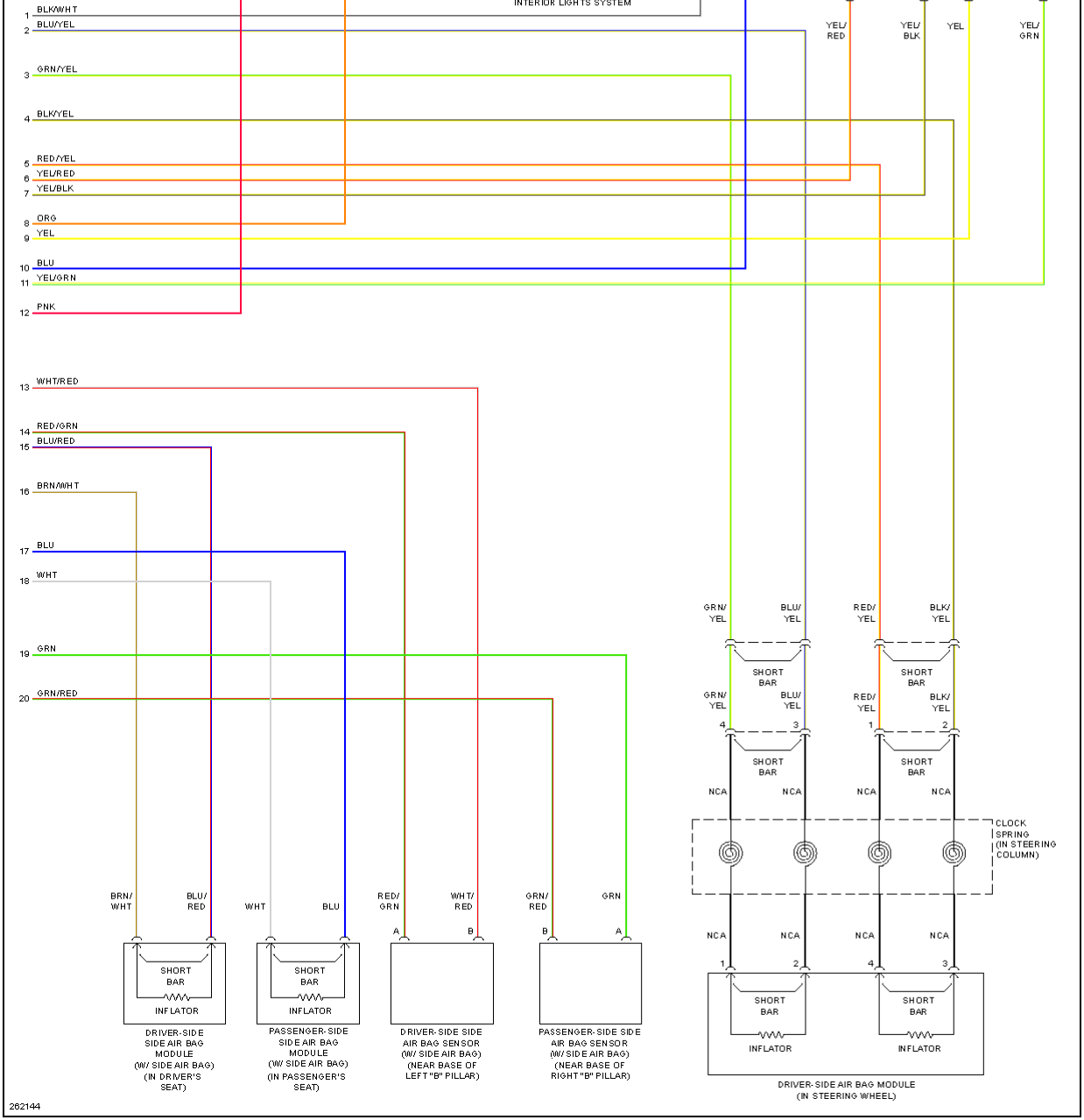

AUDIO PILOT MICROPHONE
A LT GRN/RED
B RED/BLU
ANTENNA AMPLIFIER
MANUAL ANTENNA
BLU A
AUDIO AMPLIFIER (RIGHT SIDE OF LUGGAGE COMPT)
0920-303A
0920-303B
POWER TOPS SYSTEM
INTERIOR LIGHTS SYSTEM
AUDIO UNIT
CENTER PANEL UNIT
NCA
BLK/RED
G10 (BEHIND CENTER OF DASH)
CLOCK SPRING
AUDIO CONTROL SWITCH
VOL-
VOL+
SEEK+
SEEK-
MODE
MUTE
G18 (BASE OF RIGHT "B" PILLAR)
CENTER SPEAKER
RIGHT DOOR SPEAKER
RIGHT DOOR UPPER SPEAKER
LEFT DOOR SPEAKER
LEFT DOOR UPPER SPEAKER
J/C C21 (RIGHT FRONT OF LUGGAGE COMPT)
LEFT REAR SPEAKER
RIGHT REAR SPEAKER
271010

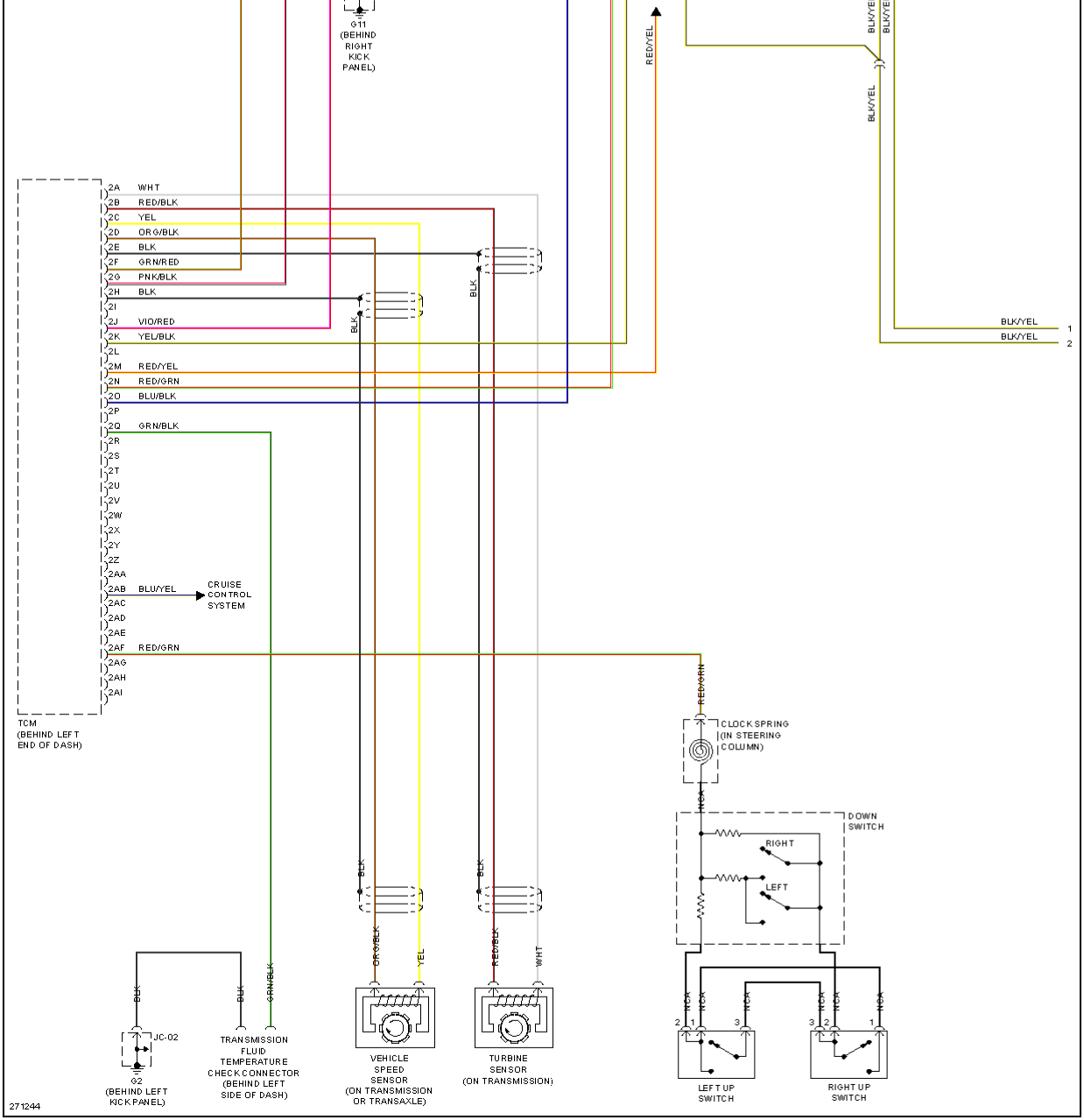

HOT AT
ALL TIMES
ROOM
FUSE
15A
RELAY & MAIN
FUSE BLOCK
(LEFT SIDE OF
ENGINE COMPARTMENT)
INSTRUMENT
CLUSTER
SYSTEM
BLU/
RED
BRN/RED
A
LT GRN/RED
B
BLU/RED
C
BRN/RED
D
BLU/RED
E
BLU/RED
F
RED
INSTRUMENT
CLUSTER SYSTEM
G
GRN/RED
H
BLK
STEERING
LOCK UNIT
J/C
G08
G8
(BEHIND
RIGHT SIDE
OF DASH)
GRN/RED
BRN/RED
LT GRN/RED
0914-101C
3P
3O
3N
KEYLESS
CONTROL
MODULE
(BEHIND
LEFT END
OF DASH)
247108

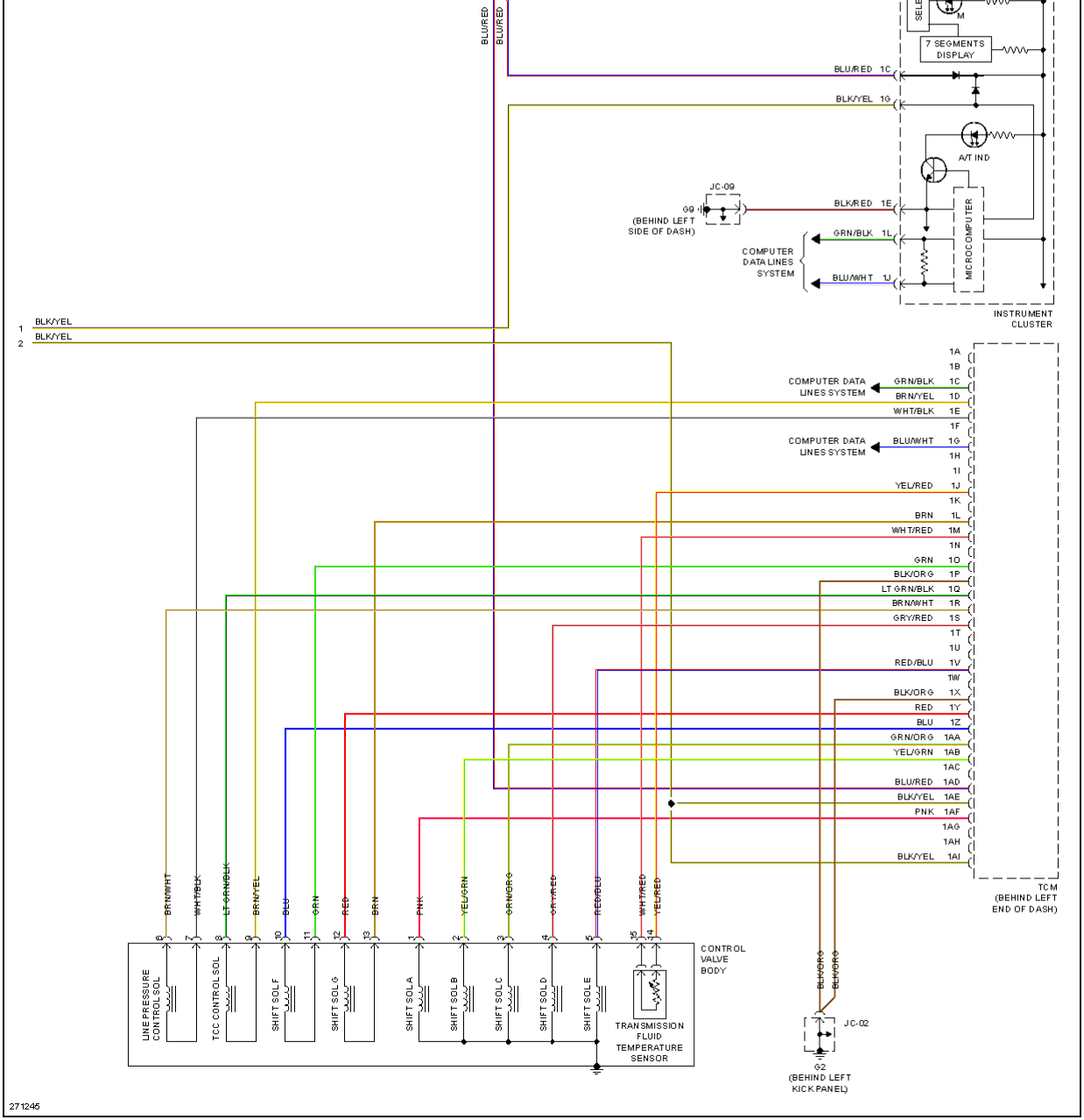

BLK
WHT
WHT
BLK/YEL
1G
0922-101A
INSTRUMENT CLUSTER
CHARGE INDICATOR
MICROCOMPUTER
1L
1J
1E
0922-101A
GRN/ BLK
BLU/ WHT
BLK/RED
J/C 9
COMPUTER DATA LINES SYSTEM
G9
(BEHIND LEFT SIDE OF DASH)
GRN/ BLK
BLU/ WHT
1AI
1AM
01A
PCM
(LEFT FRONT CORNER OF ENGINE COMPT)
2AJ
2AI
01B
BLK
BLK
BATTERY
WHT
WHT
LT GRN/ RED
BRN/ WHT
GENERATOR
STARTER
NCA
269759

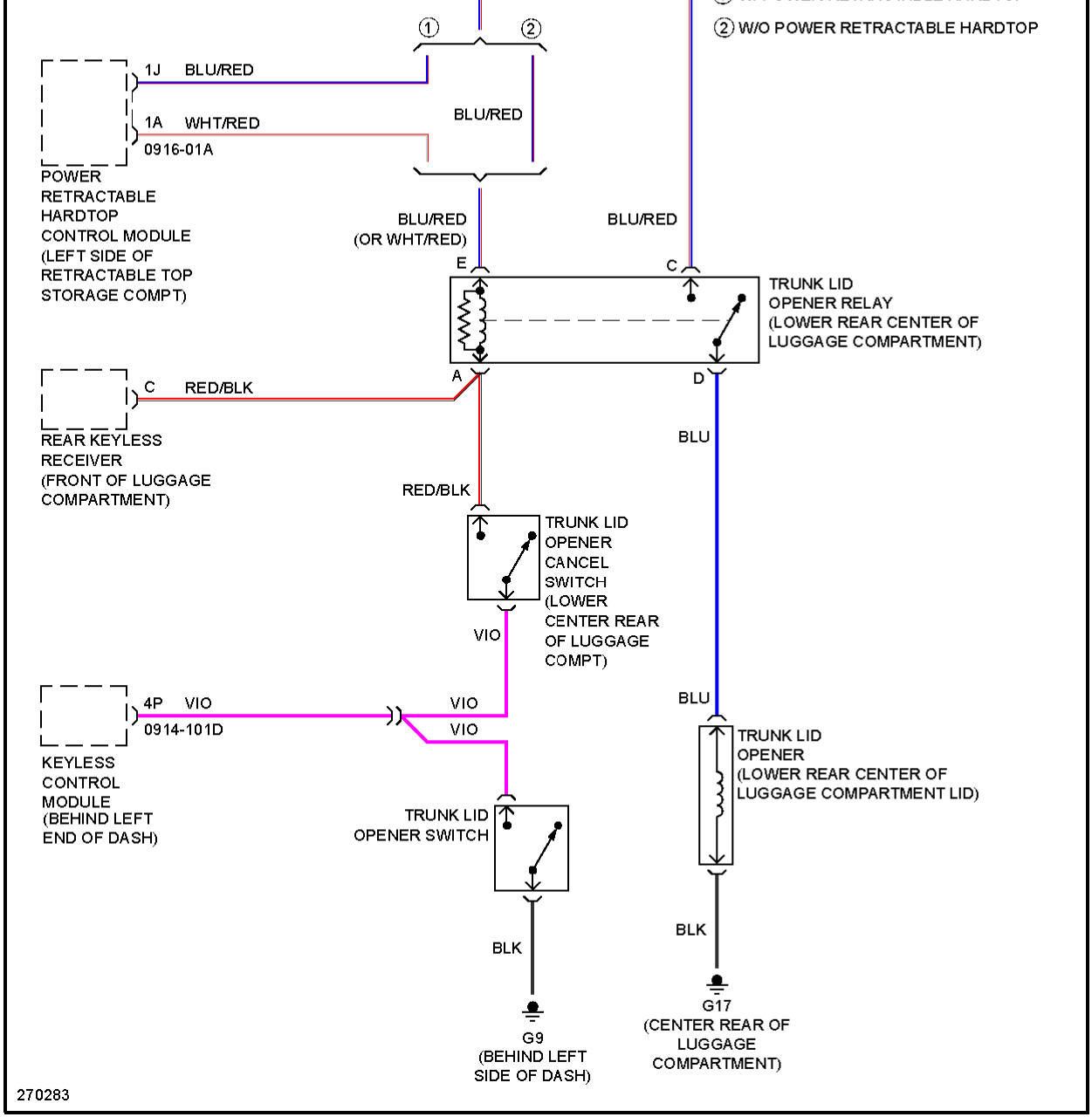

WHT/BLU
YEL/BLK
IG KEY 2
FUSE
15A
MAIN
FUSE
120A
ST
FUSE
20A
STARTER
RELAY
RELAY & MAIN
FUSE BLOCK
(LEFT SIDE OF
ENGINE COMPT)
BLK
WHT/
GRN
WHT/
GRN
BLU/
RED
GRN/
WHT
M/T
A/T
GRN/
WHT
GRN/
WHT
STARTER
INTERLOCK
SWITCH
(BEHIND LEFT
SIDE OF DASH)
TRANSMISSION
RANGE
SWITCH
(ON
TRANSMISSION)
WHT/
GRN
WHT/
GRN
A/T
WHT/
GRN
GRN/
WHT
1B
1X
01A
BLK
BLK
BLK
BLU/
RED
BATTERY
STARTER
PULL-IN
HOLD
M
PCM
(LEFT FRONT CORNER OF
ENGINE COMPT)
NCA
247052

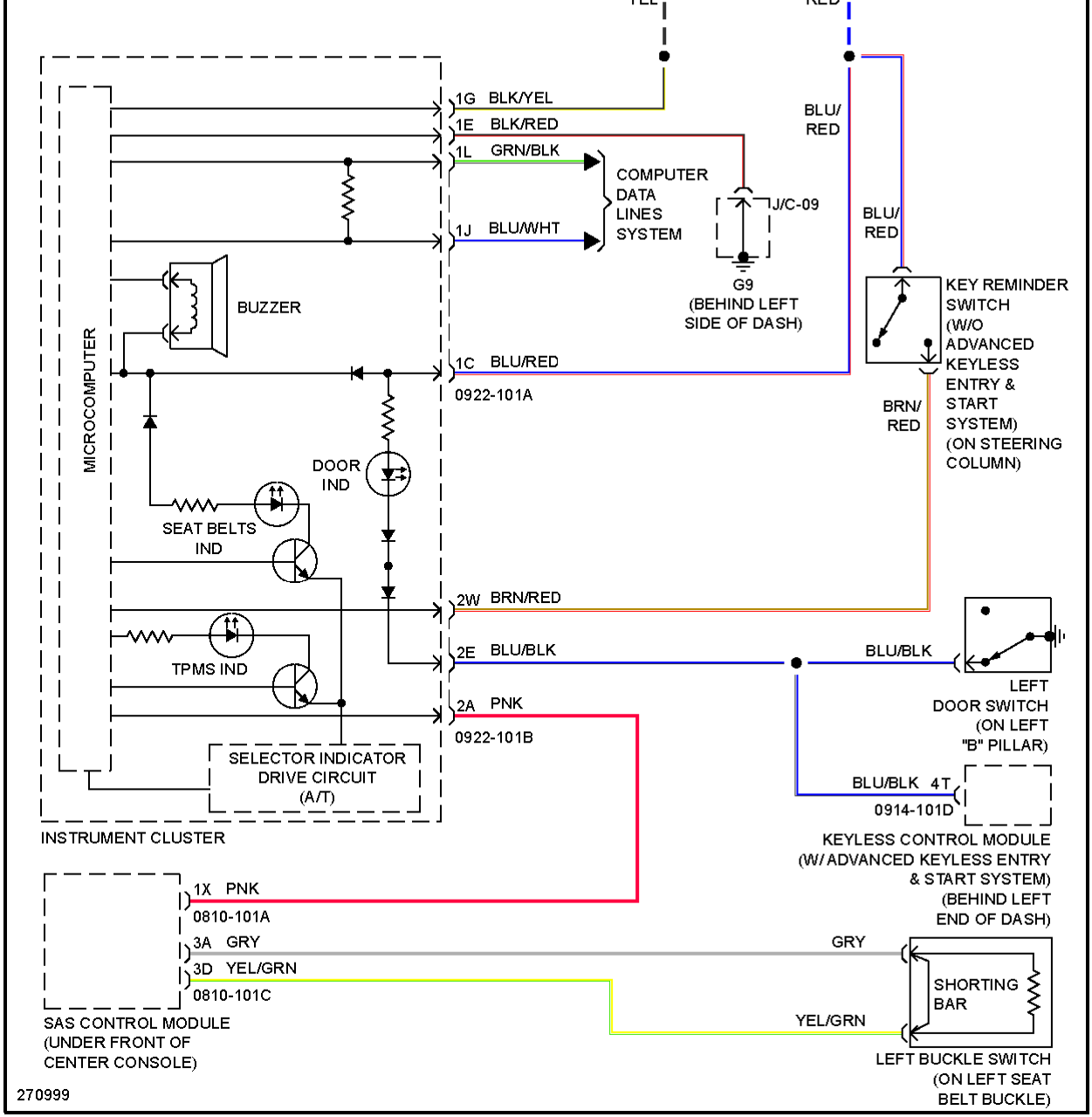

1A BLU/YEL
1B BLU/BLK
1C
1D GRN/YEL
1E BRN/WHT
1F
1G BLK/YEL
1H BLK/ORG
1I BLK
1J RED/YEL
1M YEL/RED
1P YEL/BLK
1Q BLK/RED
1R ORG
1S YEL
1T WHT/BLK
1U BLU
1V YEL/GRN
1W BLK/WHT
1X PNK
G13
(UNDER FRONT OF CENTER CONSOLE)
COMPUTER DATA LINES SYSTEM
BLK/WHT
BLU/YEL
GRN/YEL
BLK/YEL
RED/YEL
YEL/RED
YEL/BLK
ORG
YEL
BLU
YEL/GRN
PNK
2A YEL/BLK
2B
2C WHT/RED
2D YEL/BLK
2E
2F RED/GRN
2G BLU/RED
2H
2I
2J BRN/WHT
2L
2M
2O
2P BLU
2R
2S WHT
2T
2U
2V YEL
2W
2X GRN
2Y YEL
2Z
2AA GRN/RED
WHT/RED
RED/GRN
BLU/RED
BRN/WHT
BLU
WHT
GRN
GRN/RED
3A GRY
3B RED/BLU
3C
3D YEL/GRN
3E
3F
3G YEL/BLK
3I
3J YEL/RED
3M LT GRN/BLK
3P LT GRN/RED
3R
3S
3T
3U
3V
3W
3X
SAS CONTROL MODULE
(UNDER FRONT OF
CENTER CONSOLE)
LT GRN/ RED
LT GRN/ BLK
NCA
A
C
SEAT TRACK POSITION SENSOR (UNDER DRIVER'S SEAT)
YEL/ RED
YEL/ BLK
SHORT BAR
INFLATOR
RIGHT BUCKLE SWITCH (ON RIGHT SEAT BELT BUCKLE)
YEL/ GRN
GRY
LEFT BUCKLE SWITCH (ON LEFT SEAT BELT BUCKLE)
BLK
RED/ BLU
G14
(UNDER DRIVER'S SEAT)
BLK/ WHT
3D
3A
SEAT WEIGHT SENSOR CONTROL MODULE (UNDER PASSENGER SEAT)
1A
1B
2A
2B
3B
B
LEFT SEAT WEIGHT SENSOR (UNDER LEFT SIDE OF PASSENGER SEAT)
RIGHT SEAT WEIGHT SENSOR (UNDER RIGHT SIDE OF PASSENGER SEAT)
BLK/ YEL
G12
(UNDER PASSENGER'S SEAT)
YEL
PASSENGER-SIDE PRE-TENSIONER SEAT BELT (NEAR BASE OF RIGHT "B" PILLAR)
YEL/ BLK
DRIVER-SIDE PRE-TENSIONER SEAT BELT (NEAR BASE OF LEFT "B" PILLAR)
262143

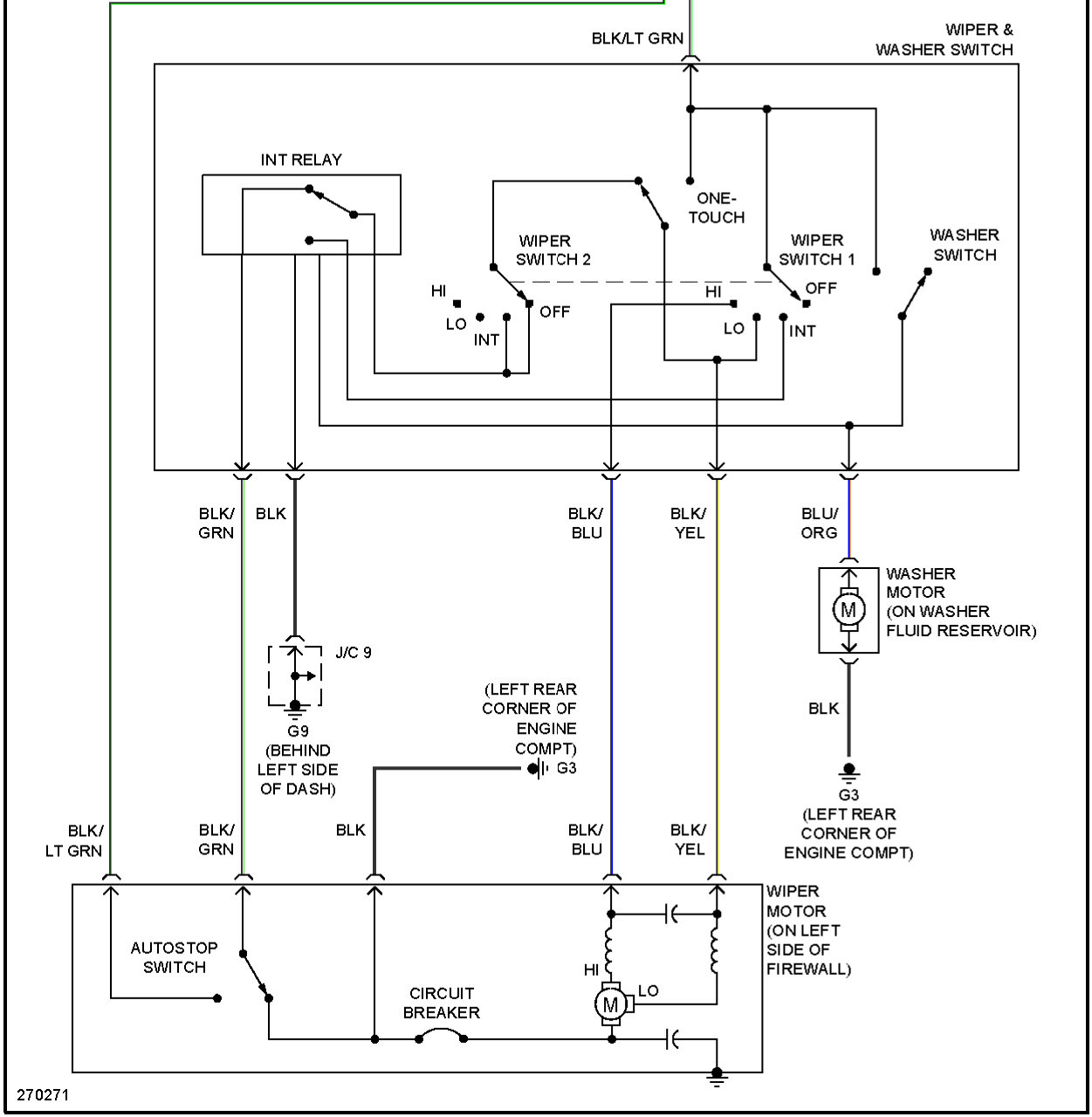

INTERIOR LIGHTS SYSTEM
1 BLK/WHT
2 BLU/YEL
3 GRN/YEL
4 BLK/YEL
5 RED/YEL
6 YEL/RED
7 YEL/BLK
8 ORG
9 YEL
10 BLU
11 YEL/GRN
12 PNK
13 WHT/RED
14 RED/GRN
15 BLU/RED
16 BRN/WHT
17 BLU
18 WHT
19 GRN
20 GRN/RED
YEL/ RED
YEL/ BLK
YEL
YEL/ GRN
GRN/ YEL
BLU/ YEL
RED/ YEL
BLK/ YEL
SHORT BAR
NCA
CLOCK SPRING (IN STEERING COLUMN)
INFLATOR
BRN/ WHT
BLU/ RED
WHT
BLU
RED/ GRN
WHT/ RED
GRN/ RED
GRN
DRIVER-SIDE SIDE AIR BAG MODULE (W/ SIDE AIR BAG) (IN DRIVER'S SEAT)
PASSENGER-SIDE SIDE AIR BAG MODULE (W/ SIDE AIR BAG) (IN PASSENGER'S SEAT)
DRIVER-SIDE SIDE AIR BAG SENSOR (W/ SIDE AIR BAG) (NEAR BASE OF LEFT "B" PILLAR)
PASSENGER-SIDE SIDE AIR BAG SENSOR (W/ SIDE AIR BAG) (NEAR BASE OF RIGHT "B" PILLAR)
DRIVER-SIDE AIR BAG MODULE (IN STEERING WHEEL)
262144


G11
(BEHIND
RIGHT
KICK
PANEL)
RED/YEL
BLK/YEL
BLK/YEL
BLK/YEL
1
BLK/YEL
2
2A WHT
2B RED/BLK
2C YEL
2D ORG/BLK
2E BLK
2F GRN/RED
2G PNK/BLK
2H BLK
2I
2J VIO/RED
2K YEL/BLK
2L
2M RED/YEL
2N RED/GRN
2O BLU/BLK
2P
2Q GRN/BLK
2R
2S
2T
2U
2V
2W
2X
2Y
2Z
2AA
2AB BLU/YEL
CRUISE
CONTROL
SYSTEM
2AC
2AD
2AE
2AF RED/GRN
2AG
2AH
2AI
TCM
(BEHIND LEFT
END OF DASH)
BLK
BLK
BLK
BLK
RED/GRN
CLOCK SPRING
(IN STEERING
COLUMN)
NCA
DOWN
SWITCH
RIGHT
LEFT
BLK
BLK
GRN/BLK
ORG/BLK
YEL
RED/BLK
WHT
NCA
NCA
NCA
NCA
NCA
NCA
2
1
3
3
2
1
JC-02
G2
(BEHIND LEFT
KICK PANEL)
TRANSMISSION
FLUID
TEMPERATURE
CHECK CONNECTOR
(BEHIND LEFT
SIDE OF DASH)
VEHICLE
SPEED
SENSOR
(ON TRANSMISSION
OR TRANSAXLE)
TURBINE
SENSOR
(ON TRANSMISSION)
LEFT UP
SWITCH
RIGHT UP
SWITCH
271244


BLU/RED
BLU/RED
7 SEGMENTS DISPLAY
BLU/RED 1C
BLK/YEL 1G
A/T IND
JC-09
G9
(BEHIND LEFT SIDE OF DASH)
BLK/RED 1E
GRN/BLK 1L
BLU/WHT 1J
COMPUTER DATA LINES SYSTEM
MICROCOMPUTER
INSTRUMENT CLUSTER
1 BLK/YEL
2 BLK/YEL
COMPUTER DATA LINES SYSTEM
GRN/BLK 1C
BRN/YEL 1D
WHT/BLK 1E
COMPUTER DATA LINES SYSTEM
BLU/WHT 1G
YEL/RED 1J
BRN 1L
WHT/RED 1M
GRN 1O
BLK/ORG 1P
LT GRN/BLK 1Q
BRN/WHT 1R
GRY/RED 1S
RED/BLU 1V
BLK/ORG 1X
RED 1Y
BLU 1Z
GRN/ORG 1AA
YEL/GRN 1AB
BLU/RED 1AD
BLK/YEL 1AE
PNK 1AF
BLK/YEL 1AI
TCM (BEHIND LEFT END OF DASH)
BRN/WHT
WHT/BLK
LT GRN/BLK
BRN/YEL
BLU
GRN
RED
BRN
PNK
YEL/GRN
GRN/ORG
GRY/RED
RED/BLU
WHT/RED
YEL/RED
LINE PRESSURE CONTROL SOL
TCC CONTROL SOL
SHIFT SOL F
SHIFT SOL G
SHIFT SOL A
SHIFT SOL B
SHIFT SOL C
SHIFT SOL D
SHIFT SOL E
TRANSMISSION FLUID TEMPERATURE SENSOR
CONTROL VALVE BODY
BLK/ORG
BLK/ORG
JC-02
G2
(BEHIND LEFT KICK PANEL)
271245


② W/O POWER RETRACTABLE HARDTOP
1J BLU/RED
1A WHT/RED
0916-01A
POWER RETRACTABLE HARDTOP CONTROL MODULE (LEFT SIDE OF RETRACTABLE TOP STORAGE COMPT)
BLU/RED
BLU/RED (OR WHT/RED)
BLU/RED
E
C
TRUNK LID OPENER RELAY (LOWER REAR CENTER OF LUGGAGE COMPARTMENT)
A
D
C RED/BLK
REAR KEYLESS RECEIVER (FRONT OF LUGGAGE COMPARTMENT)
BLU
RED/BLK
TRUNK LID OPENER CANCEL SWITCH (LOWER CENTER REAR OF LUGGAGE COMPT)
VIO
BLU
4P VIO
0914-101D
VIO
VIO
KEYLESS CONTROL MODULE (BEHIND LEFT END OF DASH)
TRUNK LID OPENER (LOWER REAR CENTER OF LUGGAGE COMPARTMENT LID)
TRUNK LID OPENER SWITCH
BLK
BLK
G9 (BEHIND LEFT SIDE OF DASH)
G17 (CENTER REAR OF LUGGAGE COMPARTMENT)
270283


1G BLK/YEL
1E BLK/RED
1L GRN/BLK
1J BLU/WHT
COMPUTER DATA LINES SYSTEM
J/C-09
G9
(BEHIND LEFT SIDE OF DASH)
BLU/ RED
BLU/ RED
KEY REMINDER SWITCH (W/O ADVANCED KEYLESS ENTRY & START SYSTEM) (ON STEERING COLUMN)
BRN/ RED
BUZZER
MICROCOMPUTER
1C BLU/RED
0922-101A
DOOR IND
SEAT BELTS IND
TPMS IND
2W BRN/RED
2E BLU/BLK
2A PNK
0922-101B
SELECTOR INDICATOR DRIVE CIRCUIT (A/T)
INSTRUMENT CLUSTER
BLU/BLK
LEFT DOOR SWITCH (ON LEFT "B" PILLAR)
BLU/BLK 4T
0914-101D
KEYLESS CONTROL MODULE (W/ ADVANCED KEYLESS ENTRY & START SYSTEM) (BEHIND LEFT END OF DASH)
1X PNK
0810-101A
3A GRY
3D YEL/GRN
0810-101C
SAS CONTROL MODULE (UNDER FRONT OF CENTER CONSOLE)
GRY
YEL/GRN
SHORTING BAR
LEFT BUCKLE SWITCH (ON LEFT SEAT BELT BUCKLE)
270999


BLK/LT GRN
WIPER &
WASHER SWITCH
INT RELAY
ONE-
TOUCH
WIPER
SWITCH 2
WIPER
SWITCH 1
WASHER
SWITCH
HI
LO
INT
OFF
HI
LO
INT
OFF
BLK/
GRN
BLK
BLK/
BLU
BLK/
YEL
BLU/
ORG
WASHER
MOTOR
(ON WASHER
FLUID RESERVOIR)
M
J/C 9
G9
(BEHIND
LEFT SIDE
OF DASH)
(LEFT REAR
CORNER OF
ENGINE
COMPT)
G3
BLK
G3
(LEFT REAR
CORNER OF
ENGINE COMPT)
BLK/
LT GRN
BLK/
GRN
BLK
BLK/
BLU
BLK/
YEL
WIPER
MOTOR
(ON LEFT
SIDE OF
FIREWALL)
AUTOSTOP
SWITCH
CIRCUIT
BREAKER
HI
LO
M
270271