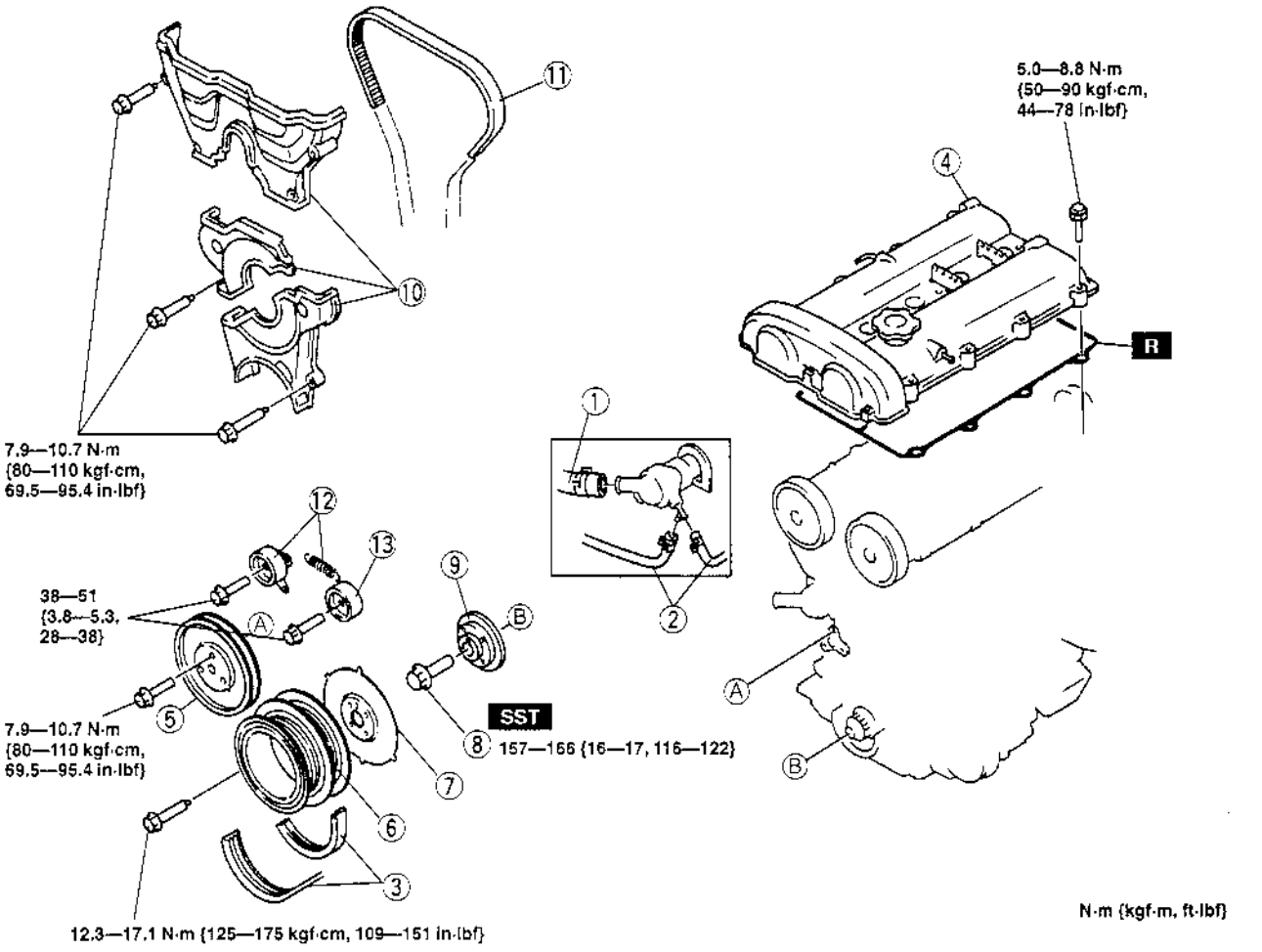
TIMING BELT REMOVAL/INSTALLATION

X5U110W06

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
3. Remove the air hose.
4. Remove the camshaft position sensor and crankshaft position sensor.
5. Remove the high-tension lead and ignition coil. (Refer to 01–18 IGNITION COIL REMOVAL/INSTALLATION.)
6. Remove the spark plug. (Refer to 01–18 SPARK PLUG REMOVAL/INSTALLATION.)
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Verify the air gap. (Refer to 01–40 CRANKSHAFT POSITION SENSOR INSPECTION.)
10. Start the engine and
    (1) Inspect for the pulleys and drive belt for runout and contact.
    (2) Verify the ignition timing. (Refer to 01–10 ENGINE TUNE-UP, Ignition Timing Inspection.)



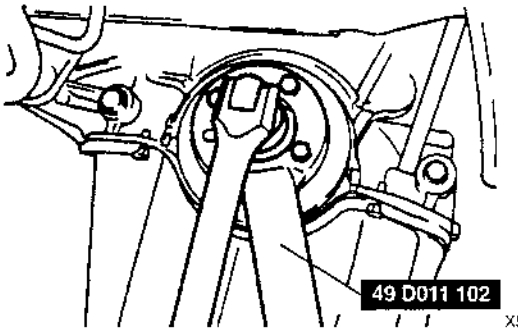
X5U110WAH

1	Upper radiator hose
2	Water hose
3	Drive belt ☞ 01–10 DRIVE BELT ADJUSTMENT
4	Cylinder head cover ☞ Installation Note
5	Water pump pulley
6	Crankshaft pulley
7	Plate

8	Pulley lock bolt ☞ Removal/Installation Note
9	Pulley boss
10	Timing belt cover
11	Timing belt ☞ Removal Note ☞ Installation Note
12	Tensioner and tensioner spring ☞ Installation Note
13	Idler

Pulley Lock Bolt Removal/Installation Note

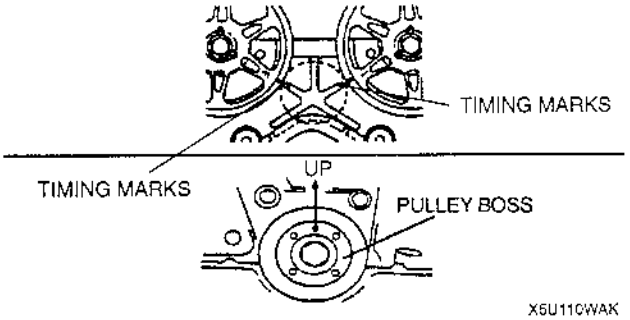
- Hold the crankshaft by using the **SST**.



X5U110WAJ

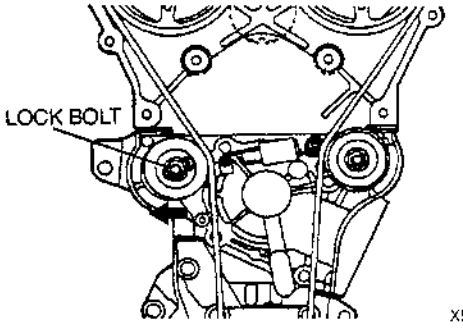
Timing Belt Removal Note

1. Install the pulley boss.
2. Install the pulley lock bolt.
3. Turn the crankshaft clockwise and face the pin on the pulley boss straight up and align the timing marks.



X5U110WAK

4. Loosen the tensioner lock bolt.
5. Push the tensioner in the direction of the arrow and hand-tighten the lock bolt.



X5U110WAL

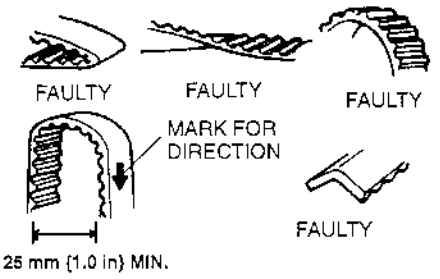
6. Remove the pulley lock bolt.
7. Remove the pulley boss.

Caution

- **The following will damage the belt and shorten its life; forcefully twisting it, turning it inside out, or allowing oil or grease on it.**

Note

- Mark the timing belt rotation on the belt for proper reinstallation.

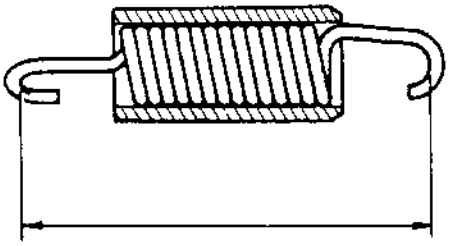


X5U110WAM

Tensioner and Tensioner Spring Installation Note

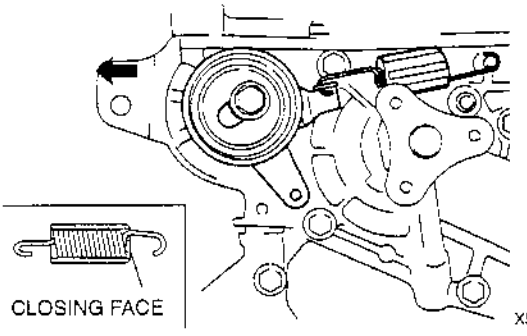
1. Measure the tensioner spring free length. If not within the specification, replace the tensioner spring.

Free length
59.2 mm {2.33 in}



X5U110WAN

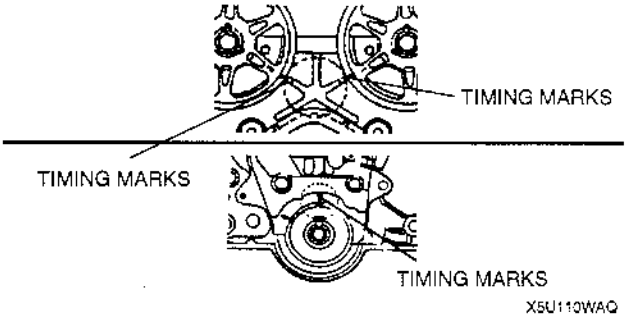
2. Install the tensioner.
3. Install the tensioner spring with the damper rubber closing face on the right side.
4. Temporarily secure the tensioner with the spring fully extended.



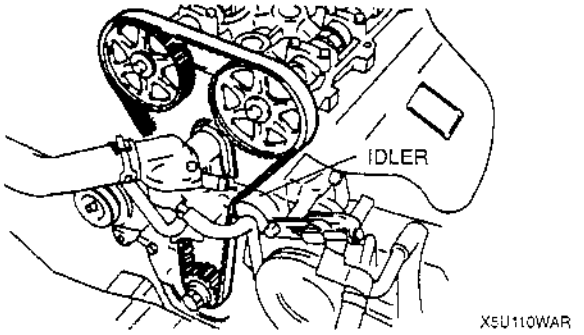
X5U110WAP

Timing Belt Installation Note

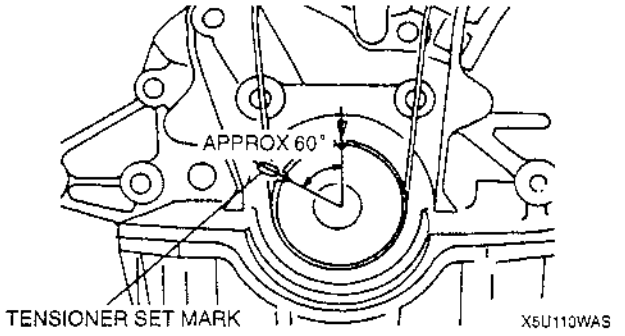
1. Verify that the timing belt pulley mark and camshaft pulley marks are aligned with the timing marks as shown.



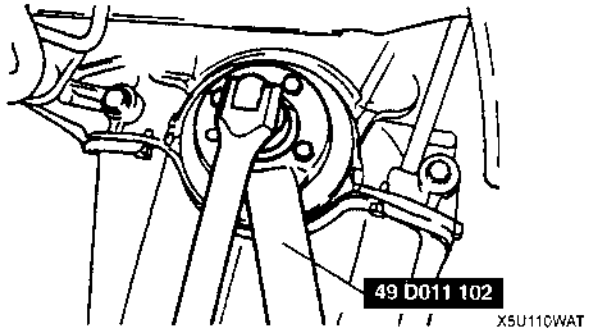
2. Install the timing belt so that there is no looseness at the idler side and between the camshaft pulleys.



3. Install the pulley boss and pulley lock bolt.
4. Turn the crankshaft clockwise 1 and 5/6 times, and align the timing belt pulley mark with the tensioner set mark for proper timing belt tension adjustment.



5. Hold the crankshaft by using the **SST**, and remove the pulley lock bolt and the pulley boss.



6. Verify that the timing belt pulley mark is aligned with the tensioner set mark.

Caution
- **Be sure not to apply tension other than that of the tensioner spring.**

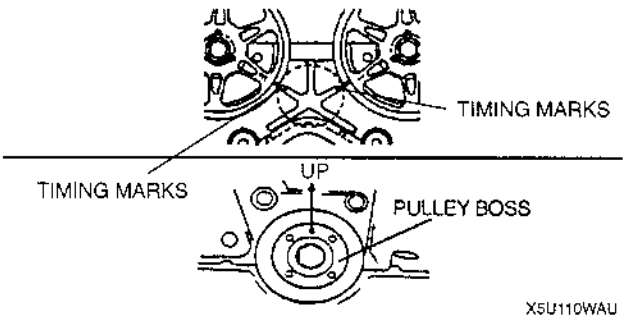
7. Loosen the tensioner lock bolt to apply tension to the timing belt.

Caution
- **Avoid the tensioner from moving with the tensioner lock bolt as it is turned.**

8. Tighten the tensioner lock bolt.

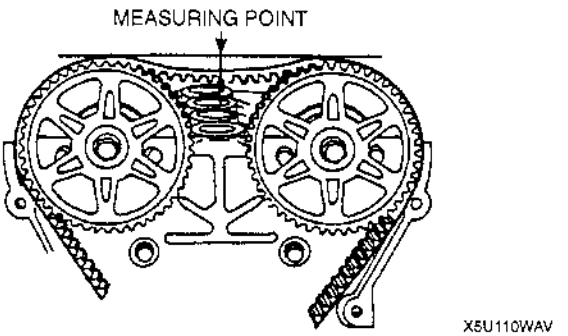
Tightening torque
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

9. Install the pulley boss and the pulley lock bolt.
10. Turn the crankshaft 2 and 1/6 times, and face the pin on the pulley boss straight up.
11. Verify that the camshaft pulley marks are aligned with the timing marks as shown.



12. If not, repeat from **Timing Belt Removal Note**. (Refer to Timing Belt Removal Note.)
13. Inspect the timing belt deflection at the point indicated by applying moderate pressure **98 N {10 kgf, 22 lbf}**.

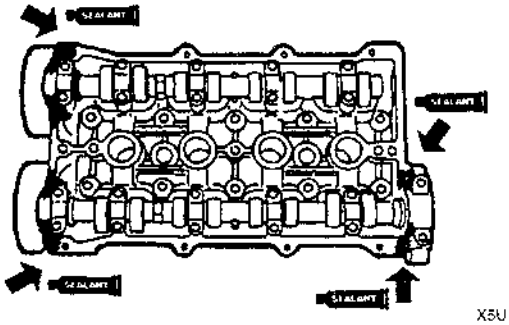
Timing belt deflection
8.5—11.5 mm {0.35—0.45 in}



14. If not as specified, repeat from step 4.

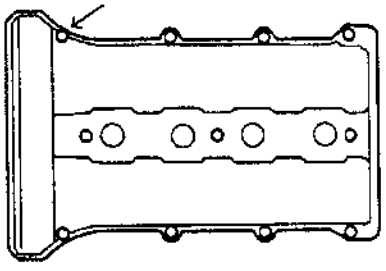
Cylinder Head Cover Installation Note

1. Verify that the grooves on the cylinder head cover are free of oil, water and other foreign material.
2. Install the cylinder head cover gasket into the cylinder head cover.
3. Apply silicone sealant to the cylinder head as shown.



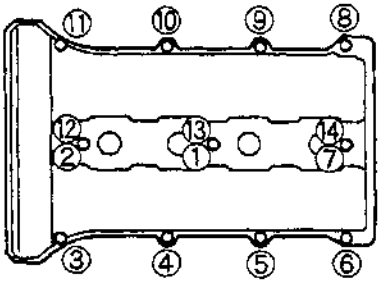
X5U110WAW

4. Hand-tighten the cylinder head cover bolt as shown.



X5U110WB1

5. Tighten the cylinder head cover bolts in two or three steps in the order shown.



X5U110WAX

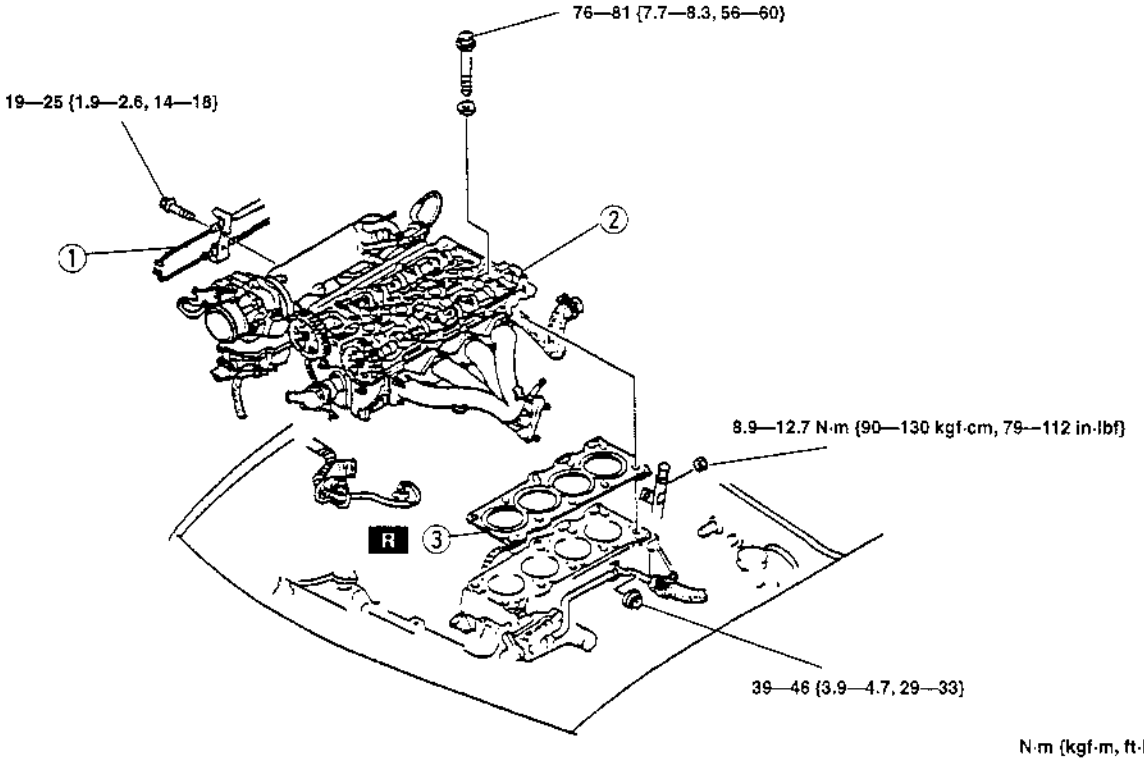
CYLINDER HEAD GASKET REPLACEMENT

X5U110W07

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". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)**

1. Remove the timing belt. (Refer to 01–10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove the front pipe and exhaust manifold insulator. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Disconnect the vacuum hose and engine harness connectors.
5. Disconnect the fuel hose. (Refer to 01–14 BEFORE REPAIR PROCEDURE.) (Refer to 01–14 AFTER REPAIR PROCEDURE.)
6. Remove the intake manifold bracket.
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Verify the engine oil level. (Refer to 01–11 ENGINE OIL INSPECTION.)
10. Inspect for the engine oil, engine coolant, and fuel leakage.
11. Verify the compression. (Refer to 01–10 COMPRESSION INSPECTION.)
12. Start the engine and verify the idle speed. (Refer to 01–10 ENGINE TUNE-UP, Idle Speed Adjustment.)



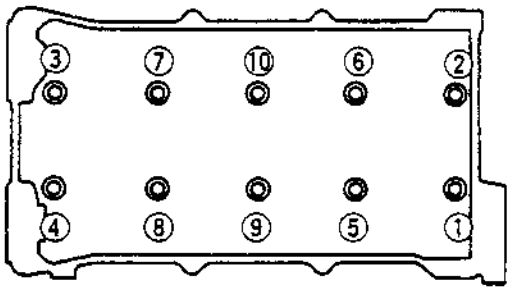
N·m {kgf·m, ft·lbf}

X5U110WAY

1	Accelerator cable bracket
2	Cylinder head ☞ Removal Note ☞ Installation Note
3	Cylinder head gasket

Cylinder Head Removal Note

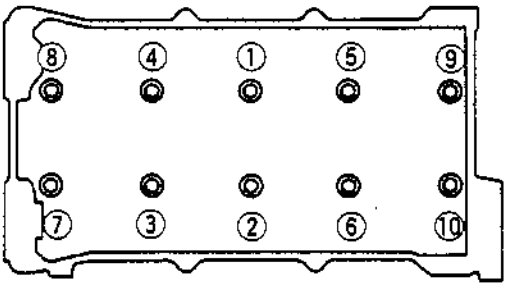
- Loosen the cylinder head bolts in two or three steps in the order shown.



X5U110WAZ

Cylinder Head Installation Note

- Tighten the cylinder head bolts in two or three steps in the order shown.

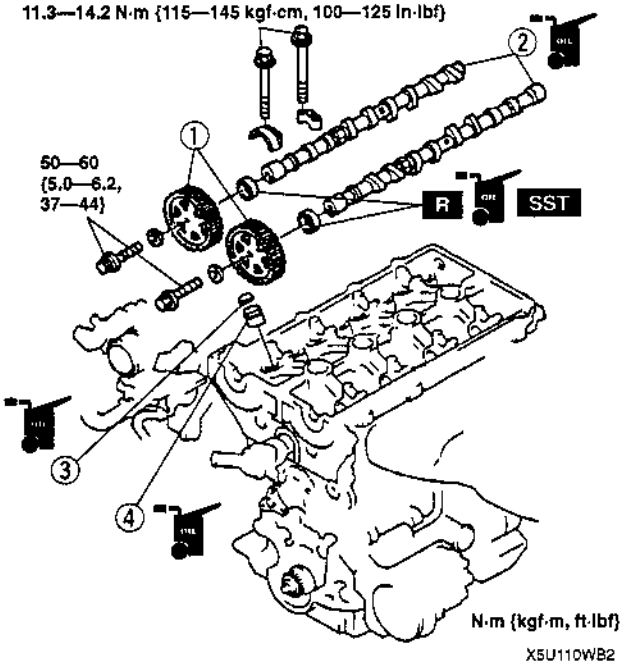


X5U110WB0

TAPPET AND ADJUSTMENT SHIM REMOVAL/INSTALLATION

X5U110W08

1. Remove the timing belt. (Refer to 01–10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

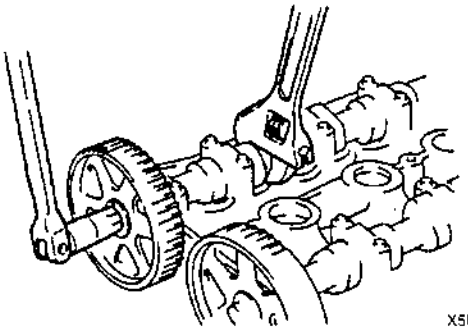


X5U110WB2

1	Camshaft pulley ☞ Removal Note ☞ Installation Note
2	Camshaft ☞ Removal Note ☞ Installation Note
3	Adjustment shim
4	Tappet

Camshaft Pulley Removal Note

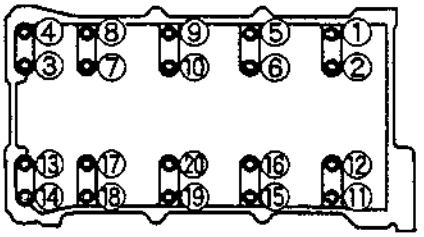
- Hold the camshaft with a wrench at the cast hexagon, and remove the camshaft pulley lock bolt.



X5U110WB3

Camshaft Removal Note

1. Loosen the camshaft cap bolts in two or three steps in the order shown.



X5U110WB4

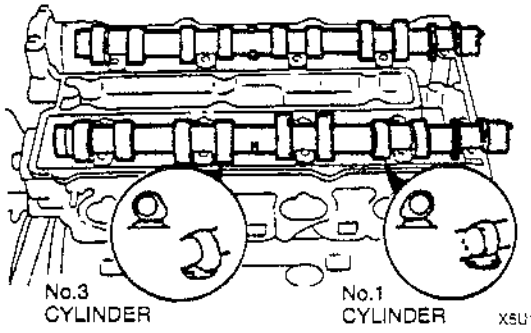
2. Remove the camshaft caps.

Camshaft Installation Note

Caution

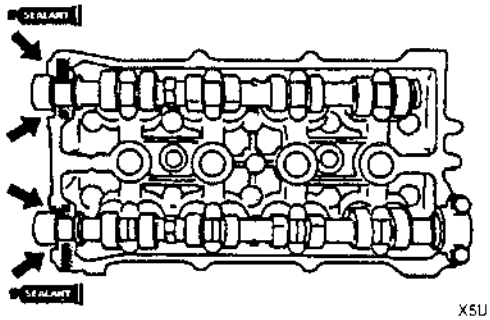
- **Because there is little camshaft thrust clearance, the camshaft must be held horizontally while it is installed. Otherwise, excessive force will be applied to the thrust area, causing burr on the thrust receiving area of the cylinder head journal. To avoid this, the following procedure must be observed.**

1. Assemble camshaft onto the cylinder head, facing the cam noses at No.1 and No.3 cylinders as shown.



X5U110WB5

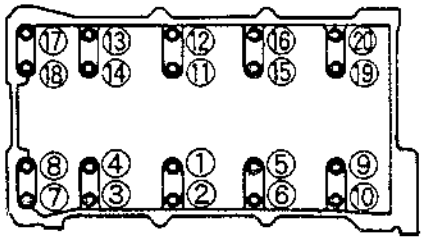
2. Apply silicone sealant to the areas shown. Keep the camshaft sliding surface free of sealant to prevent engine damage.



X5U110WB6

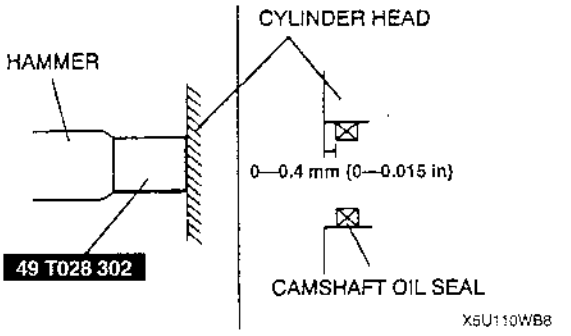
3. Apply engine oil to the camshaft and the cylinder head journals.
4. Install the camshaft caps to the positions from which they were removed.
5. Tighten the camshaft cap bolts in two or three steps in the order shown.

Tightening torque
11.3—14.2 N·m
{115—145 kgf·cm, 100—125 in·lbf}



X5U110WB7

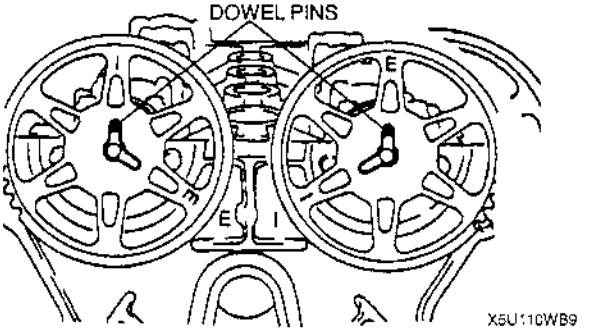
6. Verify that the camshaft settles horizontally when two bearing cap bolts at No.3 journal are tightened.
7. Apply clean engine oil to the camshaft oil seal.
8. Push the oil seal slightly in by hand.
9. Tap the oil seals in evenly by using the **SST** and a hammer.



X5U110WB8

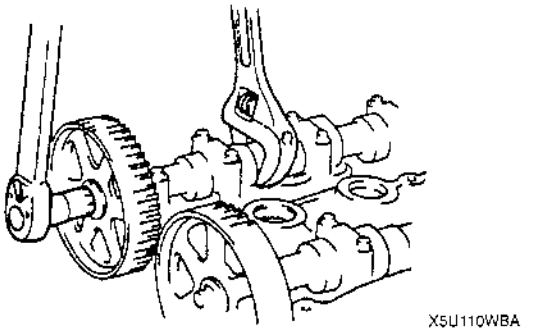
Camshaft Pulley Installation Note

1. Turn the camshafts until the camshaft dowel pins face straight up.
2. Install the camshaft pulleys with the I mark (intake side) or the E mark (exhaust side) straight up.



X5U110WB9

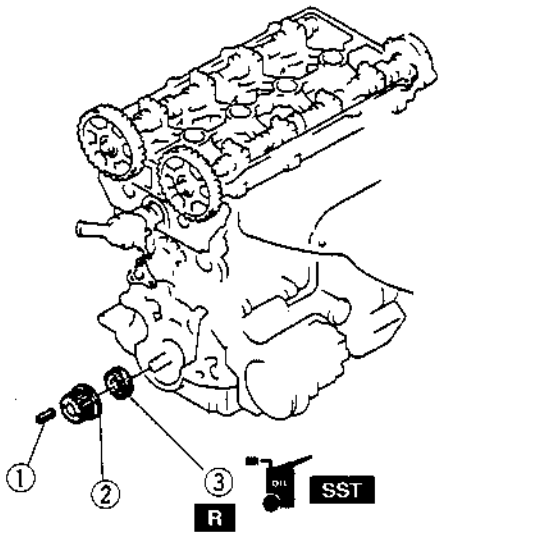
3. Hold the camshaft by using a wrench on the cast hexagon, and tighten the camshaft pulley lock bolt.


X5U110WBA

FRONT OIL SEAL REPLACEMENT

X5U110W09

1. Remove the timing belt. (Refer to 01–10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

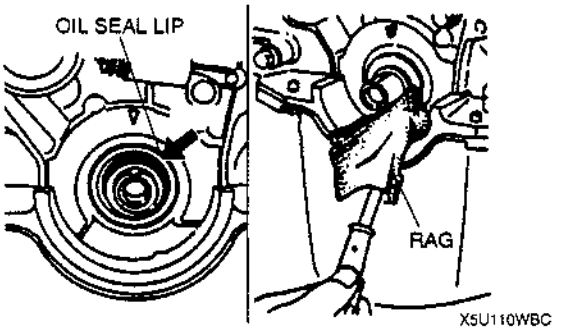


X5U110WBB

1	Key
2	Timing belt pulley
3	Front oil seal ☞ Removal Note ☞ Installation Note

Front Oil Seal Removal Note

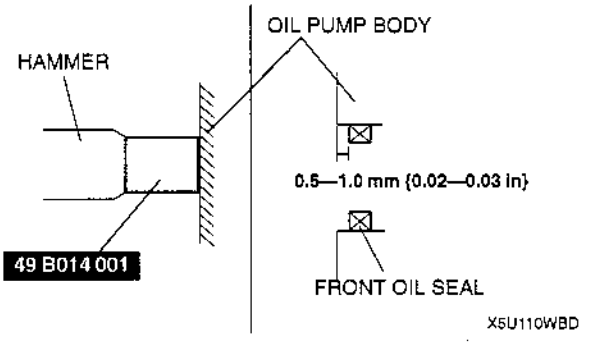
1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



X5U110WBC

Front Oil Seal Installation Note

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

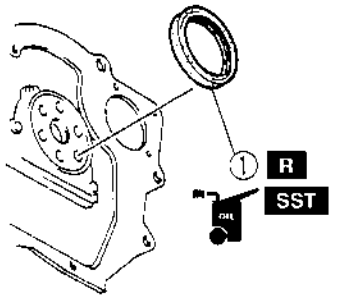


X5U110WBD

REAR OIL SEAL REPLACEMENT

X5U110W10

1. Remove the flywheel. (MT) (Refer to 05–10 CLUTCH UNIT REMOVAL/INSTALLATION.)
2. Remove the drive plate. (AT) (Refer to 05–13 DRIVE PLATE REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

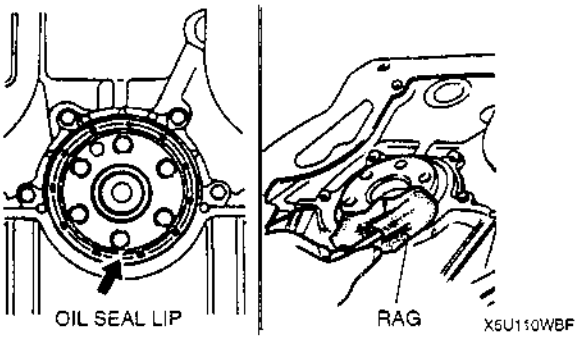


X5U110WBE

1	Rear oil seal ☞ Removal Note ☞ Installation Note

Rear Oil Seal Removal Note

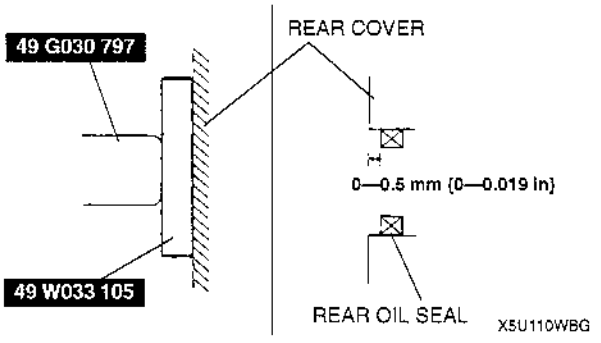
1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



X5U110WBF

Rear Oil Seal Installation Note

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



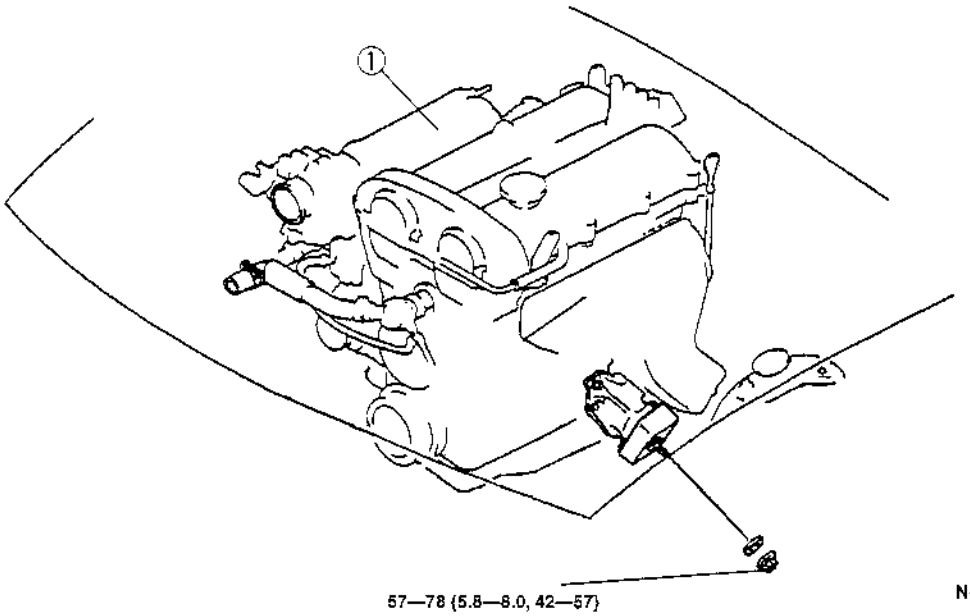
X5U110WBG

ENGINE REMOVAL/INSTALLATION

X5U110W11

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". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)**

1. Disconnect the negative battery cable.
2. Remove the radiator. (Refer to 01–12 RADIATOR REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Disconnect the accelerator cable and bracket.
5. Disconnect the fuel hose. (Refer to 01–14 BEFORE REPAIR PROCEDURE.) (Refer to 01–14 AFTER REPAIR PROCEDURE.)
6. Disconnect the vacuum hose and engine harness connectors.
7. Disconnect the heater hose.
8. Remove the drive belt. (Refer to 01–10 DRIVE BELT ADJUSTMENT.)
9. Remove the P/S oil pump with the oil hose still connected. Position the P/S oil pump so that it is out of the way. (with P/S oil pump)
10. Remove the A/C compressor with the pipe still connected. Position the A/C compressor so that it is out of the way. (with A/C compressor)
11. Remove the transmission. (Refer to 05–11 MANUAL TRANSMISSION REMOVAL/INSTALLATION.) (Refer to 05–13 AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION.)
12. Remove in the order indicated in the table.
13. Install in the reverse order of removal.
14. Start the engine and
    (1) Inspect for the engine oil, engine coolant, transmission oil and fuel leakage.
    (2) Verify the ignition timing. (Refer to 01–10 ENGINE TUNE-UP, Ignition Timing Inspection.)
    (3) Verify the idle speed. (Refer to 01–10 ENGINE TUNE-UP, Idle Speed Adjustment.)
    (4) Verify the idle mixture. (Refer to 01–10 ENGINE TUNE-UP, Idle Mixture Inspection.)
15. Perform a road test.



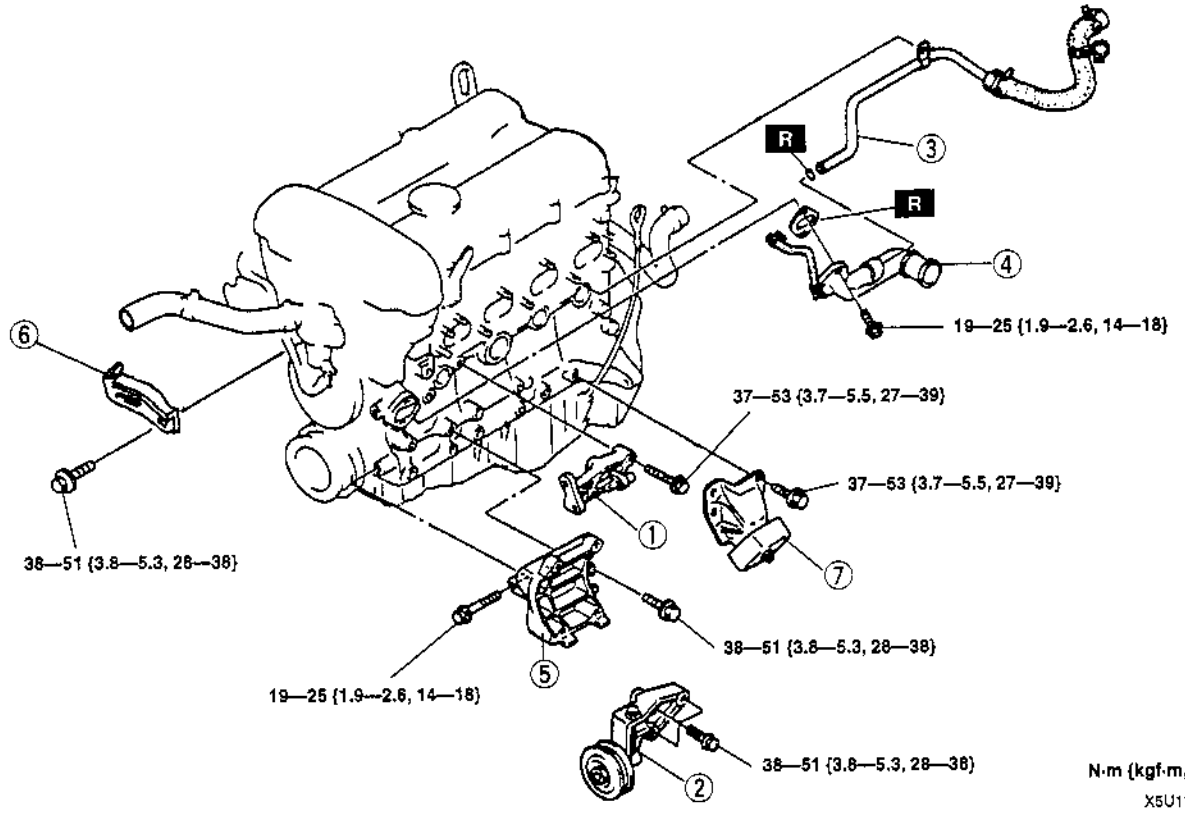
X5U110WBH

1	Engine

ENGINE DISASSEMBLY/ASSEMBLY

X5U110W12

1. Remove the oil pressure switch. (Refer to 01–11 OIL PRESSURE INSPECTION.)
2. Remove the intake-air system. (Refer to 01–13 INTAKE-AIR SYSTEM, INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Remove the exhaust system. (Refer to 01–15 EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
4. Remove the oil filter. (Refer to 01–11 OIL FILTER REPLACEMENT.)
5. Remove the high-tension lead. (Refer to 01–18 HIGH-TENSION LEAD REMOVAL/INSTALLATION.)
6. Remove the ignition coil.
7. Remove the generator.
8. Disassemble in the order indicated in the table.
9. Assemble in the reverse order of disassembly.



N·m {kgf·m, ft·lbf}

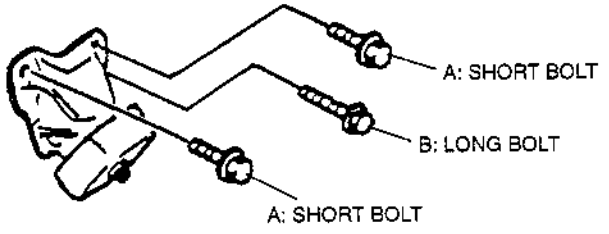
X5U110WBJ

1	P/S oil pump bracket (with P/S oil pump)
2	Idler (without P/S oil pump)
3	Water bypass pipe
4	Water inlet pipe

5	A/C compressor bracket (with A/C compressor)
6	Generator strap
7	Engine mount ☞ Installation Note (RH)

Engine Mount Installation Note (RH)

- Install the engine bolts as shown.

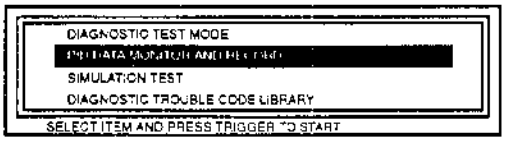


X5U110WBN

ENGINE TUNE-UP

Engine Tune-up Preparation

1. Warm up the engine to normal operating temperature.
2. Shift transmission into Neutral (MT) or P position (AT).
3. Turn off all electrical loads.
   - Headlight
   - Blower
   - Rear window defroster
4. Verify that the battery is fully charged. (Refer to 01–17 BATTERY INSPECTION.)
5. Wait until the electrical fan stops.
6. Connect the NGS tester to the data link connector-2 and select the "PID/DATA MONITOR AND RECORD" function and press TRIGGER.



X5U110WBK

7. Select "RPM" and press TRIGGER.
8. Press "SET UP" and turn the test mode on (press ON).
9. Press CANCEL.
10. Select "START" to begin.

Ignition Timing Inspection

1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed is within the specification.

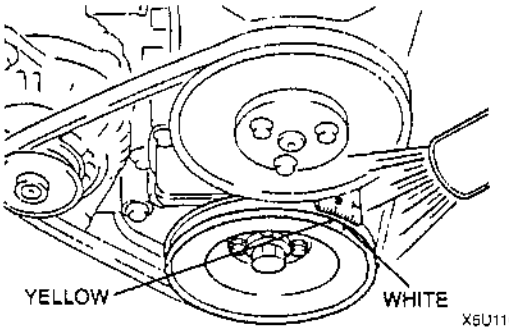
   Specification
   750—850 (800 ± 50) rpm

3. If not as specified, adjust the idle speed. (Refer to Idle Speed Adjustment.)
4. Connect a timing light to the high-tension lead of the No.1 cylinder.
5. Verify that the timing mark (white) on the crankshaft pulley and the T mark on the timing belt cover are aligned.

   Ignition timing
   BTDC 9°—11° (10° ± 1°)
   (TIMING MARK [YELLOW])

6. Press "SET UP" and turn the test mode off. (press OFF)
7. Press CANCEL.
8. Verify that the timing mark (yellow) is within the specification.

X5U110W13



X5U110WBL

   Specification
   BTDC 6—18°

9. If not as specified, inspect the following.
   - Camshaft position sensor
   - Crankshaft position sensor
   - Throttle position sensor
   - Engine coolant temperature sensor
   - Neutral switch (MT)
   - Clutch switch (MT)
   - Transmission range switch (AT)
10. If the devices are normal, replace the PCM.

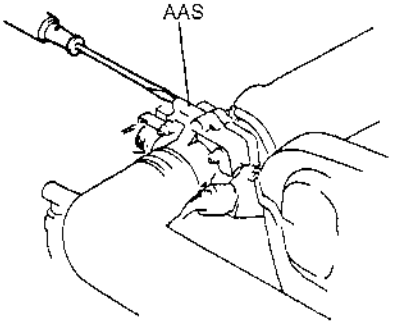
Idle Speed Adjustment

1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed is within the specification.

   Specification
   750—850 (800 ± 50) rpm

3. If not within the specification, adjust the idle speed by turning the air adjusting screw (AAS).

   Caution
   - **The throttle adjusting screw (TAS) is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.**



X5U110WBM

4. Press SET UP and turn the test mode off. (press OFF)
5. Press CLEAR to clear previously selected items.
6. Disconnect the NGS tester.

Idle-up Speed Inspection

1. Perform "Engine Tune-up Preparation", "Idle Speed Adjustment".
2. Press SET UP and turn the test mode off (press OFF).
3. Press CANCEL.
4. Press START.
5. Verify that the idle speed is normal.
6. Verify that the idle-up speed is within the specification.

Load condition	Idle-up speed (rpm)*1		
	MT	AT	
		N, P position	D range
E/L ON*2	750—850 (800 ± 50)	750—850 (800 ± 50)	700—800 (750 ± 50)
P/S ON*3			
A/C ON*4	950—1050 (1000 ± 50)		

*1 : Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.
*2 : Headlight is on, Fan switch (above 1st), Cooling fan are operating, Rear window defroster is on.
*3 : Steering wheel is fully turned.
*4 : A/C switch and fan switch are on.

7. If not as specified with all loads conditions, inspect the idle air control valve.
   If not as specified with some load conditions, inspect related input switches, harnesses and connectors.

Idle Mixture Inspection

1. Perform "Engine Tune-up Preparation".
2. Verify that the idle speed and ignition timing are within the specification.
3. Insert an exhaust gas analyzer to the tailpipe.
4. Verify that the CO and HC concentrations are within the regulation.
5. If not, inspect the following.
   - On-board diagnostic system
   - Heated oxygen sensor
   - Intake manifold vacuum
   - Fuel line pressure
   - Ignition timing control
6. If the systems are normal, replace the following.
   - California emission regulation applicable model: Warm up three way catalytic converter.
   - Except california model: Three way catalytic converter.

01–11 LUBRICATION SYSTEM

ENGINE OIL LEVEL INSPECTION

X5U111W01

1. Position the vehicle on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the dipstick and inspect oil level and condition. Verify that the oil level is within the F and L marks on the dipstick.
5. Add or replace oil as necessary.

ENGINE OIL REPLACEMENT

X5U111W02

Warning

- **When the engine and the engine oil are hot, they can badly burn. Don't burn yourself with either.**
- **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 with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

1. Position the vehicle on level ground.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a container.
4. Install a new gasket and the drain plug.

Tightening torque
30—41 N·m {3.0—4.2 kgf·m, 22—30 ft·lbf}

5. Refill the engine with the specified type and amount of engine oil.
6. Refit the oil filler cap.
7. Run the engine and inspect for oil leakage.
8. Inspect the oil level and add oil as necessary. (Refer to 01–11 ENGINE OIL LEVEL INSPECTION.)

Note

- The actual oil level may vary from the specified capacity in some cases.

Oil capacity

L {US qt, Imp qt}

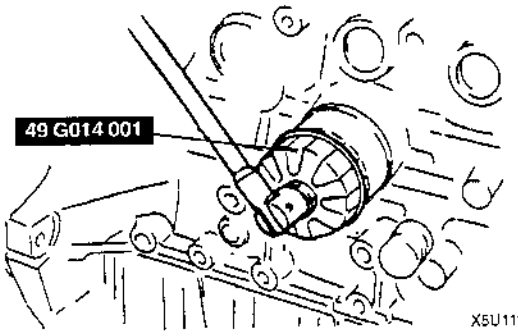
Item	Engine
	BP
Oil replacement	3.6 {3.8, 3.2}
Oil and oil filter replacement	3.8 {4.0, 3.3}
Total (dry engine)	4.0 {4.2, 3.5}

Engine oil grade
API Service
SG (Energy Conserving II),
SH (Energy Conserving II) or ILSAC (GF-I)
SJ or ILSAC (GF-II)
Engine oil viscosity
Above –25 °C {–13 °F}: SAE 10W–30
Below 0 °C {32 °F}: SAE 5W–30

OIL FILTER REPLACEMENT

X5U111W03

1. Remove the oil filter by using the **SST**.



X5U111WA0

2. Use a clean rag to wipe off the mounting surface on the oil filter body.
3. Apply clean engine oil to the O-ring of the oil filter.
4. Tighten the filter according to the installation direction on the side of it or packing box by using the **SST**.
5. Start the engine and inspect for oil leakage.
6. Inspect the oil level and add oil as necessary. (Refer to 01–11 ENGINE OIL LEVEL INSPECTION.)

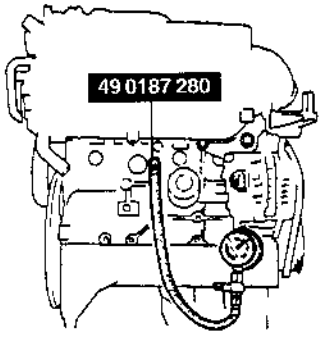
OIL PRESSURE INSPECTION

X5U111W04

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.**
- **When the engine and the oil are hot, they can badly burn. Turn off the engine and wait until they are cool.**

1. Remove the oil pressure switch.
2. Screw the **SST** into the oil pressure switch installation hole.



X5U111WA1

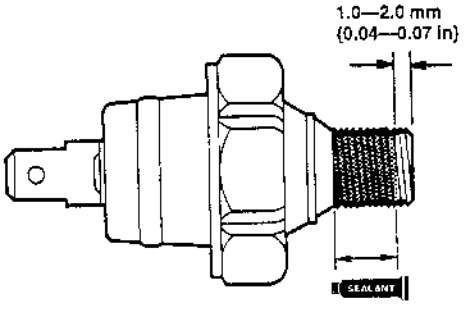
3. Warm up the engine to normal operating temperature.
4. Run the engine at the specified speed, and note the gauge readings.

Note

- The oil pressure can vary with oil viscosity and temperature.

Oil pressure
295—392 kPa
{3.0—4.0 kgf/cm^2, 43—56 psi} [3,000 rpm]

5. If the pressure is not as specified, inspect for amount of engine oil, oil leakage, or any wear parts inside of engine etc. Repair or replace as necessary.
6. Stop the engine and wait until it is cool.
7. Remove the **SST**.



X5U111WA2

8. Apply silicone sealant to the oil pressure switch threads as shown.
9. Install the oil pressure switch.

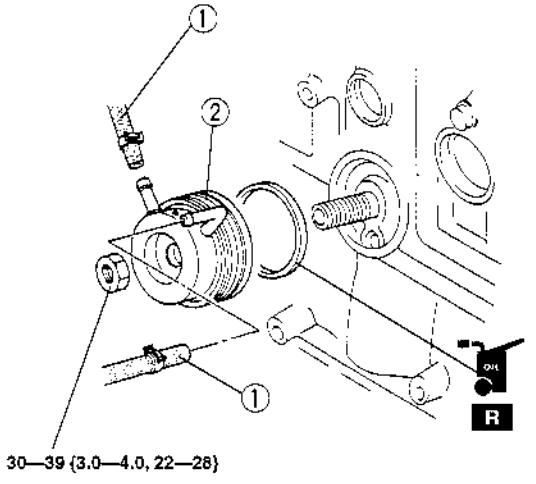
Tightening torque
12—17 N·m {1.2—1.8 kgf·m, 9—13 ft·lbf}

10. Start the engine and inspect for oil leakage.

OIL COOLER REMOVAL/INSTALLATION

X5U111W05

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
3. Remove the intake manifold bracket.
4. Remove the oil filter. (Refer to 01–11 OIL FILTER REPLACEMENT.)
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Inspect the engine oil level. (Refer to 01–11 ENGINE OIL LEVEL INSPECTION.)
8. Start the engine and inspect for the engine oil leakage.



N·m {kgf·m, ft·lbf}

X5U111WA3

1	Water hose
2	Oil cooler

OIL PAN REMOVAL/INSTALLATION

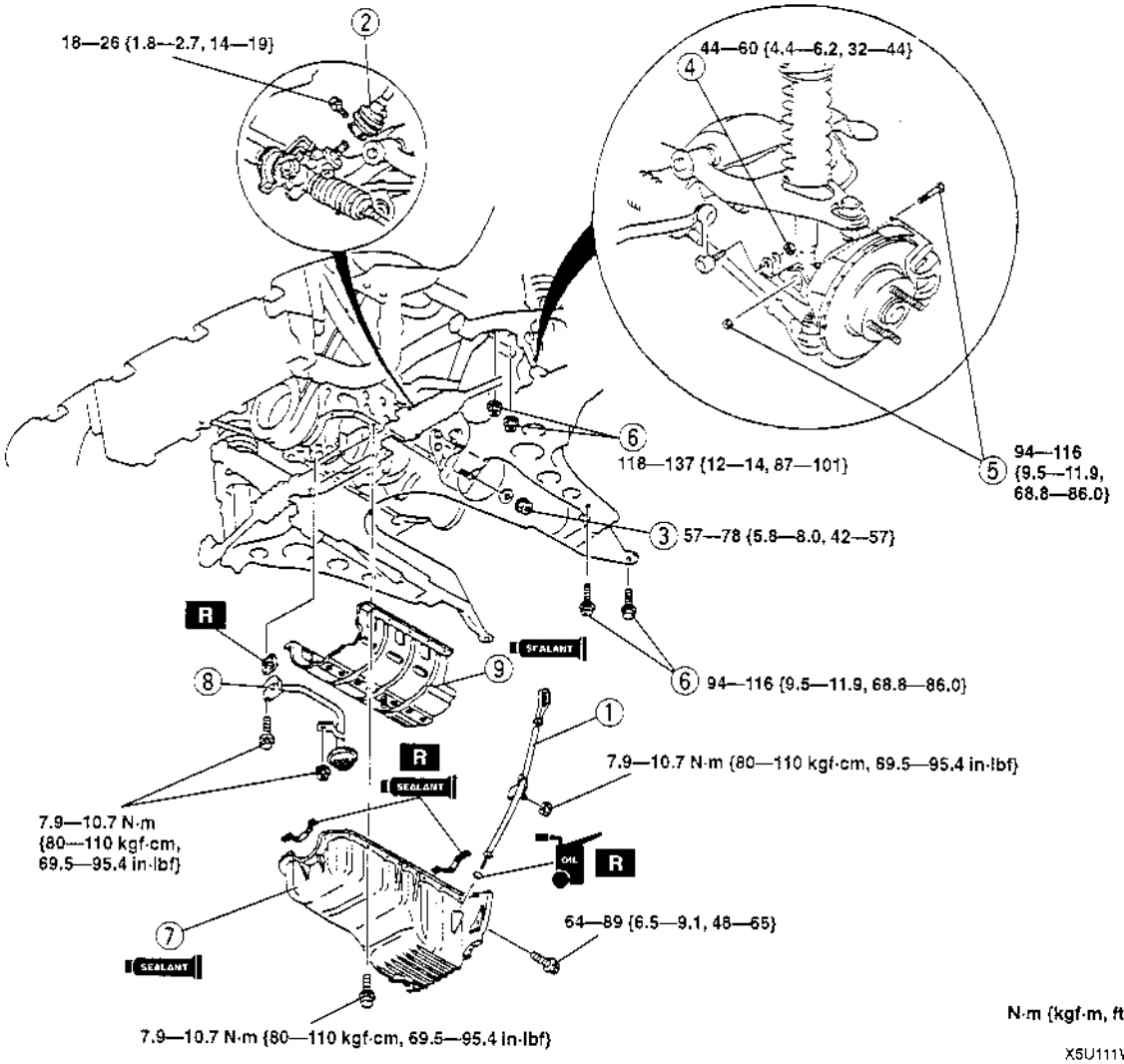
X5U111W06

1. Disconnect the negative battery cable.
2. Remove the air cleaner component. (Refer to 01–13 INTAKE-AIR SYSTEM 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.**

3. Remove the ABS wheel-speed sensor.
4. Drain the engine oil. (Refer to 01–11 ENGINE OIL REPLACEMENT.)
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



N·m {kgf·m, ft·lbf}

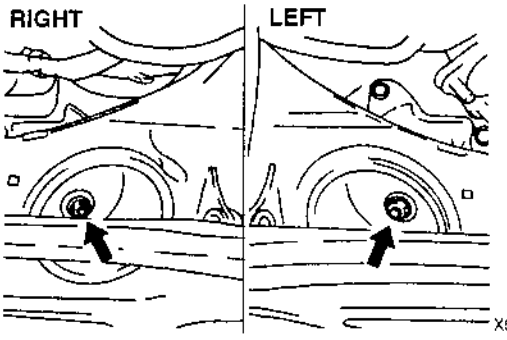
X5U111WA4

1	Dipstick and pipe
2	Intermediate shaft
3	Engine mount nut ☞ Removal Note
4	Stabilizer control link nut
5	Shock absorber bolt and nut
6	Crossmember bolt and nut ☞ Removal Note

7	Oil pan ☞ Removal Note ☞ Installation Note
8	Oil strainer
9	Oil baffle ☞ Removal Note ☞ Installation Note

Engine Mount Nut Removal Note

1. Loosen the oil pan mounting bolts.
2. Remove the engine mounting nuts.



3. Lift the engine slightly by using a hoist.

Crossmember Bolt and Nut Removal Note

1. Support the crossmember by using a transmission jack.
2. Remove the crossmember bolts and nuts.

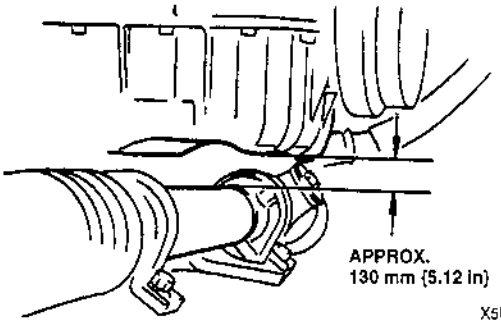
Caution

- **Do not damage the brake hoses, A/C pipes and P/S pipes when lowering the crossmember.**

Note

- Lower the crossmember after separating the steering intermediate shaft from the pinion shaft.

3. Lower the crossmember until the clearance between the oil pan and the steering gear housing exceeds **approx. 130 mm {5.12 in}**.



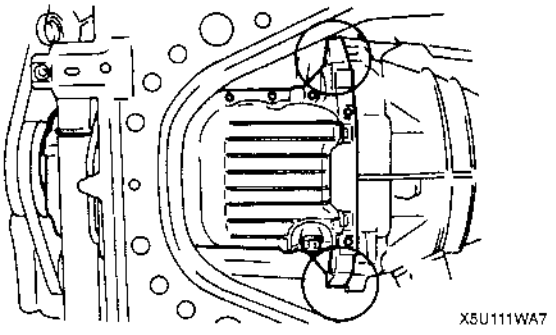
Oil Pan Removal Note

1. Remove the oil pan mounting bolts.

Caution

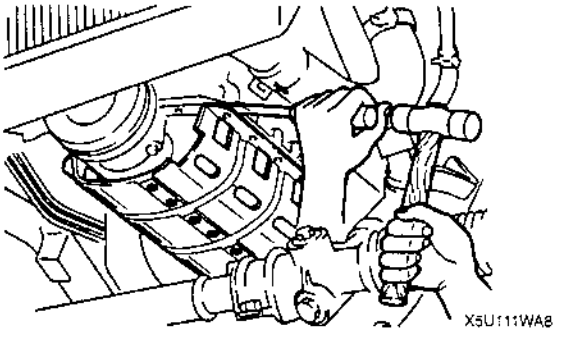
- **Pry tools can easily scratch the cylinder block and the oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.**

2. Insert a screwdriver only at the points shown in the figure.



Oil Baffle Removal Note

- Insert a screwdriver or a separator tool between the cylinder block and the oil baffle.

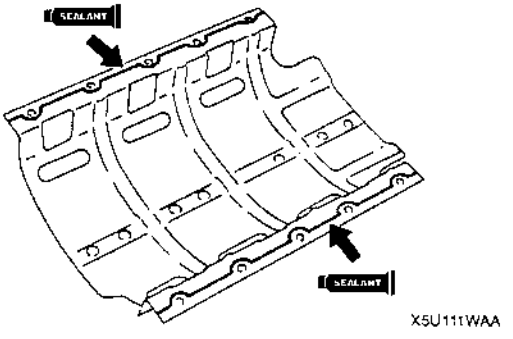


Oil Baffle Installation Note

- Apply silicone sealant to the oil baffle along the inside of the bolt holes.

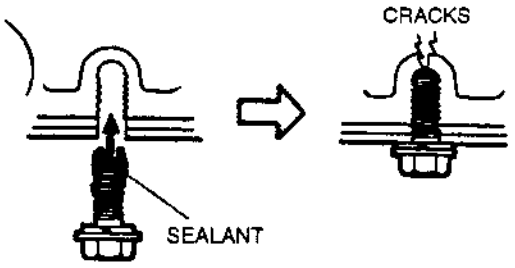
Thickness

ϕ2.5—3.5 mm {0.099—0.137 in}



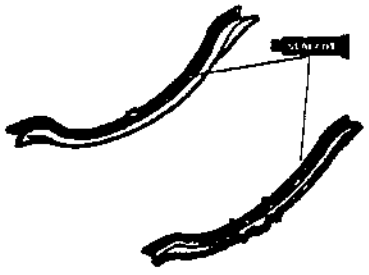
Oil Pan Installation Note

Caution
- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**



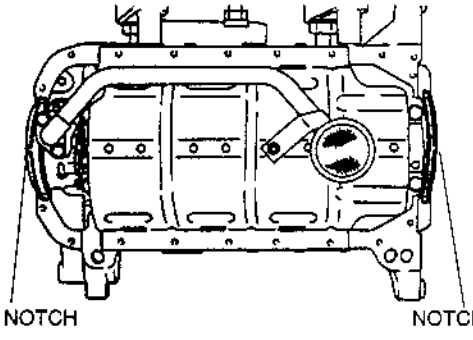
X5U111WA9

1. Apply silicone sealant to the contact surfaces of new oil pan gaskets as shown.



X5U111WAB

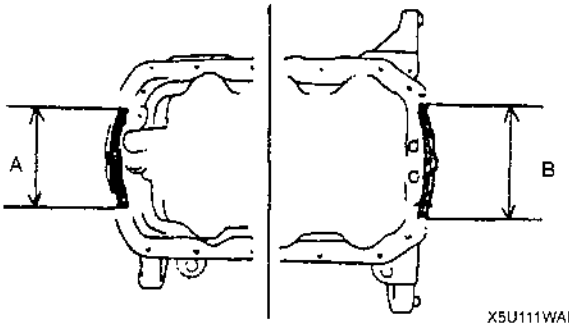
2. Install new gaskets onto the oil pump body and the rear cover facing the notches as shown.



X5U111WAC

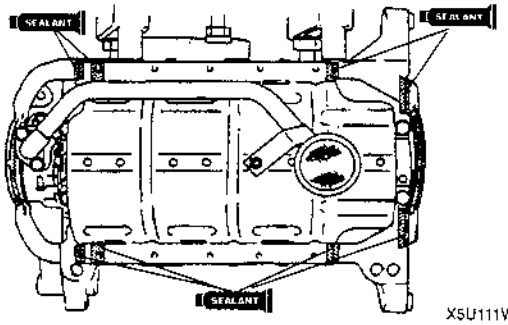
3. Apply silicone sealant onto the area of oil pan gasket indicated by A and B.

Thickness
ϕ2.0 mm {0.079 in}



X5U111WAD

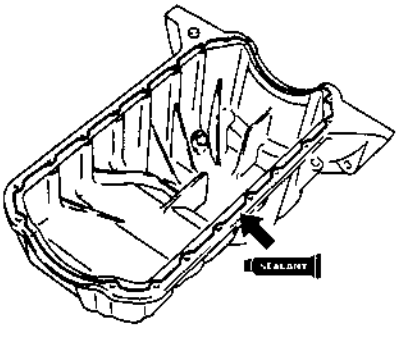
4. Apply silicone sealant to the shaded areas shown.



X5U111WAE

5. Apply silicone sealant to the oil pan along the inside of the bolt holes and overlap the ends.

Thickness
ϕ2.5—3.5 mm {0.099—0.137 in}



X5U111WAF

01–12 COOLING SYSTEM

COOLING SYSTEM SERVICE WARNINGS

X5U112W01

Warning

- **Removing the radiator cap or loosening the radiator drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding 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—still using a cloth—turn it, and remove it.**
- **When the engine and the engine coolant are hot, they can badly burn. Turn off the engine and wait until they are cool before draining the engine coolant.**

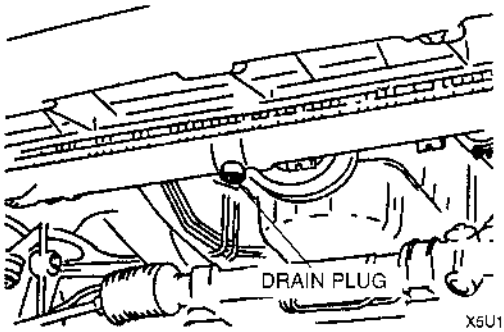
ENGINE COOLANT LEVEL INSPECTION

X5U112W02

1. Remove the radiator cap. (Refer to 01–12 COOLING SYSTEM SERVICE WARNINGS.)
2. Verify that the coolant level is near the radiator filler neck.
3. Verify that the coolant level on the coolant reservoir is between the FULL and LOW marks.
4. Add coolant as necessary.

ENGINE COOLANT REPLACEMENT

1. Drain the coolant in the coolant reservoir.
2. Remove the radiator cap and the radiator drain plug. (Refer to 01–12 COOLING SYSTEM SERVICE WARNINGS.)



X5U112WA0

3. Drain the coolant into a container.
4. Flush the cooling system with water until all traces of color are gone.
5. Leave the system until drain completely.
6. Tighten the radiator drain plug.

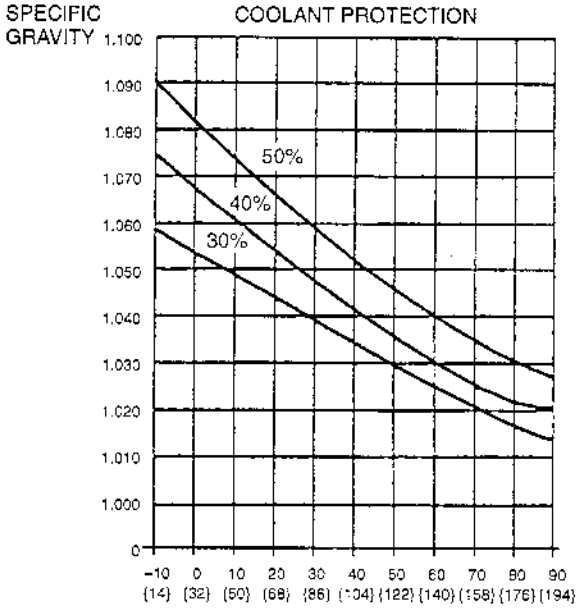
Tightening torque
0.7—1.1 N·m {7—12 kgf·cm, 7—10 in·lbf}

Caution
- **The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**

7. Referring to the following graph and chart, select proper gravity of the coolant. Slowly pour the coolant into the radiator up to the coolant filler port.

Filling pace
1.0 L {1.1 US qt, 0.9 Imp qt}/min. [max]

X5U112W03



X5U112WA1

Antifreeze solution mixture percentage

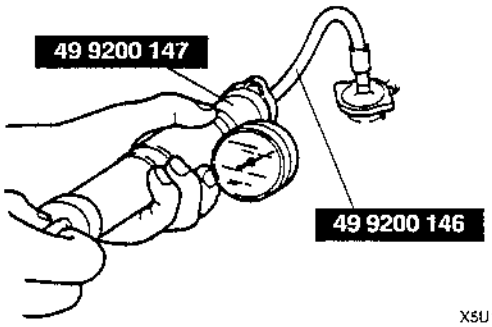
Coolant protection	Volume percentage		Gravity at 20 °C {68°F}
	Water	Coolant	
Above –16 °C {3 °F}	65	35	1.054
Above –26 °C {–15 °F}	55	45	1.066
Above –40 °C {–40 °F}	45	55	1.078

8. Fill the coolant into the reservoir up to the FULL mark on the coolant reservoir.
9. Fully install the radiator cap.
10. Start the engine and warms up. If the coolant temperature becomes too high, stop the engine to prevent it from overheating.
11. After engine warms up, run it at approx. 2,500 rpm for 5 minutes.
12. Increase the engine speed to approx. 3,000 rpm for 5 seconds, then return to idle. Repeat several times.
13. Stop the engine and wait until it is cool. (Refer to 01–12 COOLING SYSTEM SERVICE WARNINGS.)
14. Inspect the coolant level. If it is low, repeat steps 7–12.
15. Inspect for the coolant leakage.

ENGINE COOLANT LEAKAGE INSPECTION

X5U112W04

1. Inspect the coolant level. (Refer to 01–12 ENGINE COOLANT LEVEL INSPECTION.)
2. Remove the radiator cap.
3. Connect a radiator cap tester and the **SST** to the radiator filler neck.



X5U112WA2

Caution

- **Applying more than 123 kPa {1.25 kgf/cm^2, 17.8 psi} can damage the hoses, fittings, and other components, and cause leaks.**

4. Apply pressure to the radiator.

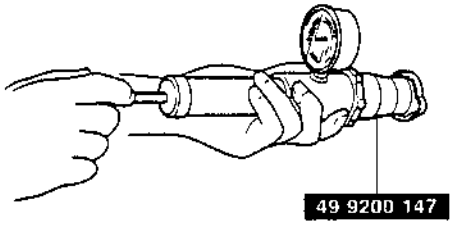
   Pressure
   123 kPa {1.25 kgf/cm^2, 17.8 psi}

5. Verify that the pressure is held. If not, inspect the system for coolant leakage.

RADIATOR CAP INSPECTION

X5U112W05

1. Attach the radiator cap to a radiator cap tester with the **SST**. Apply pressure gradually.



X5U112WA3

2. Verify that the pressure becomes stable within the specification.

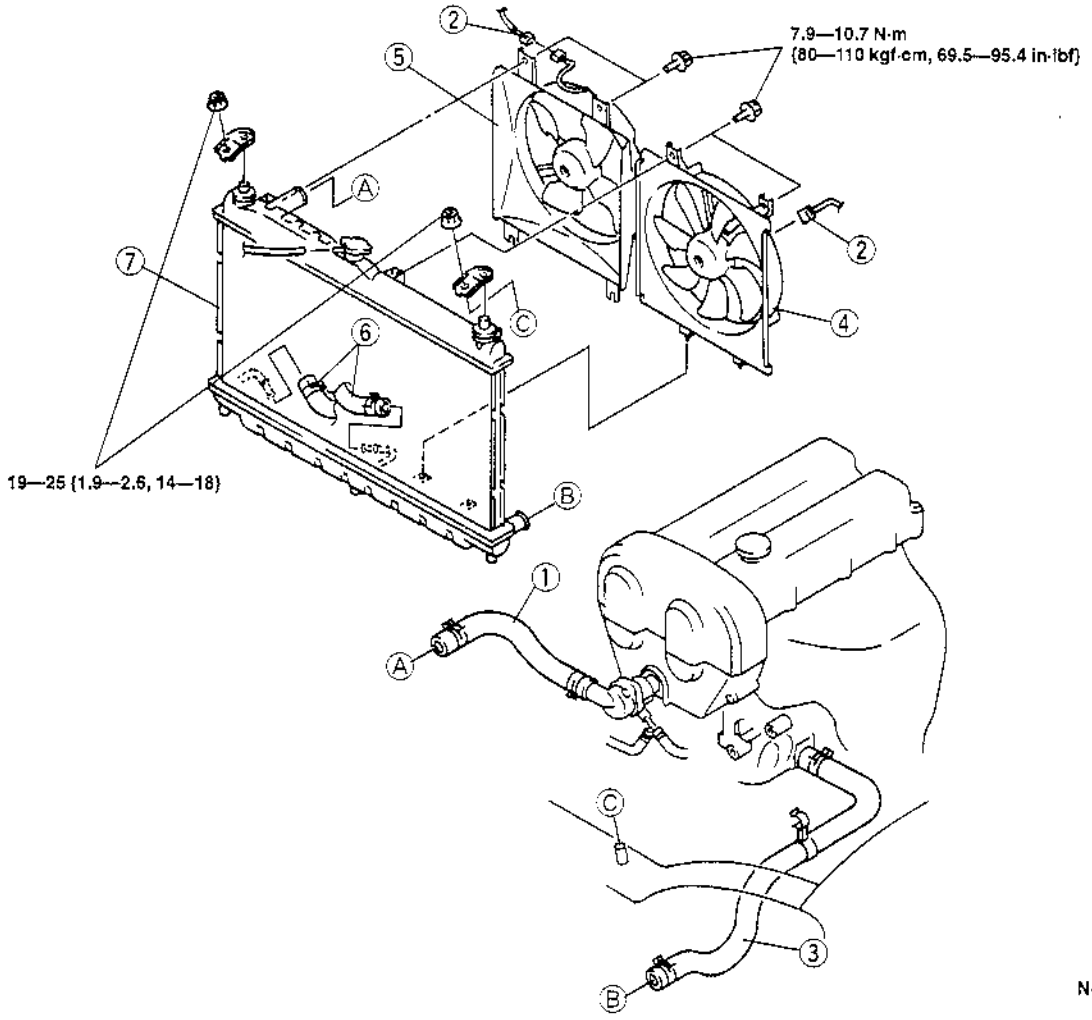
   Pressure
   94—122 kPa
   {0.95—1.25 kgf/cm^2, 13.5—17.7 psi}

3. If the pressure is held for 10 seconds, the radiator cap is normal.

RADIATOR REMOVAL/INSTALLATION

X5U112W36

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
3. Remove the air hose.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



N·m {kgf·m, ft·lbf}

X5U112WA4

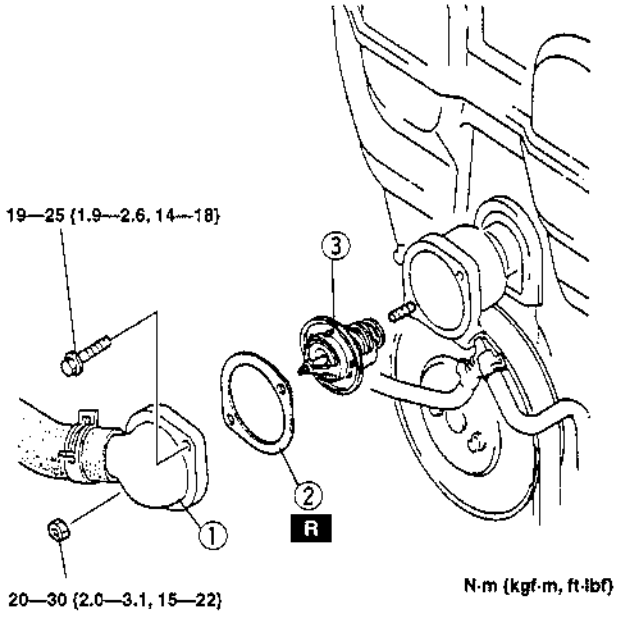
1	Upper radiator hose
2	Cooling fan motor connector and condenser fan motor connector
3	Lower radiator hose
4	Cooling fan

5	Condenser fan
6	Oil hose (AT) ☞ 05–13 OIL COOLER REMOVAL/INSTALLATION
7	Radiator

THERMOSTAT REMOVAL/INSTALLATION

X5U112W07

1. Disconnect the negative battery cable.
2. Remove the air hose.
3. Drain the engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

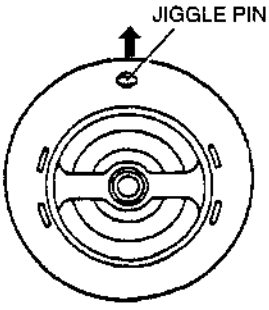


X5U112WA5

1	Thermostat cover
2	Thermostat cover gasket ☞ Installation Note
3	Thermostat ☞ Installation Note

Thermostat Installation Note

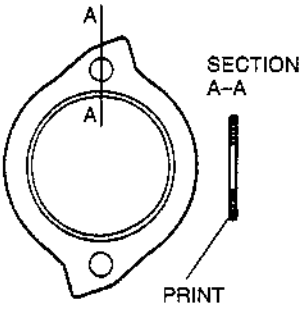
- Install the thermostat into the cylinder head with the jiggle pin at the top.



X5U112WA6

Thermostat Cover Gasket Installation Note

- Install a new gasket with the seal print side facing the cylinder head.



X5U112WA7

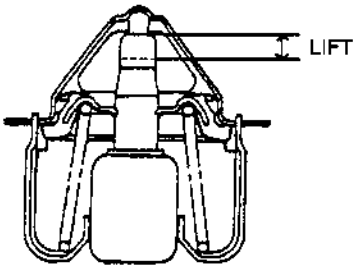
THERMOSTAT INSPECTION

X5U112W08

Inspect the thermostat for the following and replace as necessary.

- Open valve in room temperature
- Opening temperature and lift of the valve

Initial-opening temperature °C {°F}	83.5—88.0 {183—190}
Full-open temperature °C {°F}	100 {212}
Full-open lift mm {in}	8.5 {0.33} min.

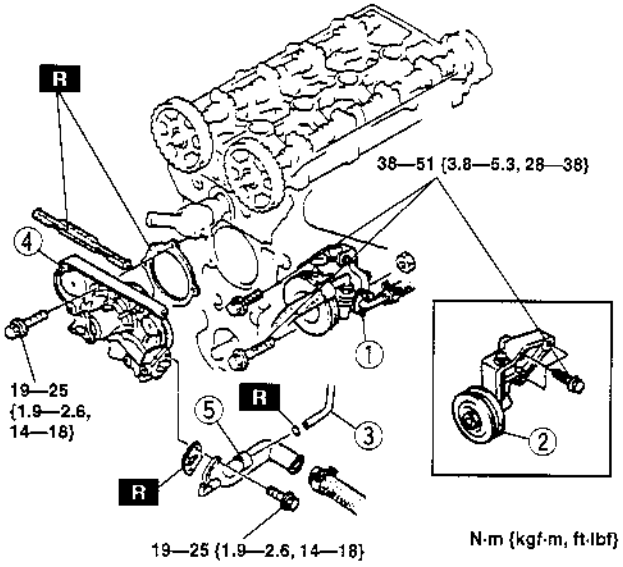


X5U112WA8

WATER PUMP REMOVAL/INSTALLATION

X5U112W09

1. Remove the air cleaner.
2. Remove the timing belt. (Refer to 01–10 TIMING BELT REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



X5U112WA9

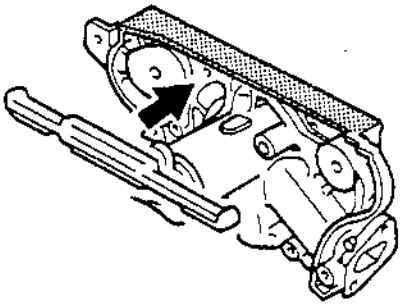
1	P/S oil pump ☞ Removal Note
2	Idler (without P/S oil pump)
3	Water hose
4	Water pump ☞ Installation Note
5	Water inlet pipe

P/S Oil Pump Removal Note

- Remove the P/S oil pump with the oil hose still connected. Position the P/S oil pump so that it is out of the way.

Water Pump Installation Note

- Install the new rubber seal with the bonding agent.

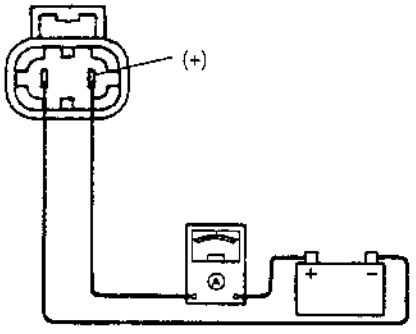


X5U112WAA

COOLING FAN MOTOR INSPECTION

X5U112W10

1. Verify that the battery is fully charged. (Refer to 01–17 BATTERY INSPECTION.)
2. Disconnect the cooling fan motor connector.
3. Connect battery positive voltage and an ammeter to the cooling fan motor connector.



X5U112WAB

4. Verify that the cooling fan motor operates smoothly at the standard current draw.

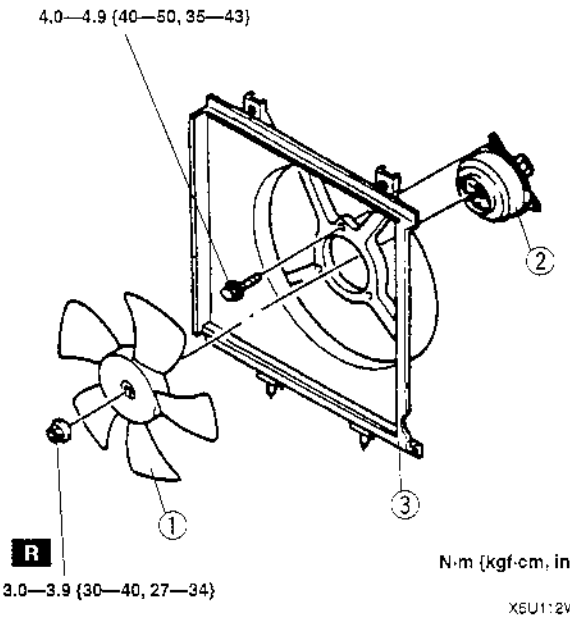
Item	Engine
	BP
Current (A) [12 V]	4.50—6.49

5. If not as specified, replace the cooling fan motor.

COOLING FAN MOTOR REMOVAL/INSTALLATION

X5U112W11

1. Remove the cooling fan. (Refer to 01–12 RADIATOR REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



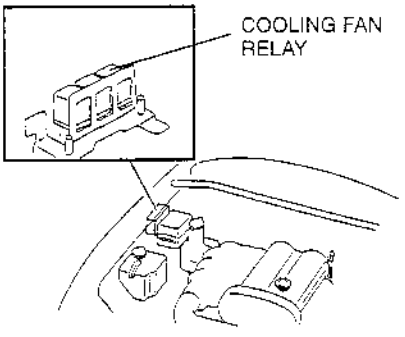
X5U112WAC

1	Cooling fan blade
2	Cooling fan motor
3	Radiator cowling

COOLING FAN RELAY INSPECTION

X5U112W12

1. Disconnect the negative battery cable.
2. Remove the cooling fan relay.



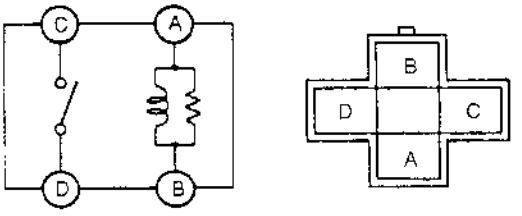
X5U112WAD

3. Apply battery positive voltage and inspect for continuity between terminals of the cooling fan relay by using an ohmmeter.

○—○ : Continuity

Step	Terminal			
	A	B	C	D
1	○	○		
2	B+	GND	○	○

X5U112WAE



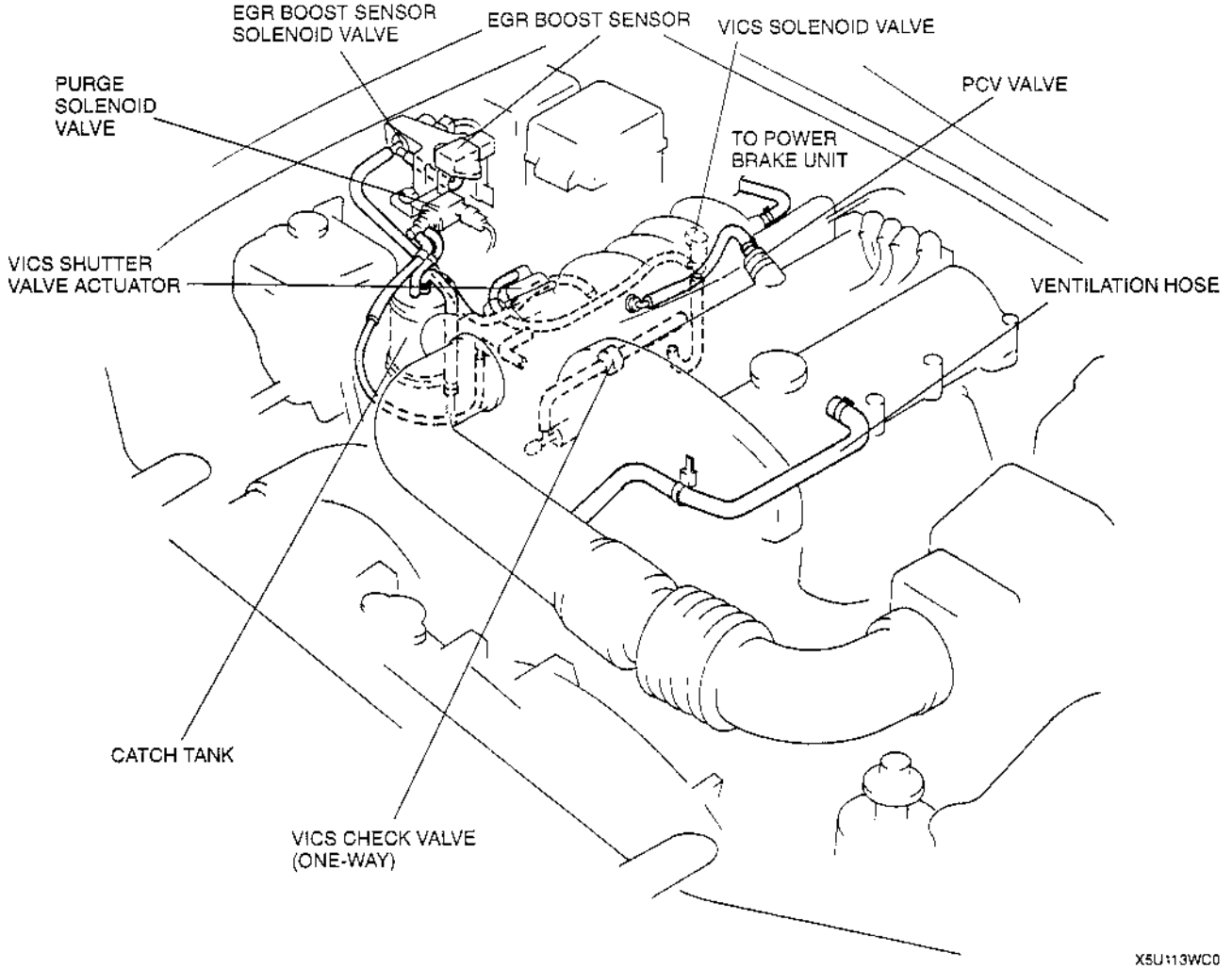
X5U112WAF

4. If not as specified, replace the cooling fan relay.

01–13 INTAKE-AIR SYSTEM

VACUUM HOSE ROUTING DIAGRAM

X5U113W01



X5U113WC0

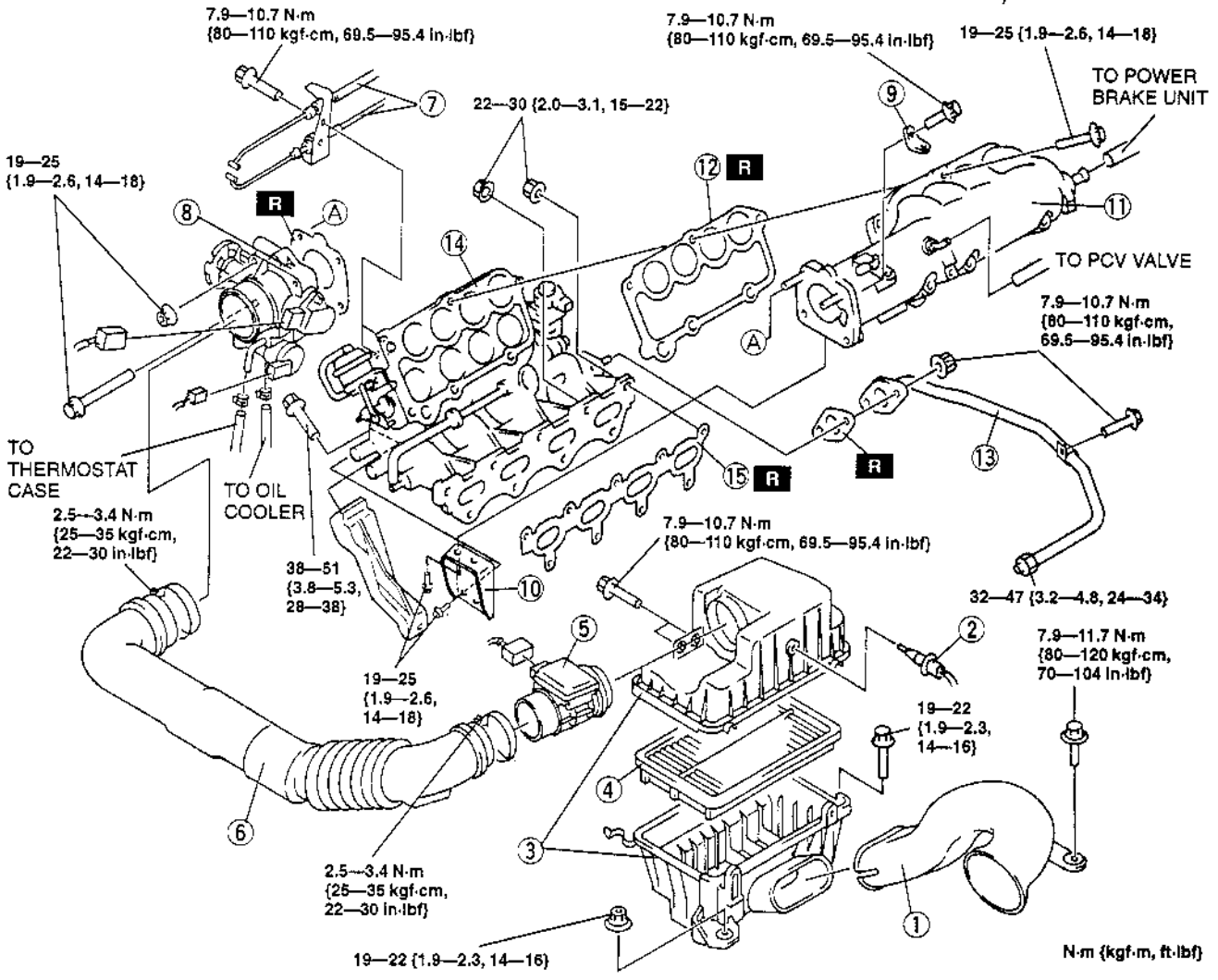
INTAKE-AIR SYSTEM REMOVAL/INSTALLATION

X5U113W02

Warning

- **When the engine and intake-air system are hot, they can badly burn. Turn off the engine and wait until they are cool before removing or installing the intake-air system.**

1. Disconnect the negative battery cable.
2. Drain the engine coolant from radiator. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Refill the engine coolant to radiator. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)

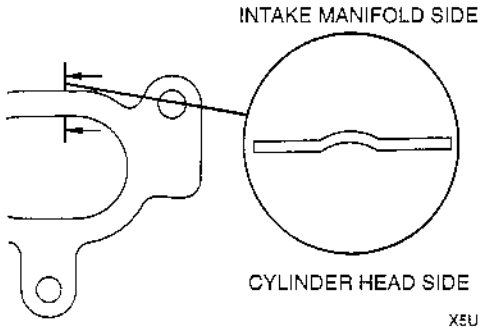


X5U113WC1

1	Fresh-air duct
2	Intake air temperature sensor
3	Air cleaner
4	Air cleaner element
5	Mass air flow sensor
6	Air hose
7	Accelerator cable (and throttle cable (AT only))
8	Throttle body
9	Dynamic chamber bracket ☞ Installation Note

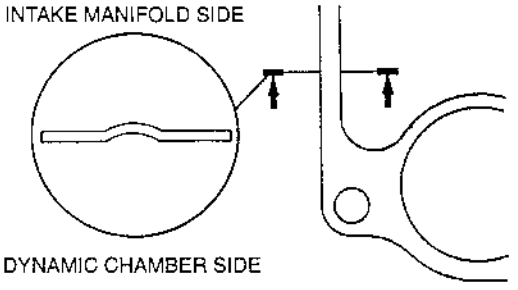
10	Dynamic chamber stay ☞ Installation Note
11	Dynamic chamber
12	Dynamic chamber gasket ☞ Installation Note
13	EGR pipe
14	Intake manifold
15	Intake manifold gasket ☞ Installation Note

Intake Manifold Gasket Installation Note
- To install the intake manifold gasket, make sure that the convex side of the gasket is faced to the intake manifold side.



X5U113WA2

Dynamic Chamber Gasket Installation Note
- To install the dynamic chamber gasket, make sure that the convex side of the gasket is faced to the intake manifold side.



X5U113WC2

Dynamic Chamber Stay Installation Note
- Snugly tighten the bolts, then tighten the dynamic chamber side bolts before tightening the intake manifold side bolts.

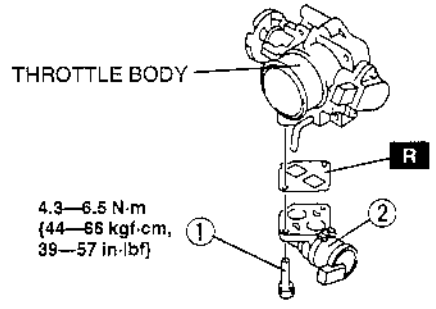
Dynamic Chamber Bracket Installation Note
- Snugly tighten the bolts, then tighten the dynamic chamber side bolt before tightening the fuel distributor side bolt.

IDLE AIR CONTROL VALVE REMOVAL/INSTALLATION

X5U113W15

1. Disconnect the negative battery cable.
2. Remove the air hose and the throttle body. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Disconnect the IAC valve connector.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

1	Bolt
2	IAC valve



X5U113WC3

IDLE AIR CONTROL VALVE INSPECTION

X5U113W03

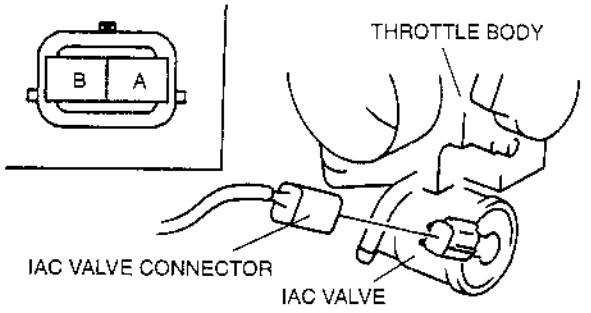
Simulation Test
1. Carry out the "Idle Air Control Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, Idle Air Control Inspection.)
2. If not as specified, perform the further inspection for the IAC valve.

Resistance Inspection

Note
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Disconnect the IAC valve connector.
3. Measure the resistance between the IAC valve terminals by using an ohmmeter.

Resistance
8.7—10.5 Ω (24 °C (75 °F))



X5U113WA3

4. If not as specified, replace the IAC valve. (Refer to 01–13 IDLE AIR CONTROL VALVE REMOVAL/INSTALLATION.) If as specified but the Simulation Test is failed, inspect following:
   Open circuit
   - Power circuit (IAC valve connector terminal A and PCM connector terminal 3M.)
   - Ground circuit (IAC valve connector terminal B and PCM connector terminal 3O.)

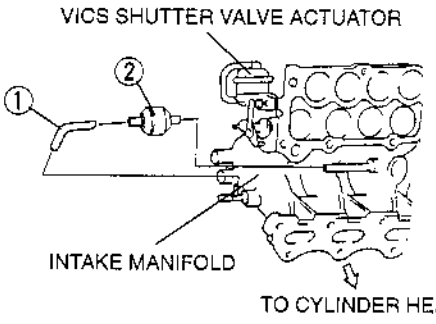
   Short circuit
   - IAC valve connector terminal A and PCM connector terminal 3M to ground.
5. Remove the IAC valve, and inspect for any damage or clogging. Replace the IAC valve if not as specified. (Refer to 01–13 IDLE AIR CONTROL VALVE REMOVAL/INSTALLATION.)

VICS CHECK VALVE (ONE-WAY) REMOVAL/INSTALLATION

X5U113W16

1. Disconnect the negative battery cable.
2. Remove the air hose, throttle body, and dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

1	Vacuum hose
2	VICS check valve (one-way)

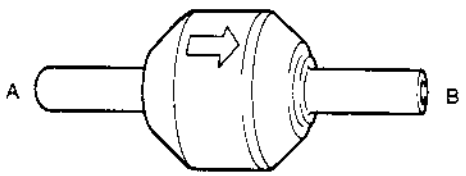


X5U113WC9

VICS CHECK VALVE (ONE-WAY) INSPECTION

X5U113W06

1. Remove the VICS check valve (one-way). (Refer to 01–13 VICS CHECK VALVE (ONE-WAY) REMOVAL/INSTALLATION.)
2. Blow through A and verify that the air flows from B.
3. Blow through B and verify that the air does not flow from A.
4. If not as specified, replace the VICS check valve (one-way).



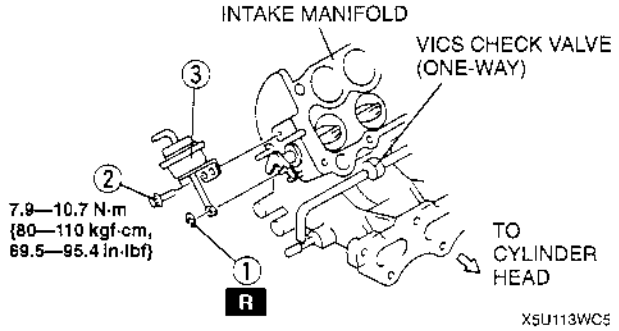
X5U113WA7

VICS SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION

X5U113W17

1. Disconnect the negative battery cable.
2. Remove the air hose, throttle body, and dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

1	E ring
2	Bolt
3	VICS shutter valve actuator



X5U113WC5

VICS SHUTTER VALVE ACTUATOR INSPECTION

Simulation Test

1. Carry out the "VICS Operation Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, VICS Operation Inspection.)
2. If not as specified, perform the further inspection for the VICS shutter valve actuator.

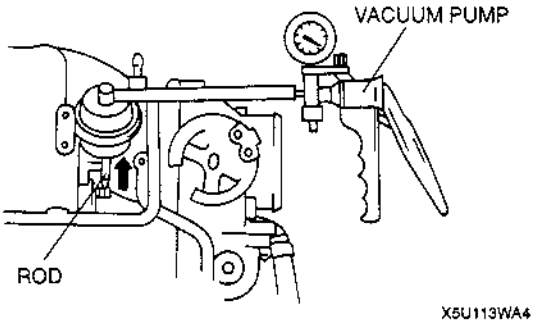
Operation Inspection

Note
- Perform the following test only when directed.

1. Disconnect the vacuum hose from the VICS shutter valve actuator.
2. Connect a vacuum pump to the VICS shutter valve actuator.
3. Apply vacuum slowly and inspect the rod movement of the VICS shutter valve actuator under the following condition.

Vacuum kPa {mmHg, inHg}	Rod movement
Above –1.3 {–10, –0.4}	Not pulled
–1.3— –4.0 {–10— –30, –0.4— –1.1}	Start to move
Below –26 {–190, –7.5}	Fully pulled

X5U113W14

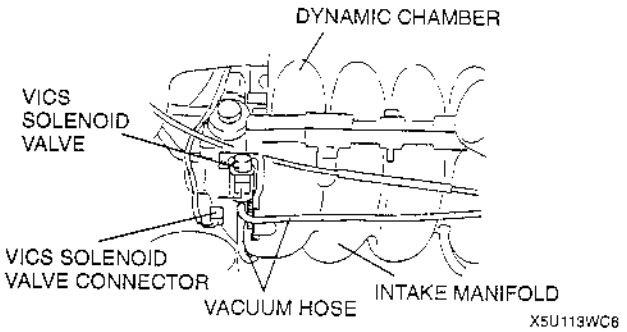


X5U113WA4

4. If not as specified, replace the VICS shutter valve actuator. (Refer to 01–13 VICS SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION.) If as specified but the Simulation Test is failed, inspect following:
Vacuum hose improper routing, kinks or leakage.

VICS SOLENOID VALVE REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the VICS solenoid valve connector.
3. Disconnect the vacuum hose from the VICS solenoid valve.

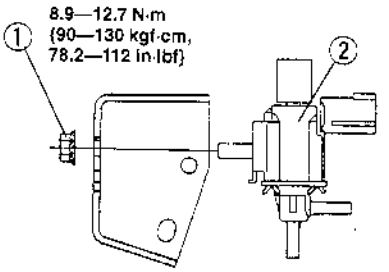


X5U113WC6

4. Remove in the order indicated in the table.

X5U113W18

5. Install in the reverse order of removal.



X5U113WC7

1	Nut
2	VICS solenoid valve

VICS SOLENOID VALVE INSPECTION

X5U113W11

Simulation Test

1. Carry out the "VICS Operation Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, VICS Operation Inspection.)
2. If not as specified, perform the further inspection for the VICS solenoid valve.

Airflow Inspection

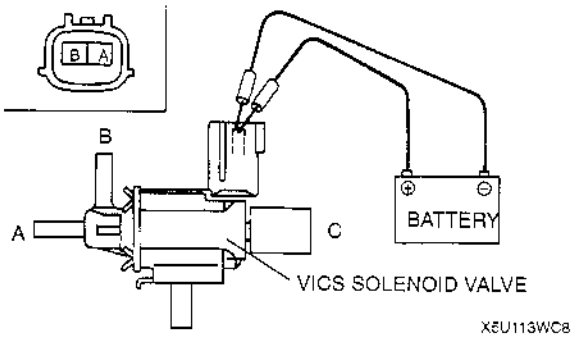
Note
- Perform the following test only when directed.

1. Remove the VICS solenoid valve.
2. Inspect for airflow between each port under the following condition.

○—○ : Continuity ○═○ : Airflow

Step	Terminal		Port		
	A	B	A	B	C
1	○—○			○═○	
2	B+	GND	○═○		

X5U113WB1

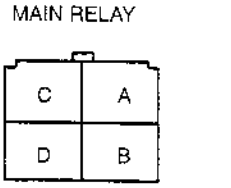


X5U113WC8

3. If not as specified, replace the VICS solenoid valve. If as specified but the Simulation Test is failed, inspect following:

Vacuum hose improper routing, kinks or leakage.

Open circuit
- Power circuit (VICS solenoid valve connector terminal A and main relay connector terminal D through common connector.)
- Ground circuit (VICS solenoid valve connector terminal B and PCM connector terminal 3Q.)



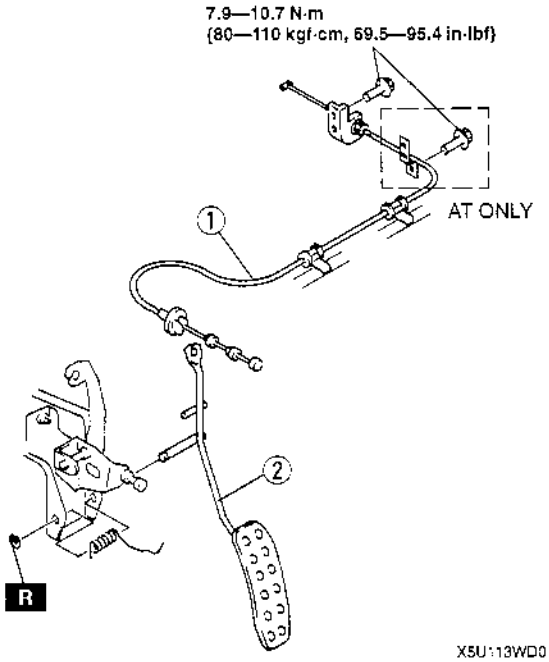
X5U113WD2

Short circuit
- VICS solenoid valve connector terminal A and main relay connector terminal D through common connector to ground.

ACCELERATOR PEDAL REMOVAL/INSTALLATION

X5U113W12

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



X5U113WD0

1	Accelerator cable ☞ Installation Note
2	Accelerator pedal

Accelerator Cable Installation Note

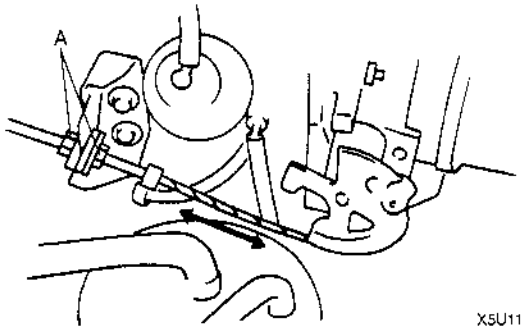
- Carry out the "ACCELERATOR CABLE INSPECTION/ADJUSTMENT" procedure after installing the accelerator cable.

ACCELERATOR CABLE INSPECTION/ADJUSTMENT

X5U113W13

1. Verify that the throttle valve is at the closed throttle position.
2. Measure the free play of the accelerator cable.

Free play
1—3 mm {0.04—0.11 in}



X5U113WD1

3. If not within the specification, adjust by turning locknuts A.

Tightening torque
9.8—14 N·m {1.0—1.5 kgf·m, 7.3—10 ft·lbf}

01–14 FUEL SYSTEM

BEFORE REPAIR PROCEDURE

Warning

- **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Warning

- **Fuel line spills and leaks 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 following "Fuel Line Safety Procedure".**

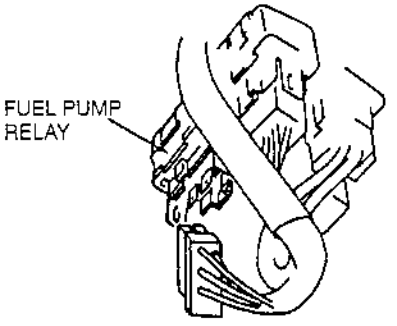
Note

- Fuel in the fuel system is under high pressure when the engine is not running.

X5U114W01

Fuel Line Safety Procedure

1. Remove the fuel-filler cap and release the pressure in the fuel tank.
2. Disconnect the fuel pump relay connector (6-pin type connector; 4 terminal) located above the accelerator pedal.



X5U114WA0

3. Start the engine.
4. After the engine stalls, crank the engine several times.
5. Turn the ignition switch off.
6. Install the fuel pump relay.

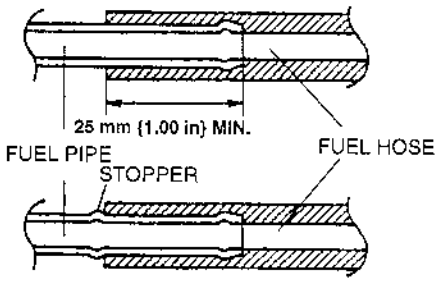
AFTER REPAIR PROCEDURE

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. When installing the fuel hose, observe "Fuel Hose Installation" and "Fuel Leakage Inspection" described below.**

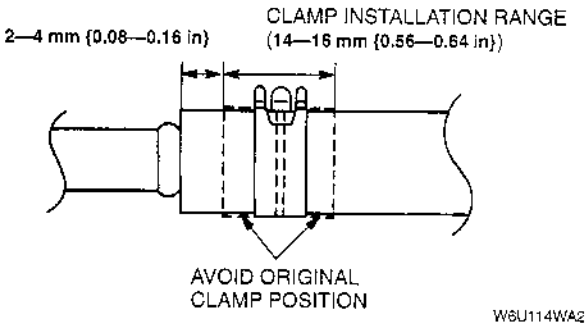
Fuel Hose Installation

1. Replace damaged or deformed fuel hoses, fuel pipes, and hose clamps.
2. When installing the fuel hose onto the fuel pipe, fit the hose onto the pipe over **25 mm {1.00 in}**. When the pipe has a stopper, fit the hose until it contacts the stopper.



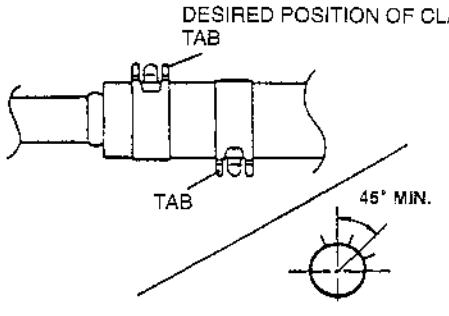
W6U114WA1

3. Install a hose clamp over the fuel hose within the clamp installation range as shown, avoiding the original clamp position.



W6U114WA2

4. When installing two clamps, their tabs must be positioned **more than 45° (desired 180°)** apart.



W6U114WA3

X5U114W02

Fuel Leakage Inspection

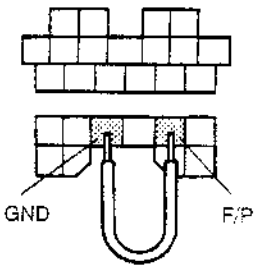
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

Caution

- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

1. Connect data link connector terminals F/P and GND by using a jumper wire.



X5U114WA1

2. Turn the ignition switch to ON to operate the fuel pump.
3. Pressurize the system this way for **at least 5 minutes** to be sure of no leakage.
4. If there is fuel leakage, inspect for damaged fuel hoses, hose clamps, and fuel pipe sealing surface and replace as necessary.
5. After repair, assemble the system and repeat steps 1 to 3.

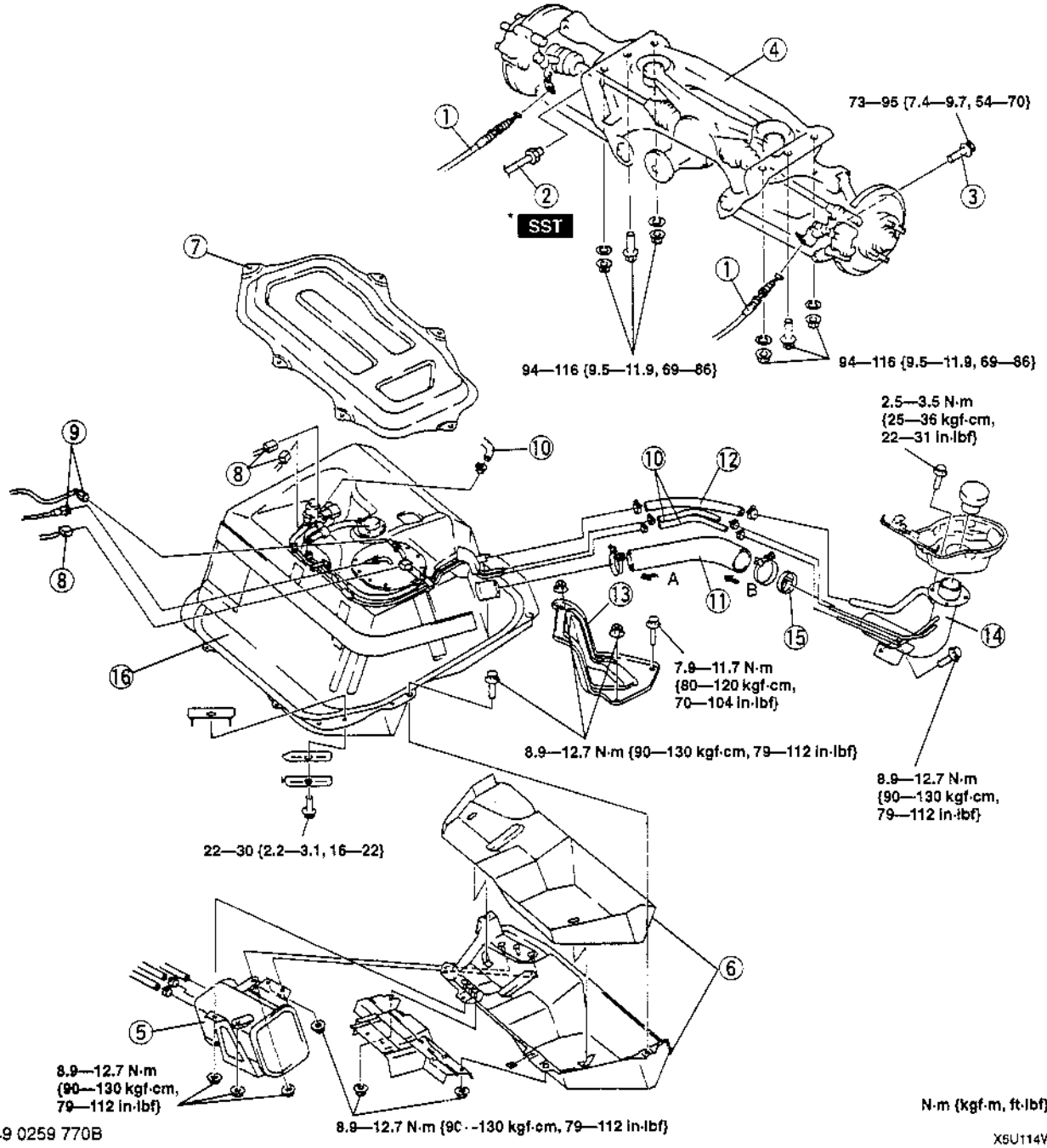
FUEL TANK REMOVAL/INSTALLATION

X5U114W03

Warning

- **Repairing a fuel tank that has not been properly steam cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Siphon the fuel from the fuel tank. (Refer to Fuel Drawing Note.)
4. Remove the middle pipe. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
5. Remove the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)
6. Remove the power plant frame. (Refer to 05–11 MANUAL TRANSMISSION REMOVAL/INSTALLATION.) (Refer to 05–13 AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION.)
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)



* 49 0259 770B

N·m {kgf·m, ft·lbf}

X5U114WA2

1	Parking brake cable ☞ 04–12 PARKING BRAKE CABLE (LEVER TYPE) REMOVAL/INSTALLATION
2	Brake pipe ☞ 04–11 AIR BLEEDING
3	Shock absorber bolt
4	Rear crossmember component ☞ Removal Note
5	Charcoal canister
6	Fuel tank insulator
7	Service hole cover
8	Connector
9	Plastic fuel hose ☞ Disassembly Note ☞ Assembly Note
10	Evaporative hose ☞ Installation Note
11	Joint hose ☞ Installation Note
12	Breather hose ☞ Installation Note
13	Dust cover
14	Fuel-filler pipe
15	Nonreturn valve ☞ Installation Note
16	Fuel tank

Fuel Drawing Note

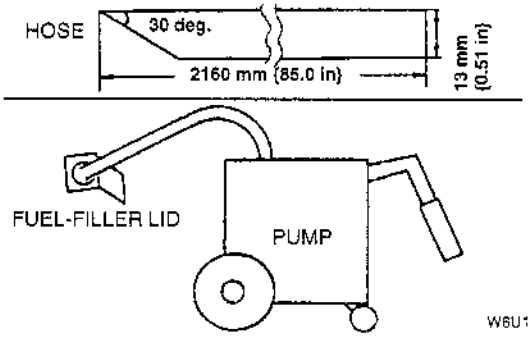
1. Remove the fuel-filler cap and insert a hose into the fuel tank through the fuel-filler pipe.
2. Siphon the fuel into a container by using a fuel drawing pump.

Note

- To make work easier, prepare a hose of following size.

Specification

Outer diameter: 13 mm {0.51 in}
Length: 2160 mm {85.0 in} or longer



W6U114WA6

Rear Crossmember Component Removal Note

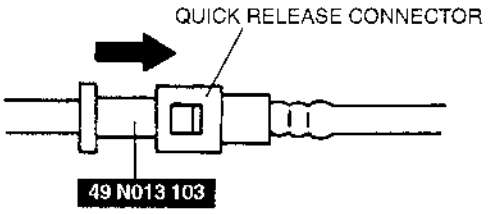
1. Support the rear crossmember component by using a transmission jack.
2. Remove the rear crossmember mounting bolts and nuts.
3. Lower the rear crossmember component.

Plastic Fuel Hose Disassembly Note

Caution

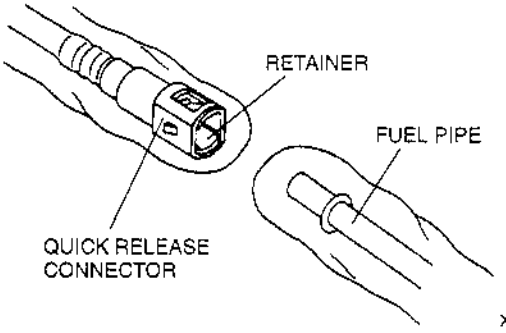
- **The retainer must be replaced if removed from the fuel pipe without using the SST. Otherwise, effectiveness of the retainer will be reduced.**

1. Inspect that the quick release connector joint area is free of foreign materials. Clean as necessary.
2. Set the **SST** as shown and push into the quick release connector to disconnect the plastic fuel hose.



X5U114WC5

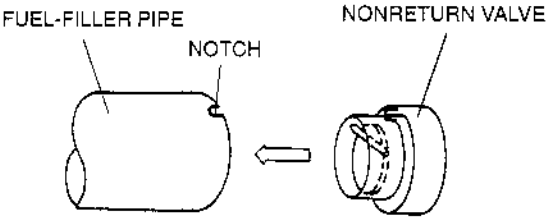
3. Cover the disconnected quick release connector and fuel pipe to prevent them from being scratched or contaminated with foreign materials.



X5U114WC6

Nonreturn Valve Installation Note

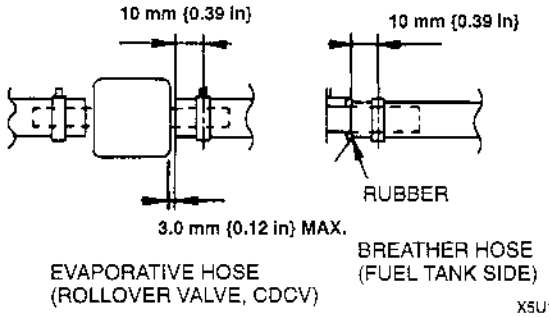
- Align the nonreturn valve with the notch in the fuel-filler pipe as shown, then install.



W6U114WA7

Breather Hose, Evaporative Hose Installation Note

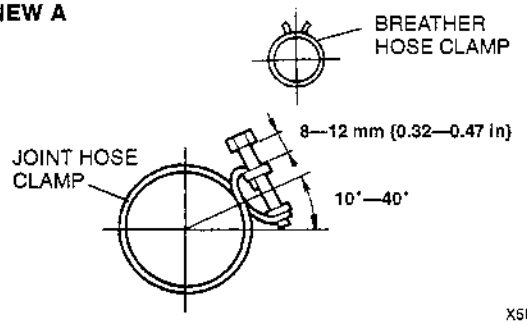
- Fit each hose onto the respective fittings within specification, and install clamps as shown.



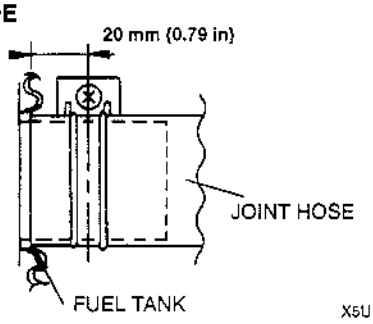
Joint Hose Installation Note

- Fit the joint hose onto the respective fittings within specification, and install clamps as shown.

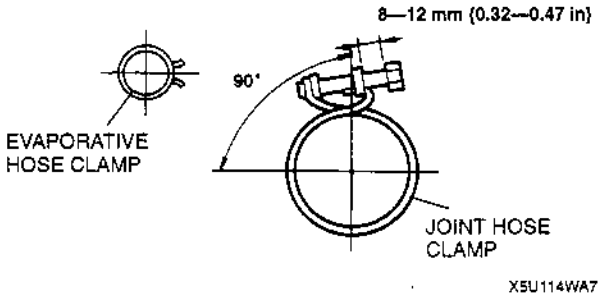
VIEW A



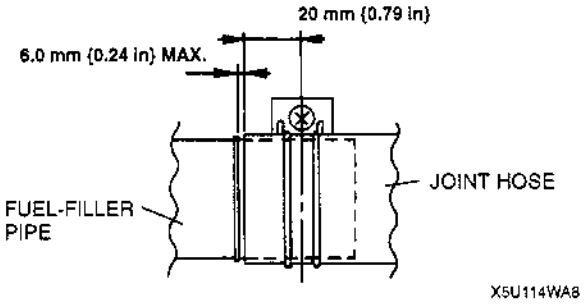
FUEL TANK SIDE



VIEW B

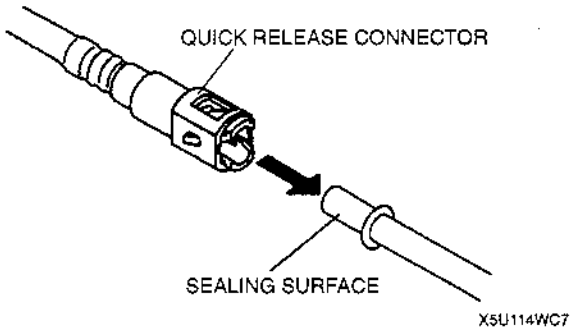


FUEL-FILLER PIPE SIDE



Plastic Fuel Hose Assembly Note

1. Inspect that the inside of the fuel pipe and the quick release connector is free of foreign materials and damage. Clean as necessary, taking care not to damage the sealing surfaces.
2. Push the quick release connector into the fuel pipe until a click is heard.

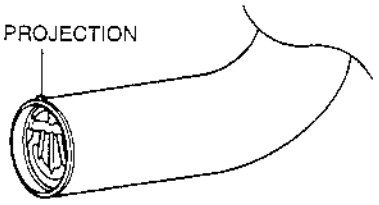


3. Pull the quick release connector by hand and verify that it is installed securely.

NONRETURN VALVE INSPECTION

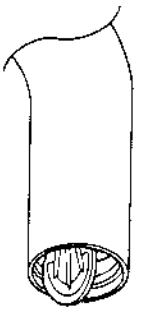
X5U114W04

1. Remove the fuel-filler pipe. (Refer to 01–14 FUEL TANK REMOVAL/INSTALLATION.)
2. Verify that the projection on the nonreturn valve is aligned with the notch on the fuel-filler pipe.



W6U114WB7

3. If not, remove the nonreturn valve and align the projection with the notch, then reinstall.
4. Verify that the nonreturn valve is closed when the fuel-filler pipe end is held up vertically.
5. If it opens, replace the nonreturn valve.
6. Verify that the nonreturn valve opens under its own weight when the fuel-filler pipe end is held down vertically.



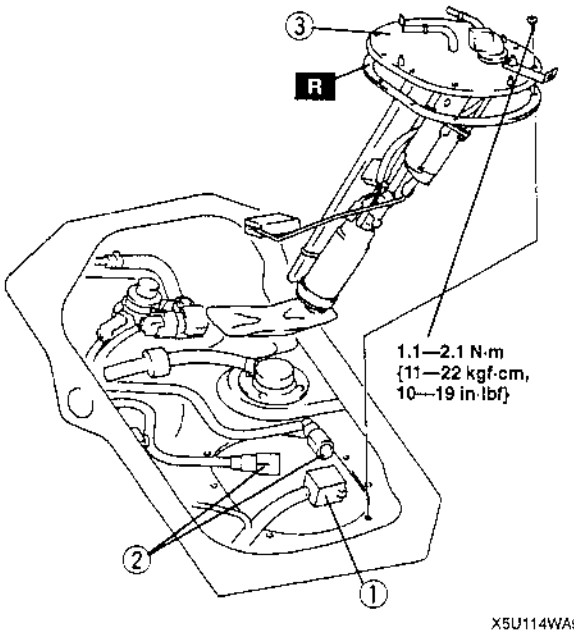
W6U114WB8

7. If it does not open, replace the nonreturn valve.

FUEL PUMP REMOVAL/INSTALLATION

X5U114W05

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Uncover the rear package trim.
4. Remove the service hole cover.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)



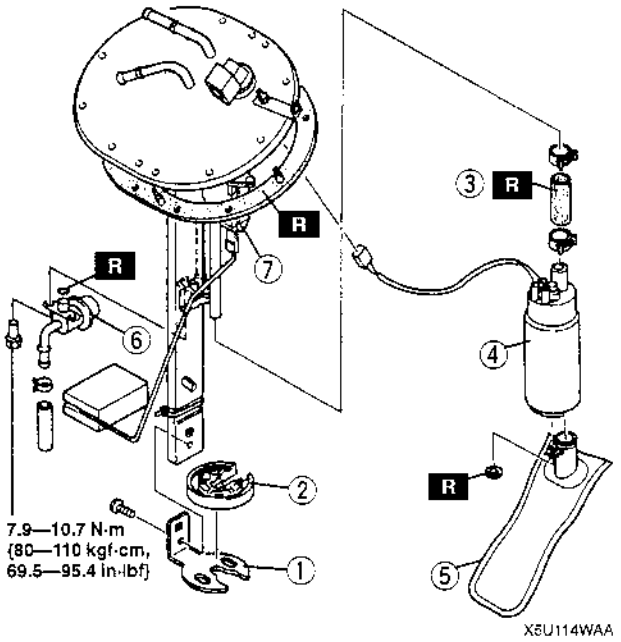
X5U114WA9

1	Connector
2	Plastic fuel hose ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Disassembly Note ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Assembly Note
3	Fuel pump

FUEL PUMP DISASSEMBLY/ASSEMBLY

X5U114W06

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

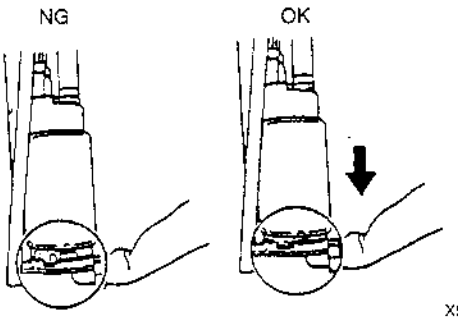


X5U114WAA

1	Bracket
2	Rubber mount
3	Fuel hose ☞ Assembly Note
4	Fuel pump ☞ Assembly Note
5	Fuel filter (low-pressure)
6	Pressure regulator
7	Fuel gauge sender unit

Fuel Pump Assembly Note

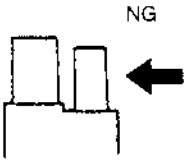
- After installing the fuel pump to the bracket, pull the pump down so that it is tight against the bracket and there is no gap.



X5U114WAB

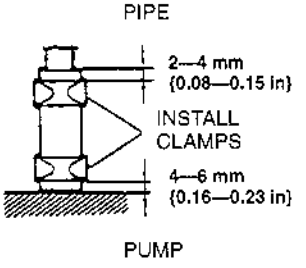
Fuel Hose Assembly Note

1. Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.



X5U114WBF

2. Install the clamps as shown.



X5U114WAC

FUEL PUMP INSPECTION

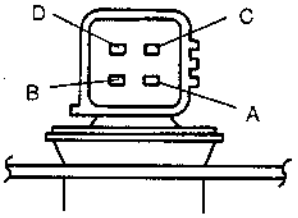
Simulation Test

1. Carry out the "Fuel Pump Operation Inspection", "Fuel Pump Control Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, Fuel Pump Operation Inspection.) (Refer to 01–01A ENGINE SYSTEM INSPECTION, Fuel Pump Control Inspection.)
2. If not as specified, perform the further inspection for the fuel pump.

Continuity Inspection

Note
- Perform the following test only when directed.

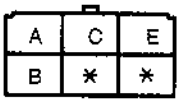
1. Disconnect the negative battery cable.
2. Remove the service hole cover.
3. Disconnect the fuel pump connector.
4. Inspect for continuity between fuel pump connector terminals B and D.



X5U114WAD

5. If there is no continuity, replace the fuel pump. If as specified but the Simulation Test is failed, inspect following:
   Fuel pump relay malfunction
   Open circuit
   - Ground circuit (Fuel pump connector terminal D and body ground)
   - Power circuit (Fuel pump relay connector terminal C and fuel pump connector terminal B through common connector)

FUEL PUMP RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U114WCC

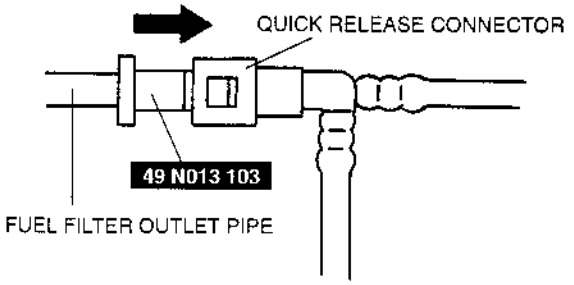
   Short circuit
   - Fuel pump relay connector terminal C and fuel pump connector terminal B through common connector to ground.
6. Reconnect the fuel pump connector.

X5U114W07

Fuel Pump Maximum Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

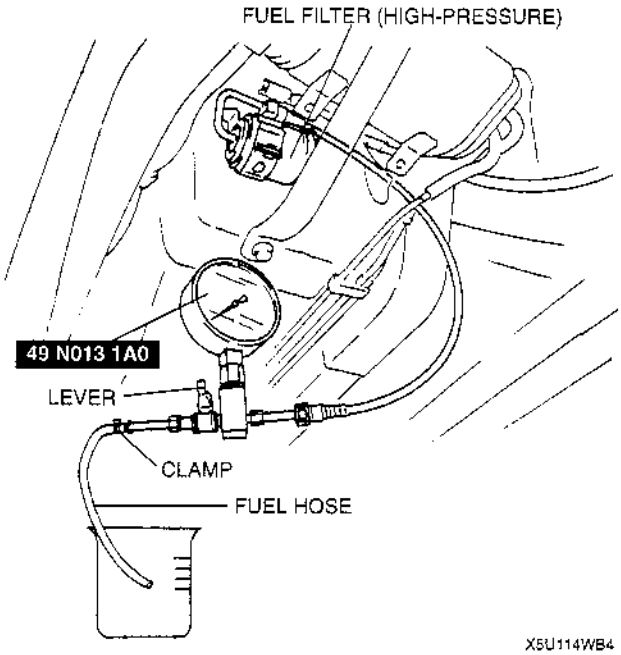
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Lift up the vehicle with safety stands.
4. Remove the fuel filter cover.
5. Inspect that the quick release connector joint area is free of foreign materials. Clean as necessary.
6. Set the **SST** to the fuel filter outlet pipe and push into the quick release connector and disconnect the fuel pipe.



X5U114WB2

Caution
- **Removing the retainer from the disconnected fuel pipe will reduce the effectiveness of the retainer. The retainer must be replaced when any of the following applies.**
  1. **Scratches or damage is observed on the retainer.**
  2. **Fuel pipe has been replaced.**
  3. **Fuel filter (high-pressure) has been replaced.**

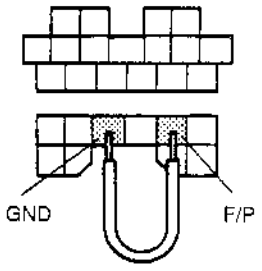
7. If removal of the retainer is required, remove it by squeezing the tabs of the retainer.
8. Cover the disconnected quick release connector to prevent them from being scratched or contaminated with foreign materials.
9. Turn the lever as shown to plug the **SST** outlet. Push the **SST** into the fuel filter outlet pipe until a click is heard.
10. Connect a fuel hose and clamp to the **SST** outlet pipe. Set the fuel hose into a container to avoid fuel spills.



11. Pull the quick release connector by hand and verify that it is installed securely.
12. Connect the negative battery cable.

Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

13. Connect data link connector terminals F/P and GND by using a jumper wire.



14. Turn the ignition switch to ON to operate the fuel pump. Measure the fuel pump maximum pressure.

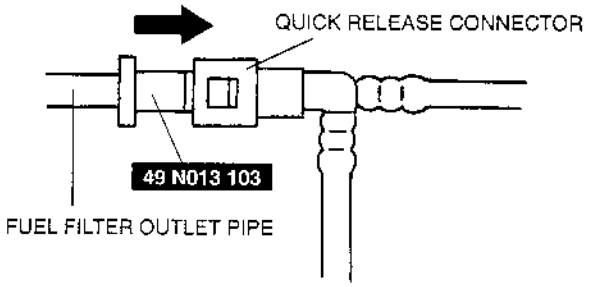
Fuel pump maximum pressure
Less than 640 kPa {6.5 kgf/cm^2, 92 psi}

15. Turn the ignition switch off and disconnect the jumper wire.
16. If not as specified, inspect following:
    - Fuel pump
    - Fuel pump relay
    - Fuel filter for clogging
    - Fuel line for clogging or leakage
17. Disconnect the **SST**. Inspect the fuel pipe for kinks. Replace the fuel pipe if necessary.
18. Inspect that the inside of the fuel filter outlet pipe and the quick release connector is free of foreign materials and damage. Clean as necessary, taking care not to damage the sealing surfaces.
19. Push the fuel pipe into the fuel filter outlet pipe until a click is heard.
20. Pull the quick release connector by hand and verify that it is installed securely.
21. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

Fuel Pump Hold Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

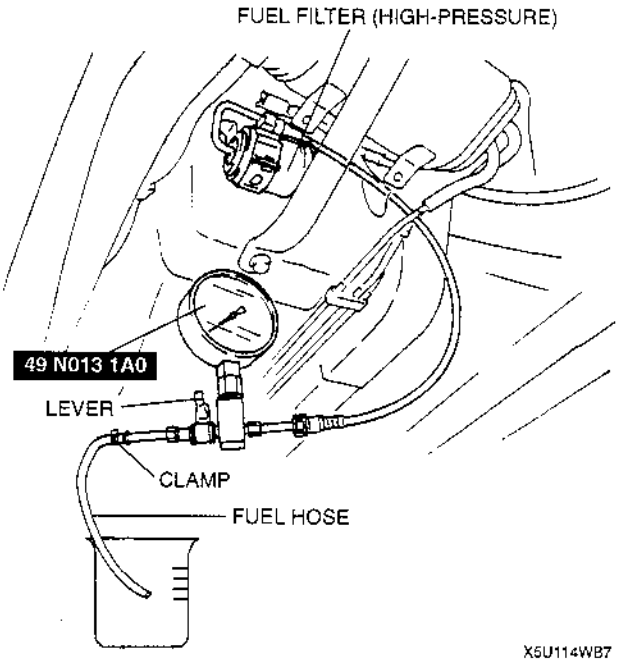
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Lift up the vehicle with safety stands.
4. Remove the fuel filter cover.
5. Inspect that the quick release connector joint area is free of foreign materials. Clean as necessary.
6. Set the **SST** to the fuel filter outlet pipe and push into the quick release connector and disconnect the fuel pipe.



Caution
- **Removing the retainer from the disconnected fuel pipe will reduce the effectiveness of the retainer. The retainer must be replaced when any of the following applies.**
  1. **Scratches or damage is observed on the retainer.**
  2. **Fuel pipe has been replaced.**
  3. **Fuel filter (high-pressure) has been replaced.**

7. If removal of the retainer is required, remove it by squeezing the tabs of the retainer.
8. Cover the disconnected quick release connector to prevent them from being scratched or contaminated with foreign materials.

9. Turn the lever as shown to plug the **SST** outlet. Push the **SST** into the fuel filter outlet pipe until a click is heard.
10. Connect a fuel hose and clamp to the **SST** outlet pipe. Set the fuel hose into a container to avoid fuel spills.

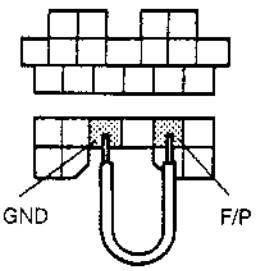


11. Pull the quick release connector by hand and verify that it is installed securely.
12. Connect the negative battery cable.

Caution

- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

13. Connect data link connector terminals F/P and GND by using a jumper wire.



14. Turn the ignition switch to ON for **10 seconds** to operate the fuel pump.
15. Turn the ignition switch off. Measure the fuel pump hold pressure **after 5 minutes**.

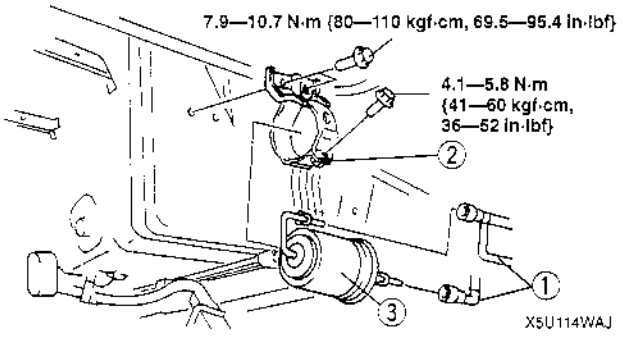
Fuel pump hold pressure
More than 340 kPa {3.5 kgf/cm^2, 50 psi}

16. Disconnect the jumper wire.
17. If not as specified, replace the fuel pump.
18. Disconnect the **SST**. Inspect the fuel pipe for kinks. Replace the fuel pipe if necessary.
19. Inspect that the inside of the fuel filter outlet pipe and the quick release connector is free of foreign materials and damage. Clean as necessary, taking care not to damage the sealing surfaces.
20. Push the fuel pipe into the fuel filter outlet pipe until a click is heard.
21. Pull the quick release connector by hand and verify that it is installed securely.
22. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

FUEL FILTER (HIGH-PRESSURE) REMOVAL/INSTALLATION

X5U114W08

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Raise the rear of the vehicle and support it with safety stands.
4. Remove the fuel filter protector.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

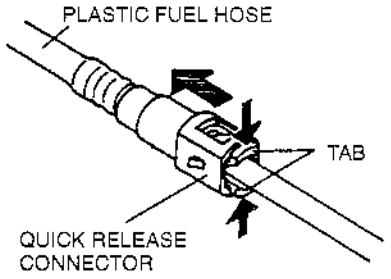


X5U114WAJ

1	Plastic fuel hose ☞ Disassembly Note ☞ Assembly Note
2	Fuel filter bracket
3	Fuel filter (high-pressure) ☞ Removal Note ☞ Installation Note

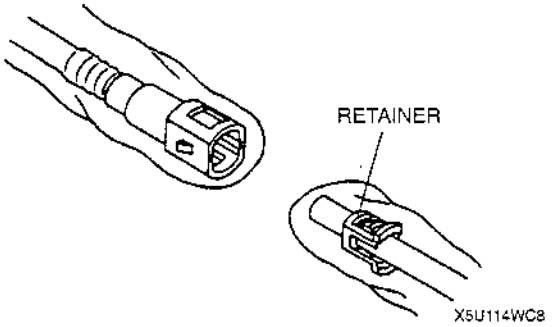
Plastic Fuel Hose Disassembly Note

1. Inspect that the quick release connector joint area is free of foreign materials. Clean as necessary.
2. Squeeze the tabs of the retainer and disconnect the quick release connector.



X5U114WCG

3. Cover the disconnected quick release connector and fuel pipe to prevent them from being scratched or contaminated with foreign materials.



X5U114WC8

Caution

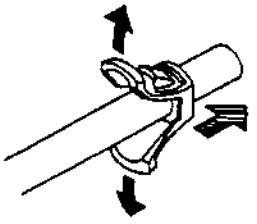
- **Removing the retainer from the disconnected fuel pipe will reduce the effectiveness of the retainer. The retainer must be replaced when any of the following applies.**
  1. **Retainer has been removed.**
  2. **Scratches or damage is observed on the retainer.**
  3. **Plastic fuel hose has been replaced.**
  4. **Fuel filter (high-pressure) has been replaced.**

4. If removal of the retainer is required, remove it in the following procedure.

Caution

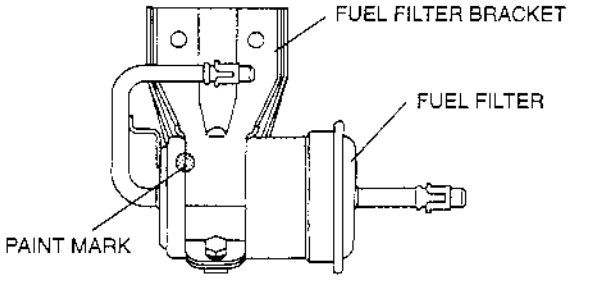
- **Removing the retainer by using a tool can damage the fuel pipe and cause fuel leakage. Remove the retainer by opening the tabs outward by hand.**

(1) Open the tabs of the retainer outward.
(2) Remove and discard the retainer.


X5U114WC9

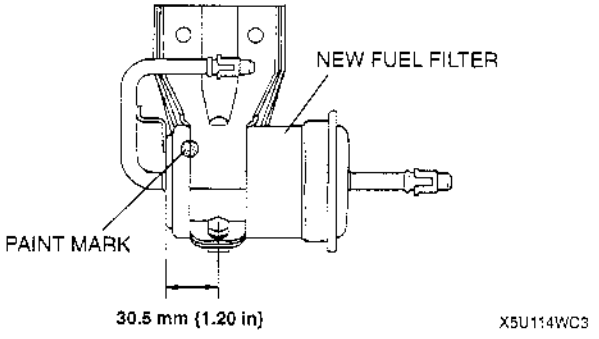
Fuel Filter (High-pressure) Removal Note

- Before removing the fuel filter, paint mark the fuel filter and fuel filter bracket for correct reassembly.



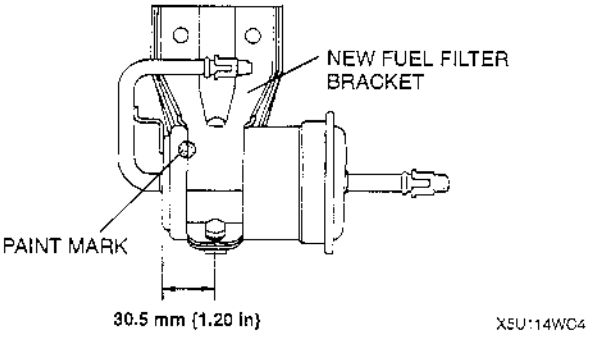
Fuel Filter (High-pressure) Installation Note
Replacing the fuel filter:

1. Paint mark the new fuel filter on the same spot as the removed fuel filter.
2. Align the paint marks and install the fuel filter.



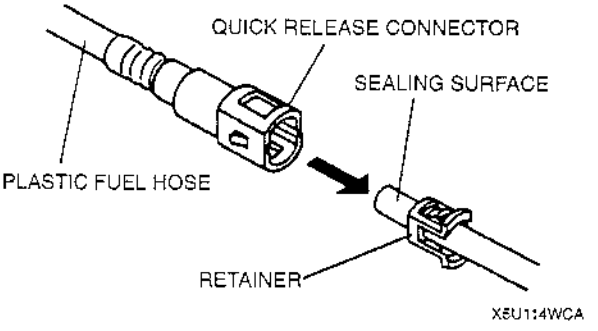
Replacing the fuel filter bracket:

1. Paint mark the new fuel filter bracket on the same spot as the removed fuel filter bracket.
2. Align the paint marks and install the fuel filter bracket.



Plastic Fuel Hose Assembly Note

1. When the retainer is not removed, observe the following procedure.
   (1) Inspect the plastic fuel hose for kinks. Replace if necessary.
   (2) Inspect that the inside of the fuel pipe and the quick release connector is free of foreign materials and damage. Clean as necessary, taking care not to damage the sealing surfaces.
   (3) Align the fuel pipe and quick release connector so that the tabs of the retainer are correctly fitted into the quick release connector. Push the quick release connector into the retainer until a click is heard.

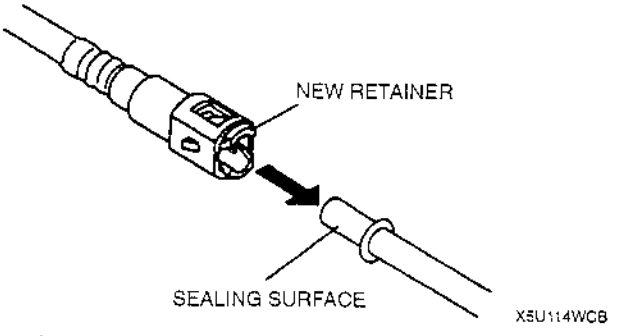


   (4) Pull the quick release connector by hand and verify that it is installed securely. Visually inspect that the tabs of the retainer are securely fitted into the quick release connector.
2. When the retainer is removed, observe the following procedure.

Note

- Use the designated genuine retainer only.

   (1) Install a new retainer onto the quick release connector. Visually inspect that the tabs of the retainer are securely fitted into the quick release connector.
   (2) Inspect that the inside of the fuel pipe and the quick release connector is free of foreign materials and damage. Clean as necessary, taking care not to damage the sealing surfaces.
   (3) Push the quick release connector into the fuel pipe until a click is heard.

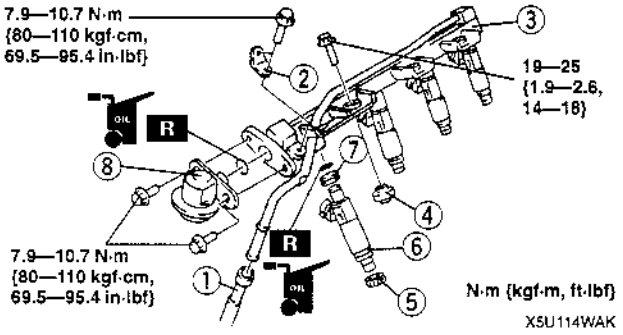


   (4) Pull the quick release connector by hand and verify that it is installed securely.

FUEL INJECTOR REMOVAL/INSTALLATION

X5U114W09

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove the dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

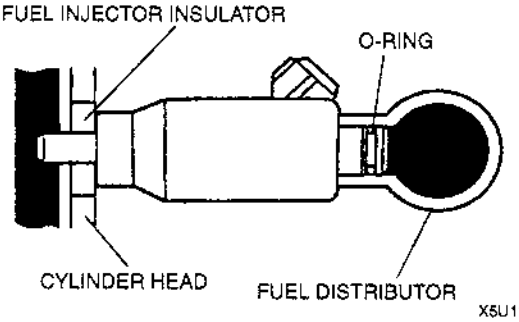


X5U114WAK

1	Plastic fuel hose ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Disassembly Note ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Assembly Note.
2	Fuel distributor bracket
3	Fuel distributor
4	Fuel distributor insulator
5	Fuel injector insulator
6	Fuel injector ☞ Installation Note
7	Grommet
8	Pulsation damper No.2

Fuel Injector Installation Note

1. Use new fuel injector O-rings.
2. Apply a small amount of engine oil to the O-rings and install them into the fuel distributor.
3. Verify that the O-rings and the fuel injector sealing surfaces are free of foreign materials. Clean with gasoline if necessary.
4. Install the fuel injectors in the fuel distributor with light twisting motion so that the O-rings will not be folded.



X5U114WB0

FUEL INJECTOR INSPECTION

X5U114W10

On-vehicle Inspection

1. Warm up the engine and let it idle.
2. Listen for operational sound of each fuel injector with a screwdriver or a soundscope.

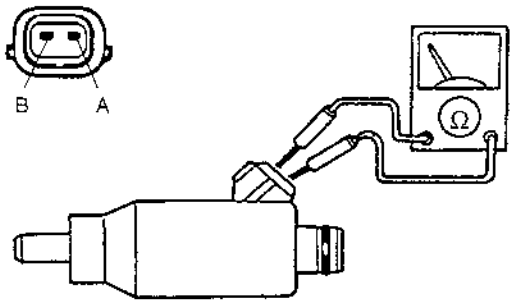
Note
- The best way to judge the performance of a fuel injector is to compare its sound with the sound of other fuel injectors.

3. If no sound is heard, carry out the "Fuel Injector Resistance Inspection".

Resistance Inspection

Note
- Perform the following test only when directed.

1. Disconnect the fuel injector connectors.
2. Measure the resistance of the fuel injector by using an ohmmeter.



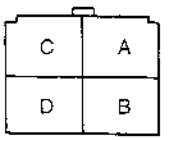
X5U114WC1

Resistance
12—16 Ω [20 °C {68 °F}]

3. If not as specified, replace the fuel injector. If as specified but On-vehicle Inspection is failed, inspect following:

Open circuit
- Ground circuit (No.1 cylinder fuel injector connector terminal B and PCM connector terminal 3W)
- Ground circuit (No.2 cylinder fuel injector connector terminal B and PCM connector terminal 3X)
- Ground circuit (No.3 cylinder fuel injector connector terminal B and PCM connector terminal 3Y)
- Ground circuit (No.4 cylinder fuel injector connector terminal B and PCM connector terminal 3Z)
- Power circuit (No.1 cylinder fuel injector connector terminal A and main relay connector terminal D through common connector)
- Power circuit (No.2 cylinder fuel injector connector terminal A and main relay connector terminal D through common connector)
- Power circuit (No.3 cylinder fuel injector connector terminal A and main relay connector terminal D through common connector)
- Power circuit (No.4 cylinder fuel injector connector terminal A and main relay connector terminal D through common connector)

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

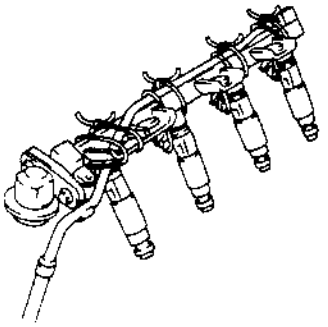
X5U114WCD

Short circuit
- No.1 cylinder fuel injector connector terminal B and PCM connector terminal 3W to ground.
- No.2 cylinder fuel injector connector terminal B and PCM connector terminal 3X to ground.
- No.3 cylinder fuel injector connector terminal B and PCM connector terminal 3Y to ground.
- No.4 cylinder fuel injector connector terminal B and PCM connector terminal 3Z to ground.

Fuel Leakage Test

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove the dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
4. Remove the fuel injectors together with the fuel distributor. (Refer to 01–14 FUEL INJECTOR REMOVAL/INSTALLATION.)
5. Fasten the fuel injectors firmly to the fuel distributor with wire.

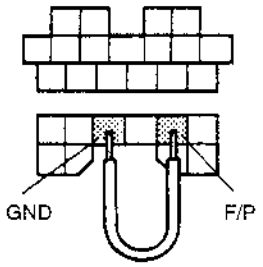


X5U114WAN

6. Connect the negative battery cable.

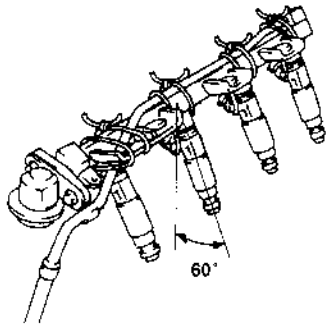
Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

7. Connect data link connector terminals F/P and GND by using a jumper wire.



X5U114WAP

8. Turn the ignition switch to ON to operate the fuel pump.
9. Tilt the fuel injectors **approx. 60 degrees** and verify that fuel leaks from the fuel injector nozzles is within specification.



X5U114WAQ

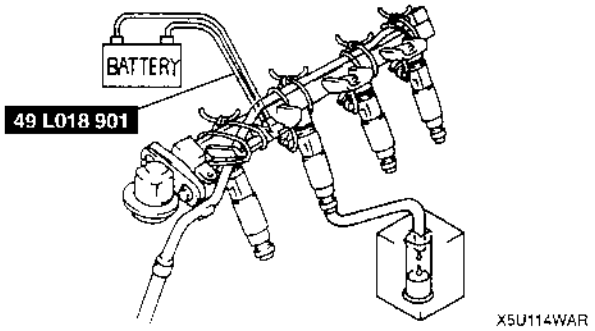
Fuel leakage
Less than 1 drop/2 minutes

10. Turn the ignition switch off and remove the jumper wire.
11. If not as specified, replace the fuel injector.
12. Install the dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
13. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

Volume Test

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove the dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
4. Remove the fuel injectors together with the fuel distributor.
5. Fasten the fuel injectors firmly to the fuel distributor with wire and connect the fuel pipe connector.
6. Connect the **SST** as shown in the figure.

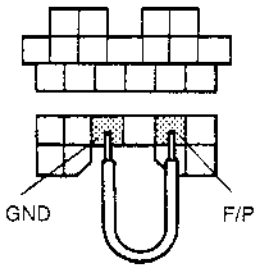


X5U114WAR

7. Connect the negative battery cable.

Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

8. Connect data link connector terminals F/P and GND by using a jumper wire.



X5U114WAS

9. Turn the ignition switch to ON to operate the fuel pump.
10. Measure the injection volume of each fuel injector by using a graduated container.

Injection volume
66—82 ml {66—82 cc, 2.3—2.7 floz}/15 sec.

11. Turn the ignition switch off and disconnect the jumper wire.
12. If not as specified, replace the fuel injector.
13. Install the dynamic chamber. (Refer to 01–13 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
14. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

PRESSURE REGULATOR REMOVAL/INSTALLATION

X5U114W11

(Refer to 01–14 FUEL PUMP DISASSEMBLY/ASSEMBLY.)

PRESSURE REGULATOR INSPECTION

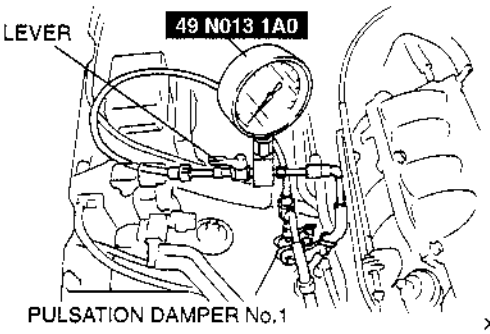
X5U114W12

Fuel Line Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Disconnect the fuel pipe on the pulsation damper No.1 outlet side. Set the **SST** between pulsation damper No.1 and the fuel distributor as shown in the figure. Turn the lever on the **SST** as shown to open the fuel line. (Refer to 01–14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Removal Note.)

Note
- Verify that a click is heard when the **SST** is pushed into pulsation damper No.1 and fuel pipe.

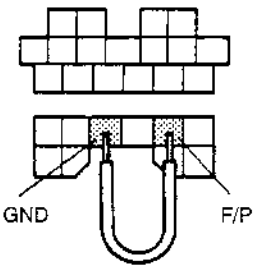


X5U114WBB

4. Pull the quick release connector by hand and verify that it is installed securely.
5. Connect the negative battery cable.

Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

6. Connect data link connector terminals F/P and GND by using a jumper wire.



X5U114WBC

7. Turn the ignition switch to ON to operate the fuel pump. Measure the fuel line pressure.

Fuel line pressure
370—420 kPa {3.7—4.3 kgf/cm^2, 53—61 psi}

8. Turn the ignition switch off and disconnect the jumper wire.
9. If not as specified, inspect following:
   - Fuel pump maximum pressure
   - Fuel pump relay
   - Fuel filter for clogging
   - Fuel line for clogging or leakage

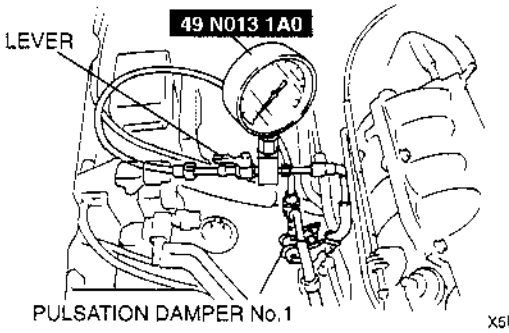
   If all items above are okay, perform the "Fuel Hold Pressure Inspection".
10. Disconnect the **SST** and connect the fuel pipe to the pulsation damper No.1. (Refer to 01–14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Installation Note.)
11. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)

Fuel Hold Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01-14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Disconnect the fuel pipe on the pulsation damper No.1 outlet side. Set the **SST** between pulsation damper No.1 and the fuel distributor as shown in the figure. Turn the lever on the **SST** as shown to open the fuel line. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Removal Note.)

Note
- Verify that a click is heard when the **SST** is pushed into pulsation damper No.1.

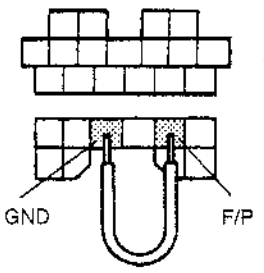


X5U114WBD

4. Pull the quick release connector by hand and verify that it is installed securely.
5. Connect the negative battery cable.

Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

6. Connect data link connector terminals F/P and GND by using a jumper wire.



X5U114WBE

7. Turn the ignition switch to ON for **10 seconds** to operate the fuel pump.
8. Turn the ignition switch off. Measure the fuel hold pressure **after 5 minutes**.

Fuel hold pressure
More than 250 kPa {2.55 kgf/cm^2, 36.3 psi}

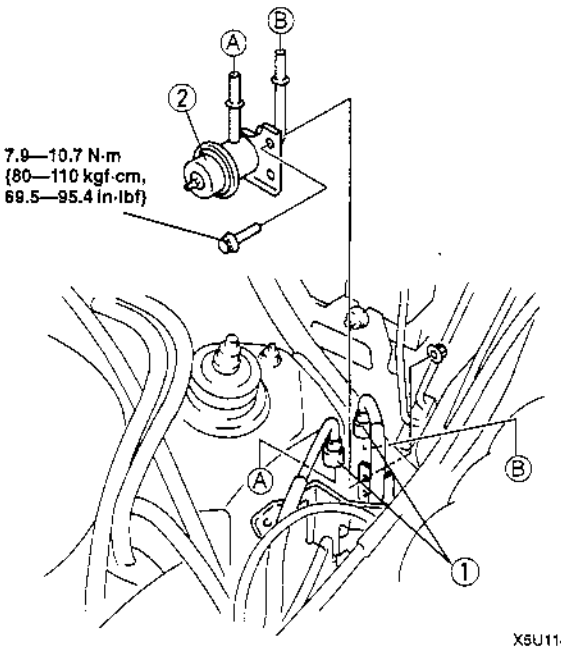
9. Disconnect the jumper wire.
10. Disconnect the **SST** and connect the fuel pipe to the pulsation damper No.1. (Refer to 01-14 FUEL INJECTOR REMOVAL/INSTALLATION, Fuel Pipe Installation Note.)
11. If not as specified, inspect following:
    - Fuel pump hold pressure
    - Fuel injector for leakage
    - Fuel line for improper routing, kinks or leakage

    If okay, replace the pressure regulator. (Refer to 01-14 FUEL PUMP DISASSEMBLY/ASSEMBLY.)

PULSATION DAMPER No.1 REMOVAL/INSTALLATION

X5U114W13

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Complete the "AFTER REPAIR PROCEDURE". (Refer to 01–14 AFTER REPAIR PROCEDURE.)



X5U114WAT

1	Plastic fuel hose ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Disassembly Note ☞ 01–14 FUEL TANK REMOVAL/INSTALLATION, Plastic Fuel Hose Assembly Note
2	Pulsation damper No.1

PULSATION DAMPER No.2 REMOVAL/INSTALLATION

X5U114W14

(Refer to 01–14 FUEL INJECTOR REMOVAL/INSTALLATION.)

PULSATION DAMPER No.1, No.2 INSPECTION

X5U114W15

1. Visually inspect pulsation damper No.1 and No.2 for damage and cracks. Also inspect that there is no extreme rust which will cause fuel leakage.
2. If either is observed, replace the faulty pulsation damper.

FUEL PUMP RELAY INSPECTION

X5U114W16

Note
- The lock of the fuel pump relay will be easily broken when removing the relay from the bracket. Do not remove the relay from the bracket except when replacement is required. Perform "FUEL PUMP RELAY INSPECTION" before removing the relay.

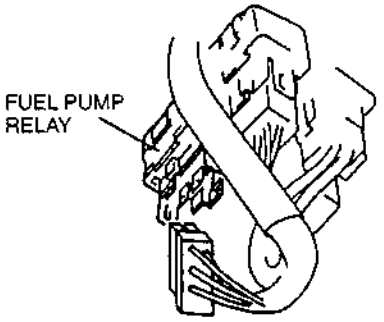
Simulation Test

1. Carry out the "Fuel Pump Operation Inspection", "Fuel Pump Control Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, Fuel Pump Operation Inspection.) (Refer to 01–01A ENGINE SYSTEM INSPECTION, Fuel Pump Control Inspection.)
2. If not as specified, perform the further inspection for the fuel pump relay.

Continuity Inspection

Note
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Disconnect the fuel pump relay connector (6-pin type connector: 4 terminal) located above the accelerator pedal.



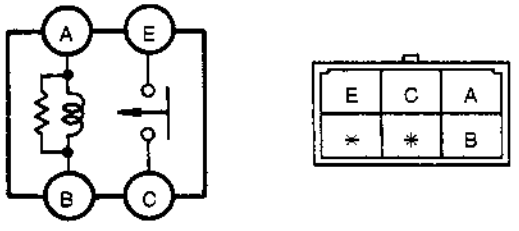
X5U114WAU

3. Inspect for continuity between the fuel pump relay terminals by using an ohmmeter.

○—○ : Continuity

Step	Terminal			
	A	B	C	E
1	○	○		
2	B+	GND	○	○

X5U114WAV



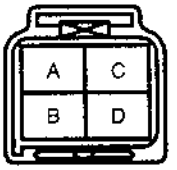
X5U114WAW

4. If not as specified, replace the fuel pump relay. If as specified but the Simulation Test is failed, inspect following:

Fuel pump malfunction

Open circuit
- Ground circuit (Fuel pump relay connector terminal B and PCM connector terminal 3N)
- Ground circuit (Fuel pump relay connector terminal C and fuel pump connector terminal B through common connector)
- Power circuit (Fuel pump relay connector terminal A or E and main relay connector terminal D)

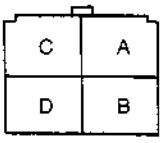
FUEL PUMP



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U114WCE

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U114WCF

Short circuit
- Fuel pump relay connector terminal B and PCM connector terminal 3N to ground
- Fuel pump relay connector terminal C and fuel pump connector terminal B to ground

5. Connect the fuel pump relay connector.
6. Connect the negative battery cable.

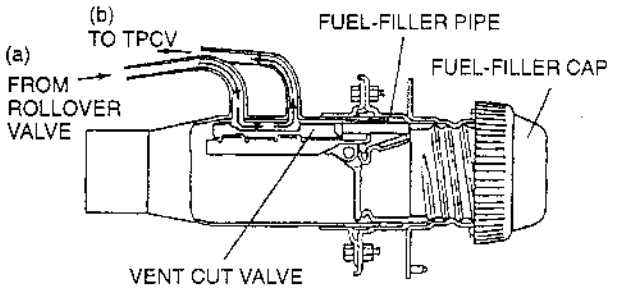
VENT CUT VALVE INSPECTION

X5U114W17

Caution

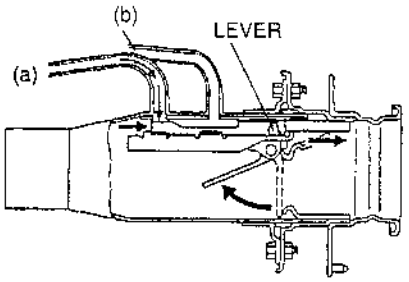
- **It is necessary to install the fuel-filler cap properly. When the fuel-filler cap, except for the OES, has been installed or the fuel-filler cap is loose, the vent cut valve may not operate properly.**

1. Verify that air goes through from (a) to (b) with the fuel-filler cap on.

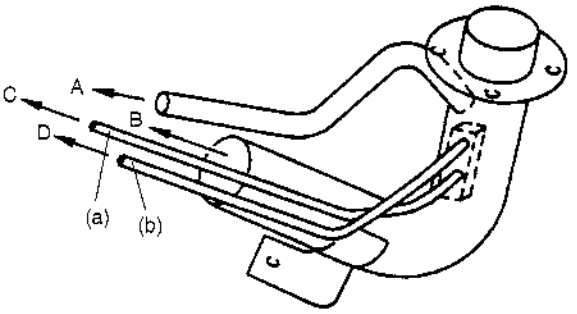


X5U114WAX

2. If air does not go through, replace the fuel-filler pipe component.
3. Remove the fuel-filler cap.
4. While depressing the lever in the fuel-filler port, verify that air does not go through from (a) to (b).



X5U114WAY



A: TO FUEL TANK (BREATHER HOSE)
B: TO FUEL TANK (JOINT HOSE)
C: TO ROLLOVER VALVE AND FUEL TANK PRESSURE SENSOR
D: TO TANK PRESSURE CONTRL VALVE (TPCV)

X5U114WAZ

5. If air goes through them, replace the fuel-filler pipe component.

01–15 EXHAUST SYSTEM

EXHAUST SYSTEM INSPECTION

X5U115W01

1. Start the engine and inspect each exhaust system component for exhaust gas leakage.
2. If leakage is found, repair or replace as necessary.

EXHAUST SYSTEM REMOVAL/INSTALLATION

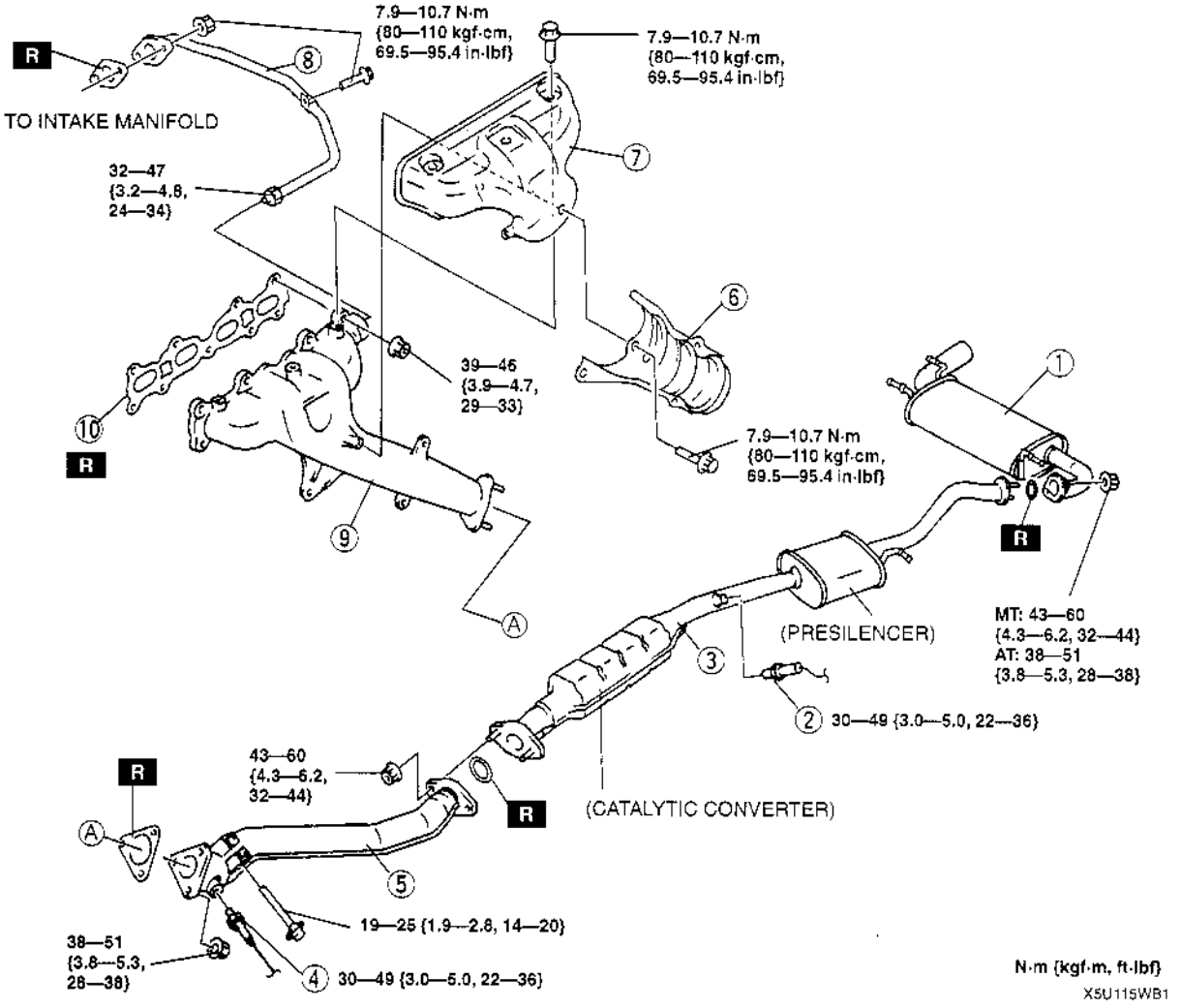
X5U115W03

Warning

- **When the engine and exhaust system are hot, they can badly burn. Turn off the engine and wait until they are cool before removing or installing the exhaust system.**

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

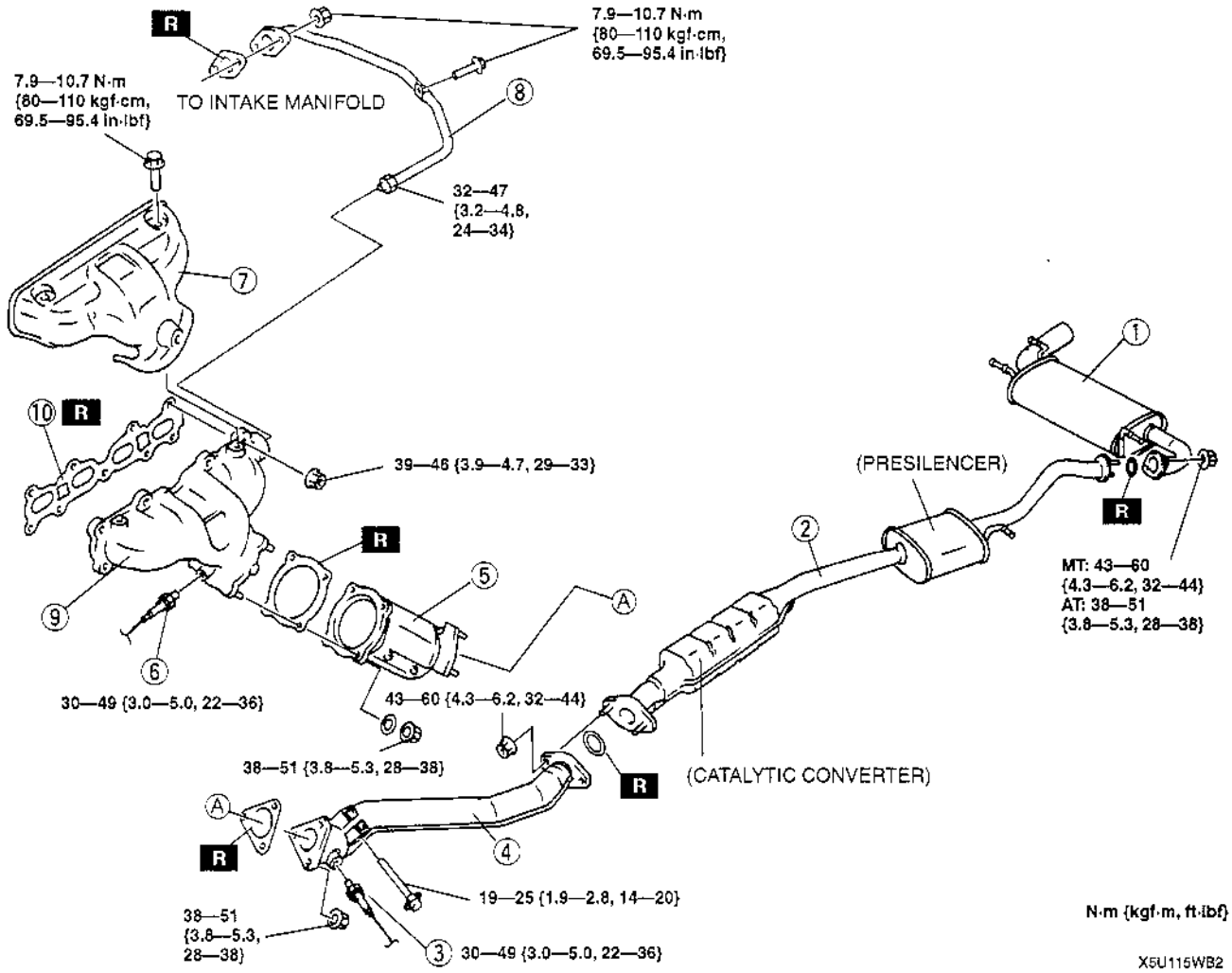
EXCEPT CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL



1	Main silencer
2	Heated oxygen sensor (Rear)
3	Middle pipe
4	Heated oxygen sensor (Front)
5	Front pipe
6	Exhaust manifold insulator No1 ☞ Removal Note

7	Exhaust manifold insulator No2
8	EGR pipe
9	Exhaust manifold
10	Exhaust manifold gasket ☞ Installation Note

CALIFORNIA EMISSION REGULATIONS APPLICABLE MODEL



1	Main silencer
2	Middle pipe
3	Heated oxygen sensor (Rear)
4	Front pipe
5	Warm up three way catalytic converter
6	Heated oxygen sensor (Front)

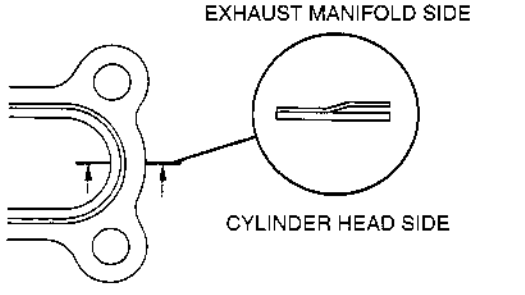
7	Exhaust manifold insulator ☞ Removal Note
8	EGR pipe
9	Exhaust manifold
10	Exhaust manifold gasket ☞ Installation Note

Exhaust Manifold Insulator No1, Exhaust Manifold Insulator Removal Note

- Remove the windshield washer tank with the washer tank connector connected before removing the exhaust manifold insulator. (Refer to 09–19 WINDSHIELD WASHER TANK REMOVAL/INSTALLATION.)

Exhaust Manifold Gasket Installation Note

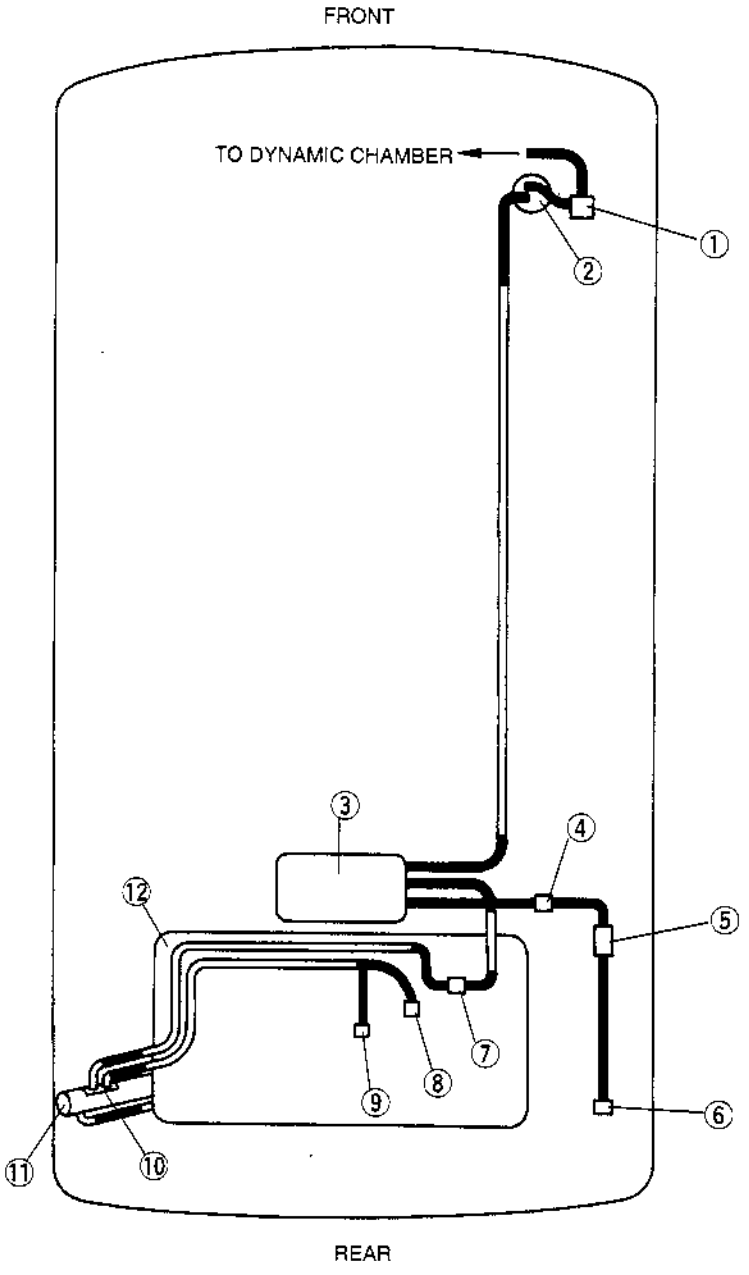
- To install the exhaust manifold gasket, make sure that the convex side of the gasket is faced to the exhaust manifold side.



01–16 EMISSION SYSTEM

EVAPORATIVE EMISSION CONTROL SYSTEM COMPONENTS LOCATION

X5U116W01

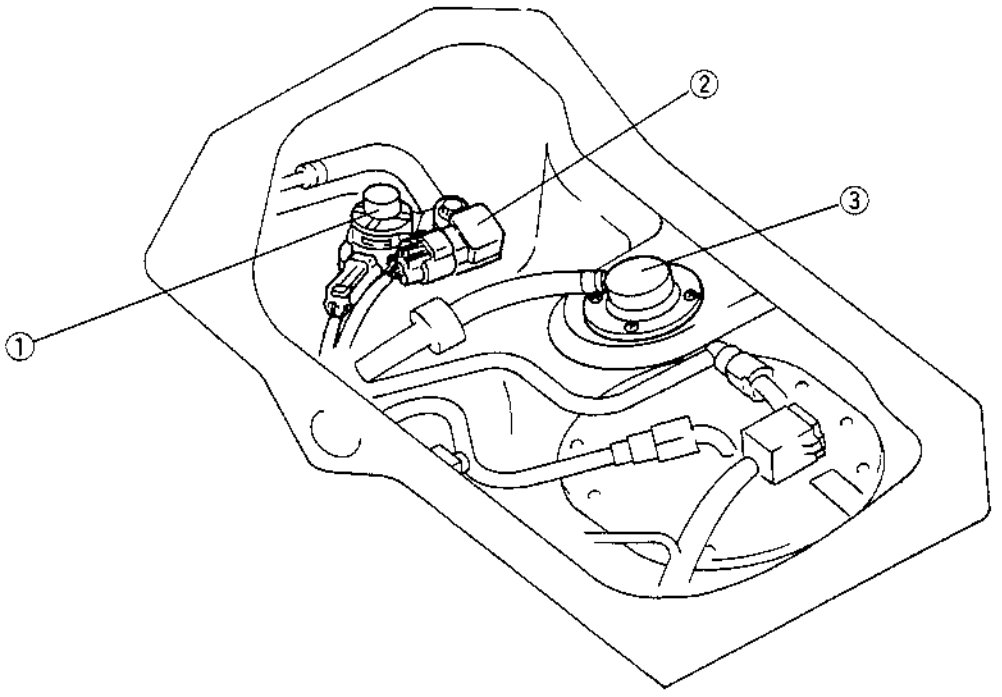


X5U116WA0

1	Purge solenoid valve
2	Catch tank
3	Charcoal canister
4	CDCV
5	Air filter
6	Evaporative chamber

7	TPCV
8	Fuel tank pressure sensor
9	Rollover valve
10	Vent cut valve
11	Fuel-filler cap
12	Fuel tank

Figure 1

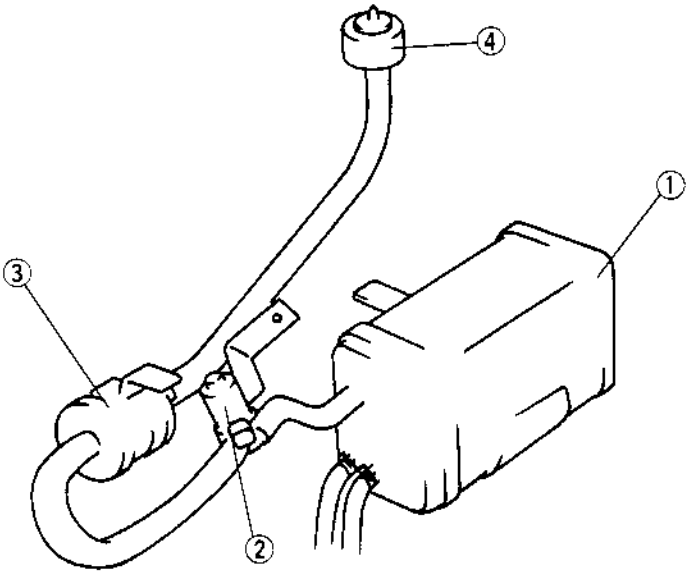


X5U116WA1

1	TPCV
2	Fuel tank pressure sensor

3	Rollover valve

Figure 2

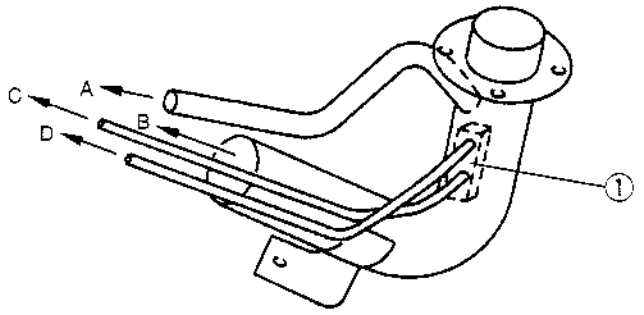


X5U116WA2

1	Charcoal canister
2	CDCV

3	Air filter
4	Evaporative chamber

Figure 3



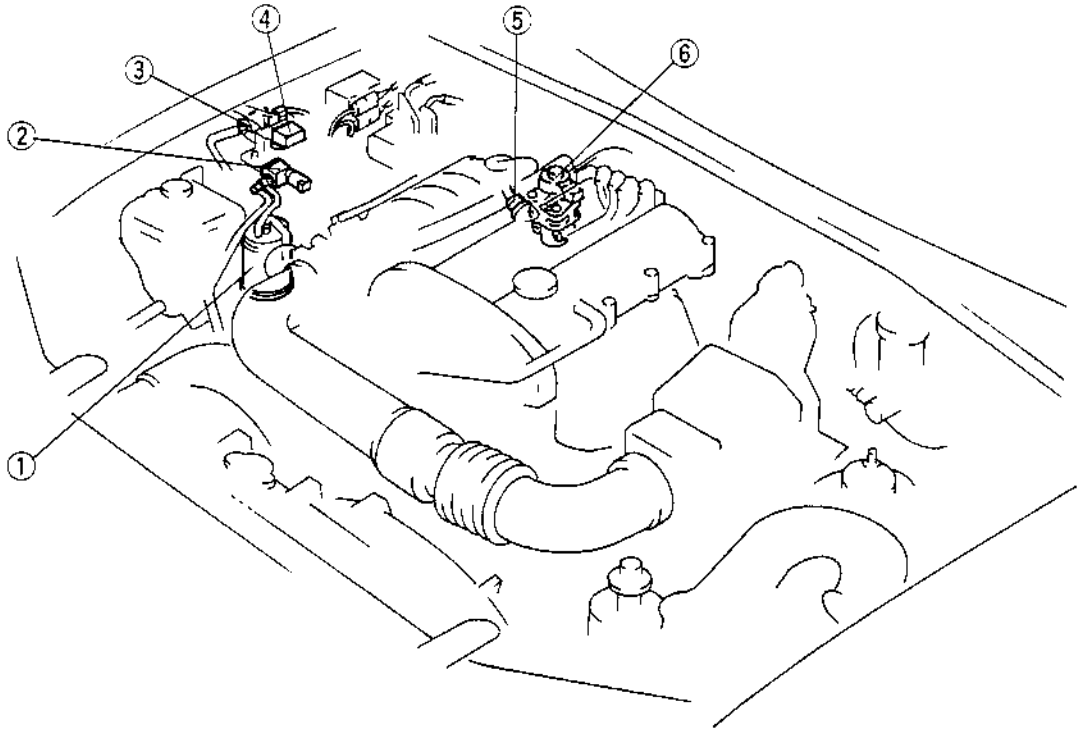
A: TO FUEL TANK (BREATHER HOSE)
B: TO FUEL TANK (JOINT HOSE)
C: TO ROLLOVER VALVE AND FUEL TANK PRESSURE SENSOR
D: TO TPCV

X5U116WA3

1	Vent cut valve

EMISSION SYSTEM (ENGINE COMPARTMENT SIDE) COMPONENT LOCATION

X5U116W02



X5U116WA4

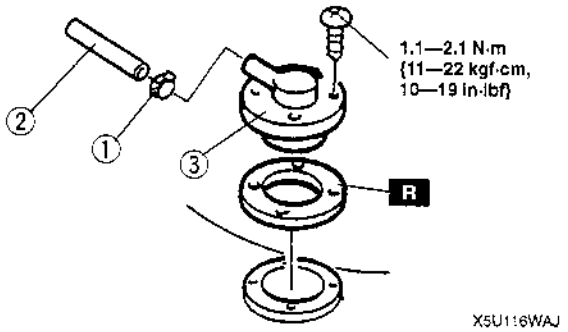
1	Catch tank
2	Purge solenoid valve
3	EGR boost sensor solenoid valve

4	EGR boost sensor
5	PCV valve
6	EGR valve

ROLLOVER VALVE REMOVAL/INSTALLATION

X5U116W15

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to 01–14 BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Uncover the rear package trim.
4. Remove the service hole cover.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



X5U116WAJ

1	Clamp
2	Evaporative hose ☞ Installation Note
3	Rollover valve

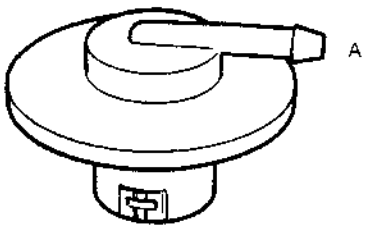
Evaporative Hose Installation Note

- Install the evaporative hose until it contacts the stopper.

ROLLOVER VALVE INSPECTION

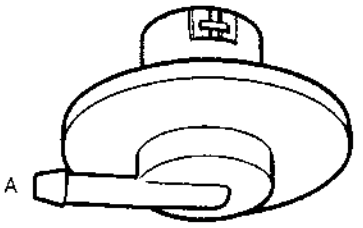
X5U116W03

1. Remove the rollover valve. (Refer to 01–16 ROLLOVER VALVE REMOVAL/INSTALLATION.)
2. Blow from port A and verify that there is airflow.



X5U116WA5

3. Turn the valve over and blow from port A. Verify that there is no airflow.



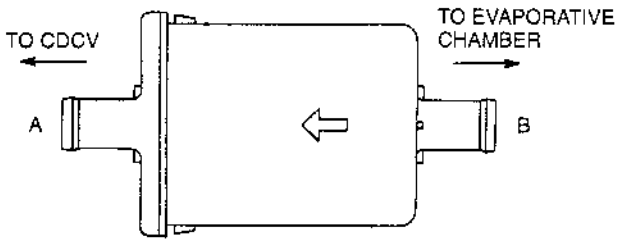
X5U116WA6

4. If not as specified, replace the rollover valve.

AIR FILTER INSPECTION

X5U116W05

1. Remove the air filter.
2. Blow from port A and verify that there is airflow from port B.
3. Blow from port B and verify that there is airflow from port A.



X5U116WA9

4. If not as specified, replace the air filter.

TANK PRESSURE CONTROL VALVE (TPCV) INSPECTION

X5U116W04

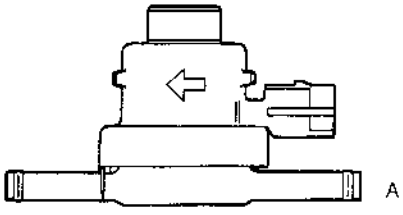
Simulation Test

1. Carry out the "Evaporative Emission Control System Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, Evaporative Emission Control System Inspection.)
2. If not as specified, perform the further inspection for the TPCV.

Airflow Inspection

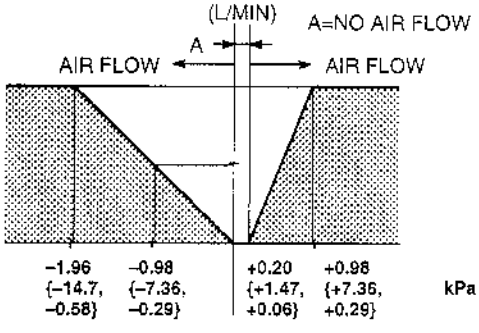
Note
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Remove the TPCV.
3. Apply pressure to port A and inspect airflow under the following conditions.



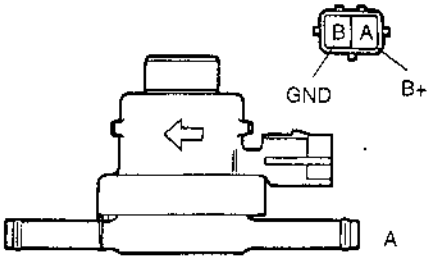
X5U116WAN

Pressure kPa {mmHg, inHg}	Airflow
Between 0— +0.20 {0— +1.47, 0— +0.06}	No
Above +0.98 {+7.36, +0.29}	Yes
Below –0.98 {–7.36, –0.29}	Yes



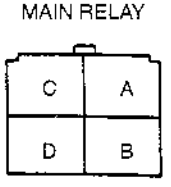
X5U116WA8

4. Apply battery positive voltage to the valve connector terminal A and apply pressure to port A, and verify that air flows smoothly.



X5U116WA7

5. If not as specified, replace the TPCV. If as specified but the Simulation Test is failed, inspect following:
   Evaporative hose improper routing, kinks or leakage.
   Open circuit
   - Ground circuit (TPCV connector terminal B and PCM connector terminal 3U through common connector)
   - Power circuit (TPCV connector terminal A and main relay connector terminal D through common connector)



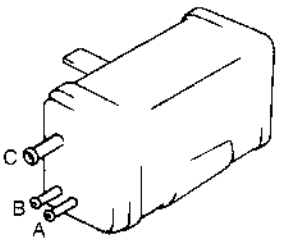
X5U116WB0

   Short circuit
   - TPCV connector terminal B and PCM connector terminal 3U to ground
6. Connect the negative battery cable.

CHARCOAL CANISTER INSPECTION

X5U116W07

1. Remove the charcoal canister. (Refer to 01–14 FUEL TANK REMOVAL/INSTALLATION.)
2. Plug ports A and B, then blow air into port C.
3. Verify that there is no air leakage.
4. If not as specified, replace the charcoal canister.



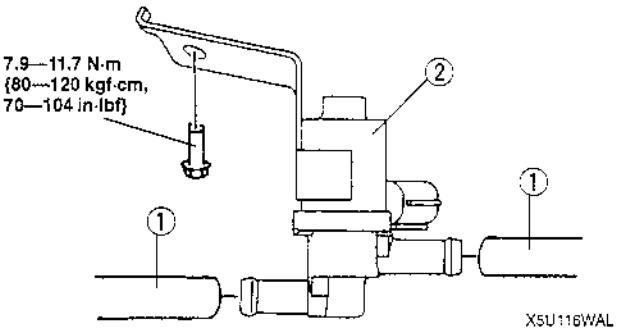
X5U116WAB

CANISTER DRAIN CUT VALVE (CDCV) REMOVAL/INSTALLATION

X5U116W16

1. Disconnect the negative battery cable.
2. Raise the rear of the vehicle and support it with safety stands.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

1	Evaporative hose ☞ Installation Note
2	CDCV



X5U116WAL

Evaporative Hose Installation Note

- Install the evaporative hose until it contacts the stopper.

CANISTER DRAIN CUT VALVE (CDCV) INSPECTION

X5U116W08

Simulation Test

1. Carry out the "Evaporative Emission Control System Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, Evaporative Emission Control System Inspection.)
2. If not as specified, perform the further inspection for the CDCV.

○—○ : Continuity ○═○ : Airflow

Step	Terminal		Port	
	A	B	A	B
1	○	○	○	○
2	B+	GND		

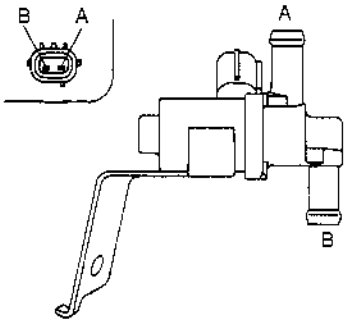
W6U116WAA

Airflow Inspection

Note

- Perform the following test only when directed.

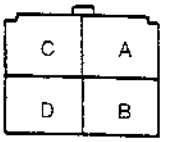
1. Remove the CDCV. (Refer to 01–16 CANISTER DRAIN CUT VALVE (CDCV) REMOVAL/INSTALLATION.)
2. Inspect airflow between the ports under the following conditions.



X5U116WAC

3. If not as specified, replace the CDCV. If as specified but the Simulation Test is failed, inspect following:
Evaporative hose improper routing, kinks or leakage.
Open circuit
- Ground circuit (CDCV connector terminal B and PCM connector terminal 3U through common connector)
- Power circuit (CDCV connector terminal A and main relay connector terminal D)

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

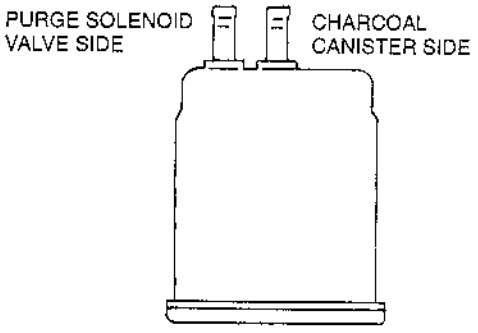
X5U116WB

Short circuit
- CDCV connector terminal B and PCM connector terminal 3U to ground

CATCH TANK INSPECTION

X5U116W09

1. Remove the catch tank.
2. Plug the purge solenoid valve side port of the catch tank.
3. Blow from the charcoal canister side port and verify that there is no air leakage.
4. If not as specified, replace the catch tank.

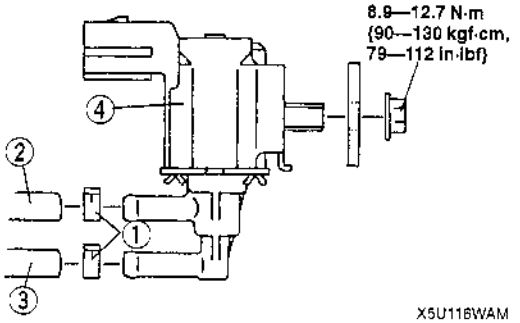


X5U116WAD

PURGE SOLENOID VALVE REMOVAL/INSTALLATION

X5U116W17

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



X5U116WAM

1	Clamp
2	Evaporative hose ☞ Installation Note
3	Vacuum hose ☞ Installation Note
4	Purge solenoid valve

Vacuum Hose, Evaporative Hose Installation Note
- Install the vacuum hose and evaporative hose until it contacts the stopper.

PURGE SOLENOID VALVE INSPECTION

X5U116W10

Simulation Test

1. Carry out the "Purge Control Inspection". (Refer to 01-01A ENGINE SYSTEM INSPECTION, Purge Control Inspection.)
2. If not as specified, perform the further inspection for the purge solenoid valve.

Airflow Inspection

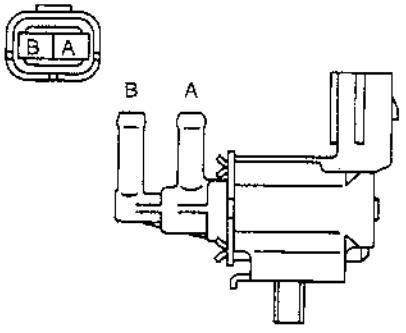
Note
- Perform the following test only when directed.

1. Remove the purge solenoid valve. (Refer to 01-16 PURGE SOLENOID VALVE REMOVAL/INSTALLATION.)
2. Inspect airflow between the ports under the following conditions.

○—○ : Continuity ○═══○ : Airflow

Step	Terminal		Port	
	A	B	A	B
1	○—————○			
2	B+	GND	○═══○	

X5U116WAK

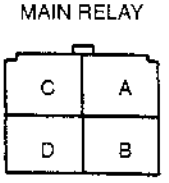


X5U116WAE

3. If not as specified, replace the purge solenoid valve. If as specified but the Simulation Test is failed, inspect following:

Vacuum hose improper routing, kinks or leakage.

Open circuit
- Ground circuit (purge solenoid valve connector terminal B and PCM connector terminal 3L through common connector)
- Power circuit (purge solenoid valve connector terminal A and main relay connector terminal D through common connector)



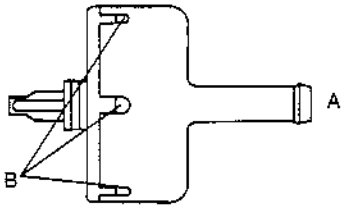
X5U116WB2

Short circuit
- Purge solenoid valve connector terminal B and PCM connector terminal 3L to ground

EVAPORATIVE CHAMBER INSPECTION

X5U116W06

1. Remove the evaporative chamber.
2. Blow from port A and verify that there is airflow from port B.



X5U116WAA

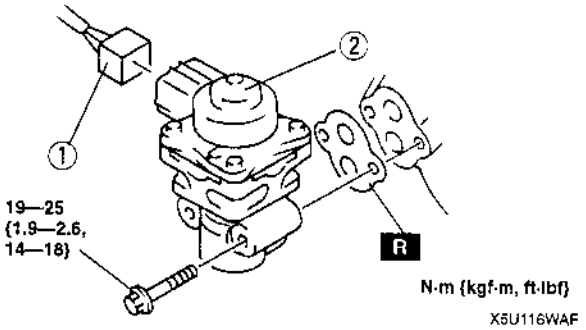
3. If not as specified, replace the evaporative chamber.

EGR VALVE REMOVAL/INSTALLATION

X5U116W11

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	EGR valve connector
2	EGR valve



N·m {kgf·m, ft·lbf}

X5U116WAF

EGR VALVE INSPECTION

X5U116W12

On-vehicle Inspection

1. Carry out the "EGR Control Inspection". (Refer to 01–01A ENGINE SYSTEM INSPECTION, EGR Control Inspection.)
2. If not as specified, perform the further inspection for the EGR valve.

Resistance Inspection

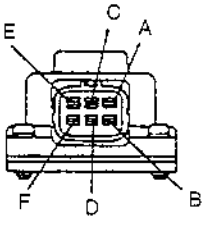
Note

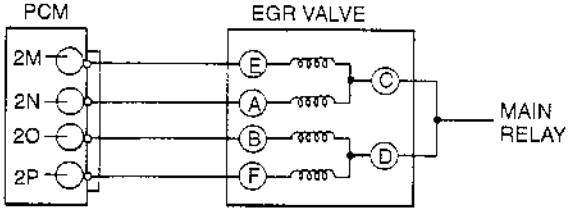
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Inspect resistance of the EGR valve coils.

Terminals	Resistance (Ω)
C—E C—A D—B D—F	Approx. 22

EGR VALVE

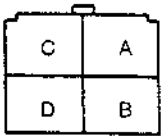




X5U116WAG

3. If not as specified, replace the EGR valve. If as specified but the Simulation Test is failed, inspect following:
   Vacuum hose improper routing, kinks or leakage.
   Open circuit
   - Ground circuit (EGR valve connector terminal E and PCM connector terminal 2M)
   - Ground circuit (EGR valve connector terminal A and PCM connector terminal 2N)
   - Ground circuit (EGR valve connector terminal B and PCM connector terminal 2O)
   - Ground circuit (EGR valve connector terminal F and PCM connector terminal 2P)
   - Power circuit (EGR valve connector terminal C or D and main relay connector terminal D through common connector)

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U116WB3

Short circuit

- EGR valve connector terminal E and PCM connector terminal 2M to ground
- EGR valve connector terminal A and PCM connector terminal 2N to ground
- EGR valve connector terminal B and PCM connector terminal 2O to ground
- EGR valve connector terminal F and PCM connector terminal 2P to ground

4. Remove the EGR valve, and inspect for any damage or clogging. Replace the EGR valve if not as specified.
5. Connect the negative battery cable.

EGR BOOST SENSOR SOLENOID VALVE INSPECTION

X5U116W13

Simulation Test

1. Carry out the "EGR Control Inspection". (Refer to 01-01A ENGINE SYSTEM INSPECTION, EGR Control Inspection.)
2. If not as specified, perform the further inspection for the EGR boost sensor solenoid valve.

Airflow Inspection

Note

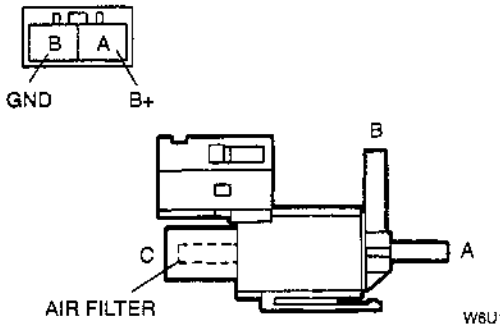
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Remove the EGR boost sensor solenoid valve.
3. Inspect airflow between each port under the following conditions.

○—○ : Continuity ○═○ : Airflow

Step	Terminal		Port		
	A	B	A	B	C
1	○—○			○═○	
2	B+	GND	○═○		

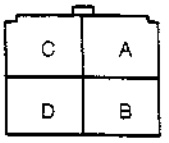
W6U116WAK



W6U116WAJ

4. If not as specified, replace the EGR boost sensor solenoid valve. If as specified but the Simulation Test is failed, inspect following:
Vacuum hose improper routing, kinks or leakage.
Open circuit
   - Ground circuit (EGR boost sensor solenoid valve connector terminal B and PCM connector terminal 3T)
   - Power circuit (EGR boost sensor solenoid valve connector terminal A and main relay connector terminal D through common connector)

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U116WB4

Short circuit

- EGR boost sensor solenoid valve connector terminal B and PCM connector terminal 3T to ground

5. Connect the negative battery cable.

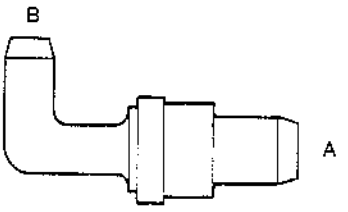
PCV VALVE INSPECTION

1. Remove the PCV valve.
2. Blow through the valve and verify that air flows as specified.

Specification

Condition	Airflow
Air applied from port A	Yes
Air applied from port B	No

X5U116W14



X5U116WAH

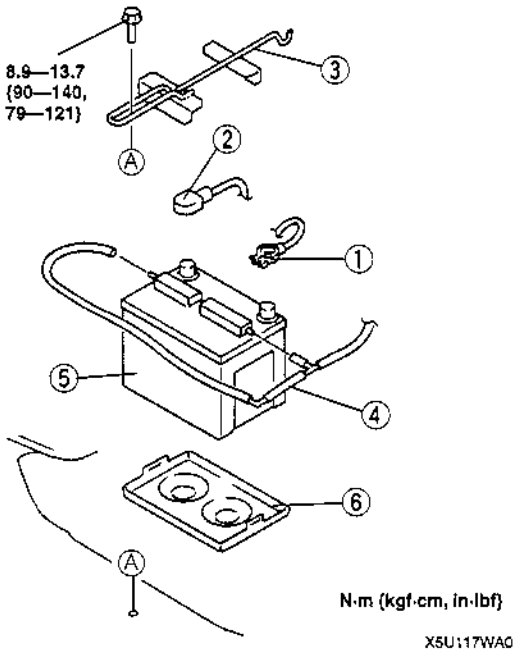
3. If not as specified, replace the PCV valve.

01–17 CHARGING SYSTEM

BATTERY REMOVAL/INSTALLATION

X5U117W01

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



N·m {kgf·cm, in·lbf}

X5U117WA0

1	Negative battery cable
2	Positive battery cable
3	Battery clamp
4	Battery vent hose
5	Battery
6	Battery tray

BATTERY INSPECTION

X5U117W02

Battery

- Check the battery in the following procedure.

Step	Inspection		Action
1	Measure open circuit voltage of battery.	Above 12.4 V	Go to step 3.
		Below 12.4 V	Go to next step.
2	Quick charge for 30 minutes and reinspect voltage.	Above 12.4 V	Go to next step.
		Below 12.4 V	Replace battery.
3	Apply test load (see test load chart) to battery using a battery load tester and record battery voltage after 15 seconds. Is voltage more than specification?	Yes	Battery is okay.
		No	Replace battery.

Test load chart

Battery	Load (A)
S46A24L(S)	105

Battery positive voltage with load

Approximate battery temp.	Minimum voltage (V)
21 °C {70 °F}	9.6
15 °C {60 °F}	9.5
10 °C {50 °F}	9.4
4 °C {40 °F}	9.3
– 1 °C {30 °F}	9.1
– 7 °C {20 °F}	8.9
–12 °C {10 °F}	8.7
–18 °C { 0 °F}	8.5

Dark Current

1. Verify that the ignition switch is at the OFF position and that the ignition key has been removed.
2. Disconnect the negative battery cable.

Caution

- **Operating electrical loads while measuring the dark current can damage the circuit tester.**

3. Measure the dark current between the negative battery terminal and the negative battery cable.

Dark current
20 mA max.

4. If the current exceeds the maximum, remove the fuse in the main fuse block and the fuse block one by one while measuring the dark current.
5. Inspect and repair harnesses and connectors of the fuse at which the current reduces.

BATTERY RECHARGING

Warning

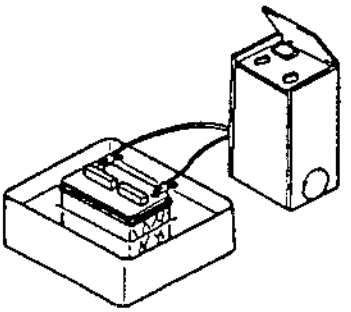
- **Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarettes), heat, and sparks away from the top and surrounding area of open battery cells.**

Caution

- **When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.**
- **To prevent damage to electrical components or the battery, turn all accessories off and stop the engine before performing maintenance or recharging the battery.**
- **Do not quick charge for over 30 minutes. It will damage the battery.**

1. Place a battery in a pan of water to prevent it from overheating. The water level should come up about halfway on the battery. Keep water off the top of the battery.

X5U117W03



X5U117WA1

2. Connect a battery charger to the battery.
3. Adjust the charging current as follows.

Battery type (5-hour rate)	Slow charge (A)	Quick charge (A)/(30 min.)
S46A24L(S)(32)	3.0—4.0	20

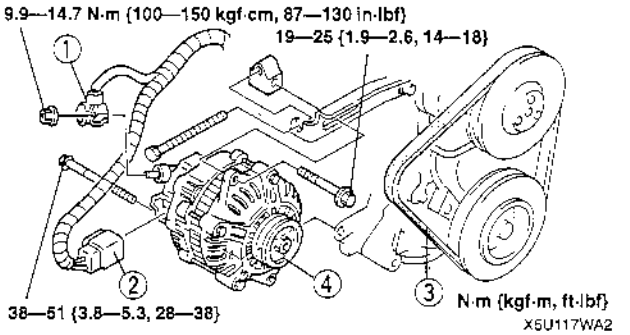
4. After the battery has been recharged, measure the battery positive voltage and verify that the battery keeps specified voltage for more than 1 hour.

Specification
Above 12.4 V

5. If not as specified, replace the battery.

GENERATOR REMOVAL/INSTALLATION

X5U117W04



X5U117WA2

1	Terminal B wire
2	Connector
3	Drive belt
4	Generator

Warning

- **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 before performing the following operation.**

1. Disconnect the negative battery cable.
2. Remove the intake manifold bracket.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Inspect the drive belt deflection/tension. (Refer to 01–10 DRIVE BELT INSPECTION.)

GENERATOR INSPECTION

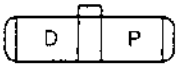
X5U117W05

Generator Warning Light

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (Refer to 01–10 DRIVE BELT INSPECTION.)
3. Turn the ignition switch to ON and verify that the generator warning light comes on.
4. If not, inspect the generator warning light, wiring harnesses between the battery, generator warning light, and PCM terminal 1Q. When the generator warning light and the wiring harnesses are okay, replace the PCM.
5. Verify that the generator warning light goes out after the engine is started.
6. If not, verify the diagnostic trouble code No.s displayed. (Refer to 01–01A ENGINE DIAGNOSTIC INSPECTION.)

Generator Voltage

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is within the specification. (Refer to 01–10 DRIVE BELT INSPECTION.)
3. Turn off all electrical loads.
4. Turn the ignition switch to START and verify that the generator turns smoothly without any noise while the engine is running.
5. Measure the voltage at the terminals shown in the table.



X5U117WA3

Standard voltage

Terminal	Ignition switch ON (V)	Idle (V) [20 °C {68 °F}]
	BP	BP
B	B+	13—15
P	Below 1	Approx. 3—8
D	Approx. 0	*

* : Turn the following electrical loads on and verify that the voltage reading increases.
- Headlights
- Blower motor
- Rear window defroster

6. If not as specified, disassemble and inspect the generator.

Current

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (Refer to 01–10 DRIVE BELT INSPECTION.)
3. Disconnect the negative battery cable.
4. Connect a circuit tester, capable of reading 120 A or over, between generator terminal B and the wiring harness.
5. Connect the negative battery cable.
6. Turn all electrical loads off.
7. Start the engine and increase the engine speed to 2,000—2,500 rpm.
8. Turn the following electrical loads on and verify that the current reading increases.
   - Headlights
   - Blower motor
   - Rear window defroster

   Note
   - Current required for generating power varies with electrical loads applied.

Standard current (Reference)

Measuring conditions
Room temperature: 20 °C {68 °F}
Voltage: 13.5 V
Engine hot

Engine speed (rpm)	Terminal B current (A)
	BP
1,000	Approx. 0—60 (must not be 0)
2,000	Approx. 0—68 (must not be 0)

9. If generator terminal B current will not increase, disassemble and inspect the generator.

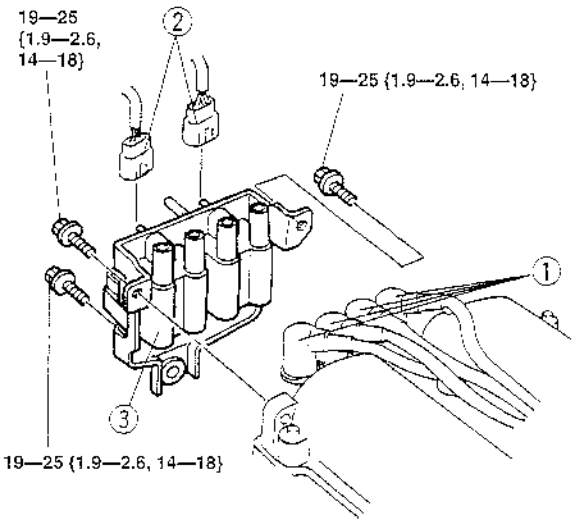
01–18 IGNITION SYSTEM

IGNITION COIL REMOVAL/INSTALLATION

X5U118W02

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

1	High-tension lead ☞ 01–18 HIGH-TENSION LEAD REMOVAL/INSTALLATION
2	Connector
3	Ignition coil



N·m {kgf·m, ft·lbf}

X5U118WA0

IGNITION COIL INSPECTION

X5U118W03

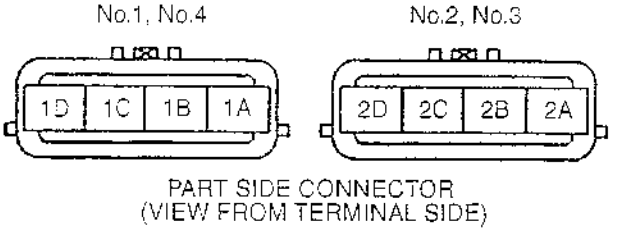
Igniter

- Carry out spark test. (Refer to 01–01A ENGINE SYSTEM INSPECTION, Spark Test.)

Ignition Coil Operation Inspection

1. Disconnect the negative battery cable.
2. Inspect the ignition coil power supply voltage (terminal 1A and 2A).

Specification
B+



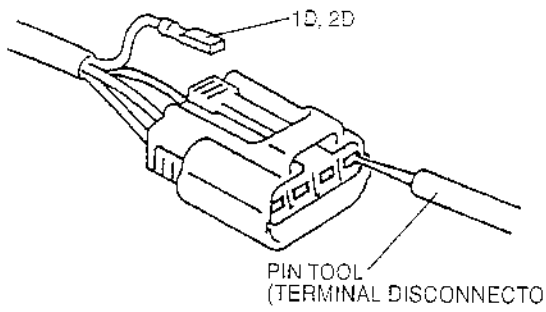
PART SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

Y5L118WA1

3. If not as specified, inspect the power supply system harness (Ignition coil terminal 1A, 2A and ignition switch, including short cord.).
4. Inspect the ignition coil (terminal 1C and 2C) ground voltage.

Specification
0 V

5. If not as specified, inspect the ground system harness (Ignition coil terminal 1C, 2C and body ground.).
6. Pull the ignition coil connector 1D and 2D out using a pin tool (terminal disconnector).

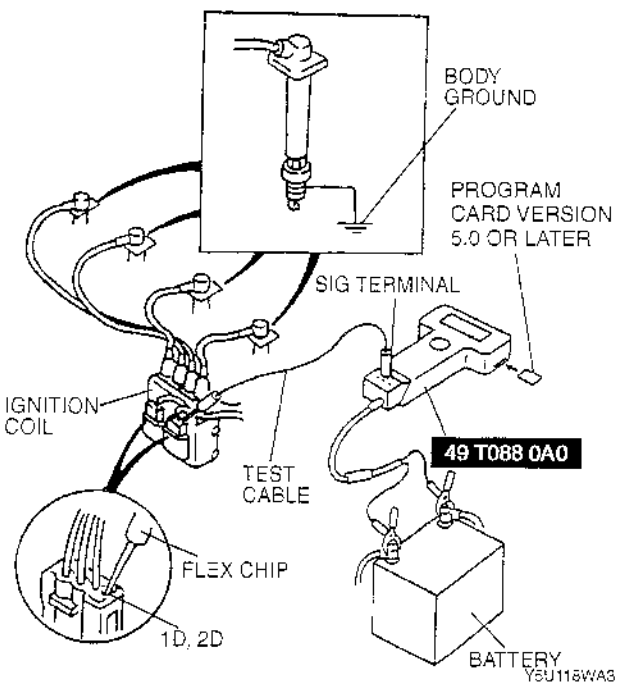


Y5U118WA2

7. Remove the spark plug, high–tension lead and ignition coil.
8. Connect the **SSTs** (NGS tester) as shown in the figure.

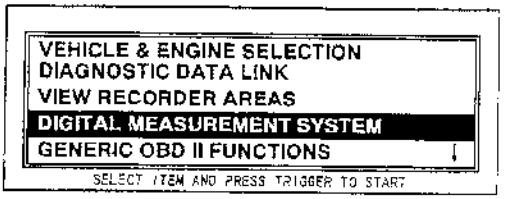
Note

- Using the signal simulation of **SST** apply a pseudo–pulse to the ignition coil and inspect its operation.
- Disconnect the ignition coil terminal 1D and 2D from the connectors in advance.



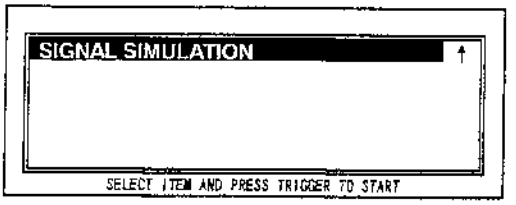
Y5U118WA3

9. Connect the negative battery cable.
10. Turn the ignition switch to ON.
11. Prepare the **SST** (NGS tester) in the following procedure.
    (1) Move the cursor to **DIGITAL MEASUREMENT SYSTEM.**
    (2) Press the **TRIGGER** key to enter this selection.



X3L140WAL

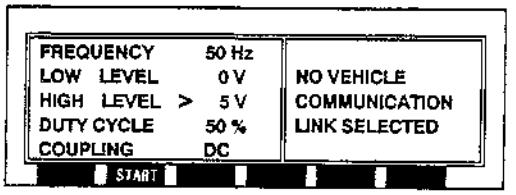
    (3) Move the cursor to **SIGNAL SIMULATION.**
    (4) Press the **TRIGGER** key to enter this selection.



Y5U118WA4

    (5) Move the cursor and set the following:

Set value
FREQUENCY: 50Hz
LOW LEVEL: 0V
HIGH LEVEL: 5V
DUTY CYCLE: 50%
COUPLING: DC



Y5U118WA5

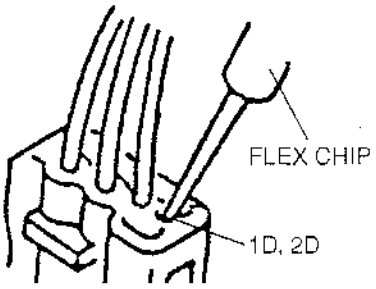
Warning

- **Do not hold the spark plug, high–tension lead, or ignition coil while inspecting the ignition coil. You may be subjected to a strong shock.**

Note
- No.1 and No.4 cylinders and No.2 and No.3 cylinders are ignited simultaneously.

(6) Press **START**.

12. Verify that the spark plug produces a strong, pale spark when the cable from the SIG terminal of the **SST** (NGS tester) is connected to the ignition coil terminal 1D and 2D.



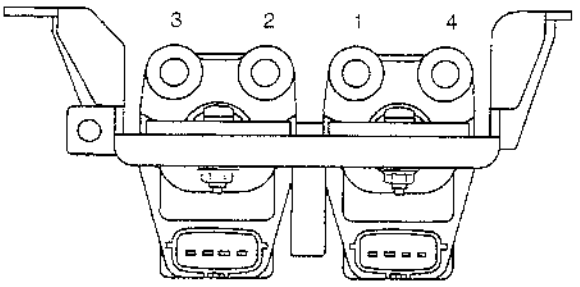
Y5U118WA6

13. If not as specified, replace the ignition coil.

Secondary Coil Winding

1. Disconnect the high-tension leads. (Refer to 01–18 HIGH-TENSION LEAD REMOVAL/INSTALLATION.)
2. Measure the resistance from lead hole 1 to 4, and lead hole 2 to 3 by using an ohmmeter.

Specification
8.24—12.36 kΩ [20 °C {68 °F}]



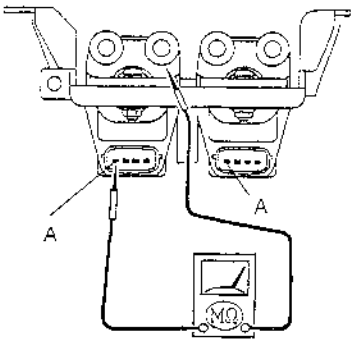
X5U118WA2

3. If not as specified, replace the ignition coil.

Insulation Resistance of Case

1. Disconnect the high-tension leads. (Refer to 01–18 HIGH-TENSION LEAD REMOVAL/INSTALLATION.)
2. Disconnect the ignition coil connector.
3. Measure the insulation resistance between terminal A, and ignition coil case by using a 500 V mega tester.

Specification
Above 10 MΩ



X5U118WA3

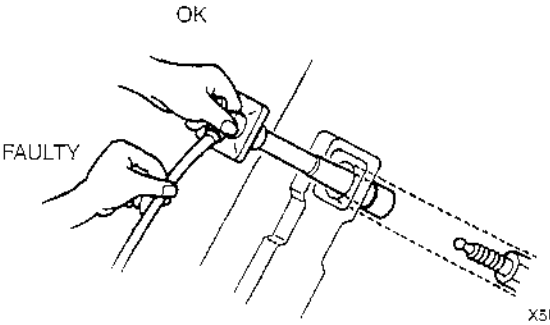
4. If not as specified, replace the ignition coil.

HIGH-TENSION LEAD REMOVAL/INSTALLATION

X5U118W04

Caution

- **The high-tension leads must be reinstalled to their original positions. Incorrect installation can damage the leads and cause power loss, and negatively effect the electronic components.**
- **Pulling on the wire part of the high-tension lead may break it. To remove the lead, pull only on the boot.**



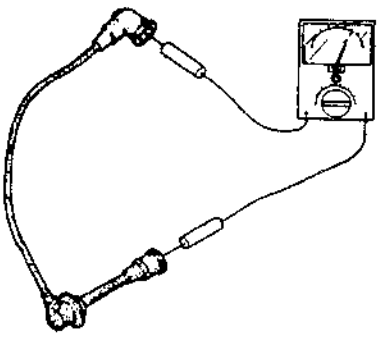
X5U118WA4

HIGH-TENSION LEAD INSPECTION

X5U118W05

1. Measure the resistance of high-tension lead by using an ohmmeter.

Specification
No.1 lead: 4—11 kΩ
No.2 lead: 3—8 kΩ
No.3 lead: 2—6 kΩ
No.4 lead: 1—5 kΩ



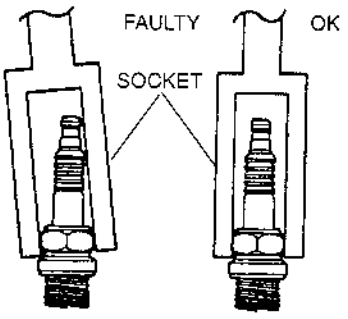
X5U118WA5

2. If not as specified, replace the high-tension lead.

SPARK PLUG REMOVAL/INSTALLATION

X5U118W06

Caution
- **To avoid breaking the spark plug, be sure to fit the socket squarely over it.**



X5U118WA6

1. Disconnect the high-tension lead. (Refer to 01–18 HIGH-TENSION LEAD REMOVAL/INSTALLATION.)
2. Remove the spark plug.
3. Install in the reverse order of removal.

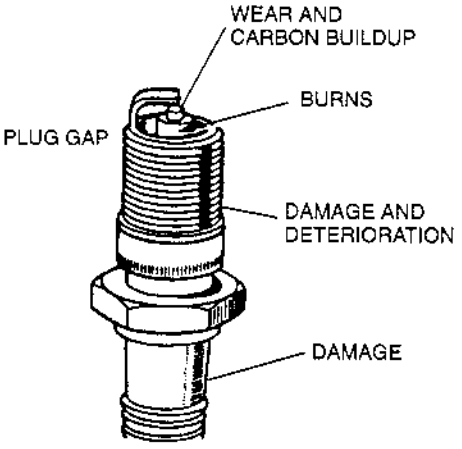
Tightening torque
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}

SPARK PLUG INSPECTION

X5U118W07

Check the following and replace the spark plugs as necessary.
1. Damaged insulation
2. Worn electrodes
3. Carbon deposits
   If cleaning is necessary, use a plug cleaner or a wire brush. Wipe upper insulator.
4. Damaged gasket

Plug gap
1.0—1.1 mm {0.040—0.043 in}



X5U118WA7

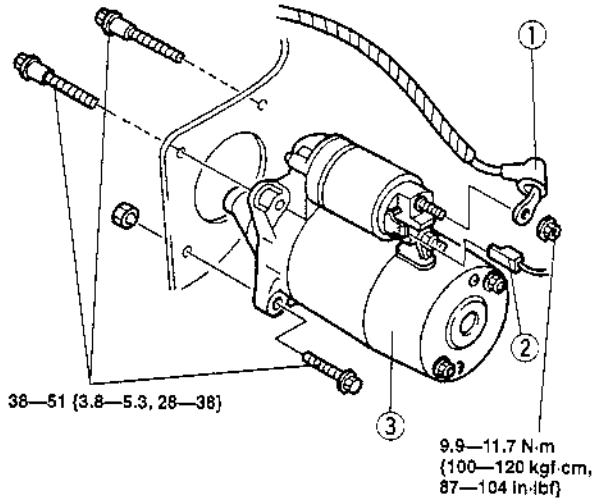
01–19 STARTING SYSTEM

STARTER REMOVAL/INSTALLATION

Warning

- **When the battery cable 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 battery before performing the following operation.**

1. Disconnect the negative battery cable.
2. Remove the intake manifold bracket.
3. Remove the oil filler tube. (AT)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



N·m {kgf·m, ft·lbf}

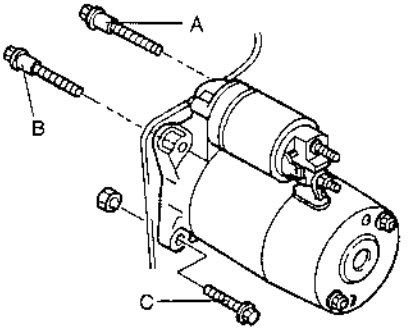
X5U119WA0

1	Terminal B wire
2	Terminal S wire
3	Starter ☞ Installation Note

X5U119W01

Starter Installation Note

1. Temporarily tighten the starter fitting bolt A.



X5U119WA1

2. Tighten the starter fitting bolt B and C.

Tightening torque
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

3. Tighten the starter fitting bolt A.

Tightening torque
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

STARTER INSPECTION

X5U119W02

On-vehicle Inspection

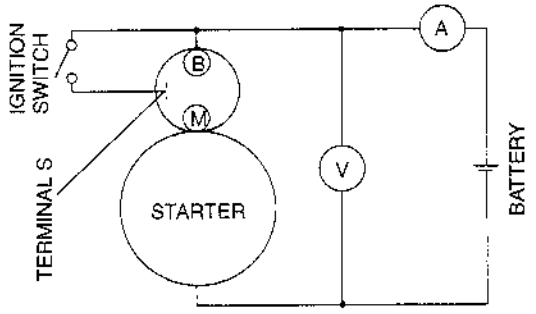
1. Verify that the battery is fully charged.
2. Crank the engine and verify that the starter turns smoothly without any noise.
3. If not as specified, measure the voltage at terminals S and B when the ignition switch is in the START position.

Specification
Above 8 V

4. If the voltage is within the specification, remove the starter and inspect the magnetic switch and the starter.
5. If the voltage is not as specified, inspect the wiring harness, ignition switch, starter interlock switch (MT), and transmission range switch (AT).

No Load Test

1. Verify that the battery is fully charged.
2. Connect the starter, battery, voltmeter, and ammeter as shown.



X5U119WA2

3. Operate the starter and verify that it turns smoothly.
4. Measure the voltage and current while the starter is operating.

Specification

Item	Engine
	BP
Voltage (V)	11
Current (A)	Below 90

5. If not as specified, repair or replace the inner parts as necessary.

Magnetic Switch Operation Inspection

Caution

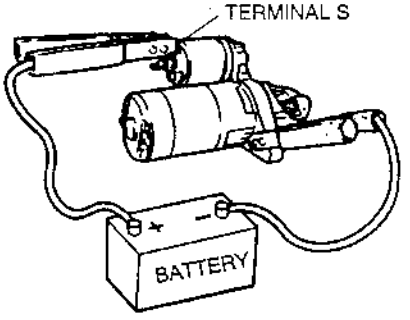
- **Applying power for more than 10 seconds can damage the starter. Do not apply power for more than the aforementioned time.**

Pull-out test

Note

- In case the battery is being charged, the pinion may turn while in a protruded state. This is normal because the current flows to the motor through the pull-in coil and the motor turns.

1. Verify that the drive pinion is pulled out with battery positive voltage connected to terminal S and the starter body grounded.

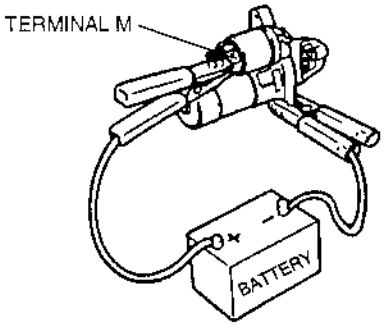


X5U119WA4

2. If not as specified, repair or replace the inner parts as necessary.

Return test

1. Disconnect the motor wire from terminal M.
2. Connect battery positive voltage to terminal M and ground the starter body.

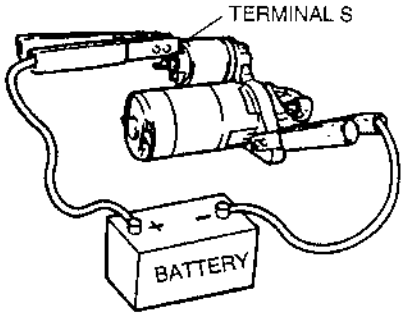


X5U119WA5

3. Pull out the drive pinion with a screwdriver. Verify that it returns to its original position when released.
4. If not as specified, repair or replace the inner parts as necessary.

Pinion Gap Inspection

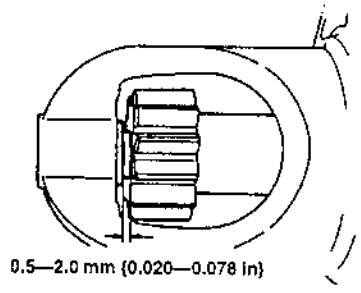
1. Pull out the drive pinion with battery positive voltage connected to terminal S and the starter body grounded.



X5U119WA6

2. Measure the pinion gap while the drive pinion is pulled.

Specification
0.5—2.0 mm {0.020—0.078 in}

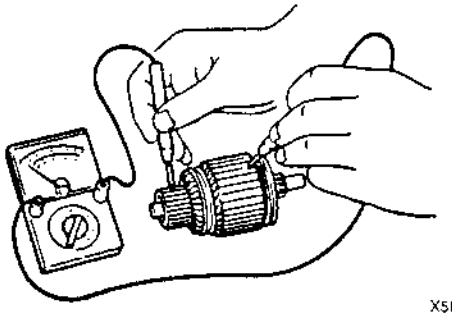


X5U119WA7

3. If not as specified, adjust with an adjustment washer (between drive housing front cover and magnetic switch).

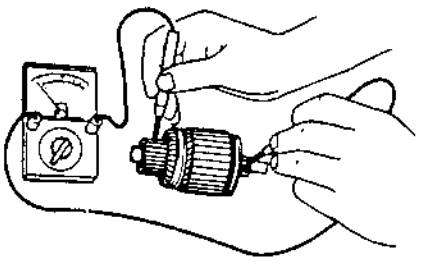
Starter Inner Parts Inspection
Armature

1. Verify for no continuity between the commutator and the core at each segment by using an ohmmeter.



X5U119WA8

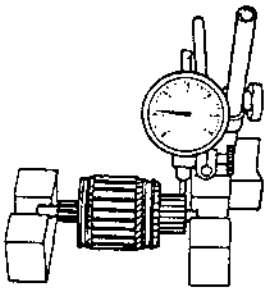
2. If there is continuity, replace the armature.
3. Verify for no continuity between the commutator and the shaft by using an ohmmeter.



X5U119WA9

4. If there is continuity, replace the armature.
5. Place the armature on V-blocks, and measure the runout by using a dial indicator.

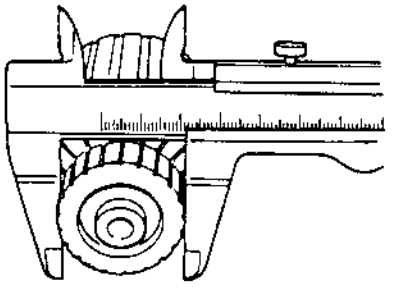
Runout
0.03 mm {0.001 in} max.



X5U119WAA

6. If not within the specification, repair by using a lathe or replace the armature.
7. Measure the commutator diameter.

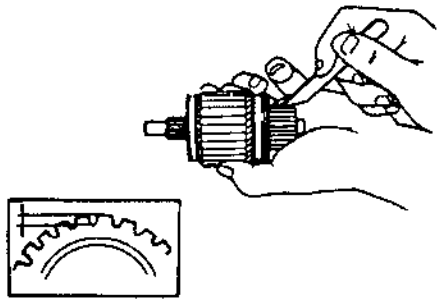
Standard commutator diameter
29.4 mm {1.16 in}
Minimum commutator diameter
28.8 mm {1.14 in}



X5U119WAB

8. If not within the minimum specification, replace the armature.
9. Measure the segment groove depth of commutator.

Standard depth
0.5—0.8 mm {0.02—0.03 in}
Minimum depth
0.2 mm {0.008 in}

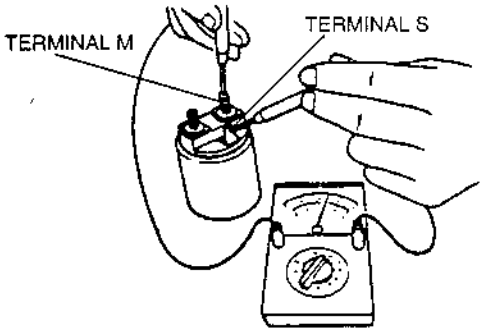


X5U119WAC

10. If not within the minimum specification, undercut the grooves to the standard depth.

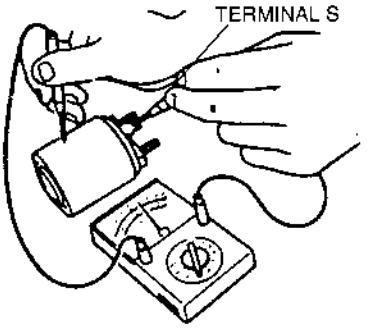
Magnetic switch

1. Verify for continuity between terminals S and M by using an ohmmeter.



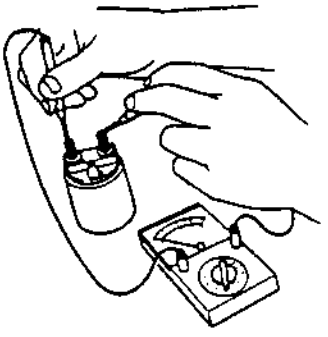
X5U119WAD

2. If there is no continuity, replace the magnetic switch.
3. Verify for continuity between terminal S and the body by using an ohmmeter.



X5U119WAE

4. If there is no continuity, replace the magnetic switch.
5. Verify for no continuity between terminals M and B by using an ohmmeter.

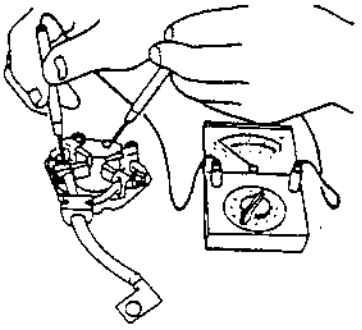


X5U119WAF

6. If there is continuity, replace the magnetic switch.

Brush and brush holder

1. Verify for no continuity between each insulated brush and the plate by using an ohmmeter.

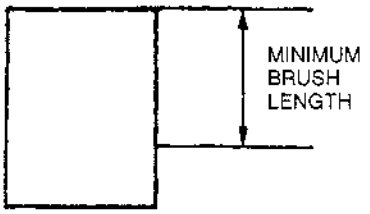


X5U119WAG

2. If there is continuity, replace the brush holder.
3. Measure the brush length.

Standard brush length
12.3 mm {0.48 in}
Minimum brush length
7.0 mm {0.28 in}

4. If any brush is worn almost to or beyond the minimum specification, replace all the brushes.

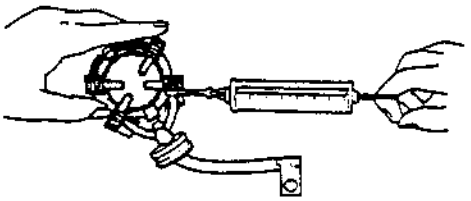


CONTACT FACE WITH COMMUTATOR

X5U119WAH

5. Measure the brush spring force by using a spring balance.

Standard spring force
15.05—20.35 N
{1.534—2.076 kgf, 3.375—4.567 lbf}
Minimum spring force
5.9 N {0.60 kgf, 1.32 lbf}



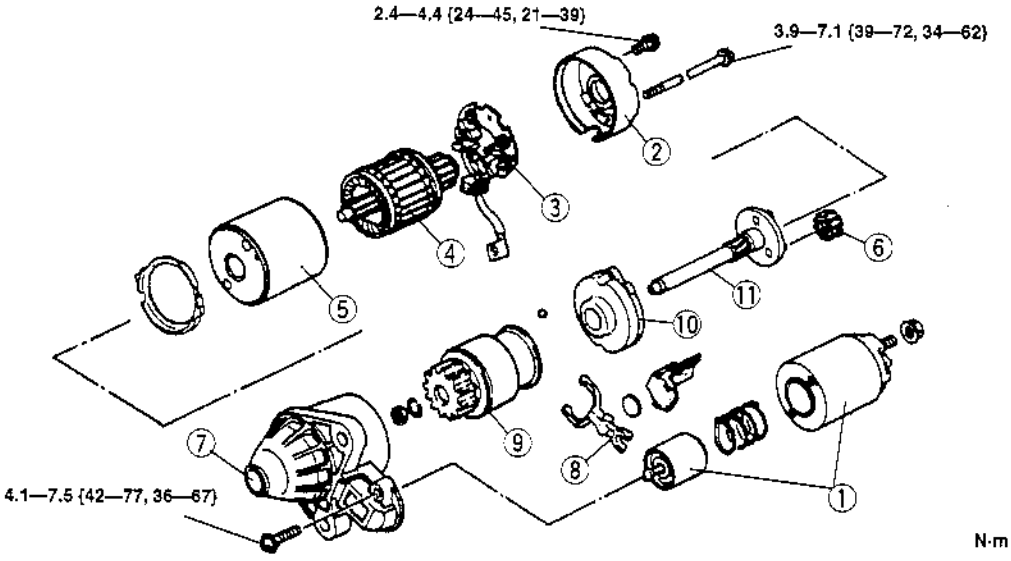
X5U119WAJ

6. If not within the minimum specification, replace the brush spring.

STARTER DISASSEMBLY/ASSEMBLY

X5U119W03

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



N·m {kgf·cm, in·lbf}

X5U119WAK

1	Magnetic switch
2	Rear housing
3	Brush and brush holder
4	Armature
5	Yoke
6	Planetary gear

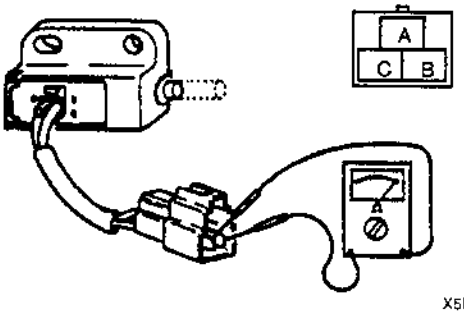
7	Front cover
8	Lever
9	Drive pinion
10	Internal gear
11	Gear shaft

STARTER INTERLOCK SWITCH INSPECTION (MT)

X5U119W04

1. Disconnect the starter interlock switch connector.
2. Inspect for continuity between terminals of the starter interlock switch by using an ohmmeter.

Terminal	Condition	
	Clutch Pedal not depressed	Clutch Pedal depressed
B to C	No continuity	Continuity



X5U119WA3

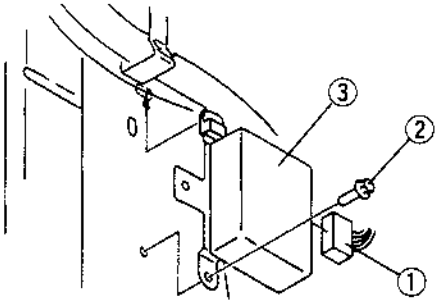
3. If not as specified, replace the starter interlock switch.

01–20 CRUISE CONTROL SYSTEM

CRUISE CONTROL MODULE REMOVAL/INSTALLATION

X5U120W01

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove the key interlock unit. (Refer to 05–14 KEY INTERLOCK UNIT REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



X5U120WA0

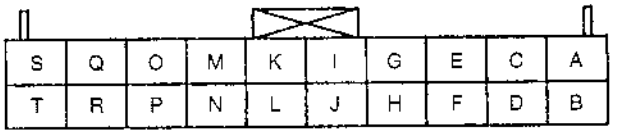
1	Cruise control module connector
2	Bolt
3	Cruise control module

CRUISE CONTROL MODULE INSPECTION

X5U120W02

1. Remove the lower panel.
2. Remove the key interlock unit. (Refer to 05–14 KEY INTERLOCK UNIT REMOVAL/INSTALLATION.)
3. Remove the cruise control module with the connector connected.
4. Measure the voltage at the cruise control module terminals as indicated below.
5. Disconnect the cruise control module connector before inspecting for continuity at terminal T.
6. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
7. If the parts and wiring harnesses are okay but the system still does not work properly, replace the cruise control module.

Terminal Voltage List (Reference)



X5U120WA1

Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	Cruise actuator control	Cruise actuator (Vent 1)	Ignition switch at ON	Cruise control main switch on	B+	• Brake switch • Cruise actuator
				Other	0	
B	Cruise actuator control	Cruise actuator (Vacuum)	Ignition switch at ON	Cruise control main switch on	B+	• Brake switch • Cruise actuator
				Other	0	
C	Cruise actuator control	Cruise actuator (Vent 2)	Ignition switch at ON	Cruise control main switch on	B+	• Brake switch • Cruise actuator
				Other	0	
D	Cruise set indicator light output	Cruise set indicator light	Ignition switch at ON		B+	• METER 15 A fuse • Instrument cluster
			Ignition switch at LOCK or ACC		0	
E	Cruise control main switch on/off	Cruise control main switch	Ignition switch at ON	Cruise control main switch on	B+	• METER 15 A fuse • Cruise control main switch
				Other	0	
F	—	Not used	—		—	—
G	O/D off	TCM	Ignition switch at ON		B+	TCM
			Ignition switch at LOCK or ACC		0	
H	Cruise actuator power supply	Brake switch	Ignition switch at ON	Cruise control main switch on	B+	—
				Other	0	
I	Test	Data link connector	—		—	—
J	AT Selector lever position	Transmission range switch	Ignition switch at ON	Selector lever at N or P range	0	Transmission range switch
				Other	B+	
	MT Clutch switch on/off	Clutch switch	Ignition switch at ON	Depress clutch pedal	0	Clutch switch
				Other	B+	
K	—	Not used	—		—	—
L	—	Not used	—		—	—
M	Brake switch on/off	Brake switch	Depress brake pedal		B+	Brake switch
			Release brake pedal		0	
N	Cruise control switch position	Cruise control switch	Ignition switch at ON and cruise control main switch on	SET/COAST switch hold on	Approx. 1.5	Cruise control switch
				RESUME/ACCEL switch hold on	Approx. 3.1	
				Other	Approx. 5	
O	Brake switch on/off	Brake switch	Ignition switch at ON and cruise control main switch on	Depress brake pedal	0	Brake switch
				Release brake pedal	B+	

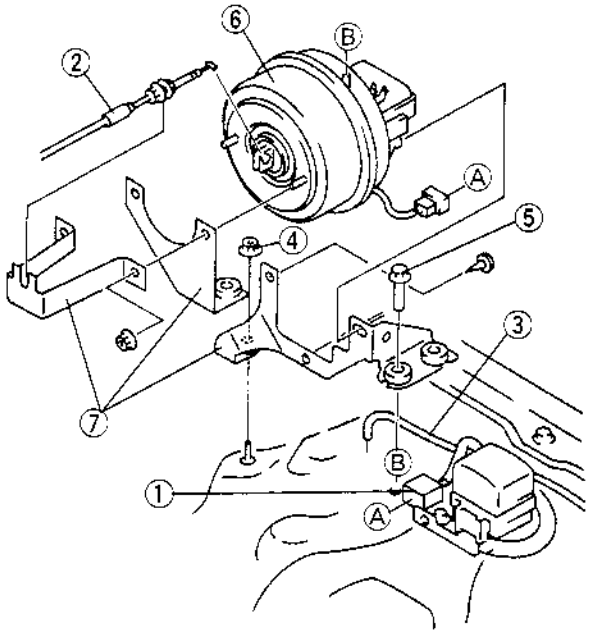
Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
P	Vehicle speed	Vehicle speedometer sensor	Ignition switch at ON and cruise control main switch on	Rear tires rotating	Alternates 0 and 5	• METER 15 A fuse • Instrument cluster
				Other	0 or 5	
Q	—	Not used	—		—	—
R	—	Not used	—		—	—
S	—	Not used	—		—	—
T	Cruise control module ground	GND	Constant: inspect for continuity to ground		Yes	GND

CRUISE ACTUATOR REMOVAL/INSTALLATION

X5U120W03

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Adjust the actuator cable. (Refer to 01–20 ACTUATOR CABLE ADJUSTMENT.)

1	Cruise actuator connector
2	Actuator cable
3	Vacuum hose
4	Nut
5	Bolt
6	Cruise actuator
7	Bracket

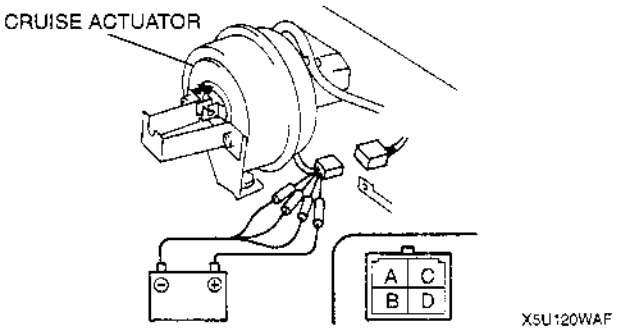


X5U120WA2

CRUISE ACTUATOR INSPECTION

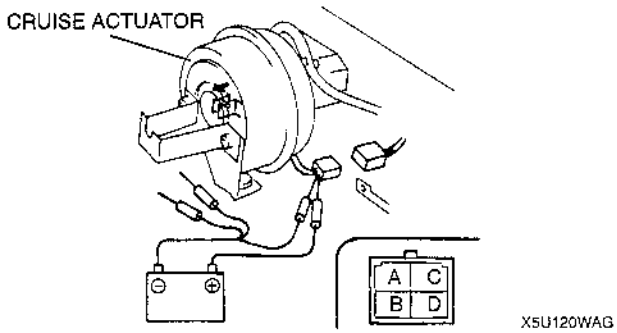
X5U120W04

1. Disconnect the cruise actuator connector.
2. Disconnect the actuator cable from the cruise actuator.
3. Allow the engine to idle.
4. Confirm that the diaphragm is drawn into the cruise actuator when battery positive voltage is connected to terminal C and terminals A, B and D are connected to the ground.



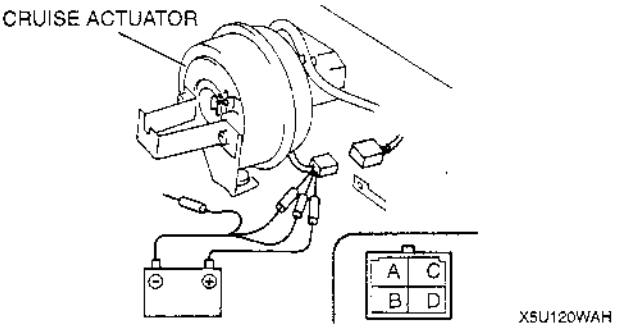
X5U120WAF

5. With the diaphragm being drawn into the cruise actuator, confirm that the diaphragm returns to its original position when terminals B and D are disconnected from the ground.



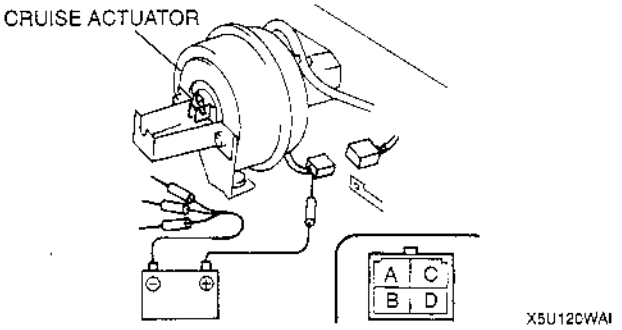
X5U120WAG

6. With the diaphragm returning to its original position, confirm that the diaphragm stops moving when terminal D is reconnected to the ground.



X5U120WAH

7. With the movement of the diaphragm stopped, confirm that the diaphragm returns completely to its original position when all terminals connected to the ground are disconnected.



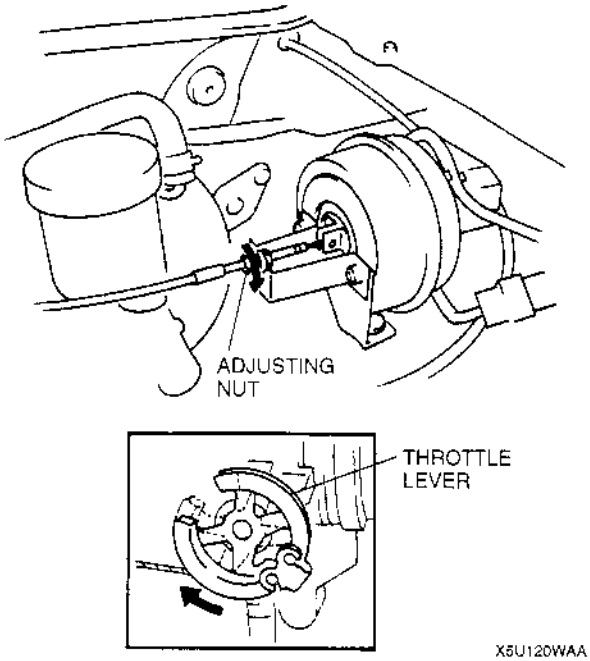
X5U120WAI

8. If not as specified, replace the cruise actuator.

ACTUATOR CABLE ADJUSTMENT

X5U120W09

1. Turn the adjusting nut as shown in the figure until the throttle lever starts moving to eliminate the actuator cable play.

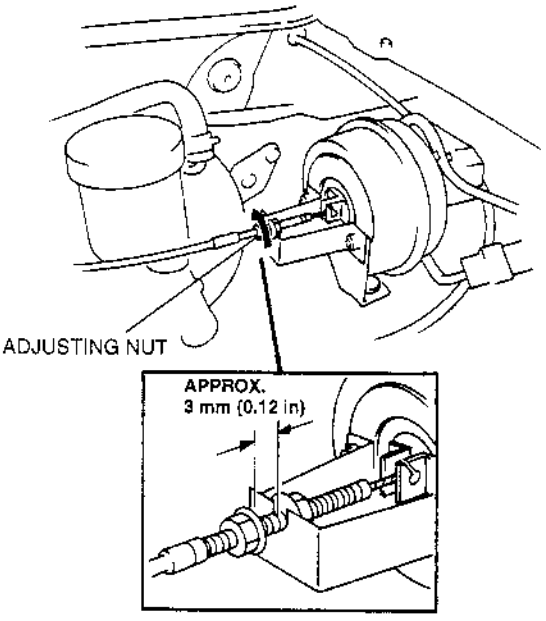


X5U120WAA

2. Turn the adjusting nut as shown in the figure to obtain **approximately 3 mm {0.12 in}** free play.

Note

- Turning the adjusting nut twice makes **3 mm {0.12 in}** free play.



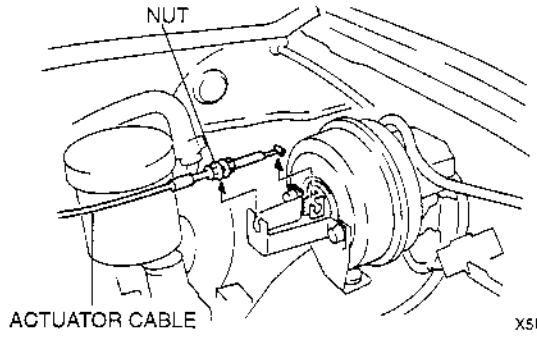
X5U120WAB

3. Tighten the inside nut.

ACTUATOR CABLE REMOVAL/INSTALLATION

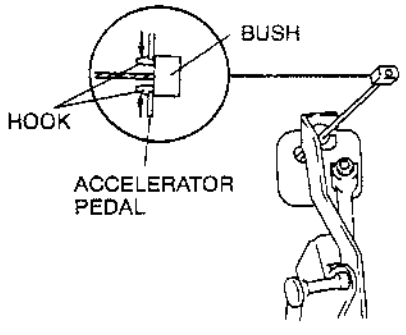
X5U120W10

1. Loosen the nut, and remove the actuator cable.



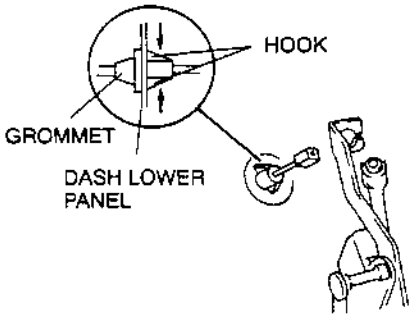
X5U120WAC

2. Press the hooks of the bush, and remove it from the accelerator pedal.



X5U120WAD

3. Press the hooks of the grommet, and remove it from the dash lower panel.



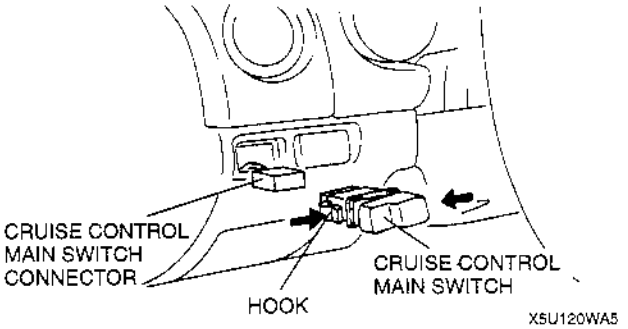
X5U120WAE

4. Push the actuator cable through the dash lower panel to remove it.
5. Install in the reverse order of removal.
6. Adjust the actuator cable. (Refer to 01–20 ACTUATOR CABLE ADJUSTMENT.)

CRUISE CONTROL MAIN SWITCH REMOVAL/INSTALLATION

X5U120W05

1. Disconnect the negative battery cable.
2. Remove the fuse block cover.
3. Push the hooks of the cruise control main switch and pull the switch out from inside of the dashboard.
4. Disconnect the cruise control main switch connector to remove the cruise control main switch.



X5U120WA5

5. Install in the reverse order of removal.

CRUISE CONTROL MAIN SWITCH INSPECTION

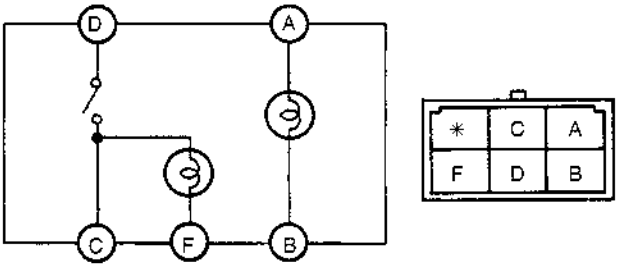
X5U120W06

1. Remove the cruise control main switch. (Refer to 01–20 CRUISE CONTROL MAIN SWITCH REMOVAL/INSTALLATION.)
2. Inspect for continuity between the cruise control main switch terminals by using an ohmmeter.

○—○ : Continuity ○—⓪—○ : Bulb

Switch position	Terminal				
	A	B	C	D	F
Off	○—⓪—○		○	—⓪—	○
On	○—⓪—○		○	—○—⓪—	○

X5U120WA6



X5U120WA7

3. If not as specified, replace the cruise control main switch.

CRUISE CONTROL SWITCH REMOVAL/INSTALLATION

X5U120W07

- Refer to 09–18 COMBINATION SWITCH DISASSENBLY/ASSEMBLY.

CRUISE CONTROL SWITCH INSPECTION

1. Remove the combination switch. (Refer to 09–18 COMBINATION SWITCH REMOVAL/INSTALLATION.)
2. Inspect for continuity between the cruise control switch terminals by using an ohmmeter.

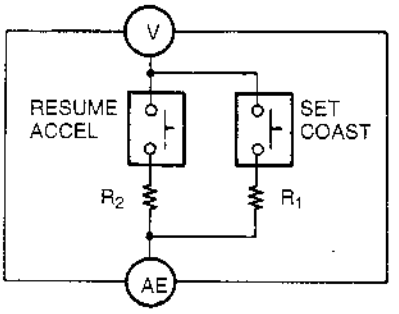
○-W-○ : Resistance

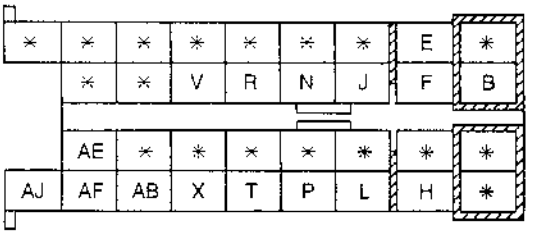
Switch position	Terminal	
	V	AE
SET/COAST	○—W—○	:R_1
Off		
RESUME/ACCEL	○—W—○	: R_2

R_1: 240 Ω R_2: 910 Ω

X5U120WA8

X5U120W08





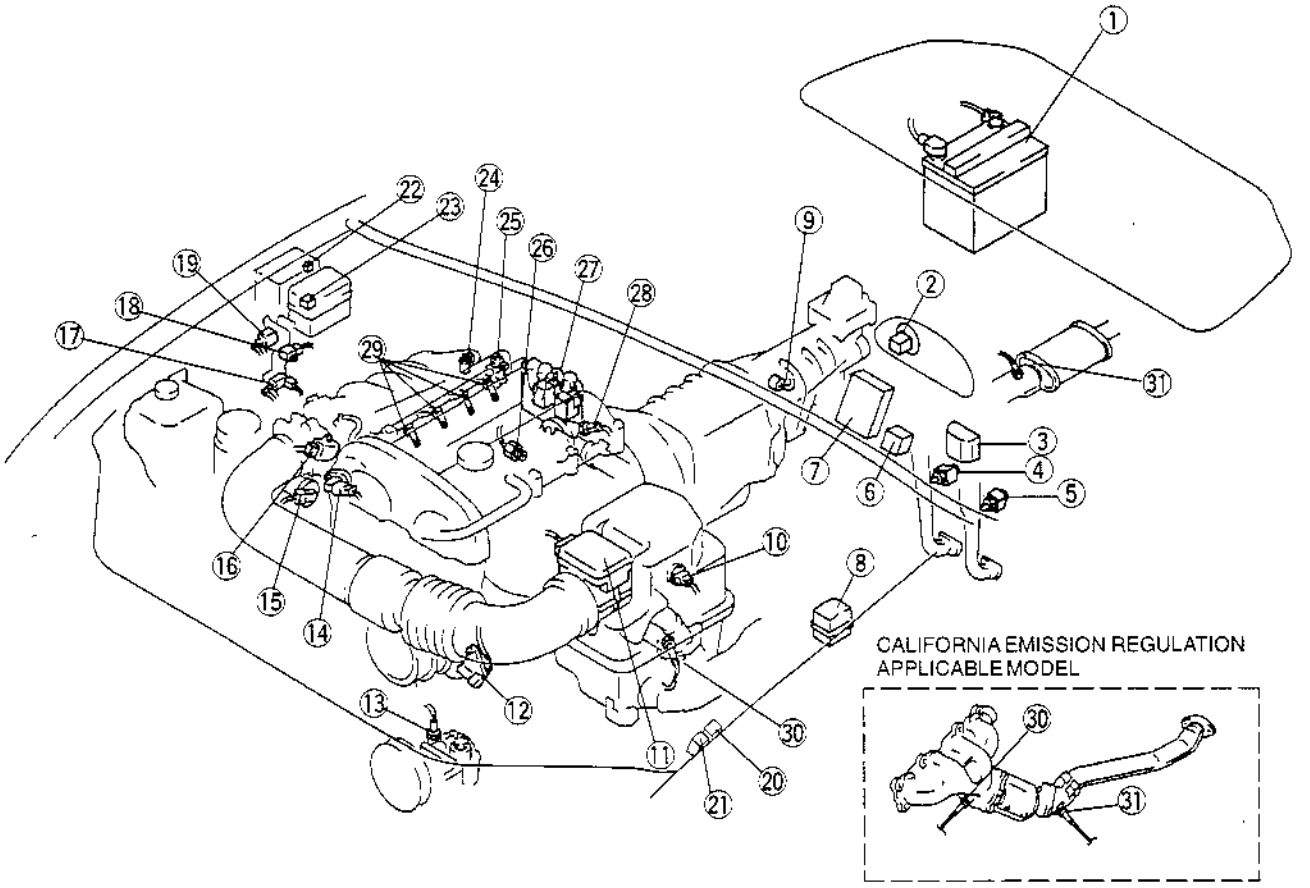
X5U120WA9

3. If not as specified, replace the wiper lever.

01–40 CONTROL SYSTEM

CONTROL SYSTEM COMPONENT LOCATION

X5U140W01



X5U140WA0

1	Battery
2	Vehicle speed sensor
3	DLC-2
4	Brake switch
5	Clutch switch (MT)
6	Fuel pump relay
7	PCM
8	DLC
9	Neutral switch (MT)
10	Intake air temperature sensor
11	Mass air flow sensor
12	Crankshaft position sensor
13	PSP switch
14	Camshaft position sensor
15	IAC valve
16	Throttle position sensor

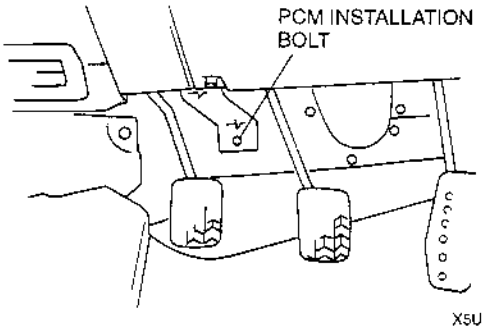
17	Purge solenoid valve
18	EGR boost sensor
19	EGR boost sensor solenoid valve
20	Condenser fan relay
21	A/C relay
22	Cooling fan relay
23	Main relay
24	VICS solenoid valve
25	EGR valve
26	Knock sensor
27	Ignition coil
28	Engine coolant temperature sensor
29	Fuel injectors
30	Heated oxygen sensor (Front)
31	Heated oxygen sensor (Rear)

PCM REMOVAL/INSTALLATION

X5U140W02

1. Disconnect the negative battery cable.
2. Disconnect the connector from the PCM installed on the upper part of the brake pedal.
3. Remove the bolt and nut holding the PCM.

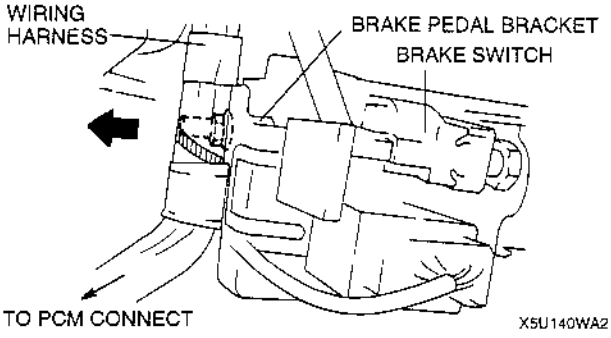
Note
- When removing the bolt.



X5U140WA1

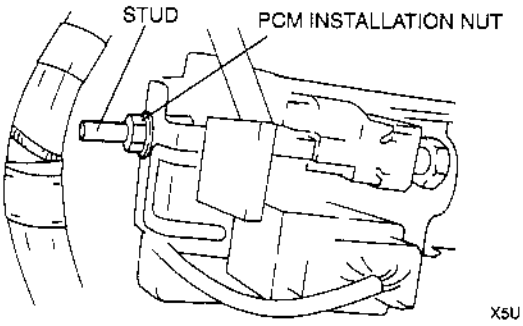
Note
- When removing the nut.

(1) Push the harness (PCM harness) installed to the brake pedal bracket in the opposite direction of the brake pedal bracket.



X5U140WA2

(2) While pushing the harness, push the stay until it comes apart from the stud with the PCM installation nut.
(3) Remove the PCM installation nut.



X5U140WA3

4. Install in the reverse order of removal.

Tightening torque
bolt, nut: 7.9—10.7 N·m
{80—110 kgf·cm, 70—95.4 in·lbf}

PID/DATA MONITOR INSPECTION

X5U140W03

Procedure

Note
- PIDs for the following parts are not available on this model. Go to the appropriate part inspection page.
- Engine coolant temperature sensor (Water temperature sender unit). (Refer to 01–40 ENGINE COOLANT TEMPERATURE SENSOR INSPECTION.)
- Camshaft position sensor. (Refer to 01–40 CAMSHAFT POSITION SENSOR INSPECTION.)
- Main relay. (Refer to 01–40 MAIN RELAY INSPECTION.)

1. Connect the NGS tester to the DLC-2. (Refer to 01–01A ENGINE ON-BOARD DIAGNOSTIC, On-Board Diagnostic Test.)
2. Turn the ignition switch on.
3. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display and press TRIGGER. (Refer to 01–01A ENGINE ON-BOARD DIAGNOSTIC, PID/DATA Monitor and Record Procedure.)
4. Select the appropriate PID on the NGS display and press START.
5. Measure the PID value.

Note
- When measuring the following PID value, perform the following:
- FTP V PID. (Refer to 01–40 PID/DATA MONITOR INSPECTION, FTP V PID Inspection procedure.)
- BARO V PID. (Refer to 01–40 PID/DATA MONITOR INSPECTION, BARO V PID Inspection procedure.)
- TP V PID. (Refer to 01–40 PID/DATA MONITOR INSPECTION, TP V PID Inspection procedure.)

6. If PID value is not within the specification, follow the instruction in ACTION column.

Note
- Perform the SIMULATION TEST for the output device after PID/DATA measurement is completed.

• A/C RLY	• FTP V
• CDCV	• FAN3
• EGRBV	• IACV
• FP RLY	• VICSV
• FTP	• PRGV

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Action	PCM terminal
A/C RLY (A/C relay)	ON/OFF	A/C operating: ON Ignition switch ON: OFF	Inspect following PIDs: RPM, TP V, ECT V, A/C SW. Inspect A/C relay ☞ 07–40	1S
A/C SW (Refrigerant pressure switch)	ON/OFF	Refrigerant pressure switch and fan switch ON: ON Refrigerant pressure switch OFF: OFF	Inspect refrigerant pressure switch ☞ 07–40	1P
ALTF (Generator field coil control duty value)	%	Ignition switch ON: 0% Idle: 0—100% Generator operating → E/L ON: Duty value rise	Inspect following PIDs: IAT, IAT V, RPM, B+, B+2, ALTT V. Inspect generator ☞ 01–17	1O
ALTT V (Generator output voltage)	V	Ignition switch ON: 0 V Idle: B+ +1 V	Inspect following PIDs: IAT, IAT V, RPM, B+, B+2, ALTF. Inspect generator ☞ 01–17	1T
B+ (Battery positive voltage)	V	Ignition switch ON: B+	Inspect main relay ☞ 01–40 Inspect battery ☞ 01–17	1B
B+2 (PCM back-up positive voltage)	V	Constant: B+	Inspect battery ☞ 01–17	1H
BARO (Barometric pressure)	kPa / Hg	Below 400 m {0.25 mile} above sea level: 99—103 kPa {29—30 inHg}	Inspect EGR boost sensor ☞ 01–40	3S
BARO V (Barometric pressure signal voltage)	V	Below 400 m {0.25 mile} above sea level: 4.1—4.3 V With pressure gauge: Vacuum reading –26.6 kPa {–200 mmHg, –7.85 inHg}: 3.0—3.4 V	Inspect EGR boost sensor ☞ 01–40	3S
BRK SW (Brake switch)	ON/OFF	Brake pedal depressed ON: ON Brake pedal released OFF: OFF	Inspect brake switch ☞ 04–11	1F

Monitor item (Definition)	Unit/ Condition		Condition/Specification (Reference)	Action	PCM terminal
CDCV (Canister drain cut valve)	ON/OFF		Ignition switch ON: OFF Idle: OFF	Inspect CDCV ☞ 01–16	3U
CHRGLMP (Generator warning light)	ON/OFF		Ignition switch ON: ON Idle: OFF	Inspect generator warning light ☞ 09–22	1Q
CLT SW (Clutch switch)	ON/OFF		Clutch pedal depressed: ON Others: OFF	Inspect clutch switch ☞ 01–40	3I
ECT (Engine coolant temperature)	°C	°F	Engine coolant temperature 20 °C {68 °F}: 20 °C {68 °F} Engine coolant temperature 60 °C {140 °F}: 60 °C {140 °F}	Inspect engine coolant temperature sensor ☞ 01–40	2E
ECT V (Engine coolant temperature signal voltage)	V		Engine coolant temperature 20 °C {68 °F}: 3.0—3.1 V After warms up: Below 1.0 V	Inspect engine coolant temperature sensor ☞ 01–40	2E
EGRBV (EGR boost sensor solenoid valve)	ON/OFF		Ignition switch ON: OFF Idle: OFF	Inspect EGR boost sensor solenoid valve ☞ 01–16	3T
FAN2 (Condenser fan control)	ON/OFF		Condenser fan operating (ECT above 108 °C {226 °F}) or terminal TEN ground and throttle valve open or A/C relay ON: ON Others: OFF	Inspect following PIDs: RPM, TP V, ECT V, A/C SW, TEN. Inspect condenser fan relay ☞ 07–40	1I
FAN3 (Cooling fan control)	ON/OFF		Cooling fan operating (ECT above 97 °C {207 °F}) or terminal TEN ground and throttle valve open or A/C relay ON: ON Others: OFF	Inspect following PIDs: RPM, TP V, ECT V, A/C SW, DLC. Inspect cooling fan relay ☞ 01–12	1R
FHO2S (Heated oxygen sensor (Front))	V		Ignition switch ON: 0—1.0 V After warms up: 0—1.0 V Acceleration: 0.5—1.0 V Deceleration: 0—0.5 V	Inspect heated oxygen sensor ☞ 01–40	2C
FHO2SH (Heated oxygen sensor heater (Front))	ON/OFF		Always: ON	Inspect following PIDs: ECT V, MAF V, Inspect heated oxygen sensor heater ☞ 01–40	1U
FP RLY (Fuel pump relay)	ON/OFF		Ignition switch ON: OFF Idle: ON Cranking: ON	Inspect following PID: RPM. Inspect fuel pump relay ☞ 01–14	3N
FTL V (Fuel tank level signal voltage)	V		Idle condition • Fuel tank full: 0.2—0.5 V • Fuel tank empty: 3.4—4.4 V • Fuel tank half: 1.8—2.8 V **Note** • The voltages above will be measured when the battery voltage is between 12 V to 14 V.	Inspect fuel level sender unit ☞ 09–22	3K
FTP (Fuel tank pressure)	kPa	Hg	Ignition switch ON: 0—1.0 kPa {0—0.3 inHg} Idle: 0—1.0 kPa {0—0.3 inHg} **Note** • The pressure and output voltage varies according to the fuel temperature.	Inspect fuel tank pressure sensor ☞ 01–40	2A

Monitor item (Definition)	Unit/ Condition	Condition/Specification (Reference)	Action	PCM terminal
FTP V (Fuel tank pressure signal voltage)	V	Ignition switch ON: 2.5—2.8 V Idle: 2.5—2.8 V Fuel tank pressure 0 kPa {0 mmHg}: 2.5 V Fuel tank pressure 1 kPa {7.5 mmHg}: 2.8 V With pressure gauge: • Vacuum reading –6.66 kPa {–50 mmHg, –1.97 inHg}: 0.45—0.55 V. • Vacuum reading 0 kPa {0 mmHg, 0 inHg}: 2.25—2.75 V. • Pressure reading 6.66 kPa {50 mmHg, 1.97 inHg}: 4.05—4.95 V. **Note** • The pressure and output voltage varies according to the fuel temperature.	Inspect fuel tank pressure sensor ☞01–40	2A
IACV (Idle air control valve)	ms	Ignition switch ON: 1.0 ms. Idle: 0.3—1.0 ms. Short terminal TEN: 0.3—0.7 ms.	Inspect following PIDs: IAT V, RPM, ECT V, MAF V, TP V, NL SW, CLT SW, PSP SW, A/C SW, TEN. Inspect idle air control valve ☞01–13	3M 3O
IAT (Intake air temperature)	°C / °F	Intake air temperature 20 °C {68 °F}: 20 °C {68 °F}	Inspect intake air temperature sensor ☞01–40	2B
IAT V (Intake air temperature signal voltage)	V	Intake air temperature 20 °C {68 °F}: 2.3—2.4 V Intake air temperature 30 °C {86 °F}: 1.9 V	Inspect intake air temperature sensor ☞01–40	2B
IGT (Ignition timing)	BTC	Idle: BTDC 6—18 ° Idle (Terminal TEN ground): BTDC 9—11 ° Cranking: 7 °	Inspect following PIDs: MAF V, IAT V, RPM, TP V, ECT V, PSP SW, NL SW, CLT SW, A/C SW, TEN, camshaft position sensor. Inspect Engine tune-up ☞01–10	3G 3H
INJ (Fuel injection duration)	ms	Ignition switch ON: 0 msec Idle: 1.5—4.0 msec	Inspect following PIDs: MAF V, IAT V, RPM, TP V, ECT V, NL SW, CLT SW, FHO2S, PSP SW, BRK SW, A/C SW, B+, camshaft position sensor	3W, 3X, 3Y, 3Z
KR (Knocking retard)	DEG	Ignition switch ON: 0° Idle: 0°	Inspect knock sensor ☞01–40	2F
MAFV (Mass air flow signal voltage)	V	Ignition switch ON: 0.9—2.0 V Idle: 1.7—2.4 V	Inspect mass air flow sensor ☞01–40	2L
MIL (Malfunction indicator light)	ON/OFF	Ignition switch ON: ON DTC output: ON No DTC output: OFF	Inspect malfunction indicator light ☞09–22	1E
NL SW (MT) (Neutral switch)	ON/OFF	Shift position at neutral: ON Others: OFF	Inspect neutral switch ☞01–40	1V
PRGV (Purge solenoid valve duty value)	%	Ignition switch ON: 0%	Inspect following PIDs: IAT V, RPM, ECT V, MAF V, TP V, BARO V, FHO2S, B+. Inspect purge solenoid valve ☞01–16	3L
PSP SW (PSP switch)	ON/OFF	Steering wheel is at straight ahead position: OFF Steering wheel is fully turned: ON	Inspect PSP switch ☞01–40	1G
RFC FLAG (Readiness Function Code)	ON/OFF	RFC exists: ON No RFC: OFF	—	—

Monitor item (Definition)	Unit/ Condition		Condition/Specification (Reference)	Action	PCM terminal
RHO2S (Heated oxygen sensor (Rear))	V		Ignition switch ON: 0—1.0 V Idle (After warms up): 0—1.0 V Idle (Engine cold): 0—0.5 V Accelerate: 0.5—1.0 V Decelerate: 0—0.5 V	Inspect heated oxygen sensor ☞ 01–40	3J
RHO2S (Heated oxygen sensor heater (Rear))	ON/OFF		Engine coolant temperature above 70 °C {158 °F}: ON Engine coolant temperature below 70 °C {158 °F}: OFF	Inspect following PIDs: ECT V, MAF V, Inspect heated oxygen sensor heater ☞ 01–40	3V
RPM (Engine speed)	rpm		Idle: 750—850 rpm	Inspect crankshaft position sensor ☞ 01–40	2J
SEGRP (EGR valve (stepping motor) position)	step		Ignition switch ON: 0 step Idle: 0 step Cranking: 0—60 steps	Inspect following PIDs: ECT V, TP V, Inspect EGR valve ☞ 01–16	2M, 2N, 2O, 2P
TEN (TEN terminal (DLC))	ON/OFF		Open terminal TEN: OFF Short terminal TEN: ON	Inspect the DLC TEN terminal and PCM connector terminal 1L	1L
TP V (Throttle position sensor signal voltage)	V		Closed throttle position: 0.1—1.1 V Wide open throttle: 3.0—4.6 V	Inspect throttle position sensor ☞ 01–40	3E
TR SW (AT) (Transmission range switch)	ON/OFF		P or N range: ON Others: OFF	Inspect transmission range switch ☞ 05–13	1V
VICSV (VICS solenoid valve)	ON/OFF		Ignition switch ON: ON Idle: ON Engine speed above 5250 rpm: OFF	Inspect following PID: RPM, Inspect VICS solenoid valve ☞ 01–13	3Q
VS (Vehicle speed)	KPH	MPH	Vehicle speed 20 km/h {12.5 mph}: 20 km/h {12.5 mph} Vehicle speed 40 km/h {25 mph}: 40 km/h {25 mph}	Inspect vehicle speed sensor ☞ 09–22	2D

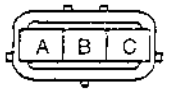
FTP V PID Inspection Procedure

1. Confirm the ignition switch is turned on.
2. Confirm that the following PIDs are within the specifications:

   BARO
   101.3 kPa {760 mmHg, 29.9 inHg}
   (Absolute pressure)

   IAT
   30—100 °C {86—212 °F}

3. Disconnect the fuel tank pressure sensor connector and measure the voltage at fuel tank pressure sensor connector terminal C.



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCK

   Voltage
   5.0 V

4. Reconnect the connector.
5. Disconnect the vacuum hose from the fuel tank pressure sensor. Connect the vacuum pump to the fuel tank pressure sensor.
6. Select FTP V PID on the NGS tester and press START.
7. Apply the vacuum and verify that the FTP V is as specified on the table.

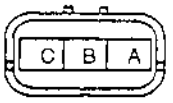
BARO V PID Inspection Procedure

1. Confirm the ignition switch is turned on.
2. Confirm that the following PIDs are within the specifications:

   BARO
   101.3 kPa {760 mmHg, 29.9 inHg}
   (Absolute pressure)

   IAT
   10—50 °C {50—122 °F}

3. Disconnect the EGR boost sensor connector and measure the voltage at EGR boost sensor connector terminal C.



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCD

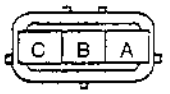
Voltage
4.5—5.5 V

4. Reconnect the connector.
5. Disconnect the vacuum hose from the EGR boost sensor. Connect the vacuum pump to the EGR boost sensor.
6. Select BARO V PID on the NGS tester and press START.
7. Apply the vacuum and verify that the BARO V is as specified on the table.

Vref Terminal Circuit Inspection

1. Turn the ignition switch to ON.
2. Measure the voltage between the throttle position sensor connector (vehicle side) terminal A and body ground by using a voltmeter.
   (1) Measurement voltage is 0 V.
      ① Turn the ignition switch off.
      ② Disconnect the throttle position sensor connector, EGR boost sensor connector, and fuel tank pressure sensor connector (which is applied Vref).
      ③ Verify there is no continuity between the throttle position sensor connector (vehicle side) terminal A and body ground by using an ohmmeter.

THROTTLE POSITION
SENSOR CONNECTOR

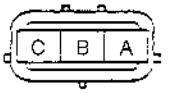


X5U140WA4

      ④ If there is continuity, repair the related harness for short to circuit.
      ⑤ Inspect continuity between the PCM connector (vehicle side) terminal 2I and each sensor connector (vehicle side) terminals which is applied Vref by using an ohmmeter.

PCM terminal	Connector (vehicle side)	Terminal
2I	Throttle position sensor	A
	EGR boost sensor	C
	FTP sensor	C

THROTTLE POSITION
SENSOR CONNECTOR



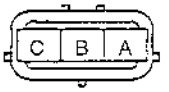
EGR BOOST
SENSOR CONNECTOR

FTP
SENSOR CONNECTOR

X5U140WA5

      ⑥ If there is continuity, repair the related harnesses.
   (2) Measurement voltage is B+.
      ① Turn the ignition switch off.
      ② Disconnect the battery positive harness and battery negative harness.
      ③ Verify there is no continuity between the throttle position sensor connector (vehicle side) terminal A and battery positive harness by using an ohmmeter.

THROTTLE POSITION
SENSOR CONNECTOR



X5U140WA6

      ④ If there is continuity, repair the related harnesses for short to B+ circuit.
   (3) Measurement voltage is approx. 5 V.
   - Vref terminal of PCM is okay.

Ground Circuit Inspection

1. Turn the ignition switch off.
2. Disconnect the PCM connectors.
3. Inspect for continuity between the PCM ground terminals and body ground by using an ohmmeter.

PCM ground terminal
3A
3B
3C
3F

4. If not as specified, repair the related harnesses for open circuit.

Power Supply Circuit Inspection

1. Turn the ignition switch off.
2. Disconnect the PCM connectors.
3. Measure the voltage between the PCM battery power terminal connectors and body ground by using a voltmeter.

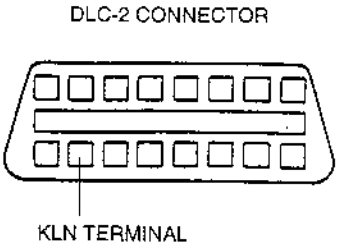
Power supply terminal
1A
1B (Ignition switch: ON)

Power supply terminal voltage
B+

4. If not as specified, repair the related harnesses and fuses.

Serial Communication Terminal Inspection

1. Turn the ignition switch off.
2. Disconnect PCM connectors.
3. Verify there is continuity between PCM connector terminal 1D and DLC-2 KLN terminal.



X5U140WCE

4. If not as specified, repair the related harnesses.

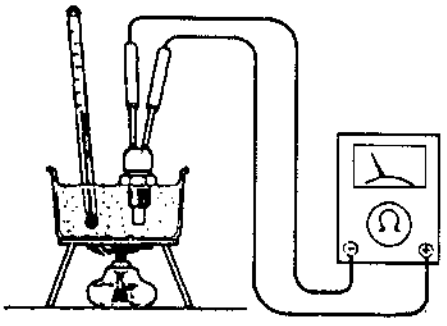
INTAKE AIR TEMPERATURE SENSOR INSPECTION

X6U140W04

Inspection of Resistance

Note
- Perform the following test only when detected.

1. Disconnect the intake air temperature sensor connector.
2. Remove the intake air temperature sensor.
3. Place the intake air temperature sensor in water with a thermometer, and heat the water gradually.
4. Measure the resistance of the intake air temperature sensor by using an ohmmeter.



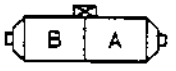
X5U140WA7

Specification

Water temperature (°C {°F})	Resistance (kΩ)
20 {68}	2.09—2.81
80 {176}	0.274—0.370

5. If not specified, replace the intake air temperature sensor. If intake air temperature sensor is okay, but PID value is out of specification, inspect as follows:

Open circuit
- Reference voltage circuit (Intake air temperature sensor connector terminal B and PCM connector terminal 2B.)
- Ground circuit (Intake air temperature sensor connector terminal A and PCM connector terminal 3F.)



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WA8

Short circuit
- Intake air temperature sensor connector terminal B and PCM connector terminal 2B to ground.

6. Reconnect the intake air temperature sensor connector.

MASS AIR FLOW SENSOR INSPECTION

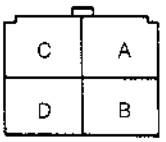
X5U140W05

Note
- Perform the following test only when detected.

1. Visually check for the following on the mass air flow sensor.
   - Damage
   - Cracks
   - Terminal bends
   - Terminal rust
2. If any of the above are found, replace the mass air flow sensor. If the above are found okay, but PID value is out of specification, inspect as follows:

Open circuit
- Mass air flow circuit (Mass air flow sensor connector terminal B and PCM connector terminal 2L.)
- Power circuit (Mass air flow sensor connector terminal C and main relay terminal D through common connector.)
- Ground circuit (Mass air flow sensor connector terminal A and PCM connector terminal 3C through common connector.)

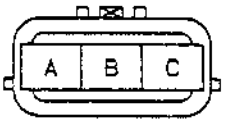
MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCF

MASS AIR FLOW SENSOR



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WA9

Short circuit
- Mass air flow sensor connector terminal B and PCM connector terminal 2L to ground.
- Mass air flow sensor connector terminal C and main relay terminal D through common connector to ground.

3. Reconnect the mass air flow sensor connector.

Note
- The scan tool shows the MAF rate and load value.

Specification

	Intake MAF (g/s)		Engine load calculated value (%)	
	MT	AT	MT	AT
Idle*1	2.6—3.3	2.4—3.4	16.0—23.0	15.0—23.0
Engine speed 2,500 rpm*2	7.1—9.3	8.3—9.6	16.0—21.0	16.0—21.0

*1 : 750—850 rpm
*2 : No load, neutral or P position

THROTTLE POSITION SENSOR INSPECTION

X5U140W06

Note
- The throttle position sensor on this type of vehicle is a maintenance-free type.
- Perform the following test only when detected.

1. If not as PID value specified, inspect as follows:
   - Verify that the throttle valve is fully closed.
   - Accelerator cable the free play (Refer to 01–13.)
   - Throttle cable the free play (Refer to 01–13.)
   - Actuator cable the free play (Refer to 01–20.)
2. If above specified okay, but PID value is out of specification, inspect as follows:
   Open circuit
   - Reference voltage circuit (Throttle position sensor connector terminal A and PCM connector terminal 2I.)
   - Throttle position circuit (Throttle position sensor connector terminal C and PCM connector terminal 3E.)
   - Ground circuit (Throttle position sensor connector terminal B and PCM connector terminal 3F.)

HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WAA

   Short circuit
   - Throttle position sensor connector terminal A and PCM connector terminal 2I to ground.
   - Throttle position sensor connector terminal C and PCM connector terminal 3E to ground.
3. Reconnect the throttle position sensor connector.
4. If correct the above open or short circuit, replace throttle position sensor.

THROTTLE POSITION SENSOR REPLACEMENT

X5U140W23

1. Disconnect the throttle position sensor connector.
2. Remove the attaching screws.
3. Remove the throttle position sensor.
4. Verify that the throttle valve is fully closed.
5. Catch the tang of the throttle body on the throttle position sensor plastic rotor.
6. Position the throttle position sensor on the throttle body so that the mounting holes align.
7. Install the attaching screws.

Tightening torque
1.6—2.3 N·m {16—24 kgf·cm, 14—20 in·lbf}

8. Release the throttle.
9. Verify the throttle position sensor PID value. (Refer to 01–40 PID/DATA MONITOR INSPECTION)
10. If not as PID value specified, carry out the THROTTLE POSITION SENSOR INSPECTION. If not as PID (TP V) condition, replace the throttle body.