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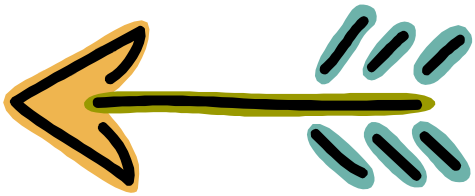

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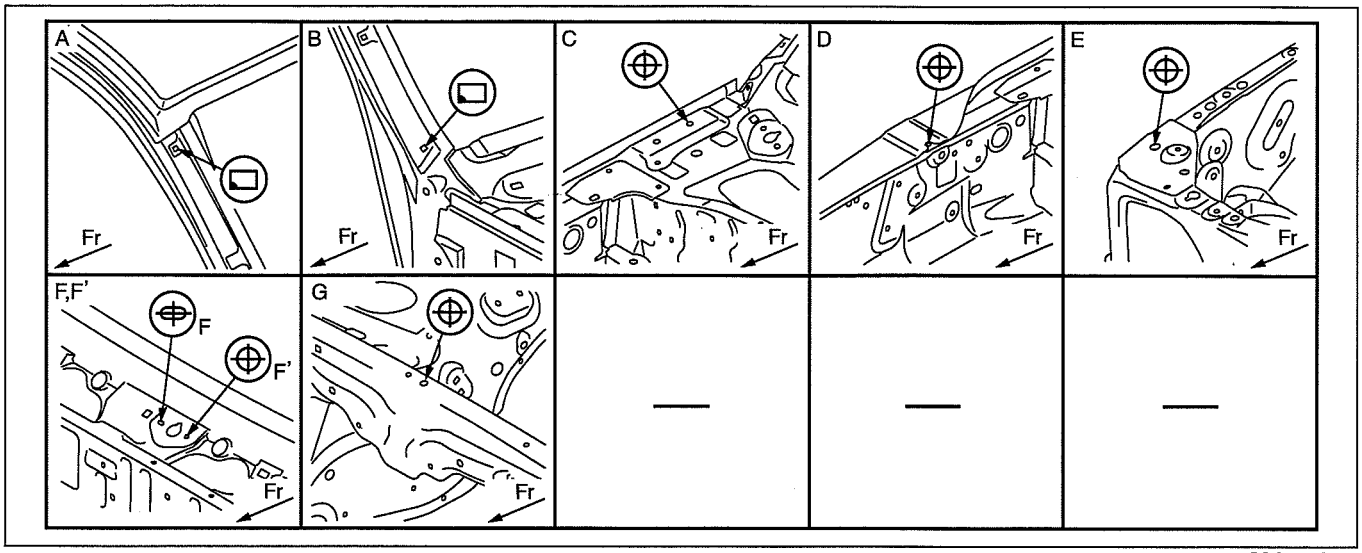


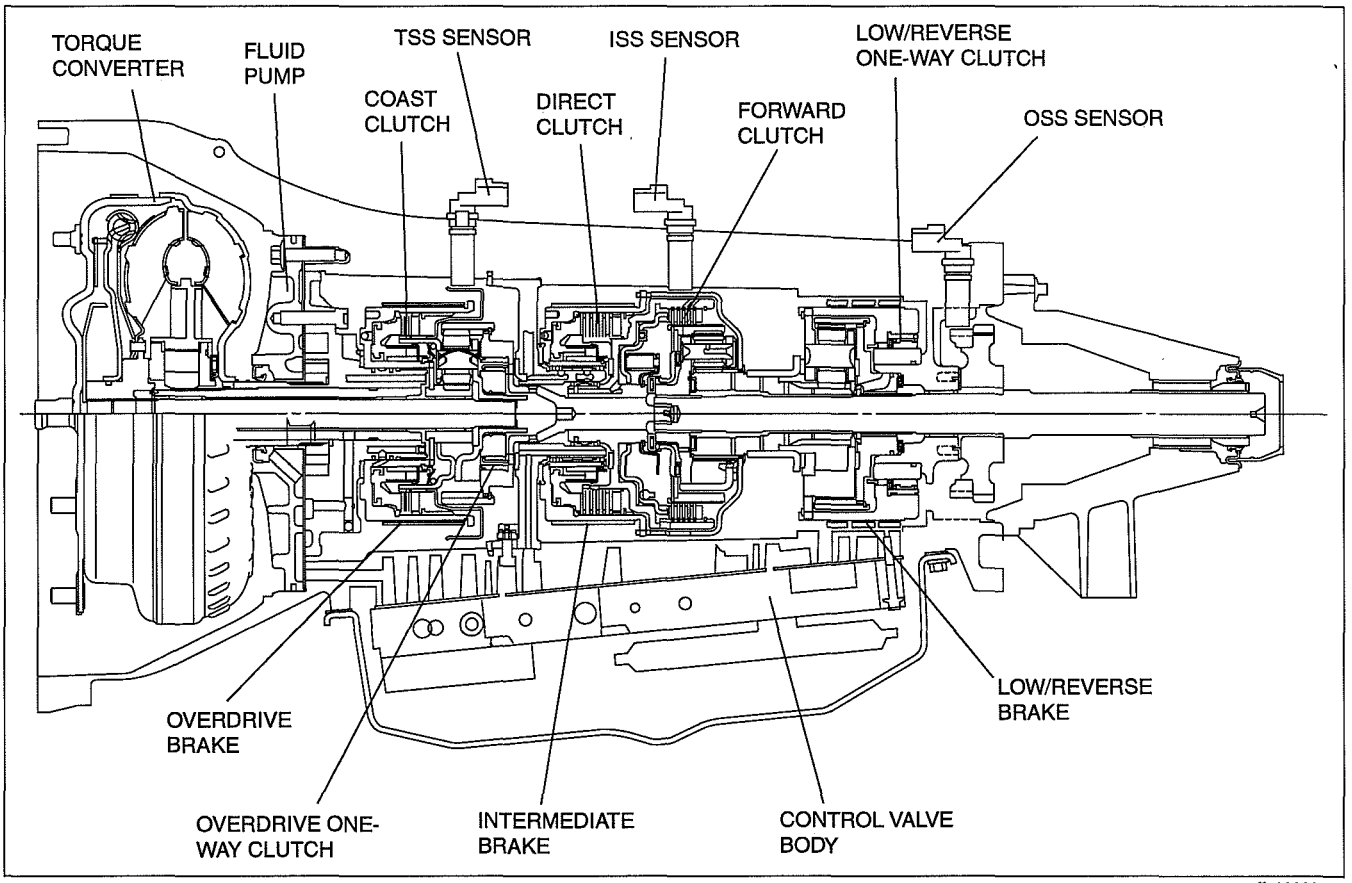
DBG0980B014

Point symbol	Designation	Hole diameter or bolt or nut size mm {in}
A	Windshield garnish installation square hole	6.8 x 6.8 {0.27 x 0.27}
B	Windshield garnish installation square hole	6.8 x 6.8 {0.27 x 0.27}
C	Bonnet hinge installation hole	ø12 {0.47}
D	Front fender installation hole	ø10 {0.39}

Point symbol	Designation	Hole diameter or bolt or nut size mm {in}
E	Shroud gusset datum hole	ø14 {0.55}
F	Cowl panel datum slot	ø6.2 x 8 {0.24 x 0.31}
F'	Cowl panel datum hole	ø6.2 {0.24}
G	Shroud panel datum hole	ø10 {0.39}

Transmission

- Automatic transmission [5R55S]
  - — Five forward speeds automatic transmission has been adopted.
  - — A water-cooling type and an air-cooling type AT oil cooler has been adopted.
  - — An adaptive learn strategy system has been adopted.
  - — An engine-transaxle total control system has been adopted.



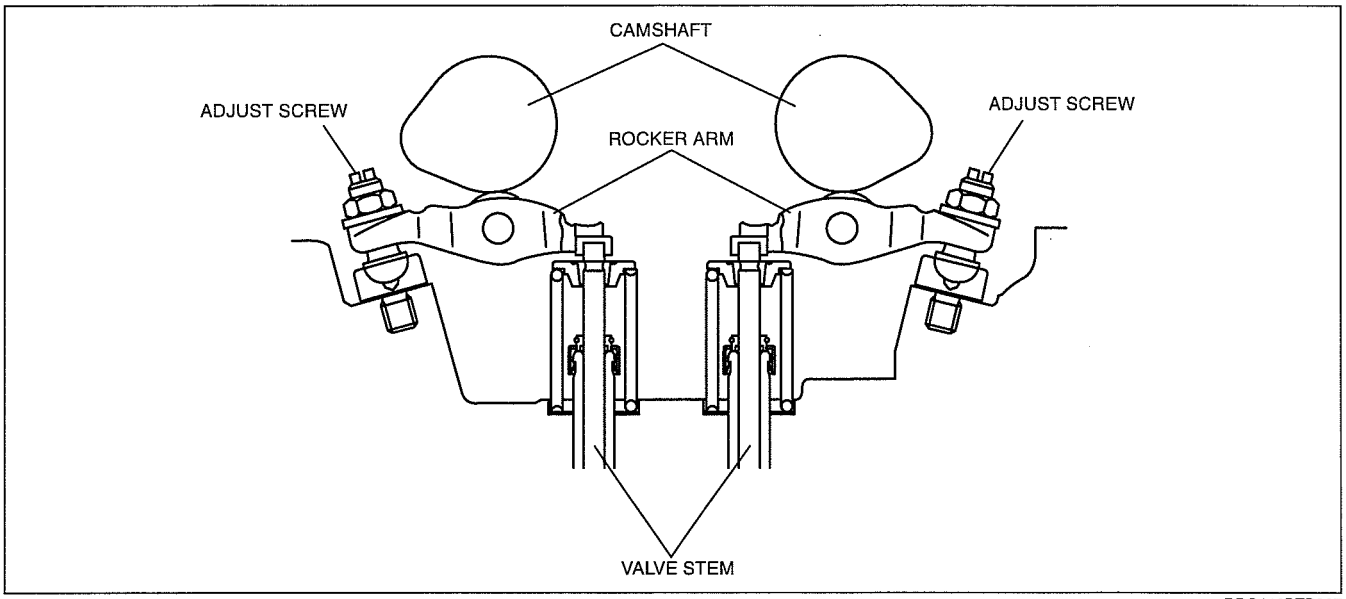
arnffn00000345

DTC	Condition	MIL	DC	Self-test type*1	Memory function
P0403	EGR solenoid valve circuit malfunction	ON	1	C/O/R	
P0404	EGR valve stuck	ON	2	C/R	
P0405	EGR valve position sensor circuit low input	ON	1	C/O/R	
P0406	EGR valve position sensor circuit high input	ON	1	C/O/R	
P0489	EGR solenoid valve control circuit low input	ON	1/2	C/O	
P0490	EGR solenoid valve control circuit high input	ON	1/2	C/O	
P0500	VSS circuit malfunction	ON	2	C	
P0562	Battery voltage low input	ON	1	C/O/R	
P0563	Battery voltage high input	ON	1	C/O/R	
P0602	PCM programming error	ON	1	O	
P0606	PCM malfunction	ON	1	C/O/R	
P0607	PCM performance problem	ON	1/2	C/O/R	
P0610	PCM vehicle options error	ON	1	O	
P0627	Fuel metering valve control circuit open	ON	1	C/R	
P0628	Fuel metering valve control circuit low input	ON	1	C/R	
P0629	Fuel metering valve control circuit high input	ON	1	C/R	
P0642	Fuel pressure sensor and boost sensor 5 V circuit low input	ON	1	C/O/R	
P0643	Fuel pressure sensor and boost sensor 5 V circuit high input	ON	1	C/O/R	
P0652	CMP sensor and APP sensor 5 V circuit low input	ON	1	C/O/R	
P0653	CMP sensor and APP sensor 5 V circuit high input	ON	1	C/O/R	
P0660	Intake shutter solenoid valve (half) control circuit open	ON	1	C/O	
P0661	Intake shutter solenoid valve (half) control circuit low input	ON	1	C/O	
P0662	Intake shutter solenoid valve (half) control circuit high input	ON	1	C/O	
P0663	Intake shutter solenoid valve (full) control circuit open	ON	1	C/O	
P0664	Intake shutter solenoid valve (full) control circuit low input	ON	1	C/O	
P0665	Intake shutter solenoid valve (full) control circuit high input	ON	1	C/O	
P0685	Main relay control circuit open	—	—	—	
P0698	EGR valve position sensor 5 V circuit low input	ON	1	C/O/R	
P0699	EGR valve position sensor 5 V circuit high input	ON	1	C/O/R	
P1196	Key off voltage high input	—	—	—	
P1259	IMMOBILIZER to PCM signal error	—	—	C/O	—
P1260	Theft detected Vehicle immobilizer	—	—	C/O	—
P1391	Glow plug control circuit low input	ON	1	C/O	
P1392	Glow plug control circuit high input	ON	1	C/O	
P1528	Exhaust shutter solenoid valve circuit problem	—	1	C/O	—
P1602	Immobilizer/PCM communication error	—	—	C/O	—
P1603	ID Number Unregistered	—	—	C/O	—
P1604	Code word unregistered	—	—	C/O	—
P1621	Immobilizer code word does not match	—	—	C/O	—
P1622	Immobilizer ID does not match	—	—	C/O	—
P1623	Immobilizer code word/ID number write failure	—	—	C/O	—
P1624	Anti-theft system	—	—	C/O	—
P1675	Injection quantity adjustment value writing error	ON	1	O	
P1676	Injection quantity adjustment value checksum error	ON	1	O	
P2008	Variable swirl control (VSC) solenoid valve circuit open	ON	1	C/O	
P2009	Variable swirl control (VSC) solenoid valve circuit low input	ON	1	C/O	
P2010	Variable swirl control (VSC) solenoid valve circuit high input	ON	1	C/O	
P2135	Accelerator pedal position (APP) sensor No.1/No.2 voltage correlation problem	ON	1	C/O/R	
P2136	Accelerator pedal position (APP) sensor No.1/idle switch voltage correlation problem	ON	1	C/O/R	
P2143	EGR control solenoid valve control circuit open	ON	1/2	C/O	
P2144	EGR control solenoid valve control circuit low input	ON	1/2	C/O/R	
P2145	EGR control solenoid valve control circuit high input	ON	1/2	C/O/R	

VALVE, ROCKER ARM CONSTRUCTION [WL-C, WE-C]

dcf011012111t05

- The valves are operated by rocker arms.
- Valve clearance is adjusted by the adjust screw and nut of the rocker arm.



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ENGINE MOUNT STRUCTURAL VIEW [WL-C, WE-C]

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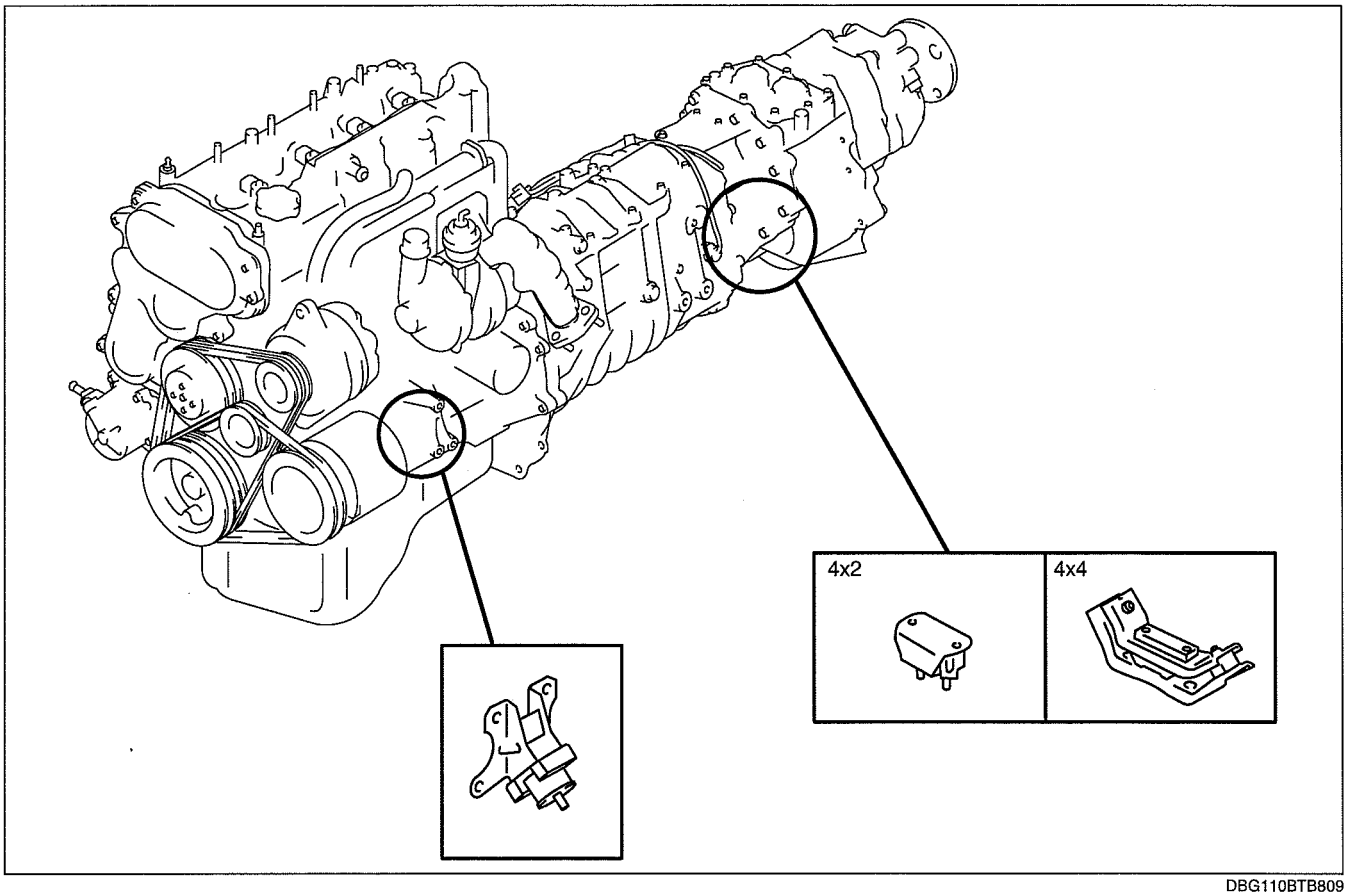

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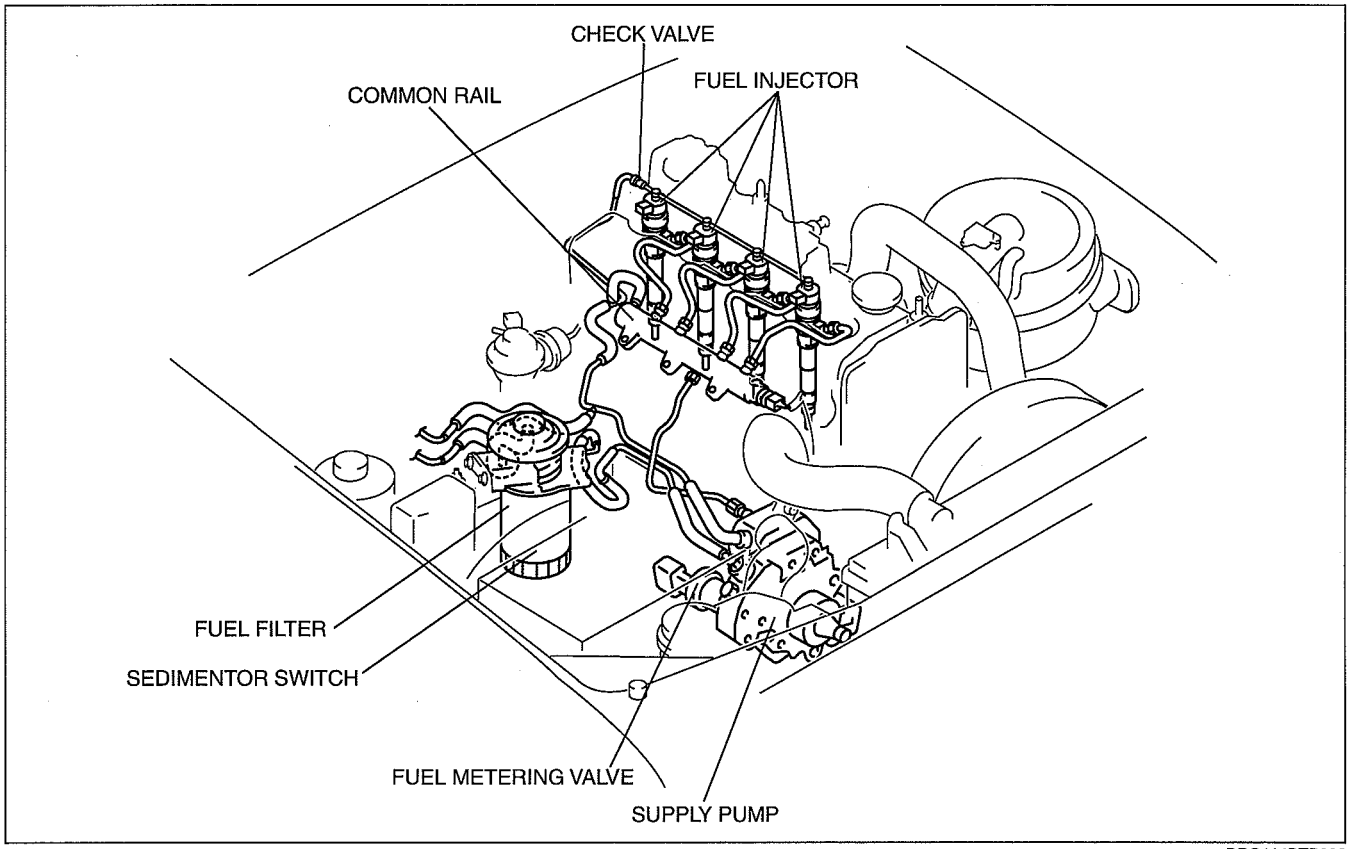
FUEL SYSTEM STRUCTURAL VIEW [WL-C, WE-C]

dcf011400000t05

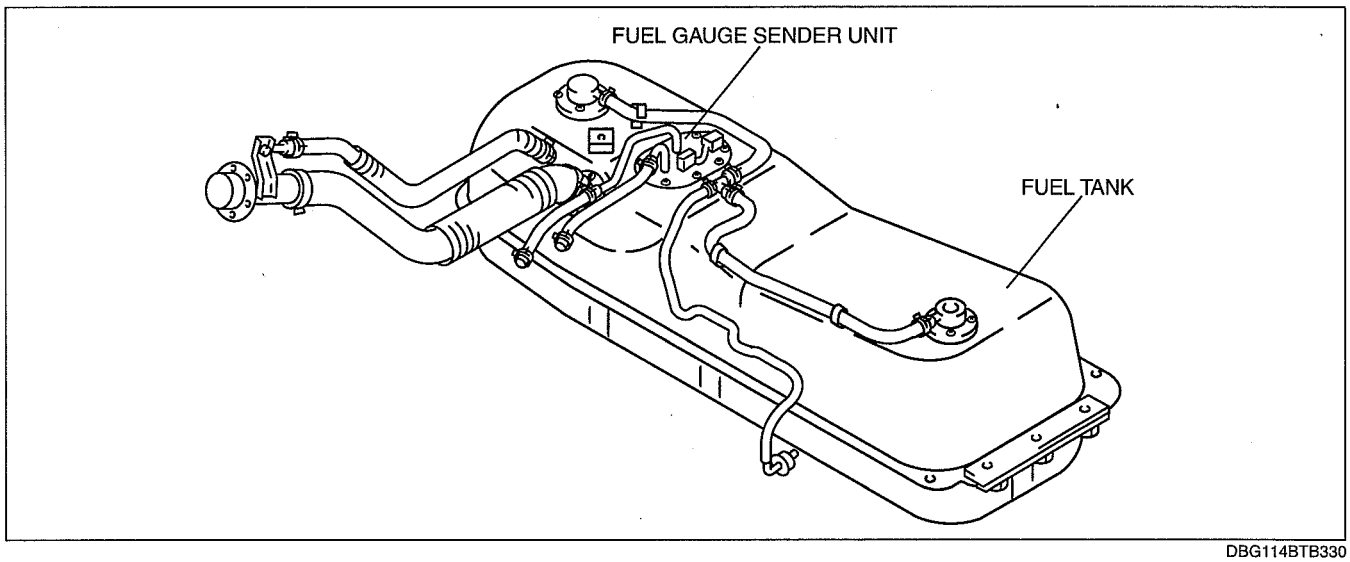
Engine Room Side



DBG114BTB302

Fuel Tank Side

Double cab 4x2 (except Hi-Rider), Stretch cab 4x2 (with rear access system (except Hi-Rider))



DBG114BTB330

OXIDATION CATALYTIC CONVERTER CONSTRUCTION [WL-C, WE-C]

dcf011620500t05

- Consists of a three-way catalytic converter and insulator.
- A catalytic converter utilizing a platinum–palladium–rhodium system has been adopted.

OXIDATION CATALYTIC CONVERTER OPERATION [WL-C, WE-C]

dcf011620500t06

- Contaminants in the exhaust gas (HC and CO) are purified by oxidization while passing through the catalytic converter.
  - — Oxidization process
    - Noxious hydrocarbon (HC) and carbon monoxide (CO) are bonded to oxygen which is converted to non-noxious carbon dioxide and water.
      $O_2 + HC + CO \rightarrow CO_2 + H_2O$

ROLLOVER VALVE FUNCTION [WL-C, WE-C]

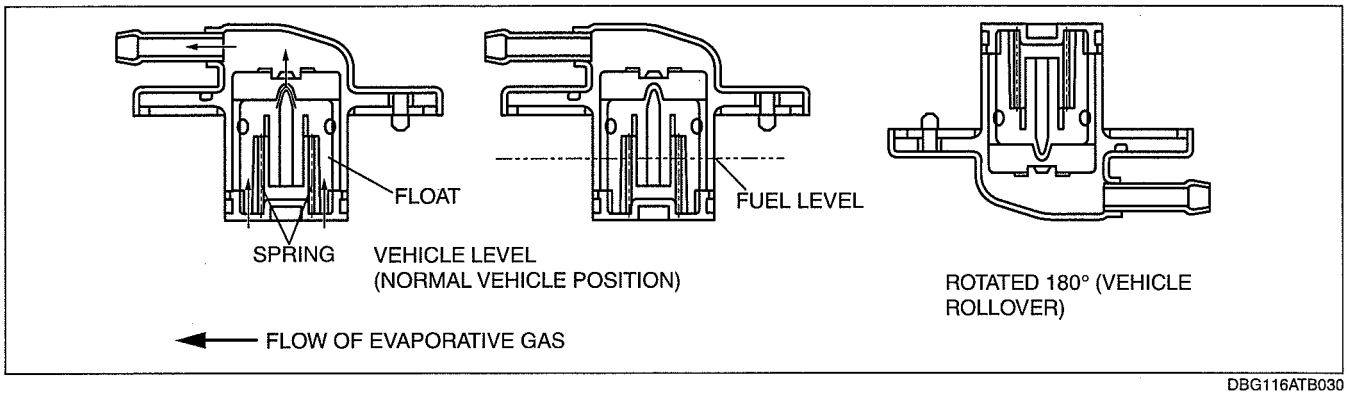
dcf011642720t03

- The rollover valve prevents fuel flow into the airflow hose during sudden cornering or vehicle rollover.

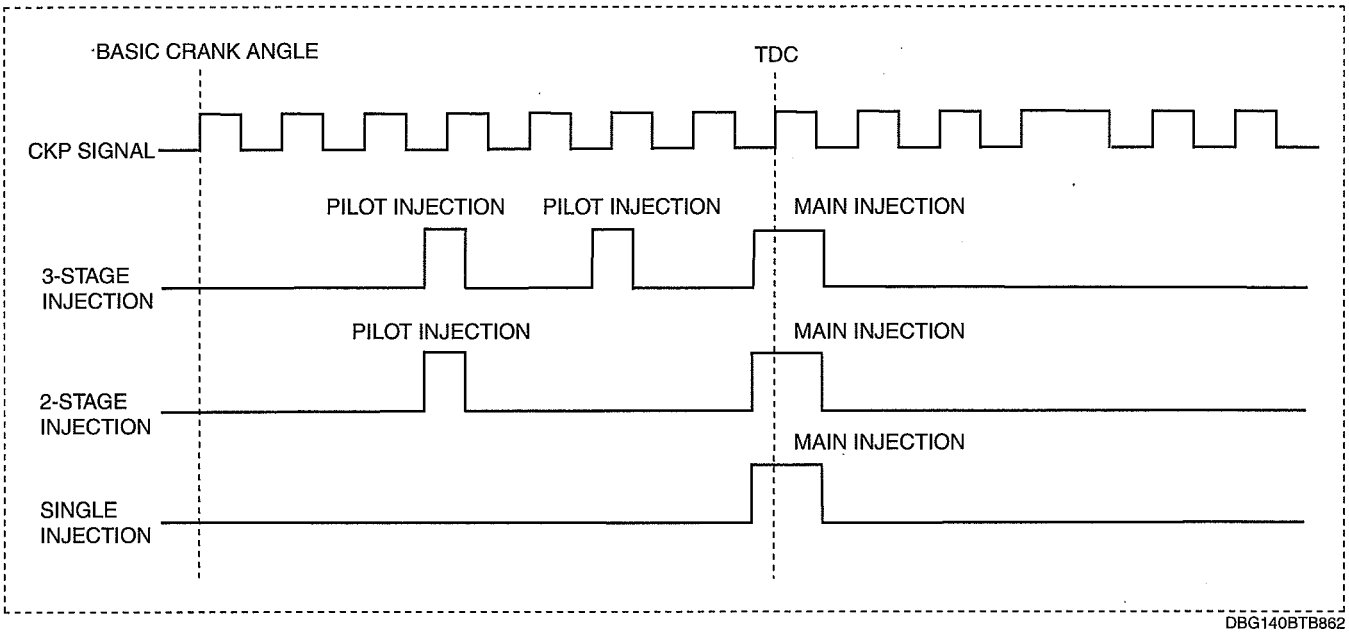
ROLLOVER VALVE CONSTRUCTION/OPERATION [WL-C, WE-C]

dcf011642720t04

- The rollover valve consists of a float, and spring.
- The rollover valve utilizes a combination of float weight, spring force, and buoyancy. When the float is sunk in the fuel, the float (valve) closes to block the sealing surface of the passage.



DBG116ATB030



DBG140BTB862

Operation condition

- The PCM determines the number of times fuel injection occurs based on the engine speed, fuel injection amount, and signals from each sensor.
- When the engine is started, the PCM calculates the number of times fuel injection occurs based on the engine coolant temperature, engine speed and fuel injection amount.

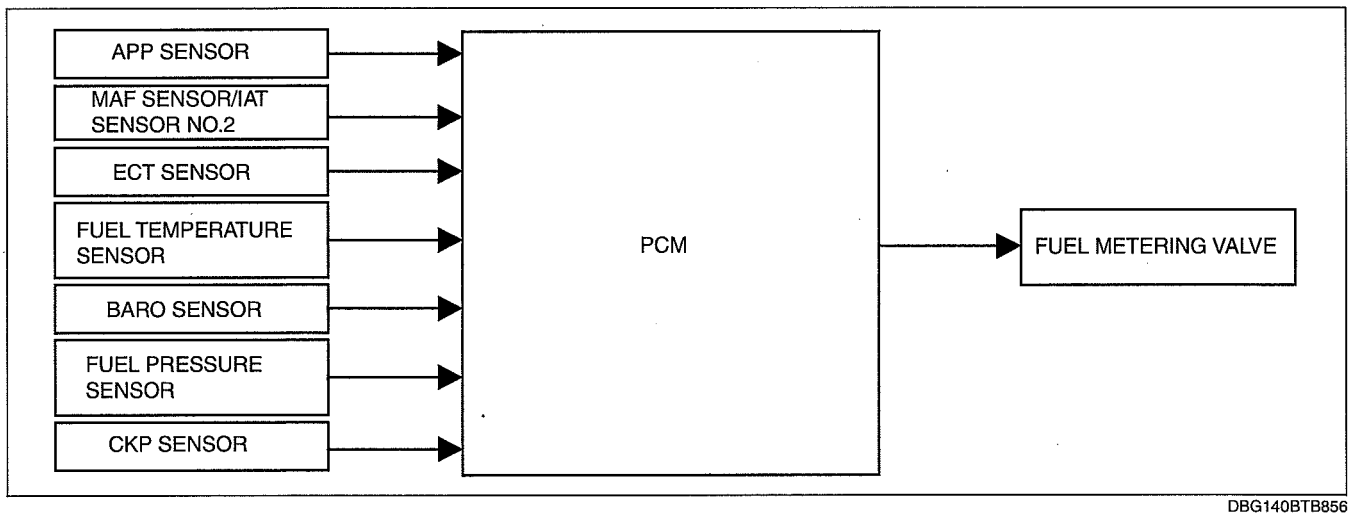
FUEL PRESSURE CONTROL OUTLINE [WL-C, WE-C]

dcf014000000t46

- The PCM performs the feedback control of the fuel pressure in the common rail to gain optimum fuel injection pressure according to engine operation conditions.
- Because the fuel pressure can be controlled regardless of engine operation conditions, high pressure fuel injection even with low engine speed is possible. Due to this, generation of NOx and particulate matter can be reduced.

FUEL PRESSURE CONTROL BLOCK DIAGRAM [WL-C, WE-C]

dcf014000000t47



DBG140BTB856

FUEL PRESSURE CONTROL OPERATION [WL-C, WE-C]

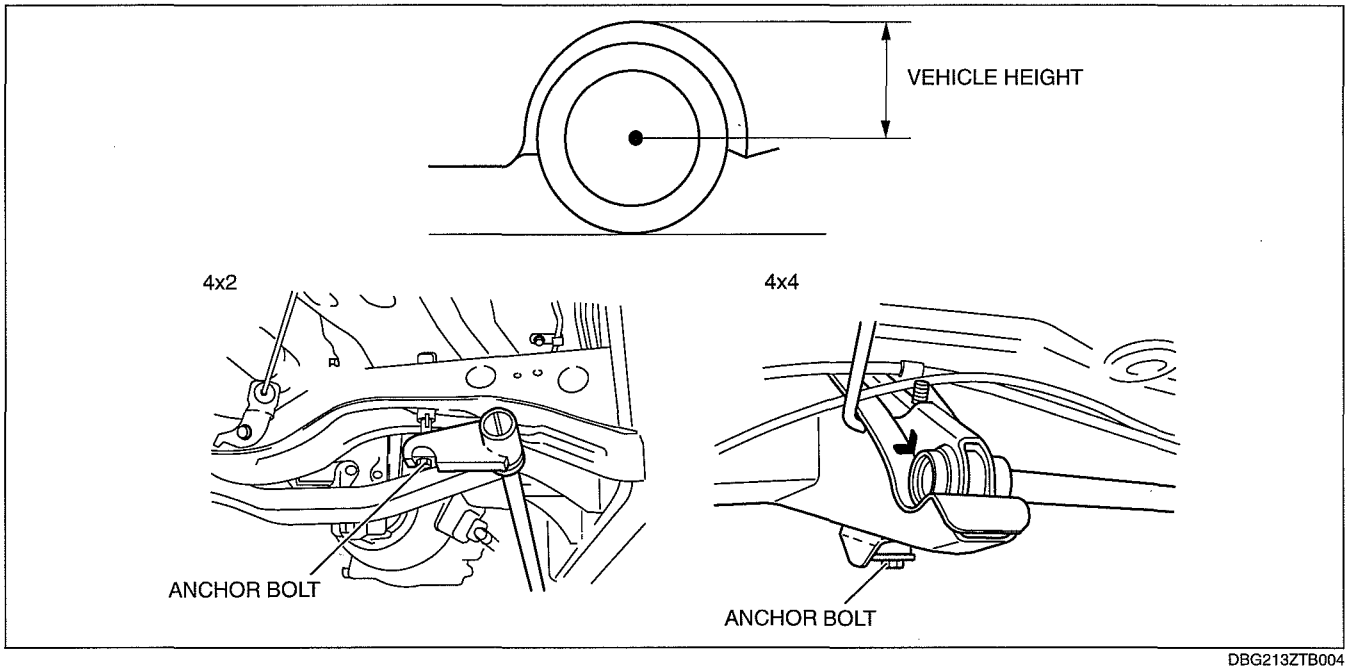
dcf014000000t48

- The PCM calculates the target fuel pressure based on the engine speed and fuel injection amount.
- The PCM operates the fuel metering valve which is installed to the supply pump to adjust the fuel pressure in the common rail to the target fuel pressure.
- By controlling the amount of pumped fuel from the supply pump with the fuel metering valve, the fuel pressure in the common rail is controlled and a constant, optimum injection pressure has been realized.

FRONT SUSPENSION DESCRIPTION

dcf021300000t03

- The vehicle height can be adjusted by turning the torsion bar spring anchor bolt. When adjustment is required, adjust the vehicle height as follows:
  1. Place the vehicle on level ground.
  2. Inspect the front and rear tire pressure and adjust it if necessary.
  3. Measure the distance form the center of each front wheel to the fender brim.
     4x2 (Except Hi-Rider): **416—456 mm {16.4—17.9 in}**
     Hi-Rider: **512—552 mm {20.2—21.7 in}**
     4x4 (Stretch cab (with Rear Access Systetm)): **512—552 mm {20.2—21.7 in}**
     4x4 (Double cab): **502—542 mm {19.8—21.3 in}**
     *Difference between left and right: **10 mm {0.39in} max.**
  4. If the difference between left and right is not within the specification, adjust the vehicle height by turning the torsion bar spring anchor bolt.



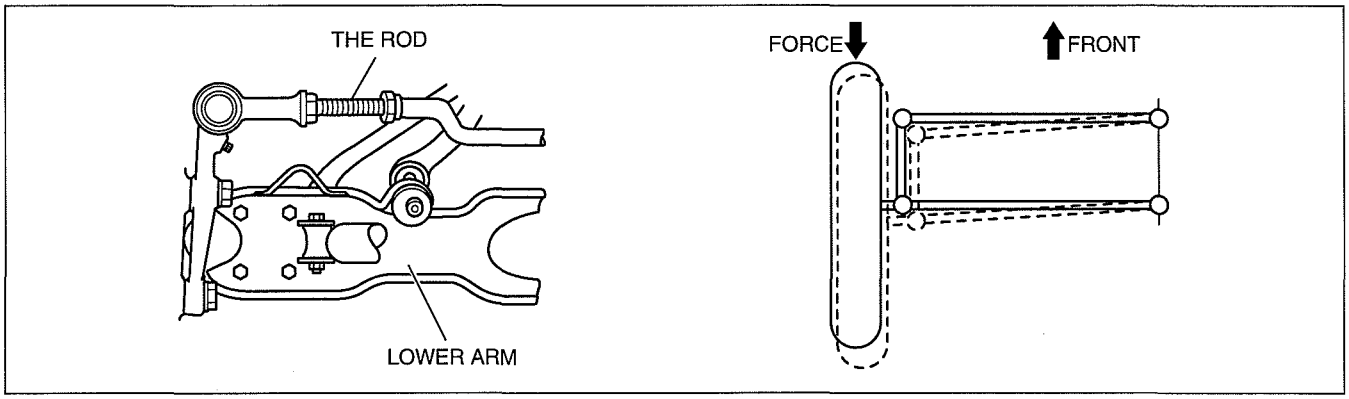
DBG213ZTB004

02

FRONT LOWER ARM AND TIE ROD CONSTRUCTION [4x2 (EXCEPT Hi-Rider)]

dcf021300000t04

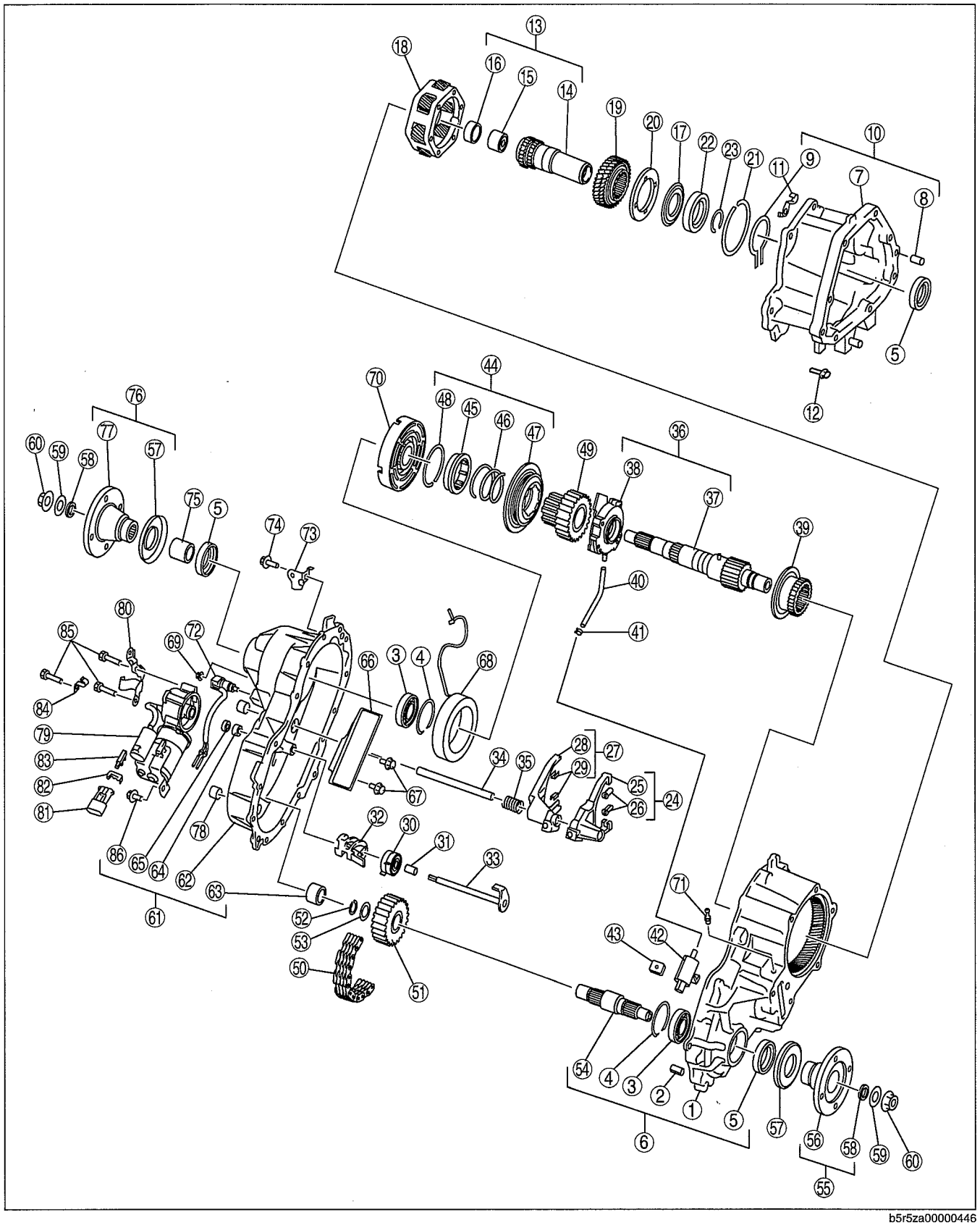
- To prevent shimmy, the lower arm and tie rod are arranged in parallel.



DBG213ZTB005

- By aligning the lower arm and tie rod in parallel, a change in toe-in, which is the cause of shimmy, does not occur.
- The theory of why the tor-in change does not occur is that when force is applied to the tires form the front, they move backward, thus resulting in the rectangle (formed by the links) becoming a parallelogram configuration. As a result, the tires move in parallel to the inside and, although there is a slight change in the vehicle tread width, there is no change in tor-in.

Exploded view

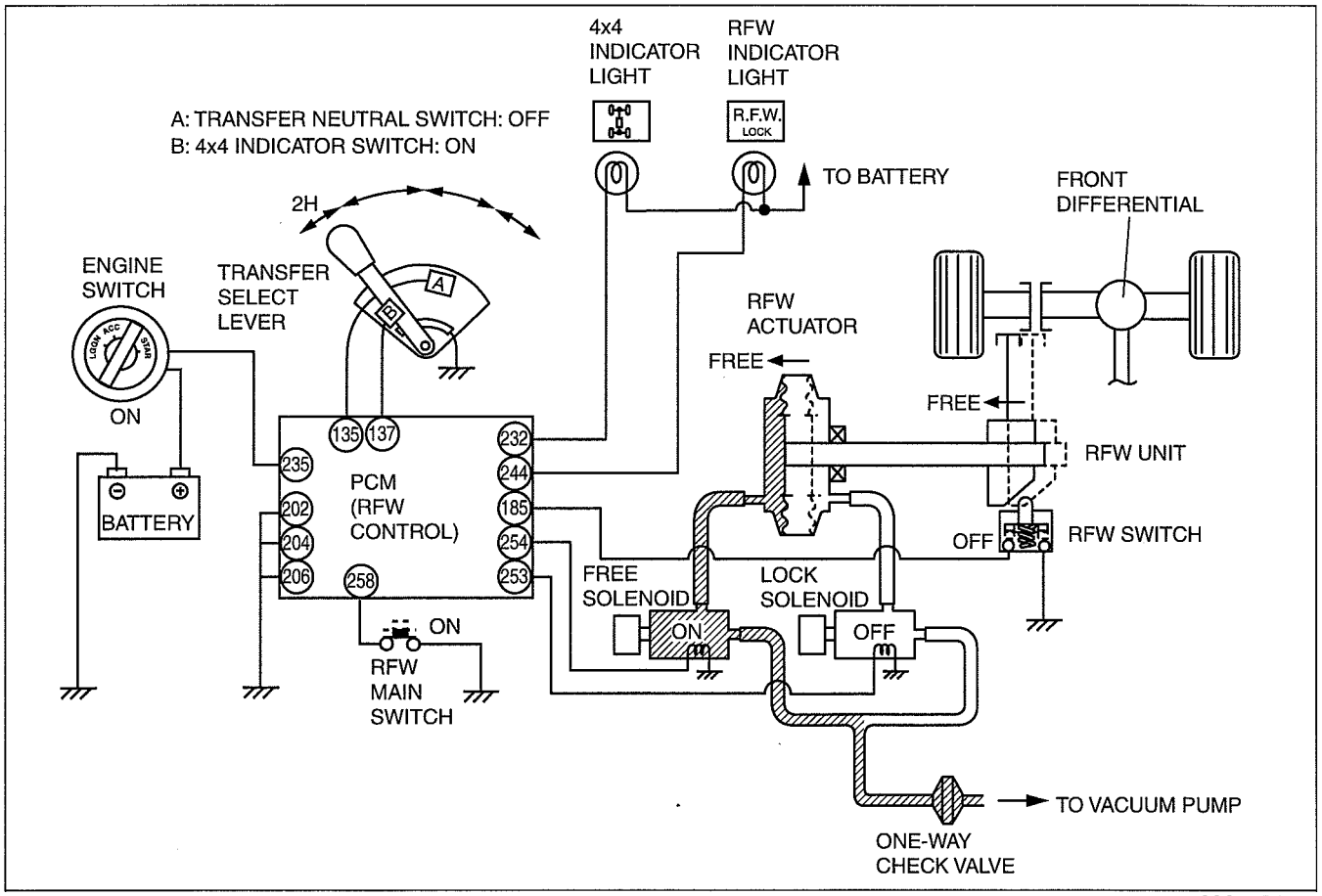


b5r5za00000446

1	Center transfer case
2	Dowel pin
3	Bearing
4	Snap ring
5	Oil seal

6	Center transfer case component
7	Front transfer case
8	Dowel pin
9	Snap ring
10	Front transfer case component

2H (lock) to 2H (free) Selection



DBG314ZTB009

Part name / Condition	Input				Output				RFW actuator Position
	Transfer neutral switch	4x4 indicator switch	RFW switch	RFW main switch	Lock solenoid	Free solenoid	4x4 indicator light	RFW indicator light	
2H-L	OFF	ON	ON	OFF	ON	OFF	OFF	ON	Lock
2H-F_1	OFF	ON	OFF	ON	OFF	ON	OFF	OFF	Free
2H-F	OFF	ON	OFF	-	OFF	ON	OFF	OFF	Free

- When the above condition (2H-L) the RFW main switch is pressed once (ON), condition 2H-F_1 is established, the RFW indicator light is switched OFF, and, same time, the free solenoid is switched ON, and the actuator is pulled to the free side. When the RFW unit becomes fully free, the RFW switch is turned OFF, and 2H-F condition is established.

TRANSMISSION/TRANSAXLE

05
SECTION

05-00 OUTLINE

TRANSMISSION/TRANSAXLE FEATURES [5R55S]

id0500001002f1

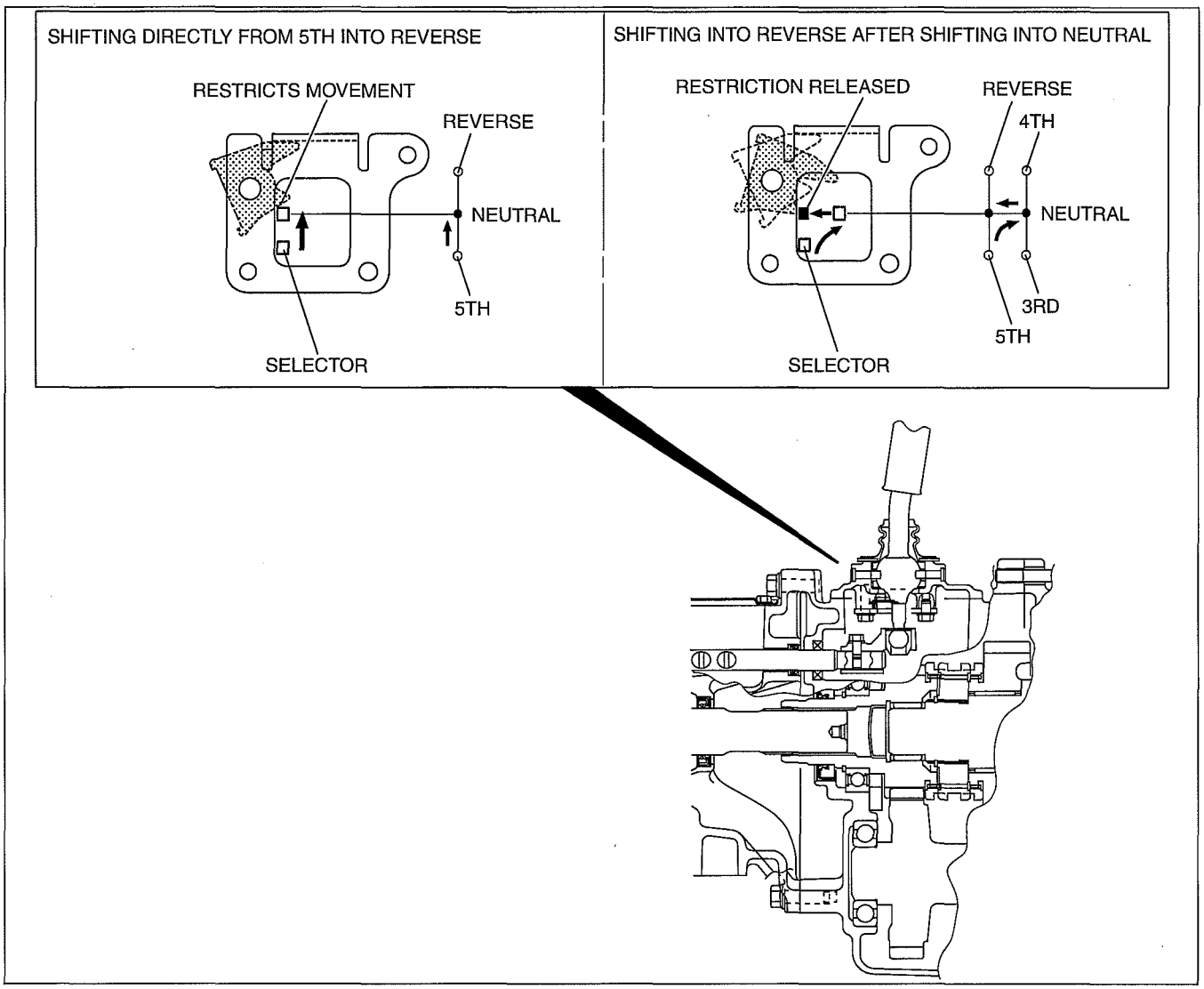
Improved marketability	• Five-speed 5R55S automatic transmission has been adopted. • A water-cooling type and an air-cooling type AT oil cooler has been adopted
Superior shift quality	• Adaptive learn strategy system has been adopted • Engine-transaxle total control system has been adopted

TRANSMISSION/TRANSAXLE SPECIFICATIONS [5R55S]

id0500001006f1

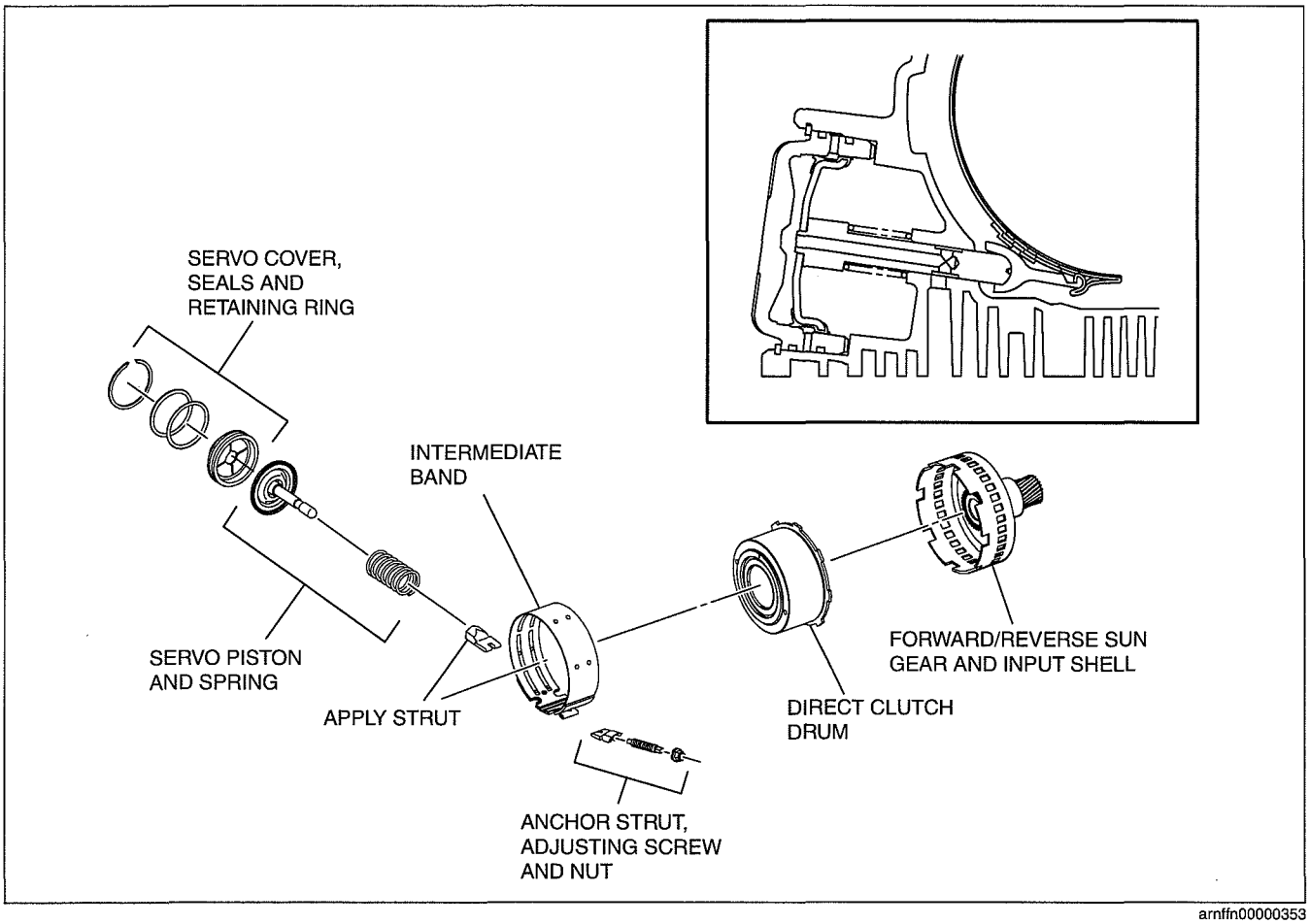
Item			Specification
Transmission type			5R55S
Transmission control			Floor-shift
Gear ratio	1GR		3.22
	2GR		2.29
	3GR		1.55
	4GR		1.00
	5GR		0.71
	Reverse		3.07
ATF	Type		Mercon® V
	Capacity (approx. quantity)	(L {US qt, Imp qt})	9.93 {10.49, 8.74}
Hydraulic system(Number of drive/driven gear plates)	Forward clutch		5/5
	Coast clutch		2/2
	Direct clutch		5/5

S15MX-D


SHIFTING DIRECTLY FROM 5TH INTO REVERSE
RESTRICTS MOVEMENT
REVERSE
NEUTRAL
5TH
SELECTOR
SHIFTING INTO REVERSE AFTER SHIFTING INTO NEUTRAL
RESTRICTION RELEASED
REVERSE
4TH
NEUTRAL
3RD
5TH
SELECTOR
DCG511BTB014

Intermediate Band

- The intermediate band connects the forward/reverse sun gear to the transmission case.
- The intermediate band is applied in 3GR, as well as in manual 3GR.
- During 3GR operation, hydraulic pressure is applied to the intermediate servo.
  - — This pressure causes the servo to move and apply force to the intermediate band.
  - — This action causes the direct clutch drum to be held.
  - — The intermediate band holds the intermediate brake and direct clutch drum to the case in 3GR.
  - — This causes the input shell and forward sun gear to be held stationary.



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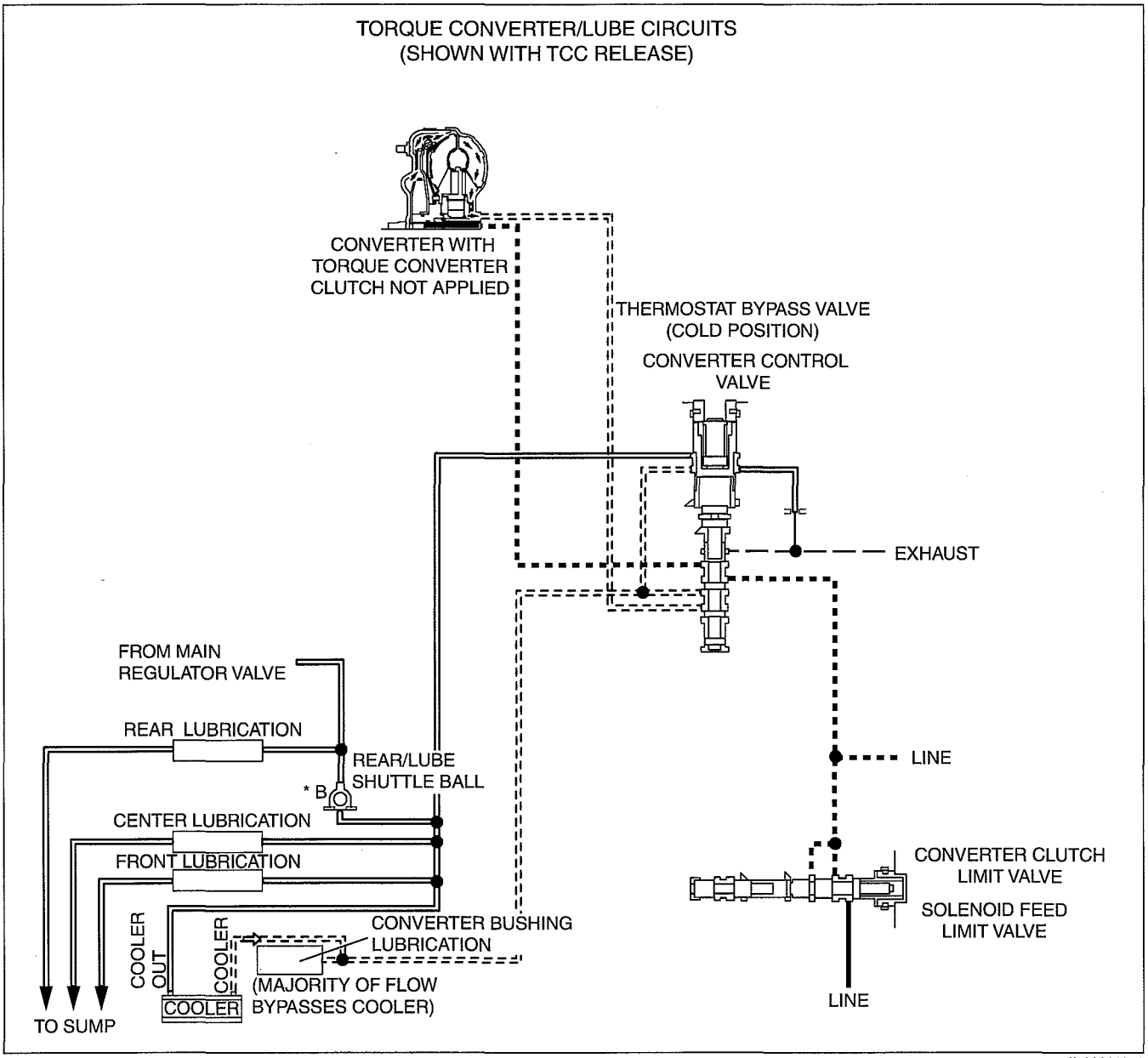
TORQUE CONVERTER/LUBE HYDRAULIC CIRCUITS CONSTRUCTION [5R55S]

id0513c1322000

- In the 5R55S transmission, fluid for torque converter operation flows as follows during TCC release:
  - — From the LINE circuit, through the converter clutch limit valve, through the converter control valve, to the torque converter
  - — From the torque converter, through the converter control valve, into the lube circuits
- The thermostat bypass valve allows fluid from the torque converter to bypass the fluid cooler and enter into the lube circuits when fluid temperature is cold.

TORQUE CONVERTER/LUBE CIRCUITS
(SHOWN WITH TCC RELEASE)



arnffn00000373

06-14 POWER STEERING

POWER STEERING OUTLINE

dcf061400000t01

- With the adoption of an engine speed sensing power steering mechanism, handling stability has been improved.
- With the adoption of a steering column with a tilt mechanism, operability has been improved. (some models)
- With the adoption of a steering shaft with an energy absorbing mechanism, safety has been improved.

09-10 BODY PANELS

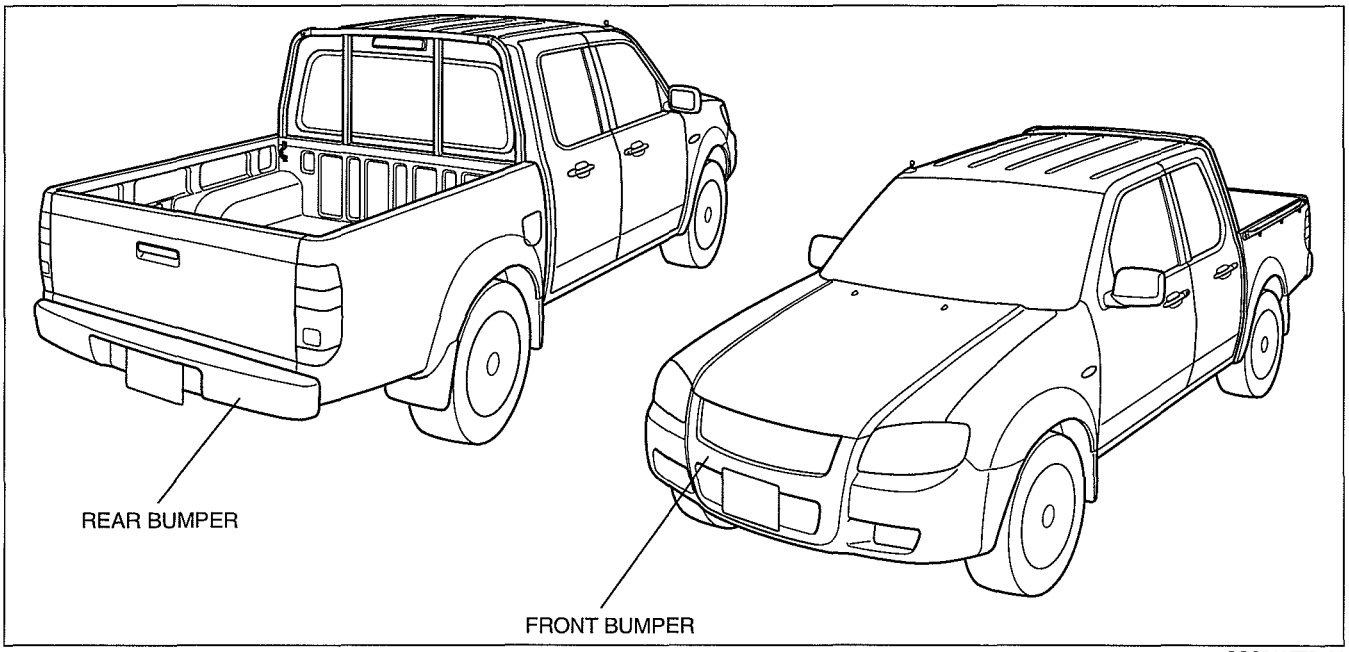
BODY PANEL OUTLINE

dcf091056100t01

- Front and Rear Bumper has been changed.

BODY PANEL STRUCTURAL VIEW

dcf091056100t02



DBG910ZTB001

09-22 INSTRUMENTATION/DRIVER INFO.

INSTRUMENT CLUSTER OUTLINE

dcf092255430t01

- LEDs have been adopted for warning and indicator lights installed on the instrument cluster.
- A flat-type horn has been adopted.

INSTRUMENT CLUSTER SPECIFICATIONS

dcf092255430t02

Instrument Cluster

Item			Specification
Speedometer	Meter type		Stepping motor type
	Indication range	(km/h)	0—180
	Input signal source		Speedometer sensor
	Rated voltage	(V)	DC 12
Tachometer	Meter type		Stepping motor type
	Indication range	(rpm)	0—5,000
	Red zone	(rpm)	4,500—5,000 (WL-3, WL-C) 4,250—5,000(WE-C)
	Input signal source		PCM
	Rated voltage	(V)	DC 12
Fuel gauge	Meter type		Stepping motor type (Reset-to-zero type)
	Input signal source		Fuel gauge sender unit
	Rated voltage	(V)	DC 12
Water temperature gauge	Meter type		Stepping motor type (Medium range stabilized type)
	Input signal source		Water temperature sender unit (WL-3) ECT sensor (WL-C, WE-C)
	Rated voltage	(V)	DC 12
Odometer/ Tripmeter	Display		LCD
	Indication digits		Odometer: 6 digits, Tripmeter: 4 digits
	Rated voltage	(V)	DC 12
Warning alarms	Sound frequency	(Hz)	2,000—2,200
	Output sound pressure level	(dB)	67.5

Clock

Item		Specification
Clock accuracy (Reference value)*	(s/day)	-1.5—1.5

* : If the clock accuracy varies largely from the reference value, battery deterioration or an audio unit (base unit) malfunction may have occurred.

ENGINE

01
SECTION

01

01–10A MECHANICAL [WL-3]

CAMSHAFT END PLAY INSPECTION [WL-3]

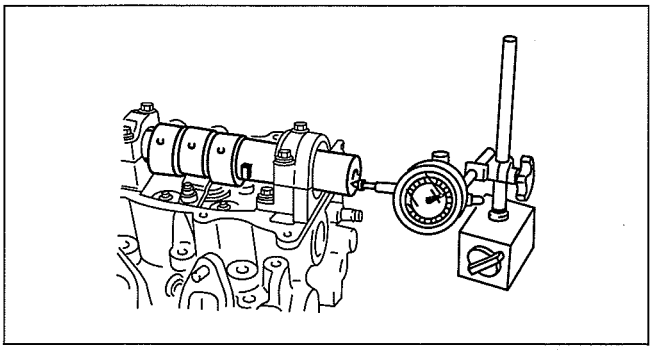
DCF011012420W03

1. Install the camshaft cap. (See 01–10A–49 Camshaft Cap Assembly Note.)
2. Measure the camshaft end play.
   - If it exceeds the maximum specification, replace the cylinder head or camshaft.

Standard camshaft end play
0.030—0.160 mm {0.0012—0.0062 in}

Maximum camshaft end play
0.20 mm {0.0079 in}

3. Remove the camshaft cap. (See 01–10A–7 Camshaft Cap Disassembly Note.)



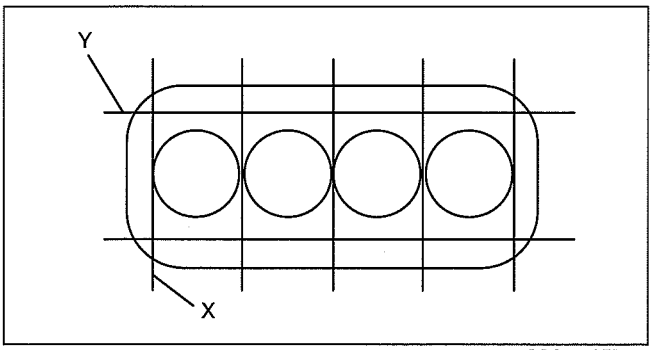
DBG110AEB083

CYLINDER BLOCK INSPECTION/REPAIR [WL-3]

DCF011010300W01

1. Measure the distortion of the cylinder block top surface in the seven directions as shown in the figure.
   - If the distortion exceeds the maximum specification, replace the cylinder head.

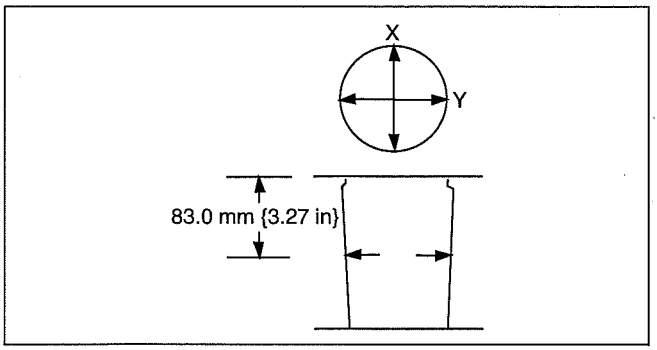
Maximum cylinder block distortion
X direction: 0.02 mm {0.0008 in}
Y direction: 0.05 mm {0.0020 in}



DBG110AEB115

2. Measure the cylinder bore using the cylinder gauge. Measurement positions are in the X and Y directions at **83 mm {3.27 in}** below the top surface of the cylinder.
   - If the cylinder bore exceeds the wear limit, replace the cylinder block or rebore the cylinder and install the oversized pistons so that the specified piston-to-cylinder clearance is obtained.

Note
- Base the boring diameter on the diameter of an oversized piston. All cylinders must be the same diameter.



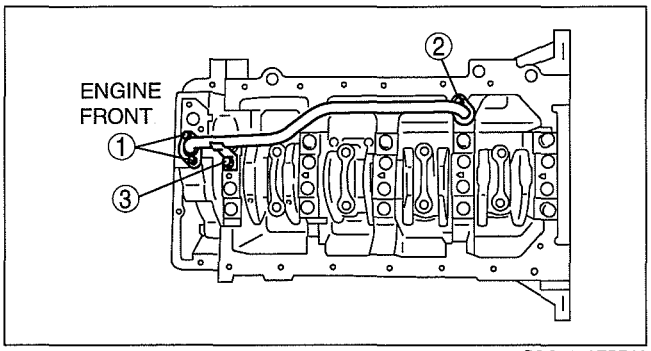
ADA2224ER91

Cylinder bore size
Standard: 93.000—93.022 mm {3.6615—3.6622 in}
0.25 {0.01} oversize: 93.250—93.272 mm {3.6713—3.6721 in}
0.50 {0.02} oversize: 93.500—93.522 mm {3.6811—3.6819 in}

Cylinder bore wear limit
0.15 mm {0.0059 in}

Oil Pipe Assembly Note

1. Tighten the bolts in two or three steps in the order shown in the figure.

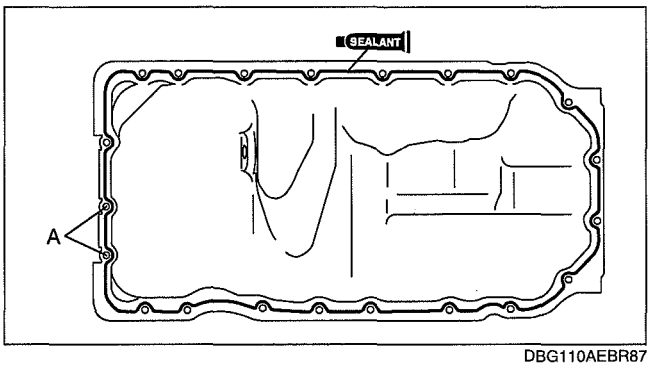


DBG110AEBR89

Oil Pan Assembly Note

1. Apply silicone sealant to the oil pan as shown in the figure.

   Thickness
   ϕ2.0—3.0 mm {0.08—0.118 in}

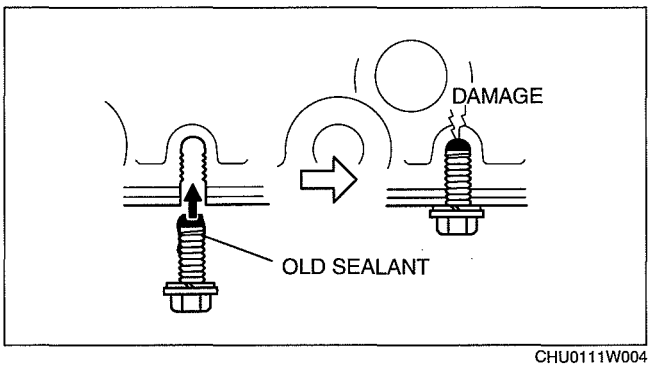


DBG110AEBR87

2. Tighten the oil pan bolts A as shown in the figure.

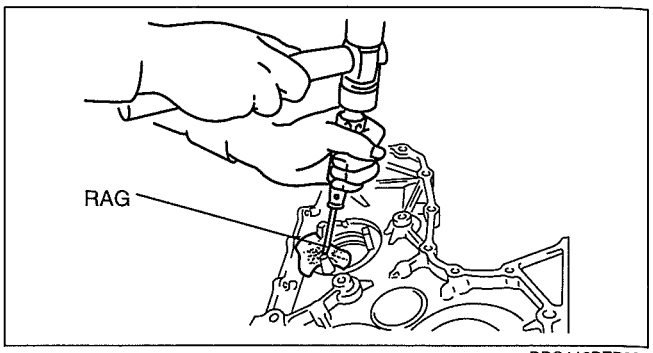
   Caution
   - **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause bolt hole damage.**

3. Tighten the remaining oil pan bolts in several passes.



CHU0111W004

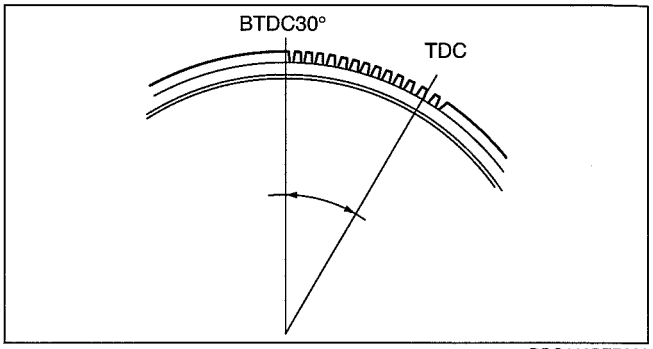
2. Remove the oil seal using a screwdriver protected with a rag,



DBG110BEB088

Supply Pump Gear Disassembly Note

1. Set the No.1 cylinder to TDC of compression.
2. Rotate the flywheel ring gear from TDC to approximately **30°** BTDC (about 13 teeth on the gear).

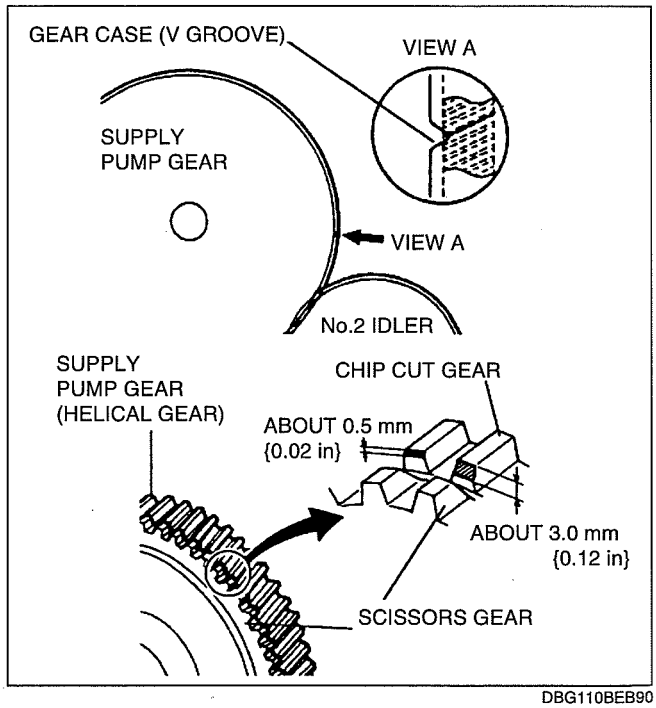


DBG110BEB089

3. Verify that the end-gap (V groove) of the timing gear case and the chip cut gear of the fuel injection pump gear are aligned.

Note

- If the chip cut gear is hard to find, move the supply pump gear on notch back and forth, then check the chip cut gear.



DBG110BEB90

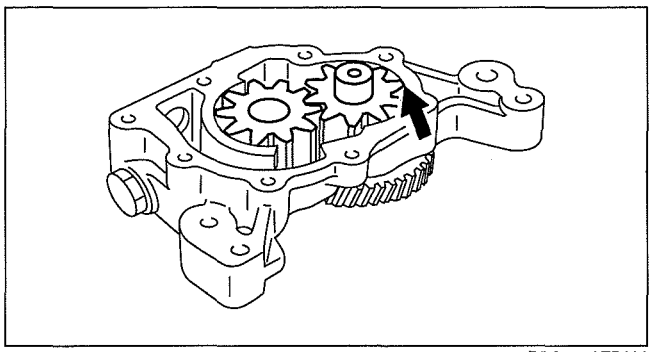
GEAR CLEARANCE INSPECTION [WL-C, WE-C]

DCF011019220W02

1. Measure the following clearance.
   - If it exceeds the maximum specification, replace the gear and/or pump body.

Standard oil pump tip clearance
0.10—0.19 mm {0.0040—0.0074 in}

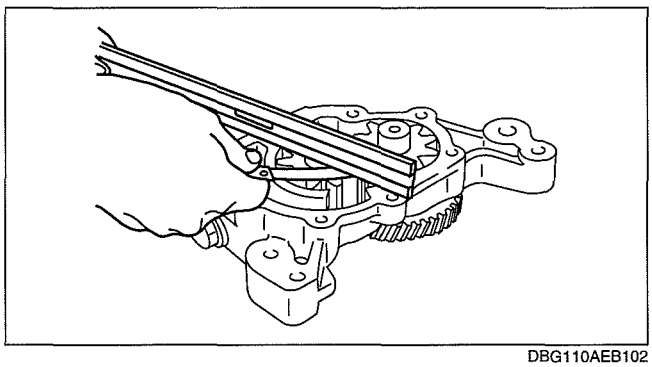
Maximum oil pump tip clearance
0.20 mm {0.008 in}



DBG110AEB101

Standard oil pump side clearance
0.04—0.09 mm {0.0016—0.0035 in}

Maximum oil pump side clearance
0.15 mm {0.0059 in}



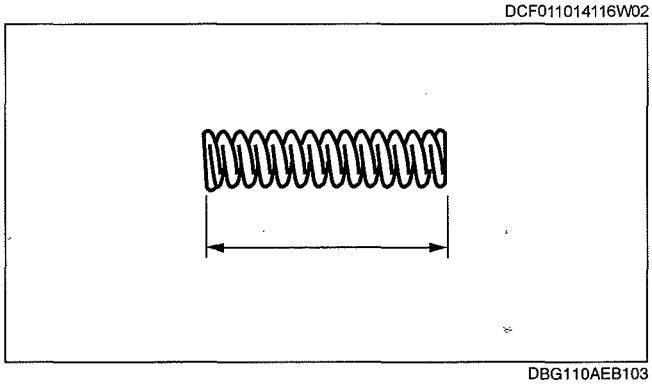
DBG110AEB102

PLUNGER SPRING INSPECTION [WL-C, WE-C]

DCF011014116W02

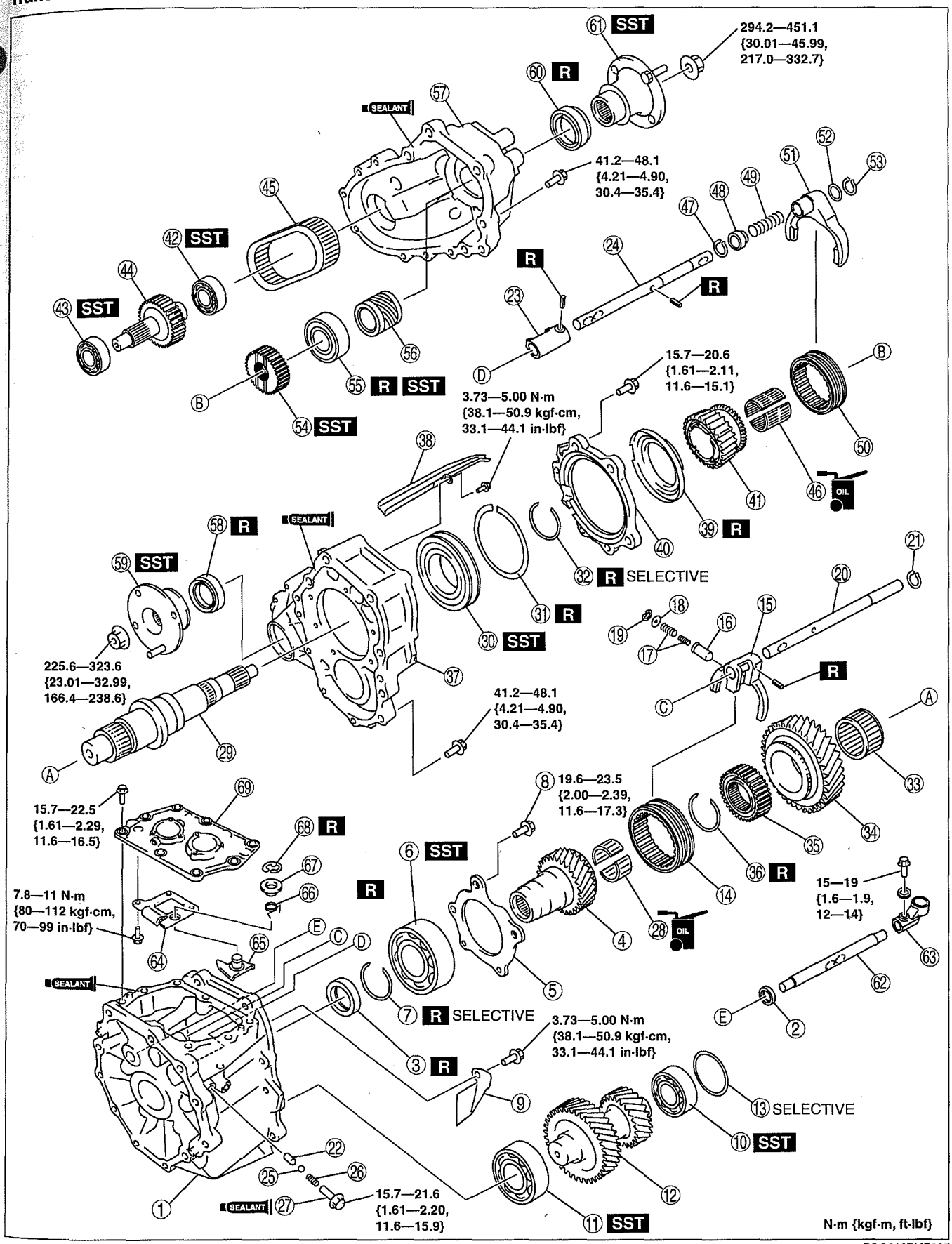
1. Apply pressing force to the pressure spring and check the spring height. Replace the plunger spring if necessary.

Standard plunger spring length
43.8 mm {1.72 in}



DBG110AEB103

Transfer Assembly



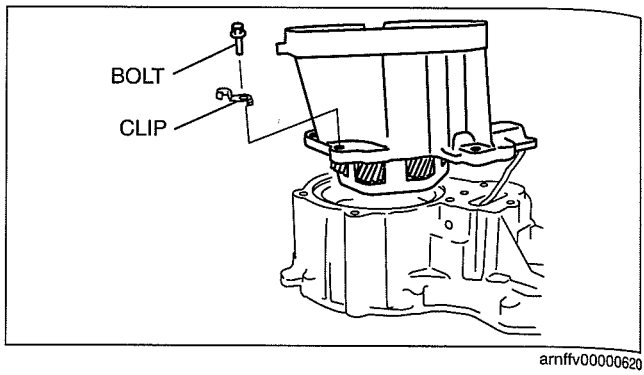
DBG316BMB027

1	Front case

2	Oil seal (control rod) (See 03–16–11 Oil Seal (control rod) Assembly Note.)

49. Remove the front transfer case six bolts.
50. Remove the front transfer case by separating the adapter sealer bond using a flathead screwdriver.

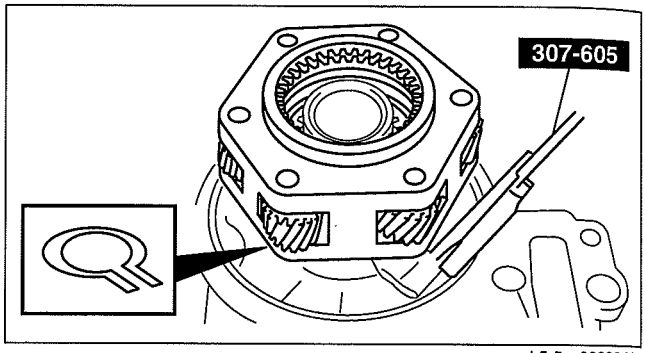
Caution
- **When prying at the transfer case, be careful not to damage the case.**



arnffv00000620

51. Remove the input shaft component and planetary gear component from the front transfer case.

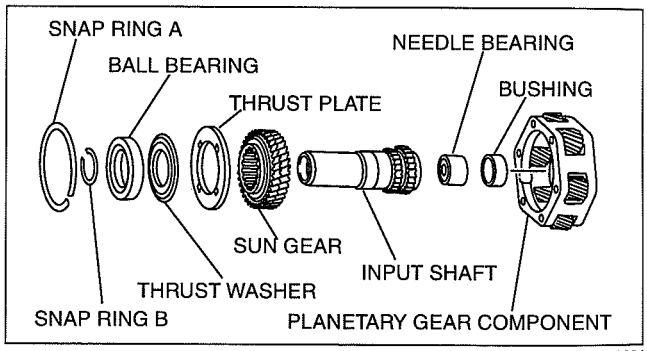
Note
- Expand the snap ring using the **SST**, and separate the planetary gear component and the input shaft component from the front transfer case.



b5r5za00000409

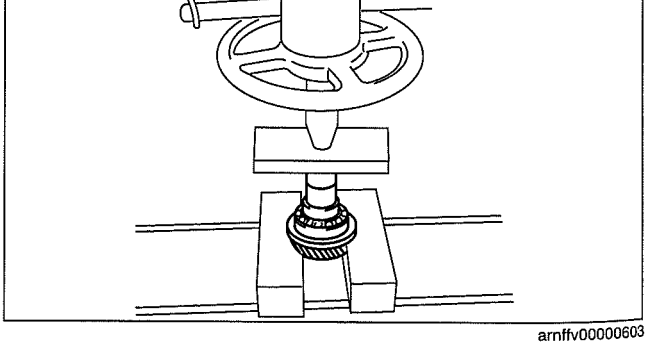
52. Remove the snap ring and oil seal from the front transfer case.

53. Remove the snap ring A.
54. Pull out the input shaft component and sun gear from the planetary gear component.
55. Remove the snap ring B.

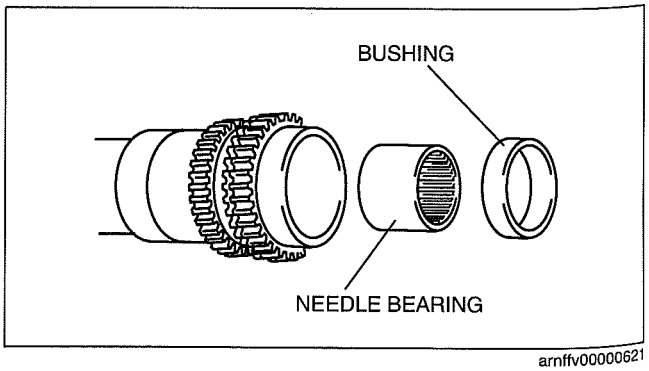


b5r5za00000324

56. Remove the ball bearing, thrust washer, thrust plate and from the input shaft using the press.


arnffv00000603

57. Remove the needle bearing and bushing from the input shaft component.



arnffv00000621

05–11B MANUAL TRANSMISSION [S15M-D, S15MX-D]

PRECAUTION [S15M-D, S15MX-D]

DCF051100000W04

1. Clean the transmission exterior thoroughly using a steam cleaner or cleaning solvents before disassembly.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

Caution
- **Cleaning sealed bearings using cleaning fluids or a steam cleaner can wash the grease out of the bearing.**

2. Clean the removed parts using cleaning solvent, and dry them using compressed air.
3. Clean out all holes and passages using compressed air, and check that there are no obstructions.
4. Make sure each part is cleaned before assembling.
5. Coat all movable parts with the specified oil.
6. Replace parts whenever required.
7. Remove old sealant from contact surfaces before applying new sealant.
8. Assemble the parts within **10 min** after applying sealant. Allow all sealant to cure at least **30 min** after assembling before filling the transmission with transmission oil.

Warning
- **Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transmission is held in a lopsided position on the stand. This would cause the transmission to turn suddenly, causing serious injury. Never keep the transmission tilted to one side. Always hold the rotating handle firmly when turning the transmission.**

Spring

1. Measure the free length of each spring.
   - If not within the specification, replace the spring.

Detent ball springs for 1st/2nd and 3rd/4th shift rods
Standard length: 22.5 mm {0.886 in}

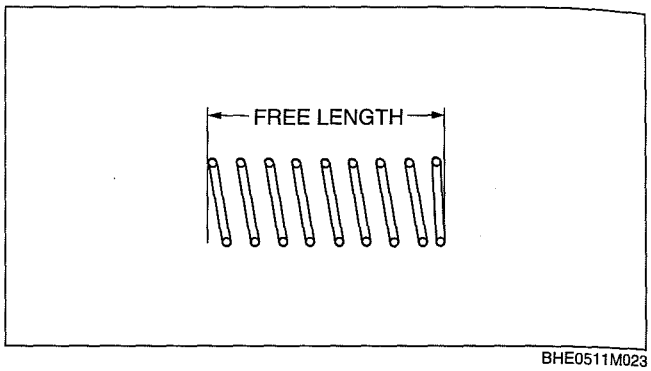
Detent ball spring for 5th/reverse shift rod
Standard length: 24.97 mm {0.9831 in}

1st/2nd select lock spindle spring [4x2]
Standard length: 57.5 mm {2.26 in}

Push pin spring for 1st/2nd shift rod end [4x4]
Standard length: 32.8 mm {1.29 in}

Push pin spring for 5th/reverse shift rod end [4x4]
Standard length: 41.0 mm {1.61 in}

Detent ball spring for 5th/reverse shift rod end [4x4]
Standard length: 24.97 mm {0.9831 in}

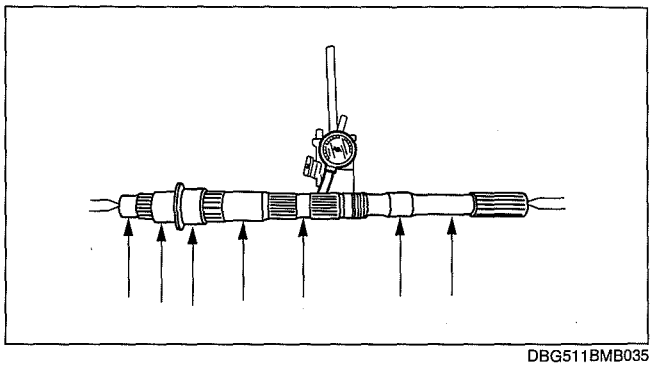


BHE0511M023

Mainshaft

1. Measure the mainshaft runout using a dial gauge.
   - If it exceeds the maximum specification, replace the mainshaft.

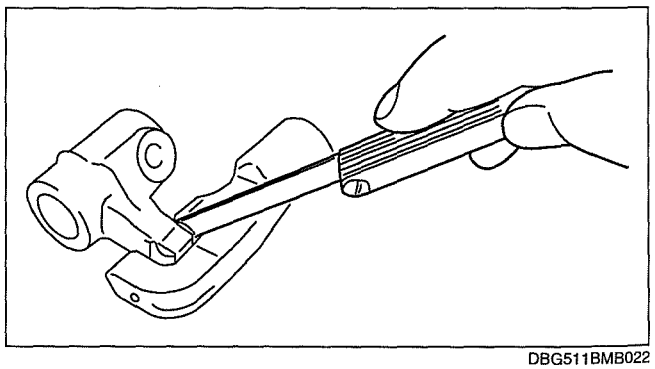
Mainshaft maximum runout
0.03 mm {0.0012 in}


DBG511BMB035

Shift Rod End, Control Lever

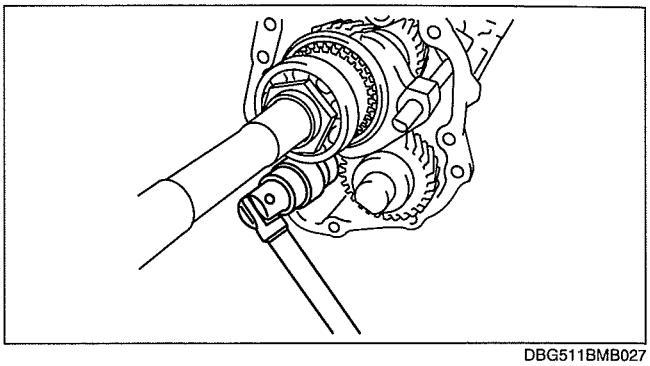
1. Measure the clearance between the shift rod end and control lever using a feeler gauge.
   - If not within the specification, replace the shift rod end or control lever as a set.

Standard clearance between shift rod end and control lever
0.5 mm {0.020 in} or less


DBG511BMB022

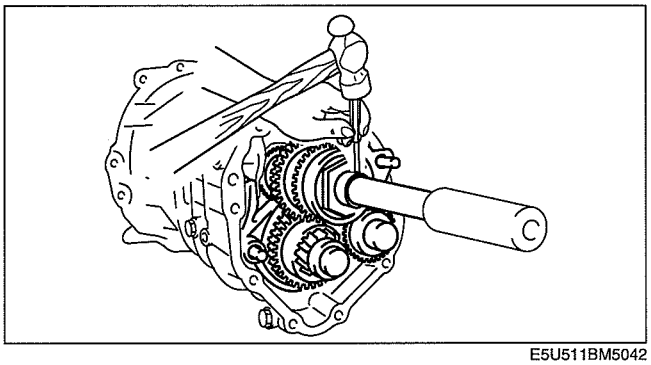
4. Tighten the countershaft locknut in the counterclockwise direction.

   Tightening torque:
   127—196 N·m {13.0—19.9 kgf·m, 94—144 ft·lbf}



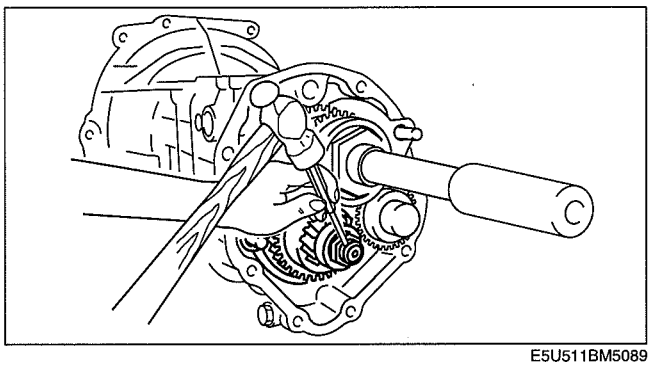
DBG511BMB027

5. Using the pin punch, stake the mainshaft rear bearing locknut.



E5U511BM5042

6. Using the pin punch, stake the countershaft rear bearing locknut.

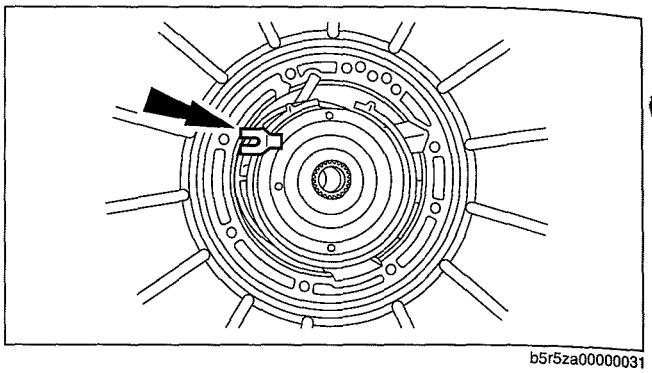


E5U511BM5089

28. Compress the overdrive brake band and remove the apply strut.

Note
- Tag and identify parts for reassembly.

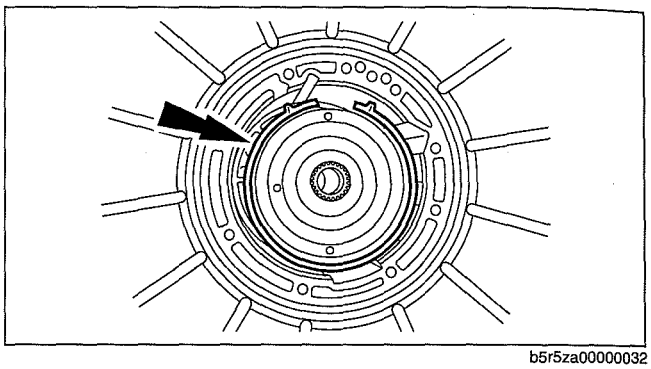
Caution
- **Identify the anchor and apply ends of the overdrive brake band.**



b5r5za00000031

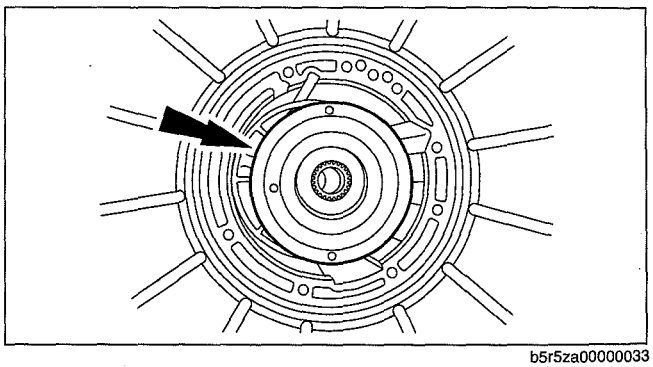
29. Remove and inspect the overdrive brake band. Check the following conditions for installing a new band:
- Inspect for glazing.
- Inspect for missing friction material.
- Inspect for material flaking.
- Inspect for damage to the anchor pins.

Note
- The new overdrive brake band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.


b5r5za00000032

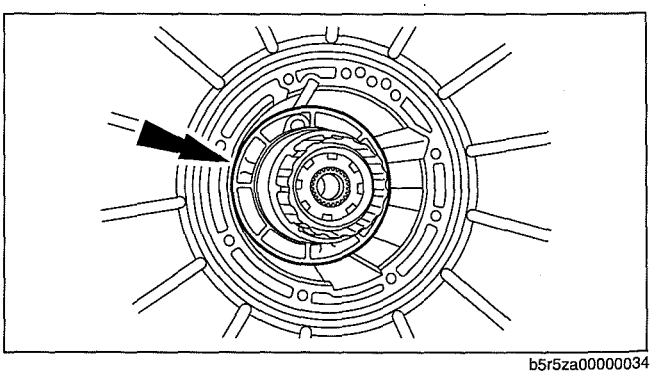
30. Remove the overdrive brake and coast clutch drum component.

Caution
- **Do not bend the trigger wheel.**

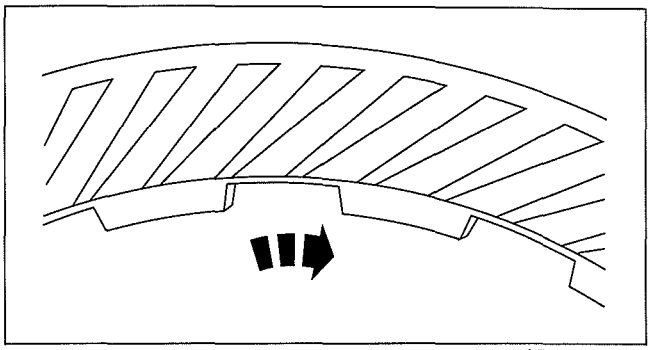

b5r5za00000033

31. Remove the overdrive planetary gear carrier.

Note
- The thrust bearing (No.12) is in this component.


b5r5za00000034

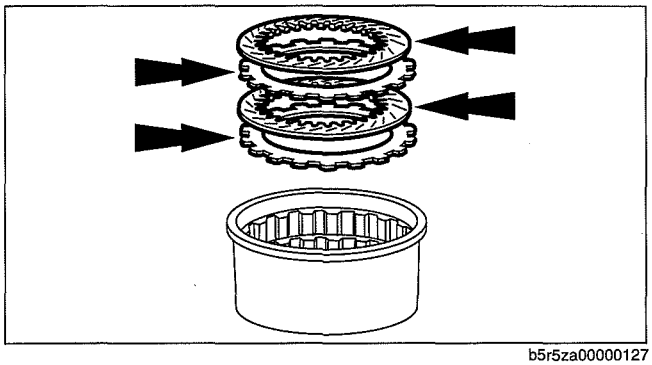
6. When installing friction plates, the word TOP should face up. If reusing plates, grooves must be installed clockwise. Install the coast clutch disc pack.



b5r5za00000126

7. Install the 2 steel clutch plates and 2 friction clutch plates in alternating order starting with a steel clutch plate.

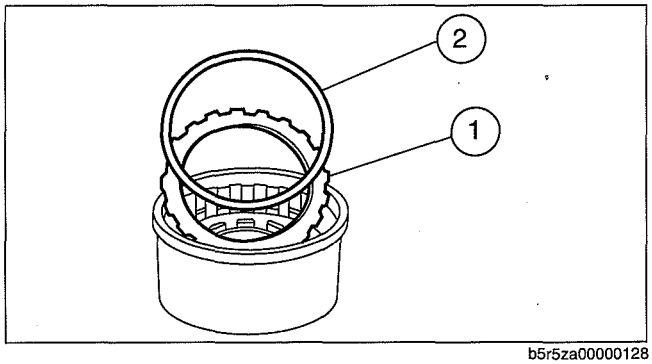
Caution
- **The retaining ring is select fit.**



b5r5za00000127

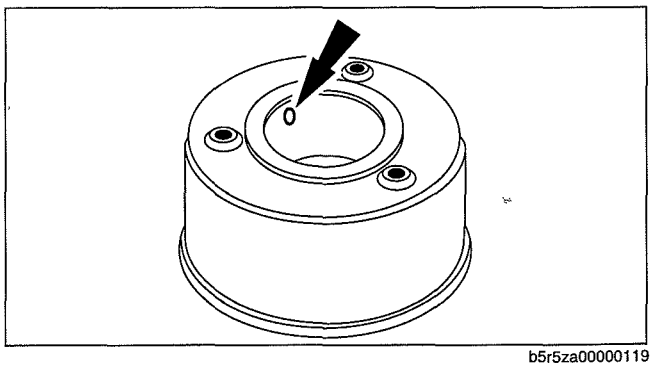
8. Install the coast clutch pressure plate.
   (1) Install the coast clutch pressure plate.
   (2) Install the original retaining ring.

Warning
- **Air pressure must not exceed 138 kPa {1.4 kgf/cm^2, 20 psi}. Wear safety glasses when using compressed air and make sure drum is facing down as shown. Failure to follow these instructions may result in personal injury.**



b5r5za00000128

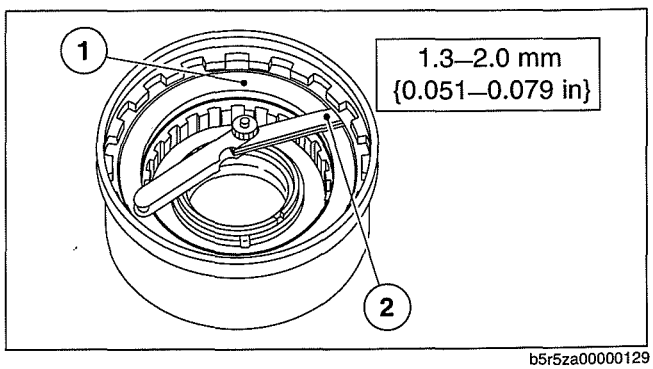
9. Air check the assembly.
   - Apply air pressure to the hole in the drum while blocking the other hole with a finger.



b5r5za00000119

10. Check the coast clutch disc pack free play.
    (1) Push down on the coast pressure plate.
    (2) Check clearance between the coast clutch retaining ring and coast pressure plate. Clearance should be **1.3—2.0 mm {0.051—0.079 in}**. If clearance is not within the specification, install a correct coast clutch retaining ring that will provide the correct free play adjustment.

Coast clutch clearance
Standard: 1.3—2.0 mm {0.051—0.079 in}



b5r5za00000129

CONTROL VALVE BODY DISASSEMBLY/ASSEMBLY[5R55S]

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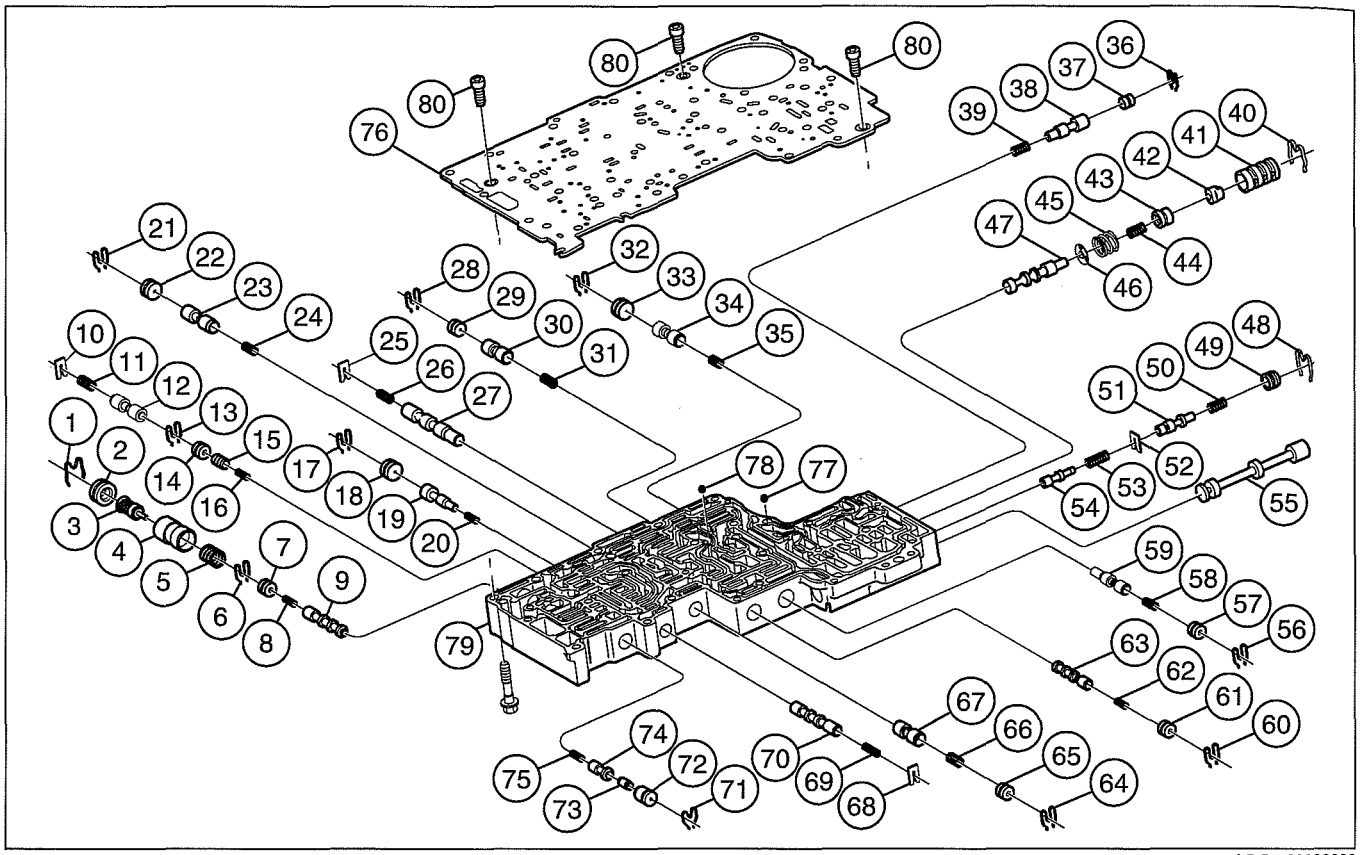


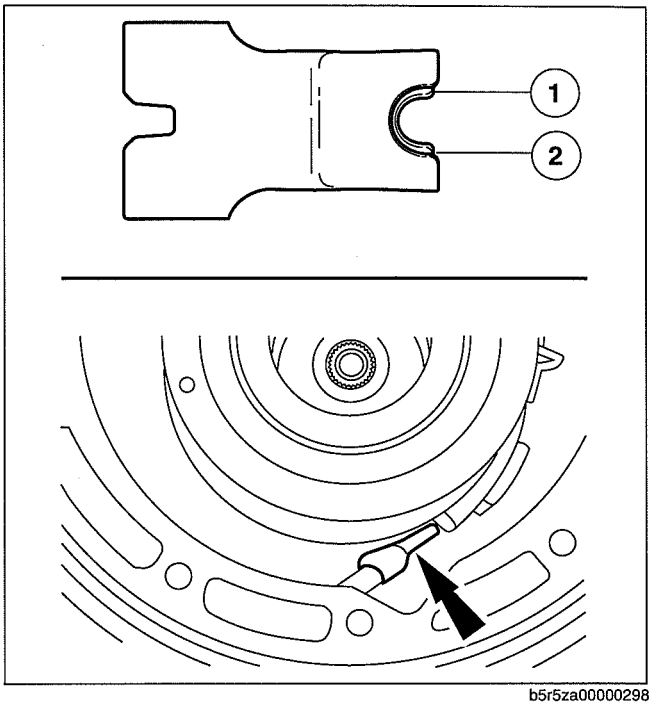
b5r5za00000083

1	Retainer clip
2	Retainer plug
3	Thermo valve component
4	Fluid cooler bypass valve
5	Fluid cooler bypass spring
6	Retainer clip
7	Retainer plug
8	Converter clutch control valve spring
9	Converter clutch control valve
10	Plate
11	Coast clutch control spring
12	Coast clutch control valve
13	Retainer clip
14	Retainer plug
15	Converter clutch back pressure valve
16	Converter clutch back pressure spring
17	Retainer clip
18	Retainer plug
19	VFS2 modulator valve
20	VFS2 modulator valve spring
21	Retainer clip
22	Retainer plug
23	Intermediate servo release valve
24	Intermediate servo release valve spring
25	Plate
26	High clutch control spring
27	High clutch control Valve
28	Retainer plug

29	Retainer clip
30	Reverse modulator valve
31	Reverse modulator valve spring
32	Retainer clip
33	Retainer plug
34	Reverse engagement valve
35	Reverse engagement valve spring
36	Retainer clip
37	Retainer plug
38	VFS1 modulator valve
39	VFS1 modulator valve spring
40	Retainer clip
41	Sleeve
42	Booster valve
43	Booster valve
44	Inner spring
45	Outer spring
46	Retainer spring
47	Main regulator valve
48	Retainer clip
49	Retainer plug
50	Converter limit spring
51	Converter limit valve
52	Plate
53	Solenoid regulator valve spring
54	Solenoid regulator valve
55	Manual valve
56	Retainer clip

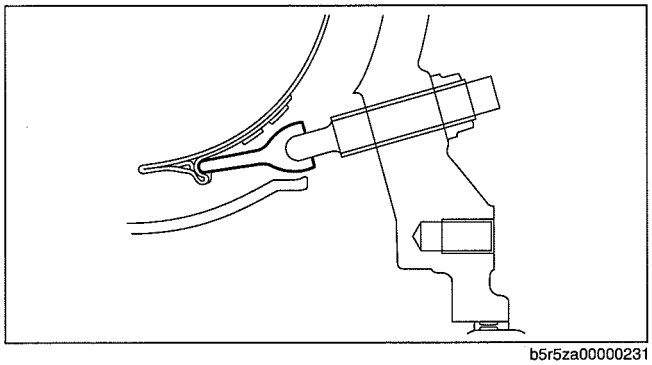
66. Install the overdrive brake band anchor strut.
    (1) Band/case side of anchor (small U notch).
    (2) Main control side of anchor (large U notch).

Caution
- **If the strut is installed incorrectly, transmission damage will occur.**

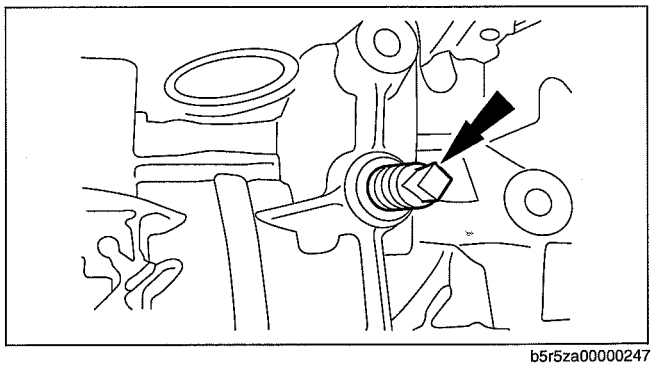


b5r5za00000298

67. Check to make sure that the overdrive brake band anchor strut is installed in the correct orientation to the case and adjustment screw.

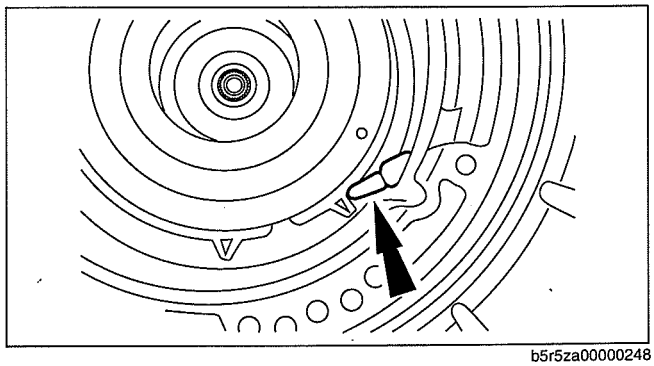

b5r5za00000231

68. Loosely install the screw.


b5r5za00000247

69. Install the overdrive brake band apply strut.

Caution
- **If the strut is installed incorrectly, transmission damage will occur.**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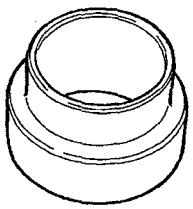
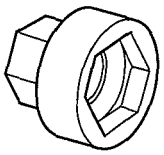
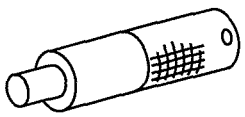
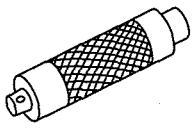
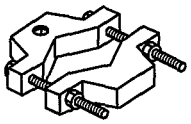
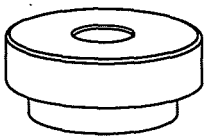
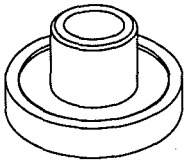
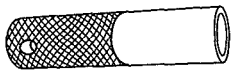
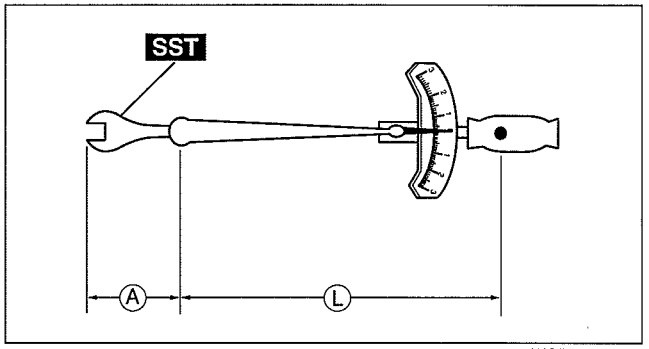
SERVICE TOOLS [S15M-D, S15MX-D]

1:49 F401 337A 2: – Attachment C 	1:49 UN01 011 2:308-168 Socket 	1:49 0636 040 2:– Piston Pin Installer 
1:49 G030 797 2: – Handle 	1:49 F017 1A0 2: – Wrench 	1:49 G030 728 2: – Attachment B 
1:49 H025 001 2: – Installer 	49 B012 004 Valve seal pusher 	–

Torque Formulas

- When using a torque wrench-**SST** or equivalent combination, the specified torque must be recalculated due to the extra length that the **SST** or equivalent adds to the torque wrench. Recalculate the torque by using the following formulas. Choose the formula that applies to you.

Torque Unit	Formula
N·m	N·m × [L/(L+A)]
kgf·m	kgf·m × [L/(L+A)]
kgf·cm	kgf·cm × [L/(L+A)]
ft·lbf	ft·lbf × [L/(L+A)]
in·lbf	in·lbf × [L/(L+A)]



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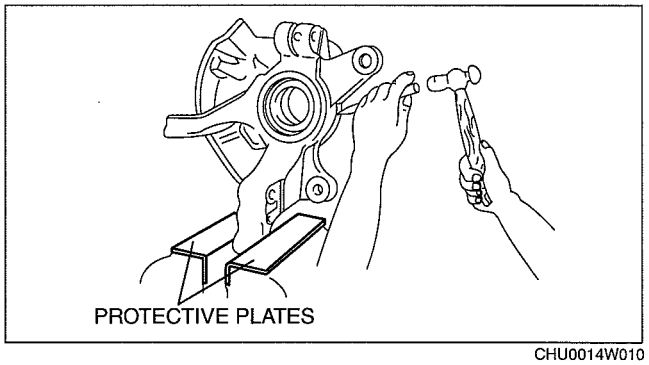
A : The length of the **SST** past the torque wrench drive.
L : The length of the torque wrench.

Vise

- When using a vise, put protective plates in the jaws of the vise to prevent damage to parts.



CHU0014W010

Dynamometer

- When inspecting and servicing the power train on the dynamometer or speedometer tester, pay attention to the following:
  - — Place a fan, preferably a vehicle-speed proportional type, in front of the vehicle.
  - — Make sure the vehicle is in a facility with an exhaust gas ventilation system.
  - — Since the rear bumper might deform from the heat, cool the rear with a fan. (Surface of the bumper must be below **70°C {158°F} degrees**.)
  - — Keep the area around the vehicle uncluttered so that heat does not build up.
  - — Watch the water temperature gauge and do not overheat the engine.
  - — Avoid added load to the engine and maintain normal driving conditions as much as possible.

Note

- When only the front or rear wheels are rotated on a chassis dynamometer or equivalent, the ABS CM determines that there is a malfunction in the ABS and illuminates the following lights:
  - — Vehicles with ABS
    - ABS warning light
    - Brake system warning light
- If the above lights are illuminated, dismount the vehicle from the chassis dynamometer and turn the ignition switch to the LOCK position. Then, turn the ignition switch back to the ON position, run the vehicle at 10 km/h or more and verify that the warning lights go out. In this case, a DTC will be stored in the memory. Clear the DTC from the memory by following the memory clearing procedure [ABS] in the on-board diagnostic system. (See 04-02A-2 ON-BOARD DIAGNOSIS [REAR ABS].)(See 04-02B-2 ON-BOARD DIAGNOSIS [4W-ABS]

Scheduled Maintenance Service (Specific Work Required)

- The specific work required for each maintenance item is listed in the following table. (Please refer to the section applicable to the model serviced.)

Maintenance Item	Specific Work Required
ENGINE	
Engine valve clearance	Inspect engine vale clearance.
Engine timing belt	Replace engine timing belt.
Engine timing belt auto tensioner	Replace engine timing belt auto tensioner.
Drive belts	Inspect for wear, cracks, fraying and tension.
Engine oil	Replace engine oil and inspect for leakage.
Engine oil filter	Replace engine oil filter and inspect for leakage.
COOLING SYSTEM	
Cooling system (Including coolant level adjustment)	Check engine coolant level and quality, and inspect for leakage.
Radiator cap	Inspect radiator cap.
Engine coolant	Replace engine coolant.
FUEL SYSTEM	
Idle speed	Check engine idle rpm.
Idle mixture	Inspect the CO and HC concentrations (see W/M).
Choke system	Check system operation.
Air cleaner element	Inspect dirt, oil and damage. Clean air cleaner element (by blowing air). Replace air cleaner element.
Fuel filter	Replace fuel filter.
Fuel injection pump inlet filter	Clean fuel injection pump inlet filter.
Fuel lines and hoses Fuel lines, hoses and connections	Inspect for cracks, leakage and loose connection.
Fuel injection system	Update to injection amount correction with current diagnostic tool (see W/M).
Fuel system (Drain water)	Drain water in fuel system.
Diesel particulate filter	Replace diesel particulate filter.
Fuel additive for diesel particulate filter	Fill up fuel additive.
IGNITION SYSTEM	
Initial ignition timing	Check initial ignition timing.
Spark plugs	Inspect for wear, damage, carbon, plug gap and high-tension lead condition. Replace spark plugs.
Ignition cables condition/security	Inspect for damage, condition and connection.
EMISSION CONTROL SYSTEM	
Evaporative system Evaporative emission control system	Check system operation (see W/M), vapor lines, vacuum fitting hoses and connection.
Crankcase emission control system	Check system operation (see W/M), PCV valve, blow-by lines, vacuum fitting hoses and connection.
E.G.R system	Check system operation (see W/M), vacuum fitting hoses and connection. MZR-CD (RF turbo) engine: Update to MAF correction for E.G.R control with current diagnostic tool (see W/M).
Air intake system	Update to MAF correction (see W/M).
Throttle positioner system	Check the diaphragm and system operation, vacuum fitting hoses and connection.
Dash pot	Check system operation.
ELECTRICAL SYSTEM	
Battery electrolyte level and specific gravity	Check battery electrolyte level and specific gravity.
Battery condition	Check battery for corroded or loose connections and cracks.
Battery	Check battery for leakage and corrosion.
All electrical system Lighting system and windshield wipers and washer	Check function of lighting system, windshield wiper (including wiper blade condition), washer and power windows.
Head light alignment	Check head light alignment.
CHASSIS AND BODY	
Brake and clutch pedals Brake pedals	Check pedal height and free play.

DTC P0016 [WL-C, WE-C]

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DTC P0016	CKP-CMP correlation
DETECTION CONDITION	• The PCM monitors the input pulses from the CKP and CMP sensors. If the pick-up timing input pulses do not match each other, the PCM determines that the camshaft position does not coincide with the crankshaft position.
POSSIBLE CAUSE	• Poor connection of connector • CMP sensor malfunction • CKP sensor malfunction • Damaged or scratched CMP sensor pulse wheel • Damaged or scratched CKP sensor pulse wheel • Foreign material on CMP sensor • Foreign material on CKP sensor • Improper valve timing

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform the repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT CMP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the CMP sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 13.
		No	Go to the next step.
4	**INSPECT CMP SENSOR FOR FOREIGN MATERIAL** • Remove the CMP sensor. • Inspect the CMP sensor for foreign material. • Is there any foreign material on the CMP sensor?	Yes	Remove foreign material from the CMP sensor, then go to Step 13.
		No	Go to the next step.
5	**INSPECT CMP SENSOR PULSE WHEEL** • Visually inspect the CMP sensor pulse wheel. • Is there any damage or scratching to the CMP sensor pulse wheel?	Yes	Replace the camshaft, then go to Step 13. (See 01-10B-9 CYLINDER HEAD GASKET REPLACEMENT [WL-C, WE-C].)
		No	Go to the next step.
6	**INSPECT CMP SENSOR** • Inspect the CMP sensor. (See 01-40B-37 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [WL-C, WE-C].) • Is the CMP sensor normal?	Yes	Go to the next step.
		No	Replace the CMP, then go to Step 13. (See 01-40B-36 CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [WL-C, WE-C].)
7	**INSPECT CKP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the CKP sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 13.
		No	Go to the next step.
8	**INSPECT CKP SENSOR FOR FOREIGN MATERIAL** • Remove the CKP sensor. • Inspect the CKP sensor for foreign material. • Is there any foreign material on the CKP sensor?	Yes	Remove foreign material from the CKP sensor, then go to Step 13.
		No	Go to the next step.
9	**INSPECT CKP SENSOR PULSE WHEEL** • Visually inspect the CKP sensor pulse wheel. • Is there any damage or scratching to the CKP sensor pulse wheel?	Yes	Replace the CKP sensor pulse wheel, then go to Step 13. (See 01-10B-7 TIMING BELT REMOVAL/INSTALLATION [WL-C, WE-C].)
		No	Go to the next step.

STEP	INSPECTION		ACTION
3	**VERIFY CURRENT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the current diagnostic tool to the DLC-2. • Clear the DTC from the PCM memory using the current diagnostic tool. • Start the engine. • Is the same DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Perform the "INTERMITTENT CONCERN TROUBLESHOOTING". (See 01-03B-60 INTERMITTENT CONCERN TROUBLESHOOTING [WL-C, WE-C].)
4	**CLASSIFY 5V CONSTANT VOLTAGE CIRCUIT OR OTHER RELATED MALFUNCTION** • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the boost sensor/IAT sensor No.1 terminal C (wiring harness-side) and body ground. • Is the voltage **5 V constant voltage** ?	Yes	Go to Step 11.
		No	Go to the next step.
5	**CLASSIFY 5V CONSTANT VOLTAGE CIRCUIT OR BOOST SENSOR/IAT SENSOR NO.1 RELATED MALFUNCTION** • Disconnect the boost sensor/IAT sensor No.1 connector. • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the boost sensor terminal C (wiring harness-side) and body ground. • Is the voltage **5 V constant voltage** ?	Yes	Go to Step 9.
		No	Go to the next step.
6	**INSPECT BOOST SENSOR 5V CONSTANT VOLTAGE CIRCUIT FOR SHORT TO GROUND** • Turn the engine switch off. • Inspect for continuity between the boost sensor/IAT sensor No.1 terminal C (wiring harness-side) and body ground • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to ground, then go to Step 17.
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 17.
		No	Go to the next step.
8	**INSPECT BOOST SENSOR 5V CONSTANT VOLTAGE CIRCUIT FOR OPEN** • Turn the engine switch off. • Inspect for continuity between the boost sensor/IAT sensor No.1 terminal C (wiring harness-side) and PCM terminal 133 (wiring harness-side). • Is there continuity?	Yes	Repair or replace the wiring harness for an open circuit, then go to Step 17.
		No	Go to Step 17.
9	**INSPECT BOOST SENSOR/IAT SENSOR NO.1 CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the boost sensor/IAT sensor No.1 connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 17.
		No	Go to the next step.
10	**INSPECT BOOST SENSOR** • Inspect the boost sensor/IAT sensor No.1. (See 01-40B-27 BOOST SENSOR INSPECTION [WL-C, WE-C].) • Is there any malfunction?	Yes	Replace the boost sensor/IAT sensor No.1, then go to Step 17.
		No	Go to Step 17.

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CURRENT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the current diagnostic tool to the DLC-2. • Clear the DTC from the PCM memory using the current diagnostic tool. • Start the engine. • Is the same DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Perform the "INTERMITTENT CONCERN TROUBLESHOOTING". (See 01-03B-60 INTERMITTENT CONCERN TROUBLESHOOTING [WL-C, WE-C].)
4	**INSPECT FUEL TEMPERATURE SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the fuel temperature sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
5	**INSPECT FUEL TEMPERATURE SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the engine switch to the ON position (Engine off). • Measure the voltage between fuel temperature sensor terminal A (wiring harness-side) and body ground. • Is the voltage **more than 4.9 V**?	Yes	Repair or replace the wiring harness for a possible short to power supply, then go to Step 9.
		No	Go to the next step.
6	**INSPECT FUEL TEMPERATURE SENSOR** • Inspect the fuel temperature sensor. (See 01-40B-32 FUEL TEMPERATURE SENSOR INSPECTION [WL-C, WE-C].) • Is there any malfunction?	Yes	Replace the fuel temperature sensor, then go to Step 9.
		No	Go to the next step.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 9.
		No	Go to the next step.
8	**INSPECT FUEL TEMPERATURE SENSOR CIRCUIT FOR OPEN CIRCUIT** • Turn the engine switch off. • Inspect for continuity between the following terminals: — Fuel temperature sensor terminal A (wiring harness-side) and PCM terminal 115 (wiring harness-side) — Fuel temperature sensor terminal B (wiring harness-side) and PCM terminal 170 (wiring harness-side) • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for a possible open circuit, then go to the next step.

STEP	INSPECTION		ACTION
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion) • Is there any malfunction?	Yes	Repair or replace the terminal, then go to step 10.
		No	Repair or replace the wiring harness for an open circuit, then go to Step 10.
8	**INSPECT IDLE SWITCH GROUND CIRCUIT FOR OPEN CIRCUIT** • Turn the engine switch off. • Inspect for continuity between APP sensor terminal B and body ground. • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness for an open circuit, then go to Step 10.
9	**INSPECT IDLE SWITCH** • Inspect idle switch. (See 01-40B-30 IDLE SWITCH INSPECTION [WL-C, WE-C].) • Is there any malfunction?	Yes	Replace the idle switch, then go to the next step. (See 01-13B-11 ACCELERATOR PEDAL COMPONENT REMOVAL/INSTALLATION [WL-C, WE-C].)
		No	Adjust the accelerator pedal, then go to the next step. (See 01-13B-12 ACCELERATOR PEDAL ADJUSTMENT [WL-C, WE-C].)
10	**VERIFY TROUBLESHOOTING OF DTC P0227 COMPLETED** • Turn the engine switch off. • Make sure to reconnect all disconnected connectors. • Turn the engine switch to the ON position (Engine off). • Clear the DTC from the memory using the current diagnostic tool. • Run the vehicle under the FREEZE FRAME DATA stored condition. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01-40B-9 PCM REMOVAL/INSTALLATION [WL-C, WE-C].)
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01-02B-10 AFTER REPAIR PROCEDURE [WL-C, WE-C].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See 01-02B-11 DTC TABLE [WL-C, WE-C].)
		No	DTC troubleshooting completed.

DTC P0228 [WL-C, WE-C]

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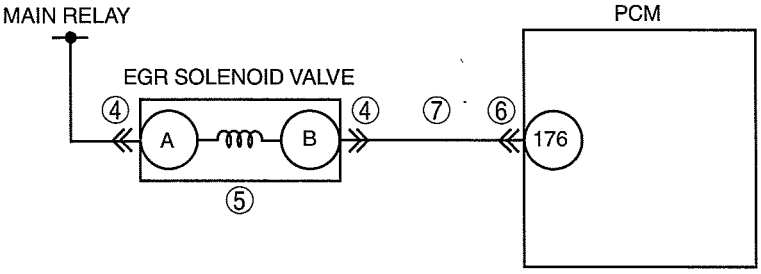
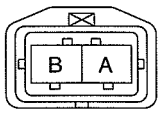
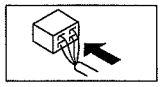
DTC P0228	Idle switch circuit high input
DETECTION CONDITION	• The PCM monitors the input voltage from APP sensor No.1 when the idle switch is on. If the input voltage is **more than 1.35 V for 1.5 s**, the PCM determines that the idle switch circuit has a malfunction.
POSSIBLE CAUSE	• Idle switch malfunction. • Accelerator pedal misadjustment. • Short to ground in wiring harness between idle switch terminal A and PCM terminal 161 • PCM malfunction

DTC P0490	EGR solenoid valve control circuit high input

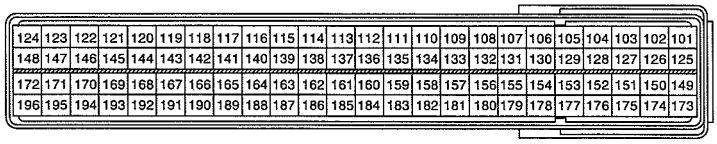


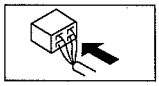
EGR SOLENOID VALVE
WIRING HARNESS-SIDE CONNECTOR





PCM
WIRING HARNESS-SIDE CONNECTOR



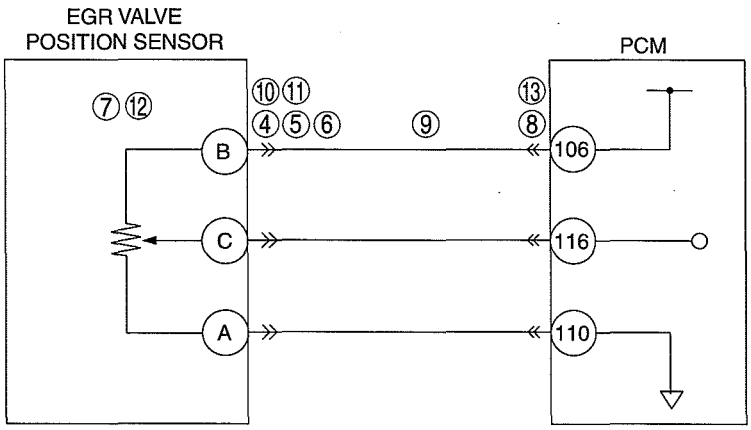


Diagnostic procedure

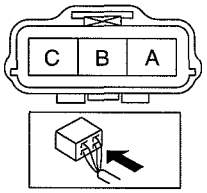
STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CURRENT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the current diagnostic tool to the DLC-2. • Clear the DTC from the PCM memory using the current diagnostic tool. • Run the vehicle under the FREEZE FRAME DATA stored condition. • Is the same DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Perform the "INTERMITTENT CONCERNS TROUBLESHOOTING". (See 01-03B-60 INTERMITTENT CONCERN TROUBLESHOOTING [WL-C, WE-C].)
4	**INSPECT EGR SOLENOID VALVE CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the EGR solenoid valve connector. • Inspect for poor connection (damaged/pulled-out pins, corrosion, etc.). • Is there malfunction?	Yes	Repair or replace the terminal, then go to Step 8.
		No	Go to the next step.
5	**INSPECT EGR SOLENOID VALVE MALFUNCTION** • Perform EGR solenoid valve inspection. (See 01-16B-5 EGR SOLENOID VALVE INSPECTION [WL-C, WE-C].) • Is the EGR solenoid valve normal?	Yes	Go to the next step.
		No	Replace the EGR solenoid valve, then go to Step 8.
6	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the PCM connector. • Inspect for poor connection at terminal 176. (such as damaged/pulled-out pins, corrosion). • Is there malfunction?	Yes	Repair the terminal, then go to Step 8.
		No	Go to the next step.

STEP	INSPECTION		ACTION
4	**CLASSIFY CMP SENSOR OR APP SENSOR RELATED MALFUNCTION** • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the CMP sensor terminal C (wiring harness-side) and body ground. • Is the voltage **4.9 V or less** ?	Yes	Go to the next step.
		No	Go to Step 10.
5	**INSPECT CMP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the CMP sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 15.
		No	Go to the next step.
6	**CLASSIFY CMP SENSOR OR HARNESS RELATED MALFUNCTION** • Disconnect the CMP sensor connector. • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the CMP sensor terminal C (wiring harness-side) and body ground. • Is the voltage **4.9 V or less** ?	Yes	Go to the next step.
		No	Go to Step 9.
7	**INSPECT PCM CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 15.
		No	Go to the next step.
8	**INSPECT CMP SENSOR CIRCUIT FOR SHORT TO GROUND** • Turn the engine switch off. • Inspect for continuity between the CMP sensor terminal C (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness for a possible short to ground, then go to Step 15.
		No	Go to Step 15.
9	**INSPECT CMP SENSOR** • Inspect the CMP sensor. (See 01-40B-37 CAMSHAFT POSITION (CMP) SENSOR INSPECTION [WL-C, WE-C].) • Is there any malfunction?	Yes	Replace the CMP sensor, then go to Step 15.
		No	Go to Step 15.
10	**INSPECT APP SENSOR CONNECTOR FOR POOR CONNECTION** • Turn the engine switch off. • Disconnect the APP sensor connector. • Inspect for poor connection (such as damaged/ pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the terminal, then go to Step 15.
		No	Go to the next step.
11	**CLASSIFY APP SENSOR OR HARNESS RELATED MALFUNCTION** • Disconnect the APP sensor connector. • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the APP sensor terminal A (wiring harness-side) and body ground. • Is the voltage **4.9 V or less** ?	Yes	Go to the next step.
		No	Go to Step 14.

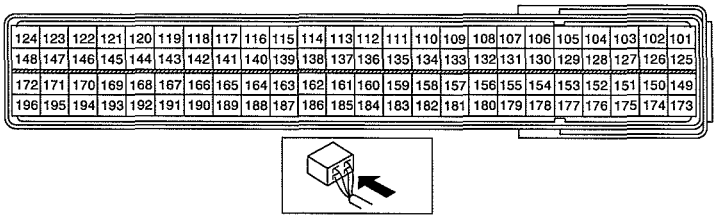
DTC P0699	EGR valve position sensor 5 V circuit high input



EGR VALVE POSITION SENSOR
WIRING HARNESS-SIDE CONNECTOR



PCM
WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CURRENT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the current diagnostic tool to the DLC-2. • Clear the DTC from the PCM memory using the current diagnostic tool. • Run the vehicle under the FREEZE FRAME DATA stored condition. • Is the same DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Perform the "INTERMITTENT CONCERNS TROUBLESHOOTING". (See 01-03B-60 INTERMITTENT CONCERN TROUBLESHOOTING [WL-C, WE-C].)
4	**CLASSIFY EGR POSITION SENSOR OPEN CIRCUIT OR SHORT CIRCUIT RELATED MALFUNCTION** • Turn the engine switch to the ON position (Engine off). • Measure the voltage between the EGR position sensor connector terminal B and body ground. • Is the voltage **5.1 V or more** ?	Yes	Go to step 10
		No	Go to the next step.
5	**INSPECT POOR CONNECTION OF EGR POSITION SENSOR CONNECTOR** • Turn the engine switch off. • Disconnect the EGR position sensor connector. • Inspect for poor connection (damaged, pulled-out terminals, corrosion, etc.). • Is there a malfunction?	Yes	Repair or replace the terminals, then go to Step 14.
		No	Go to the next step.

DTC P2146 [WL-C, WE-C]

dcf010202100w06

DTC P2146	Fuel injector No.1 and No.4 power supply circuit malfunction
DETECTION CONDITION	• The PCM monitors the fuel injector No.1 and No.4 power supply voltage when the engine is running. If the following conditions are detected 5 times, the PCM determines that the fuel injector No.1 and No.4 power supply circuit has a malfunction. — Fuel injector No.1 and No.4 power supply voltage is **less than 43 V** — Fuel injector No.1 and No.4 power supply voltage is **53 V or above**
POSSIBLE CAUSE	• PCM malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related service repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**VERIFY CURRENT SIGNAL STATUS: IS CONCERN INTERMITTENT OR CONSTANT?** • Connect the current diagnostic tool to the DLC-2. • Clear the DTC from the PCM memory using the current diagnostic tool. • Start the engine. • Is the same DTC present?	Yes	Go to the next step.
		No	Intermittent concern exists. Perform the "INTERMITTENT CONCERN TROUBLESHOOTING".
4	**VERIFY TROUBLESHOOTING OF DTC P2146 COMPLETED** • Turn the engine switch off. • Make sure to reconnect all disconnected connectors. • Turn the engine switch to the ON position (Engine off). • Clear the DTC from the memory using the current diagnostic tool. • Run the vehicle under the FREEZE FRAME DATA stored condition. • Is the same DTC present?	Yes	Replace the PCM, then go to the next step. (See 01-40B-9 PCM REMOVAL/INSTALLATION [WL-C, WE-C].)
		No	Go to the next step.
5	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "After Repair Procedure". (See 01-02B-10 AFTER REPAIR PROCEDURE [WL-C, WE-C].) • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 01-02B-11 DTC TABLE [WL-C, WE-C].)
		No	Troubleshooting completed.

DTC P2147 [WL-C, WE-C]

dcf010202100w07

DTC P2147	Fuel injector No.1 and No.4 power supply circuit low input
DETECTION CONDITION	• The PCM monitors the fuel injector No.1 and No.4 power supply current when the engine is running. If the power supply current is **25 A or above 3 times** while other fuel injector power supply current is **25 A or above**, the PCM determines that the fuel injector No.1 and No.4 power supply current is too high.
POSSIBLE CAUSE	• Fuel injector malfunction • Connector or terminal malfunction • Short to ground in the wiring harness between the fuel injector No.1 terminal B and PCM terminal 174 • Short to ground in the wiring harness between the fuel injector No.4 terminal B and PCM terminal 150 • PCM malfunction

×: Applicable

	Troubleshooting item		Improper engine coolant level	Water and anti-freeze mixture is improper	Cooling system malfunction (Radiator, hose, over-flow system, thermostat, etc.)	Cooling fan system malfunction	Engine or transaxle mounts are improperly installed	Cooling fan seat is improper	Fuel quality	Engine overheating	Intake-air system clogging or restriction	Air leakage from intake-air system	Vacuum leakage
1	Melting of main or other fuses												
2	Engine check lamp illuminates												
3	Will not crank												
4	Hard start/long crank/erratic start/erratic crank								×	×	×	×	
5	Engine stalls	After start/at idle							×	×	×		
6	Cranks normally but will not start								×		×		
7	Slow return to idle				×								
8	Engine runs rough/rolling idle								×	×	×	×	
9	Fast idle/runs on												
10	Low idle/stalls during deceleration								×		×		
11	Engine stalls/quits	Acceleration/cruise						×	×	×	×	×	
	Engine runs rough	Acceleration/cruise						×	×	×	×	×	
	Misses	Acceleration/cruise						×	×	×	×	×	
	Buck/jerk	Acceleration/cruise/deceleration						×	×	×	×	×	
	Hesitation/stumble	Acceleration						×	×	×	×	×	
	Surges	Acceleration/cruise						×	×	×	×	×	
12	Lack/loss of power	Acceleration/cruise						×	×	×	×	×	×
13	Knocking/pinging				×				×		×	×	
14	Poor fuel economy				×				×		×	×	×
15	Emissions compliance				×				×	×	×	×	×
16	High oil consumption/leakage												
17	Cooling system concerns	Overheating	×	×	×	×							
18	Cooling system concerns	Runs cold			×	×							
19	Excessive black smoke								×		×	×	×
20	Fuel odor (in engine compartment)												
21	Engine noise								×		×	×	×
22	Vibration concerns (engine)						×	×	×		×	×	×
23	A/C does not work sufficiently												
24	A/C always on or A/C compressor runs continuously												
25	A/C does not cut off under wide open throttle conditions												

NO.10 LOW IDLE/STALLS DURING DECELERATION [WL-C, WE-C]

dcf010300000w39

10	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine stops unexpectedly at the beginning of deceleration or recovery from deceleration.
POSSIBLE CAUSE	• Intake-air system restriction or clogging • Poor fuel quality • A/C system improper operation • Inadequate fuel pressure • Fuel pressure limiter malfunction (built-in common rail) • Fuel leakage • Fuel line restriction or clogging • Fuel filter restriction or clogging • Incorrect fuel injection timing • Incorrect idle speed • Erratic signal from CKP sensor • Erratic signal from CMP sensor • Supply pump malfunction • Fuel injector malfunction • Low engine compression • Improper valve timing • Glow system malfunction • EGR system malfunction • MAF sensor/IAT sensor No.2 or related circuit malfunction • ECT sensor or related circuit malfunction • Fuel pressure sensor or related circuit malfunction • Accelerator pedal position (APP) sensor or related circuit malfunction **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:** • **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** • **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE REPAIR PROCEDURE" and "AFTER REPAIR PROCEDURE" described in this manual.**

Diagnostic Procedure

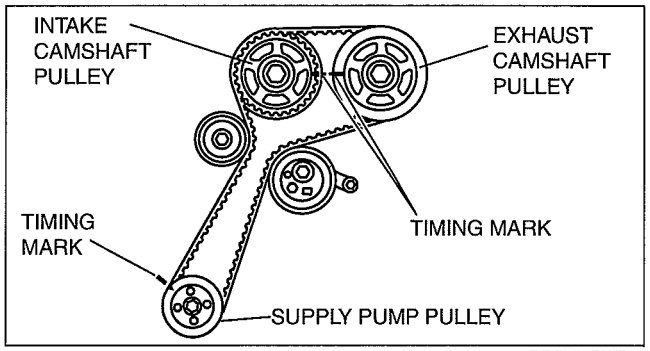
STEP	INSPECTION	RESULTS	ACTION
1	Does the engine idle roughly?	Yes	Go to the symptom troubleshooting "NO.8 ENGINE RUNS ROUGH/ROLLING IDLE [WL-C, WE-C]".
		No	Go to the next step.
2	Inspect the following: • Fuel line/fuel filter clogging or restriction • Intake-air system restriction or clogging • Fuel quality (e.g.: include water contamination, winter/summer blend) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 2.
3	Perform the self-test function using the current diagnostic tool. Turn the engine switch to the ON position (Engine off). Retrieve any DTCs. Are any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC test. (See 01-02B-11 DTC TABLE [WL-C, WE-C].) **Communication error message is displayed:** Inspect the following: • Open circuit between main relay and PCM terminal 201, 203, 205 • Open circuit main relay and PCM terminal 219 • Main relay stuck open • Open or poor ground circuit (PCM terminal 202, 204, 206) • Poor connection to vehicle body ground
		No	**No DTC is displayed:** Go to the next step.
4	Inspect idle speed. (See 01-10B-21 ENGINE TUNE-UP [WL-C, WE-C].) Is the idle speed correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the idle speed inspection results.

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	Inspect the following: • Intake-air system clogging or restriction • Exhaust system and/or oxidation catalytic converter restriction or clogging • Charge air cooler condition (restriction or damaged) Are all items normal?	Yes	Go to the next step.
		No	Service if necessary. Repeat Step 1.
2	Perform the self-test function using the current diagnostic tool. Turn the engine switch to the ON position (Engine off). Retrieve any DTCs. Are any DTCs displayed?	Yes	**DTC is displayed:** Go to the appropriate DTC test. (See 01-02B-11 DTC TABLE [WL-C, WE-C].) **Communication error message is displayed:** Inspect the following: • Open circuit between main relay and PCM terminal 201, 203, 205 • Open circuit main relay and PCM terminal 219 • Main relay stuck open • Open or poor ground circuit (PCM terminal 202, 204, 206) • Poor connection to vehicle body ground
		No	**No DTC is displayed:** Go to the next step.
3	Does any other symptom exist?	Yes	Go to appropriate flowchart.
		No	Go to the next step.
4	Inspect the air cleaner element for clogging. Is the air cleaner element normal?	Yes	Go to the next step.
		No	Repair or replace the air cleaner element.
5	Inspect intake shutter valve operation. (See 01-03B-62 ENGINE CONTROL SYSTEM OPERATION INSPECTION [WL-C, WE-C].) Is there any malfunction?	Yes	Repair or replace if necessary.
		No	Go to the next step.
6	Inspect the guide blade valve operation. (See 01-03B-62 ENGINE CONTROL SYSTEM OPERATION INSPECTION [WL-C, WE-C].) Is there any malfunction?	Yes	Repair or replace if necessary.
		No	Go to the next step.
7	Inspect the CKP sensor. (See 01-40B-39 CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [WL-C, WE-C].) (See 01-40B-38 CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [WL-C, WE-C].) Is the CKP sensor normal?	Yes	Go to the next step.
		No	Replace the CKP sensor. Then go to the next step.
8	Visually inspect the CMP sensor and the teeth of the pulse wheel. Are the CMP sensor and the teeth of the pulse wheel normal?	Yes	Inspect the following PIDs: (See 01-40B-10 PCM INSPECTION [WL-C, WE-C].) • IAT • MAP • RPM • MAF If the PID value is not as specified, repair or replace malfunctioning parts. If the PID value is normal, go to the next step.
		No	Replace malfunctioning parts.
9	Perform the EGR system inspection. Is the EGR system normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to EGR system operation results.
10	Inspect the hose bands between following parts: • Turbocharger compressor housing and air cleaner • Turbocharger compressor housing and charge air cooler Are the hose bands loose?	Yes	Retighten the hose bands. If the concern is resolved, the inspection is complete. If the concern still exists, go to the next step.
		No	Go to the next step.
11	Inspect for improper operation, kinks, clogging or disconnection on guide blade actuator. (See 01-03B-62 ENGINE CONTROL SYSTEM OPERATION INSPECTION [WL-C, WE-C].) Is the actuator normal?	Yes	Go to the next step.
		No	Repair or replace if necessary. If the concern is resolved, the inspection is complete. If the concern still exists, turbocharger is normal. Go to the next step.

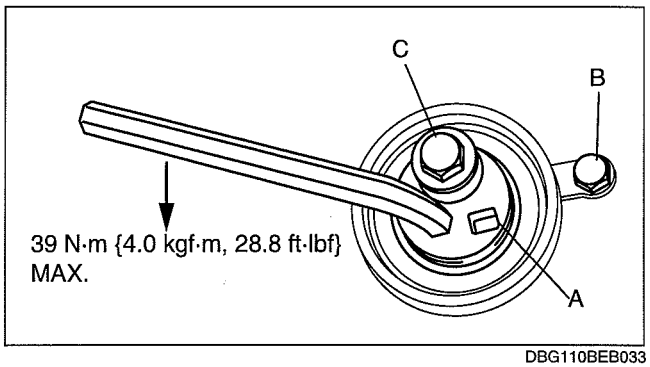
Tensioner Removal Note

1. Turn the crankshaft clockwise and align the timing marks as shown.



DBG110BWB98

2. Turn the auto tensioner counterclockwise using an Allen wrench. (Rotate the auto tensioner with a force of **39 N·m {4.0 kgf·m, 28.8 ft·lbf}** or less.)
3. Insert a fixing pin of approx. **6mm {0.24 in}** diameter into hole A to secure the auto tensioner.
4. Remove the bolts in the order of B and C, then remove the auto tensioner.



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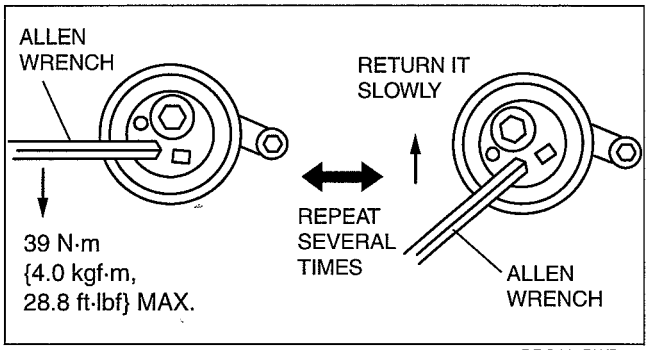
Note

- If the rod projects suddenly while removing the auto tensioner, the air flows into the pressure chamber and the rod could move slightly. If this occurs, bleed the air from the pressure chamber using the following procedure.

5. Assemble the auto tensioner to the engine.
6. Turn the auto tensioner with a force of **39 N·m {4.0 kgf·m, 28.8 ft·lbf}** or less using an Allen wrench, then turn it back slowly. Repeat this procedure several times.
7. Verify that the rod has resistance when it is in the most projected position. If there is no resistance, repeat the above procedure.



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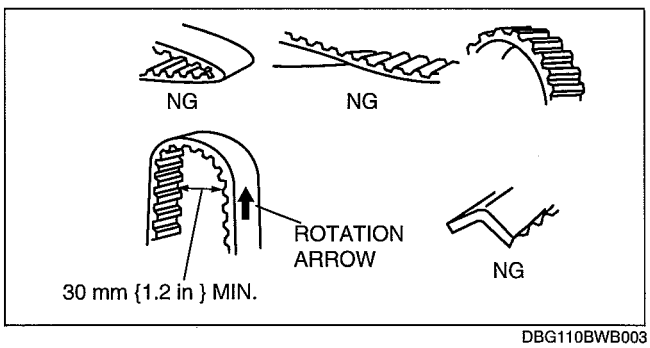
Timing Belt Removal Note

Caution

- **The following will damage the timing belt and shorten its life; forcefully twisting it, turning it inside out, or getting oil or grease on it.**
- **After removing the timing belt, do not move the crankshaft and/or camshaft pulley from this position because it can cause the valve and piston to contact and damage them.**

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



DBG110BWB003

ENGINE OIL REPLACEMENT [WL-C, WE-C]

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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 the drain plug by using a new washer.

Tightening torque
29.4—41.2 N·m {3.00—4.20 kgf·m, 21.7—30.3 ft·lbf}

5. Refill the engine oil 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 if necessary. (See 01-11B-2 ENGINE OIL LEVEL INSPECTION [WL-C, WE-C].)

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

Recommended engine oil

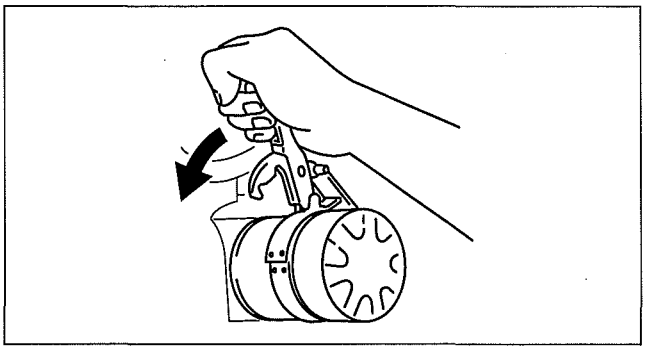
Item	Specification
Grade	API CD/CE/CF–4 or ACEA B1/B3/B5
Viscosity (SAE)	5W–30, 10W–30

Oil capacity (approx. quantity)
Oil replacement: 6.8 {7.2 US qt, 6.0 Imp qt}
Oil and oil filter replacement: 7.0 {7.4 US qt, 6.2 Imp qt}
Total (dry engine): 8.0 {8.5 US qt, 7.0 Imp qt}

OIL FILTER REPLACEMENT [WL-C, WE-C]

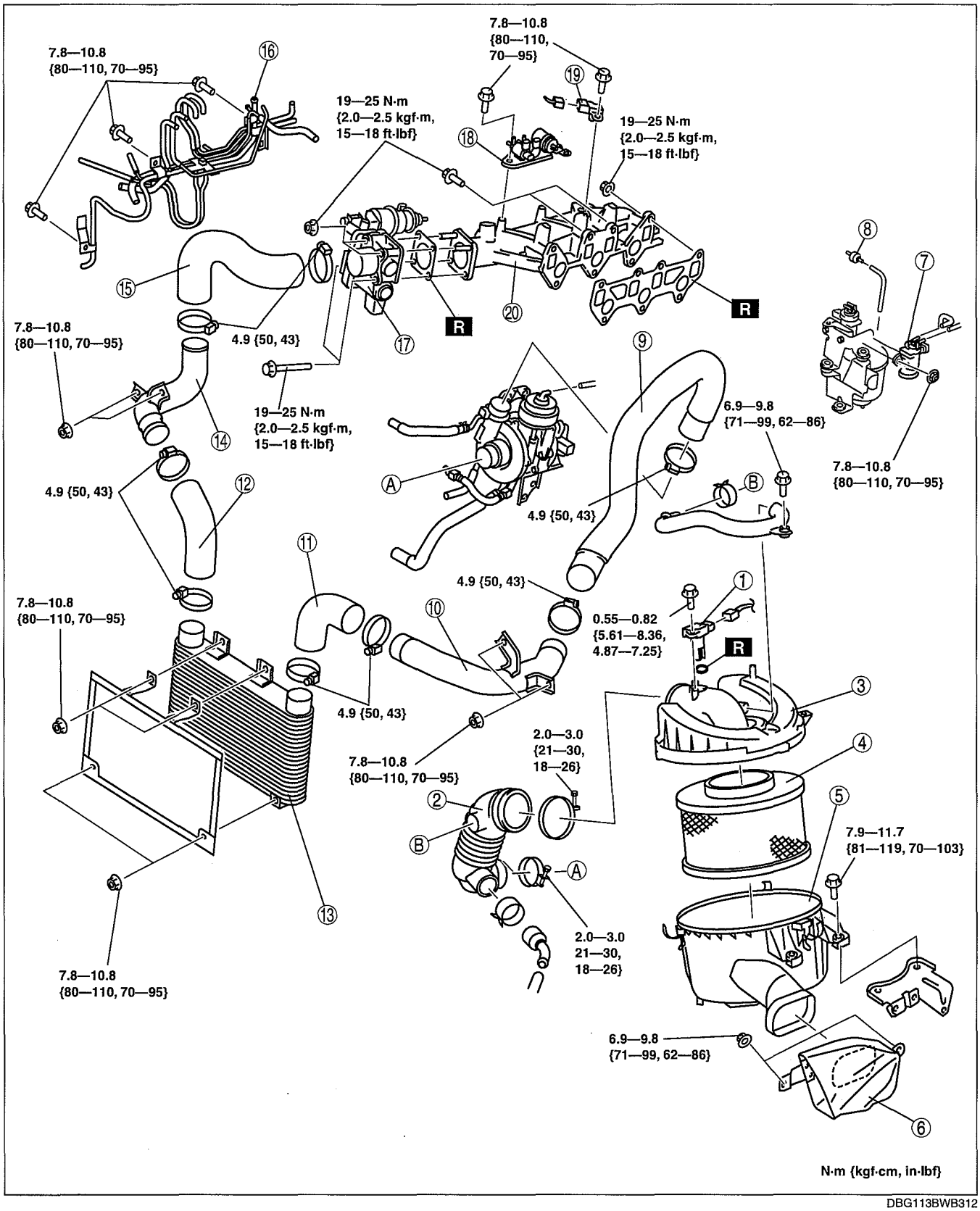
dcf011114300w02

1. Remove the oil filter by using the filter wrench.
2. Use a clean rag to wipe off the mounting surface on the oil filter body.
3. Apply engine oil to the O-ring and tighten the filter according to the installation directions on the side of the oil filter using the filter wrench.
4. Start the engine and inspect for oil leakage.
5. Inspect for the oil level and add oil if necessary. (See 01-11B-2 ENGINE OIL LEVEL INSPECTION [WL-C, WE-C].)(See 01-11B-3 ENGINE OIL REPLACEMENT [WL-C, WE-C].)



DBG111AWB1R3

4. Install in the reverse order of removal.



DBG113BWB312

1	MAF sensor/IAT sensor No.2
2	Air intake hose
3	Air cleaner cover
4	Air cleaner element
5	Air cleaner case

6	Fresh-air duct (See 01-13B-5 Fresh-Air Duct Removal Note.)
7	VBC solenoid valve
8	Vacuum check valve
9	Turbocharger air outlet hose
10	Turbocharger air outlet pipe

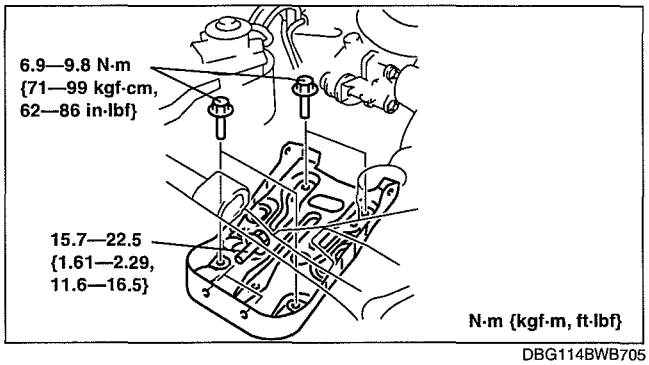
SUPPLY PUMP REMOVAL/INSTALLATION [WL-C, WE-C]

dcf011413350w01

Caution

- **Fuel line spills and leakage on the parts are dangerous. Fuel can ignite and also deteriorate the parts. To prevent this, always cover the mouths of the removed parts in the fuel system with rags to soak up the fuel.**
- **To prevent the fuel injection pipe from clogging, be careful that foreign material has not entered the pipe. Also, be sure to tighten the bolts with the specified tightening torque when installing the fuel injection pipe.**
- **To prevent fuel leakage, follow the procedure indicated in the workshop manual when removing and installing the fuel injector.**
- **The fuel injection pipe can be removed and reinstalled up to five times. Be sure to record in the service record when removing and installing the fuel injection pipe. If removing it for the sixth time, be sure to replace it with a new one.**
- **Always carry out the cleaning process before carrying out any repairs to the fuel injection system components to prevent foreign matter ingress to the components.**
- **If fuel does not pass through the fuel filter, foreign material may have penetrated in the supply pump, and this may cause a malfunction resulting in damage to the supply pump. Therefore, do not install the fuel hoses (main and return side) in reverse. When installing the fuel hose, always follow the Fuel Hose Installation Note in the Workshop Manual and perform the procedure. (See 01-14B-13 Fuel Hose Installation Note.)**

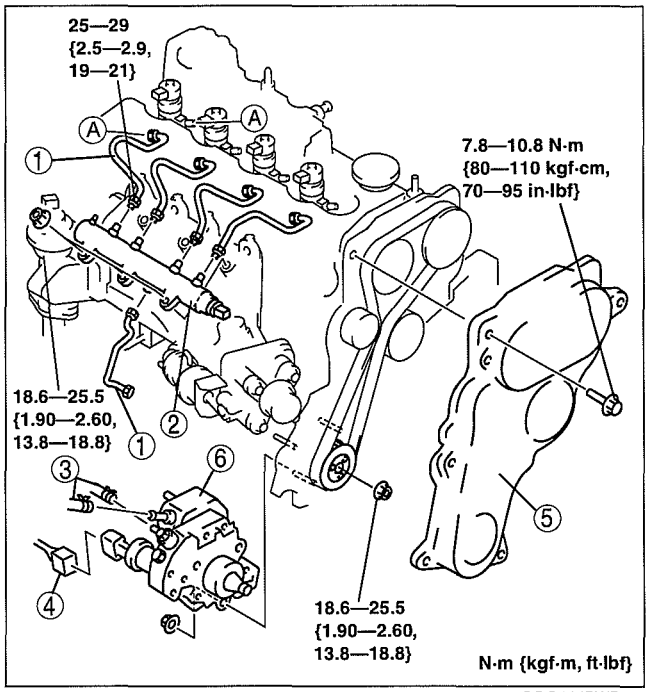
1. Disconnect the negative battery cable.
2. Complete the "BEFORE REPAIR PROCEDURE". (See 01-14B-3 BEFORE REPAIR PROCEDURE [WL-C, WE-C].)
3. Remove the battery and battery tray. (See 01-17-2 BATTERY REMOVAL/INSTALLATION.)
4. Remove the battery carrier.
5. Set the fuel filter component slightly out of the way. (See 01-14B-9 FUEL FILTER REMOVAL/ INSTALLATION [WL-C, WE-C].)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Complete the "AFTER REPAIR PROCEDURE". (See 01-14B-4 AFTER REPAIR PROCEDURE [WL-C, WE-C].)



DBG114BWB705

9. Start the engine and verify that fuel does not leak from the fuel system.

1	Injection pipe (See 01-14B-12 Injection Pipe Removal Note.)
2	Common real
3	Fuel hose (See 01-14B-13 Fuel Hose Installation Note.)
4	Connector
5	Timing belt cover (See 01-10B-9 Timing Belt Cover Installation Note.)
6	Supply pump (See 01-14B-12 Supply Pump Pulley Removal Note.)



DBG114BWB002

BATTERY REMOVAL/INSTALLATION

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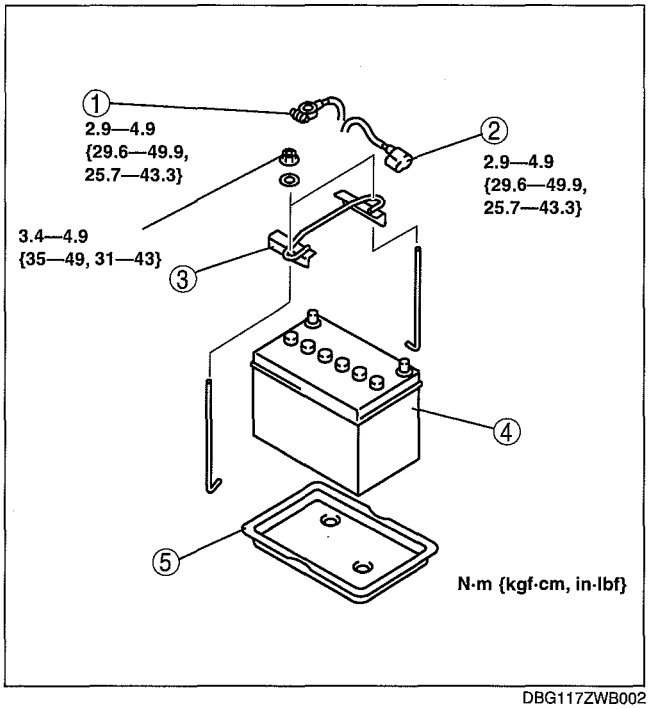
1. Remove in the order indicated in the table.

1	Negative battery cable
2	Positive battery cable (See 01-17-2 Positive Battery Cable Installation Note.)
3	Battery clamp
4	Battery
5	Battery tray

2. Install in the reverse order of removal.



DBG117ZWB002

Positive Battery Cable Installation Note

Note
- Secure the positive battery cable to the battery clamp with the band.

BATTERY INSPECTION

dcf011718520w02

Warning
- **Since battery acid is toxic, be careful when handling the battery.**
- **Since battery acid is highly corrosive, be careful not to allow it to contact clothing or the vehicle.**
- **In case battery acid contacts skin, eyes, or clothing, flush it immediately with running water. Especially if the acid gets in the eyes, flush with water for more than 15 min and get prompt medical attention.**

Electrolyte specific gravity

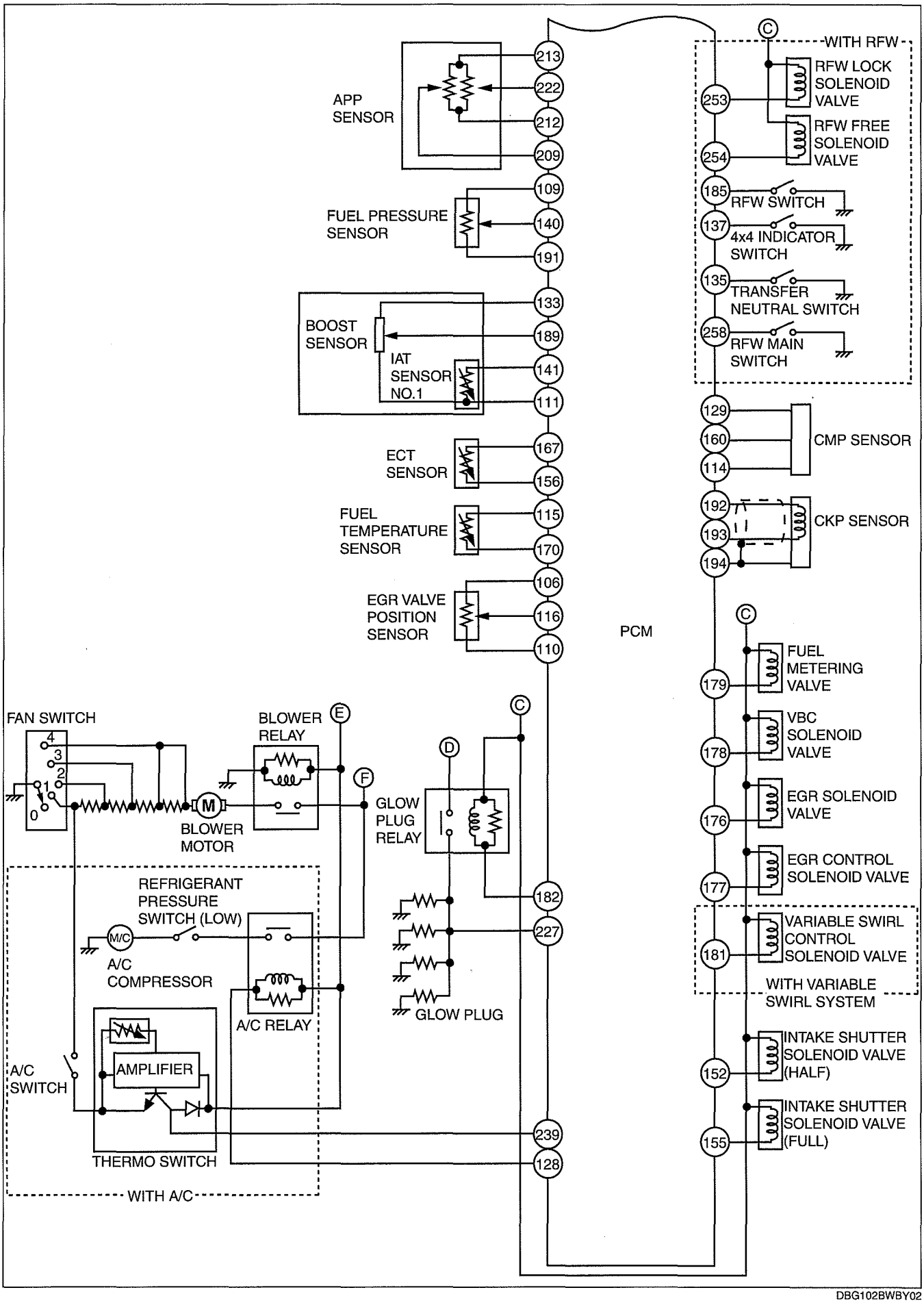
1. Measure the electrolyte specific gravity using a hydrometer.
   - If it is less than the specification, recharge the battery. (See 01-17-4 BATTERY RECHARGING.)

Battery electrolyte specific gravity [20 °C {68 °F}]
1.22—1.29

Battery voltage

1. Inspect the battery as follows:

Step	Inspection		Action
1	Measure the battery positive voltage.	12.4 V or more	Go to Step 3.
		Less than 12.4 V	Go to the next step.
2	Quick charge for 30 min and recheck voltage.	12.4 V or more	Go to the next step.
		Less than 12.4 V	Replace the battery.



DBG102BWBY02

Open circuit
- Signal circuit (MAF sensor/IAT sensor No.2 connector terminal D and PCM connector terminal 188)
- Ground circuit (MAF sensor/IAT sensor No.2 connector terminal E and PCM connector terminal 154)

Short circuit
- MAF sensor/IAT sensor No.2 connector terminal D and PCM connector terminal 188 to GND

INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 INSPECTION [WL-C, WE-C]

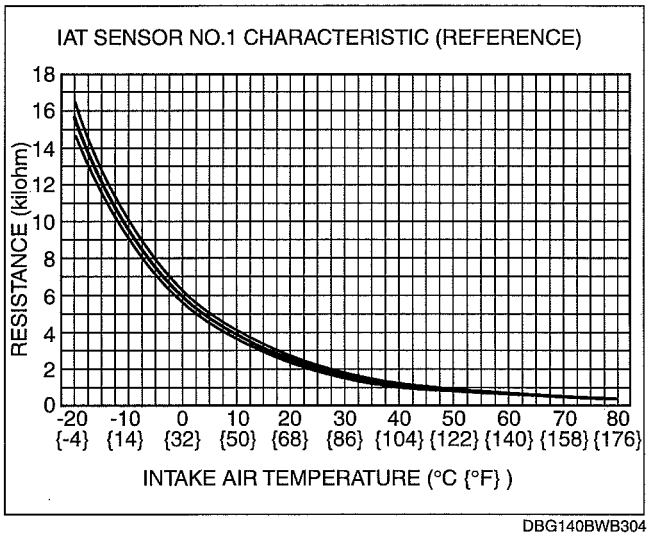
dcf014018842w02

Note
- Perform the following inspection only when directed.

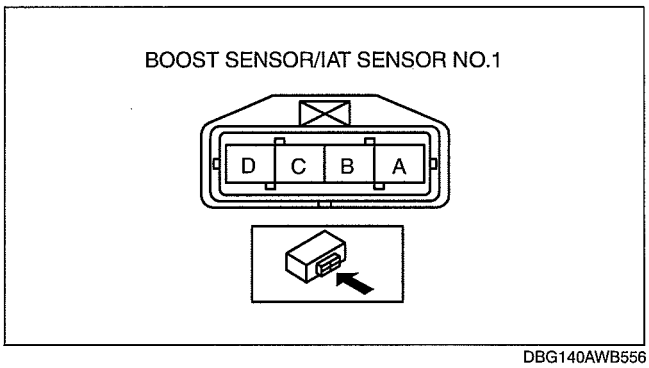
Resistance Inspection
1. Disconnect the boost sensor/IAT sensor No.1 connector.
2. Measure the resistance between IAT sensor No.1 terminals A and B using an ohmmeter.
   - If not as specified, replace the boost sensor/IAT sensor No.1.
   - If as specified, carry out the "Circuit Open/Short inspection".

Specification

Water temperature (°C {°F})	Resistance (kilohm)
20 {68}	2.41—2.61
80 {176}	0.32—0.34

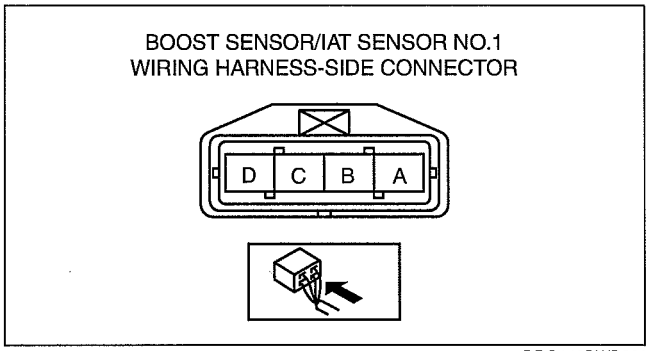


DBG140BWB304



DBG140AWB556

Circuit Open/Short Inspection
1. Disconnect the boost sensor/IAT sensor No.1 connector.
2. Disconnect the PCM connector.(See01-40B-9 PCM REMOVAL/INSTALLATION [WL-C, WE-C].)
3. Inspect for an open or short circuit in the following siring harnesses.
   - If there is an open or short circuit, repair or replace wiring harnesses.



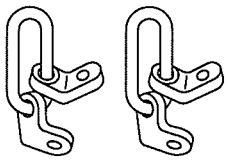
DBG140BWB301

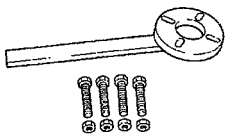
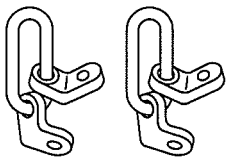
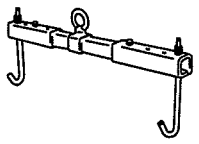
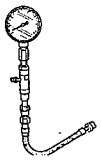
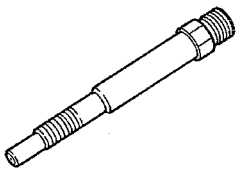
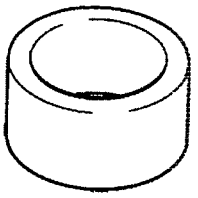
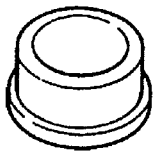
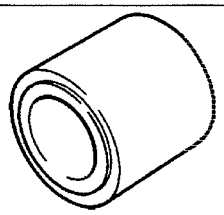
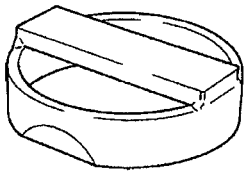
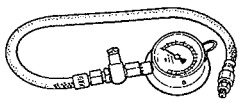
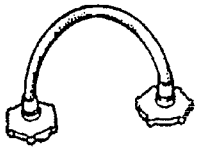
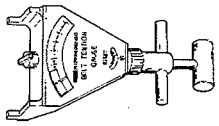
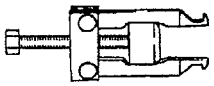
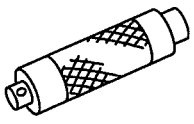
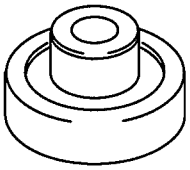
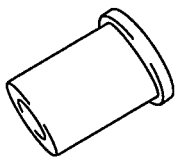
01-60B SERVICE TOOLS [WL-C, WE-C]

ENGINE SST[WL-C, WE-C]

id0160b6800100

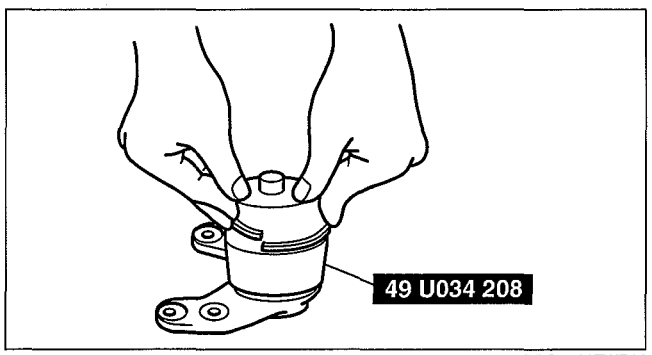
1: Mazda **SST** number
2: Global **SST** number
Example

1:49 UN30 3050 2:303-050 Engine lifting brackets	

1:49 S011 102A 2:– Crankshaft lock tool	1:49 UN30 3050 2:303-050 Engine lifting brackets	1:49 L017 5A0 2:– Support hanger
		
1:49 S010 1A0 2:– Compression gauge set (Part of 49 S013 1A1A)	1:49 S013 102 2:– Adapter (Part of 49 S013 1A1A)	1:49 S010 301 2:– Oil seal installer
		
1:49 F027 009 2:– Oil seal installer	1:49 S010 001 2:– Oil seal installer	1:49 S011 103 2:– Oil seal installer
		
1:49 0187 280A 2:– Oil pressure gauge	1:49 9200 146 2:– Adapter A (Part of 49 9200 145)	1:49 9200 147 2:– Adapter B (Part of 49 9200 145)
		
1:49 9200 020A 2:– Belt tension gauge	1:49 S019 005 2:– Oil seal puller	1:49 G030 797 2:– Handle (Part of 49 B025 0A0)
		
1:49 H033 101 2:– Bearing remover	1:49 G028 208 2:– Installer (Part of 49 G028 2A1)	—
		

Clip Installation Note

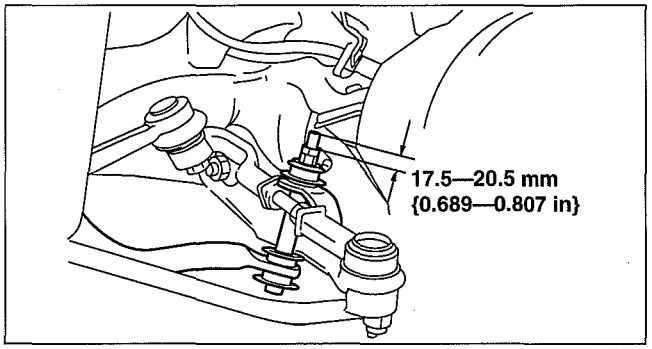
1. Install the **SST** to the ball joint stud with the stud stands straight up.
2. Install the clip in the dust boot groove.



DBG0213ZWB00

Stabilizer Bolt, Bushing, Retainer, Spacer, And Nut Installation Note

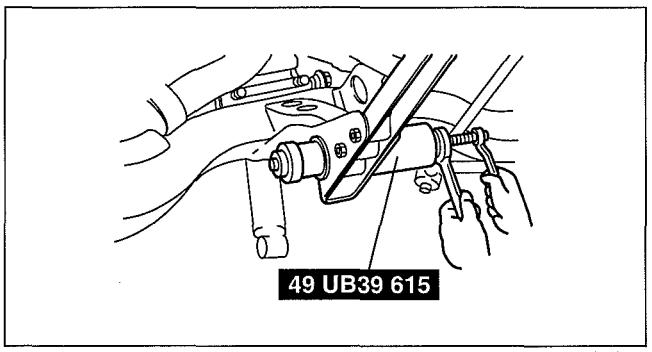
1. Tighten the nuts so that **17.5—20.5 mm {0.689—0.807 in}** of thread is exposed at the end of the bolt.



DBG0213ZWB00

Rubber Bushing Installation Note

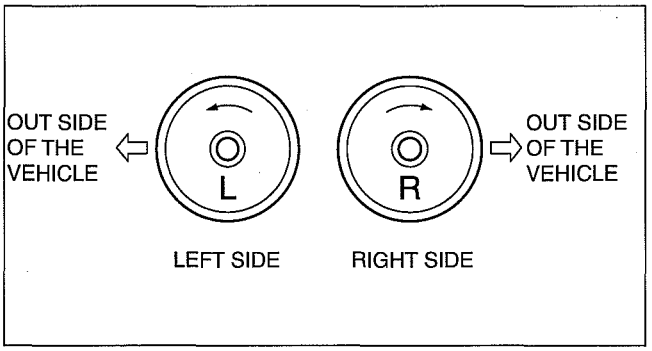
1. Install a new bushing using the **SST**.



DBG0213ZWB01

Torsion Bar Spring Installation Note

1. Before installation, check the identification mark on the end of the torsion bar spring.



DBG213ZWB031

DRIVELINE/AXLE

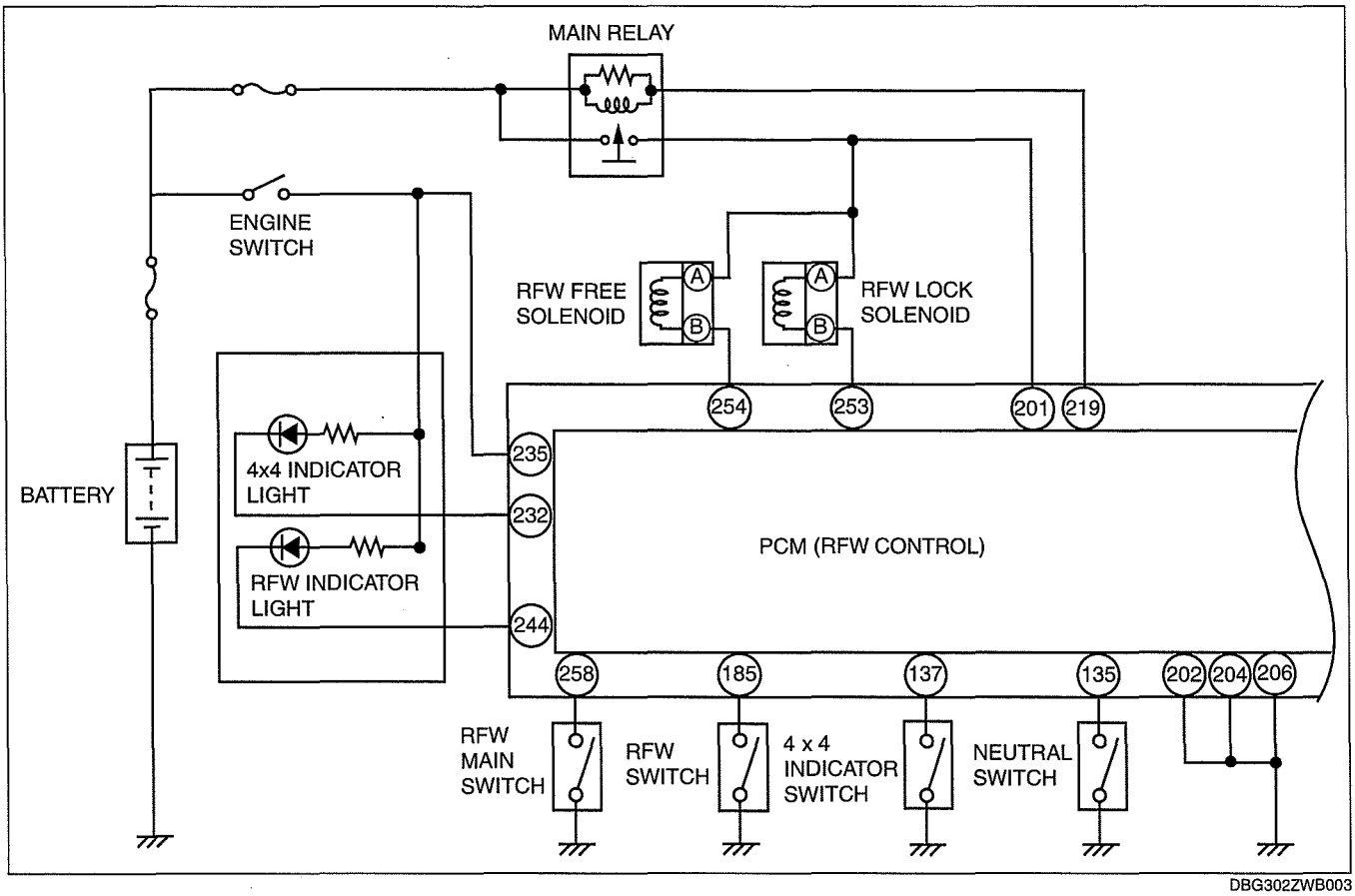
03 SECTION

03-02 ON-BOARD DIAGNOSTIC

03

RFW (REMOTE FREEWHEEL) SYSTEM WIRING DIAGRAM

dcf030227100w01



DBG302ZWB003

RFW (REMOTE FREEWHEEL) ON-BOARD DIAGNOSIS

dcf030227100w02

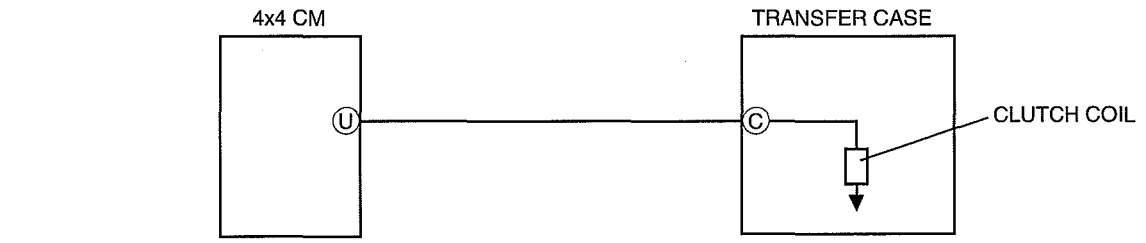
- The on-board diagnostic procedures are mentioned in Section 01. (See 01-02B-6 FOREWORD [WL-C, WE-C].)

STEP	INSPECTION		ACTION
3	**INSPECT MOTOR COMPONENT (SHIFT MOTOR) WIRING HARNESS FOR OPEN CIRCUIT** • Inspect for continuity between the 4x4 CM connector (vehicle harness-side) and the following vehicle harness-side terminals of motor component: — 4x4 CM connector A— Motor component (shift motor) terminal C — 4x4 CM connector B— Motor component (shift motor) terminal C — 4x4 CM connector C— Motor component (shift motor) terminal F — 4x4 CM connector D— Motor component (shift motor) terminal F • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to next step.
4	**VERIFY THAT THE SAME DTC IS NOT PRESENT** • Reconnect all disconnected connectors. • Clear the DTCs from the memory. (See 03-02-2 4x4 CONTROL SYSTEM ON-BOARD DIAGNOSIS[4x4 control module].) • Change the current transfer mode by operating the 4x4 switch.(2H-4H-4L) • Are any DTCs present?	Yes	Repeat the inspection from Step 1. If the malfunction recurs, replace the 4x4 CM, then go to the next step. (See 03-18-5 4x4 CONTROL MODULE REMOVAL/ INSTALLATION [AT (5R55S)].)
		No	Go to the next step.
5	**VERIFY THAT NO OTHER DTCS ARE PRESENT** • Are any DTCs present?	Yes	Go to the applicable DTC troubleshooting. (See 03-02-2 4x4 CONTROL SYSTEM ON-BOARD DIAGNOSIS[4x4 control module].)
		No	Troubleshooting completed.

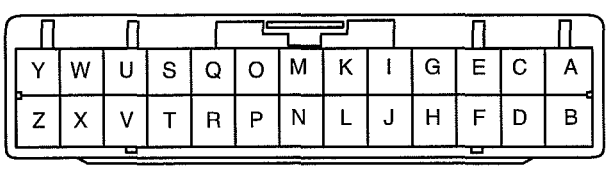
DTC No.3 [4x4 control module]

id0302a1801900

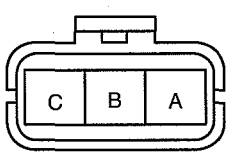
DTC No.3	Clutch coil malfunction
DETECTION CONDITION	• Open circuit, short to ground or short to battery has been detected in the clutch coil wiring harness.
POSSIBLE CAUSE	• Open circuit in the wiring harness between 4x4 CM terminal U and clutch coil terminal C, short to battery or to ground • Clutch coil malfunction • Poor connection at connector (female terminal)



4x4 CM
WIRING HARNESS-SIDE CONNECTOR



SPEED SENSOR
WIRING HARNESS-SIDE CONNECTOR



NO.2 4x4/4L INDICATOR DOSE NOT ILLUMINATE [4x4 control module]

id030310802600

2	4x4/4L INDICATOR DOSE NOT ILLUMINATE
DESCRIPTION	4x4/4L indicator dose not illuminate when select 4H or 4L position.
TROUBLESHOOTING HINTS	• Instrument cluster malfunction • TCM malfunction • 4x4 control module malfunction

Diagnostic procedure

STEP	INSPECTION		ACTION
1	**INSPECT CONTINUITY FOR 4x4 CONTROL MODULE AND TCM** • Between 4x4 control module terminal S and TCM terminal BB. • Between 4x4 control module terminal R and TCM terminal BA. • Is there continuity?	Yes	Go to next step.
		No	Repair wiring harness between 4x4 control module terminal and TCM. Then go to Step 5.
2	**INSPECT CONTINUITY FOR TCM AND INSTRUMENT CLUSTER** • Between TCM terminal N and instrument cluster terminal 1D. • Between TCM terminal R and instrument cluster terminal 1F. • Is there continuity?	Yes	Inspect the instrument cluster. Then go to next step.
		No	Repair wiring harness between TCM and instrument cluster. Then go to Step 5.
3	**INSPECT FOR CONTINUITY BETWEEN 4x4 CONTROL MODULE CONNECTOR TERMINAL W, X AND GROUND** • Turn engine switch OFF. • Is there continuity?	Yes	Go to next step.
		No	Repair wiring harness between 4x4 control module and ground. Then go to Step 5.
4	**MEASURE VOLTAGE BETWEEN 4x4 CONTROL MODULE CONNECTOR TERMINAL T, Y, Z AND GROUND** • Turn engine switch ON. • Is the voltage greater than **10 V**?	Yes	Go to next step.
		No	Repair related wiring harness and related fuses. Then go to Step 5.
5	• **Verify test results.** — If normal, return to the diagnostic index to service any additional symptoms. — If malfunction remains, inspect the related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If the vehicle is repaired, troubleshooting completed. • If the vehicle is not repaired or additional diagnostic information is not available, replace the TCM.		

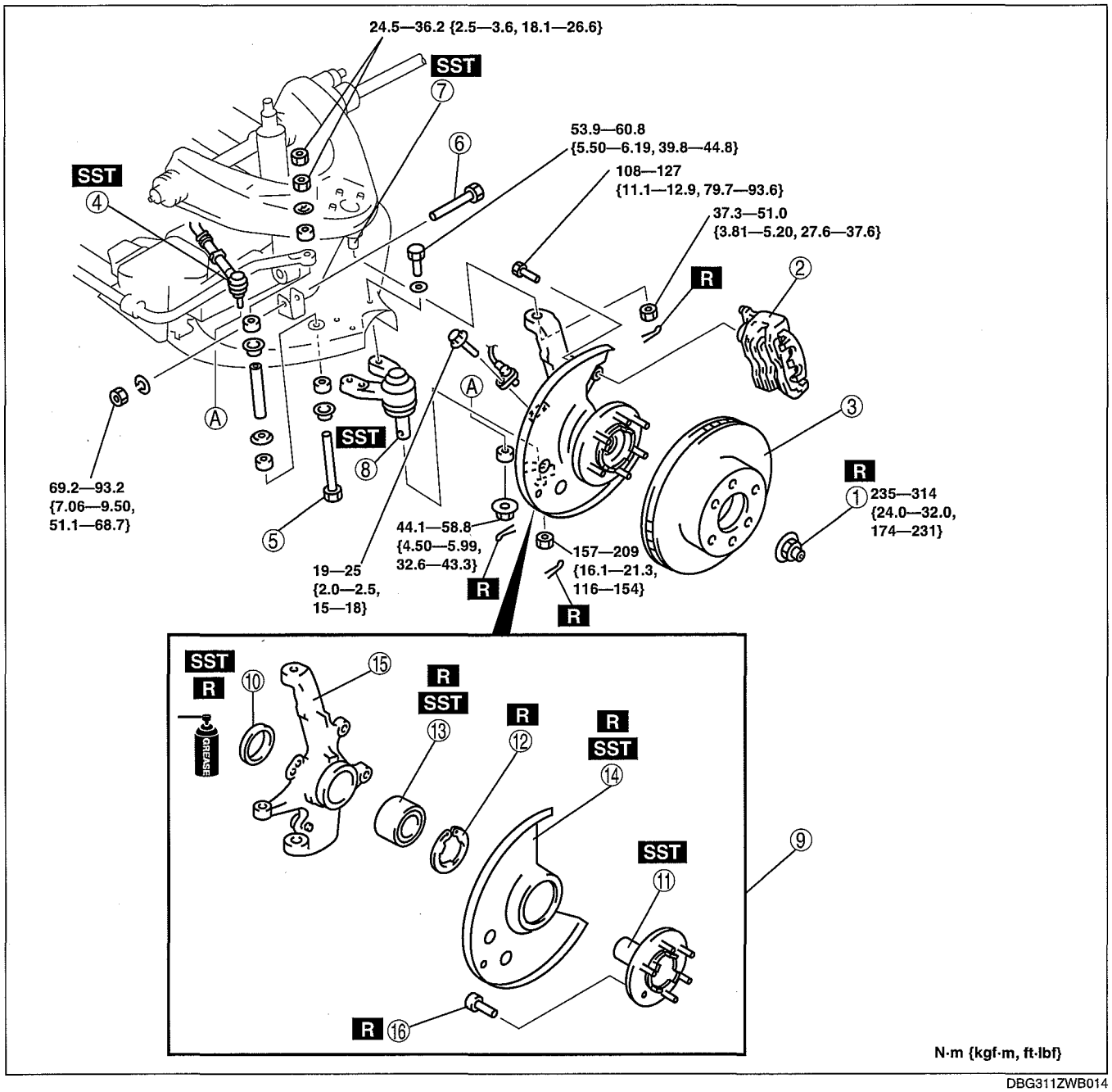
WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION [4x4]

dcf03110406Ow05

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 the vehicle is being serviced.**

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



DBG311ZWB014

1	Locknut (See 03-11-15 Locknut Removal Note) (See 03-11-19 Locknut Installation Note)
2	Brake caliper component (See 03-11-15 Brake Caliper Component Removal Note)
3	Disc plate

4	Tie-rod end ball joint (See 03-11-15 Tie-rod End Ball Joint Removal Note)
5	Bolt (stabilizer)
6	Bolt (shock absorber)
7	Upper arm ball joint
8	Lower arm ball joint
9	Wheel hub, steering knuckle, dust cover

Outer Ring Assembly Note

1. Fill the outer ring and boot with the specified grease.

Caution

- **Do not touch the grease with your hand. Apply it from the tube to prevent foreign matter from entering the boot.**

Note

- Use the specified grease supplied in the boot kit.

Grease amount
115—135 g {4.06—4.76 oz}

2. Align the marks, and install the outer ring on to the shaft.
3. Install a new clip.
4. Install the boot.
5. Set the drive shaft to the standard length.

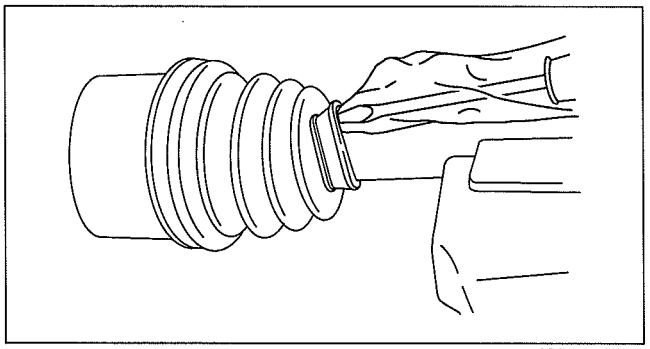
Front drive shaft standard length
LH: 507.8—517.8 mm {20.00—20.38 in}
RH: 596.7—606.7 mm {23.50—23.88 in}

6. Release any trapped air from the boots by carefully lifting up the small end of each boot with a cloth wrapped screwdriver.

Caution

- **Be careful not to allow the grease to leak.**
- **Do not damage the boot.**

7. Verify that the drive shaft length is within the specification.



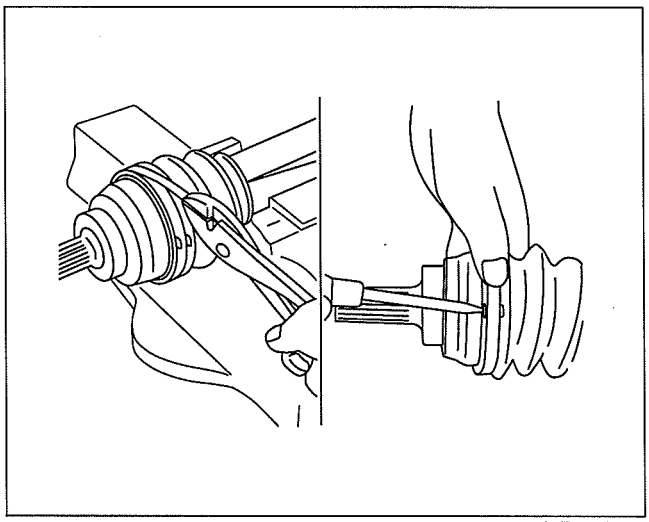
ABR6316W010

Boot Band Assembly Note
Differential side

1. Fold the band in the direction opposite to the forward revolving direction of the drive shaft and use pliers to pull it tight.
2. Lock the end of the band by bending the locking clips.

Caution

- **Install the band into the groove securely.**



A6E6316W008

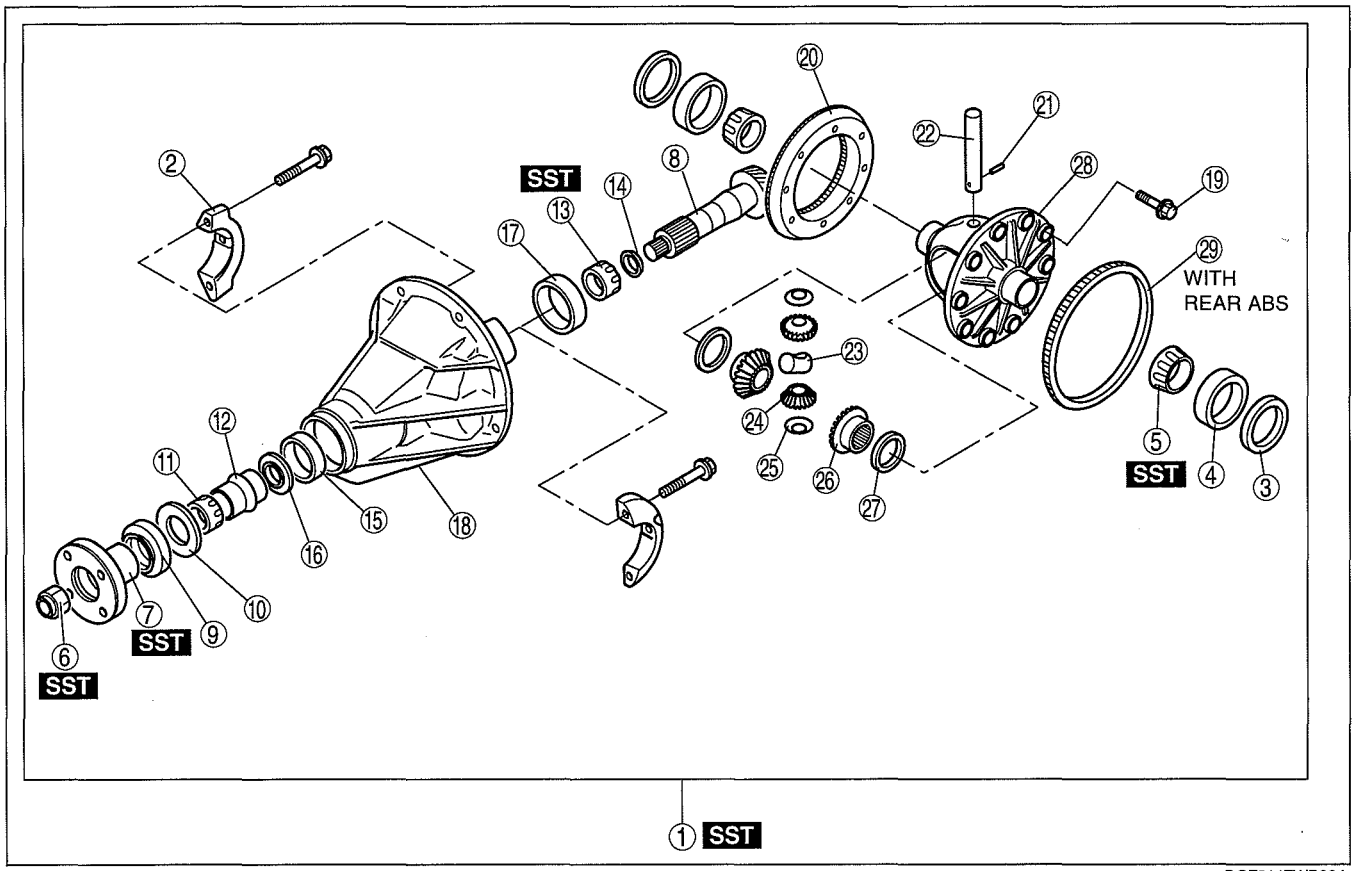
REAR DIFFERENTIAL DISASSEMBLY [STANDARD DIFFERENTIAL]

dcf031427100w07

Warning

- **The engine stand is equipped with a self-lock mechanism, however, if the rear differential is tilted, the self-lock mechanism could become inoperative. If the rear differential unexpectedly rotates, it could cause injury, therefore do not maintain the rear differential tilted. When turning the rear differential, grasp the rotation handle firmly.**

1. Disassemble in the order indicated in the table.



DCF314ZWB004

1	Differential component (See 03-14B-5 Differential Component Disassembly Note.)
2	Bearing cap (See 03-14B-5 Bearing Cap Disassembly Note.)
3	Adjusting shim
4	Side bearing outer race
5	Side bearing inner race (See 03-14B-5 Side Bearing Inner Race Disassembly Note.)
6	Locknut (See 03-14B-5 Locknut Disassembly Note.)
7	Companion flange (See 03-14B-6 Companion Flange Disassembly Note.)
8	Drive pinion (See 03-14B-6 Drive Pinion Disassembly Note.)
9	Oil seal (See 03-14B-6 Oil Seal Disassembly Note.)
10	Thrust washer
11	Front bearing inner race
12	Collapsible spacer
13	Rear bearing inner race (See 03-14B-6 Rear Bearing Inner Race Disassembly Note.)

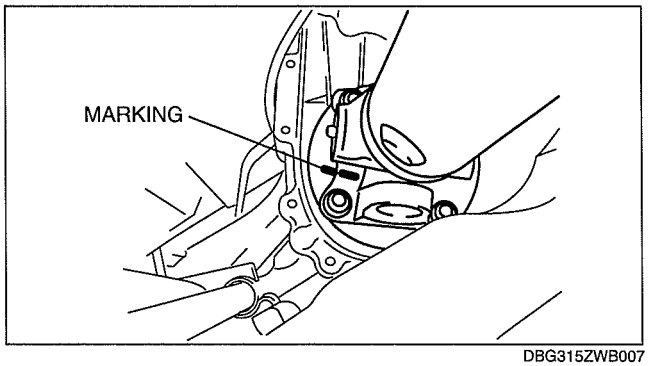
14	Adjusting shim
15	Front bearing outer race (See 03-14B-7 Front Bearing Outer Race, Rear Bearing Outer Race Disassembly Note.)
16	Oil baffle
17	Rear bearing outer race (See 03-14B-7 Front Bearing Outer Race, Rear Bearing Outer Race Disassembly Note.)
18	Differential carrier
19	Bolt
20	Ring gear
21	Knock pin (See 03-14B-7 Knock Pin Disassembly Note.)
22	Pinion shaft
23	Thrust block
24	Pinion gear
25	Thrust washer
26	Side gear
27	Thrust washer
28	Differential case
29	ABS sensor rotor (with rear ABS)

Propeller Shaft Removal Note

Caution
- **When replacing with a new propeller shaft, mark the companion flange to match the position of the tag on the propeller shaft.**

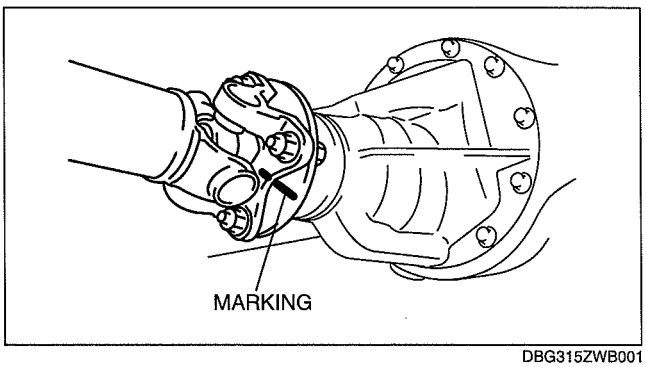
1. Before removing the propeller shaft, make alignment marks on the yoke and differential companion flange.

FRONT PROPELLER SHAFT (4x4)



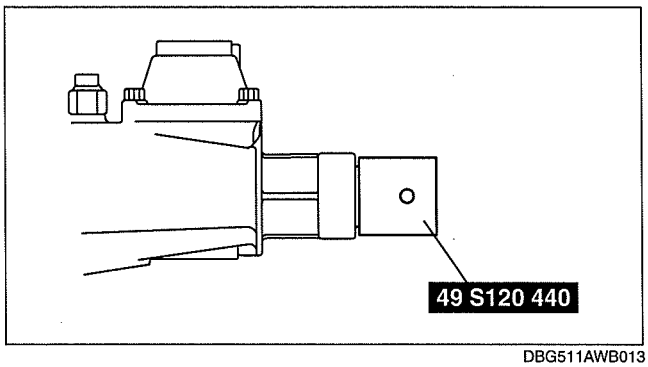
DBG315ZWB007

REAR PROPELLER SHAFT



DBG315ZWB001

2. Install the **SST** to the extension housing. (R15M-D)



DBG511AWB013

Propeller Shaft Installation Note
1. Align the marks and install the propeller shaft.
2. When installing a new propeller shaft, align the differential companion flange mark with the tag on the propeller shaft and assemble.

RFW MAIN SWITCH INSPECTION

dcf031827464w02

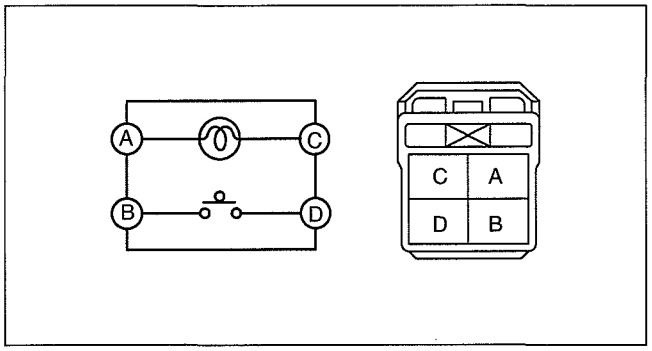
1. Remove the RFW main switch.
2. Inspect for continuity between the terminals as shown using a tester.

○—○ : Continuity

Switch	Terminal			
	A	B	C	D
DEPRESSED	○	○	○	
		○		○
RELEASED	○	○	○	

DBG318ZWB007

- If not correct, replace the switch.

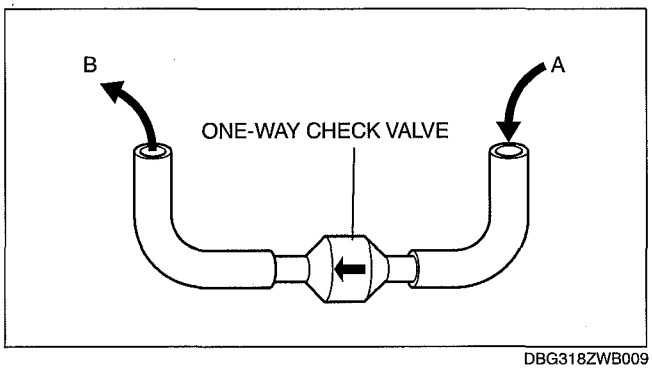


DBG318ZWB008

ONE-WAY CHECK VALVE INSPECTION

dcf031813995w01

1. Remove the one-way check valve.
2. Blow through A and inspect that air flows from B.
3. Blow through B and inspect that air does not flow from A.
   - If not correct, replace the one-way check valve.

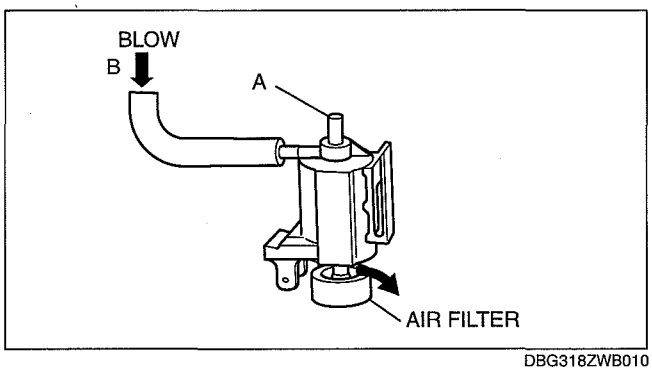


DBG318ZWB009

LOCK AND FREE SOLENOID VALVES INSPECTION

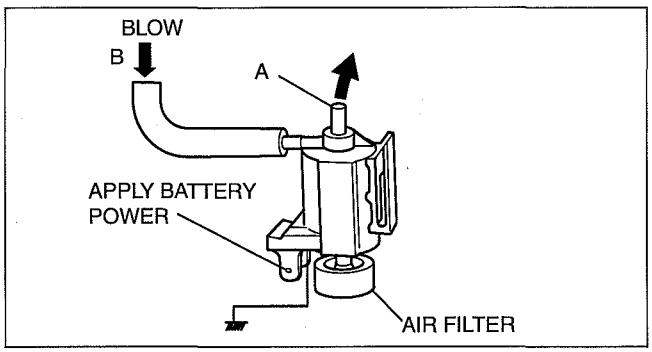
dcf031827740w01

1. Disconnect the vacuum hoses and the connector from each solenoid valve.
2. Blow through each valve from port B.
3. Inspect that air flows from the air filter.
4. Connect **12 V** and a ground to the terminals of each valve.
5. Blow through each valve from port B.

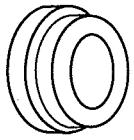
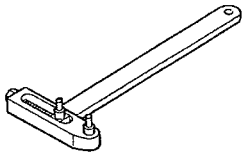
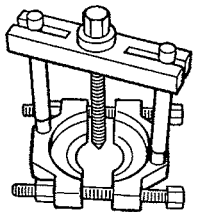
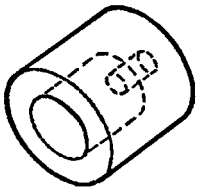
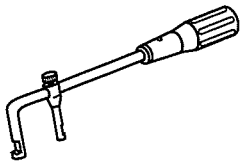
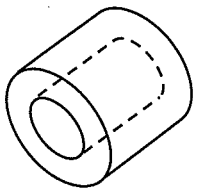
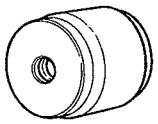
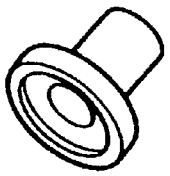
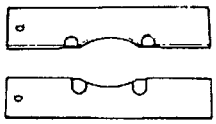
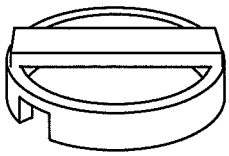
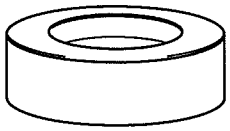
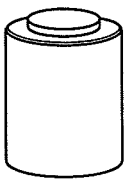
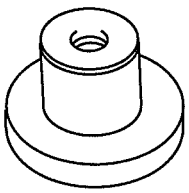
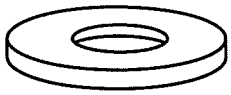
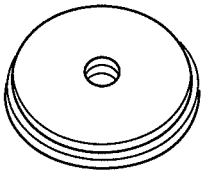
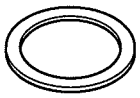
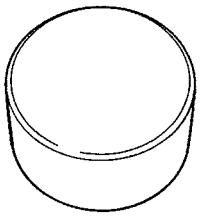
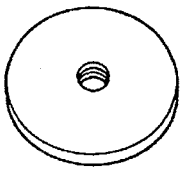
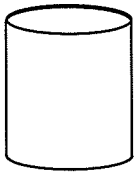
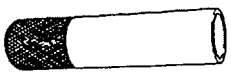
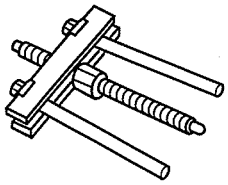
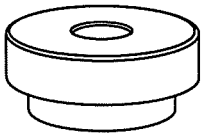


DBG318ZWB010

6. Inspect that air flows from port A.
   - If not correct, replace the lock and free solenoid valve(s).



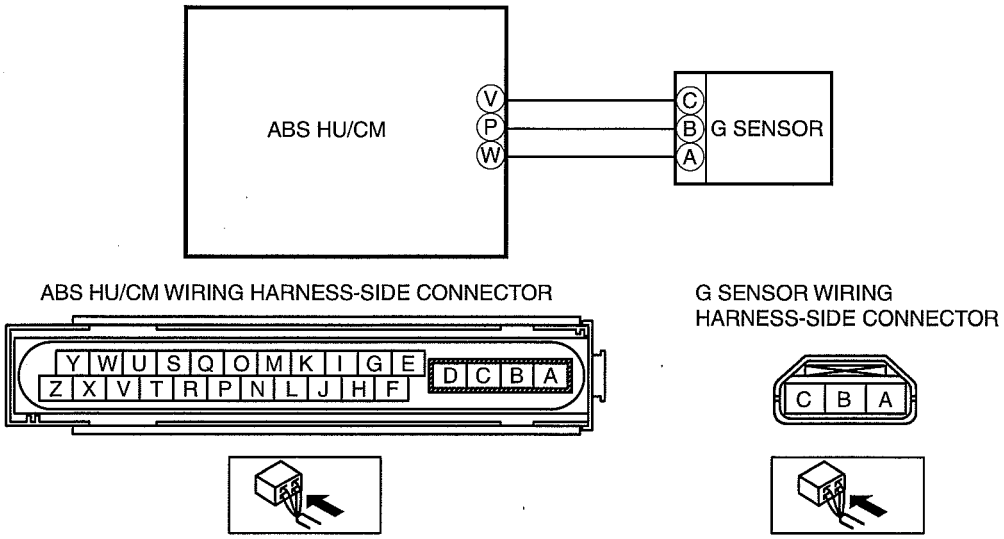
DBG318ZWB011

1:49 8531 568 2:– Collar B 	1:49 0259 720 2:– Side bearing adjustment wrench 	1:49 0710 520 2:– Bearing puller 
1:49 U027 005 2:– Bearing installer 	1:49 U027 004 2:– Oil seal remover 	1:49 U027 006 2:– Bearing installer 
1:49 W027 001 2:– Body 	1:49 M005 796 2:– Body 	1:49 G033 102 2:– Handle 
1:49 F026 103 2:– Wheel hub puller 	1:49 W010 107A 2:– Oil seal installer 	1:49 D026 102 2:– Sensor rotor installer 
1:49 G019 011 2:– Bearing installer 	1:49 F026 102 2:– Bearing installer 	1:49 1011 748 2:– Attachment 
1:49 G033 105 2:– Attachment 	1:49 W033 101 2:– Body 	1:49 T019 001 2:– Attachment 
1:49 1361 555 2:– Gauge block 	1:49 J027 002 2:– Collar 	1:49 E027 007 2:– Collar 
1:49 0727 415 2:– Bearing installer 	1:49 UN20 4069 2:204-069 Remover 	1: 49 UN20 5D0180 2:205-D018 Attachment 

DTC C1730, C1949, C1950 [4W-ABS]

dcf040200000w28

DTC C1730, C1949, C1950	G sensor
DETECTION CONDITION	• C1730 — Voltage to G sensor is detected out of range • C1949 — Monitor voltage of G sensor is detected at **4.7 V or more**, or **0.3 V or less** for more than **1 s**. • C1950 — G sensor 0-point correction value is default or more — Output voltage value from G sensor remains absolutely unchanged
POSSIBLE CAUSE	• Open circuit in harness between ABS HU/CM terminal V and G sensor terminal C • Open, short to power, or short to ground circuit in harness between ABS HU/CM terminal P and G sensor terminal B • Open circuit in harness between ABS HU/CM terminal W and G sensor terminal A • Malfunction of G sensor

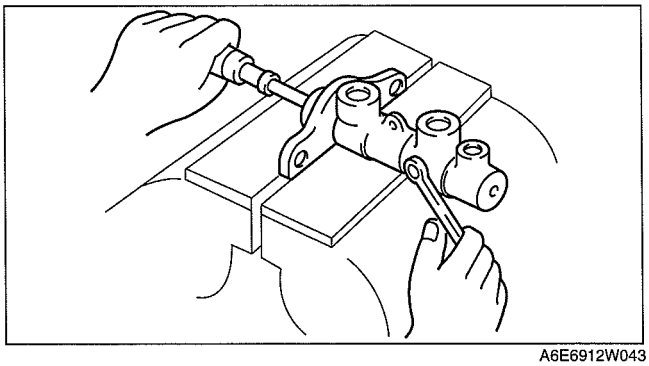


Diagnostic procedure

STEP	INSPECTION		ACTION
1	**INSPECT G SENSOR POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT** • Turn engine switch to ON (engine OFF). • Measure voltage between G sensor terminal C (harness side) and ground. • Is voltage **B+**?	Yes	Go to the next step.
		No	Repair or replace harness for open circuit between G sensor terminal C and engine switch, then go to Step 7.
2	**INSPECT G SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Turn engine switch to OFF. • Disconnect ABS HU/CM and G sensor connectors. • Inspect continuity between ABS HU/CM terminal W (harness side) and G sensor terminal A (harness side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace harness for open circuit between ABS HU/CM terminal W and G sensor terminal A, then go to Step 7.
3	**INSPECT G SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Inspect continuity between ABS HU/CM terminal P (harness side) and G sensor terminal B (harness side). • Is there continuity?	Yes	Go to the next step.
		No	Repair or replace harness for open circuit between ABS HU/CM terminal P and G sensor terminal B, then go to Step 7.
4	**INSPECT G SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER** • Turn engine switch to ON (engine OFF). • Measure voltage between ABS HU/CM terminal P (harness side) and ground. • Is voltage **B+**?	Yes	Repair or replace harness for short to power circuit between ABS HU/CM terminal P and G sensor terminal B, then go to Step 7.
		No	Go to the next step.

Stop Screw (with 4W-ABS) Assembly Note

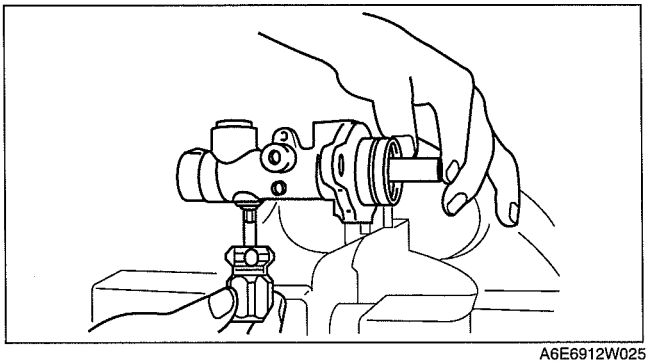
1. Install the secondary piston component with the piston hole facing the stop pin.
2. Install and tighten a new gasket and the stop pin.
3. Push and release the piston to verify that it is held by the stop pin.



A6E6912W043

Stop Screw (without 4W-ABS) Assembly Note

1. Push the primary piston component in fully.
2. Install and tighten a new gasket and the stop screw.
3. Push and release the piston to verify that it is held by the stop screw.



A6E6912W025

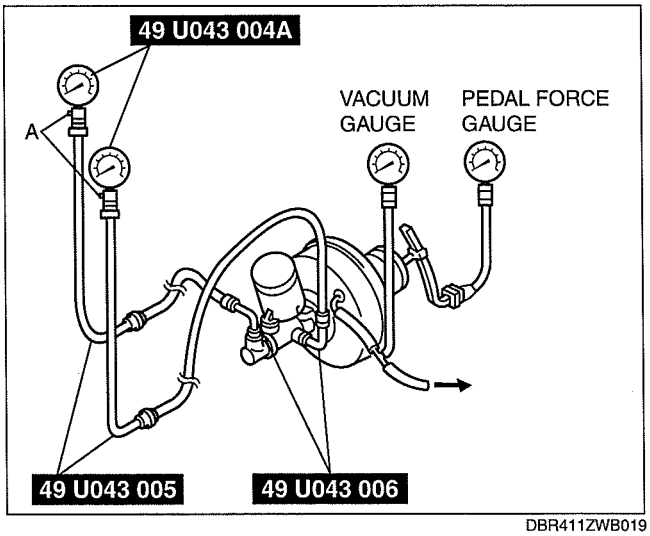
POWER BRAKE UNIT INSPECTION

dcf041143800w01

04

Power Brake Unit Function Inspection (Inspection using gauges)

1. Connect the **SST** gauges, a vacuum gauge, and a pedal depression gauge as shown in the figure. Bleed the air from the **SST** gauges before performing the following tests.



DBR411ZWB019

Checking for vacuum loss (unloaded condition)

1. Start the engine.
2. Stop the engine when the vacuum gauge indicates **67 kPa {500 mmHg, 20 inHg}**.
3. Observe the vacuum gauge for **15 s**.
   - If the gauge indicates **64—66 kPa {476—499 mmHg, 18.8—19.6 inHg}**, the unit is operating.

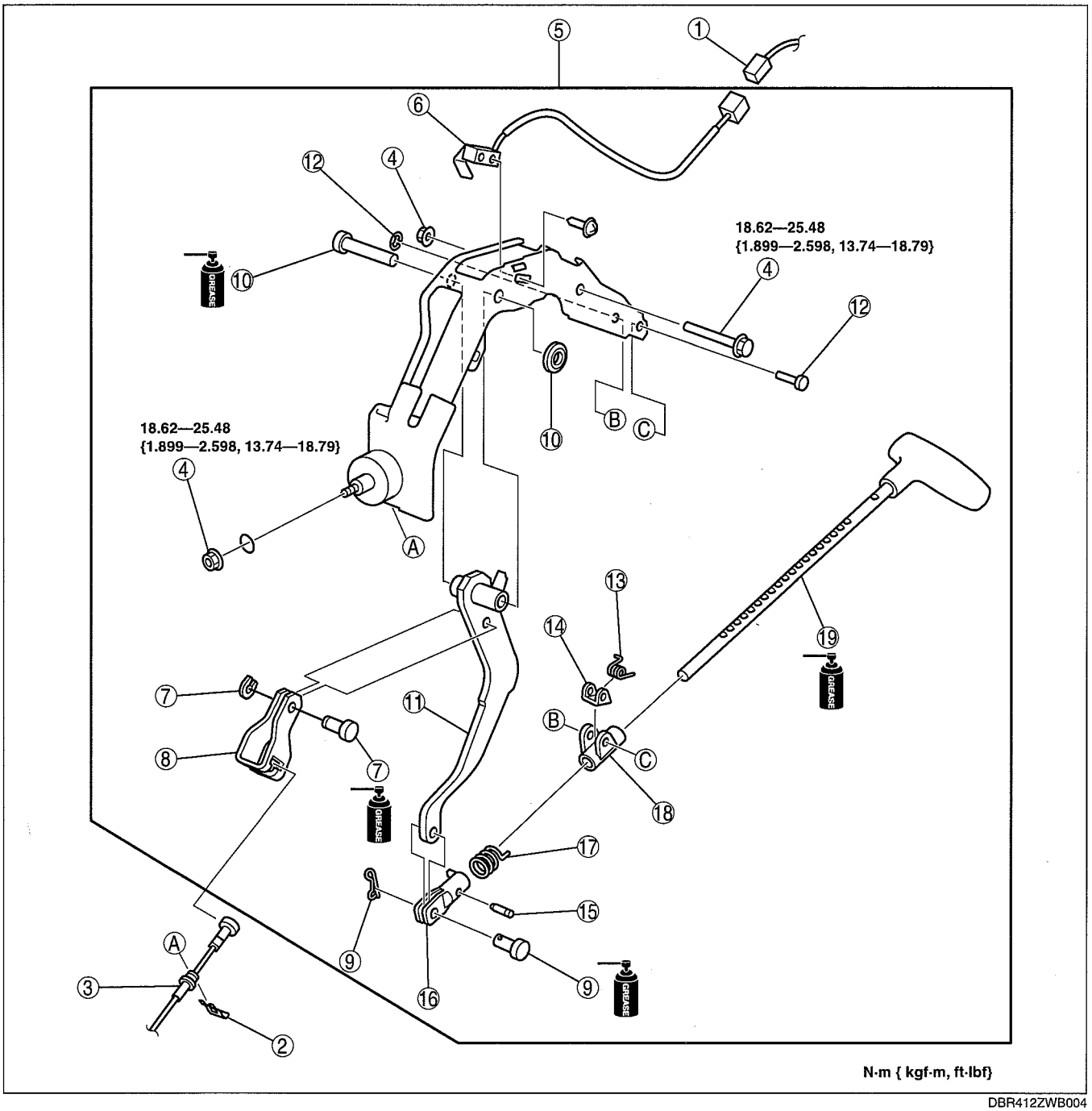
Checking for vacuum loss (loaded condition)

1. Start the engine.
2. Depress the brake pedal with a force of **200 N {20 kgf, 45 lbf}**.
3. With the brake pedal held depressed, stop the engine when the vacuum gauge indicates **67 kPa {500 mmHg, 20 inHg}**.
4. Observe the vacuum gauge for **15 s**.
   - If the gauge indicates **64—66 kPa {476—499 mmHg, 18.8—19.6 inHg}**, the unit is operating.

PARKING BRAKE LEVER REMOVAL/INSTALLATION

dcf041244300w03

1. Remove the lower panel. (See 09-17-10 LOWER PANEL REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. After installation, inspect the parking brake lever stroke. (See 04-12-3 PARKING BRAKE LEVER INSPECTION.)



DBR412ZWB004

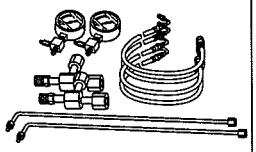
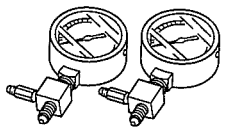
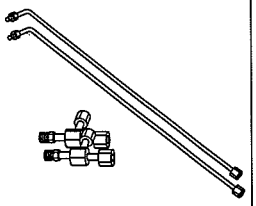
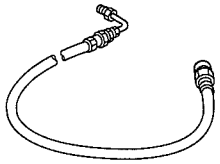
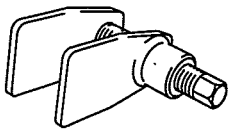
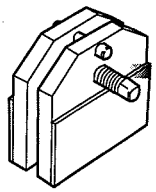
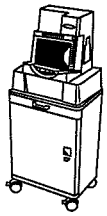
1	Parking brake switch connector
2	Clip
3	Front parking brake cable (See 04-12-5 PARKING BRAKE CABLE REMOVAL/INSTALLATION [WL-3].) (See 04-12-6 PARKING BRAKE CABLE REMOVAL/INSTALLATION [WL-C (EXCEPT Hi-Rider)].) (See 04-12-7 PARKING BRAKE CABLE REMOVAL/INSTALLATION [WL-C (Hi-Rider), WE-C].)
4	Bolt and nut
5	Parking brake lever component

6	Parking brake switch
7	Clip and joint pin
8	Cable connector
9	Clip and joint pin
10	Clip and joint pin
11	Lever
12	Clip and joint pin
13	Spring
14	Ratchet pawl

04-60 SERVICE TOOLS

BRAKES SST

dcf046000000w01

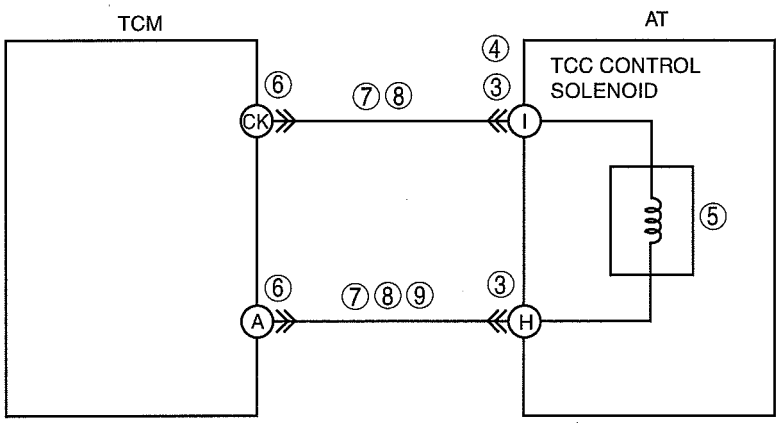
49 0259 770B Flare nut wrench 	49 U043 0A0A Oil pressure gauge set 	49 U043 004A Oil pressure gauge (Part of 49 U043 0A0A) 
49 U043 005 Joint (Part of 49 U043 0A0A) 	49 U043 006 Hose (Part of 49 U043 0A0A) 	49 0221 600C Disc brake expand tool 
49 T033 001A Disc brake piston stopper 	WDS 	—

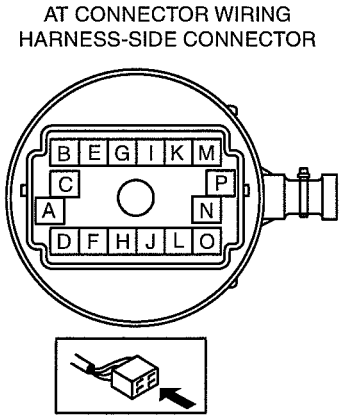
04

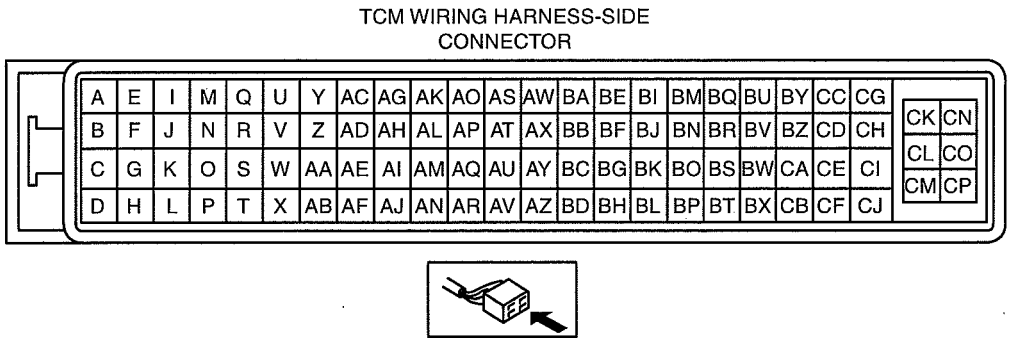
DTC P0740, P0741, P0742, P0743, P0744 [5R55S]

id0502c1814800

DTC P0740	**Torque converter clutch (TCC) control solenoid circuit malfunction (open circuit)**
DTC P0741	**Torque converter clutch (TCC) control solenoid circuit malfunction (stuck off)**
DTC P0742	**Torque converter clutch (TCC) control solenoid circuit malfunction (stuck on)**
DTC P0743	**Torque converter clutch (TCC) control solenoid circuit malfunction (open or short circuit)**
DTC P0744	**Torque converter clutch (TCC) control solenoid circuit malfunction (short to power)**
DETECTION CONDITION	• P0740: Open circuit in circuit between TCC control solenoid and TCM, or in TCC control solenoid internal circuit. • P0741: Torque converter clutch slipping indicating a mechanical or hydraulic concern. • P0742: Short to ground in circuit between TCC control solenoid and TCM, or in TCC control solenoid internal circuit. • P0743: Open or short circuit in circuit between TCC control solenoid and TCM, or in TCC control solenoid internal circuit. • P0744: Short to power supply in circuit between TCC control solenoid and TCM, or in TCC control solenoid internal circuit.
POSSIBLE CAUSE	• TCC control solenoid malfunction. • Short to ground in wiring harness between AT connector terminal I (wiring harness-side) and TCM terminal CK (wiring harness-side). • Short to ground in wiring harness between AT connector terminal H (wiring harness-side) and TCM terminal A (wiring harness-side). • Short to power supply in wiring harness between AT connector terminal H (wiring harness-side) and TCM terminal A (wiring harness-side). • Open circuit in wiring harness between AT connector terminal I (wiring harness-side) and TCM terminal CK (wiring harness-side). • Open circuit in wiring harness between AT connector terminal H (wiring harness-side) and TCM terminal A (wiring harness-side). • Damaged connector between AT connector and TCM. • TCM malfunction.







Diagnostic procedure

STEP	INSPECTION		ACTION
1	**VERIFY FREEZE FRAME DATA HAS BEEN RECORDED** • Has the FREEZE FRAME DATA been recorded?	Yes	Go to the next step.
		No	Record the FREEZE FRAME DATA on the repair order, then go to the next step.

STEP	INSPECTION		ACTION
4	**INSPECT POWER SUPPLY CIRCUIT** • Turn the engine switch to the ON position (engine off). • Inspect the voltage at O/D OFF switch terminal C (wiring harness-side). • Is the voltage **approx. 12 V**?	Yes	Go to the next step.
		No	Inspect the engine switch and wiring harness, then go to Step 10.
5	**INSPECT O/D OFF SWITCH** • Turn the engine switch to the LOCK position. • Inspect the O/D OFF switch. (See 05-13-19 O/D OFF SWITCH INSPECTION [5R55S].) • Is the O/D OFF switch normal?	Yes	Go to the next step.
		No	Replace the selector lever, then go to Step 10. (See 05-14-4 SELECTOR LEVER REMOVAL/INSTALLATION.)
6	**INSPECT TCM CONNECTOR FOR POOR CONNECTION** • Disconnect the TCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is the connection normal?	Yes	Go to the next step.
		No	Repair or replace connector and/or terminals, then go to Step 10.
7	**INSPECT O/D OFF SWITCH CIRCUIT FOR OPEN CIRCUIT** • Inspect for continuity between the TCM terminal BM (wiring harness-side) and O/D OFF switch terminal D (wiring harness-side). • Is there continuity between terminals?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to Step 10.
8	**INSPECT O/D OFF SWITCH CIRCUIT FOR SHORT TO GROUND** • Turn the engine switch to the LOCK position. • Inspect for continuity between O/D OFF switch terminal D (wiring harness-side) and body ground. • Is there continuity?	Yes	Repair or replace the wiring harness, then go to the Step 10.
		No	Go to the next step.
9	**INSPECT O/D OFF SWITCH CIRCUIT FOR SHORT TO POWER SUPPLY** • Turn the engine switch to the ON position (engine off). • Inspect the voltage at O/D OFF switch terminal D (wiring harness-side). • Is the voltage **0 V**?	Yes	Go to the next step.
		No	Repair or replace the wiring harness, then go to the next step.
10	**VERIFY TROUBLESHOOTING OF DTC P1780 COMPLETED** • Make sure to reconnect all the disconnected connectors. • Clear the DTC from memory using the IDS/PDS. • Perform the "After Repair Procedure". (See 05-02-4 AFTER REPAIR PROCEDURE [5R55S].) • Are any DTCs present?	Yes	Replace the TCM, then go to the next step. (See 05-13-44 TCM REMOVAL/INSTALLATION [5R55S].)
		No	Go to the next step.
11	**VERIFY DTCS** • Are DTCs except for P1780 output?	Yes	Go to the applicable DTC inspection. (See 05-02-5 DTC TABLE [5R55S].)
		No	DTC troubleshooting completed.

NO.12 TORQUE CONVERTER CLUTCH (TCC) NON-OPERATION [5R55S]

id0503c1801700

12	Torque converter clutch (TCC) non-operation
DESCRIPTION	• TCC does not operate when vehicle reaches TCC operation range.
POSSIBLE CAUSE	• Basically, the TCC does not operate when the fail-safe is operating. Verify the DTC first. **Caution** • **If the TCC is stuck, inspect it. In addition, inspect the oil cooler for foreign particles which may have mixed in with the ATF.** 1. TCC is burned (1) Input sensor system malfunction • ECT sensor • TFT sensor • Sensor ground (2) Output solenoid valve system malfunction (Sticking) • TCC control solenoid malfunction (3) Main control malfunction (Poor operation, stuck) • TCC hydraulic pressure system • Improper pressures • Fluid pump malfunction • Converter malfunction 2. Accelerator pedal position sensor malfunction (Not operating linearly) 3. Brake switch malfunction (Always ON) 4. TCM malfunction **Note** • Before the following the troubleshooting steps, make sure that the Automatic Transmission On-Board Diagnostic and Automatic Transmission Basic Inspections are conducted. (See 05-03-4 BASIC INSPECTION [5R55S].)

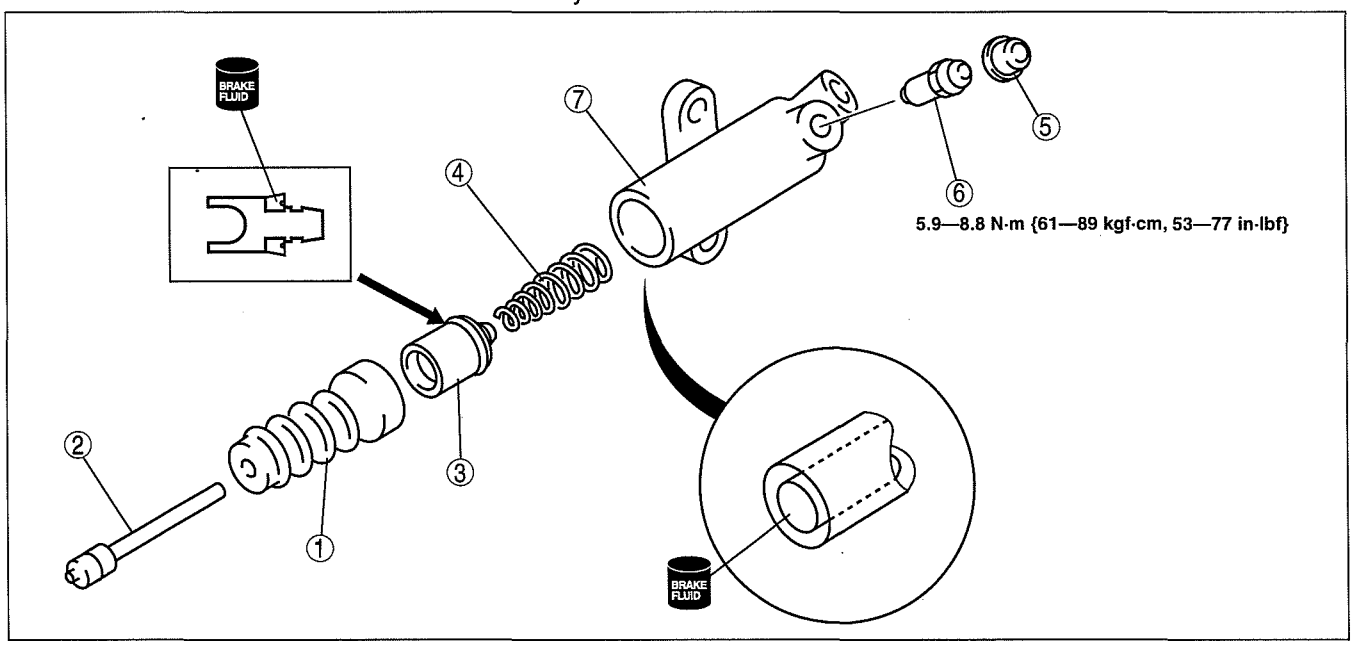
Diagnostic procedure

STEP	INSPECTION		ACTION
1	Check the value at the following. (See 05-02-45 PID/DATA MONITOR INSPECTION [5R55S].) **PCM PIDs (using IDS/PDS):** • APP • VSS **TCM PIDs (using IDS/PDS):** • TFT Are they normal?	Yes	Go to the next step.
		No	Repair or replace any malfunctioning parts.
2	Disconnect the TCM connector. Is the resistance between TCM ground terminal CO and body ground, and between TCM ground terminal CL and body ground **less than 5.0 ohms**?	Yes	Go to the next step.
		No	Repair the wiring harness.
3	Measure the resistance between TCM terminal A and AT connector terminal H, and between TCM terminal CK and AT connector terminal F. Are the resistances **less than 5.0 ohms**?	Yes	Go to the next step.
		No	Repair the TCC control solenoid circuit. Reconnect the TCM connector.
4	Inspect the TCC control solenoid. (See 05-13-34 SOLENOID VALVE INSPECTION [5R55S].) Are the TCC control solenoids operating properly?	Yes	Replace TCM.
		No	Replace TCC control solenoid. If the problem remains, overhaul the transmission and repair or replace any malfunctioning parts.
5	• Verify test results. — If normal, return to the diagnostic index to service any additional symptoms. — If the malfunction remains, inspect the related Service Information and perform repair or diagnosis. • If the vehicle repaired, the troubleshooting is completed. • If the vehicle the not repaired or additional diagnostic information is not available, replace the TCM.		

CLUTCH RELEASE CYLINDER DISASSEMBLY/ASSEMBLY

dcf051041920w02

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



DBG510ZWB004

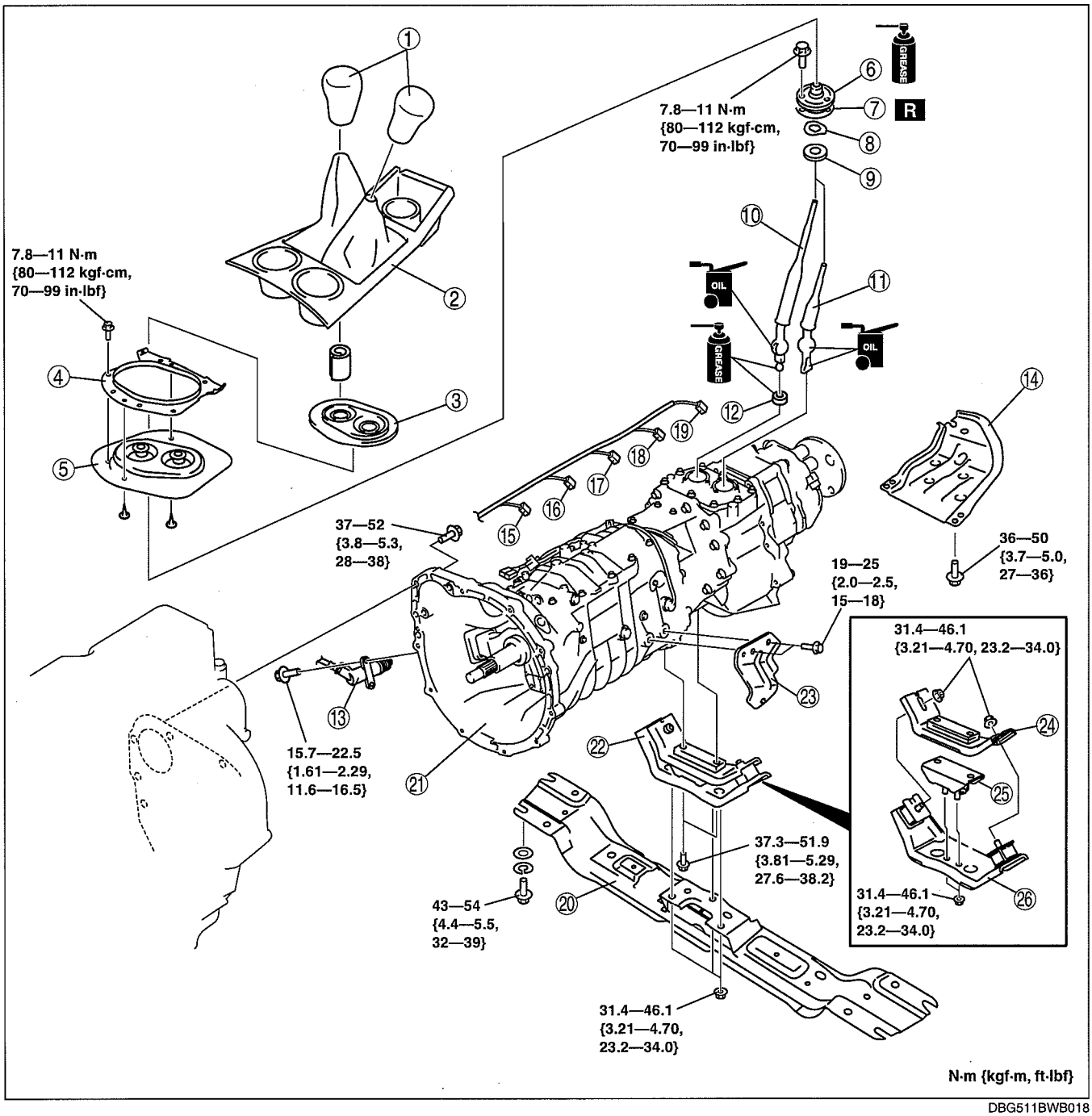
1	Boot
2	Push rod
3	Piston, piston cup component
4	Return spring

5	Bleeder cap
6	Bleeder screw
7	Clutch release cylinder body

TRANSMISSION AND TRANSFER REMOVAL/INSTALLATION [S15MX-D]

dcf051100000w08

1. Disconnect the negative battery cable.
2. Remove the front propeller shaft and rear propeller shaft. (See 03-15-2 PROPELLER SHAFT REMOVAL/ INSTALLATION.)
3. Remove the front pipe and oxidation catalytic converter. (See 01-15B-2 EXHAUST SYSTEM REMOVAL/ INSTALLATION [WL-C, WE-C].)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Perform the 'INSPECTION AFTER TRANSMISSION INSTALLATION', and verify that there is no abnormality. (See 05-11B-12 INSPECTION AFTER TRANSMISSION AND TRANSFER INSTALLATION [S15MX-D].)



DBG511BWB018

1	Shift lever knob
2	Boot panel (See 09-17-12 CONSOLE REMOVAL/ INSTALLATION.)
3	Dust boot
4	Change boot upper plate

5	Boot
6	Dust boot
7	Gasket
8	Wave washer
9	Change bush
10	Shift lever

O/D OFF SWITCH INSPECTION [5R55S]

id0513c1254200

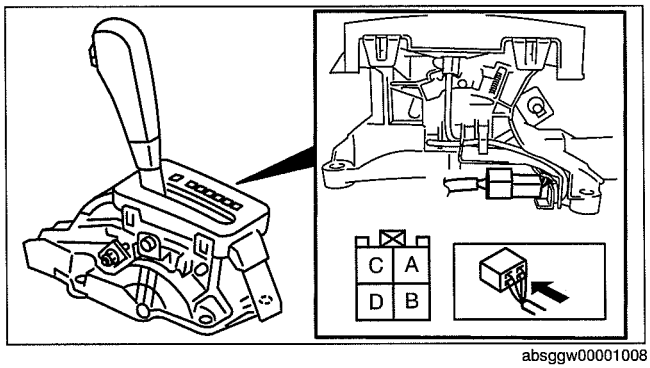
Operation Inspection

1. Turn the engine switch to the ON position.
2. Verify that the O/D OFF indicator light is not illuminated. Press the O/D OFF switch and verify that the O/D OFF indicator light illuminates.
   - If there is any malfunction, inspect the terminal voltage of the O/D OFF switch. (See 05-13-19 Voltage Inspection.)

Voltage Inspection

1. Turn the engine switch to the ON position.
2. Measure the voltage at the O/D OFF switch connector.
   - If there is any malfunction, inspect for continuity at the O/D OFF switch. (See 05-13-19 Continuity Inspection.)

Position		Connector terminal	
		C	D
OFF (Normal)	(V)	B+	0
ON (Depressed)	(V)	0	0



absggw00001008

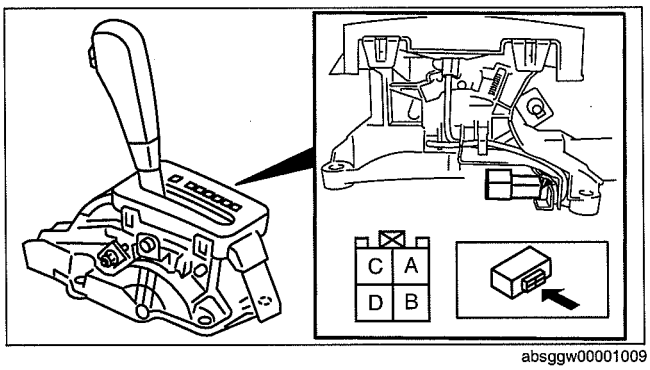
Continuity Inspection

1. Disconnect the O/D OFF switch connector.
2. Verify that the continuity is as indicated in the table.
   - If the switch is normal, inspect the wiring harness. (O/D OFF switch—TCM, O/D OFF switch—Body ground)
   - If there is any malfunction, replace the selector lever component. (See 05-14-4 SELECTOR LEVER REMOVAL/ INSTALLATION.)

○—○ : Continuity

Switch	Terminal	
	C	D
ON (Normal)		
OFF (Depressed)	○	○

absggw00001858



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Terminal	Signal	Connected to	Test Condition	Voltage/ Resistance	Action
I	Pressure control solenoid A control	Pressure control solenoid A	Inspect resistance between TCM terminals I and CK (wiring harness-side).	3.3—7.5 ohm	• Inspect the pressure control solenoid A (See 05-13-34 SOLENOID VALVE INSPECTION [5R55S]) • Inspect the related wiring harness
J	Pressure control solenoid B control	Pressure control solenoid B	Inspect resistance between TCM terminals J and CK (wiring harness-side).	3.3—7.5 ohm	• Inspect the pressure control solenoid B (See 05-13-34 SOLENOID VALVE INSPECTION [5R55S]) • Inspect the related wiring harness
K	Selector position indicator signal 1	Instrument cluster	Inspect continuity between TCM and instrument cluster (wiring harness-side).	Continuity	• Inspect the related wiring harness
L	—	—	—	—	—
M	Pressure control solenoid C control	Pressure control solenoid C	Inspect resistance between TCM terminals M and CK (wiring harness-side).	3.3—7.5 ohm	• Inspect the pressure control solenoid C (See 05-13-34 SOLENOID VALVE INSPECTION [5R55S]) • Inspect the related wiring harness
N	4x4 HI indicator output	Instrument cluster	Engine switch ON	B+	• Inspect the instrument cluster • Inspect the related wiring harness
			Engine switch OFF	Below 1.0 V	
O	—	—	—	—	—
P	—	—	—	—	—
Q	Selector position indicator signal 2	Instrument cluster	Inspect continuity between TCM and instrument cluster (wiring harness-side).	Continuity	• Inspect the related wiring harness
R	4x4 LO indicator output	Instrument cluster	Engine switch ON	B+	• Inspect the instrument cluster • Inspect the related wiring harness
			Engine switch OFF	Below 1.0 V	
S	—	—	—	—	—
T	—	—	—	—	—
U	Vehicle speed output	Instrument cluster	Inspect continuity between TCM and instrument cluster (wiring harness-side).	Continuity	• Inspect the related wiring harness
V	—	—	—	—	—
W	—	—	—	—	—
X	—	—	—	—	—
Y	—	—	—	—	—
Z	—	—	—	—	—
AA	—	—	—	—	—
AB	—	—	—	—	—
AC	—	—	—	—	—
AD	Output shaft speed (+)	OSS sensor	Inspect resistance between TCM terminals AD and AG (wiring harness-side).	325—485 ohm	• Inspect the OSS sensor (See 05-13-32 OUTPUT SHAFT SPEED (OSS) SENSOR INSPECTION [5R55S]) • Inspect the related wiring harness
AE	—	—	—	—	—
AF	—	—	—	—	—

CONTROL VALVE BODY REMOVAL [5R55S]

id0513c1710600

On-Vehicle Removal

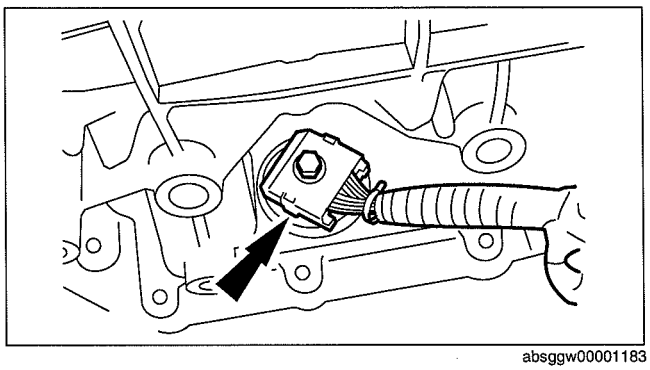
Warning

- **A hot transmission and ATF can cause severe burns. Turn off the engine and wait until they are cool before replacing ATF.**
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

Caution

- **Clean the transmission exterior thoroughly with a stream cleaner or cleaning solvents before removal.**

1. Disconnect the negative battery cable.
2. Drain the ATF. (See 05-13-16 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT [5R55S].)
3. Remove the digital TR sensor insulator.
4. Remove the CKP sensor insulator.
5. Remove the insulator bracket.
6. Disconnect the AT connector.



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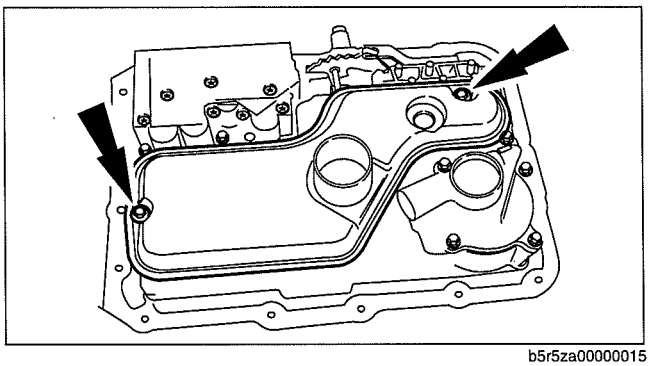
7. Remove the transmission fluid filter and seal component and discard.



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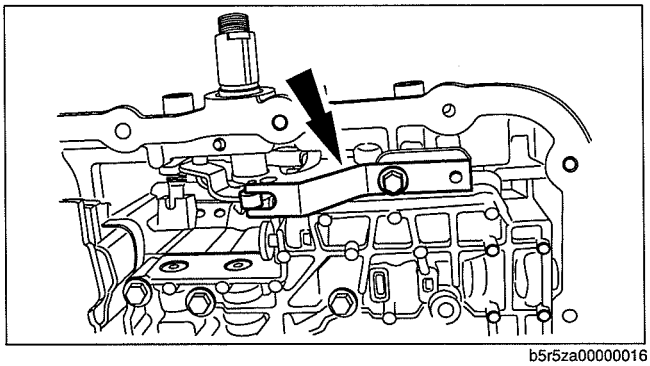
8. Remove the detent spring.



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06-50 TECHNICAL DATA

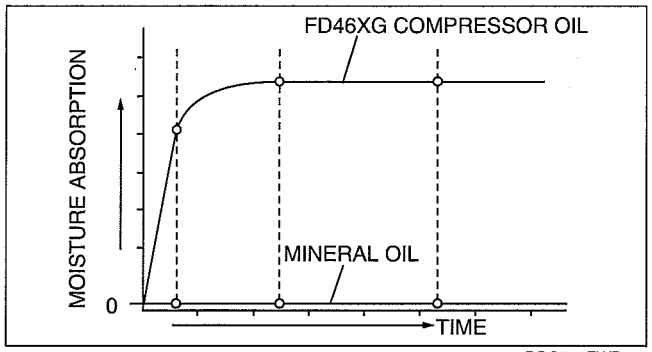
STEERING TECHNICAL DATA

dcf065000000w01

Item	Specification
Steering wheel play	0—30 mm {0—1.18 in}
Steering wheel effort	7.8 N·m {80 kgf·cm, 58 in·lbf} max.
Steering shaft length	789.9—792.9 mm {31.10—31.22 in}
Steering gear worm shaft preload	0.64—1.23 N·m {6.6—12.5 kgf·cm, 5.7—10.8 in·lbf} [Pull scale reading: 6.4—12.3 N {0.66—1.25 kgf, 1.44—2.76 lbt}]
Tie-rod end rotational torque	0.49—1.18 N·m {5—12 kgf·cm, 4.4—10.4 in·lbt} [Pull scale reading: 4.9—11.8 N·m {0.5—1.2 kgf, 1.11—2.65 lbt}]
Steering gear backlash	0 mm
Power steering fluid type	ATF M-III or equivalent (e.g. Dexron®II)
Power steering fluid capacity (approx. quantity)	1.1 L {1.2 US qt, 1.0 Imp qt}
Oil pump fluid pressure	9.3—9.8 MPa {94.8—99.9 kgf/cm^2, 1348—1421 psi}
Gear housing fluid pressure	9.30—9.79 MPa {94.8—99.8 kgf/cm^2, 1348—1419psi}

Handling Compressor Oil

- **Use only FD46XG compressor oil for this vehicle. Using a PAG oil other than FD46XG compressor oil can damage the A/C compressor.**
- **Do not spill FD46XG compressor oil on the vehicle. A drop of compressor oil on the vehicle surface can eat away at the paint. If oil gets on the vehicle, wipe it off immediately.**
- **FD46XG compressor oil (PAG oil) has a higher moisture absorption efficiency than the previously used mineral oil. If moisture mixes with the compressor oil, the refrigerant system could be damaged. Therefore, install caps immediately after using the compressor oil or removing refrigerant system parts to prevent moisture absorption.**

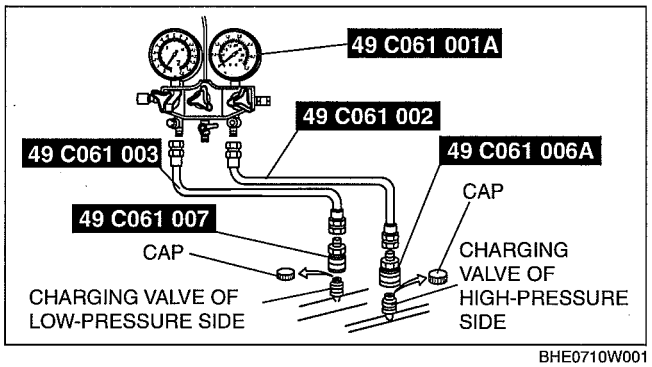


DBG710ZWB001

REFRIGERANT SYSTEM GENERAL PROCEDURES

dcf071000000w03

1. Fully close the valves of the **SST** (49 C061 001A).
2. Connect the **SSTs** (49 C061 002, 49 C061 003) to the high- and low-pressure side joints of the **SST** (49 C061 001A).
3. Connect the **SSTs** (49 C061 006A, 49 C061 007) to the ends of the **SSTs** (49 C061 002, 49 C061 003).
4. Connect the **SSTs** (49 C061 006A, 49 C061 007) to the charging valves.

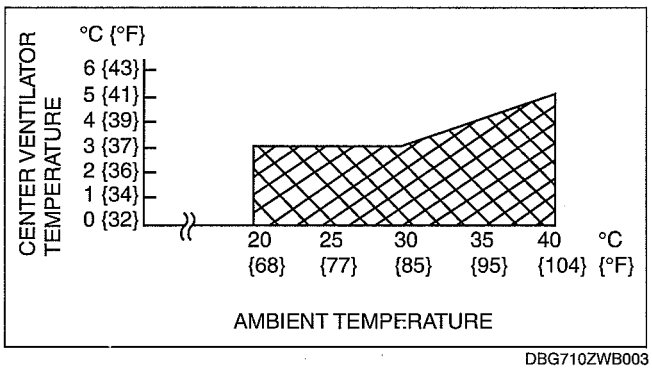


BHE0710W001

REFRIGERANT SYSTEM PERFORMANCE TEST

dcf071000000w04

1. Inspect the refrigerant pressure. (See 07-10-3 REFRIGERANT PRESSURE CHECK.)
2. Place a dry-bulb thermometer in the driver-side center ventilator outlet.
3. Start the engine and after it is warmed up, run it at a constant **1,500 rpm**.
4. Set the fan speed to MAX HI.
5. Turn the A/C switch on.
6. Set to RECIRCULATE mode.
7. Set the temperature control to MAX COLD.
8. Set to VENT mode.
9. Close all the doors and windows.
10. Wait until the air conditioner output temperature stabilizes.
    Stabilized condition
    - The A/C compressor repeatedly turns on and off at regular intervals.
11. After the blower air is stabilized, read the dry-bulb thermometer.
12. Verify the ambient temperature.
13. Verify that the temperature reading is in the shaded zone.
    - If the there is any malfunction, inspect the refrigerant system according to the troubleshooting chart.



DBG710ZWB003

REFRIGERANT PRESSURE SWITCH REMOVAL/INSTALLATION

dcf074061503w01

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (See 07-10-3 RECOVERY.) (See 07-10-3 REFRIGERANT CHARGING.)

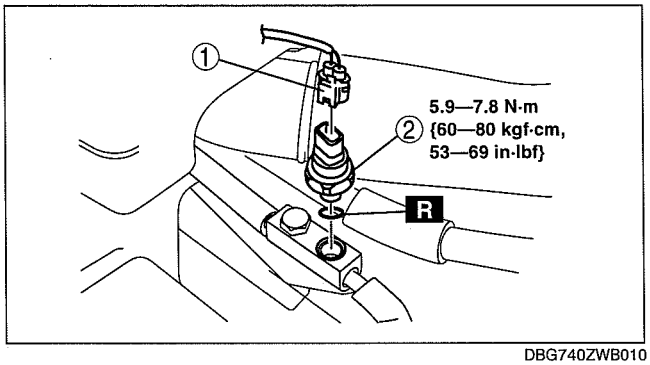
Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

3. Remove in the order indicated in the table.

1	Refrigerant pressure switch connector
2	Refrigerant pressure switch

4. Install in the reverse order of removal.
5. Perform the refrigerant system performance test. (See 07-10-2 REFRIGERANT SYSTEM PERFORMANCE TEST.)



DBG740ZWB010

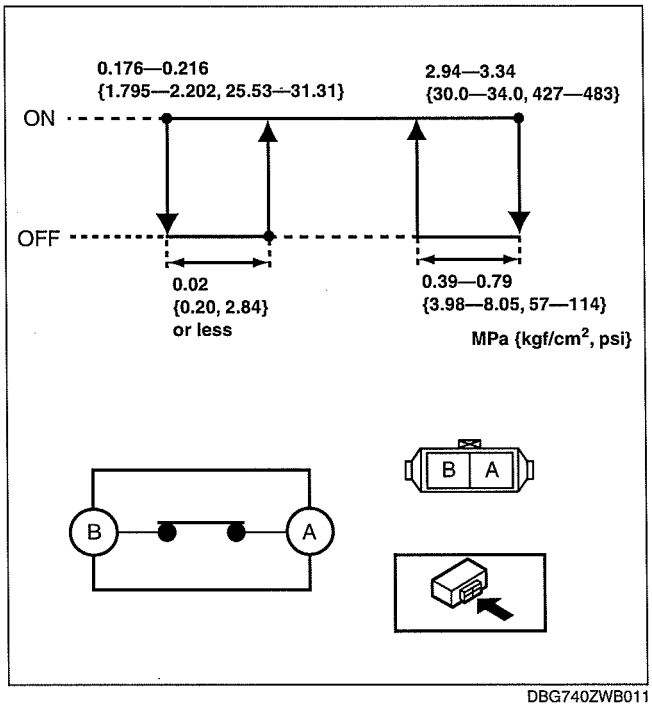
Refrigerant Pressure Switch Installation Note

1. Apply compressor oil to O-ring and connect the joint.

REFRIGERANT PRESSURE SWITCH INSPECTION

dcf074061503w02

1. Install the **SST** (gas charging set).
2. Disconnect the refrigerant pressure switch connector.
3. Verify the high-pressure side reading of the SST (manifold gauge) and continuity between the refrigerant pressure switch terminals.
   - If there is any malfunction, replace the refrigerant pressure switch.



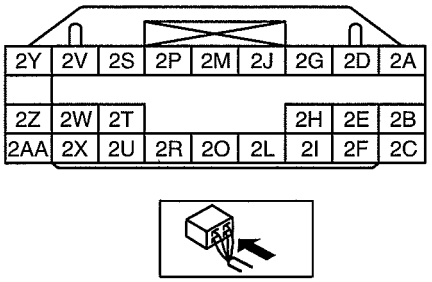
DBG740ZWB011

DTC B1877, B1878, B1879, B1885

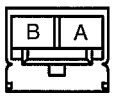
dcf080200000w12

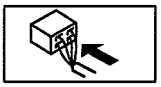
DTC	B1877	Driver-side pre-tensioner seat belt system resistance high
	B1878	Driver-side pre-tensioner seat belt system circuit short to power supply
	B1879	Driver-side pre-tensioner seat belt system circuit short to ground
	B1885	Driver-side pre-tensioner seat belt system resistance low
DETECTION CONDITION		**Warning** • **Detection conditions are for understanding the DTC outline before performing an inspection. Performing an inspection with only detection conditions may cause injury due to an operating error, or damage the system. When performing an inspection, always follow the inspection procedure.** • Resistance other than **1.5—3.1 ohms** detected in driver-side pre-tensioner seat belt circuit • Malfunction in the wiring harness between driver-side pre-tensioner seat belt and SAS control module
POSSIBLE CAUSE		• Open or short circuit in wiring harness between driver-side pre-tensioner seat belt and SAS control module • Driver-side pre-tensioner seat belt malfunction • SAS control module malfunction

SAS CONTROL MODULE WIRING HARNESS-SIDE CONNECTOR



DRIVER-SIDE PRE-TENSIONER SEAT BELT WIRING HARNESS-SIDE CONNECTOR





Diagnostic procedure

STEP	INSPECTION		ACTION
1	**INSPECT DRIVER-SIDE PRE-TENSIONER SEAT BELT** • Using the current diagnostic tool, verify the following PID/DATA monitor. (See 08-02-6 PID/DATA MONITOR TABLE.) — DR_PTENS • Is the resistance of the driver-side pre-tensioner seat belt normal? — Resistance: **1.5—3.1 ohms**	Yes	Replace the SAS control module. (See 08-10-6 SAS CONTROL MODULE REMOVAL/ INSTALLATION.)
		No	Go to the next step.
2	**INSPECT DRIVER-SIDE PRE-TENSIONER SEAT BELT CONNECTOR** **Warning** • **Handling the air bag system components improperly can accidentally deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read the service warnings and cautions before handling the air bag system components. (See 08-10-2 SERVICE WARNINGS.) (See 08-10-3 SERVICE CAUTIONS.)** • Turn the engine switch to LOCK position. • Disconnect the negative battery cable and wait for **1 min or more**. • Disconnect the driver-side pre-tensioner seat belt connector. • Is there any malfunction of the driver-side pre-tensioner seat belt connector?	Yes	Replace the air bag wiring harness.
		No	Go to the next step.

STEP	INSPECTION		ACTION
9	**CONFIRM THAT MALFUNCTION SYMPTOMS DO NOT RECUR AFTER REPAIR** • Turn the engine switch to LOCK position. • Disconnect the negative battery cable and wait for **1 min or more**. • Connect all SAS control module connectors. • Connect the driver and passenger-side pre-tensioner seat belt connectors. • Connect the driver and passenger-side seat connectors. • Connect the passenger-side air bag module connector. • Connect the clock spring connector. • Connect the instrument cluster connector. • Connect the negative battery cable. • Turn the engine switch to ON position. • Does the air bag system warning light operate properly?	Yes	Complete troubleshooting, then explain repairs to customer.
		No	Recheck malfunction symptoms, then repeat from Step 1 if malfunction recurs.

Speaker Inspection

1. With the audio power on, press the POWER button and simultaneously press the AUTO-M button for **approx. 1s.**
2. Inspect according to the following table:

INSPECTION	DISPLAY	ACTION	
• Start the speaker inspection mode. • Does each speaker output sound in the following order? 1. Front speaker and tweeter (LH) 2. Front speaker and tweeter (RH) 3. Rear speaker (RH)*1 4. Rear speaker (LH)*1	—	Yes	Speakers, and wiring harness between the base unit and speakers are normal.
		No	• Inspect the following parts. — Malfunctioning speaker — Wiring harness between base unit and malfunctioning speaker

3. Turn the audio off or the ignition switch to the LOCK position to stop the diagnostic assist function.

*1 : May or may not be equipped, depending on the vehicle.

Radio Reception Condition Inspection

1. With the audio power on and at radio mode, press the POWER button and simultaneously press the Preset 2 button for **approx. 1 s.**
2. Inspect according to the following table:

Caution

- **Even if the system is normal, radio reception may be difficult depending on where the system is inspected (indoors/outdoors, or conditions at the location). Before inspecting the system, verify that radio reception is adequate.**
- **When inspecting, select a frequency band (radio station) with the best reception.**

INSPECTION	DISPLAY	ACTION
Start the radio reception condition inspection mode.	NORMAL CONDITION S-METER 5 | S-METER 9	Antenna, antenna feeder and base unit are normal
	S-METER 3 | S-METER 4	Change the frequency (radio station) and inspect again.
	MALFUNCTION PRESENT S-METER 0 | S-METER 2	Inspect the antenna and antenna feeder. • If either the antenna or the antenna feeder is not normal, replace the malfunctioning part. • If the antenna and antenna feeder are normal, replace the base unit.

3. Turn the audio off or the ignition switch to the LOCK position to stop the diagnostic assist function.

STEP	INSPECTION		ACTION
6*	**INSPECT WIRING HARNESS BETWEEN KEYLESS CONTROL MODULE AND THEFT-DETERRENT CONTROL MODULE FOR CONTINUITY AND SHORT** • Disconnect keyless control module connector. • Inspect wiring harness between keyless control module connector terminal J and theft-deterrent control module connector (24-pin) terminal V. • Is there open circuit and/or short circuit at above wiring harness?	Yes	Repair wiring harness between keyless control module and theft-deterrent control module, then go to Step 15.
		No	Replace keyless control module and reprogram transmitter ID code, then go to Step 15.
7	**INSPECT KEYLESS CONTROL MODULE AND THEFT-DETERRENT CONTROL MODULE POWER SUPPLY FUSES** • Are keyless control module and theft-deterrent control module power supply fuses okay?	Yes	Go to next step.
		No	Check for a short to ground on blown fuse's circuit. Repair or replace if necessary. Install appropriate amperage fuse.
8	**INSPECT DOOR SWITCHES** • Are door switches installed securely?	Yes	Go to next step.
		No	Install door switch(es) securely, then go back to Step 2 of keyless entry system preliminary inspection.
9	**INSPECT THEFT-DETERRENT CONTROL MODULE INSTALLATION** • Is theft-deterrent control module installed to joint box securely?	Yes	Go to next step.
		No	Install theft-deterrent control module securely, then go to Step 15.
10*	**INSPECT WIRING HARNESS BETWEEN KEYLESS CONTROL MODULE POWER SUPPLIES AND KEYLESS CONTROL MODULE FOR CONTINUITY** • Turn ignition switch to ON position. • Measure voltage at following keyless control module terminals: — IG1 signal (Terminal A) — B+ signal (Terminal B) • Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and keyless control module, then go to Step 15.
11*	**INSPECT WIRING HARNESS BETWEEN KEYLESS CONTROL MODULE POWER SUPPLY, KEYLESS CONTROL MODULE AND GROUND FOR SHORT TO B+** • Disconnect keyless control module connector. • Measure voltage at following keyless control module connector terminal A. • Is voltage **approximately 12 V**?	Yes	Repair malfunctioning wiring harness, then go to Step 15.
		No	Go to next step.
12*	**INSPECT WIRING HARNESS BETWEEN KEYLESS CONTROL MODULE AND GROUND FOR CONTINUITY** • Is there continuity between keyless control module connector terminal L and ground?	Yes	Go to next step.
		No	Repair wiring harness between keyless control module and ground, then go to Step 15.
13*	**INSPECT WIRING HARNESS BETWEEN KEYLESS CONTROL MODULE AND DOOR SWITCH FOR CONTINUITY AND SHORT** • Turn ignition switch to LOCK position. • Disconnect keyless control module connector. • Inspect wiring harness between keyless control module connector terminal C and door switch connector terminal. • Is there open circuit and/or short circuit at above wiring harness?	Yes	Repair wiring harness between keyless control module and door switch or replace malfunction door switch, then go to Step 15.
		No	Go to next step.

STEP	INSPECTION		ACTION
3	• Remove center panel from audio unit, and reinstall center panel to audio unit. • Turn audio power switch ON. • Push POWER SW button and MEDIA button at same time for approximately 1 second to enter system to switch check mode. • Push all buttons and check if buzzer sounds. • Is all buttons okay?	Yes	Replace audio unit.
		No	Replace center panel.

NO.6 RECEPTION FREQUENCY OF RADIO SLIPS

dcf090366900w21

6	Reception frequency of radio slip/Possible DTC: 09:Er22
POSSIBLE CAUSE	• Audio unit malfunction • Electronic jamming from outside, or inferior condition of broadcasting station radio wave

Diagnostic procedure

STEP	INSPECTION		ACTION
1	• Push SEEK button and check if desired broadcasting station is tuned. • Is it okay?	Yes	Go to the Step 3.
		No	Go to the next step.
2	• Check if other broadcasting station is received at certain place when indication of reception frequency stays. • Is other station received? **Note** • When you receive weak signal from one broadcasting station and come close to broadcasting antenna which emits strong signal, broadcasting with strong signal is sometimes received.	Yes	Go to the next step.
		No	Replace audio unit.
3	• Compare reception with other audio unit on same model (model/unit) under same problem conditions. • Is reception equivalent between customer's unit and compared unit?	Yes	Troubleshooting completed (Audio unit is normal).
		No	Replace audio unit.

FOREWORD [CD PLAYER/CHANGER]

dcf090366900w22

Troubleshooting Index

No.	Items	Symptom	Possible DTC
1	CD player/changer	CD player/changer does not load the CD or ejects the CD immediately	03:Er01, 03:Er10
2		CD player/changer does not eject the CD	03:Er01
3		CD player/changer does not play the CD/No sound	03:Er07, 03:Er10
4		Sound jumps	03:Er02
5		CD player/changer scratches on the CD	03:Er02
6	CD changer	Disc changer is inoperative	—
7	MP3 applicable CD player	CD player does not play the MP3-formatted file	10:Er09, 22:Er09
8		MP3-formatted file folder selection is inoperative/Track search is inoperative	10:Er09, 22:Er09
9		CD player does not indicate the MP3 title text	—
10		CD player does not play the audio data (CDDA)	—
11	CD player/changer	Track change is inoperative	03:Er02

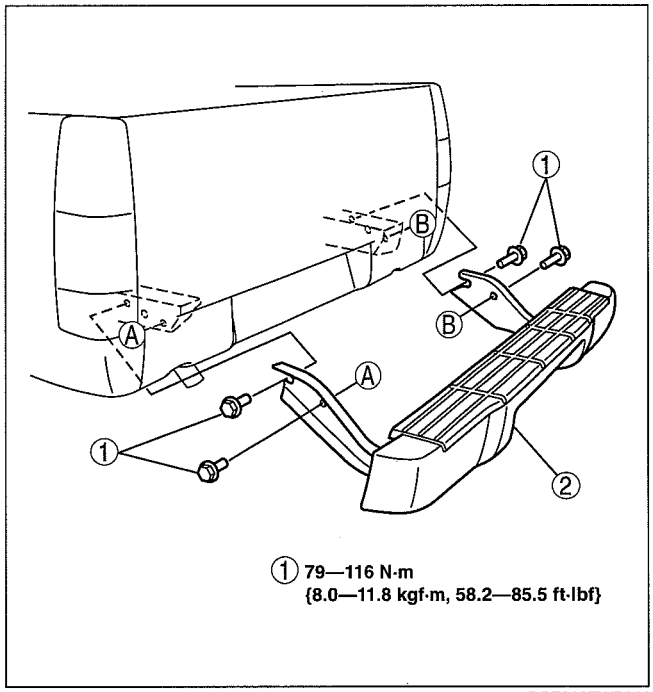
REAR BUMPER REMOVAL/INSTALLATION

dcf091050000w03

1. Disconnect the negative battery cable.
2. Remove the license plate light. (See 09-18-8 LICENSE PLATE LIGHT REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.

1	Bolt
2	Rear bumper

4. Install in the reverse order of removal.



DCF910ZWB012

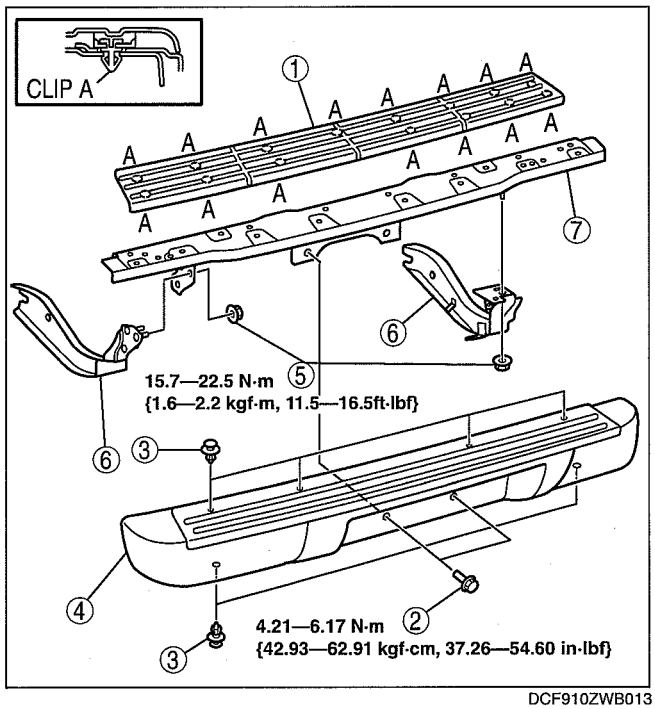
REAR BUMPER DISASSEMBLY/ASSEMBLY

dcf091050000w04

1. Disassemble in the order indicated in the table.

1	Rear bumper step
2	Bolt
3	Fastener
4	Rear bumper fascia
5	Nut
6	Rear bumper stay
7	Rear bumper reinforcement

2. Assemble in the reverse order of disassembly.



DCF910ZWB013

Reusing Windshield

Warning

- **Using the SST (piano wire) with bare hands can cause injury. Always wear gloves when using the SST (piano wire).**

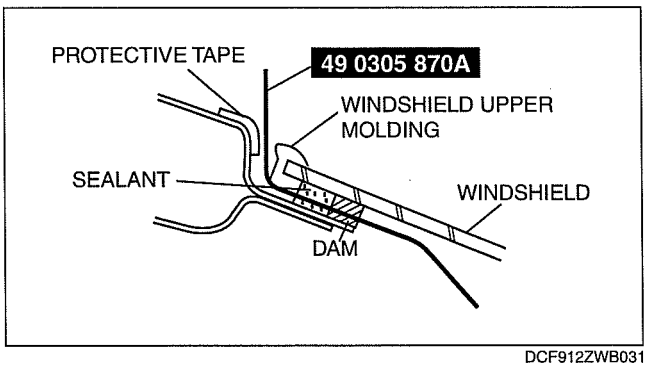
Note

- Before removing the windshield from the body, mark the position of the windshield by affixing tape to the windshield and body panel.

1. On the inside of the vehicle, insert the **SST** (piano wire) which has been cut to sufficient length.
2. Wind each end of the **SST** (piano wire) around a bar.

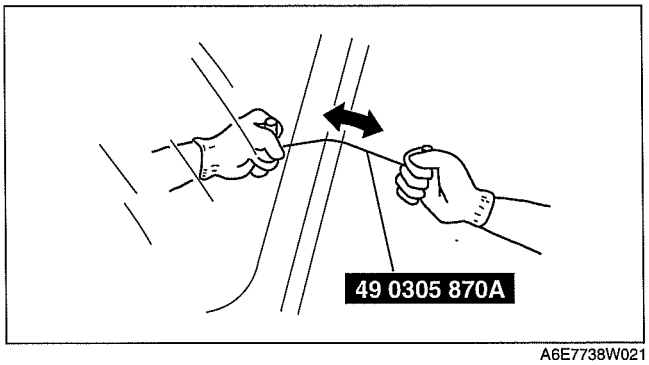
Note

- Use a long sawing action to spread the work over the whole length of the **SST** (piano wire) to prevent it from breaking due to localized heating.



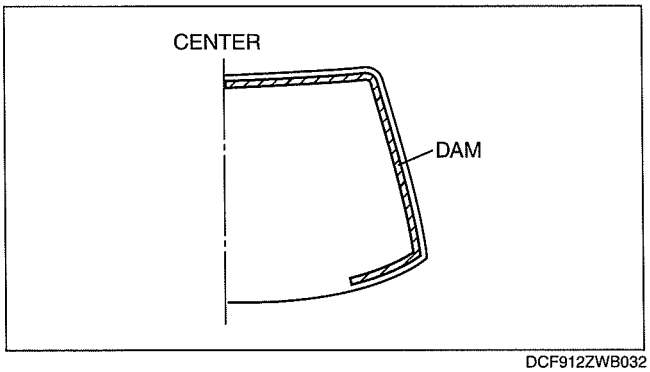
DCF912ZWB031

3. Secure one end of the **SST** (piano wire), and while pulling the other end, cut the sealant around the windshield.
4. Pinch the pin from the inside of the vehicle and detach it.
5. Remove the windshield.



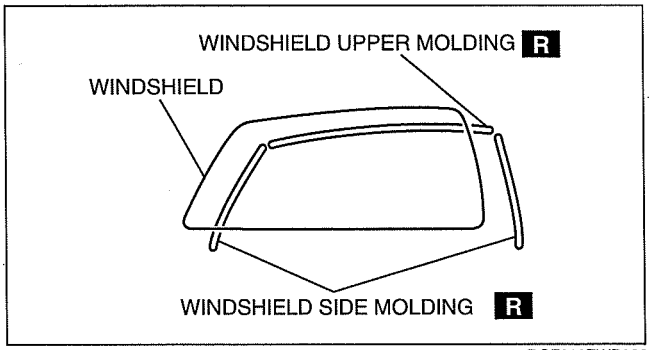
A6E7738W021

6. Remove the dam from the glass.



DCF912ZWB032

7. Remove the windshield upper molding and the windshield side molding from the windshield.

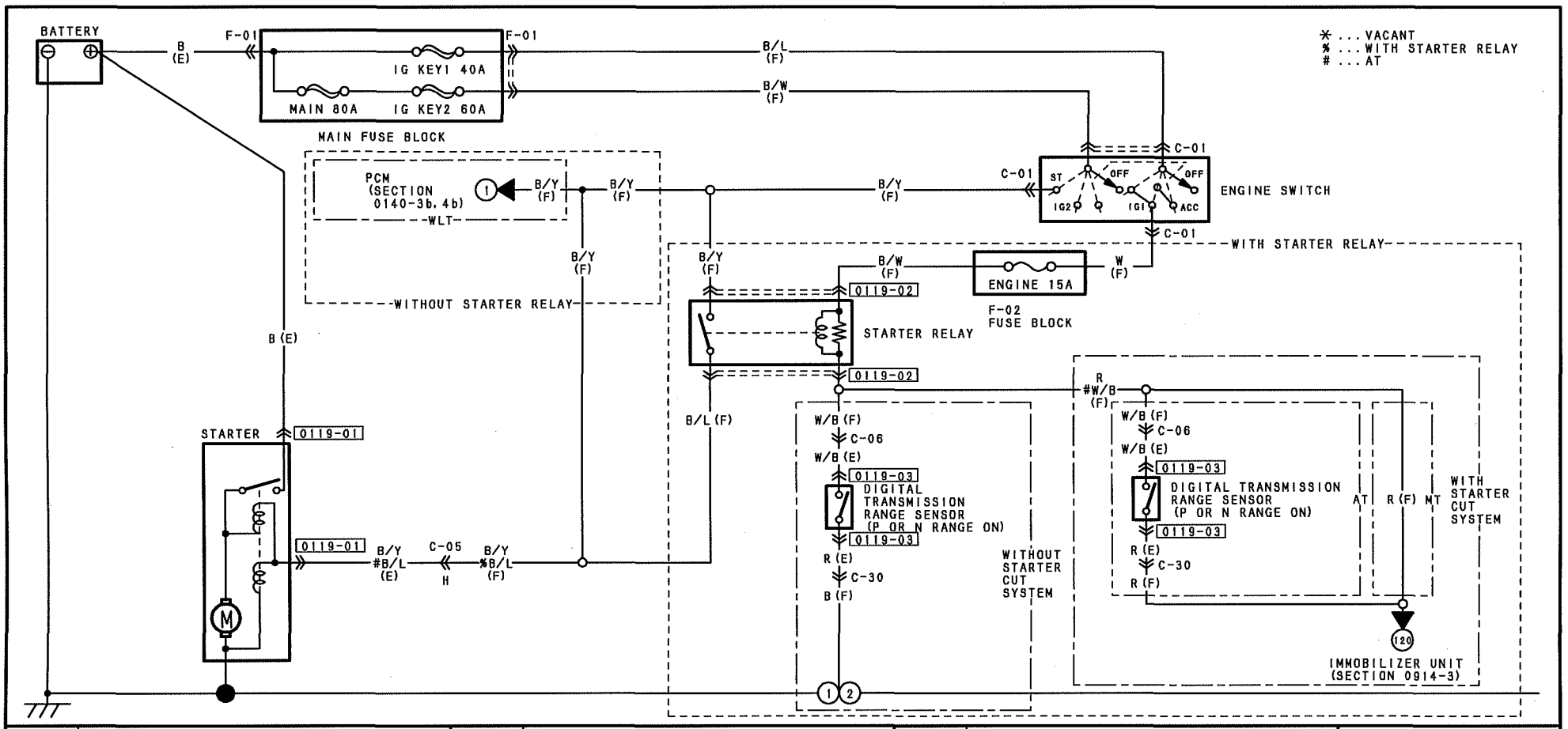


DCF912ZWB033

S

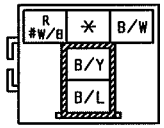
FM	FREQUENCY MODULATION
FP	FUEL PUMP
FPR	FUEL PUMP RELAY
GEN	GENERATOR
GND	GROUND
H/D	HEATER/DEFROSTER
HEAT	HEATER
HI	HIGH
HO2S	HEATED OXYGEN SENSOR
HS	HIGH SPEED
HU	HYDRAULIC UNIT
IAC	IDLE AIR CONTROL
IAT	INTAKE AIR TEMPERATURE
IG	IGNITION
ILLUMI	ILLUMINATION
INT	INTERMITTENT
JB	JOINT BOX
KS	KNOCK SENSOR
LCD	LIQUID CRYSTAL DISPLAY
LF	LEFT FRONT
LH	LEFT HAND
LO	LOW
LR	LEFT REAR
M	MOTOR
MAF	MASS AIR FLOW
MAP	MANIFOLD ABSOLUTE PRESSURE
MFI	MULTIPORT FUEL INJECTION
MID	MIDDLE
MIL	MALFUNCTION INDICATOR LAMP
MIN	MINUTE
MIX	MIXTURE
MPX	MULTIPLEX
MS	MIDDLE SPEED
MT	MANUAL TRANSMISSION
MTX	MANUAL TRANSAXLE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
O_2S	OXYGEN SENSOR
OBD	ON-BOARD DIAGNOSTIC
O/D	OVER DRIVE
OFF	SWITCH OFF
ON	SWITCH ON
OSC	OSCILLATOR
P	POWER
P/S	POWER STEERING
PCM	POWERTRAIN CONTROL MODULE
PJB	PASSENGER JUNCTION BOX

PNP	PARK/NEUTRAL POSITION
PRC	PRESSURE REGULATOR CONTROL
PRG	PURGE SOLENOID VALVE
PSP	POWER STEERING PRESSURE
PTC	POSITIVE TEMPERATURE COEFFICIENT HEATER
PWM	PULSE WIDTH MODULATION
QSS	QUICK-START SYSTEM
R	REAR
REC	RECIRCULATION
RF	RIGHT FRONT
RH	RIGHT HAND
RPM	REVOLUTIONS PER MINUTE
RR	RIGHT REAR
SAS	SOPHISTICATED AIR BAG SENSOR
SFI	SEQUENTIAL MULTIPOINT FUEL INJECTION
SOL	SOLENOID
SPV	SPILL VALVE
ST	START
SW	SWITCH
TC	TURBOCHARGER
TCC	TORQUE CONVERTER CLUTCH
TCM	TRANSMISSION(TRANSAXLE) CONTROL MODULE
TCS	TRACTION CONTROL SYSTEM
TEMP	TEMPERATURE
TFT	TRANSAXLE FLUID TEMPERATURE
TICS	TRIPLE INDUCTION CONTROL SYSTEM
TNS	TAIL NUMBER SIDE LIGHTS
TP	THROTTLE POSITION SENSOR
TR	TRANSMISSION(TRANSAXLE) RANGE
TWS	TOTAL WIRING SYSTEM
V	VOLT
VAF	VOLUME AIR FLOW SENSOR
VENT	VENTILATION
VICS	VARIABLE INERTIA CHARGING SYSTEM
VOL	VOLUME
VR	VOLTAGE REGULATOR
VRIS	VARIABLE RESONANCE INDUCTION SYSTEM
VSS	VEHICLE SPEED SENSOR
VTCS	VARIABLE TUMBLE CONTROL SYSTEM
W	WATT(S)
WOT	WIDE OPEN THROTTLE

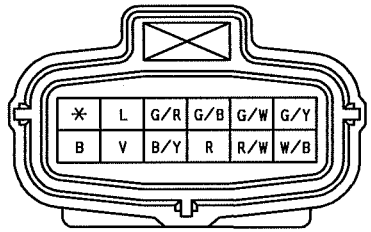


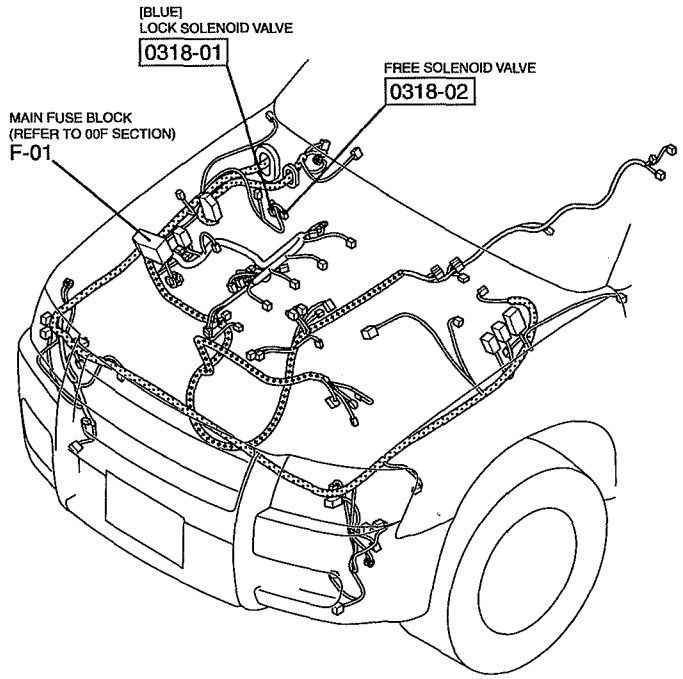
0119-01 STARTER (E)

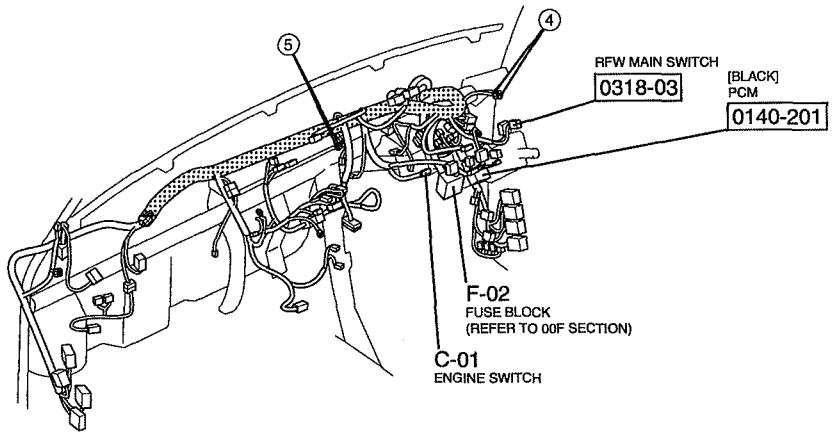
0119-02 STARTER RELAY (F)



0119-03 DIGITAL TRANSMISSION RANGE SENSOR (E)




[BLUE]
LOCK SOLENOID VALVE
0318-01
FREE SOLENOID VALVE
0318-02
MAIN FUSE BLOCK
(REFER TO 00F SECTION)
F-01


5
4
RFW MAIN SWITCH
0318-03
[BLACK]
PCM
0140-201
F-02
FUSE BLOCK
(REFER TO 00F SECTION)
C-01
ENGINE SWITCH

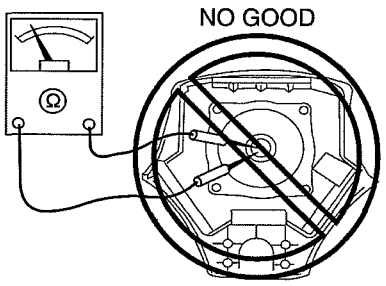
AIR BAG SYSTEM

SERVICE WARNINGS

DBG081000000W02

Air Bag Module Inspection

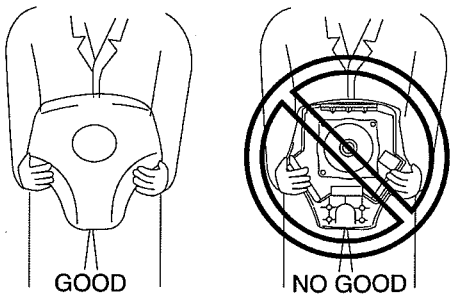
- **Inspecting an air bag module using a tester can operate (deploy) the air bag module, which may cause serious injury. Do not use a tester to inspect an air bag module. Always use the on-board diagnostic function to diagnose the air bag module for malfunctions.**



DPE810ZW1002

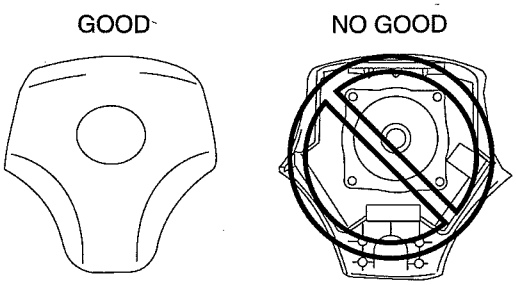
Air Bag Module Handling

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



DPE810ZW1003

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



DPE810ZW1004

Side Air Bag Module Handling

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

SAS control module Handling

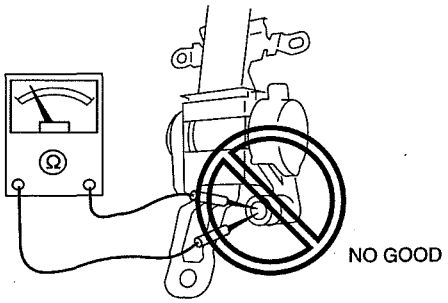
- **Removing the SAS control module or disconnecting the SAS control module connector with the ignition switch at the ON position can activate the sensor in the SAS control module and operate (deploy) the air bags and pre-tensioner seat belts, which may cause serious injury. Before removing the SAS control module or disconnecting the SAS control module connector, always turn the ignition switch to the LOCK position, disconnect the negative battery cable, and then wait for 1 min or more to allow the backup power supply of the SAS control module to deplete its stored power.**
- **Connecting the SAS control module connector with the SAS control module not securely fixed to the vehicle is dangerous. The sensor in the SAS control module could send an electrical signal to the air bag modules and pre-tensioner seat belts. This will operate (deploy) the air bags and pre-tensioner seat belts, which may result in serious injury. Therefore, before connecting the connector, securely fix the SAS control module to the vehicle.**
- **Because a sensor is built into the SAS control module, once the air bags and pre-tensioner seat belts have operated (deployed) due to a collision or other causes, the SAS control module must be replaced with a new one even if the used one does not have any visible external damage or deformation. The used SAS control module may have been damaged internally which may cause improper operation. If the SAS control module is reused, the air bags and pre-tensioner seat belts may not operate (deploy) normally, which could result in a serious accident. Always replace the SAS control module with a new one. The SAS control module cannot be bench-checked or self-checked.**

Side Air Bag Sensor Handling

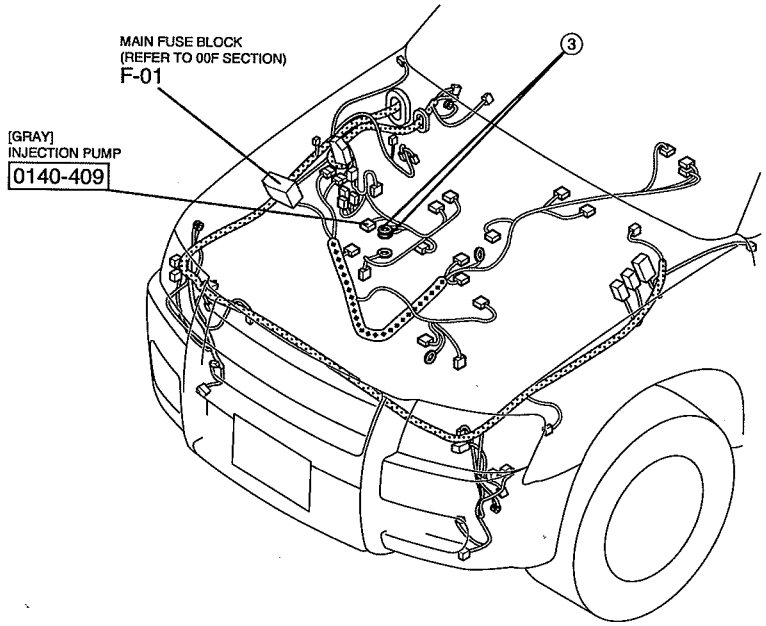
- **Removing the side air bag sensor or disconnecting the side air bag sensor connector with the ignition switch at the ON position can activate the side air bag sensor and operate (deploy) the side air bag, which may cause serious injury. Before removing the side air bag sensor or disconnecting the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

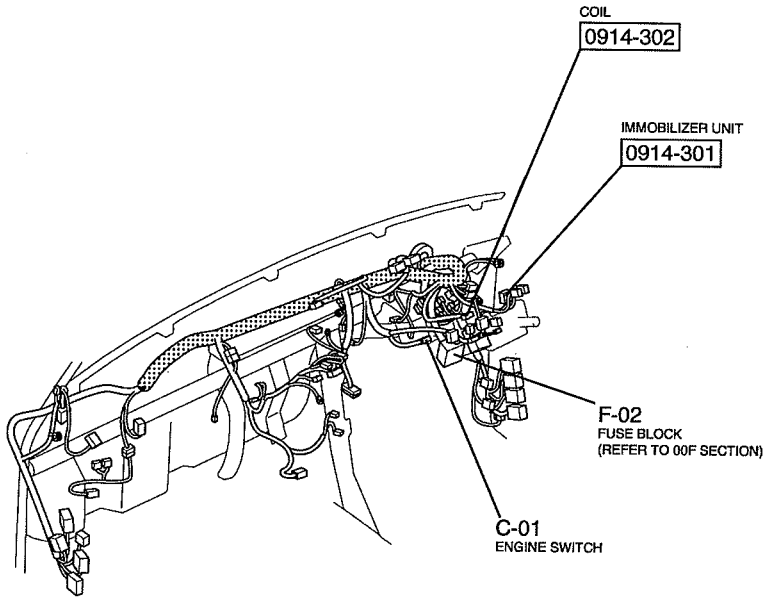
Pre-tensioner Seat Belt Inspection

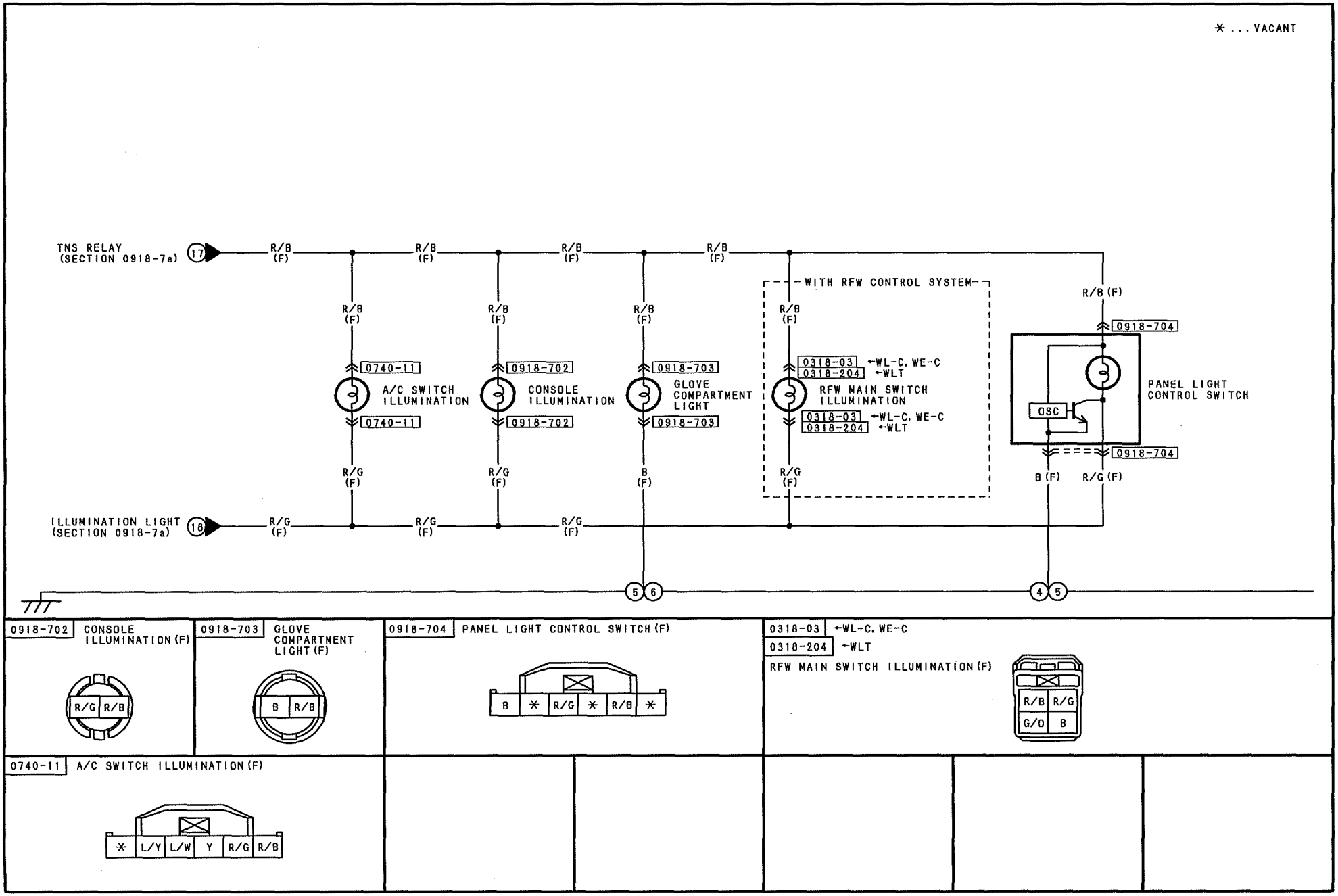
- **Inspecting a pre-tensioner seat belt using a tester can operate (deploy) the pre-tensioner seat belt, which may cause serious injury. Do not use a tester to inspect a pre-tensioner seat belt. Always use the on-board diagnostic function to diagnose the pre-tensioner seat belt for malfunctions.**



E5U810ZW5005


MAIN FUSE BLOCK
(REFER TO 00F SECTION)
F-01
③
[GRAY]
INJECTION PUMP
0140-409


COIL
0914-302
IMMOBILIZER UNIT
0914-301
F-02
FUSE BLOCK
(REFER TO 00F SECTION)
C-01
ENGINE SWITCH


* . . . VACANT
TNS RELAY (SECTION 0918-7a)
17
R/B (F)
WITH RFW CONTROL SYSTEM
0740-11
A/C SWITCH ILLUMINATION
0918-702
CONSOLE ILLUMINATION
0918-703
GLOVE COMPARTMENT LIGHT
0318-03 ←WL-C, WE-C
0318-204 ←WLT
RFW MAIN SWITCH ILLUMINATION
0918-704
PANEL LIGHT CONTROL SWITCH
OSC
R/G (F)
B (F)
ILLUMINATION LIGHT (SECTION 0918-7a)
18
5
6
4
5
0918-702 CONSOLE ILLUMINATION (F)
R/G R/B
0918-703 GLOVE COMPARTMENT LIGHT (F)
B R/B
0918-704 PANEL LIGHT CONTROL SWITCH (F)
B * R/G * R/B *
0318-03 ←WL-C, WE-C
0318-204 ←WLT
RFW MAIN SWITCH ILLUMINATION (F)
R/B R/G
G/O B
0740-11 A/C SWITCH ILLUMINATION (F)
* L/Y L/W Y R/G R/B