

ENGINE COOLANT TEMPERATURE SENSOR INSPECTION

X5U140W07

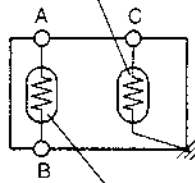
Inspection of Resistance

Note

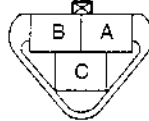
- Perform the following test only when detected.

1. Drain the engine coolant. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.) (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
2. Disconnect the engine coolant temperature sensor connector.
3. Remove the engine coolant temperature sensor.
4. Place the sensor in water with a thermometer, and heat the water gradually.

WATER TEMPERATURE SENDER UNIT

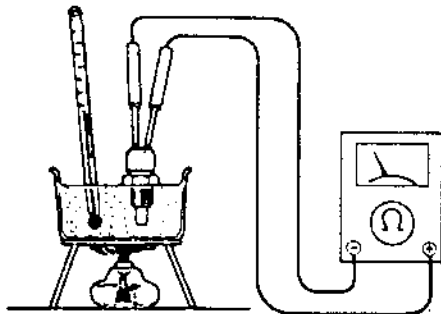


ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR



ENGINE COOLANT TEMPERATURE SENSOR

X5U140WAB



X5U140WAC

5. Measure the resistance between engine coolant temperature sensor terminals A and B by using an ohmmeter.

Specification

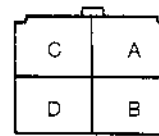
Water temperature (°C {°F})	Resistance (kΩ)
20 {68}	2.27—2.73
80 {176}	0.29—0.34

6. If not as specified, replace the engine coolant temperature sensor.
If engine coolant temperature sensor is okay, but PID value is out of specification, inspect as follows:

Open circuit

- Reference voltage circuit (Engine coolant temperature sensor connector terminal A and PCM connector terminal 2E through common connector.)
- Ground circuit (Engine coolant temperature sensor connector terminal B and PCM connector terminal 3F through common connector.)

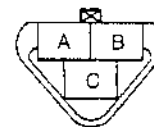
MAIN RELAY



HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL SIDE)

X5U140WCI

ENGINE COOLANT TEMPERATURE SENSOR



HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL SIDE)

X5U140WCB

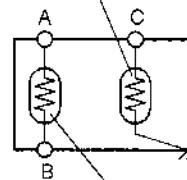
Short circuit

- Engine coolant temperature sensor connector terminal A and PCM connector terminal 2E through common connector to ground.
7. Reconnect the engine coolant temperature sensor connector.

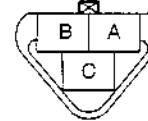
Water Temperature Sender Unit Inspection

1. Drain the engine coolant. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.) (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
2. Remove the engine coolant temperature sensor.
3. Place the sensor in water with a thermometer, and heat the water gradually.

WATER TEMPERATURE SENDER UNIT



ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR



ENGINE COOLANT TEMPERATURE SENSOR

X5U140WAD

4. Measure the resistance between engine coolant temperature sensor terminals C and body ground by using an ohmmeter.

Specification

Water temperature (°C {°F})	Resistance (Ω)
50 {122}	160—230

5. If not as specified, replace the engine coolant temperature sensor.

CRANKSHAFT POSITION SENSOR INSPECTION

Inspection of Air Gap

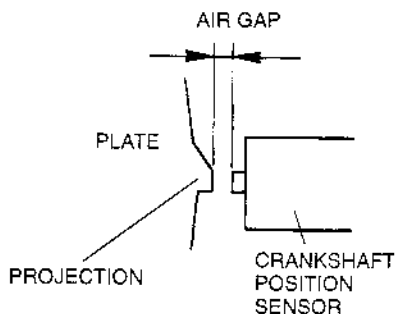
Note

- Perform the following test only when detected.

1. Measure the air gap between each four projections of the plate behind the crankshaft pulley and the crankshaft position sensor by using a feeler gauge. If not as specification, adjust the crankshaft position sensor air gap and inspect as follows:
 - Is any of the four projections of the plate behind the crankshaft pulley twisted or bent.

Specification

0.5—1.5 mm {0.020—0.059 in}



X5U140WAE

2. If not as specified, replace the plate behind the crankshaft pulley (Refer to 01-40 PLATE REMOVAL/INSTALLATION.) or crankshaft position sensor. (Refer to 01-40 CRANKSHAFT POSITION SENSOR REMOVAL/INSTALLATION.)

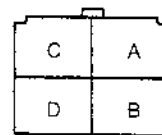
If crankshaft position sensor PID value is out of specification, inspect as follows:

Open circuit

- Crankshaft position circuit (Crankshaft position sensor connector terminal B and PCM connector terminal 2J.)

- Power circuit (Crankshaft position sensor connector terminal A and main relay terminal D through common connector.)
- Ground circuit (Crankshaft position sensor connector terminal C and PCM connector terminal 3C through common connector.)

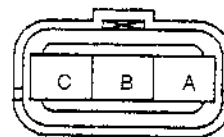
MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCJ

CRANKSHAFT POSITION SENSOR



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WAI

Short circuit

- Crankshaft position sensor connector terminal B and PCM connector terminal 2J circuit through common connector to ground.
 - Crankshaft position sensor connector terminal A and main relay terminal D through common connector to ground.
3. Reconnect the crankshaft position sensor connector.

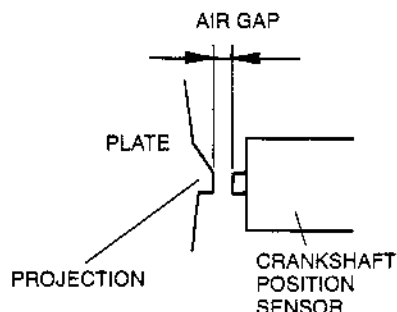
CRANKSHAFT POSITION SENSOR ADJUSTMENT

X5U140W21

1. Loosen the crankshaft position sensor installation bolt.
2. While moving the crankshaft position sensor, adjust the air gap between the crankshaft position sensor and the four projections on the plate by using a feeler gauge.

Specification

0.5—1.5 mm {0.020—0.059 in}



X5U140WAG

3. Tighten the crankshaft position sensor installation bolt.

Tightening torque

7.9—10.7 N·m

{80—110 kgf·cm, 69.5—95.4 in·lbf}

4. If not adjusted, replace the plate behind the crankshaft pulley (Refer to 01-40 PLATE REMOVAL/INSTALLATION.) or the crankshaft position sensor. (Refer to 01-40 CRANKSHAFT POSITION SENSOR REMOVAL/INSTALLATION.)

CRANKSHAFT POSITION SENSOR REMOVAL/INSTALLATION

X5U140W22

1. Disconnect the crankshaft position sensor connector.
2. Remove the undercover.
3. Remove the crankshaft position sensor installation bolt.
4. Install in the reverse order of removal.

Tightening torque

7.9—10.7 N·m

{80—110 kgf·cm, 69.5—95.4 in·lbf}

5. Reconnect the crankshaft position sensor connector.

Note

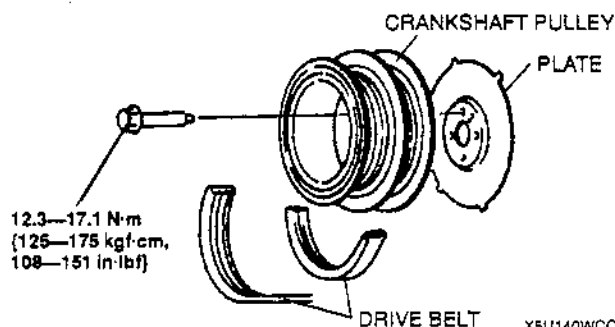
- Do not force fully pull the wiring harness of the crankshaft position sensor.

6. Adjust the air gap. (Refer to 01-40 CRANKSHAFT POSITION SENSOR ADJUSTMENT.)

PLATE REMOVAL/INSTALLATION

X5U140W24

1. Remove the drive belt.
2. Remove the crankshaft pulley.



12.3—17.1 N·m
{125—175 kgf·cm,
108—151 in·lbf}

X5U140WCC

3. Remove the plate.
4. Install in the reverse order of removal.

Note

- Adjust the drive belt when installing the drive belt. (Refer to 01-10 DRIVE BELT ADJUSTMENT.)

CONTROL SYSTEM

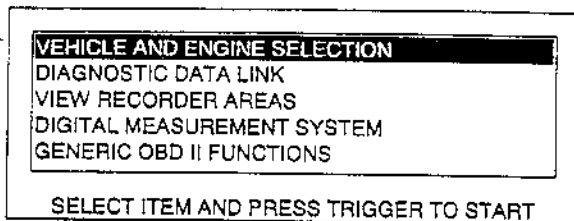
CAMSHAFT POSITION SENSOR INSPECTION

Visual Inspection

1. Remove the camshaft position sensor. (Refer to CAMSHAFT POSITION SENSOR REMOVAL/INSTALLATION.)
2. Make sure that the camshaft position sensor is free of any metallic shavings or particles. If metallic shavings or particles are found on the sensor, clean them off.
3. Install the camshaft position sensor. (Refer to CAMSHAFT POSITION SENSOR REMOVAL/INSTALLATION.)

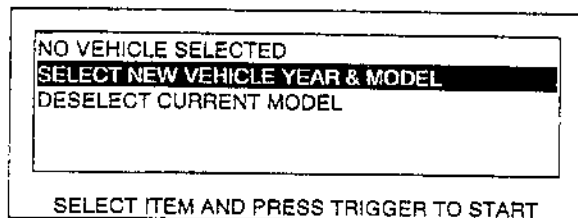
Frequency Inspection

1. Connect NGS tester to DLC-2.
2. Start the engine.
3. Move the cursor to **VEHICLE AND ENGINE SELECTION**.



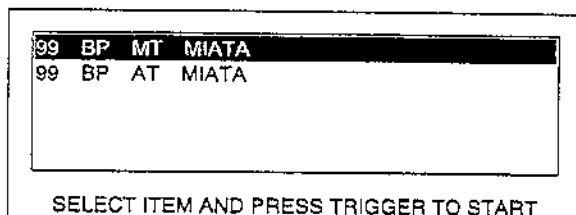
X5U140WAJ

4. Move the cursor to **SELECT NEW VEHICLE YEAR & MODEL**. Press the trigger key to enter this selection.



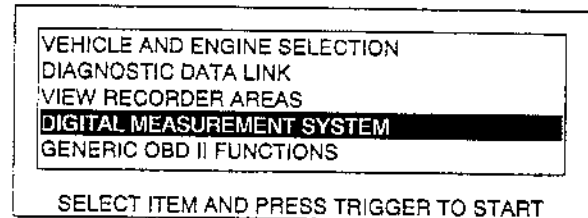
X5U140WAK

5. Move the cursor to **1999-VIN#10:X**. Press the trigger key to enter this selection.
6. Move the cursor to appropriate model. Press the trigger key to enter this selection.
7. The vehicle selection screen showing the selected vehicle will be displayed. Move the cursor to the vehicle selected. Press the trigger key.



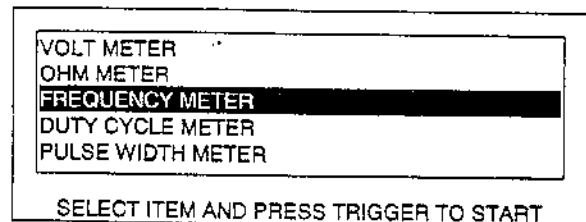
X5U140WAL

8. Connect **NGS tester** test leads to the following PCM connector terminals:
(+) lead — **PCM 2H terminal**
(-) lead — **PCM 3C terminal**
9. Move the cursor to **DIGITAL MEASUREMENT SYSTEM**. Press the trigger key to enter this selection.



X5U140WAM

10. Move the cursor to **FREQUENCY METER**. Press the trigger key to enter this selection.



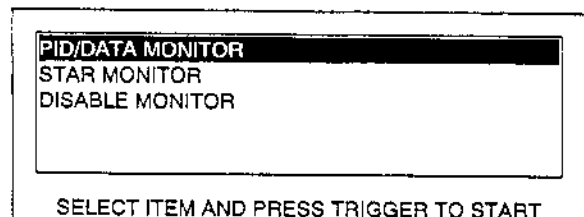
X5U140WAN

11. The **FREQUENCY METER** screen will be displayed. Press **LINK** key to select **RPM PID**.

MAX 0	FREQUENCY 0 HZ 2 VOLT DC			NO VEHICLE COMMUNICATION LINK SELECTED	
MIN 0					
CLEAR	LEVEL	AC/DC	PRINT		

X5U140WAO

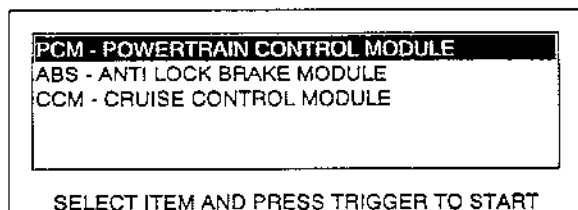
12. Move the cursor to **PID/DATA MONITOR**. Press trigger key to enter this selection.



X5U140WAP

CONTROL SYSTEM

13. Move the cursor to **PCM**. Press trigger key to enter this selection.



X5U140WAQ

14. Move the cursor to **RPM**. Press trigger key to select PID.

PCM 01	MIL	RHO2S	TP V
	NL SW	RHO2SH	VICSV
TOTAL01	PRGV	* RPM	VS
	PSP SW	SEGRP	
	CLEAR	START	

X5U140WAR

15. Press **START** to begin.
16. The **FREQUENCY METER** screen will be displayed.

Note

- The selected threshold voltage indicated on the **FREQUENCY METER SCREEN** should be **2 VOLT DC**. If incorrect threshold voltage is selected, incorrect frequency values is indicated. Press **LEVEL** to select correct threshold voltage if incorrect threshold voltage is selected.
- Threshold voltage should be DC range. Press **AC/DC** key to select DC range.

17. Inspect the frequency value and RPM PID.

Specifications

RPM PID: 750—850 RPM
FREQUENCY: 18—22 Hz

MAX 22	FREQUENCY 19 HZ 2 VOLT DC			RPM 750RPM	
MIN 18				IDLE 750~850	
CLEAR	LEVEL	AC/DC	PRINT	LINK	REC

X5U140WAS

Note

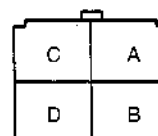
RPM PID	FREQUENCY
1000 RPM	25 Hz
2000 RPM	50 Hz
3000 RPM	75 Hz

18. Press **LEVEL** key to change the threshold voltage to **6 VOLT**.
19. Make sure that the **FREQUENCY** indicates **0 Hz**.
20. If **FREQUENCY** value is out of specifications, inspect follows:

Open circuit

- Camshaft position circuit (Camshaft position sensor connector terminal B and PCM connector terminal 2H.)
- Power circuit (Camshaft position sensor connector connector terminal A and main relay terminal D through common connector.)
- Ground circuit (Camshaft position sensor terminal C and body ground.)

MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCG

CAMSHAFT POSITION SENSOR



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WC6

Short circuit

- Camshaft position sensor connector terminal B and PCM connector terminal 2H to ground.
- Camshaft position sensor connector terminal A and main relay terminal D through common connector to ground.

21. Reconnect the camshaft position sensor connector.
22. Check the camshaft pulley for damage and cracks.

CONTROL SYSTEM

CAMSHAFT POSITION SENSOR REMOVAL/INSTALLATION

X5U140W25

1. Disconnect the negative battery cable.
2. Disconnect the camshaft position sensor connector.
3. Remove the camshaft position sensor installation bolt.
4. Remove the camshaft position sensor.
5. Make sure that the camshaft position sensor is free of any metallic sharings or particles. If metallic sharings or particles are found on the sensor, clean them off.
6. Install the camshaft position sensor in the reverse order of removal.

Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm, 69.5—95.4 in·lbf}

KNOCK SENSOR INSPECTION

X5U140W10

Inspection of Resistance

Note

- Perform the following test only when detected.

1. Verify that the ignition switch off.
2. Disconnect knock sensor connector.
3. Measure the resistance between knock sensor terminal A and the knock sensor body by using an ohmmeter.



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

Specification

Approx. 560 k Ω [20 °C {68 °F}]

4. If not as specified, replace the knock sensor. (Refer to 01-40 KNOCK SENSOR REMOVAL/INSTALLATION.) If knock sensor is okay, but PID value is out of specification, inspect as follows:

Open circuit

- Knock sensor circuit (Knock sensor connector terminal A and PCM connector terminal 2F through common connector.)

Short circuit

- Knock sensor connector terminal A and PCM connector terminal 2F through common connector to ground.

5. Reconnect the knock sensor connector.

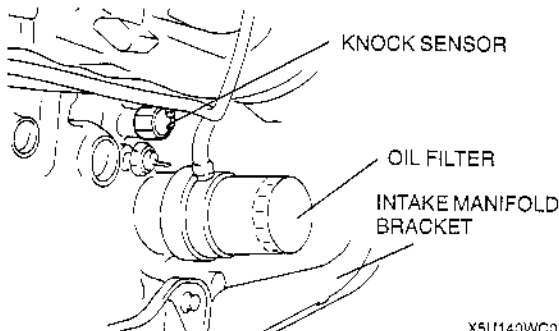
X5U140WAT

KNOCK SENSOR REMOVAL/INSTALLATION

X5U140W20

1. Disconnect the negative battery cable.
2. Remove the intake manifold bracket.
3. Remove the knock sensor by using the SST (49 H018 001).
4. Install in the reverse order of removal.

Tightening torque
19.6—34.3 N·m
{2.0—3.5 kgf·m, 14.5—25.3 ft·lbf}



X5U140WC3

HEATED OXYGEN SENSOR INSPECTION

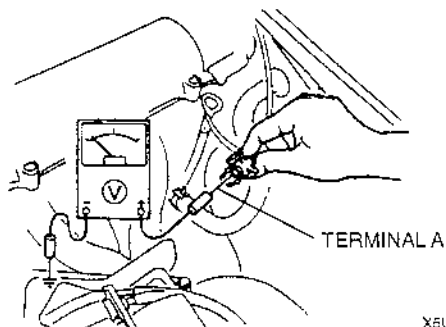
X5U140W19

Inspection of Voltage

Note

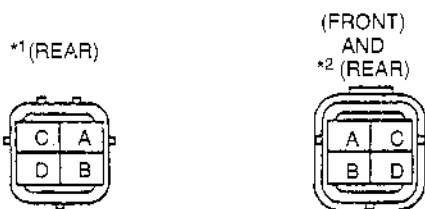
- Perform the following test only when detected.

1. Warm up the engine and run it at idle.
2. Disconnect the heated oxygen sensor connector.
3. Connect a voltmeter between the heated oxygen sensor connector terminal A and a ground.



X5U140WC1

HEATED OXYGEN SENSOR CONNECTOR



X5U140WC2

*1 : Except CALIFORNIA emission regulations applicable model.

*2 : CALIFORNIA emission regulations applicable model.

4. Run the engine at 3,000 rpm until the voltmeter indicates approx. 0—1.0 V.
5. Verify that when increase and decrease the engine speed suddenly several times.

Specification

Engine condition	Voltage (V)
Increased	0.5—1.0
Decreased	0—0.5

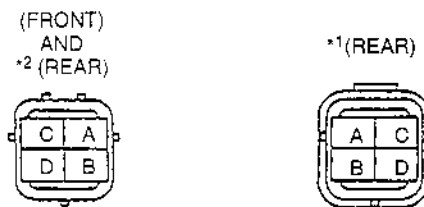
6. If not as specified, replace the heated oxygen sensor. If heated oxygen sensor is okay, but PID value is out of specification, inspect as follows:

Open circuit

- Heated oxygen circuit (Heated oxygen sensor connector terminal A and PCM connector terminal 2C (Front).)
- Ground circuit (Heated oxygen sensor connector terminal B and PCM connector terminal 3F through common connector (Front).)
- Heated oxygen circuit (Heated oxygen sensor connector terminal A and PCM connector terminal 3J (Rear).)
- Ground circuit (Heated oxygen sensor connector terminal B and PCM connector terminal 3F through common connector (Rear).)

(Except CALIFORNIA emission regulations applicable model)

- Heated oxygen circuit (Heated oxygen sensor connector terminal A and PCM connector terminal 3J through common connector (Rear).)



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WC9

*1 : Except CALIFORNIA emission regulations applicable model.

*2 : CALIFORNIA emission regulations applicable model.

Short circuit

- Heated oxygen sensor connector terminal A and PCM connector terminal 2C to ground (Front).
- Heated oxygen sensor connector terminal A and PCM connector terminal 3J to ground (Rear).

7. Reconnect the heated oxygen sensor connector.

HEATED OXYGEN SENSOR HEATER INSPECTION

X5U140W12

Inspection of Resistance

Note

- Perform the following test only when detected.

- Disconnect the heated oxygen sensor connector.
- Measure the resistance between heated oxygen sensor terminals C and D by using an ohmmeter.

HEATED OXYGEN SENSOR CONNECTOR



X5U140WC7

*1 : Except CALIFORNIA emission regulations applicable model.

*2 : CALIFORNIA emission regulations applicable model.

Specification

Approx. 15.7 Ω

- If not as specified, replace the heated oxygen sensor.
If heated oxygen sensor heater is okay, but PID value is out of specification, inspect as follows:

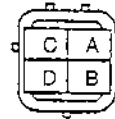
Open circuit

- Ground circuit (Heated oxygen sensor connector terminal D and PCM connector terminal 1U through common connector (Front).)
- Power circuit (Heated oxygen sensor connector terminal C and ignition switch (IG1) circuit through common connector (Front).)
- Ground circuit (Heated oxygen sensor connector terminal D and PCM connector terminal 3V (Rear).)
- Power circuit (Heated oxygen sensor connector terminal C and ignition switch (IG1) circuit through common connector (Rear).)

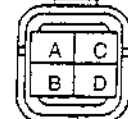
(Except CALIFORNIA emission regulations applicable model)

- Ground circuit (Heated oxygen sensor connector terminal D and PCM connector terminal 3V through common connector (Rear).)

(FRONT)
AND
*2 (REAR)



*1 (REAR)



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WCA

*1 : Except CALIFORNIA emission regulations applicable model.

*2 : CALIFORNIA emission regulations applicable model.

Short circuit

- Heated oxygen sensor connector terminal C and ignition switch (IG1) through common connector to ground heater circuit through common connector to ground (Front).
- Heated oxygen sensor connector terminal D and PCM connector terminal 1U through common connector to ground (Front).
- Heated oxygen sensor connector terminal D and PCM connector terminal 3V to ground (Rear).

(Except CALIFORNIA emission regulations applicable model)

- Heated oxygen sensor connector terminal D and PCM connector terminal 3V through common connector to ground (Rear).

- Reconnect the heated oxygen sensor connector.

EGR BOOST SENSOR INSPECTION

X5U140W13

Note

- Perform the following test only when detected.

1. Inspect the EGR boost sensor for damage and cracks.
2. Vacuum hose improper routing, kinks or leaks.
3. If correct the above inspect, inspect as follows:

Open circuit

- EGR boost circuit (EGR boost sensor connector terminal B and PCM connector terminal 3S.)
- Reference voltage circuit (EGR boost sensor connector terminal C and PCM connector terminal 2I.)
- Ground circuit (EGR boost sensor connector terminal A and PCM connector terminal 3F through common connector.)



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

X5U140WB0

Short circuit

- EGR boost sensor connector terminal C and PCM connector terminal 2I through common connector to ground.
 - EGR boost sensor connector terminal B and PCM connector 3S through common connector to ground.
4. Reconnect the EGR boost sensor connector.
 5. If correct the above open or short circuit, replace EGR boost sensor.

CLUTCH SWITCH INSPECTION

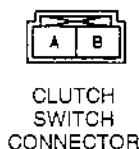
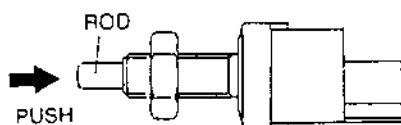
X5U140W14

Inspection of Continuity

Note

- Perform the following test only when detected.

1. Verify that the clutch switch is installed properly. (Refer to 05-10 CLUTCH PEDAL REMOVAL/INSTALLATION.)
2. Disconnect the negative battery cable.
3. Remove the clutch switch. (Refer to 05-10 CLUTCH PEDAL REMOVAL/INSTALLATION.)
4. Inspect continuity between the clutch switch terminals by using an ohmmeter.



CLUTCH
SWITCH
CONNECTOR

X5U140WB1

Specification

○—○ : Continuity

Condition	Terminal	
	A	B
Push the rod	○—○	○—○
Except above		

X5U140WB6

5. If not as specified, replace the clutch switch. If clutch switch is okay, but PID value is out of specification, inspect as follows:

Open circuit

- Power circuit (Clutch switch connector terminal A and PCM connector terminal 3I through common connector.)
- Ground circuit (Clutch switch connector terminal B and ground.)

Short circuit

- Clutch switch connector terminal A and PCM connector terminal 3I through common connector to ground.
6. Reconnect the clutch switch connector.

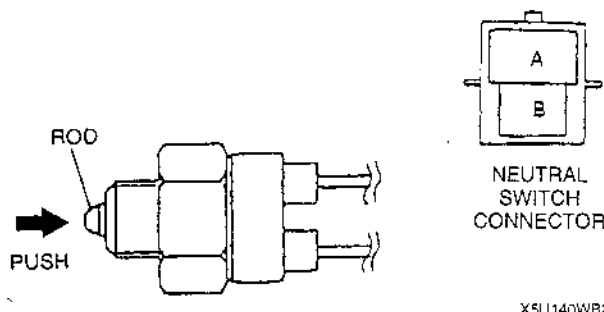
NEUTRAL SWITCH INSPECTION

Inspection of Continuity

Note

- Perform the following test only when detected.

- Disconnect the negative battery cable.
- Remove the neutral switch.
- Inspect for continuity between the neutral switch terminals by using an ohmmeter.



Specification

X5U140W15

○—○ : Continuity

Measuring Condition	Terminal	
	A	B
Push the rod	○—○	○—○
Except above		

X5U140WB7

- If not as specified, replace the neutral switch. If neutral switch is okay but PID value is out of specification, inspect as follows:

Open circuit

- Power circuit (Neutral switch connector terminal A and PCM connector terminal 1V through common connector.)
- Ground circuit (Neutral switch connector terminal B and ground through common connector.)

Short circuit

- Neutral switch connector terminal A and PCM connector terminal 1V through common connector to ground.

- Reconnect the neutral switch connector.

POWER STEERING PRESSURE SWITCH INSPECTION

Inspection of Continuity

Note

- Perform the following test only when detected.

- Inspect as follows if power steering is inoperative: (Refer to 06-12.)
 - POWER STEERING FLUID INSPECTION (Refer to 06-12.)
- Disconnect the PSP switch connector.
- Start the engine.
- Inspect for continuity between PSP switch terminal and a ground by using an ohmmeter.

Specification

X5U140W16

○—○ : Continuity

Condition	Terminal	
	A	Ground
Steering wheel not turned		
Steering wheel being turned	○—○	○—○

X5U140WB8

- If not as specified, replace the PSP switch. If PSP switch is okay but PID value is out of specification, inspect as follows:

Open circuit

- Power circuit (PSP switch connector terminal and PCM connector terminal 1G through common connector.)
- Ground circuit (PSP switch ground circuit.)

Short circuit

- PSP switch connector terminal and PCM connector terminal 1G through common connector to ground.

- Reconnect the PSP switch connector.

MAIN RELAY INSPECTION

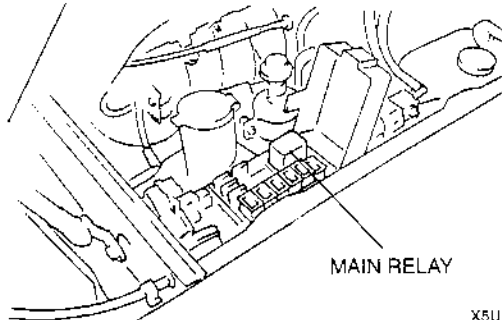
X5U140W17

Inspection of Continuity

Note

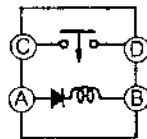
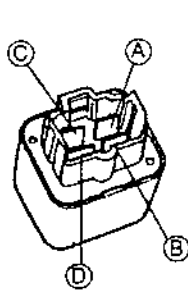
- Perform the following test only when detected.

1. Disconnect the negative battery cable.
2. Remove the main relay.



X5U140WB4

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



X5U140WB3

Specification

○—○ : Continuity

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	Ground	○—○	

X5U140WB9

4. If not as specified, replace the main relay, and inspect as follows:

Open circuit

- Reference voltage circuit (Main relay connector terminal A and ignition switch IG1 connector through common connector.)
- Reference voltage circuit (Main relay connector terminal C and battery (B+ terminal) connector through common connector.)
- Ground circuit (Main relay connector terminal B and ground circuit through common connector.)

Short circuit

- Main relay connector terminal A and ignition switch IG1 connector through common connector to ground.
- Main relay connector terminal C and battery (B+ terminal) through common connector to ground.

5. Reconnect the main relay connector.

FUEL TANK PRESSURE SENSOR INSPECTION

X5U140W18

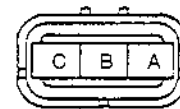
Note

- Perform the following test only when detected.

1. Inspect the fuel tank pressure sensor for damage and cracks.
2. Vacuum hose improper routing kinks or leaks.
3. If correct the above inspect, inspect as follows:

Open circuit

- Fuel tank pressure sensor connector terminal A and PCM connector 2A through common connector.
- Reference voltage circuit (Fuel tank pressure sensor connector terminal C and PCM connector terminal 2I through common connector.)
- Ground circuit (Fuel tank pressure sensor connector terminal B and PCM connector terminal 3F through common connector.)



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL CONNECTOR)

X5U140WB5

Short circuit

- Fuel tank pressure sensor connector terminal A and PCM connector terminal 2A through common connector to ground.
- Fuel tank pressure sensor connector terminal C and PCM connector terminal 2I through common connector to ground.

4. Reconnect the fuel tank pressure sensor connector.
5. If correct the above open or short circuit, replace fuel tank pressure sensor.

TECHNICAL DATA

01-50 TECHNICAL DATA

01 ENGINE 01-50-1

01 ENGINE

X5U150WC1

Item			Engine	
			BP	
			MTX	ATX
MECHANICAL				
Drive belt deflection (mm {in}/98 N {10 kgf, 22 lbf})	Generator	New	5.5—7.0 {0.22—0.27}	
		Used	6.0—7.5 {0.24—0.29}	
		Limit	8.0 {0.31}	
	P/S, A/C, P/S+A/C	New	8.0—9.0 {0.32—0.35}	
		Used	9.0—10.0 {0.36—0.39}	
		Limit	11.5 {0.45}	
Drive belt tension (N {kgf, lbf})	Generator	New	491—745 {50—76, 110—167}	
		Used	491—706 {50—72, 110—158}	
		Limit	343 {35, 77}	
	P/S, A/C, P/S+A/C	New	491—588 {50—60, 110—132}	
		Used	422—490 {43—50, 95—110}	
		Limit	245 {25, 55}	
Valve clearance [Engine cold] (mm {in})	IN		0.18—0.24 {0.008—0.009} (0.21 ± 0.03 {0.008 ± 0.0012})	
	EX		0.28—0.34 {0.012—0.013} (0.31 ± 0.03 {0.012 ± 0.0012})	
Compression pressure (kPa {kgf/cm ² , psi}) [rpm]	Standard		1442 {14.7, 209} [300]	
	Minimum		1009 {10.29, 146} [300]	
	Maximum difference between cylinders		196 kPa {2.0 kgf/cm ² , 28 psi}	
Tensioner spring free length (mm {in})			59.2 {2.33}	
Timing belt deflection (mm {in}/98 N {10 kgf, 22 lbf})			8.5—11.5	
Pushing distance of the camshaft oil seal (mm {in})			0—0.4 {0—0.015} (from the edge of the cylinder head)	
Pushing distance of the front oil seal (mm {in})			0.5—1.0 {0.02—0.03} (from the edge of the oil pump body)	
Pushing distance of the rear oil seal (mm {in})			0—0.5 {0—0.019} (from the edge of the rear cover)	
Idle speed (rpm)			750—850 (800 ± 50)	
Ignition timing (BTDC/rpm)			6—18°/750—850 (6—18°/800 ± 50)	
Idle-up speed*1 (rpm)	E/L ON*2		750—850 (800 ± 50)	
	A/C ON*3		900—1000 (950 ± 50)	750—850 (800 ± 50)
	P/S ON*4		750—850 (800 ± 50)	
Idle mixture	HC concentration		within the regulation	
	CO concentration		within the regulation	
LUBRICATION SYSTEM				
Oil pressure (kPa {kgf/cm ² , psi}) [3000 rpm]			295—392 {3.0—4.0, 43—56}	
Oil capacity	Total (dry engine) (L {US qt, Imp qt})		4.0 {4.2, 3.5}	
	Oil replacement (L {US qt, Imp qt})		3.6 {3.8, 3.2}	
	Oil and oil filter replacement (L {US qt, Imp qt})		3.8 {4.0, 3.3}	

TECHNICAL DATA

Item				Engine	
				BP	
				MTX	ATX
Engine oil				API Service SG (Energy Conserving II), SH (Energy Conserving II) or ILSAC (GF-I) SJ or ILSAC (GF-II)	
Viscosity	Above -25 °C {-13 °F}			SAE 10W-30	
	Below 0 °C {32 °F}			SAE 5W-30	
COOLING SYSTEM					
Coolant capacity (L {US qt, Imp qt})				6.0 {6.3, 5.3}	
Radiator cap valve opening pressure (kPa {kgf/cm ² , psi})				94—122 {0.95—1.25, 13.5—17.7}	
Thermostat	Initial-opening temperature (°C {°F})			83.5—88.0 {183—190}	
	Full-opening temperature (°C {°F})			100 {212}	
	Full-open lift (mm {in})			8.5 {0.33} min.	
Cooling fan motor current (A) [12 V]				below 6.49	
FUEL SYSTEM					
Fuel pump hold pressure (kPa {kgf/cm ² , psi})				More than 340 {3.5, 50}	
Fuel pump maximum pressure (kPa {kgf/cm ² , psi})				Less than 640 {6.5, 92}	
Fuel injector	Leakage			Less than 1 drop/2 minutes	
	Volume (ml {cc, floz}/15 sec.)			66—82 {66—82, 2.3—2.7}	
	Resistance (Ω)			12—16 [at 20 °C {68 °F}]	
Pressure regulator	Fuel line pressure (kPa {kgf/cm ² , psi})			370—420 {3.7—4.3, 53—61}	
	Fuel hold pressure (kPa {kgf/cm ² , psi})			More than 250 {2.55, 36.3}	
CHARGING SYSTEM					
Battery	Electrolyte gravity			—	
	Dark current*5 (mA)			Max. 20	
	Test load chart (A)	Battery type	S46A24L (S)	105	
	Slow charge (A)	Battery type (5-hour rate)	S46A24L (S) (32)	3.0—4.0	
	Quick charge (A/30 min)	Battery type (5-hour rate)	S46A24L (S) (32)	20	
Generator	Rotor resistance (Between slip rings) (Ω)			2.67 [20 °C {68 °F}]	
	Brush length	Standard (mm {in})		22 {0.87}	
		Minimum (mm {in})		6 {0.24}	
	Brush spring force	Standard (N {kgf, lbf})		3.43 {0.35, 0.77}	
		Minimum (N {kgf, lbf})		1.03 {0.105, 0.231}	
	Standard voltage (V)	Ignition switch ON	Terminal	B	B-
				P	Below 1
				D	Approx. 0
		Idle [20 °C {68 °F}]	Terminal	B	13—15
				P	Approx. 3—8
				D	*
Generated current (Reference) (A)	Engine speed (rpm)	1000	Terminal B current	Approx. 0—60 (must not be 0)	
		2000	Terminal B current	Approx. 0—68 (must not be 0)	
IGNITION SYSTEM					
Ignition coil	Resistance [20 °C {68 °F}]	Secondary coil (kΩ)	8.24—12.36		

TECHNICAL DATA

Item				Engine	
				BP	
				MTX	ATX
High-tension lead	Resistance (kΩ)		No.1 lead	4—11	
			No.2 lead	3—8	
			No.3 lead	2—6	
			No.4 lead	1—5	
Spark plug	Type	NGK		BKR5E-11* ⁶ , BKR6E-11	
		DENSO		K16PR-U11* ⁶ , K20PR-U11	
		CHAMPION		RC10YC4* ⁶ , RC8YC4	
	Plug gap (mm {in})		1.0—1.1 {0.040—0.043}		
	Resistance (kΩ) [20 °C {68 °F}]	NGK		3.0—7.5	
		DENSO			
		CHAMPION		5—15	
Tightening torque (N·m {kgf·m, ft·lbf})		15—22 {1.5—2.3, 11—16}			
STARTING SYSTEM					
Starter	Commutator diameter	Standard (mm {in})		29.4 {1.16}	
		Minimum (mm {in})		28.8 {1.14}	
	Brush length	Standard (mm {in})		12.3 {0.48}	
		Minimum (mm {in})		7.0 {0.28}	
	Brush spring force	Standard (N {kgf, lbf})		15.05—20.35 {1.534—2.076, 3.375—4.567}	
		Minimum (N {kgf, lbf})		5.9 {0.60, 1.32}	
	Pinion gap (mm {in})		0.5—2.0 {0.020—0.078}		
	No load test	Voltage (V)		11	
		Current (A)		Below 90	

*1 : Excludes temporary idle speed drop just after the loads (E/L, A/C, P/S) are turned on.

*2 : Headlight, fan switch (above 1st) and cooling fan are turned on.

*3 : A/C switch and fan switch are turned on.

*4 : Steering wheel fully turned.

*5 : Dark current is the constant flow of current present (for the audio unit, clock, PCM, etc.) when the ignition switch is off and with the ignition key removed.

*6 : Standard plug.

* : Turn the following electrical loads on and verify that the voltage reading increases.

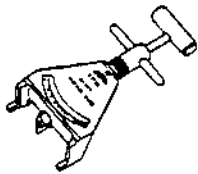

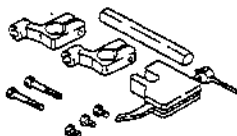
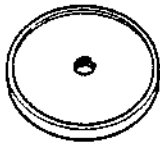


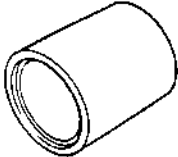

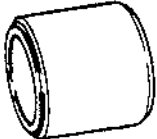
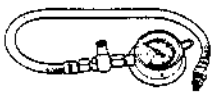

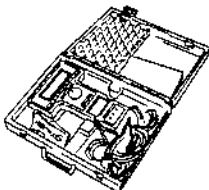
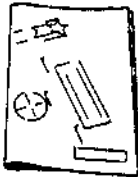


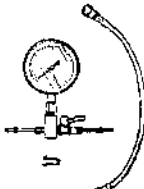
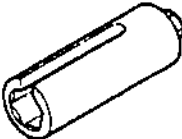
- Headlights
- Blower motor
- Rear window defroster

01-60 SERVICE TOOLS

01 ENGINE SST 01-60-1

01 ENGINE SST

X5U160W01

<p>49 9200 020A</p> <p>Belt tension gauge</p>  <p>T9200020A</p>	<p>49 D011 102</p> <p>Crankshaft lock tool</p>  <p>TD011102X</p>	<p>49 T012 0A0A</p> <p>Tappet holder set</p>  <p>TT0120A0A</p>
<p>49 W033 105</p> <p>Oil seal installer</p>  <p>TW033105X</p>	<p>49 G030 795</p> <p>Oil seal installer</p>  <p>TG030795X</p>	<p>49 G030 797</p> <p>Handle (Part of 49 G030 795)</p>  <p>TG030797X</p>
<p>49 T028 302</p> <p>Dust boot installer</p>  <p>TT028302X</p>	<p>49 G014 001</p> <p>Oil filter wrench</p>  <p>TG014001X</p>	<p>49 B014 001</p> <p>Oil seal installer</p>  <p>TB014001X</p>
<p>49 0187 280</p> <p>Oil pressure gauge</p>  <p>T0187280X</p>	<p>49 9200 145</p> <p>Radiator cap tester adapter set</p>  <p>T9200145X</p>	<p>49 T088 0A0</p> <p>NGS set</p>  <p>TT0880A0X</p>
<p>49 T088 008A</p> <p>Instruction manual</p>  <p>TT088008A</p>	<p>49 T088 010F</p> <p>Program card (V5.0)</p>  <p>TT088010F</p>	<p>49 L018 901</p> <p>Injection checker</p>  <p>TL018901X</p>
<p>49 N013 1A0</p> <p>Fuel pressure gauge set</p>  <p>TN0131A0X</p>	<p>49 H018 001</p> <p>Knock sensor wrench</p>  <p>TH018001X</p>	

SUSPENSION

02 SECTION

02

GENERAL PROCEDURES	02-10	REAR SUSPENSION	02-14
WHEEL ALIGNMENT	02-11	TECHNICAL DATA	02-50
FRONT SUSPENSION	02-13	SERVICE TOOLS	02-60

02-10 GENERAL PROCEDURES

PRECAUTION (SUSPENSION) 02-10-1

PRECAUTION (SUSPENSION)

XSU210W01

Wheels and tires removal/installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. When a wheel is removed, tighten it to **89—117 N·m {9.0—12.0 kgf·m, 66—86 ft·lbf}**.

Suspension links removal/installation

- Tighten any part of the suspension that uses rubber bushings only after the vehicle has been lowered and unloaded.

Note

- Unloaded ... Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tools in designated position.

Brake pipe flare nuts tightening

- Tighten the brake pipe flare nut by using the **SST** (49 0259 770B). Be sure to modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)

Brake lines disconnection/connection

- If any brake line has been disconnected anytime during the procedure, add brake fluid, bleed the brakes and inspect for leakage after the procedure has been completed.

Power steering components removal/installation

- If any power steering fluid line has been disconnected anytime during the procedure add ATF MIII or equivalent (e.g. Dexron®II), bleed the fluid lines, and inspect for leakage after the procedure has been completed.

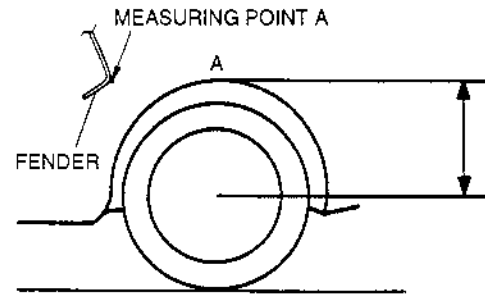
02-11 WHEEL ALIGNMENT

WHEEL ALIGNMENT PREINSPECTION	02-11-1
FRONT WHEEL ALIGNMENT	02-11-1
Specifications	02-11-1
Maximum Steering Angle Adjustment	02-11-2
Caster Adjustment	02-11-2
Camber Adjustment	02-11-2
Total Toe-in Adjustment	02-11-3

REAR WHEEL ALIGNMENT	02-11-3
Specifications	02-11-3
Total Toe-in Adjustment	02-11-4
Camber Adjustment	02-11-4

WHEEL ALIGNMENT PREINSPECTION

1. Inspect the tire inflations, and adjust to the recommended pressure as necessary.
2. Inspect the front wheel bearing play and correct as necessary.
3. Inspect the wheel and tire runouts.
4. Inspect the ball joints and steering linkage for excessive looseness.
5. The vehicle must be on level ground and carry no luggage or passengers.
6. Measure the height from the center of the wheel to the fender brim. The difference between left and right measurement must not exceed **10 mm {0.39 in.}**.



X5U211W01

X5U211WA0

FRONT WHEEL ALIGNMENT

Specifications

X5U211W02

Item		Specifications (Unloaded*1*2)	
Total toe-in	(mm {in})	3 ± 4 {0.12 ± 0.15}	
	(Degree)	0° 18' ± 24'	
Maximum steering angle	Inner	38° ± 3°	
	Outer	33° ± 3°	
Steering axis inclination (reference value)		11° 38'	
Camber angle*3	Height from center of wheel to front fender brim (mm {in})	327—336 {12.9—13.2}	-0° 32' ± 1°
		337—346 {13.3—13.6}	-0° 12' ± 1°
		347—356 {13.7—14.0}	0° 06' ± 1°
		357—366 {14.1—14.4}	0° 23' ± 1°
		367—376 {14.1—14.8}	0° 38' ± 1°
Caster angle*3	Height from center of wheel to rear fender brim (mm {in})	346—355 {13.7—13.9}	6° 17' ± 1°
		356—365 {14.0—14.3}	6° 03' ± 1°
		366—375 {14.4—14.7}	5° 48' ± 1°
		376—385 {14.8—15.1}	5° 34' ± 1°
		386—395 {15.2—15.5}	5° 20' ± 1°

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tool in designated positions

*2 : Adjust to the median when carrying out wheel alignment

*3 : Difference between left and right must not exceed 1.5°

WHEEL ALIGNMENT

Maximum Steering Angle Adjustment

1. Remove the steering gear boot clamp.
2. Loosen the tie rod locknut.
3. Turn the tie rod to provide the correct maximum steering angle.
4. After adjustment, tighten the locknut to the specified torque.

Tightening torque

35—50 N·m {3.5—5.1 kgf·m, 26—36 ft·lbf}

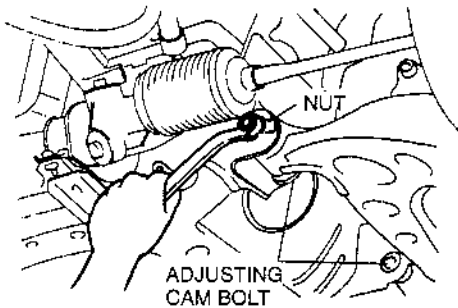
5. Adjust the toe-in.
6. Verify that the boot is not twisted, and install the boot clamp.

Caster Adjustment

Caution

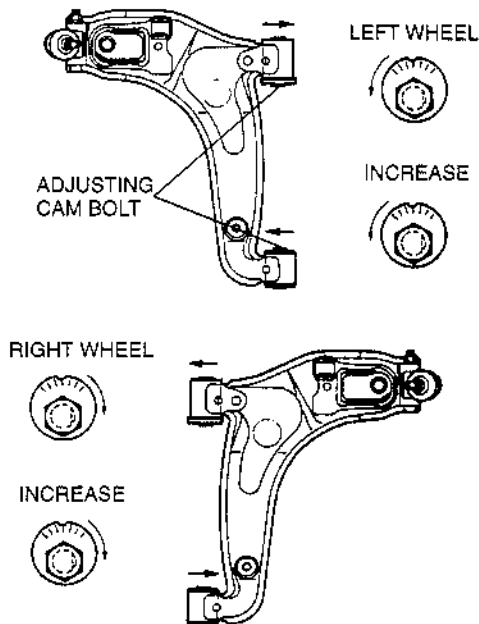
- Adjust the caster before adjusting the camber.

1. Loosen the front and/or rear cam nuts.



U5U21102

2. Turn the front and/or rear adjusting cam bolts to provide the correct caster angle.



U5U21103

Caster	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Increase	Counter-clockwise	Counter-clockwise	Clockwise	Clockwise
Decrease	Clockwise	Clockwise	Counter-clockwise	Counter-clockwise

Note

- Turning the front cam one graduation on the scale changes the caster angle about 25' and the camber about 29'. Turning the rear cam one graduation changes the caster angle about 25' and the camber about 2'.

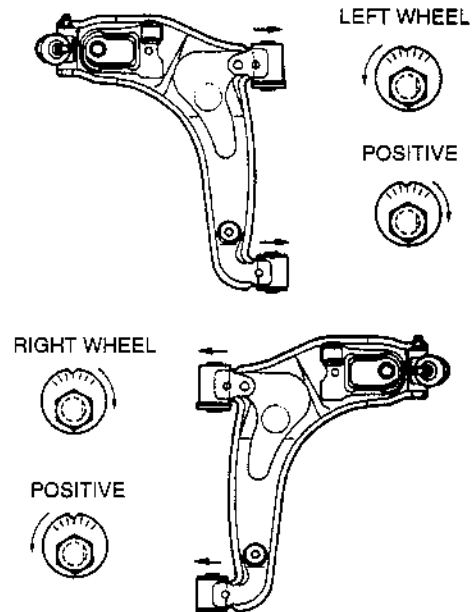
3. Adjust the camber and the toe-in.

Camber Adjustment

Caution

- Adjust the camber after adjusting the caster.

1. Loosen the front and rear cam nuts.
2. Turn the front and rear adjusting cam bolts the same amount in the opposite direction to provide the correct camber angle.



U5U21104

Camber	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Positive	Counter-clockwise	Clockwise	Clockwise	Counter-clockwise
Negative	Clockwise	Counter-clockwise	Counter-clockwise	Clockwise

WHEEL ALIGNMENT

Note

- Turning the front cam one graduation changes the camber about **29'** and the caster about **25'**. Turning the rear cam one graduation changes the camber about **2'** and the caster about **25'**.

Note

- If the cam cannot be turned far enough to make the adjustment, begin adjustment of the caster again using the other cam.

3. Tighten the nuts.

Tightening torque

94—112 N·m {9.5—11.5 kgf·m, 69—83 ft·lbf}

4. Adjust the toe-in.

Total Toe-in Adjustment

- Remove the steering gear boot clamp.
- Loosen the left and right tie rod locknuts, and turn the tie rods by the same amount.
- Loosen the left and right tie rod locknuts and turn the tie rods equally. Both tie rods are right threaded, so turning the right tie rod toward the front of the vehicle and the left toward the rear increases toe-in.

Note

- Turning both tie rods one complete turn changes toe-in by about **7 mm {0.28 in}**.

4. Tighten the tie rod locknuts to the specified torque.

Tightening torque

35—50 N·m {3.5—5.1 kgf·m, 26—36 ft·lbf}

5. Verify that the boot is not twisted, and install the boot clamp.

02

REAR WHEEL ALIGNMENT

X5U211W03

Specifications

Item		Specifications (Unloaded*1*2)	
Total toe-in	(mm {in})	3 ± 4 {0.12 ± 0.15}	
	(Degree)	0° 18' ± 24'	
Camber angle*3	Height from center of wheel to rear fender brim (mm {in})	346—355 {13.7—13.9}	−1° 14' ± 1°
		356—365 {14.0—14.3}	−0° 59' ± 1°
		366—375 {14.4—14.7}	−0° 47' ± 1°
		376—385 {14.8—15.1}	−0° 38' ± 1°
		386—395 {15.2—15.5}	−0° 32' ± 1°
Thrust angle		0° ± 48'	

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tool in designated positions

*2 : Adjust to the median when carrying out wheel alignment

*3 : Difference between left and right must not exceed 1.5°

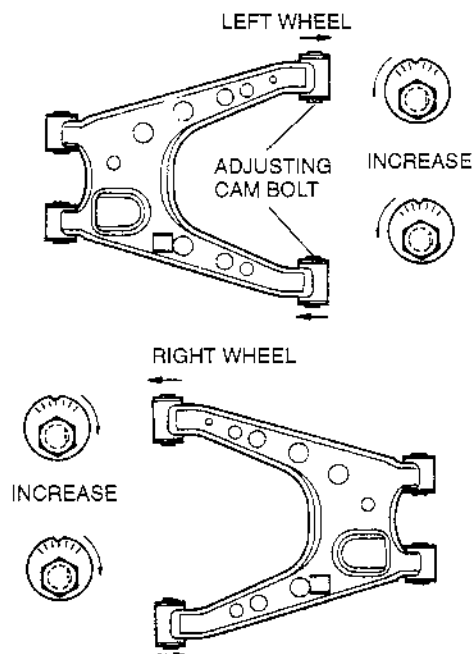
WHEEL ALIGNMENT

Total Toe-in Adjustment

Caution

- Adjust the toe-in before adjusting the camber.

- Loosen the front and/or rear cam nuts.
- Turn the front and/or rear adjusting cam bolts to provide the correct toe-in.



U5U21105

Toe-in	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Increase	Counter-clockwise	Counter-clockwise	Clock-wise	Clock-wise
Decrease	Clock-wise	Clock-wise	Counter-clockwise	Counter-clockwise

Note

- Turning the front cam one graduation changes the toe-in about **2.3 mm {0.11 in}** and the camber about **13'**. Turning the rear cam one graduation changes the toe-in about **2.3 mm {0.11 in}** and the camber about **8'**.

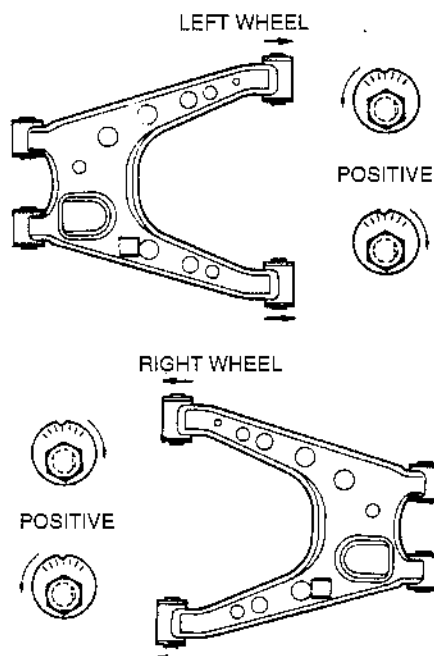
- Adjust the camber.

Camber Adjustment

Caution

- Adjust the camber after adjusting the toe-in.

- Loosen the front and rear cam nuts.
- Turn the front and rear adjusting cam bolts the same amount in the opposite direction to provide the correct camber angle.



U5U21106

Camber	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Positive	Counter-clockwise	Clock-wise	Clock-wise	Counter-clockwise
Negative	Clock-wise	Counter-clockwise	Counter-clockwise	Clock-wise

Note

- Turning the front cam one graduation changes the camber about **13'** and the toe-in about **2.3 mm {0.11 in}**. Turning the rear cam one graduation changes the camber about **8'** and the toe-in about **2.3 mm {0.11 in}**.
- If the cam cannot be turned far enough to make the adjustment, begin adjustment of the toe-in again using the other cam.

- Tighten the nuts.

Tightening torque

73—95 N·m {7.4—9.7 kgf·m, 54—70 ft·lbf}

FRONT SUSPENSION

1	Stabilizer control link nut
2	Front shock absorber and coil spring ☞ Removal Note ☞ Installation Note
3	Piston rod nut ☞ Removal Note
4	Retainer
5	Rubber bushing
6	Upper spring seat
7	Upper spring seat rubber
8	Coil spring ☞ Installation Note
9	Rubber bushing
10	Stopper casing
11	Dust boot
12	Bound stopper ☞ Installation Note
13	Lower spring seat rubber
14	Front shock absorber

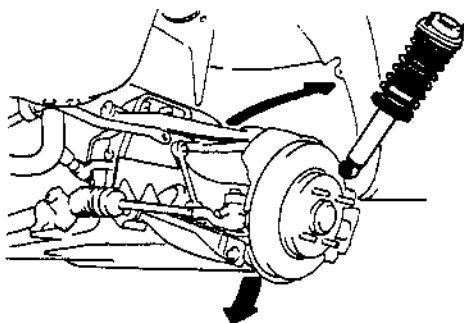
Front Shock Absorber and Coil Spring Removal Note

1. Disconnect the lower arm ball joint. (Refer to FRONT LOWER ARM REMOVAL/INSTALLATION, Lower Arm Ball Joint Removal Note.)
2. Loosen the lower arm bolts.

Caution

- Do not lower the arms excessively, which may damage the brake hose.

3. Lower the lower arm to remove the shock absorber.



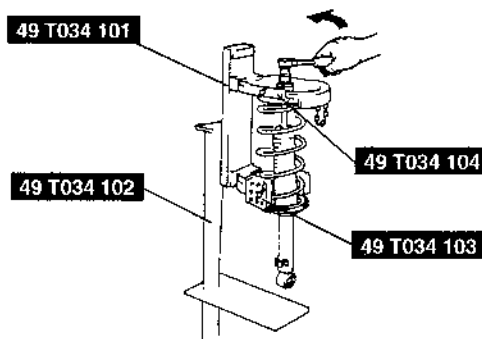
U5U21302

Piston Rod Nut Removal Note

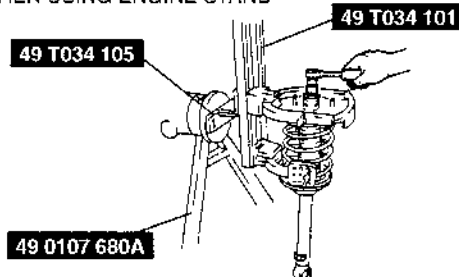
Warning

- Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SSTs before removing the coil spring nut.

1. Loosen the piston rod nut several turns, but do not remove the nut.
2. Assemble the SSTs.
3. Secure the shock absorber in the SSTs.
4. Compress the coil spring by using the SSTs and remove the nut.



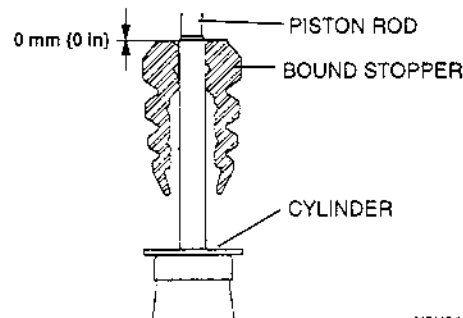
WHEN USING ENGINE STAND



U5U21304

Bound Stopper Installation Note

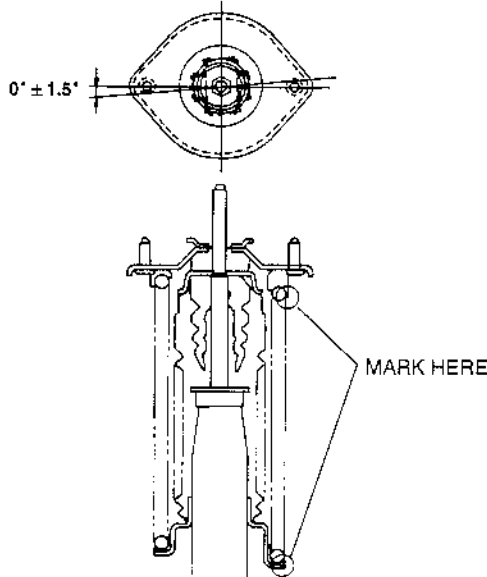
1. Install the bound stopper to the piston rod as shown.
2. Verify that the lower end of the bound stopper does not contact the cylinder.



X5U213WA8

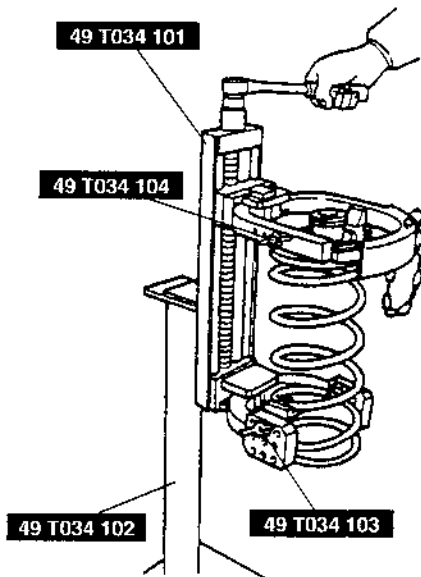
Coil Spring Installation Note

1. Temporarily assemble the upper spring seat, upper spring seat rubber, and coil spring to the shock absorber as shown.
2. Mark the upper spring seat, shock absorber, and coil spring for proper reassembly.



X5U213WA1

3. Align the marks of the upper spring seat and coil spring. Protect the upper spring seat and the coil spring with a piece of cloth, then assemble the SSTs.
4. Use the SSTs to compress the spring.



U5U21309

5. Install the shock absorber, making sure that the marks on the shock absorber and coil spring are aligned.
6. Tighten the nut several turns.
7. Remove the SSTs.
8. Secure the shock absorber in a vise.

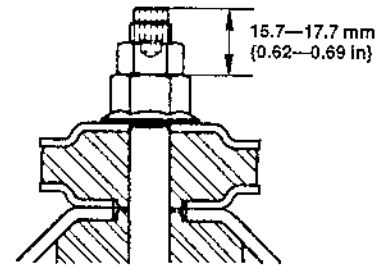
Caution

- Using an air tool will damage the piston rod thread. Do not use an air tool.

9. Apply an antirust penetrating oil lubricant to the piston rod thread and tighten the lower piston rod nut so that the exposed thread of the piston rod is 15.7—17.7 mm {0.62—0.69 in}.
10. Tighten the upper nut to the specified torque.

Tightening torque

16—23 N·m {1.6—2.4 kgf·m, 12—17 ft·lbf}



X5U213WA7

Front Shock Absorber and Coil Spring Installation Note

- Install the front shock absorber and coil spring so that the ABS wheel-speed sensor bracket of the shock absorber faces the rear of the vehicle.

FRONT SUSPENSION

FRONT SHOCK ABSORBER INSPECTION

X5U213W02

Inspect the following and replace as necessary.

1. Inspect for damage and oil leakage.
2. Inspect the rubber bushing for deterioration and wear.

3. Compress and extend the shock piston at least 3 times. Verify that the operational force does not change and that there is no unusual noise.
 - (1) Compress the shock absorber piston and release it.
 - (2) Verify that the piston extends fully at a normal speed.

FRONT SHOCK ABSORBER DISPOSAL

X5U213W03

Warning

- The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.

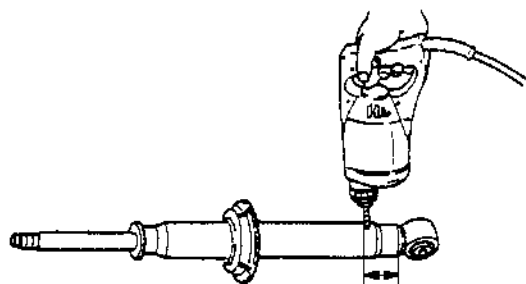
1. Clamp a shock absorber flat or with piston downwards.
2. Drill a 2—3 mm {0.08—0.12 in} hole at a point 20—30 mm {0.79—1.18 in} from the bottom of the tube so that the gas can escape.

3. Turn the hole downwards.

4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of the waste oil according to the waste disposal law.

Note

- Shock absorber gas is nitrogen gas.
- Shock absorber oil is mineral oil.



20—30 mm {0.79—1.18 in}

X5U213W00

FRONT SUSPENSION

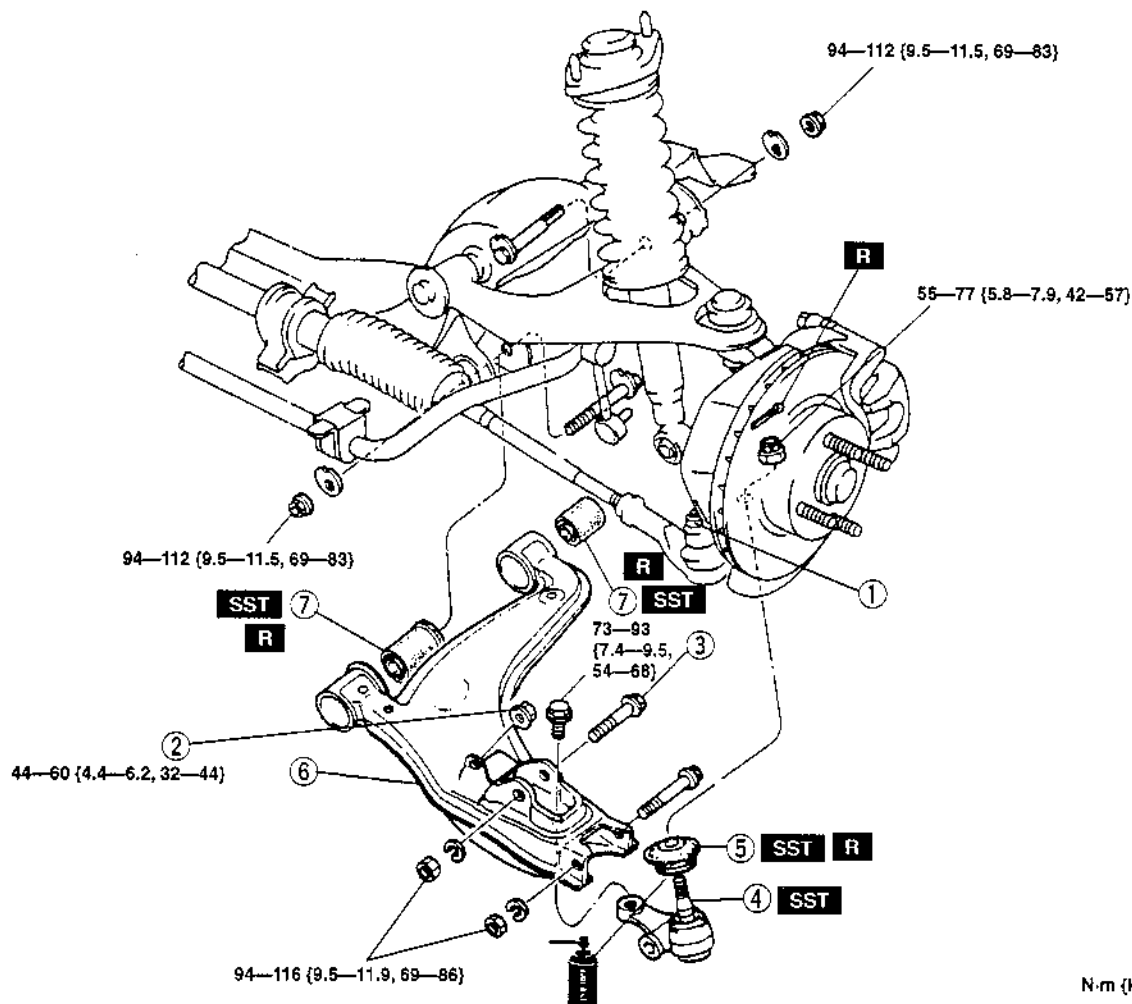
FRONT LOWER ARM REMOVAL/INSTALLATION

X5U213W04

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the front wheel alignment.



N·m (kgf·m, ft·lbf)

X5U213WA2

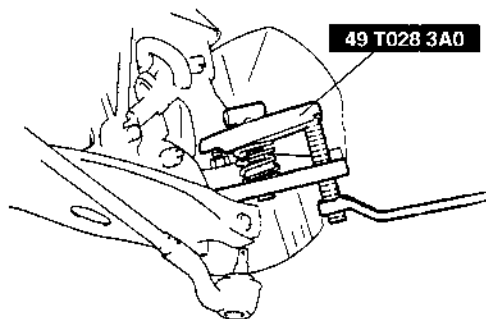
1	Tie-rod end ball joint ☐ 06-10 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Ball Joint Removal Note
2	Stabilizer control link nut
3	Shock absorber bolt
4	Lower arm ball joint ☐ Removal Note

5	Dust boot ☐ Removal Note ☐ Installation Note
6	Lower arm
7	Lower arm bushing (front and rear) ☐ Removal Note ☐ Installation Note

FRONT SUSPENSION

Lower Arm Ball Joint Removal Note

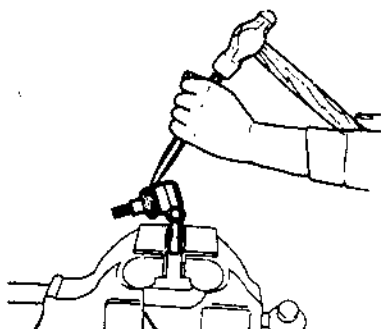
- Separate the ball joint from the knuckle by using the SST.



U5U21312

Dust Boot Removal Note

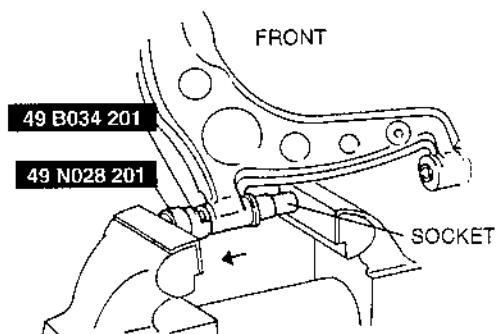
- Carefully remove the dust boot by using a chisel.



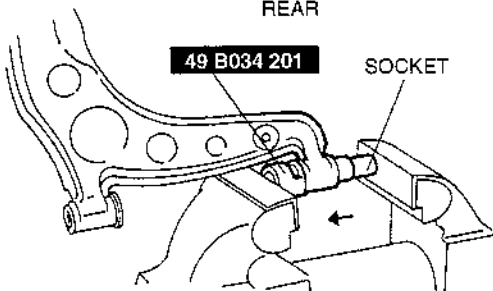
U5U21313

Lower Arm Bushing (Front and Rear) Removal Note

- Press the lower arm bushing out by using the SSTs and a socket as shown.



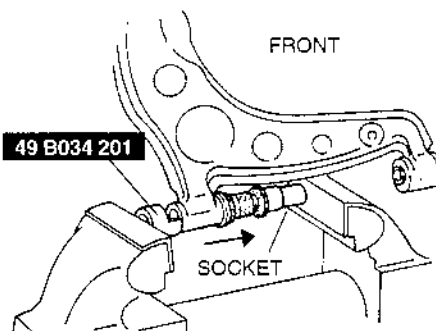
REAR



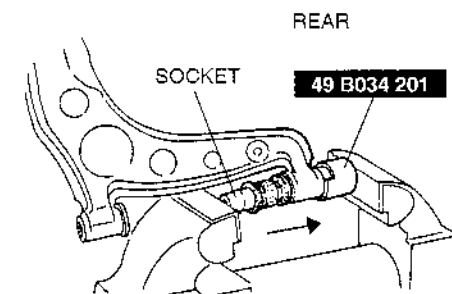
U5U21314

Lower Arm Bushing (Front and Rear) Installation Note

- Apply soapy water to the lower arm bushing.
- Press the bushing in by using the SST and socket in the direction of the arrow.



FRONT

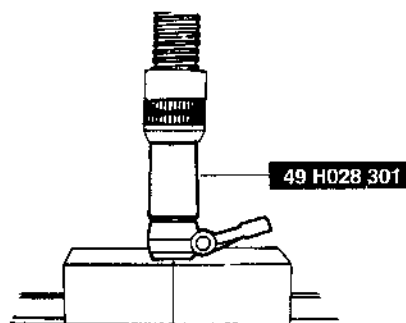


REAR

U5U21316

Dust Boot Installation Note

- Wipe away the grease on the ball joint.
- Liberaly coat the inside of the new dust boot with grease.
- Press the dust boot onto the ball joint by using the SST.
- Wipe away any grease that has been expelled from the dust boot.



U5U21315

FRONT SUSPENSION

FRONT LOWER ARM INSPECTION

U5U213AH

1. Shake the ball joint stud 5 times.
2. Connect the **SST** to the ball stud, and measure the rotation torque by using a pull scale.

Rotation torque

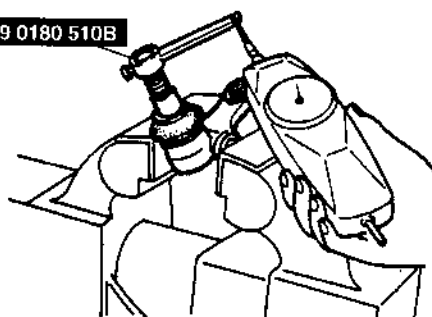
0.35—1.8 N·m

{3.5—19.5 kgf·cm, 3.1—16.9 in·lbf}

Pull scale reading

3.5—18.2 N {0.35—1.95 kgf, 0.77—4.29 lbf}

49 0180 510B



U5U21317

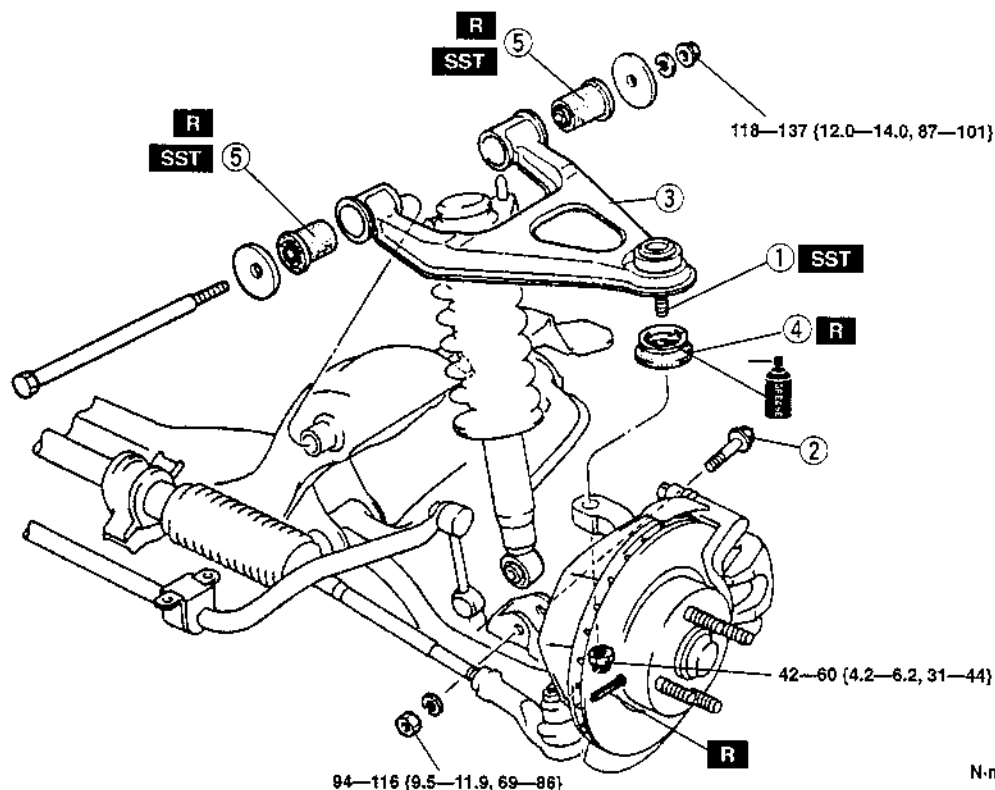
FRONT UPPER ARM REMOVAL/INSTALLATION

XSU213W05

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the front wheel alignment.



N·m (kgf·m, ft·lbf)

XSU213WA3

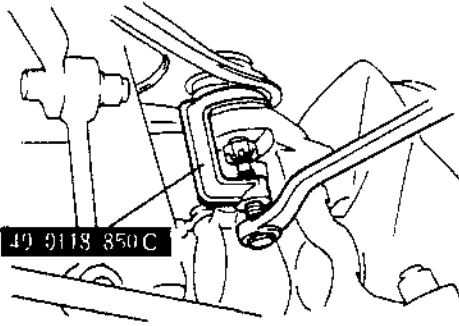
1	Upper arm ball joint ☑ Removal Note
2	Shock absorber bolt
3	Upper arm

4	Dust boot ☑ Removal Note ☑ Installation Note
5	Upper arm bushing (front and rear) ☑ Removal Note ☑ Installation Note

FRONT SUSPENSION

Upper Arm Ball Joint Removal Note

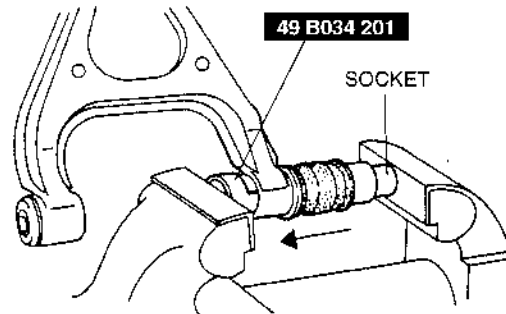
- Separate the upper arm ball joint from the knuckle by using the **SST**.



X5U213WA4

Upper Arm Bushing (Front and Rear) Installation Note

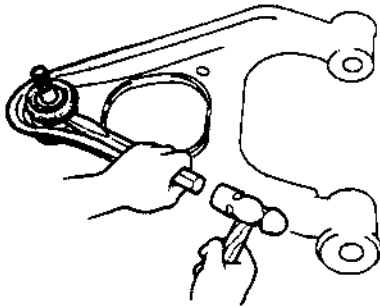
1. Apply soapy water to the upper arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21323

Dust Boot Removal Note

- Carefully remove the dust boot by using a chisel.



U5U21320

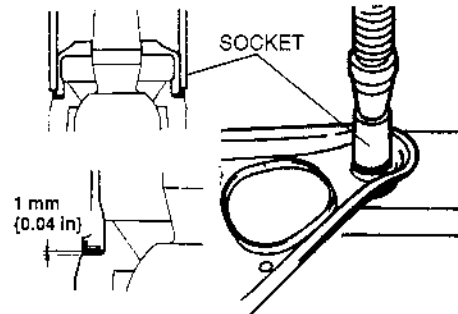
Dust Boot Installation Note

1. Liberally coat the inside of the new dust boot with grease.
2. Press the dust boot on by using a 30 mm {1 1/8 in} socket until the dust boot contacts the seat.

Caution

- Install the dust boot squarely and do not press excessively. The inner metal ring will be deformed if not done correctly.

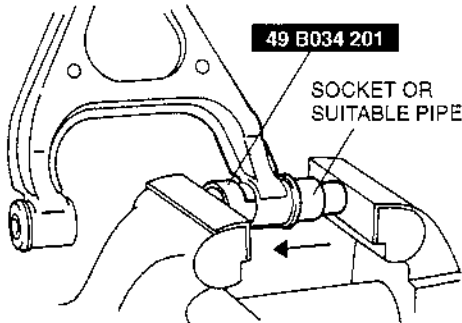
3. Verify that the clearance between the boot and the seat is less than 1 mm {0.04 in}.



U5U21322

Upper Arm Bushing (Front and Rear) Removal Note

- Press the upper arm bushing out by using the **SST** and a socket as shown.



U5U21321

FRONT SUSPENSION

FRONT UPPER ARM INSPECTION

1. Shake the ball joint stud 5 times.
2. Connect the **SST** to the ball stud, and measure the rotation torque by using a pull scale.

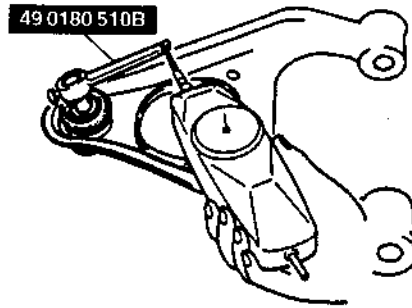
Rotation torque

0.3—2.2 N·m

{2.8—23.4 kgf·cm, 2.5—20.2 in·lbf}

Pull scale reading

3.0—22.1 N {0.3—2.3 kgf, 0.63—5.07 lbf}



U5U213AJ

U5U21324

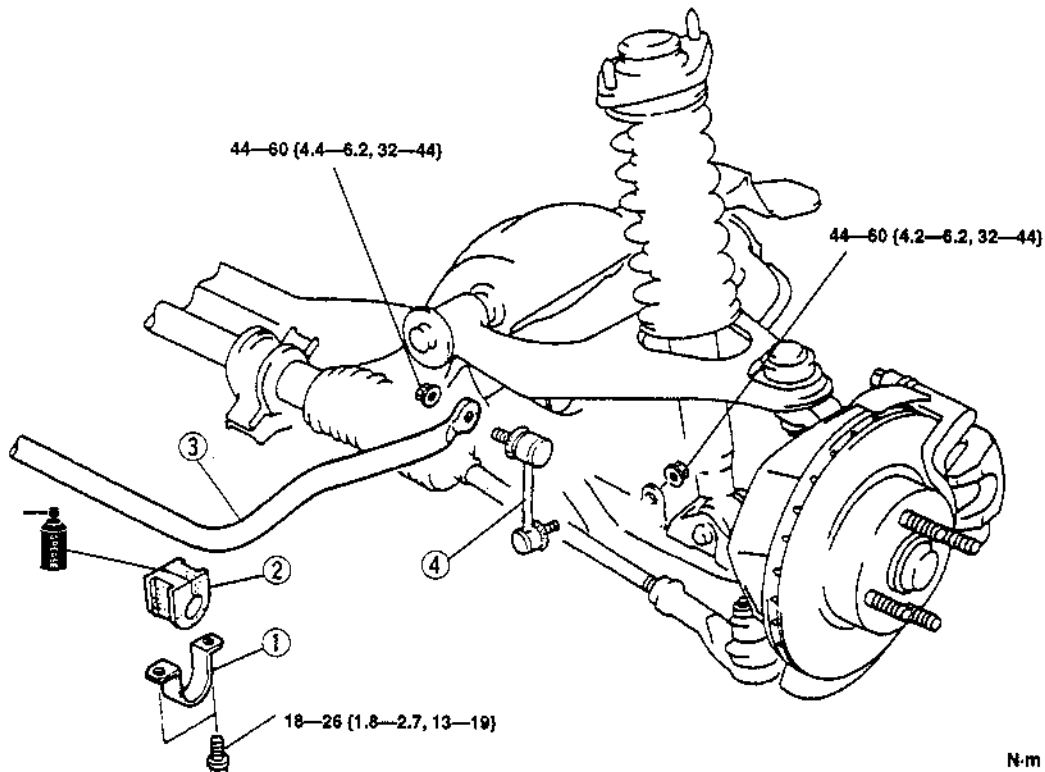
FRONT STABILIZER REMOVAL/INSTALLATION

X5U213W06

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

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



N·m (kgf·m, ft·lbf)

X5U213WA5

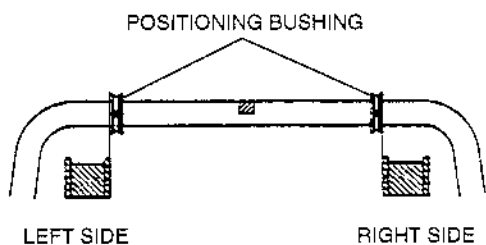
1	Stabilizer bracket
2	Stabilizer bushing ▶ Installation Note

3	Stabilizer bar
4	Stabilizer control link

FRONT SUSPENSION

Stabilizer Bushing Installation Note

- Align the bushing with the positioning bushing on the stabilizer.



X5U213WC1

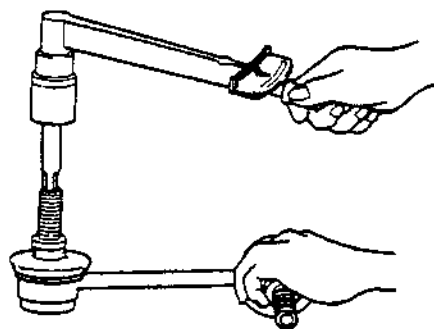
STABILIZER CONTROL LINK INSPECTION

1. Remove the stabilizer control link from the vehicle.
2. Inspect for bending and damage.
3. Measure the ball joint starting torque.
 - (1) Rock the ball joint stud side to side 10 times.
 - (2) Rotate the ball joint stud 10 times.
 - (3) Measure the starting torque by using a suitable Allen socket and a torque wrench.

Starting torque

0.14—2.7 N·m

{1.4—27 kgf·cm, 1.3—23.4 in·lbf}



X5U213W08

X5U213WB0

FRONT SUSPENSION

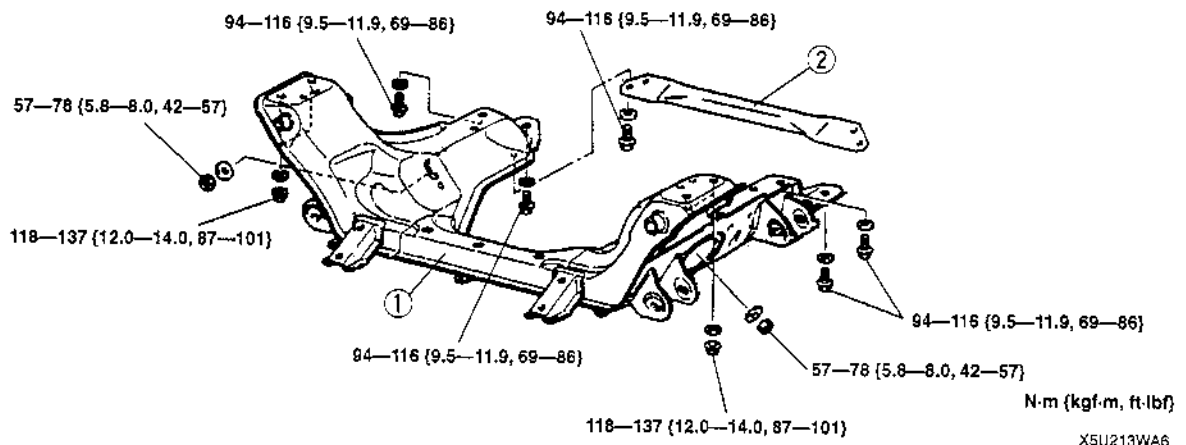
FRONT CROSSMEMBER REMOVAL/INSTALLATION

X5U213W07

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Support the engine with a hoist or baby crane.
2. Remove the steering gear and linkage. (Refer to 06-11 or 06-12 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION.)
3. Remove the steering knuckles. (Refer to 03-11 WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION.)
4. Remove the front stabilizer. (Refer to 02-11 FRONT STABILIZER REMOVAL/INSTALLATION.)
5. Remove the front lower arms. (Refer to 02-11 FRONT LOWER ARM REMOVAL/INSTALLATION.)
6. Remove the front upper arms. (Refer to 02-11 FRONT UPPER ARM REMOVAL/INSTALLATION.)
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Adjust the front wheel alignment.



1	Front crossmember
---	-------------------

2	Front crossbar
---	----------------

02-14 REAR SUSPENSION

REAR SHOCK ABSORBER AND COIL SPRING	
REMOVAL/INSTALLATION	02-14-1
Rear Shock Absorber and Coil Spring	
Removal Note	02-14-2
Rear Shock Absorber and Coil Spring	
Installation Note	02-14-2
REAR SHOCK ABSORBER	
INSPECTION	02-14-2
REAR SHOCK ABSORBER	
DISPOSAL	02-14-2
REAR LOWER ARM	
REMOVAL/INSTALLATION	02-14-3
Lower Arm Bushing (Crossmember Side)	
Removal Note	02-14-3
Lower Arm Bushing (Knuckle Side)	
Removal Note	02-14-3

Lower Arm Bushing (Knuckle Side)	
Installation Note	02-14-4
Lower Arm Bushing (Crossmember Side)	
Installation Note	02-14-4
REAR UPPER ARM	
REMOVAL/INSTALLATION	02-14-5
Upper Arm Bushing Removal Note ...	02-14-5
Upper Arm Bushing Installation Note .	02-14-5
REAR STABILIZER	
REMOVAL/INSTALLATION	02-14-6
Stabilizer Bushing Installation Note ...	02-14-6
STABILIZER CONTROL LINK	
INSPECTION	02-14-7
REAR CROSSMEMBER	
REMOVAL/INSTALLATION	02-14-7

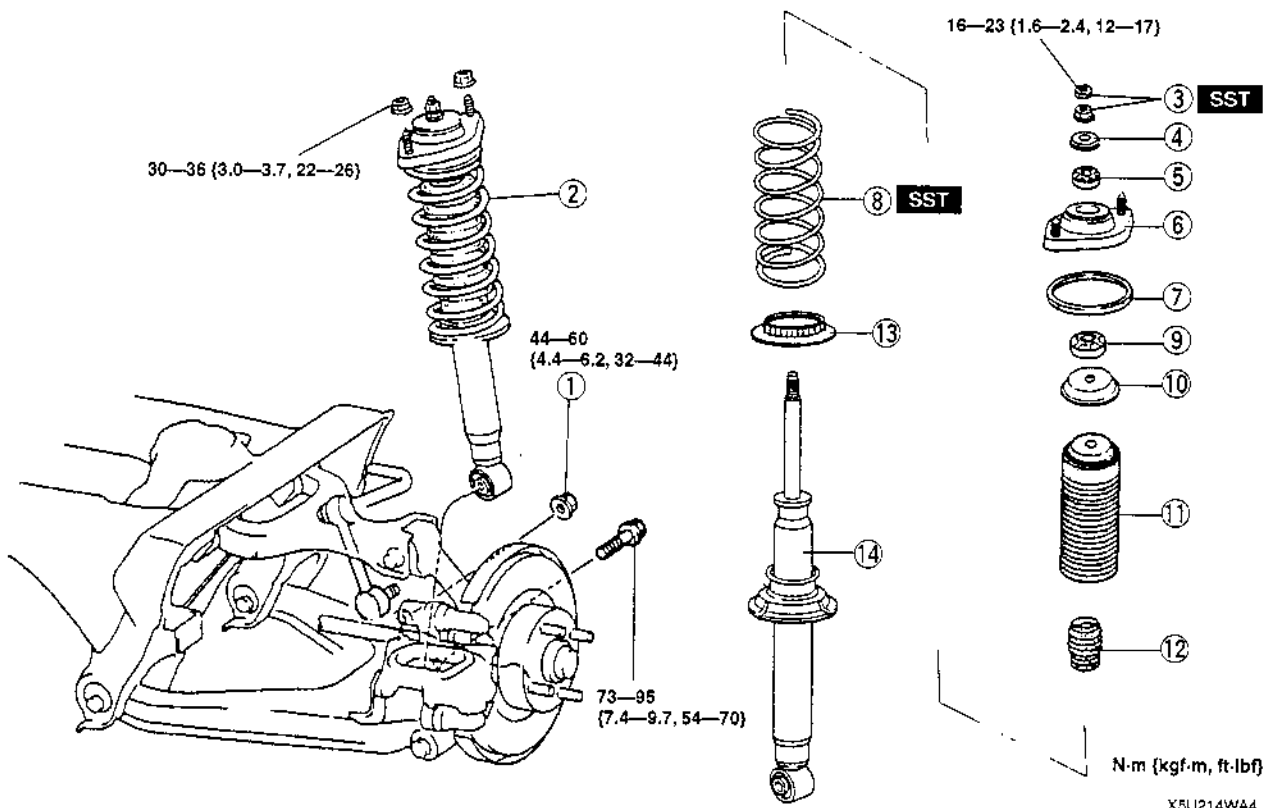
REAR SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION

X5U214W01

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the rear wheel alignment.



REAR SUSPENSION

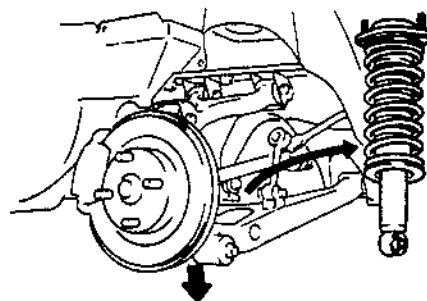
1	Stabilizer control link nut
2	Rear shock absorber and coil spring <ul style="list-style-type: none">▣ Removal Note▣ Installation Note
3	Piston rod nut <ul style="list-style-type: none">▣ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION, Piston Rod Nut Removal Note
4	Retainer
5	Rubber bushing
6	Upper spring seat
7	Upper spring seat rubber
8	Coil spring <ul style="list-style-type: none">▣ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION, Coil Spring Installation Note
9	Rubber bushing
10	Stopper casing
11	Dust boot
12	Bump stopper <ul style="list-style-type: none">▣ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL/INSTALLATION, Bump Stopper Installation Note
13	Lower spring seat rubber
14	Rear shock absorber

Rear Shock Absorber and Coil Spring Removal Note

Caution

- Do not lower the arms excessively, which may damage the brake hose.

1. Loosen the upper arm and adjusting cam nuts.
2. Lower the upper and lower arms to remove the shock absorber and spring.



USU21402

Rear Shock Absorber and Coil Spring Installation Note

- Install the rear shock absorber and coil spring so that the part number label (by Showa) or caution label (by Bilstein) on the shock absorber faces outside of the vehicle.

REAR SHOCK ABSORBER INSPECTION

X5U214W02

- Inspect the rear shock absorber in the same procedure as the front shock absorber. (Refer to 02-13 FRONT SHOCK ABSORBER INSPECTION.)

REAR SHOCK ABSORBER DISPOSAL

X5U214W03

- Dispose the rear shock absorber in the same procedure as the front shock absorber. (Refer to 02-13 FRONT SHOCK ABSORBER DISPOSAL.)

REAR SUSPENSION

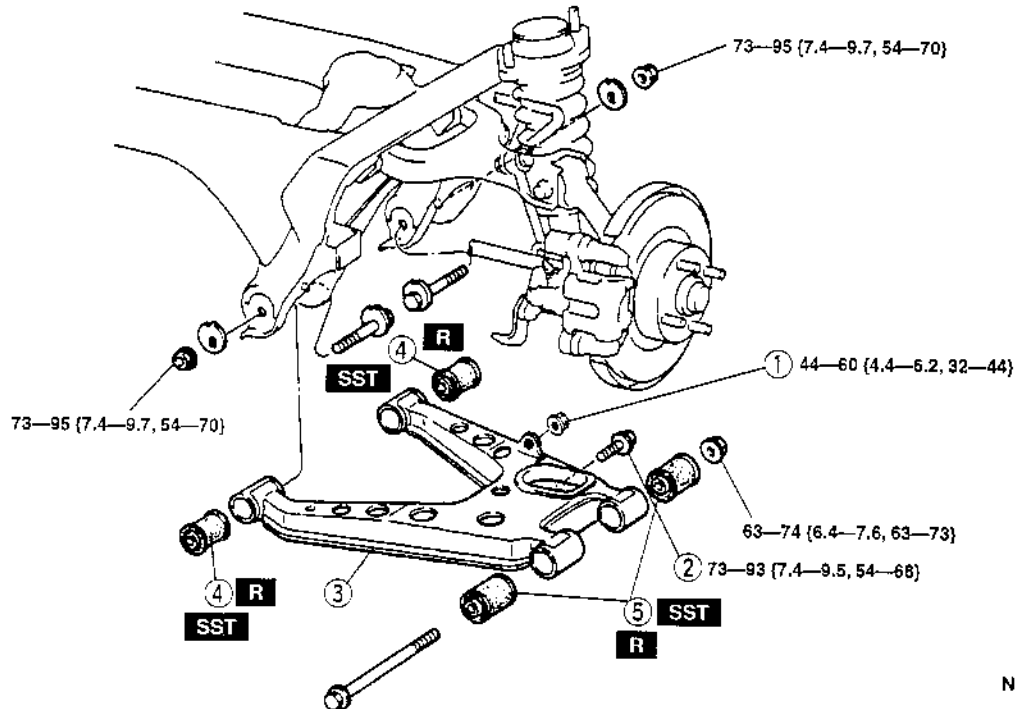
REAR LOWER ARM REMOVAL/INSTALLATION

X5U214W04

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the rear wheel alignment.



N-m (kgf-m, ft-lbf)

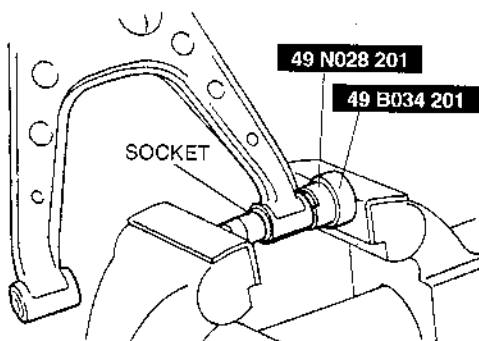
X5U214WA1

1	Stabilizer control link nut
2	Shock absorber bolt
3	Rear lower arm

4	Lower arm bushing (crossmember side) ☑ Removal Note ☑ Installation Note
5	Lower arm bushing (knuckle side) ☑ Removal Note ☑ Installation Note

Lower Arm Bushing (Crossmember Side) Removal Note

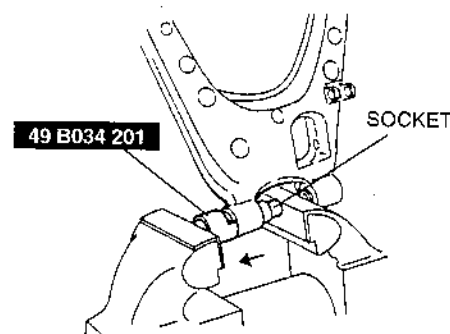
- Press the lower arm bushing out by using the SSTs and a socket as shown.



U5U21404

Lower Arm Bushing (Knuckle Side) Removal Note

- Press the lower arm bushing out by using the SST and a socket as shown.



U5U21405

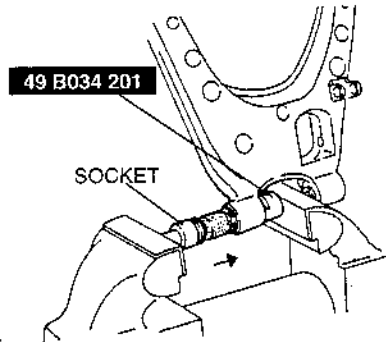
REAR SUSPENSION

Lower Arm Bushing (Knuckle Side) Installation Note

Caution

- Install the bushing with a white mark for the front side.

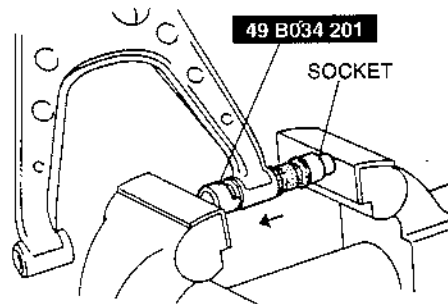
1. Apply soapy water to the lower arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21408

Lower Arm Bushing (Crossmember Side) Installation Note

1. Apply soapy water to the lower arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21407

REAR SUSPENSION

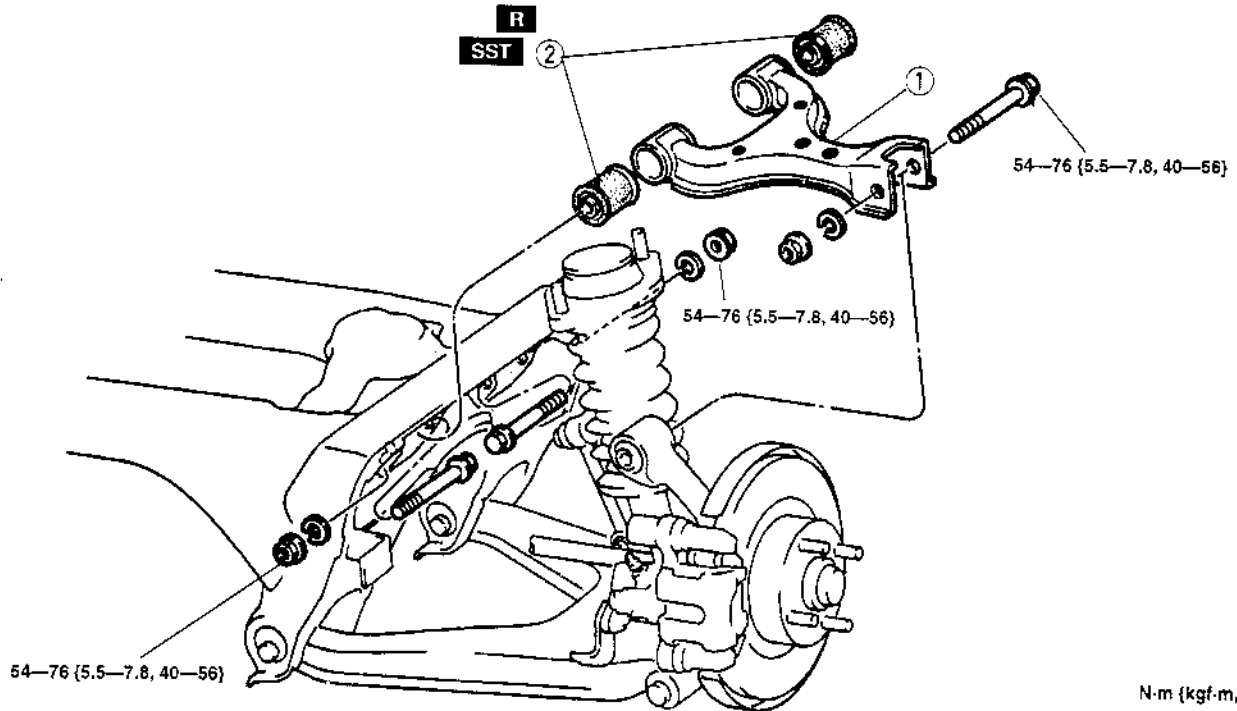
REAR UPPER ARM REMOVAL/INSTALLATION

XSU214WC5

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the rear wheel alignment.



N·m {kgf·m, ft·lbf}

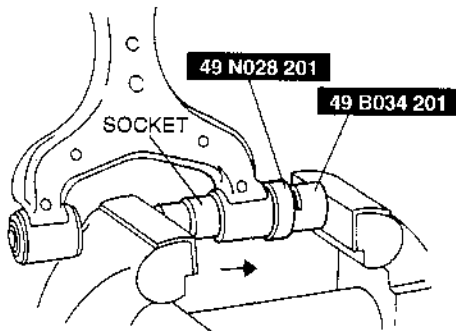
U5U21408

1	Rear upper arm
---	----------------

2	Upper arm bushing
	➤ Removal Note
	➤ Installation Note

Upper Arm Bushing Removal Note

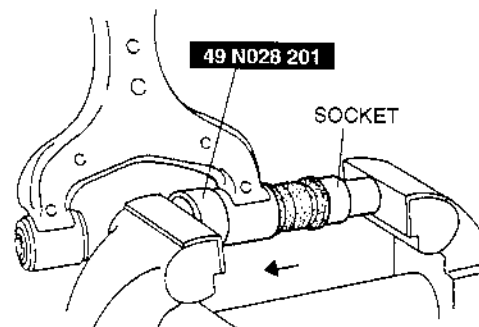
- Press the upper arm bushing out by using the **SSTs** and a socket as shown.



U5U21409

Upper Arm Bushing Installation Note

1. Apply soapy water to the upper arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21410

REAR SUSPENSION

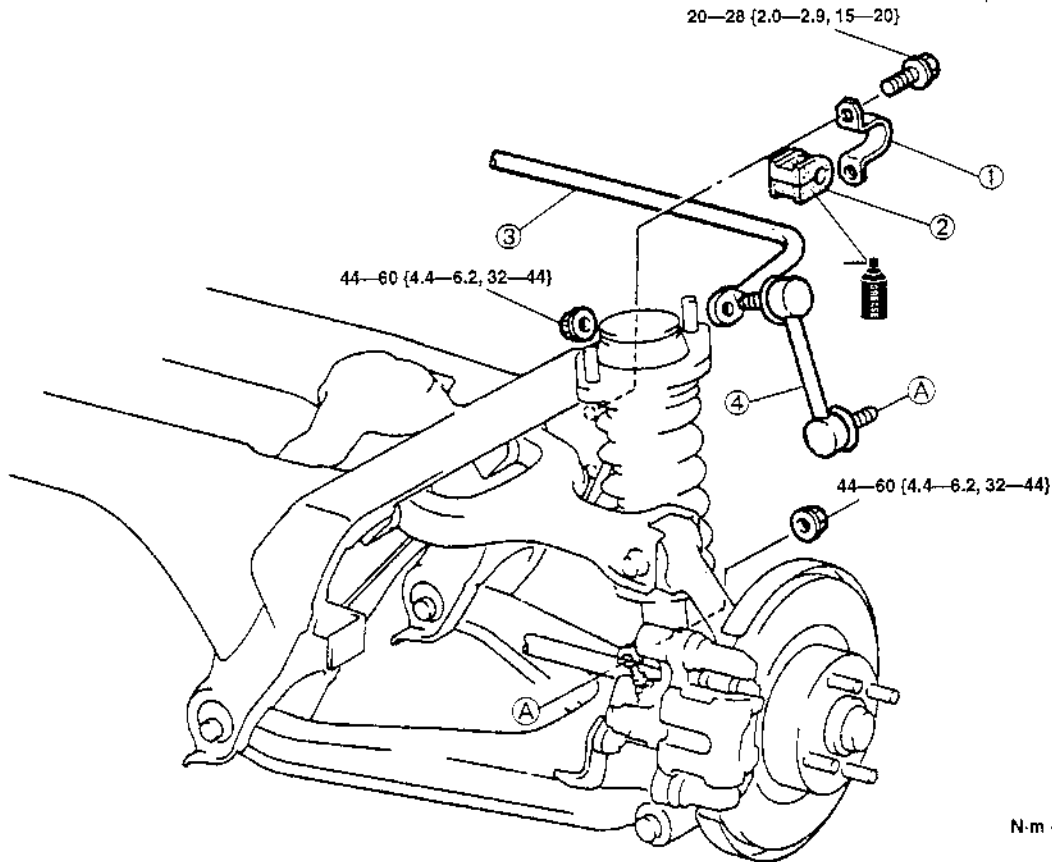
REAR STABILIZER REMOVAL/INSTALLATION

X5U214W06

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

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

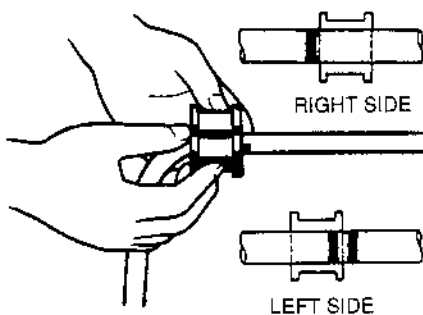


1	Stabilizer bracket
2	Stabilizer bushing ☑ Installation Note

3	Stabilizer bar
4	Control link

Stabilizer Bushing Installation Note

- Align the bushing with the installation mark on the stabilizer.



U5U21412

REAR SUSPENSION

STABILIZER CONTROL LINK INSPECTION

(Refer to 02-13 STABILIZER CONTROL LINK INSPECTION.)

X5U214W08

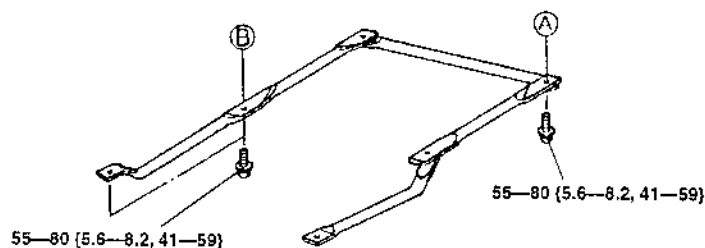
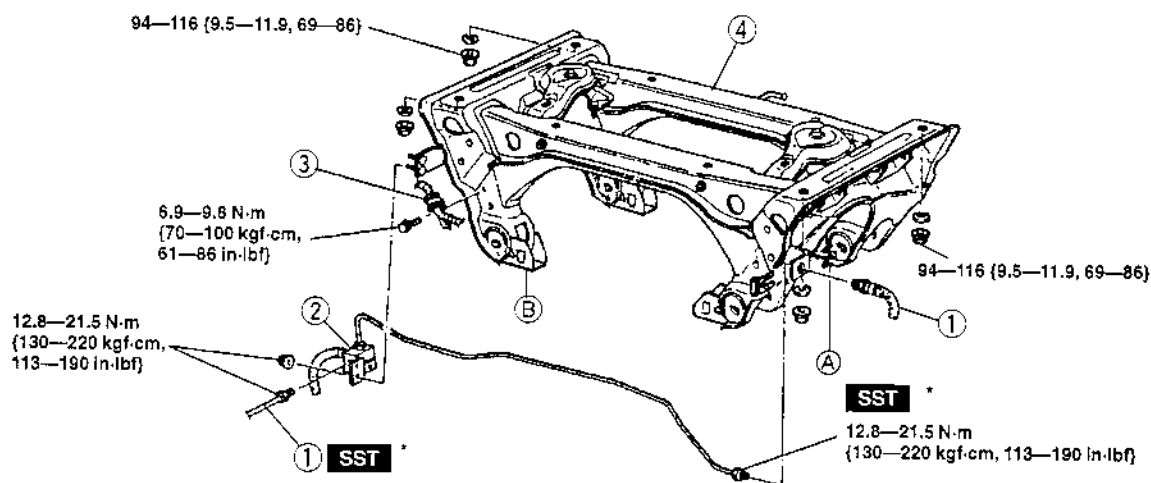
REAR CROSSMEMBER REMOVAL/INSTALLATION

X5U214W07

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

1. Disconnect the parking brake cable.
2. Remove the rear crossbar.
3. Remove the differential and the power plant frame. (Refer to 03-14 DIFFERENTIAL REMOVAL/INSTALLATION.)
4. Remove the wheel hub and knuckle with the driveshaft. (Refer to 03-12 WHEEL HUB, KNUCKLE REMOVAL/INSTALLATION.)
5. Remove the rear upper arm. (Refer to 02-14 REAR UPPER ARM REMOVAL/INSTALLATION.)
6. Remove the rear lower arm. (Refer to 02-14 REAR LOWER ARM REMOVAL/INSTALLATION.)
7. Remove the rear stabilizer. (Refer to 02-14 REAR STABILIZER REMOVAL/INSTALLATION.)
8. Remove in the order indicated in the table.
9. Install in the reverse order of removal.
10. After installation, do the following steps.
 - (1) Adjust the parking brake lever stroke. (Refer to 04-12 PARKING BRAKE LEVER ADJUSTMENT.)
 - (2) Adjust the rear wheel alignment.



* 49 0259 770B

N·m {kgf·m, ft·lbf}

X5U214WA3

1	Brake pipe and flexible hose
2	Brake pipe and joint

3	Battery cable bracket
4	Rear crossmember

02-50 TECHNICAL DATA

02 SUSPENSION 02-50-1

02 SUSPENSION

X5U250W01

Item				Specification	
WHEEL ALIGNMENT					
Front wheel alignment (Unloaded)*1	Total toe-in		(mm {in})	3 ± 4 {0.12 ± 0.15}	
			(Degree)	0°18' ± 24'	
	Maximum steering angle		Inner	38° ± 3°	
			Outer	33° ± 3°	
	Steering axis inclination (reference value)			11°38'	
	Camber angle*2	Height from center of wheel to front fender brim (mm {in})	327—336 {12.9—13.2}	-0°32' ± 1°	
			337—346 {13.3—13.6}	-0°12' ± 1°	
			347—356 {13.7—14.0}	0°06' ± 1°	
			357—366 {14.1—14.4}	0°23' ± 1°	
			367—376 {14.5—14.8}	0°38' ± 1°	
	Caster angle*2	Height from center of wheel to rear fender brim (mm {in})	346—355 {13.7—13.9}	6°17' ± 1°	
			356—365 {14.0—14.3}	6°03' ± 1°	
			366—375 {14.4—14.7}	5°48' ± 1°	
			376—385 {14.8—15.1}	5°34' ± 1°	
			386—395 {15.2—15.5}	5°20' ± 1°	
Rear wheel alignment (Unloaded)*1	Total toe-in		(mm {in})	3 ± 4 {0.12 ± 0.15}	
			(Degree)	0°18' ± 24'	
	Camber angle*2	Height from center of wheel to rear fender brim (mm {in})	346—355 {13.7—13.9}	-1°14' ± 1°	
			356—365 {14.0—14.3}	-0°59' ± 1°	
			366—375 {14.4—14.7}	-0°47' ± 1°	
			376—385 {14.8—15.1}	-0°38' ± 1°	
			386—395 {15.2—15.5}	-0°32' ± 1°	
	Thrust angle			0°48'	
	WHEELS AND TIRES				
Standard tire wheel	Size		15×6JJ		14×5 1/2JJ
	Offset (mm {in})		40 {1.57}		Steel: 45 {1.77} Alluminum alloy: 40 {1.57}
	Pitch circle diameter (mm {in})		100 {3.94}		
	Material		Alluminum alloy		Steel or alluminum alloy
Standard tire	Size		195/50R15 82V		185/60R14 82H P185/60R14 82H
	Air pressure (kPa {kgf/cm ² , psi})		180 {1.8, 26}		
	Remaining tread (mm {in})	Standard tire	1.6 {0.063} min.		
		Snow tire	50% of tread		
Standard tire wheel and tire	Lug nut tightening torque (N·m {kgf·m, ft·lbf})		89—117 {9—12, 66—86}		
	Wheel and tire runout (mm {in})	Radial direction	1.5 {0.059} max.		
		Lateral direction	2.0 {0.078} max.		Steel: 2.5 {0.088} max. Alluminum alloy: 2.0 {0.078} max.
	Wheel imbalance*3 (g {oz})		9 {0.31} max.		10 {0.35} max.

TECHNICAL DATA

Item		Specification
Temporary spare tire wheel	Size	14 × 4T
	Offset (mm {in})	45 {1.77}
	Pitch circle diameter (mm {in})	100 {3.94}
	Material	Steel
Temporary spare tire	Size	T115/70D14
	Air pressure (kPa {kgf/cm ² , psi})	412 {4.2, 60}
FRONT SUSPENSION		
Exposed thread of shock absorber piston rod (mm {in})		15.7—17.7 {0.62—0.69}
Lower arm ball joint rotation torque (Pull scale reading) (N {kgf, lbf})		3.5—18.2 {0.35—1.95, 0.77—4.29}
Upper arm ball joint rotation torque (Pull scale reading) (N {kgf, lbf})		3.0—22.1 {0.3—2.3, 0.63—5.07}
Stabilizer control link rotation torque (N·m {kgf·cm, in·lbf})		0.14—2.7 {1.4—27, 1.3—23.4}
REAR SUSPENSION		
Exposed thread of shock absorber piston rod (mm {in})		15.7—17.7 {0.62—0.69}
Stabilizer control link rotation torque (N·m {kgf·cm, in·lbf})		0.14—2.7 {1.4—27, 1.3—23.4}

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

*2 : Difference between left and right must not exceed 1°30'.

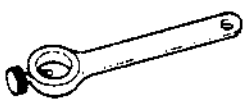
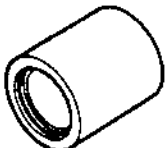

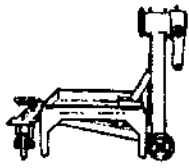



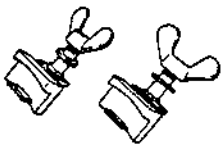

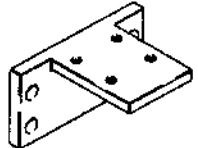
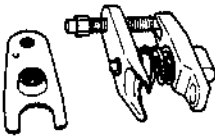


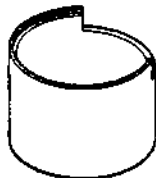
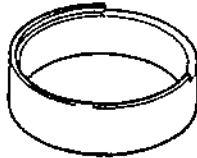
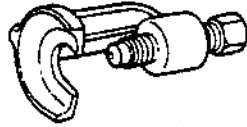
*3 : One balance weight; max. 60 g {2.1 oz}. If the total weight exceeds 100 g {3.5 oz} on one side, rebalance after moving the tire around on the rim. Do not use more than two balance weights on the inner or outer side of the wheel.

02-60 SERVICE TOOLS

02 SUSPENSION SST 02-60-1

02 SUSPENSION SST

X5U250W01

<p>49 0180 510B</p> <p>Preload measuring attachment</p>  <p>T0180510B</p>	<p>49 H028 301</p> <p>Dust boot installer</p>  <p>TH028301X</p>	<p>49 0259 770B</p> <p>Flare nut wrench</p>  <p>T0259770B</p>
<p>49 0107 680A</p> <p>Engine stand</p>  <p>T0107680A</p>	<p>49 T034 1A0</p> <p>Coil spring compressor</p>  <p>TT0341A0X</p>	<p>49 T034 101</p> <p>Spring compressor (Part of 49 T034 1A0)</p>  <p>TT034101X</p>
<p>49 T034 102</p> <p>Stand (Part of 49 T034 1A0)</p>  <p>TT034102X</p>	<p>49 T034 103</p> <p>Hook (Part of 49 T034 1A0)</p>  <p>TT034103X</p>	<p>49 T034 104</p> <p>Support (Part of 49 T034 1A0)</p>  <p>TT034104X</p>
<p>49 T034 105</p> <p>Attachment</p>  <p>TT034105X</p>	<p>49 T028 3A0</p> <p>Ball joint puller set</p>  <p>TT0283A0X</p>	<p>49 T028 303</p> <p>Body (Part of 49 T028 3A0)</p>  <p>TT028303X</p>
<p>49 T028 304</p> <p>Attachment (Part of 49 T028 3A0)</p>  <p>TT028304X</p>	<p>49 B034 201</p> <p>Support block</p>  <p>TB034201X</p>	<p>49 N028 201</p> <p>Support block</p>  <p>TN028201X</p>
<p>49 0118 850C</p> <p>Ball joint puller</p>  <p>T0118850C</p>	<p>—</p>	<p>—</p>

DRIVELINE/AXLE

03 SECTION

GENERAL PROCEDURES	03-10	DIFFERENTIAL	03-14
FRONT AXLE	03-11	PROPELLER SHAFT	03-15
REAR AXLE	03-12	TECHNICAL DATA	03-50
DRIVE SHAFT	03-13	SERVICE TOOLS	03-60

03

03-10 GENERAL PROCEDURES

PRECAUTION (DRIVELINE/AXLE) 03-10-1

PRECAUTION (DRIVELINE/AXLE)

Wheels and tires removal/installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. When a wheel is removed, retighten it to **89—117 N·m {9.0—12.0 kgf·m, 66—86 ft·lbf}**.

Suspension arm removal/installation

- Tighten any part of the suspension that uses rubber bushings only after vehicle has been lowered and unloaded.*

*Unloaded: Fuel tank is full. Engine coolant and engine oil are at specified level. Spare tire, jack, and tools are in designated position.

XSU0310W01

03-11 FRONT AXLE

WHEEL HUB, STEERING KNUCKLE

PREINSPECTION	03-11-1
Wheel Bearing Play	03-11-1
WHEEL HUB BOLT REPLACEMENT ..	03-11-1
WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION	03-11-2

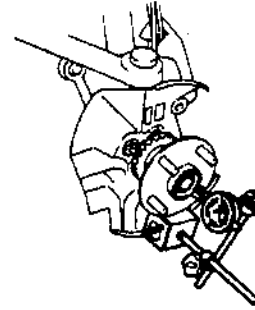
ABS Sensor Rotor Removal Note	03-11-3
Wheel Hub Bolt Removal Note	03-11-3
Wheel Hub Bolt Installation Note	03-11-3
ABS Sensor Rotor Installation Note ..	03-11-3
Locknut Installation Note	03-11-3

WHEEL HUB, STEERING KNUCKLE PREINSPECTION

Wheel Bearing Play

1. Remove the brake caliper component and disc plate.
2. Position a dial indicator against the wheel hub. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds the specification, inspect and adjust the locknut torque or replace the wheel bearing as necessary.

Maximum wheel bearing play
0.05 mm {0.002 in}



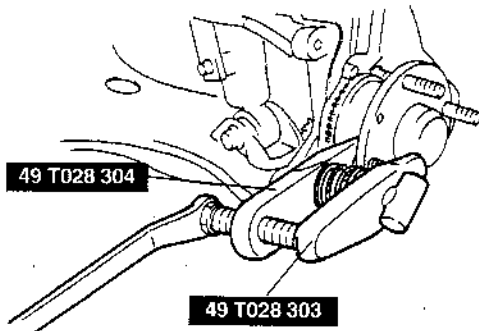
X5U311W01

03

U5U31101

WHEEL HUB BOLT REPLACEMENT

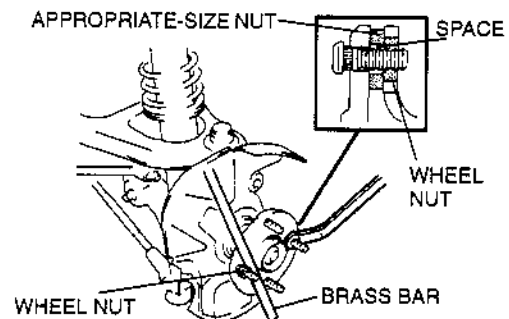
1. Remove the wheel hub bolt by using the SSTs.



U5U31102

2. As shown in the figure, install the wheel hub bolt into the wheel hub and set a washer and wheel hub nut in the wheel hub bolt.

3. Tighten the wheel hub nut while holding the wheel hub by using a brass bar.



U5U31103

FRONT AXLE

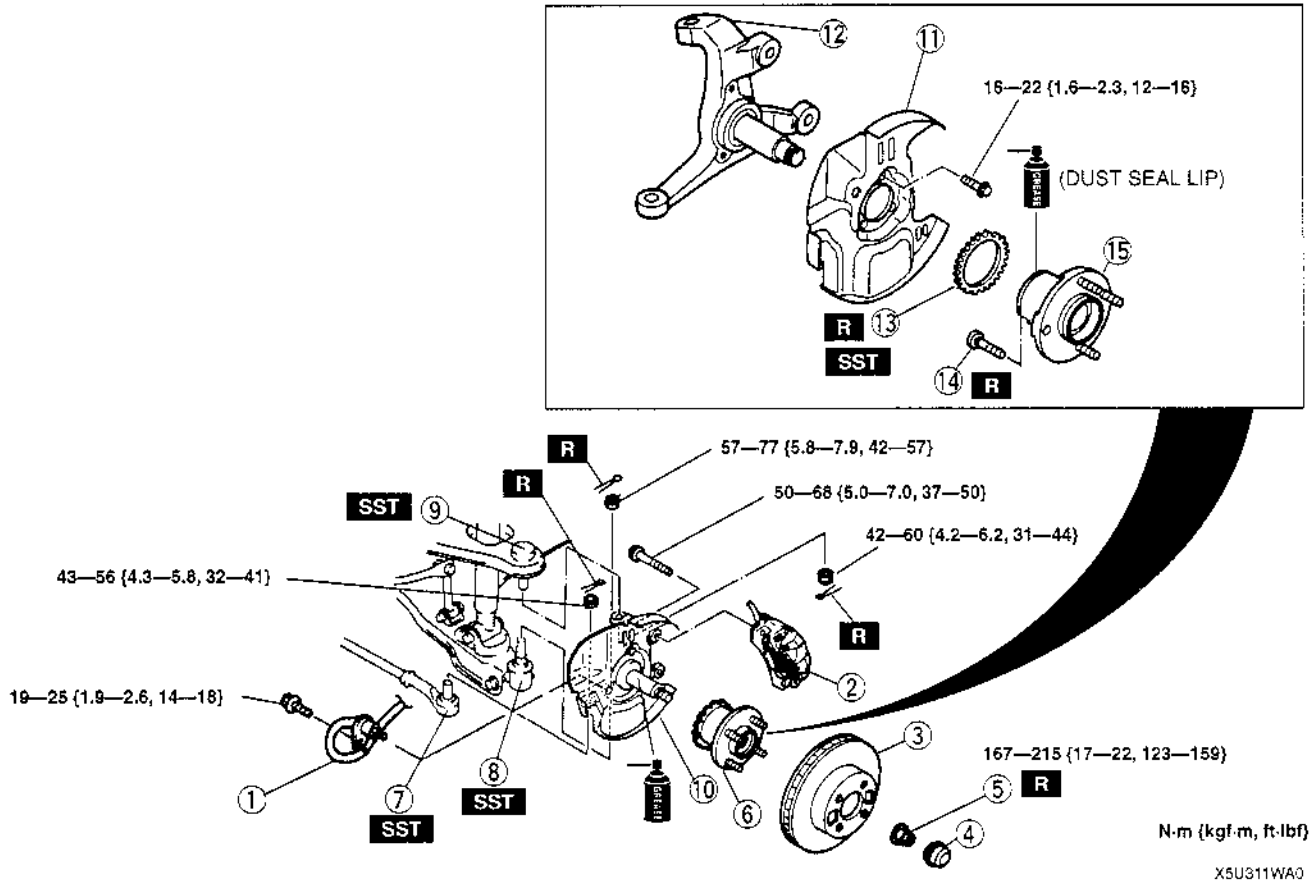
WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION

X5U311W02

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

- Remove in the order indicated in the table.
- Install in the reverse order of removal.
- After installation, adjust the total toe-in. (Refer to 02-11 WHEEL ALIGNMENT, Total Toe-in Adjustment.)



N·m (kgf·m, ft·lbf)

X5U311WA0

1	ABS wheel-speed sensor (if equipped)
2	Brake caliper component
3	Disc plate <ul style="list-style-type: none"> 04-11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Removal Note 04-11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Installation Note
4	Hub cap
5	Locknut <ul style="list-style-type: none"> Installation Note
6	Front wheel hub component
7	Tie-rod end ball joint <ul style="list-style-type: none"> 06-11 STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Ball Joint Removal Note

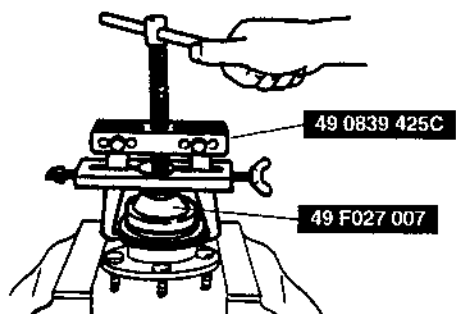
8	Front lower arm ball joint <ul style="list-style-type: none"> 02-13 FRONT LOWER ARM REMOVAL/INSTALLATION, Front Lower Arm Ball Joint Removal Note
9	Front upper arm ball joint <ul style="list-style-type: none"> 02-13 FRONT UPPER ARM REMOVAL/INSTALLATION, Front Upper Arm Removal Note
10	Dust cover and knuckle spindle
11	Dust cover
12	Knuckle spindle
13	ABS sensor rotor <ul style="list-style-type: none"> Removal Note Installation Note
14	Wheel hub bolt <ul style="list-style-type: none"> Removal Note Installation Note
15	Front wheel hub

ABS Sensor Rotor Removal Note

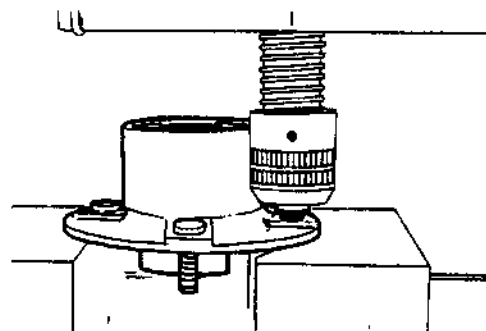
- Secure the front wheel hub in a vise and remove the sensor rotor by using the SSTs.

Note

- The sensor rotor does not need to be removed unless replacing it.



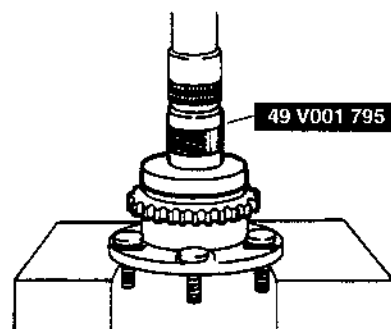
U5U31105



U5U31107

ABS Sensor Rotor Installation Note

- Install a new sensor rotor by using the SST and a press.

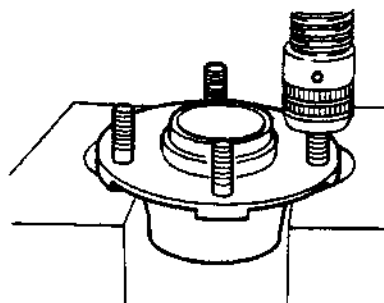


U5U31108

Wheel Hub Bolt Removal Note

Note

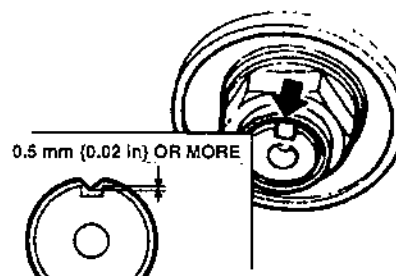
- The hub bolts do not need to be removed unless replacing them.
- Remove the hub bolts by using a press.



U5U31106

Locknut Installation Note

- Install a new locknut and stake it.



U5U31109

Wheel Hub Bolt Installation Note

- Install the new hub bolts by using a press.

03-12 REAR AXLE

WHEEL HUB, KNUCKLE

PREINSPECTION	03-12-1
Wheel Bearing Play	03-12-1

WHEEL HUB, KNUCKLE

REMOVAL/INSTALLATION	03-12-2
Rear Wheel Hub Removal Note	03-12-3
Wheel Bearing Removal Note	03-12-3
Dust Cover Removal Note	03-12-3

Bushing Removal Note	03-12-3
Bushing Installation Note	03-12-3
Dust Cover Installation Note	03-12-4
Wheel Bearing Installation Note	03-12-4
Rear Wheel Hub Installation Note	03-12-4
Oil Seal Installation Note	03-12-4
Locknut Installation Note	03-12-4

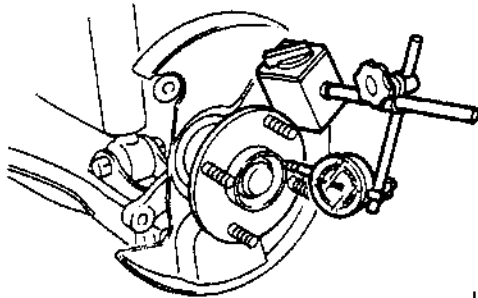
WHEEL HUB, KNUCKLE PREINSPECTION

X5U312W01

Wheel Bearing Play

1. Remove the wheel, brake caliper component, and disc plate.
2. Position a dial indicator against the wheel hub. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play. If the bearing play exceeds the specification, inspect and adjust the locknut torque or replace the wheel bearing as necessary.

Maximum wheel bearing play
0.05 mm {0.002 in}



U5U31201

REAR AXLE

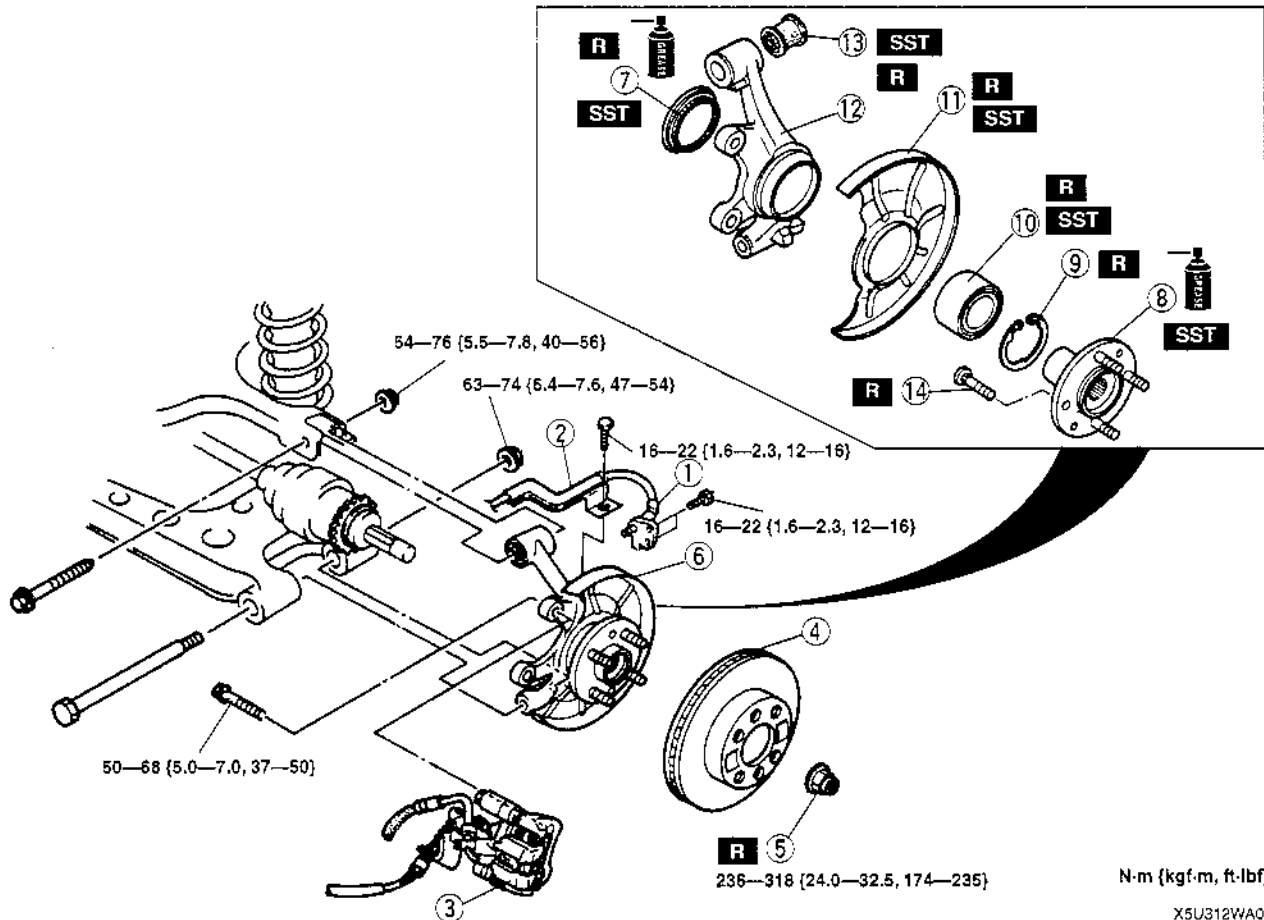
WHEEL HUB, KNUCKLE REMOVAL/INSTALLATION

X5U312W02

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

- Remove in the order indicated in the table.
- Install in the reverse order of removal.



N·m (kgf·m, ft·lbf)

X5U312WA0

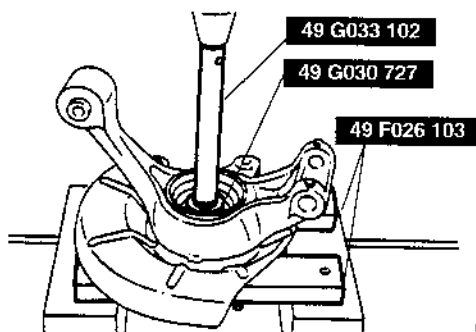
1	ABS wheel-speed sensor (if equipped)
2	Sensor bracket
3	Brake caliper component
4	Disc plate ↳ 04-11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Removal Note ↳ 04-11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Installation Note
5	Locknut ↳ Installation Note
6	Knuckle, wheel hub, and dust cover
7	Oil seal ↳ Installation Note
8	Rear wheel hub ↳ Removal Note ↳ Installation Note

9	Retaining ring
10	Wheel bearing ↳ Removal Note ↳ Installation Note
11	Dust cover ↳ Removal Note ↳ Installation Note
12	Knuckle
13	Bushing ↳ Removal Note ↳ Installation Note
14	Wheel hub bolt ↳ 03-11 WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION, Wheel hub Bolt Removal Note

REAR AXLE

Rear Wheel Hub Removal Note

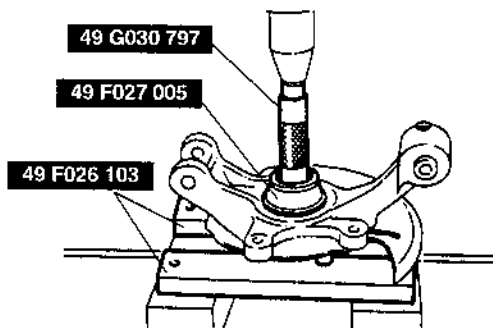
- Press out the rear wheel hub component by using the **SSTs**.



U5U31203

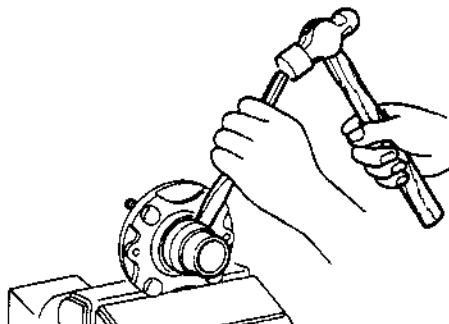
Wheel Bearing Removal Note

- Press out the wheel bearing by using the **SSTs**.



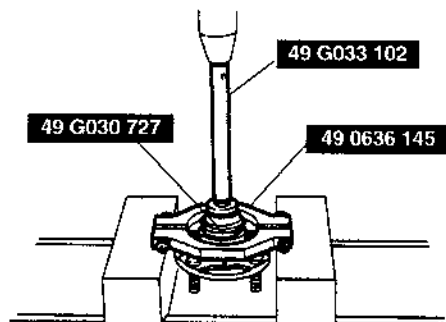
U5U31204

- Move the bearing inner race away from the rear wheel hub component by using a chisel.



U5U31205

- Press the bearing inner race off the wheel hub by using the **SSTs**.



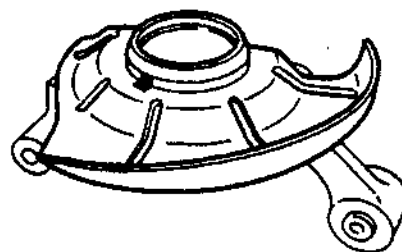
U5U31206

Dust Cover Removal Note

Note

- The dust cover does not need to be removed unless replacing it.

- Mark the dust cover and knuckle for proper reassembly.

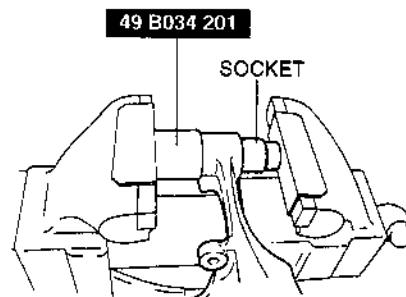


U5U31207

- Remove the dust cover by using a chisel.

Bushing Removal Note

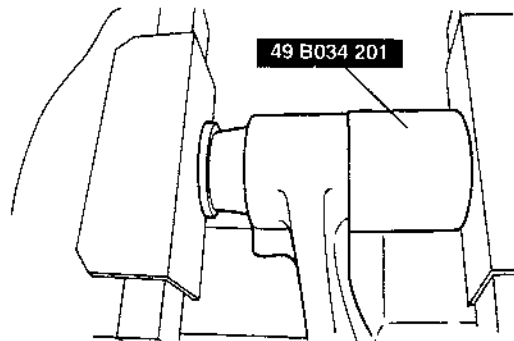
- Press out the bushing by using the **SST** and a socket.



U5U31208

Bushing Installation Note

- Apply soapy water to the bushing, then press it into the knuckle by using the **SST**.



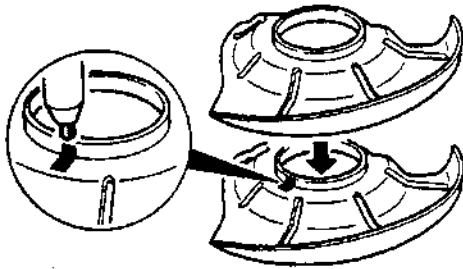
U5U31209

03

REAR AXLE

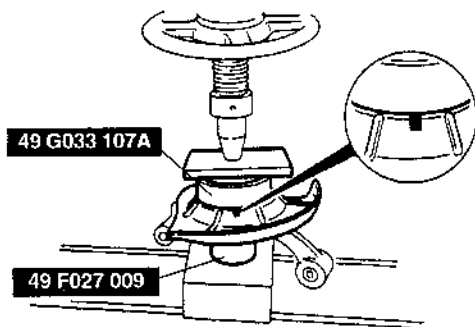
Dust Cover Installation Note

1. Mark the new dust cover as the same point as the removed one.



U5U312*0

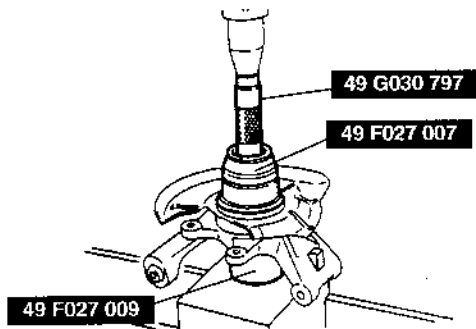
2. Align the marks of the new dust cover and the knuckle.
3. Install the new dust cover by using the SSTs.



U5U312*1

Wheel Bearing Installation Note

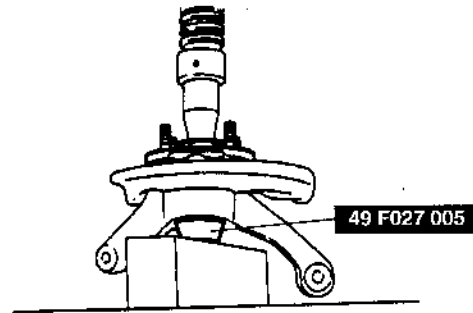
- Press the new wheel bearing into the knuckle by using the SSTs.



U5U312*2

Rear Wheel Hub Installation Note

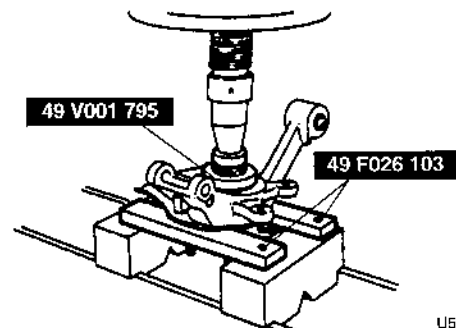
1. Apply grease to the wheel bearing inner race.
2. Press the rear wheel hub component in by using the SST.



U5U312*3

Oil Seal Installation Note

1. Apply grease to the new oil seal lip.
2. Install the new oil seal by using the SSTs.



U5U312*4

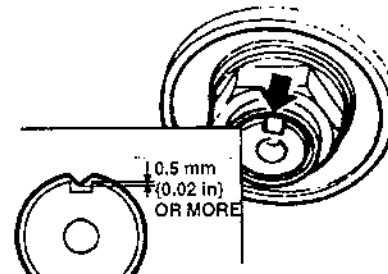
Locknut Installation Note

- Install a new locknut and stake it.

Tightening torque

236—318 N·m

{24.0—32.5 kgf·m, 174—235 ft·lbf}



X5U312WA1

03-13 DRIVE SHAFT

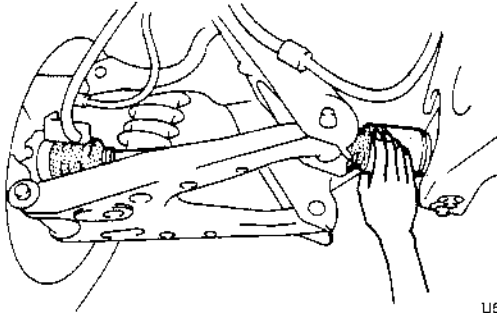
DRIVE SHAFT PREINSPECTION	03-13-1
DRIVE SHAFT	
REMOVAL/INSTALLATION	03-13-2
Drive Shaft Removal Note	03-13-2
Drive Shaft Installation Note	03-13-3
DRIVE SHAFT	
DISASSEMBLY/ASSEMBLY	03-13-3
Boot Bands Disassembly Note	03-13-4
Clip Disassembly Note	03-13-4
Snap Ring Disassembly Note	03-13-4
Balls, Inner Ring, Cage Disassembly	
Note	03-13-4

Boots Disassembly Note	03-13-4
ABS Sensor Rotor (With ABS)	
Disassembly Note	03-13-5
ABS Sensor Rotor (With ABS)	
Assembly Note	03-13-5
Boots Assembly Note	03-13-5
Cage, Inner Ring, Balls Assembly	
Note	03-13-5
Boot Bands Assembly Note	03-13-6

DRIVE SHAFT PREINSPECTION

X5U313W01

1. Inspect the dust boot on the drive shaft for cracks, damage, leaking grease, and a loose boot band.
2. Inspect the drive shaft for bending, cracks, and wear of the joints and splines.
3. Repair or replace the drive shaft as necessary.



U5U313C1

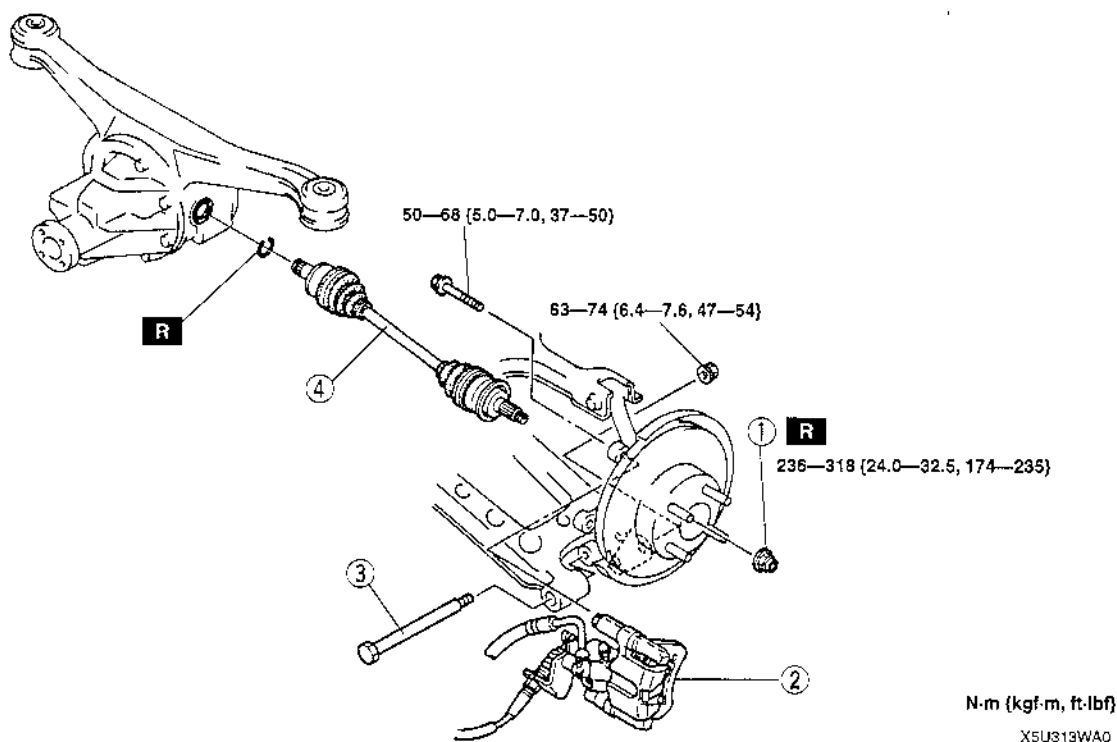
DRIVE SHAFT REMOVAL/INSTALLATION

X5U313W02

Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

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



1	Locknut ➔ 03-11 WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION, Locknut Installation Note
2	Brake caliper component

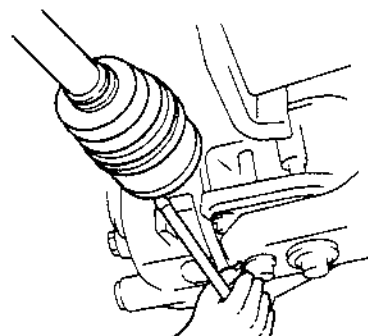
3	Bolt
4	Drive shaft ➔ Removal Note ➔ Installation Note

Drive Shaft Removal Note

Note

- If the drive shaft will not come out of the rear hub support easily, install a discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the wheel hub.

1. Pull the rear hub support from the drive shaft.
2. Remove the drive shaft from the differential by using a pry bar.



U5U31303

DRIVE SHAFT

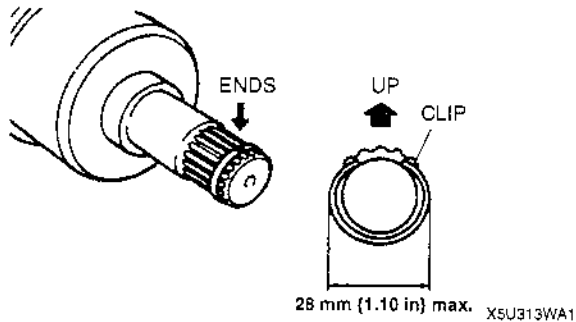
Drive Shaft Installation Note

1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

3. With the ends of the clip facing upward, push the drive shaft into the differential.
4. After installation, pull outward on the double offset joint outer ring and verify that the drive shaft is securely held by the clip.

Caution

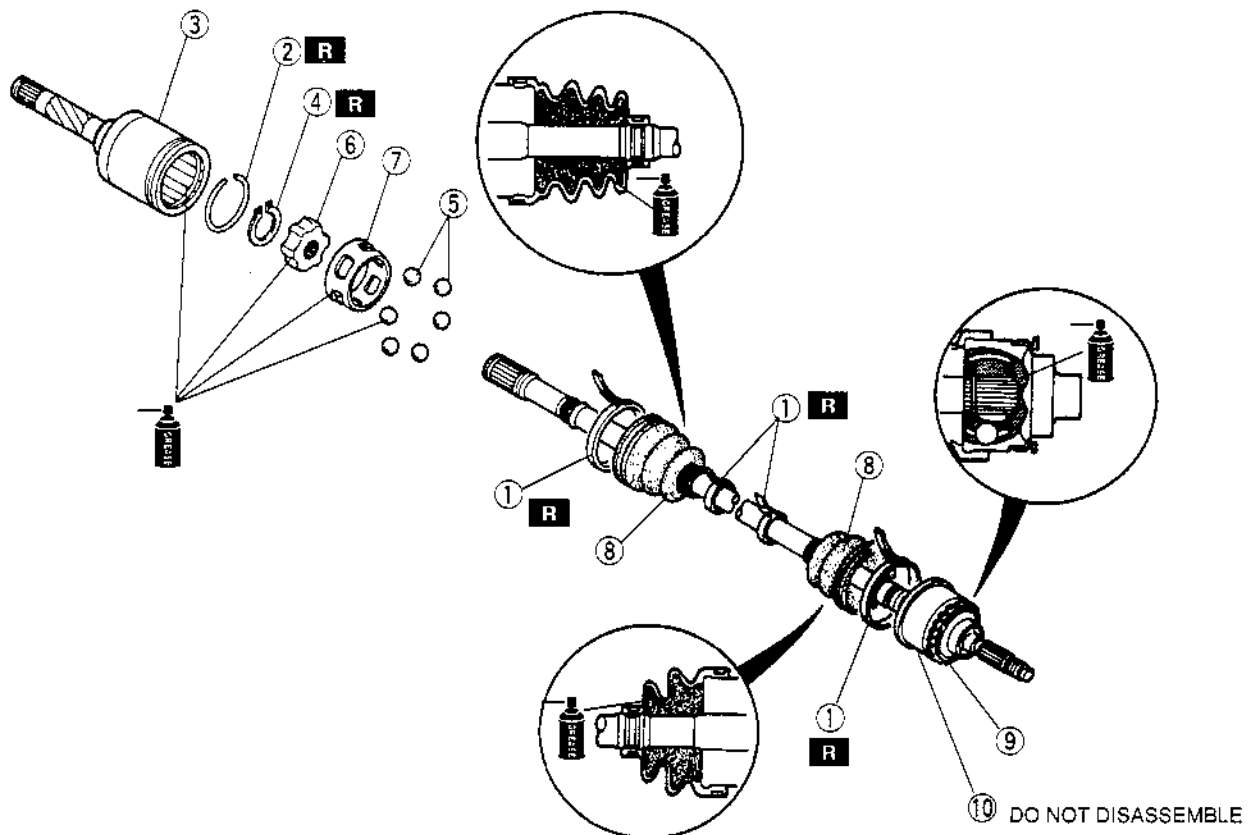
- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.



DRIVE SHAFT DISASSEMBLY/ASSEMBLY

X5U313W03

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



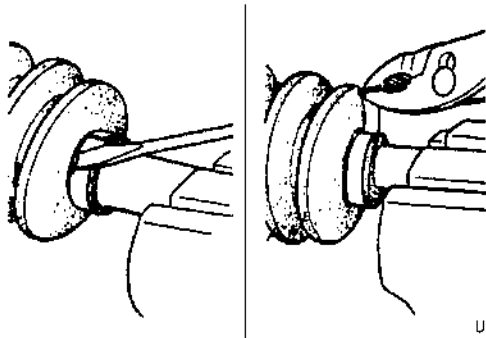
U5U3:305

DRIVE SHAFT

1	Boot bands ➤ Disassembly Note ➤ Assembly Note
2	Clip ➤ Disassembly Note
3	Outer ring
4	Snap ring ➤ Disassembly Note
5	Balls ➤ Disassembly Note ➤ Assembly Note
6	Inner ring ➤ Disassembly Note ➤ Assembly Note
7	Cage ➤ Disassembly Note ➤ Assembly Note
8	Boots ➤ Disassembly Note ➤ Assembly Note
9	ABS sensor rotor ➤ Disassembly Note ➤ Assembly Note
10	Shaft and bell joint component

Boot Bands Disassembly Note

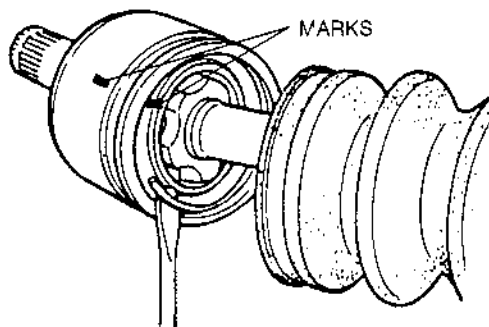
- To remove the boot bands, pry up the locking clip by using a screwdriver, then raise the end of the band.



U5U31306

Clip Disassembly Note

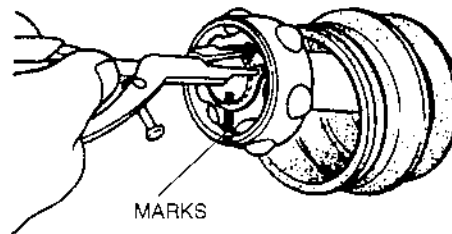
1. Mark the drive shaft and outer ring with paint as shown.
2. Remove the clip.



U5U31307

Snap Ring Disassembly Note

1. Mark the drive shaft end and inner ring with paint as shown.
2. Remove the snap ring by using snap-ring pliers.



U5U31308

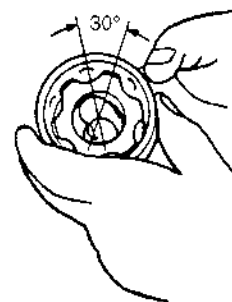
Balls, Inner Ring, Cage Disassembly Note

1. Insert a screwdriver between the inner ring and cage to remove the balls.



U5U31309

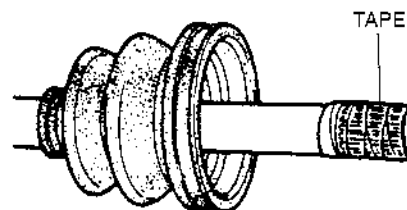
2. Mark the inner ring and cage with paint.
3. Turn the cage approximately 30°, then pull it away from the inner ring.



U5U31310

Boots Disassembly Note

1. Wrap the shaft splines with tape.



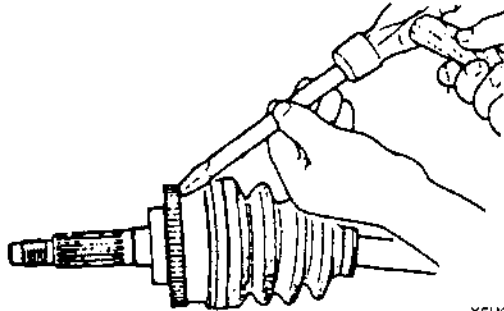
U5U31311

2. Remove the boot.

ABS Sensor Rotor (With ABS) Disassembly Note

Note

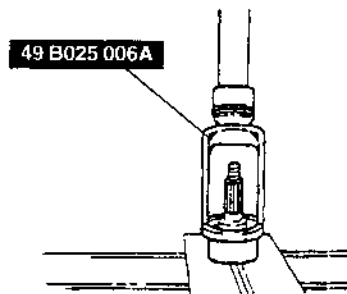
- The sensor rotor does not need to be removed unless replacing it.
- Tap the ABS sensor rotor off the bell joint outer race by using a chisel.



X5U313WA2

ABS Sensor Rotor (With ABS) Assembly Note

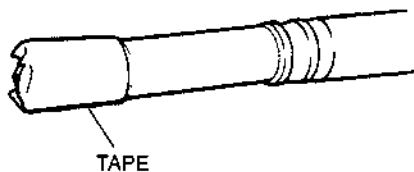
- Press in the ABS sensor rotor by using the SST.



X5U313WA3

Boots Assembly Note

- Before putting the boot onto the shaft, wrap the shaft splines with tape.

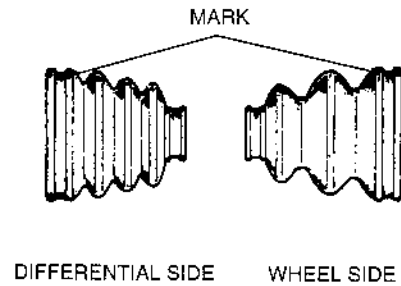


U5U31312

Note

- The initials DOJ and BJ are stamped on the wheel side and differential side boots respectively.
- Install the wheel side and differential side boots, noting the shape and size of each one in the figure.

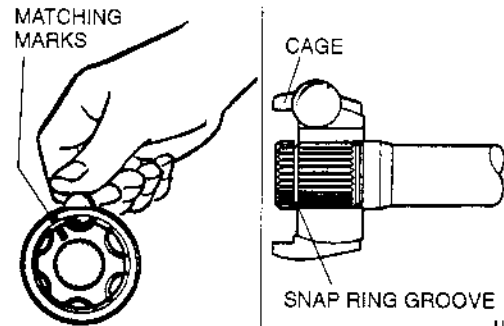
Outer diameter of large boot end
Differential side: 87.4 mm {3.441 in}
Wheel side: 90.8 mm {3.575 in}



U5U31313

Cage, Inner Ring, Balls Assembly Note

- Align the marks and install the balls to the inner ring.
- Install the cage, inner ring, and ball component to the drive shaft in the direction shown in the figure. The larger diameter of the cage should be facing the snap ring groove.
- Install a new snap ring in the drive shaft snap ring groove.



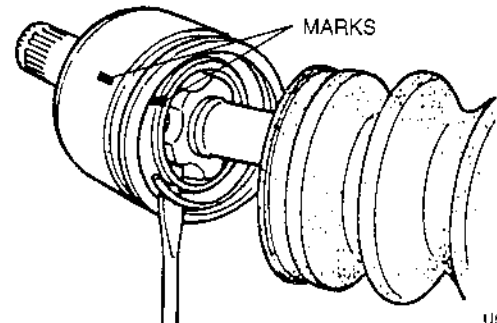
U5U31314

- Apply the specified grease (supplied in the boot kit) to the joints and boots.

Total quantity

Differential side: 85—105 g {3.00—3.71 oz}
Wheel side: 55—75 g {1.94—2.65 oz}

- Align the marks, then install a new clip.



U5U31315

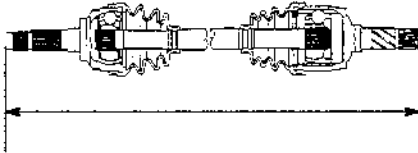
DRIVE SHAFT

Boot Bands Assembly Note

1. Verify that the boots are not dented or twisted.
2. Set the drive shaft to the standard length.

Standard length

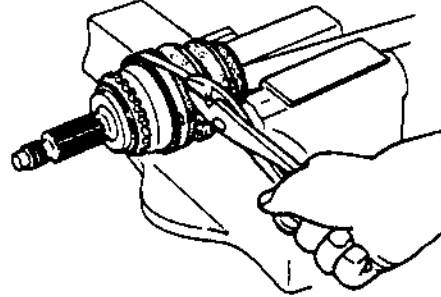
772.6—782.6 mm {30.42—30.81 in}



USU31316

3. Release any trapped air from the boots by carefully lifting up the small end of each boot with a cloth-wrapped screwdriver.
4. Verify that the drive shaft length is within the standard.

5. If the drive shaft length is not within the standard, return to step 1.
6. Fold the new band back by pulling on the end of it with pliers. The band should be folded in the direction opposite the forward revolving direction of the drive shaft.
7. Lock the end of the band by bending the locking clips.



USU31317

03-14 DIFFERENTIAL

DIFFERENTIAL OIL INSPECTION	03-14-1
DIFFERENTIAL OIL REPLACEMENT ..	03-14-1
OIL SEAL REPLACEMENT	03-14-2
DIFFERENTIAL	
REMOVAL/INSTALLATION	03-14-3
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Mounting Spacer Removal Note	03-14-4
Differential Removal Note	03-14-4
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DISASSEMBLY/ASSEMBLY	03-14-5
Differential Case Disassembly Note ..	03-14-6
Differential Gear Component	
Disassembly Note	03-14-6
Bearing Caps Disassembly Note	03-14-6
Adjusting Nuts Disassembly Note	03-14-6
Knock Pin (Standard)	
Disassembly Note	03-14-6
Bearing Inner Races (Side Bearing)	
Disassembly Note	03-14-6

Locknut (Companion Flange)	
Disassembly Note	03-14-7
Companion Flange Disassembly Note	03-14-7
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Bearing) Disassembly Note	03-14-7
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Disassembly Note	03-14-7
Differential Mount Disassembly Note ..	03-14-7
Differential Mount Assembly Note	03-14-8
Oil Seal Assembly Note	03-14-8
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Assembly Note	03-14-8
Bearing Outer Race (Rear Bearing)	
Assembly Note	03-14-8
Bearing Inner Race (Rear Bearing),	
Bearing Inner Race (Front Bearing)	
Assembly Note	03-14-8
Thrust Washers (Standard)	
Assembly Note	03-14-10

DIFFERENTIAL OIL INSPECTION

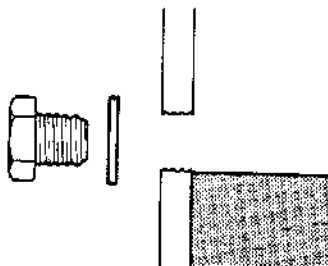
1. Remove the filler plug.
2. Verify that the oil is at the brim of the filler plug hole. If it is low, add the specified oil.

3. Install the filler plug.

X5U314W01

Tightening torque

40—53 N·m {4.0—5.5 kgf·m, 29—39 ft·lbf}



U5U31401

DIFFERENTIAL OIL REPLACEMENT

1. Remove the filler and drain plugs.

3. Wipe the plugs clean.
4. Install the drain plug and a new washer.

X5U314W02

Tightening torque

40—53 N·m {4.0—5.5 kgf·m, 29—39 ft·lbf}

5. Add the specified oil from the filler plug until the level reaches the brim of the plug hole.

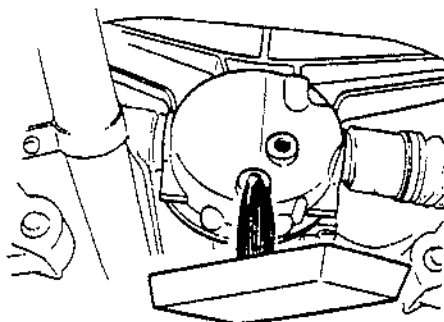
Specified oil

Type (API service GL-5)

Above -18 °C {0 °F}: SAE 90

Below -18 °C {0 °F}: SAE 80

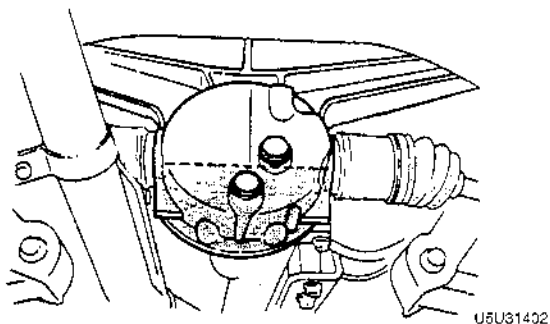
Capacity: 1.00 L {1.06 US qt, 0.88 Imp qt}



U5U31444

2. Drain the differential oil into a container.

DIFFERENTIAL



6. Install the filler plug.

Tightening torque

40—53 N·m {4.0—5.5 kgf·m, 29—39 ft·lbf}

OIL SEAL REPLACEMENT

X5U314W03

1. On level ground, jack up the vehicle and support it on safety stands.
2. Drain the differential oil.

Note

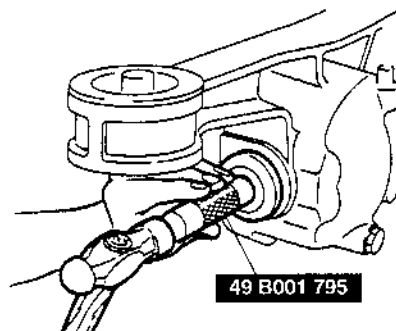
- For easier installation, do not depress the brake pedal after removing the brake caliper component.

3. Remove the brake caliper component, then suspend the brake caliper component by using a rope.
4. Remove the lower arm installation bolt and nut.

Note

- If the drive shaft will not come out of the rear hub support easily, install a discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the wheel hub.

5. Pull the rear hub support from the drive shaft.
6. Remove the drive shaft from the differential. (Refer to 03-13 DRIVE SHAFT REMOVAL/INSTALLATION, Drive Shaft Removal Note.)
7. Remove the oil seal.
8. Apply lithium-based grease to the new oil seal lip and install it by using the SST.



U5U31404

9. Install a new clip onto the drive shaft. (Refer to 03-13 DRIVE SHAFT REMOVAL/INSTALLATION, Drive Shaft Installation Note.)
10. Install the lower arm installation bolt and nut.

Tightening torque

47—66 N·m {4.7—6.8 kgf·m, 34—49 ft·lbf}

11. Install the brake caliper component.

Tightening torque

50—68 N·m {5.0—7.0 kgf·m, 37—50 ft·lbf}

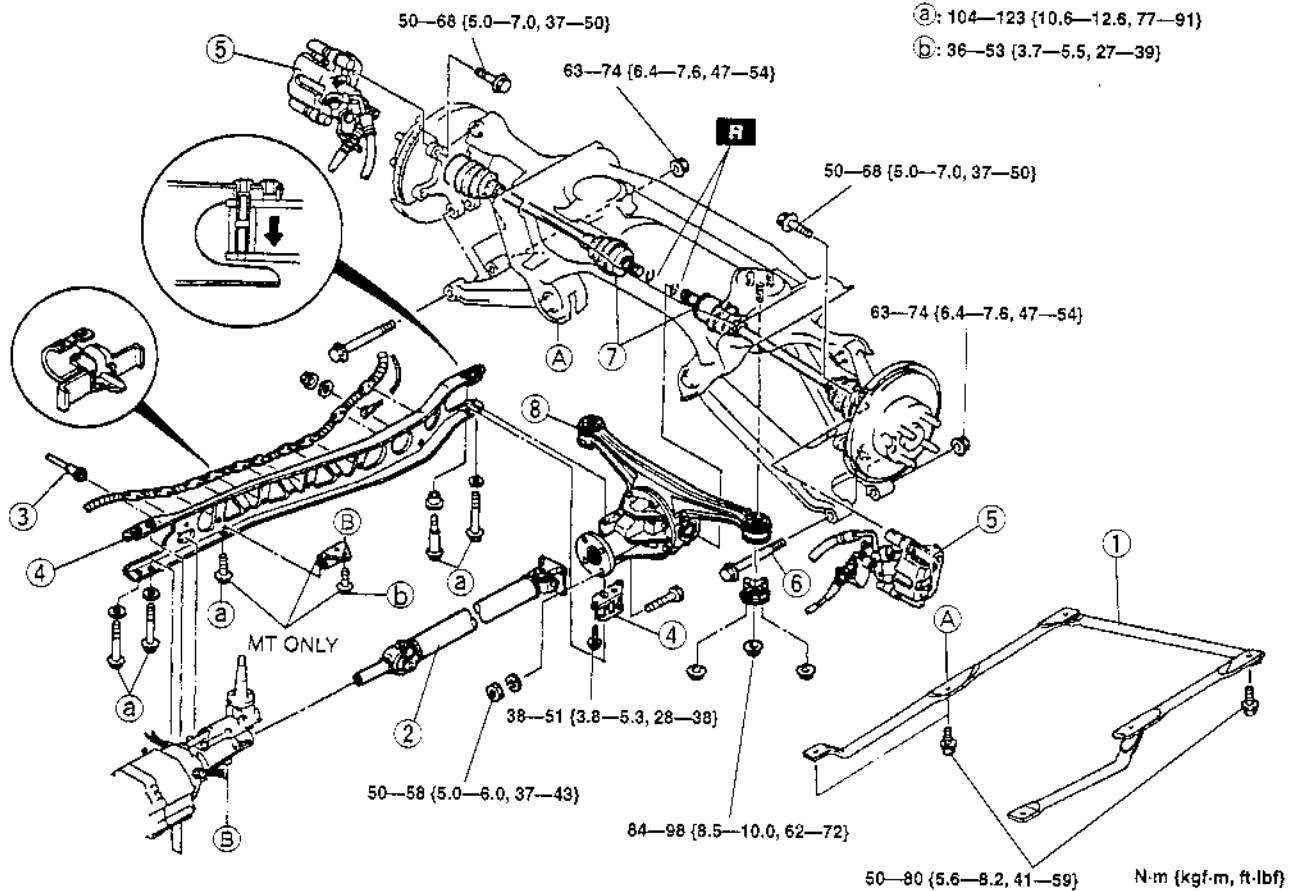
12. Add the specified oil. (Refer to 03-14 DIFFERENTIAL OIL REPLACEMENT.)
13. Adjust the rear wheel alignment.

DIFFERENTIAL

DIFFERENTIAL REMOVAL/INSTALLATION

X5U314W04

1. Drain the differential oil.
2. Remove the main silencer. (Refer to 01-15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Add the specified oil to the specified level. (Refer to 03-14 DIFFERENTIAL OIL REPLACEMENT.)



X5U314WA0

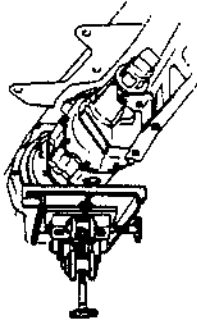
1	Rear crossbar
2	Propeller shaft ➤ 03-15 PROPELLER SHAFT REMOVAL/INSTALLATION
3	Speedometer cable
4	Power plant frame (PPF), Differential mounting spacer ➤ Removal Note ➤ 05-11 MANUAL TRANSMISSION REMOVAL/INSTALLATION, Power Plant Frame (PPF) Installation Note

5	Brake caliper component
6	Bolt
7	Drive shafts ➤ 03-13 DRIVE SHAFT REMOVAL/INSTALLATION, Drive Shaft Removal Note ➤ 03-13 DRIVE SHAFT REMOVAL/INSTALLATION, Drive Shaft Installation Note
8	Differential ➤ Removal Note

DIFFERENTIAL

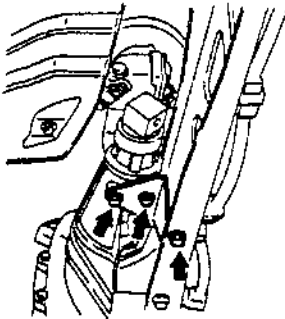
Power Plant Frame (PPF), Differential Mounting Spacer Removal Note

1. Disconnect the wire harness from the PPF.
2. Support the transmission with a jack.



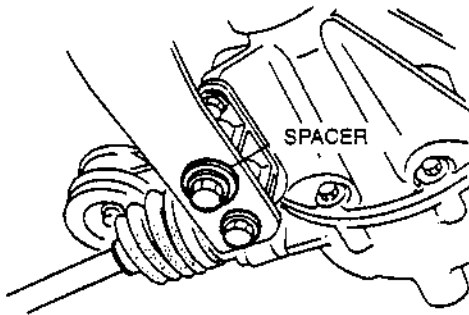
X5U314WA1

3. Remove the PPF bracket.



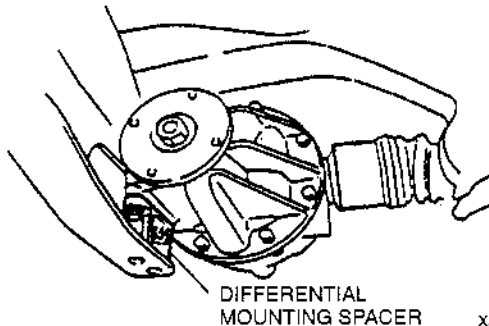
X5U314WA2

4. Remove the differential-side bolts, and pry out the spacer.



X5U314WA3

5. Remove the differential mounting spacer.

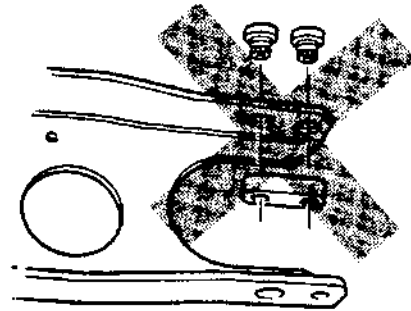


X5U314WA4

Caution

- Removing the PPF spacers will reduce the performance of the PPF. If the spacers are removed, replace the PPF as an assembly.

6. Remove the transmission-side bolts, and remove the PPF.

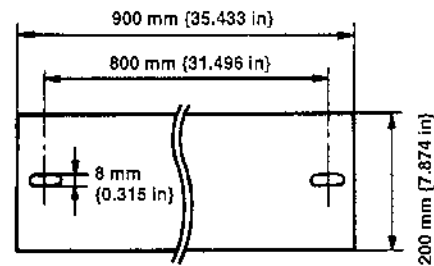


X5U314WA5

Note

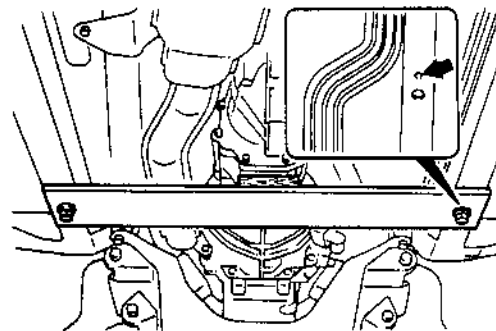
- If the sleeve cannot be removed easily, tap the side of sleeve with a plastic hammer.

7. Remove the sleeve.
8. To prevent damaging the fire wall, crank angle sensor, and engine mount, support the transmission as follows.
 - (1) Prepare a steel plate (as shown in the figure), a wooden block, bolts (M8 × 1.25), and washers.



U5U31407

- (2) Install the parts as shown in the figure.



U5U31408

Differential Removal Note

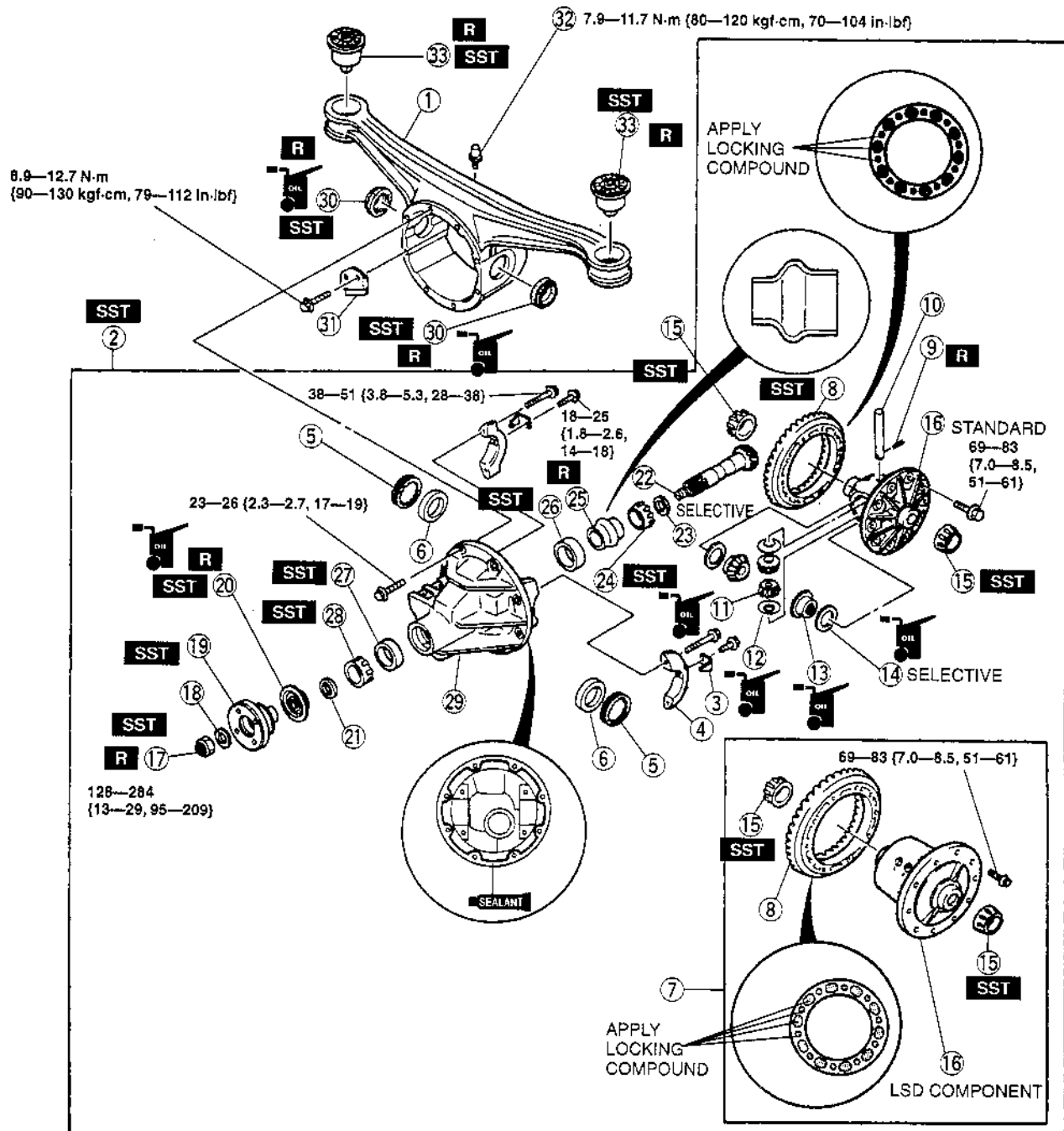
1. Support the differential by using a jack.
2. Lower the differential and move it forward.

DIFFERENTIAL

DIFFERENTIAL DISASSEMBLY/ASSEMBLY

X5U314W05

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



N·m {kgf·m, ft·lb}

X5U314WA6

1	Differential case ☑ Disassembly Note
2	Differential gear component ☑ Disassembly Note
3	Lock plates
4	Bearing caps ☑ Disassembly Note
5	Adjusting nuts ☑ Disassembly Note

6	Bearing outer races (side bearing)
7	Gear case component (LSD)
8	Ring gear
9	Knock pin (standard) ☑ Disassembly Note
10	Pinion shaft (standard)
11	Pinion gears (standard)
12	Thrust washers (standard)

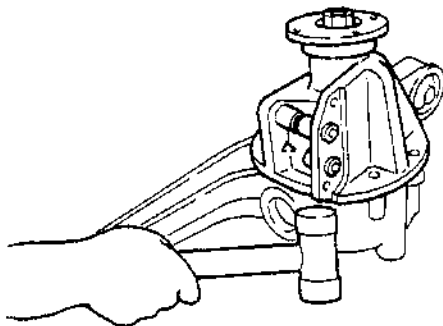
DIFFERENTIAL

13	Side gears (standard)
14	Thrust washers (standard) ☞ Assembly Note
15	Bearing inner races (side bearing) ☞ Disassembly Note
16	Gear case
17	Locknut (companion flange) ☞ Disassembly Note
18	Washer
19	Companion flange ☞ Disassembly Note
20	Oil seal (companion flange)
21	Washer
22	Drive pinion ☞ Disassembly Note
23	Spacer
24	Bearing inner race (rear bearing) ☞ Disassembly Note ☞ Assembly Note
25	Collapsible spacer
26	Bearing outer race (rear bearing) ☞ Disassembly Note ☞ Assembly Note
27	Bearing outer race (front bearing) ☞ Disassembly Note ☞ Assembly Note
28	Bearing inner race (front bearing) ☞ Assembly Note
29	Differential carrier
30	Oil seal ☞ Assembly Note
31	Baffle
32	Breather
33	Differential mount ☞ Disassembly Note ☞ Assembly Note

Differential Case Disassembly Note

Caution

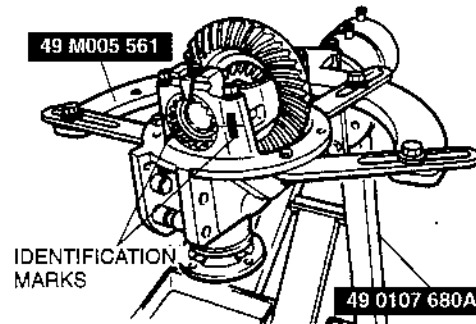
- The differential case is made of aluminum, and is therefore easily dented and scratched by metal tools. When separating the differential carrier from the case, use only a plastic hammer at the point shown in the figure.
- Strike the differential carrier with a plastic hammer to separate it from the case.



U5U31410

Differential Gear Component Disassembly Note

- Mount the differential gear component on the SSTs.



U5U31411

Bearing Caps Disassembly Note

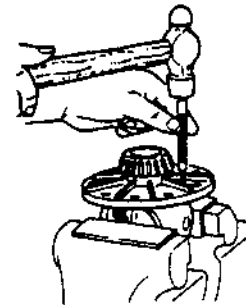
- Mark one bearing cap and the carrier.

Adjusting Nuts Disassembly Note

- Mark one adjusting nut and the carrier.

Knock Pin (Standard) Disassembly Note

- Secure the gear case in a vise and tap out the knock pin toward the ring gear side.

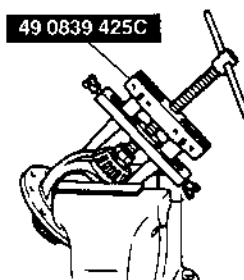


U5U31412

Bearing Inner Races (Side Bearing) Disassembly Note

Note

- Mark the bearings so that they can later be reinstalled in the same position.
- Remove the bearing inner races (side bearing) from the gear case by using the SST.

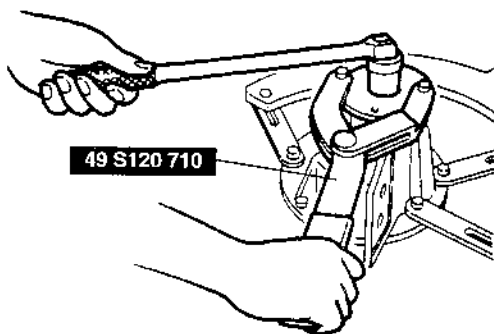


U5U31413

DIFFERENTIAL

Locknut (Companion Flange) Disassembly Note

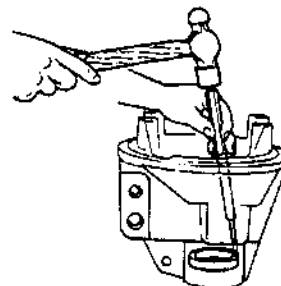
- Hold the companion flange by using the SST and remove the locknut.



U5U31414

Bearing Outer Races (Front And Rear Bearing) Disassembly Note

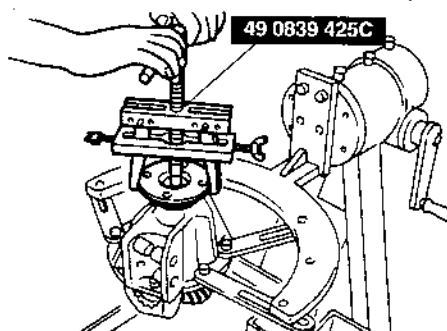
- Remove the bearing outer races by using the two grooves in the carrier and alternately tapping the sides of the races.



U5U31417

Companion Flange Disassembly Note

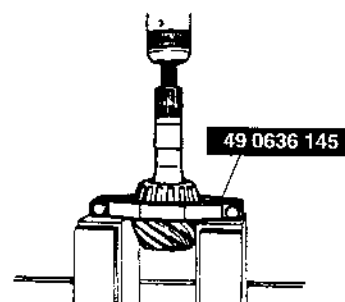
- Pull the companion flange off by using the SST.



U5U31415

Bearing Inner Race (Rear Bearing) Disassembly Note

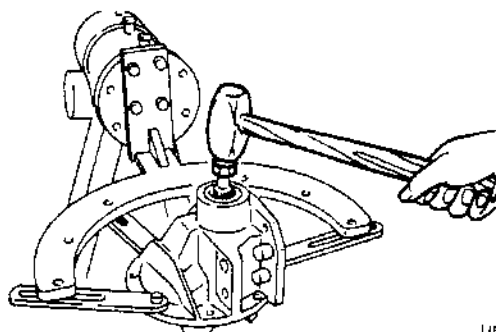
- While supporting the drive pinion to keep it from falling, remove the bearing inner race (rear bearing) by using the SST.



U5U31418

Drive Pinion Disassembly Note

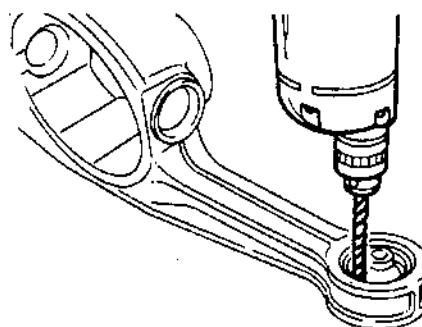
- Push out the drive pinion by attaching a miscellaneous locknut to the drive pinion, and tapping it with a copper hammer.



U5U31416

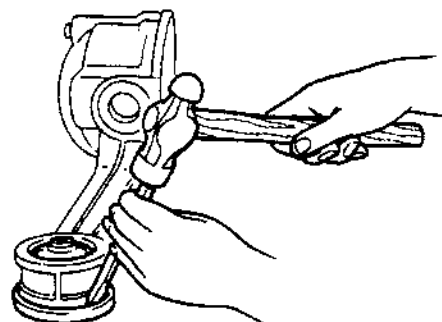
Differential Mount Disassembly Note

1. Drill holes around the differential mount.



U5U31419

2. Hit the edge of the differential mount to remove it.



U5U31420

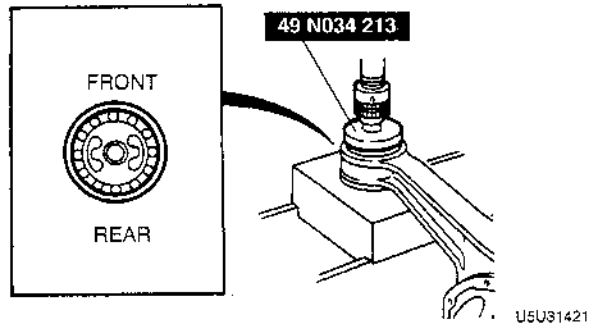
DIFFERENTIAL

Differential Mount Assembly Note

1. Install the new differential mount with the voids facing front and rear.
2. Press in the differential mount by using the **SST**.

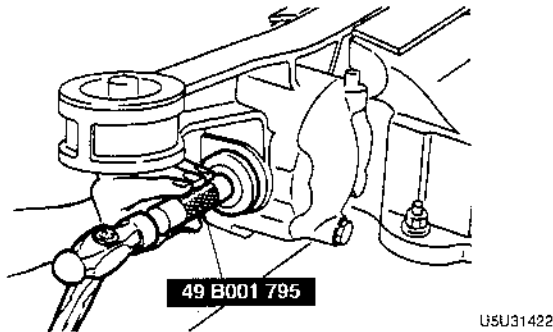
Press force

19,600 N {2,000 kgf, 4,400 lbf} max.



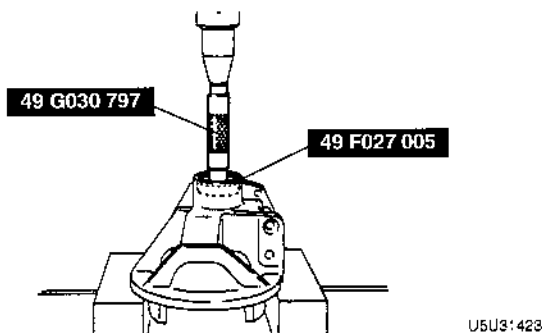
Oil Seal Assembly Note

- Apply differential gear oil to the new oil seal lip and install it by using the **SST**.



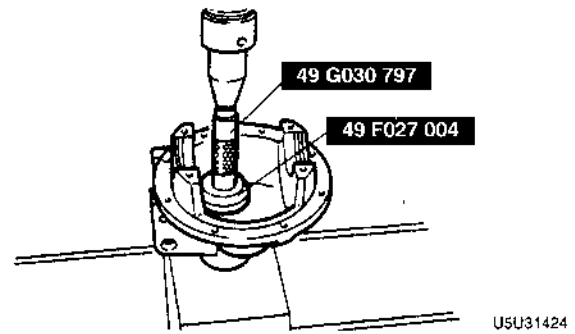
Bearing Outer Race (Front Bearing) Assembly Note

- Install the bearing outer race (front bearing) by using the **SSTs**.



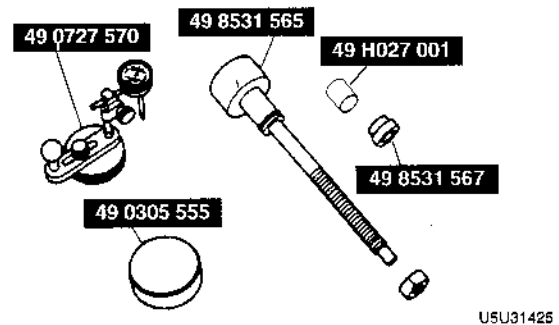
Bearing Outer Race (Rear Bearing) Assembly Note

- Install the bearing outer race (rear bearing) by using the **SSTs**.

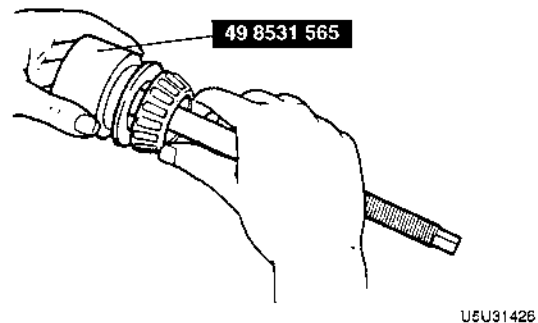


Bearing Inner Race (Rear Bearing), Bearing Inner Race (Front Bearing) Assembly Note

1. Adjust the drive pinion height as follows, by using the **SSTs**.



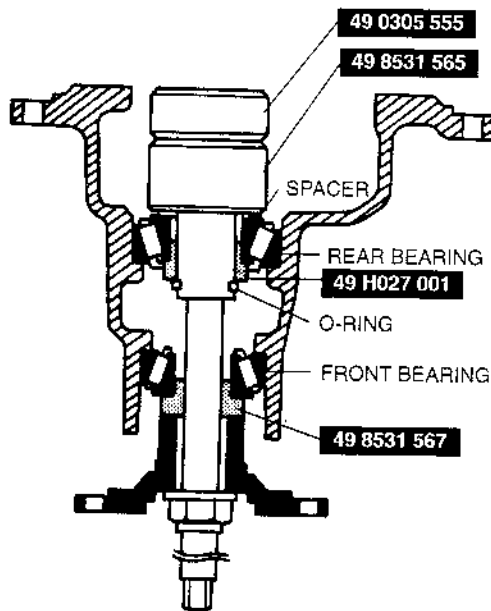
- (1) Install the previously-removed spacer onto the **SST** so that the beveled side of the spacer faces the drive pinion. Then install the rear bearing and O-ring onto the **SST**/spacer as shown in the figure.



- (2) Assemble the spacer, bearing inner race (rear bearing), and **SSTs**.
- (3) Secure the **SST** with the O-ring. Install this assembly in the carrier.
- (4) Install the bearing inner race (front bearing), the **SST**, companion flange, washer, and nut.

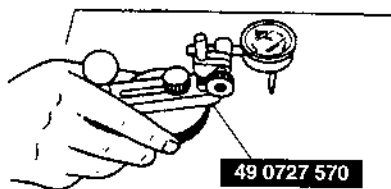
DIFFERENTIAL

- (5) Tighten the nut just enough so that the companion flange can still be turned by hand.



U5U31427

- (6) Place the **SST** on the surface plate and set the dial indicator to "Zero".

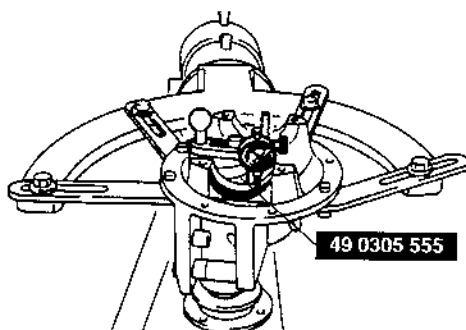


U5U31428

- (7) Place the **SST** atop the drive pinion model. Set the gauge body atop the gauge block.
 (8) Place the feeler of the dial indicator so that it contacts where the bearing inner race (side bearing) is installed in the carrier. Measure the lowest position on the left and right sides of the carrier.

Note

- The number is inscribed on the end of the drive pinion.



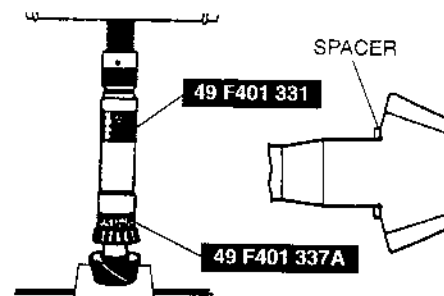
U5U31429

- (9) Add the two (left and right) values obtained by the measurements taken in step (8), and then divide the total by 2. From this result, subtract the result obtained by dividing the number inscribed on the end surface of the drive pinion by 100. (If there is no figure inscribed, use 0.) This is the pinion height adjustment value.

Mark	Thickness	Mark	Thickness
08	3.08 mm {0.1213 in}	29	3.29 mm {0.1295 in}
11	3.11 mm {0.1224 in}	32	3.32 mm {0.1307 in}
14	3.14 mm {0.1234 in}	35	3.35 mm {0.1319 in}
17	3.17 mm {0.1248 in}	38	3.38 mm {0.1331 in}
20	3.20 mm {0.1260 in}	41	3.41 mm {0.1343 in}
23	3.23 mm {0.1271 in}	44	3.44 mm {0.1354 in}
26	3.26 mm {0.1283 in}	47	3.47 mm {0.1366 in}

Note

- The identification number is indicated on the outer side of the washer.
- Install the spacer, selected in the procedure above, with the beveled side facing the drive pinion.
 - Using the **SSTs**, press the bearing inner race (rear bearing) onto the drive pinion until the force required starts to increase sharply.

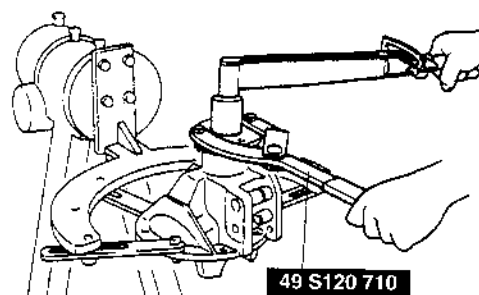


U5U31430

- Without installing the oil seal, install the drive pinion, spacer, new collapsible spacer, front bearing, washer, and companion flange to the carrier, and temporarily tighten the locknut by using the **SST**.

Tightening torque

128—284 N·m {13—29 kgf·m, 95—209 ft·lbf}



U5U31431

DIFFERENTIAL

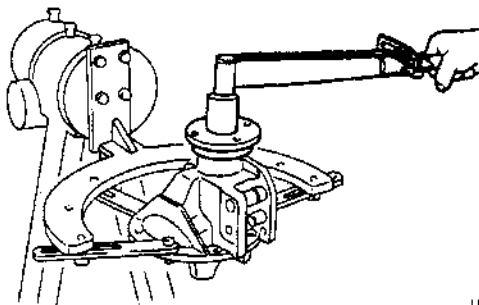
5. Turn the companion flange several turns by hand to seat the bearing.
6. Measure the drive pinion preload. Adjust the preload by tightening the locknut, and record the tightening torque.

Preload

0.9—1.3 N·m {9—14 kgf·cm, 7.9—12.1 in·lbf}

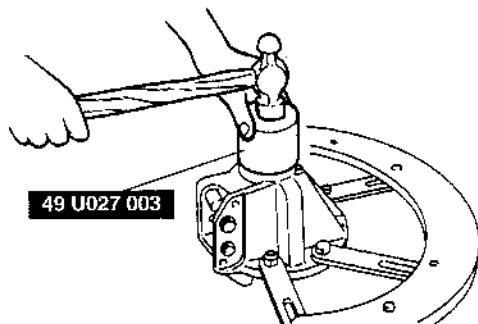
Tightening torque

128—284 N·m {13—29 kgf·m, 95—209 ft·lbf}



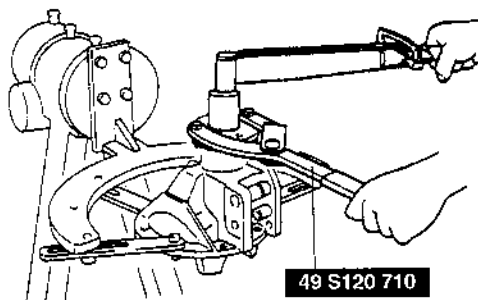
U5U31432

7. Remove the locknut, washer, and companion flange.
8. Tap a new oil seal into the differential carrier with the SST.



U5U31433

9. Install the companion flange and washer while holding the flange with the SST, and tighten a new locknut to the tightening torque recorded in step 6.



U5U31434

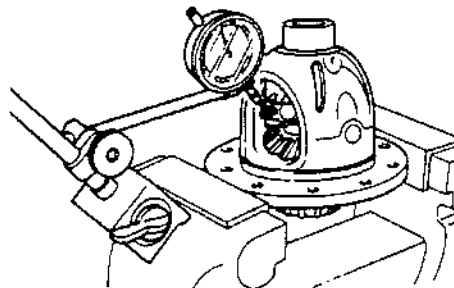
Thrust Washers (Standard) Assembly Note

1. Adjust the backlash of the side gears and pinion gear as follows.
 - (1) Set a dial gauge against the pinion gear as shown.
 - (2) Secure one of the side gears.
 - (3) Move the pinion gear, and measure the backlash at the end of it.

Standard backlash

0—0.1 mm {0—0.0039 in}

- (4) If the backlash exceeds the standard, use the selectable thrust washers for adjustment.

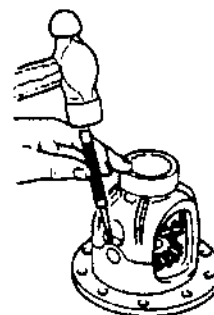


U5U31435

Thrust washer thickness

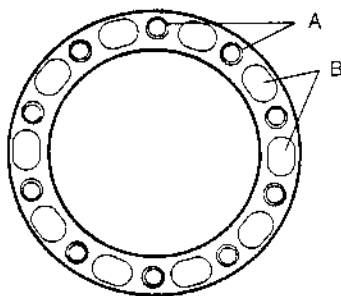
Identification mark	Thickness
0	2.00 mm {0.0787 in}
0.5	2.05 mm {0.0807 in}
1	2.10 mm {0.0827 in}
1.5	2.15 mm {0.0847 in}
2	2.20 mm {0.0866 in}

2. Install the new knock pin to secure the pinion shaft. Stake the pin with a punch to prevent it from coming out of the case.

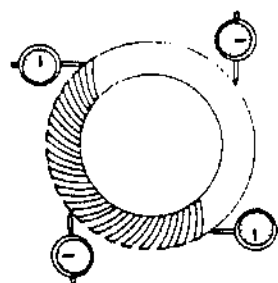


U5U31436

3. Apply thread-locking compound to bolt threads A and points B of the gear back face. Apply approximately 0.04 cm³ {0.04 cc, 0.0024 cu in} of thread-locking compound at each point and bolt thread.



U5U31437



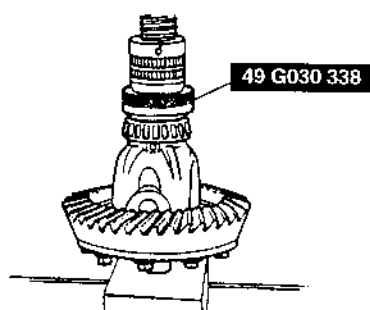
U5U31440

4. Install the ring gear onto the gear case.

Tightening torque

69—83 N·m {7.0—8.5 kgf·m, 51—61 ft·lb}

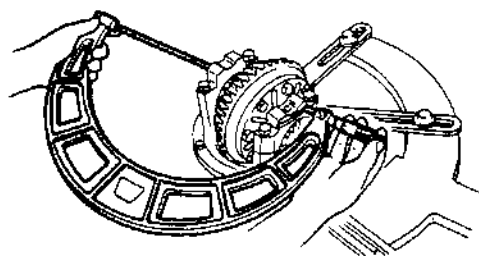
5. Press the bearing inner races (side bearing) on by using the **SST**.



U5U31439

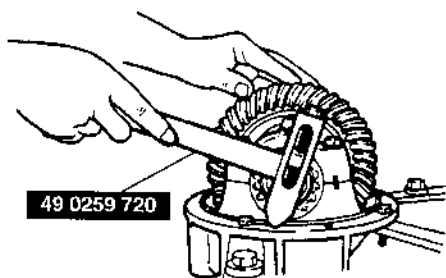
9. Tighten or loosen the adjusting nuts equally until the distance between the pilot sections on the bearing caps is **185.428—185.50 mm {7.3003—7.3031 in}**.

10. Reinspect for the backlash.



U5U31441

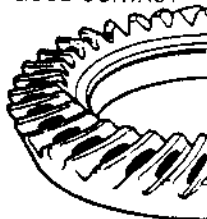
6. Install the differential gear component in the carrier.
7. Note the identification marks on the adjusting nuts, and install them on their respective sides.
8. Install the differential bearing caps, making sure that the identification mark on the cap corresponds with the one on the carrier, by using the **SST**. Then temporarily tighten the bolts.



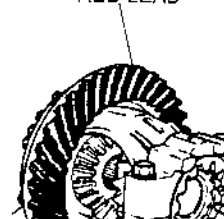
U5U31439

11. Inspect the teeth contact as follows.
(1) Coat both surfaces of 6—8 teeth of the ring gear with a thin coat of red lead.
(2) While moving the ring gear back and forth by hand, rotate the drive pinion several times and inspect the tooth contact.
(3) If the tooth contact is good, wipe off the red lead.
(4) If it is not good, adjust the pinion height, and then adjust the backlash.

GOOD CONTACT



RED LEAD



U5U31442

- (1) Mark the ring gear at four points at **approx. 90°** intervals. Mount a dial indicator to the carrier so that the feeler comes in contact at a right angle with one of the ring gear teeth.
(2) Turn both bearing adjusters equally by using the **SST** until the backlash is **0.09—0.11 mm {0.0035—0.0043 in}**.
(3) Inspect for the backlash at the three other marked points, and make sure the maximum backlash is less than **0.07 mm {0.0028 in}**.

- ① Inspect the toe and flank contact by replacing the spacer with a thinner one to move the drive pinion outward.
② Inspect the heel and face contact by replacing the spacer with a thicker one to bring the drive pinion in.

DIFFERENTIAL

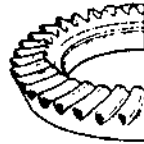
TOE CONTACT



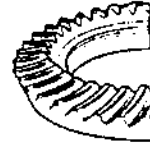
FLANK CONTACT



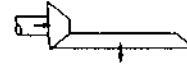
HEEL CONTACT



FACE CONTACT



U5U3:445



U5U3:443

03-15 PROPELLER SHAFT

PROPELLER SHAFT

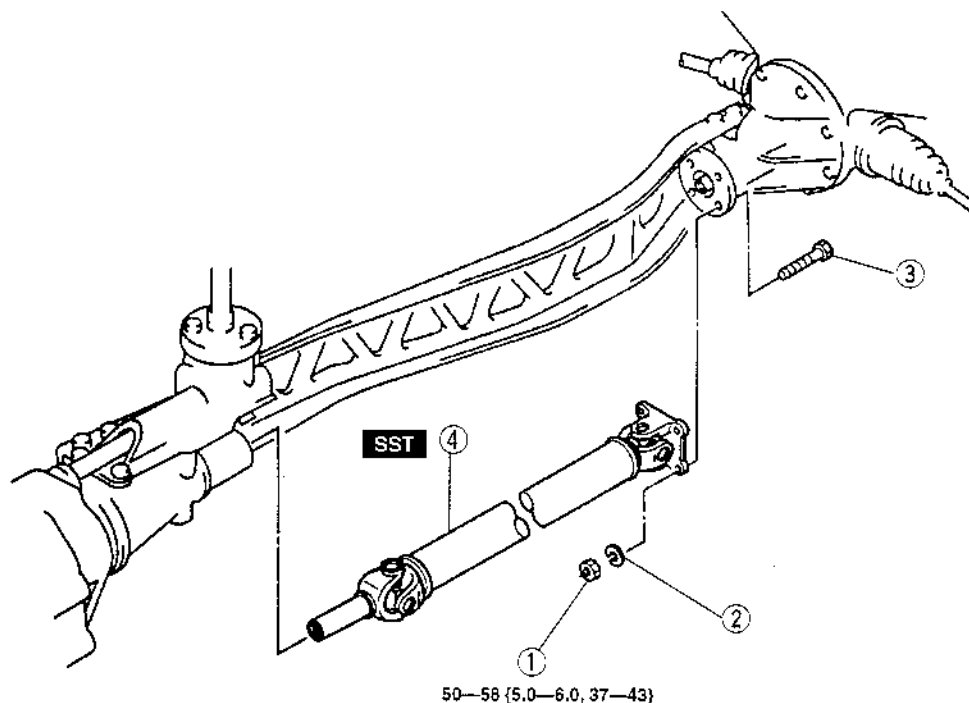
REMOVAL/INSTALLATION 03-15-1
 Propeller Shaft Removal Note 03-15-1

Propeller Shaft Installation Note 03-15-2
 PROPELLER SHAFT INSPECTION 03-15-2

PROPELLER SHAFT REMOVAL/INSTALLATION

X5U315W31

1. Remove the presilencer. (Refer to 01-15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



N·m (kgf·m, ft·lbf)

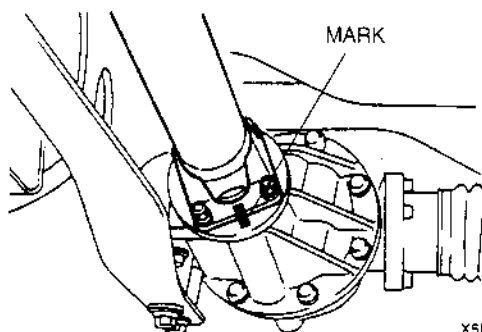
X5U315WA3

1	Nut
2	Lock washer

3	Bolt
4	Propeller shaft ➤ Removal Note ➤ Installation Note

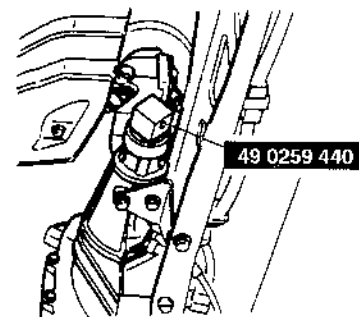
Propeller Shaft Removal Note

1. Before removing the propeller shaft, mark the flanges for correct installation.



X5U315WA1

2. Remove the propeller shaft from the extension housing, and immediately install the SST to prevent oil leakage.

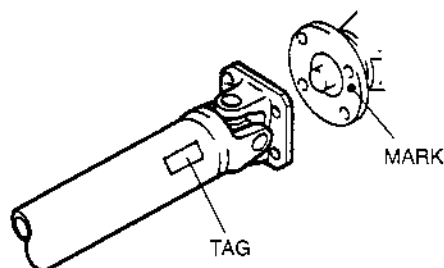


X5U315WA2

PROPELLER SHAFT

Propeller Shaft Installation Note

1. Align the marks made during removal, and install the propeller shaft. If installing a new propeller shaft, align the differential companion flange precast marking with the tag on the propeller shaft.



X5U315WA3

Tightening torque

50—58 N·m {5.0—6.0 kgf·m, 37—43 ft·lbf}

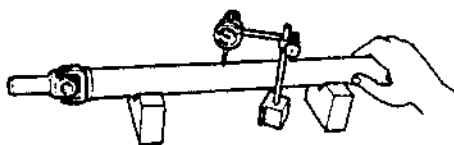
2. Verify that there is no abnormal noise or vibration when driving the vehicle. If noise or vibration comes from the propeller shaft, replace the propeller shaft.

PROPELLER SHAFT INSPECTION

Caution

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

1. Clean the propeller shaft (except for the universal joint) with a steam cleaner or solvent.
2. Measure the propeller shaft runout by using a dial indicator. Replace the propeller shaft if runout is excessive.



X5U315WA4

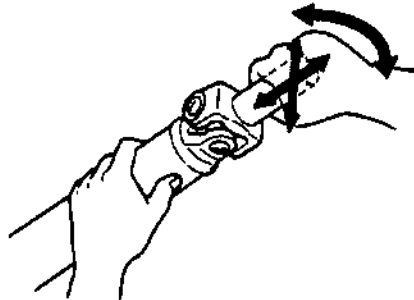
Maximum runout
0.4 mm {0.016 in}

X5U315W02

3. Move the universal joints in the directions shown, and check for universal joint looseness. If there is looseness, replace the propeller shaft.

Note

- Starting torque: 0.30—0.98 N·m {3.0—10.0 kgf·cm, 2.6—8.6 in·lbf}



X5U315WA5

4. Inspect for operation of the universal joint. If the universal joint has excessive resistance, replace the propeller shaft.

03-50 TECHNICAL DATA

03 DRIVELINE/AXLE 03-50-1

03 DRIVELINE/AXLE

X5U350W01

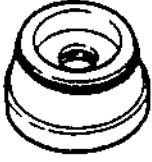
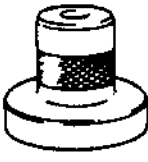
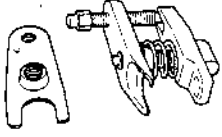
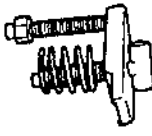

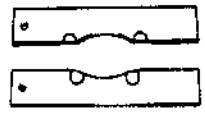
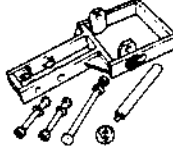
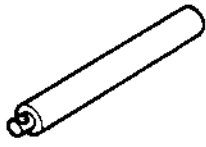



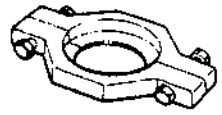

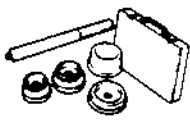
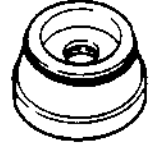
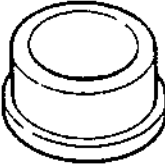
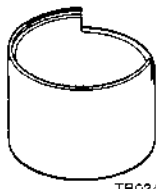

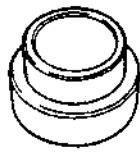


Item			Specification
FRONT AND REAR AXLES			
Front axle	Maximum wheel bearing play (mm {in})		0.05 {0.002}
Rear axle	Maximum wheel bearing play (mm {in})		0.05 {0.002}
Drive shaft	Length (Air in boot at atmospheric pressure) (mm {in})		772.6—782.6 {30.42—30.81}
Differential	Pinion height (mm {in})		-0.032—0.032 {-0.001—0.001}
	Backlash of side gear and pinion gear (mm {in})		0—0.1 {0—0.004}
	Drive pinion preload (N·m {kgf·cm, in·lbf})		0.9—1.3 {9—14, 7.9—12.1}
	Backlash of drive pinion and ring gear (mm {in})	Standard	0.09—0.11 {0.0036—0.0043}
		Minimum	0.05 {0.002}
		Allowance variation	0.07 {0.003}
	Oil	Grade	API service GL-5
		Viscosity	Above -18 °C {0 °F}: SAE 90 Below -18 °C {0 °F}: SAE 80
Capacity (L {US qt, Imp qt})		1.00 {1.06, 0.88}	
PROPELLER SHAFT			
Starting torque (N·m {kgf·cm, in·lbf})		0.30—0.98 {3.0—10.0, 2.6—8.6}	

03-60 SERVICE TOOLS

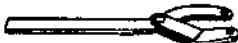



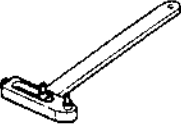
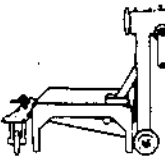
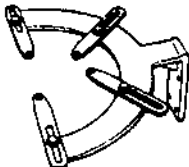
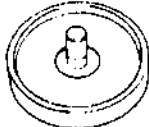
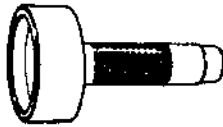
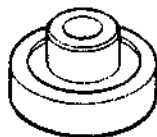
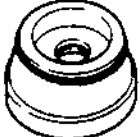
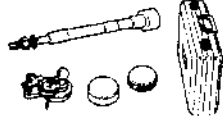
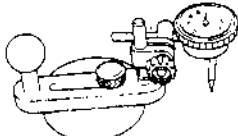
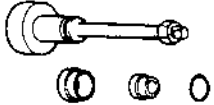



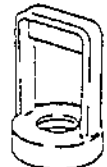
03 DRIVELINE/AXLE SST 03-60-1

03 DRIVELINE/AXLE SST

X5U36CW01

<p>49 F027 007</p> <p>Attachment φ72</p>  <p>TF027007X</p>	<p>49 V001 795</p> <p>Oil seal installer</p>  <p>TV001795X</p>	<p>49 T028 3A0</p> <p>Ball joint puller set</p>  <p>TT0283A0X</p>
<p>49 T028 303</p> <p>Body (Part of 49 T028 3A0)</p>  <p>TT028303X</p>	<p>49 T028 304</p> <p>Attachment (Part of 49 T028 3A0)</p>  <p>TT028304X</p>	<p>49 F026 103</p> <p>Wheel hub puller</p>  <p>TF026103X</p>
<p>49 B026 1A0</p> <p>Wheel hub puller</p>  <p>TB0261A0X</p>	<p>49 G033 102</p> <p>Handle (Part of 49 B026 1A0)</p>  <p>TG033102X</p>	<p>49 G030 727</p> <p>Attachment A (Part of 49 B026 1A0)</p>  <p>TG030727X</p>
<p>49 G030 795</p> <p>Oil seal installer</p>  <p>TG030795X</p>	<p>49 G030 797</p> <p>Handle (Part of 49 G030 795)</p>  <p>TG030797X</p>	<p>49 0636 145</p> <p>Fan pulley boss puller</p>  <p>T0636145X</p>
<p>49 G033 107A</p> <p>Dust cover installer</p>  <p>TG033107A</p>	<p>49 F027 0A1</p> <p>Bearing installer set</p>  <p>TF0270A1X</p>	<p>49 F027 005</p> <p>Attachment φ62 (Part of 49 F027 0A1)</p>  <p>TF027005X</p>
<p>49 F027 009</p> <p>Attachment φ68 & 77 (Part of 49 F027 0A1)</p>  <p>TF027009X</p>	<p>49 B034 201</p> <p>Support block</p>  <p>TB034201X</p>	<p>49 D017 2A1</p> <p>Bearing installer set</p>  <p>TD0172A1X</p>
<p>49 F401 337A</p> <p>Attachment C (Part of 49 D017 2A1)</p>  <p>TF401337A</p>	<p>49 F401 331</p> <p>Body (Part of 49 D017 2A1)</p>  <p>TF401331X</p>	<p>49 G030 338</p> <p>Attachment E (Part of 49 D017 2A1)</p>  <p>TG030338X</p>

SERVICE TOOLS

<p>49 S120 710</p> <p>Coupling flange holder</p>  <p>TS120710X</p>	<p>49 0839 425C</p> <p>Bearing puller set</p>  <p>T0839425C</p>	<p>49 0259 440</p> <p>Main shaft holder</p>  <p>T0259440X</p>
<p>49 U027 003</p> <p>Oil seal installer</p>  <p>TU027003X</p>	<p>49 0259 720</p> <p>Differential side bearing adjusting nut wrench</p>  <p>TC0259720X</p>	<p>49 0107 680A</p> <p>Engine stand</p>  <p>TC0107680A</p>
<p>49 M005 561</p> <p>Differential carrier hanger</p>  <p>TM005561X</p>	<p>49 N034 213</p> <p>Rubber bushing installer</p>  <p>TN034213X</p>	<p>49 B001 795</p> <p>Oil seal installer</p>  <p>TB001795X</p>
<p>49 F027 004</p> <p>Attachment $\phi 80$</p>  <p>TF027004X</p>	<p>49 F027 005</p> <p>Attachment $\phi 62$ (Part of 49 F027 0A1)</p>  <p>TF027005X</p>	<p>49 F027 0A0</p> <p>Pinion height adjustment gauge set</p>  <p>TF0270A0X</p>
<p>49 0727 570</p> <p>Pinion height gauge body (Part of 49 F027 0A0)</p>  <p>T0727570X</p>	<p>49 8531 565</p> <p>Pinion model</p>  <p>T8531565X</p>	<p>49 8531 567</p> <p>Collar A (Part of 49 8531 565)</p>  <p>T8531567X</p>
<p>49 H027 001</p> <p>Collar</p>  <p>TH027001X</p>	<p>49 0305 555</p> <p>Gauge block</p>  <p>TC0305555X</p>	<p>49 B025 006A</p> <p>Sensor rotor installer</p>  <p>TB025006A</p>

BRAKES

04 SECTION

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04

04-01 TROUBLESHOOTING

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FOREWARD

X5U401W01

- Refer to 00-00 GENERAL INFORMATION, Troubleshooting Procedures, and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

TROUBLESHOOTING NOTE

X5U401W02

- The ABS is composed of electrical components, a mechanical component (ABS hydraulic unit), and standard system components. Fundamentally, malfunctions of the ABS electrical or mechanical components are judged by the on-board diagnostic program within the ABS control module. Malfunctions are indicated by a warning light on the instrument cluster. The technician can locate a malfunction by switching the system to the diagnostic test mode.
- The on-board diagnostic system must be used when diagnosing the ABS.

PRECAUTION

Conditions That Are Not ABS Malfunctions

1. Vibrations can sometimes be felt in the steering system, body, and/or brake pedal when the ABS is functioning; such vibrations are simply an indication that the ABS is functioning.
2. The ABS warning light may illuminate under the following conditions:
 - (1) When the vehicle is traveling on snow or ice with the parking brake activated or a brake dragging on one wheel.
 - (2) When tires of different diameters are used.
 - (3) When tires of different gripping performance are used.
 - (4) When the vehicle is jacked up or on a chassis roller with the front wheels locked and the rear wheels only are rotated for **20 seconds or more**. The ABS warning light goes off when ignition switch is turned to ON again and the vehicle is driven **faster than 10 km/h {6.2 mph}**. However, diagnostic code 42 (front left wheel-speed sensor) will be entered into the control module memory. Erase it from the memory according to the following procedure:

X5U401W03

- ① Activate the on-board diagnostic system and verify diagnostic trouble codes. (Refer to 04-01 ANTILOCK BRAKE SYSTEM ON-BOARD DIAGNOSIS.)
- ② If only code 42 is memorized, erase it. If code 42 and other codes are memorized, verify the causes by referring to the applicable diagnostic chart for the other codes. (Refer to 04-01 ANTILOCK BRAKE SYSTEM ON-BOARD DIAGNOSIS.)
3. When battery voltage is **below approx. 10 V**, the warning light will illuminate and the ABS will not work. In this condition, at the moment battery voltage increases to **more than approx. 10 V**, the warning light will go off and the system will return to normal control. However, diagnostic code 63 will be entered into the control module memory if vehicle speed is **faster than 6 km/h {4 mph}** when battery voltage is **below 10 V**.

ANTILOCK BRAKE SYSTEM ON-BOARD DIAGNOSIS

X5U401W04

On-Board Diagnostic (OBD) Test Description

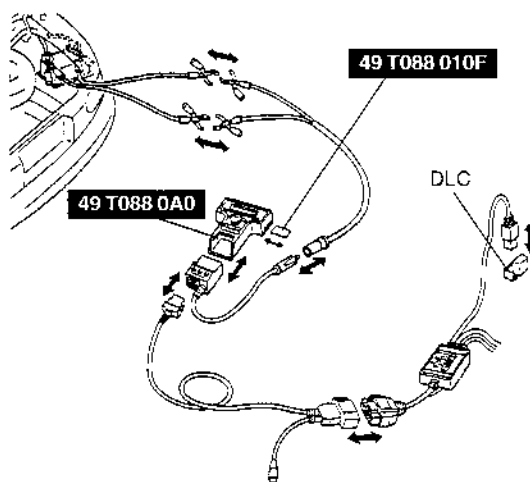
- The OBD test inspects the integrity and function of the ABS and outputs the test results when requested by the NGS tester. It also provides a quick end inspection of the ABS, is usually performed at the start of each diagnostic procedure with all accessories off and is performed at end of most troubleshooting tests for verification of repair and make sure no other faults were incurred while servicing a previous fault.

On-Board Diagnostic Test

New generation star (NGS) tester hook-up procedure

Note

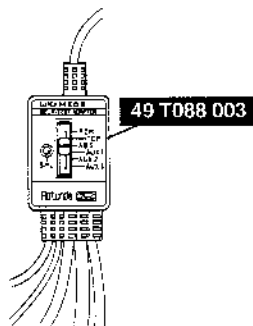
- Make sure that ignition switch is at OFF.
1. Insert the vehicle interface module and program card into the **SST** (NGS tester) control unit.
 2. Plug the NGS OBDII adapter into the interface module and the connector into the vehicle data link connector (DLC) located in the engine compartment via the SUPER MECS adapter.
 3. Plug the **SST** (NGS tester) power cable into the cigarette lighter or use a battery hook-up adapter.
 4. Listen for a double beep. The **SST** (NGS tester) is now initialized.



X5U401WA0

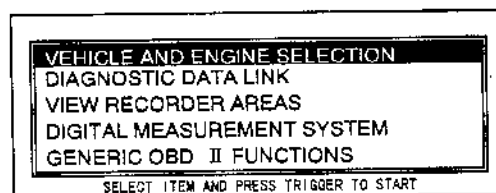
TROUBLESHOOTING

5. Set the **SST** (SUPER MECS adapter) to ABS.



U5U40102

2. Move the cursor to **VEHICLE AND ENGINE SELECTION**.



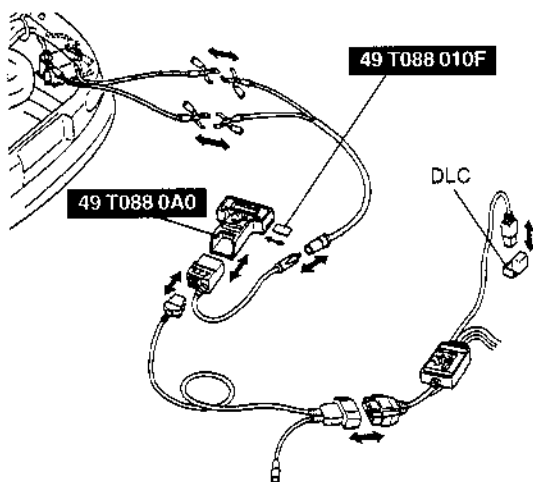
W6U401WA3

Reading DTCs Procedure

Note

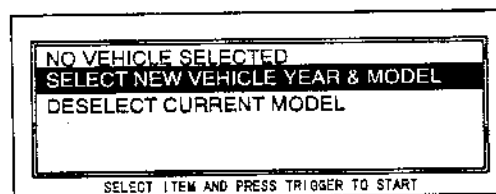
- When reading DTCs by using the NGS, the ABS warning light also indicates DTCs by flashing.
- In case the OBD test is performed in the following conditions or NGS tester isn't operated properly, **NO CODES RECEIVED** may be indicated even if the ABS control module sends any DTCs.
 1. Open or short circuit in wiring harness connected with the terminals FBS or TBS of the data link connector.
 2. Poor positive battery voltage.

1. Perform the necessary vehicle preparation and visual inspection. Hook-up the **SST** (NGS tester) to the vehicle.



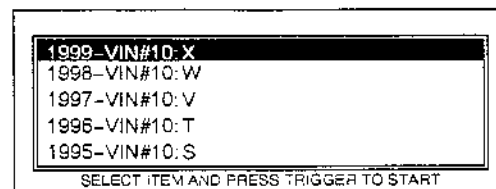
X5U401WA0

3. Move the cursor to **SELECT NEW VEHICLE YEAR & MODEL**. Press the trigger key to enter this selection.



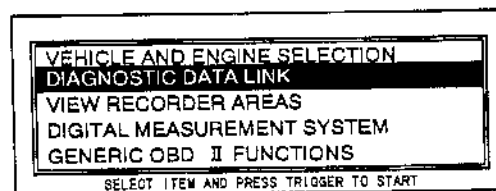
W6U401WA4

4. Move the cursor to **1999 — VIN #10:X**. Press the trigger key to enter this selection.



X5U401WA1

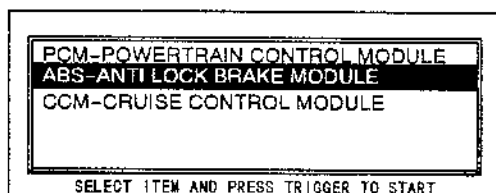
5. Move the cursor to appropriate model. Press the trigger key to enter this selection.
6. The vehicle selection screen showing the selected vehicle will be displayed. Move the cursor to the vehicle selected. Press the trigger key.
7. Move the cursor to **DIAGNOSTIC DATA LINK** in the main menu screen. Press the trigger key to enter into menu system diagnostics.



W6U401WA6

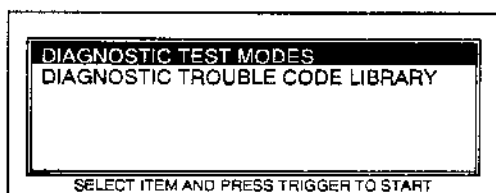
TROUBLESHOOTING

- Move the cursor to **ABS-ANTI LOCK BRAKE MODULE**. Press the trigger.



X5U401WA2

- Move the cursor to **DIAGNOSTIC TEST MODES**. Press the trigger key to enter this selection.



X5U401WA3

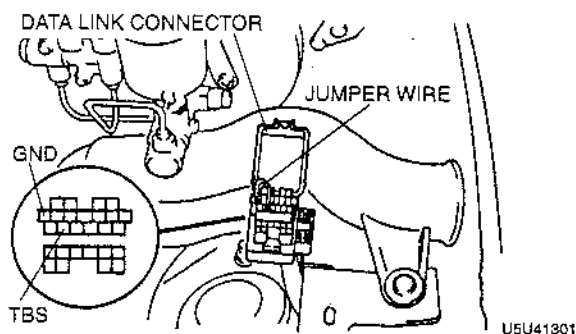
- Press START. Follow operating instruction from the menu.
- If the system is normal, **NO CODES RECEIVED** will be indicated. If any DTC is indicated, follow the appropriate DTC troubleshooting chart.
- After completion of repairs, clear DTCs.

Clearing DTCs Procedure

Caution

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

- Connect the TBS terminal to GND at the data link connector.



- Turn the ignition switch to ON.
- Output all memorized codes. (ABS warning light flashing)
- After verifying that the first code is repeated, depress the brake pedal 10 times at intervals of less than **one second (1 sec.)**.
Diagnostic trouble codes cannot be cleared if the following occur.
 - If intervals of depressing the brake pedal exceed **one second (1 sec.)**
 - Brake switch has failed
- Turn the ignition switch to OFF to finish the procedure.

Note

- After repairing the ABS wheel-speed sensor or pump motor, the ABS warning light may not go off when ignition is switched to ON. In this case, turn the ignition switch to OFF, then back ON, and drive the vehicle at a speed of more than **10 km/h {6.2 mph}** then the ABS warning light goes off.

TROUBLESHOOTING

Diagnostic Trouble Code Table

DTC	Display on the NGS	Possible cause
05	BRAKE SW — OPEN OR SHORT	Harness between brake switch to ABS CM
11	WSS, SR (RF) — OPEN OR SHORT	Right front wheel-speed sensor
12	WSS, SR (LF) — OPEN OR SHORT	Left front wheel-speed sensor
13	WSS, SR (RR) — OPEN OR SHORT	Right rear wheel-speed sensor
14	WSS, SR (LR) — OPEN OR SHORT	Left rear wheel-speed sensor
15	WSS, SR — OPEN OR SHORT	Wheel-speed sensor/sensor rotor
22	HU/SOL.V (RF)/SOL.V (RF) AV — OPEN OR SHORT	Right front solenoid valve (pressure retention)
23	SOLENOID VALVE (RF) EV — OPEN OR SHORT	Right front solenoid valve (pressure reduction)
24	SOL.V (LF)/(LF) AV — OPEN OR SHORT	Left front solenoid valve (pressure retention)
25	SOLENOID VALVE (LF) EV — OPEN OR SHORT	Left front solenoid valve (pressure reduction)
26	SOL.V (RR)/(R) AV/(RR) AV — OPEN OR SHORT	Rear solenoid valve (pressure retention)
27	SOL.V (R) EV/(RR) EV — OPEN OR SHORT	Rear solenoid valve (pressure reduction)
41	WSS, SR (RF) — OPEN OR SHORT	Right front wheel-speed sensor/sensor rotor
42	WSS, SR (LF) — OPEN OR SHORT	Left front wheel-speed sensor/sensor rotor
43	WSS, SR (RR) — OPEN OR SHORT	Right rear wheel-speed sensor/sensor rotor
44	WSS, SR (LR) — OPEN OR SHORT	Left rear wheel-speed sensor/sensor rotor
51	FAIL SAFE RELAY — OPEN OR SHORT	Valve relay
53	MOTOR, MOTOR RELAY — OPEN OR SHORT	Motor relay Motor
61	ABS/TCS CONTROL UNIT — DEFECT	ABS control module
63	POWER SUPPLY — MALFUNCTION	Power supply

TROUBLESHOOTING

Diagnostic Trouble Code Troubleshooting

Caution

- When attaching the tester lead to the terminal of the ABS CM harness connector, the SST must be used. (Refer to 04-13 ABS HARNESS AND INPUT SIGNAL INSPECTION.)

DTC 05		Brake switch	
DESCRIPTION		When open circuit is detected in following harnesses. <ul style="list-style-type: none"> Brake switch — ABS CM ABS CM — brake light 	
POSSIBLE CAUSE		<ul style="list-style-type: none"> Malfunction of related wiring harness 	
STEP	INSPECTION		ACTION
1	Inspect following harness for open circuit. <ul style="list-style-type: none"> Brake switch — ABS CM ABS CM — brake light Is harness normal?	Yes	Go to next step.
		No	Repair harness.
2	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes. Is diagnostic trouble code 05 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

DTC 11 12 13 14		Right front ABS wheel-speed sensor Left front ABS wheel-speed sensor Right rear ABS wheel-speed sensor Left rear ABS wheel-speed sensor	
DESCRIPTION		When open circuit or short to power supply is detected.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> Malfunction of ABS wheel-speed sensor Malfunction of related wiring harness 	
STEP	INSPECTION		ACTION
1	Is ABS CM connector connected properly?	Yes	Go to next step.
		No	Correct as necessary.
2	Is wiring harness between ABS CM and wheel-speed sensor okay?	Yes	Go to next step.
		No	Correct as necessary.
3	Is ABS wheel-speed sensor okay? <div> <div></div> 04-13 FRONT ABS WHEEL-SPEED SENSOR INSPECTION </div>	Yes	Go to next step.
		No	Replace ABS wheel-speed sensor.
4	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes after driving over 10 km/h {6.2 mph}. Are diagnostic trouble codes 11—14 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

DTC 15		ABS wheel-speed sensor, ABS sensor rotor	
DESCRIPTION		Disagreement of wheel speed and vehicle speed is detected.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> There are missing or damaged teeth on sensor rotor ABS wheel-speed sensor improperly installed HU inoperable due to low pressure Different size tires are used 	
STEP	INSPECTION		ACTION
1	Inspect each of the four sensors in the same procedures as step 3—7 of DTC 41—44 chart.		

TROUBLESHOOTING

DTC	22	Right front pressure reduction valve	
	23	Right front pressure retension valve	
	24	Left front pressure reduction valve	
	25	Left front pressure retension valve	
	26	Rear pressure reduction valve	
	27	Rear pressure retension valve	
DESCRIPTION		Solenoid monitor signal does not track in response to solenoid ON/OFF command.	
POSSIBLE CAUSE		<ul style="list-style-type: none">• Malfunction of solenoid valve• Malfunction of related wiring harness	
STEP	INSPECTION		ACTION
1	Is ABS CM connector connected properly?	Yes	Go to next step.
		No	Correct as necessary.
2	Inspect solenoid valve including valve relay. Is it okay? ➤ 04-13 ABS HYDRAULIC UNIT INSPECTION, Solenoid Valve Inspection Including the Valve Relay	Yes	Go to step 5.
		No	Go to next step.
3	Is solenoid valve okay? ➤ 04-13 ABS HYDRAULIC UNIT INSPECTION, Solenoid Valve Inspection	Yes	Go to next step.
		No	Replace ABS hydraulic unit.
4	Is harness between solenoid valve and ABS CM okay?	Yes	Go to next step.
		No	Repair harness.
5	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes. Are diagnostic trouble codes 22—27 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

04

DTC	41	Right front ABS wheel-speed sensor		
	42	Left front ABS wheel-speed sensor		
	43	Right rear ABS wheel-speed sensor		
	44	Left rear ABS wheel-speed sensor		
DESCRIPTION		Circuit shorted to ground is detected. Wheel speed changes to 0 km/h {0 mph} instantaneously while vehicle speed is 40 km/h {25 mph} or more. Disagreement with other sensors is detected. Circuit shorted to ground is detected.		
POSSIBLE CAUSE		<ul style="list-style-type: none">• Malfunction of ABS wheel-speed sensor, sensor rotor, or ABS hydraulic unit• Malfunction of related wiring harness		
STEP	INSPECTION		ACTION	
1	Is ABS CM connector connected properly?		Yes	Go to next step.
			No	Correct as necessary.
2	Inspect harness between ABS CM and ABS wheel-speed sensor for circuit shorted to ground. Is harness okay?		Yes	Go to next step.
			No	Repair or replace harness.
3	Is ABS wheel-speed sensor okay? ➤ 04-13 FRONT ABS WHEEL-SPEED SENSOR INSPECTION		Yes	Go to next step.
			No	Replace ABS wheel-speed sensor.
4	Are there missing or damaged teeth on sensor rotor?		Yes	Replace sensor rotor.
			No	Go to next step.
5	Is brake line okay?		Yes	Go to next step.
			No	Replace brake line.
6	Is ABS hydraulic unit okay? ➤ 04-13 ABS HYDRAULIC UNIT INSPECTION		Yes	Go to next step.
			No	Replace ABS hydraulic unit.
7	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes after driving over 10 km/h {6.2 mph}. Are diagnostic trouble codes 41—44 obtained?		Yes	Replace ABS CM.
			No	There was a temporarily poor contact in wiring harness or connector.

TROUBLESHOOTING

DTC 51		Valve relay	
DESCRIPTION		Four or more valve systems are detected to be faulty among six systems.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> • Malfunction of valve relay • Malfunction of related wiring harness 	
STEP	INSPECTION		ACTION
1	Is ABS fuse (20 A) okay?	Yes	Go to next step.
		No	Replace fuse.
2	Inspect valve relay including harness. Is it okay? ☞ 04-13 ABS RELAY INSPECTION, Valve Relay Inspection (Including Harness to ABS Control Module)	Yes	Go to step 4.
		No	Go to next step.
3	Is valve relay okay? ☞ 04-13 ABS RELAY INSPECTION, Valve Relay Inspection	Yes	Go to next step.
		No	Replace valve relay.
4	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes. Is diagnostic trouble code 51 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

DTC 53		ABS motor, motor relay	
DESCRIPTION		Motor monitor signal does not track in response to motor relay ON/OFF command.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> • Malfunction of ABS motor or motor relay • Malfunction of related wiring harness 	
STEP	INSPECTION		ACTION
1	With IG SW OFF, is motor operating?	Yes	Replace motor relay.
		No	Go to next step.
2	Is fusible link located main fuse block okay?	Yes	Go to next step.
		No	Replace fusible link.
3	Inspect motor relay including harness. Is it okay? ☞ 04-13 ABS RELAY INSPECTION, Motor Relay Inspection (Including Harness to ABS Control Module)	Yes	Go to step 7.
		No	Go to next step.
4	Is motor relay okay? ☞ 04-13 ABS RELAY INSPECTION, Motor Relay Inspection	Yes	Go to next step.
		No	Replace motor relay.
5	Inspect ABS motor, including harness. Is it okay? ☞ 04-13 ABS HYDRAULIC UNIT INSPECTION, ABS Motor Inspection (Including Harness to ABS Control Module)	Yes	Go to step 7.
		No	Go to next step.
6	Is ABS motor okay? ☞ 04-13 ABS HYDRAULIC UNIT INSPECTION, ABS Motor Inspection	Yes	Correct harness as necessary.
		No	Replace ABS hydraulic unit.
7	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes. Is diagnostic trouble code 53 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

TROUBLESHOOTING

DTC 61		ABS control module	
DESCRIPTION		The on-board diagnostic program detects ABS CM malfunction.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> Malfunction of ABS control module 	
STEP	INSPECTION		ACTION
1	Erase diagnostic trouble code, and reinspect for diagnostic trouble code. Is diagnostic trouble code 61 obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

DTC 63		Power supply, ground	
DESCRIPTION		Voltage sensor detects low voltage.	
POSSIBLE CAUSE		<ul style="list-style-type: none"> Trouble in harness between ground and ABS CM Trouble in harness between battery and ABS CM Depleted battery 	
STEP	INSPECTION		ACTION
1	Is battery terminal voltage okay? ⇒ 01-17 BATTERY INSPECTION, Battery	Yes	Go to next step.
		No	Charge or replace battery.
2	Is battery terminal connection okay?	Yes	Go to next step.
		No	Tighten the battery terminal.
3	Inspect for connection of A terminal (power supply) and AB terminal (ground) connector pins for ABS CM. Is it okay?	Yes	Go to next step.
		No	Repair ABS CM connector.
4	Is voltage of ABS CM harness between A terminal (power supply) and AB terminal (ground) 10—15 V when starting engine?	Yes	Go to next step.
		No	Repair power supply harness or ground harness.
5	Erase diagnostic trouble code, and reinspect for diagnostic trouble codes after driving over 6 km/h {3.7 mph}. Is diagnostic trouble code 63 obtained?	Yes	Replace ABS CM.
		No	There was temporarily low battery voltage and battery capacity should be inspected if this occurs frequently.

04

ANTILOCK BRAKE SYSTEM SYMPTOM TROUBLESHOOTING

X5U401W05

Diagnostic Index

- Use the following table to determine the problem and go to the appropriate troubleshooting procedure.

No.	TROUBLESHOOTING ITEM
1	IG switch is turned to ON, but ABS warning light does not illuminate.
2	IG switch is turned to ON, and ABS warning light stays on after more than 4 seconds.
3	ABS warning light flashes with vehicle stopped and ABS warning light goes off when vehicle is driven.
4	ABS warning light goes on during driving and stays on until IG switch is turned off. If IG switch is turned to ON again, ABS warning light goes off after 2—4 seconds.
5	ABS warning light goes on and off intermittently, regardless of driving and stopping.
6	ABS warning light indicates normal; however, ABS does not operate correctly.

TROUBLESHOOTING

Symptom Troubleshooting

Caution

- Disconnecting and connecting the ABS CM connector must be done with the ignition switch off.
- When attaching the tester lead to the harness connector terminal, the SST must be used.
- Reinspect for the diagnostic trouble codes and repair as necessary after completion.

Note

- If any symptoms have appeared in the past and are normal at present, a possible cause is a temporarily poor contact in the wiring harness or connector. **The ABS CM is normal.**

1 IG switch is turned to ON, but ABS warning light does not illuminate.			
TROUBLESHOOTING HINTS <ul style="list-style-type: none"> • Burnt out bulb or short in related harness • Meter malfunction • ABS CM malfunction 			
STEP	INSPECTION		ACTION
1	Do other warning and indicator lights illuminate when IG switch is turned to ON?	Yes	Verify DTC to see if it is stored and repair it later. Go to next step.
		No	Inspect meter fuse. If fuse is melted, inspect for short to ground between fuse panel and warning light.
2	Disconnect ABS CM connector. Turn IG switch to ON. Does ABS warning light illuminate?	Yes	Go to next step.
		No	Go to step 5.
3	Connect ABS CM connector. Turn IG switch to ON. Does ABS warning light illuminate?	Yes	There was a temporarily poor connection between ABS CM and ABS CM connector. Inspect ABS CM connector terminal and ABS CM terminal.
		No	Go to next step.
4	Is ABS CM connector terminal AD deformed?	Yes	Replace harness connector.
		No	Replace ABS CM.
5	With ABS CM connector disconnected, ground ABS CM connector terminal AD. Does ABS warning light illuminate?	Yes	Go to next step.
		No	Go to step 7.
6	With ABS CM connector disconnected, inspect for continuity between ABS CM connector terminal AC and body GND. Is continuity okay?	Yes	Inspect ABS CM connector terminals AC and AD. If there is a malfunction, replace harness connector.
		No	Repair or replace harness.
7	Is ABS warning light bulb burnt out?	Yes	Replace bulb.
		No	Go to next step.
8	Inspect for continuity between ABS CM connector terminal AD and meter connector. Is continuity okay?	Yes	Inspect meter. ➤ 09-22 INSTRUMENTATION/DRIVER INFO., Instrument Cluster Inspection
		No	Repair or replace harness.

TROUBLESHOOTING

2	IG switch is turned to ON, and ABS warning light stays on after more than 4 seconds.		
TROUBLESHOOTING HINTS <ul style="list-style-type: none">• ABS CM detects a malfunction in ABS• Low battery voltage at ABS CM terminal• Poor connection in ABS CM connector• ABS warning light harness malfunction (short to ground)			
STEP	INSPECTION		ACTION
1	Is ABS CM connector connected to ABS CM securely?	Yes	Go to step 3.
		No	Connect it securely. Go to next step.
2	Turn IG switch to ON. Does ABS warning light go off after 4 seconds?	Yes	There was temporary poor connection in wiring harness or connector. Inspect wiring harness and connector terminal and repair as necessary.
		No	Go to next step.
3	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?	Yes	Read DTC and follow diagnostic trouble code troubleshooting.
		No	Go to next step.
4	Is battery voltage okay? ➡ 01-17 BATTERY INSPECTION, Battery	Yes	Make sure battery terminal connection is okay. Go to next step.
		No	Charge or replace battery. ➡ 01-17 BATTERY CHARGING ➡ 01-17 BATTERY REMOVAL/INSTALLATION
5	With engine idling, A/C on, and headlights on, is battery voltage okay? ➡ 01-17 BATTERY INSPECTION, Battery	Yes	Go to next step.
		No	Inspect generator and generator drive belt tension. Adjust generator drive belt tension and/or replace generator as necessary.
6	Disconnect ABS CM connector. Connect SST (49 F066 002) to ABS CM connector and turn IG switch to ON. Does ABS warning light go off?	Yes	Replace ABS CM.
		No	Repair short circuit between ABS CM connector terminal AD and ABS warning light.

3	ABS warning light flashes with vehicle stopped and ABS warning light goes off when vehicle is driven.		
TROUBLESHOOTING HINTS			
• Low battery voltage at ABS CM terminal			
STEP	INSPECTION		ACTION
1	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?	Yes	Read DTC and follow diagnostic trouble code troubleshooting.
		No	Go to next step.
2	Is battery voltage okay? ➡ 01-17 BATTERY INSPECTION, Battery	Yes	Make sure battery terminal connection is okay. Go to next step.
		No	Charge or replace battery.
3	With engine idling, A/C on and headlights on, is battery voltage okay?	Yes	Replace ABS CM.
		No	Inspect generator and generator drive belt tension. Adjust generator drive belt tension and/or replace generator as necessary.

TROUBLESHOOTING

4	ABS warning light goes on during driving and stays on until IG switch is turned off. If IG switch is turned to ON again, ABS warning light goes off after 2—4 seconds.		
TROUBLESHOOTING HINTS			
● ABS CM detects a malfunction in ABS			
STEP	INSPECTION		ACTION
1	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?	Yes	Read DTC and follow diagnostic trouble code troubleshooting.
		No	Go to next step.
2	Verify that ABS CM connector is correctly connected. Drive vehicle and reinspect for symptom. Does same symptom reoccur?	Yes	Go to next step.
		No	There was a temporarily poor connection in wiring harness or connector. Inspect wiring harness and connector terminal between ABS CM connector and ABS CM.
3	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?	Yes	Read DTC and follow diagnostic trouble code troubleshooting.
		No	Replace ABS CM.

5	ABS warning light goes on and off intermittently, regardless of driving and stopping.		
TROUBLESHOOTING HINTS			
<ul style="list-style-type: none">• ABS warning light harness malfunction (short to ground)• Meter malfunction			
STEP	INSPECTION		ACTION
1	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?		Yes
			Read DTC and follow diagnostic trouble code troubleshooting.
			No
			Inspect wiring harness and connector between ABS warning light and ABS CM connector terminal AD.

6	ABS warning light indicates normal; however, ABS does not operate correctly.		
TROUBLESHOOTING HINTS			
● Mechanical system malfunction			
STEP	INSPECTION		ACTION
1	Perform diagnostic trouble code inspection and verify DTCs. Is DTC displayed?	Yes	Read DTC and follow diagnostic trouble code troubleshooting.
		No	Go to next step.
2	Perform ABS hydraulic unit system inspection. ➡ 04-13 ABS HYDRAULIC UNIT INSPECTION, System Inspection Do wheels rotate properly?	Yes	Inspect conventional brake system.
		No	If wheels do not rotate: Replace ABS hydraulic unit. If wheels rotate but their rotation order is not correct: Inspect brake pipe routing to ABS hydraulic unit.

04-10 GENERAL PROCEDURES

PRECAUTION (BRAKES) 04-10-1

PRECAUTION (BRAKES)

Wheels and tires removal/installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. When a wheel is removed, tighten it to **89—117 N·m {9.0—12.0 kgf·m, 66—86 ft·lbf}**.

Brake lines disconnection/connection

Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**
- Tighten the brake pipe flare nut by using the **SST** (49 0259 770B). Be sure to modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination.
(Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)

XSU410W01

- If any brake line has been disconnected anytime during the procedure, add brake fluid, bleed the brakes, and inspect for leakage after the procedure has been completed.

Connectors disconnection

- Disconnect the negative battery cable before doing any work that requires handling of connectors. Reconnect the negative battery cable only after the work is completed.

ABS components operations

- Make sure that there are no diagnostic trouble codes in the ABS memory after working on ABS components. If there are any codes in the memory, erase them.
-

04-11 CONVENTIONAL BRAKE SYSTEM

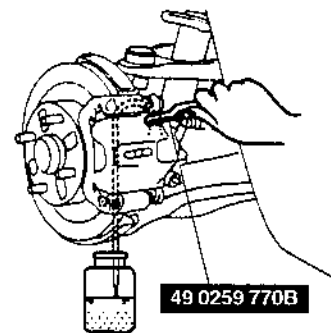
AIR BLEEDING	04-11-1	PROPORTIONING BYPASS VALVE	
VACUUM LINE INSPECTION	04-11-2	INSPECTION	04-11-12
BRAKE PEDAL INSPECTION	04-11-2	PROPORTIONING BYPASS VALVE	
Brake Pedal Height Inspection	04-11-2	REPLACEMENT	04-11-12
Brake Pedal Play Inspection	04-11-2	FRONT BRAKE (DISC) INSPECTION ..	04-11-13
Brake Pedal-to-Floor Clearance		Disc Pad Thickness Inspection	04-11-13
Inspection	04-11-2	Disc Plate Thickness Inspection	04-11-13
BRAKE PEDAL ADJUSTMENT	04-11-3	Disc Plate Runout Inspection	04-11-13
Brake Pedal Height Adjustment	04-11-3	FRONT BRAKE (DISC)	
Pedal Play Adjustment	04-11-3	REMOVAL/INSTALLATION	04-11-14
BRAKE PEDAL		Disc Plate Removal Note	04-11-14
REMOVAL/INSTALLATION	04-11-4	Disc Plate Installation Note	04-11-14
BRAKE SWITCH INSPECTION	04-11-5	Disc Pad Installation Note	04-11-15
MASTER CYLINDER		DISC PAD (FRONT) REPLACEMENT ..	04-11-15
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MASTER CYLINDER		REAR BRAKE (DISC) INSPECTION ...	04-11-17
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Stop Screw and O-Ring (Non ABS model)		Disc Plate Thickness Inspection	04-11-17
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Stop Pin and O-Ring (ABS model)		REAR BRAKE (DISC)	
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Power Brake Unit Function Inspection		DISC PAD (REAR) REPLACEMENT ...	04-11-19
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Power Brake Unit Function Inspection		DISASSEMBLY/ASSEMBLY	04-11-20
(Inspection using gauges)	04-11-10	Piston Disassembly Note	04-11-21
POWER BRAKE UNIT		Piston Assembly Note	04-11-21
REMOVAL/INSTALLATION	04-11-11		

AIR BLEEDING

Note

- The brakes should be bled whenever a brake line is disconnected. If a hydraulic line is disconnected at the master cylinder, start at the brake caliper or wheel cylinder farthest from the brake master cylinder, and move to the next farthest brake caliper or wheel cylinder until all four have been bled. If the disconnection point is anywhere except the master cylinder, start at the point closest to the disconnection, and move to the next closest brake caliper or wheel cylinder until all four have been bled.

- On level ground, jack up the vehicle and support it evenly on safety stands.
- Remove the bleeder cap and attach a vinyl tube to the bleeder screw.
- Place the other end of the vinyl tube in a clear, brake fluid-filled container.
- The first person depresses the brake pedal several times, and then holds it in the depressed position.
- The second person loosens the bleeder screw, drains out the fluid and closes the screw by using the SST.



W6U411W01

X5U411WA0

- Repeat step 4 and 5 until no air bubbles are seen. The reservoir should be kept about 3/4 full during bleeding to prevent air from reentering the lines.

Tightening torque

5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lb}

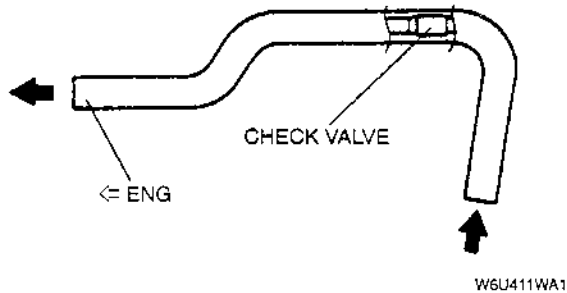
- Inspect for correct brake operation.
- Verify that there is no fluid leakage. Wipe off any spilled fluid immediately.
- After bleeding the brakes, add brake fluid to the maximum level.

CONVENTIONAL BRAKE SYSTEM

VACUUM LINE INSPECTION

W6U411W02

1. Remove the clamps and vacuum hose.
2. Apply both suction and pressure to the engine-side hose, and verify that air blows only toward that side. If air flows in both directions or not at all, replace the vacuum hose.



BRAKE PEDAL INSPECTION

X5U411W01

Brake Pedal Height Inspection

- Verify that the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

Pedal height (reference value)

171—181 mm {6.73—7.13 in} (With carpet)

Brake Pedal Play Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Lightly depress the pedal by hand until resistance is felt, and inspect for the free play.

Free play

4.0—8.4 mm {0.16—0.33 in}

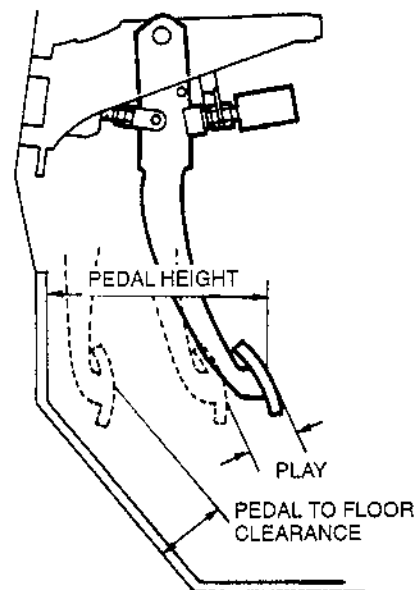
Brake Pedal-to-Floor Clearance Inspection

1. Verify that the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of 589 N {60 kgf, 132 lbf}.

Pedal-to-floor clearance

95 mm {3.74 in} min. (Without carpet)

2. If the distance is less than specified, inspect for air in the brake system.



U5U41102

CONVENTIONAL BRAKE SYSTEM

BRAKE PEDAL ADJUSTMENT

Brake Pedal Height Adjustment

1. Disconnect the brake switch connector.
2. Loosen locknut B and turn switch A until it does not contact the pedal.
3. Loosen locknut D and turn rod C to adjust the height.
4. Tighten the bolt with locknut B so that clearance between the bolt for brake switch A and pedal stopper is within the specification.

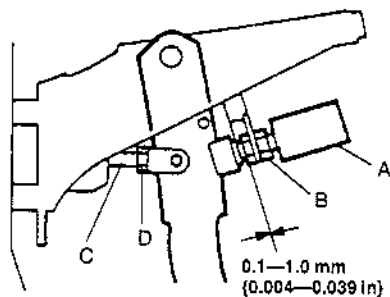
Specification

0.1—1.0 mm {0.004—0.039 in}

Tightening torque

14—17 N·m {140—180 kgf·cm, 122—156 in·lbf}

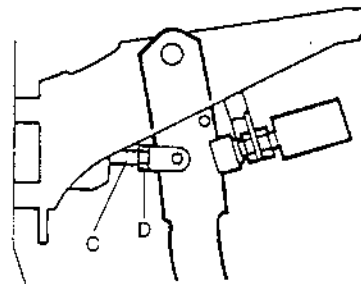
5. Connect the brake switch connector.
6. After adjustment, inspect the pedal play and the brake light operation.



X5U411WA1

Pedal Play Adjustment

1. Remove the snap pin and the clevis pin.
2. Loosen locknut D and turn rod C to align the holes in the fork and in the pedal.
3. Install the clevis pin and the snap pin.
4. Verify the pedal height and the brake light operation.



X5U411WA2

Tightening torque

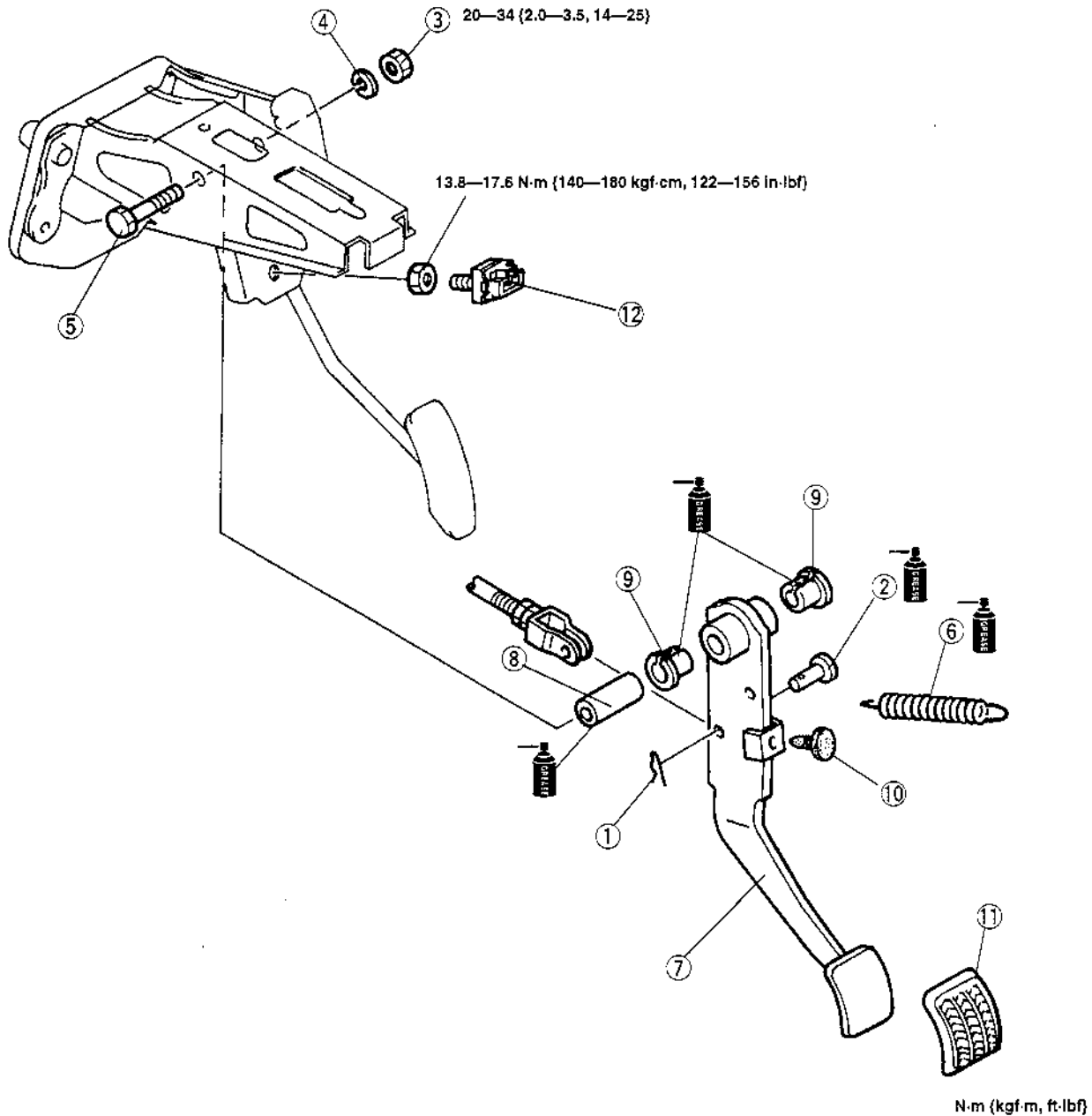
24—34 N·m {2.4—3.5 kgf·m, 17—25 ft·lbf}

CONVENTIONAL BRAKE SYSTEM

BRAKE PEDAL REMOVAL/INSTALLATION

X5U411W03

1. Disconnect the brake switch connector.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. After installation, verify and adjust the pedal height and free play as necessary.



U5U41105

1	Spring clip
2	Clevis pin
3	Nut
4	Spring washer
5	Bolt
6	Return spring

7	Brake pedal
8	Guide pipe
9	Bushing
10	Stopper
11	Pedal pad
12	Brake switch

CONVENTIONAL BRAKE SYSTEM

BRAKE SWITCH INSPECTION

X5U411W04

1. Disconnect the brake switch connector.
2. Check for continuity between the terminals of the brake switch connector by using the circuit tester.

○—○ : Continuity

Condition	Terminal			
	A	B	C	D
When the brake pedal is depressed	○—○			
When the brake pedal is not depressed			○—○	

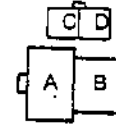
X5U411WB1

3. If not as specified, replace the brake switch.

WITHOUT CRUISE
CONTROL SYSTEM



WITH CRUISE
CONTROL SYSTEM

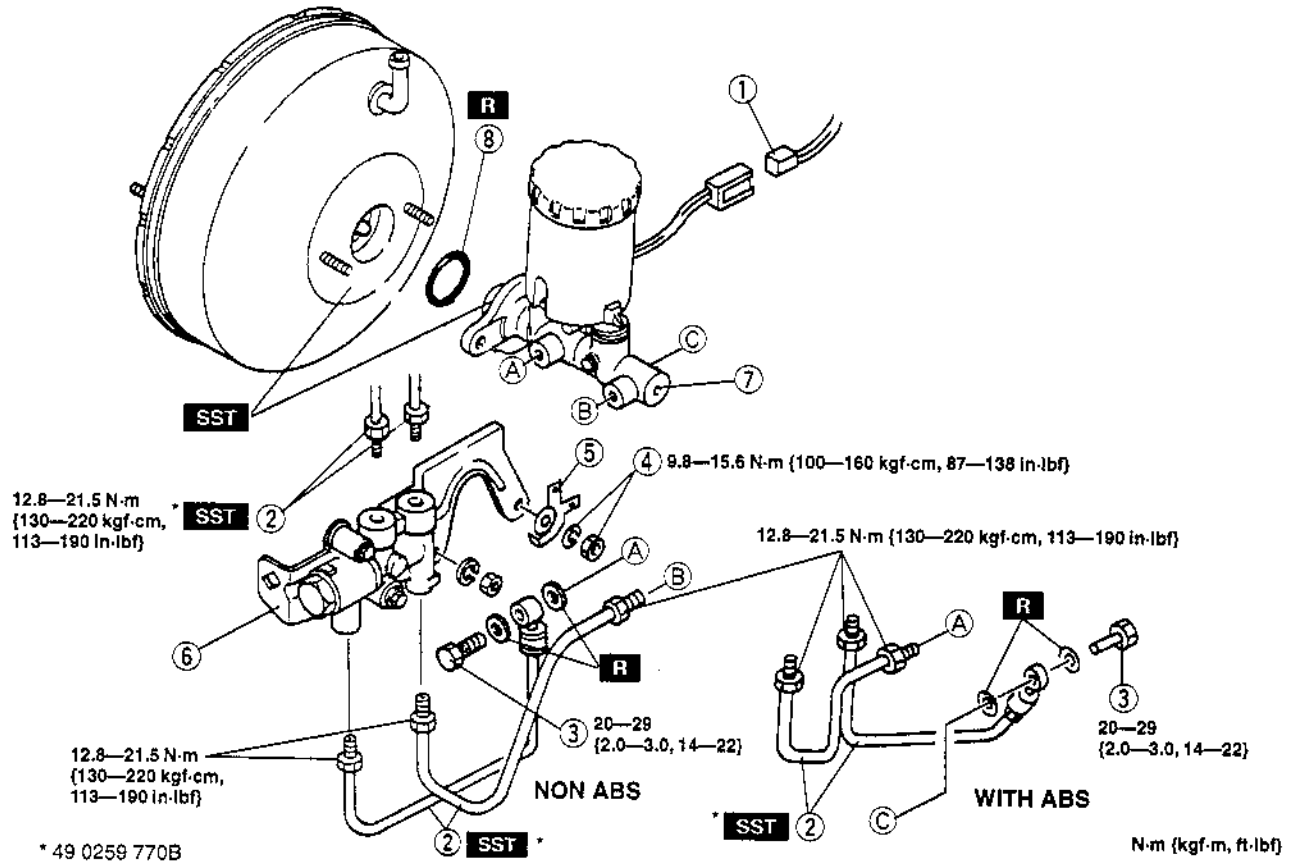


X5U411WB0

MASTER CYLINDER REMOVAL/INSTALLATION

X5U411W05

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



X5U411WA3

1	Fluid level sensor connector
2	Brake pipe
3	Connector bolt
4	Nut and washer
5	Connector bracket

6	Proportioning bypass valve and bracket
7	Master cylinder Installation Note
8	O-ring (ABS model)

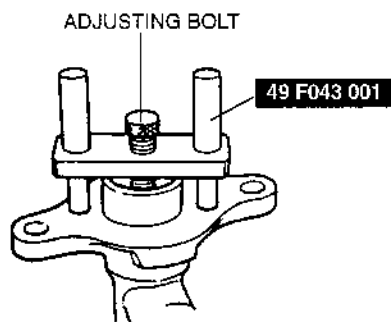
CONVENTIONAL BRAKE SYSTEM

Master Cylinder Installation Note

Non ABS model

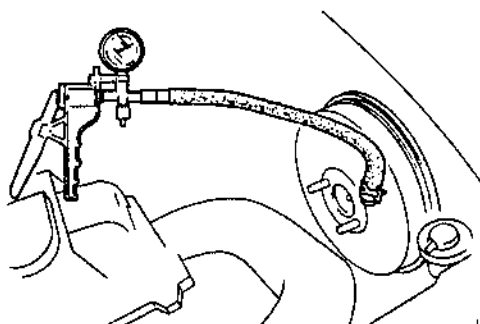
1. Measure the clearance between the push rod of the power brake unit and the piston of the master cylinder.

- (1) Place the **SST** at the top of the master cylinder. Turn the adjusting bolt until it contacts the bottom of the piston.



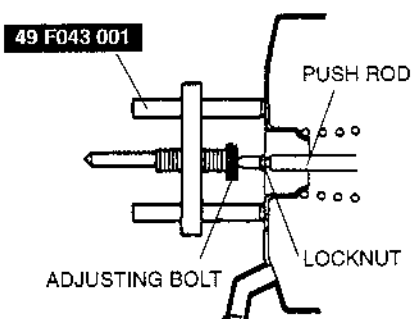
U5U41107

- (2) Apply a **66.7 kPa {500 mmHg, 19.7 inHg}** vacuum to the power brake unit by using a vacuum pump.



U5U41108

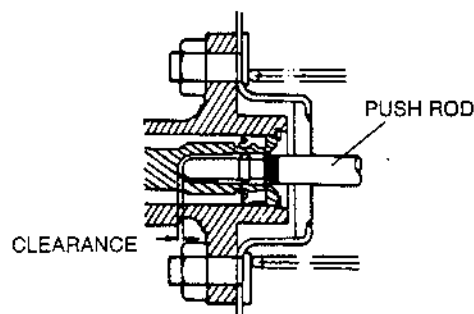
- (3) Invert the **SST** used in step 1, and place it on the power brake unit.
- (4) Measure the clearance between the end of the adjusting bolt and the push rod of the power brake unit. If it is not **0 mm {0 in}**, loosen the push rod locknut and turn the push rod to make the adjustment.



U5U41109

2. By making the above adjustment, the clearance between the push rod and piston (after installation of the brake master cylinder and the power brake unit) will be as shown in the table below.

Condition	Clearance
When vacuum applied to unit is approx. 66.7 kPa {500 mmHg, 19.7 inHg}.	0.1—0.4 mm {0.004—0.016 in}



U5U41110

ABS model

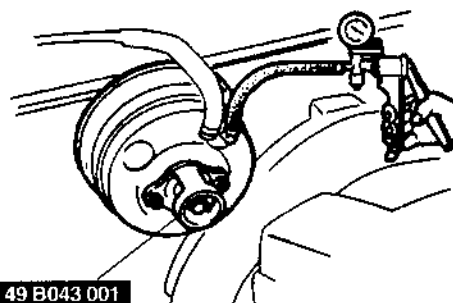
1. Inspect the push rod clearance as follows.

- (1) Turn the nut of the **SST** clockwise to fully retract the **SST** gauge rod. Attach the **SST** to the power brake unit.

Tightening torque

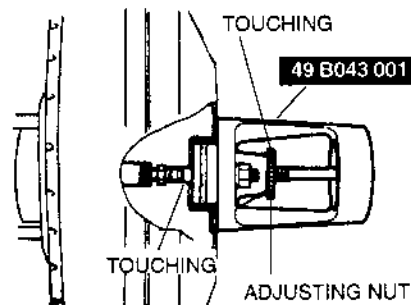
9.8—16 N·m {1.0—1.6 kgf·m, 7.2—11 ft·lbf}

- (2) Apply a **66.7 kPa {500 mmHg, 19.7 inHg}** vacuum by using a vacuum pump.



U5U41111

- (3) Turn the adjusting nut of the **SST** counterclockwise until the gauge rod just contacts the push rod end of the power brake unit. Push lightly on the end of the gauge rod to be sure it is seated. Verify that there is no gap between the adjusting nut and **SST** body.



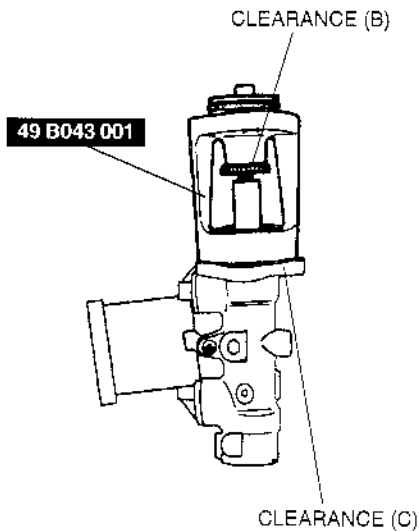
U5U41112

CONVENTIONAL BRAKE SYSTEM

- (4) Remove the **SST** from the power brake unit without disturbing the adjusting nut. Set the **SST** onto the master cylinder as shown in the figure.

Caution

- When pushing the **SST** gauge rod into the master cylinder piston, only use enough pressure to push the rod to the bottom of the piston. If too much pressure is applied, a false reading will occur.
- (5) Push lightly on the end of the **SST** gauge rod to be sure it has contacted the bottom of the master cylinder piston, but do not push so hard that the piston moves. Note any clearance between the **SST** body and the adjusting nut (clearance B) or between the body and the master cylinder (clearance C).



U5U41113

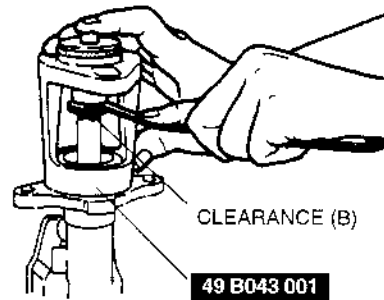
Measurement	Push rod
Clearance at (B)	Too short
Clearance at (C)	Too long
No clearance at (B) or (C)	Okay

2. Adjust the push rod clearance at B.

Note

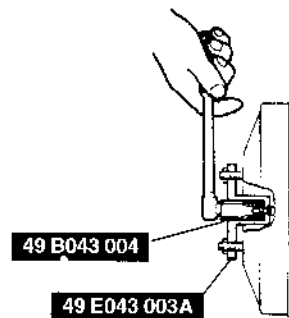
- The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

- (1) Push lightly on the end of the **SST** gauge rod, and measure the clearance between the adjusting nut and the **SST** body.



U5U41114

- (2) Using the **SST**, turn the nut to lengthen the power booster push rod an amount equal to the clearance measured at B.



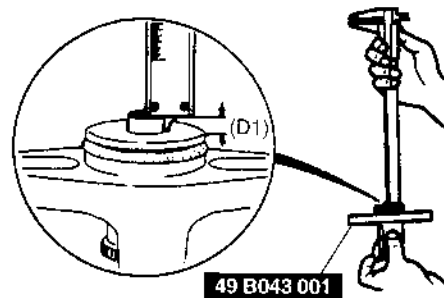
U5U41115

3. Adjust the push rod clearance at C.

Note

- The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

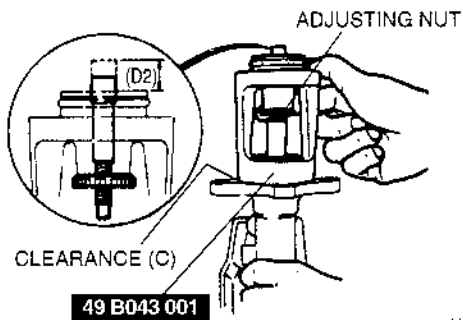
- (1) Measure and record height D1 of the gauge rod.



U5U41116

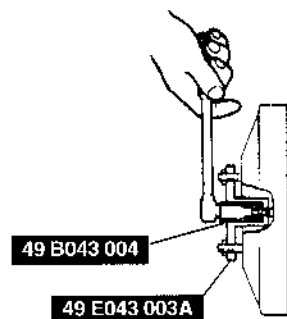
- (2) Turn the adjusting nut until the **SST** body sets squarely on the master cylinder. (Turn only enough for the body to touch.)
- (3) Measure and record height D2 of the gauge rod.

CONVENTIONAL BRAKE SYSTEM



U5U41117

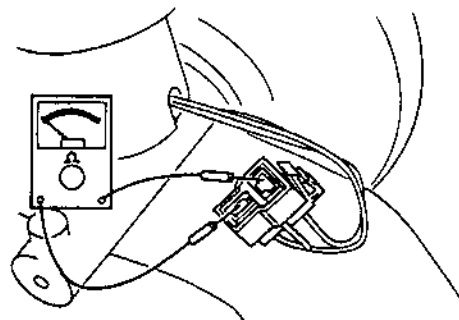
- (4) Subtract D1 from D2 and, by using the **SST**, turn the nut to shorten the power booster push rod an amount equal to the sum.



U5U41118

BRAKE FLUID LEVEL SENSOR INSPECTION

1. Disconnect the sensor connector.
2. Connect an ohmmeter to the connector.
3. Starting with the fluid level above the MIN mark on the reservoir, verify that there is no continuity.
4. Remove the brake fluid and verify continuity when the level is below the MIN mark.
5. Replace the sensor as necessary.



U5U411AH

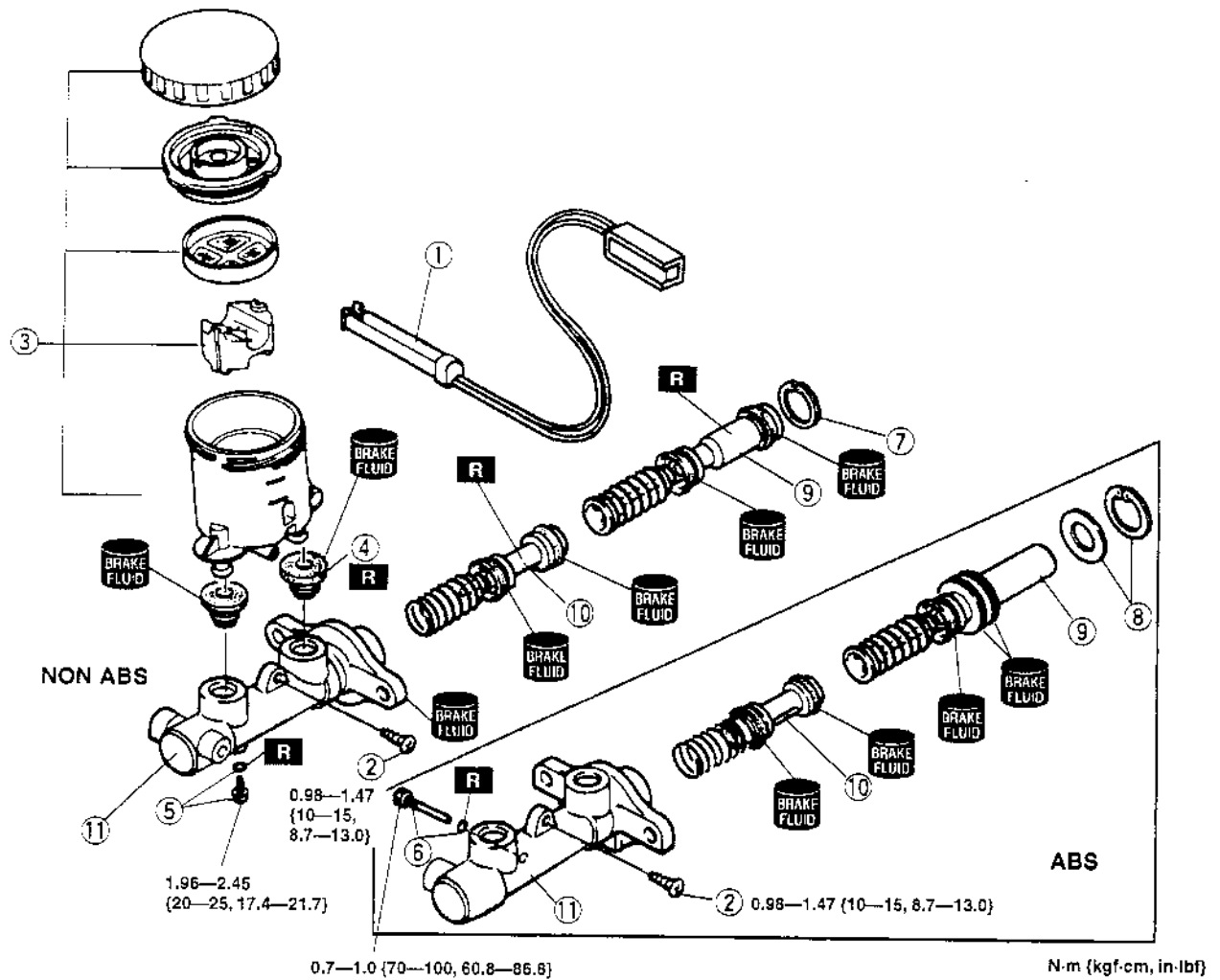
U5U41119

CONVENTIONAL BRAKE SYSTEM

MASTER CYLINDER DISASSEMBLY/ASSEMBLY

X5U411W06

1. After removing the brake fluid, disassemble in the order indicated in the table.
2. Assemble in the reverse order of removal.



X5U411WD0

1	Fluid level sensor connector
2	Screw
3	Reservoir component
4	Bushings
5	Stop screw and O-ring (Non ABS model) ➤ Assembly Note
6	Stop pin and O-ring (ABS model) ➤ Assembly Note

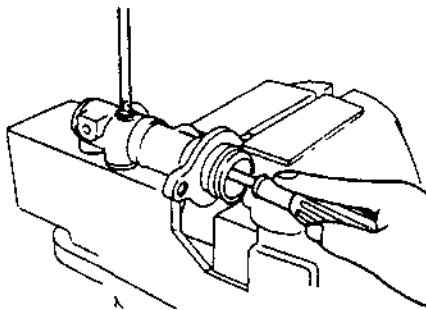
7	Snap ring (Non ABS model)
8	Snap ring and spacer (ABS model)
9	Primary piston component
10	Secondary piston component
11	Master cylinder body

CONVENTIONAL BRAKE SYSTEM

Stop Screw and O-Ring (Non ABS model)

Assembly Note

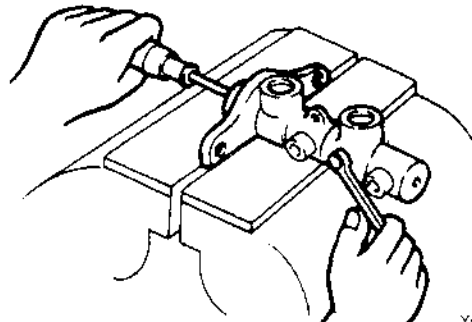
1. Push the primary piston component in fully.
2. Install and tighten a new O-ring and the stop screw.
3. Push and release the piston to verify that it is held by the stop screw.



U5U41121

Stop Pin and O-Ring (ABS model) Assembly Note

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



X5U411WD1

POWER BRAKE UNIT INSPECTION

Power Brake Unit Function Inspection (Simple Method)

Step 1

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine.
3. If the pedal moves down slightly immediately after the engine starts, the unit is operating.

Step 2

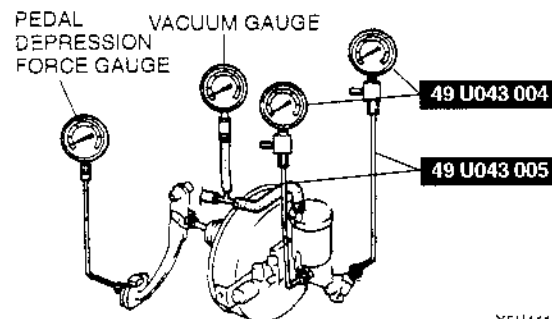
1. Start the engine and let it run for **1 or 2 minutes**.
2. Stop the engine.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage or improper connection of the check valve or vacuum hose. Repair as necessary and inspect it once again.

Step 3

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal depressed.
4. Hold the pedal down for about **30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, inspect for damage or improper connection of the check valve or vacuum hose. Repair as necessary and inspect once again.
7. If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed inspect described in "Inspection using gauges," below.

Power Brake Unit Function Inspection (Inspection using gauges)

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



X5U411WD2

Inspection for vacuum loss (unloaded condition)

1. Start the engine.
2. Stop the engine when the vacuum gauge indicates **66.7 kPa {500 mmHg, 19.7 inHg}**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge indicates **63.4—66.6 kPa {475—500 mmHg, 18.7—19.7 inHg}**, the unit is operating.

Inspection for vacuum loss (loaded condition)

1. Start the engine.
2. Depress the brake pedal with a force of **196 N {20 kgf, 44 lbf}**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge indicates **66.7 kPa {500 mmHg, 19.7 inHg}**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge indicates **63.4—66.6 kPa {475—500 mmHg, 18.7—19.7 inHg}**, the unit is operating.

CONVENTIONAL BRAKE SYSTEM

Inspection for hydraulic pressure

1. If with the engine stopped (vacuum 0 kPa {0 mmHg, 0 inHg}) the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
196 N {20 kgf, 44 lbf}	1,079—1,177 kPa {11—12 kgf/cm ² , 156—171 psi}

2. Start the engine. Depress the brake pedal when the vacuum reaches 66.7 kPa {500 mmHg, 19.7 inHg}. If the fluid pressure is within specification, the unit is operating.

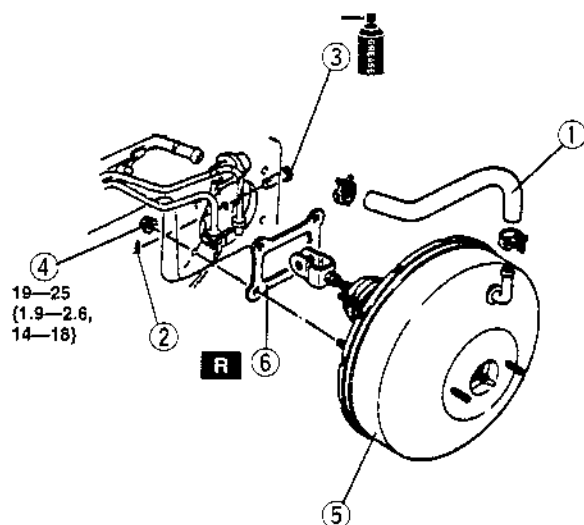
Pedal force	Fluid pressure
196 N {20 kgf, 44 lbf}	5,199—5,494 kPa {53—56 kgf/cm ² , 754—796 psi}

POWER BRAKE UNIT REMOVAL/INSTALLATION

X5U411W08

1. Remove the master cylinder and the proportioning bypass valve. (Refer to MASTER CYLINDER REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

1	Vacuum hose
2	Snap pin
3	Clevis pin
4	Nut
5	Power brake unit
6	Gasket



N·m {kgf·m, ft·lbf}

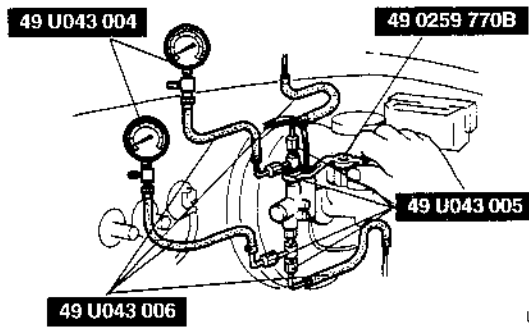
X5U411WA4

CONVENTIONAL BRAKE SYSTEM

PROPORTIONING BYPASS VALVE INSPECTION

X5U411W09

1. Connect the SSTs and the adapters to the brake pipes as shown in the figure.

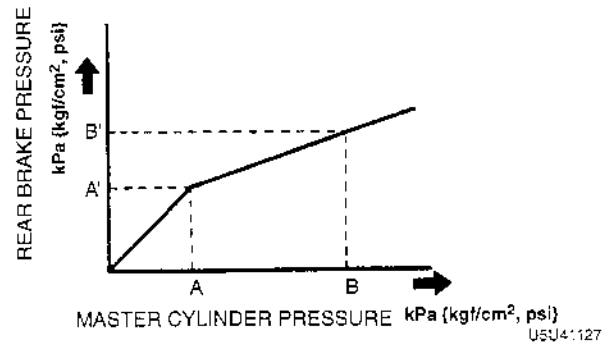


U5U41126

2. Bleed the air from the brake system.
3. Measure the fluid pressure from the master cylinder and to the rear brakes. If not as specified, replace the valve component.

Specification

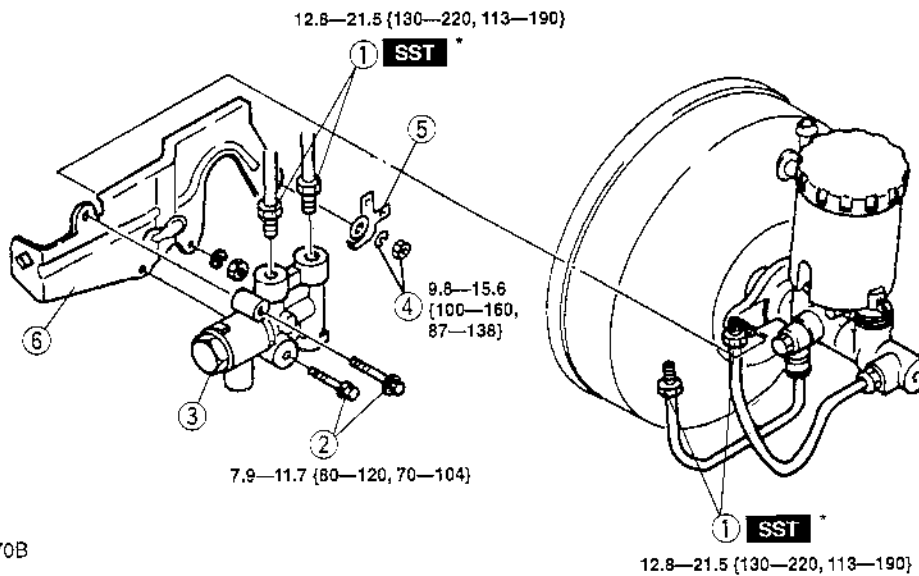
Fluid pressure kPa {kgf/cm ² , psi}			
A	A'	B	B'
3,923 {40, 569}	3,923 {40, 569} ± 294 {3, 43}	5,884 {60, 850}	4,846 {49.4, 683} ± 392 {4, 57}



PROPORTIONING BYPASS VALVE REPLACEMENT

X5U411W10

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



* 49 0259 770B

1	Brake pipe
2	Bolt
3	Proportioning bypass valve

4	Nut and washer
5	Connector bracket
6	Proportioning bypass valve bracket

CONVENTIONAL BRAKE SYSTEM

FRONT BRAKE (DISC) INSPECTION

X5U411W11

Disc Pad Thickness Inspection

1. On level ground, jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Look through the caliper inspection hole and verify the remaining thickness of the pad.

Thickness

1.0 mm {0.04 in} min.

Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution

- When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.

Minimum thickness:

18.0 mm {0.71 in}

Minimum thickness after machining by using a brake lathe on-vehicle:

18.8 mm {0.74 in}

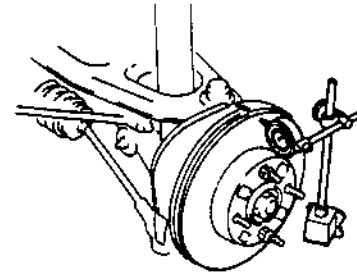
2. If the thickness is not within the specification, replace the disc plate.

Disc Plate Runout Inspection

- Tighten the disc plate to the wheel hub by using two wheel nuts. When measuring runout, measure at the outer edge of the disc plate surface.

Runout limit

0.05 mm {0.002 in} max.



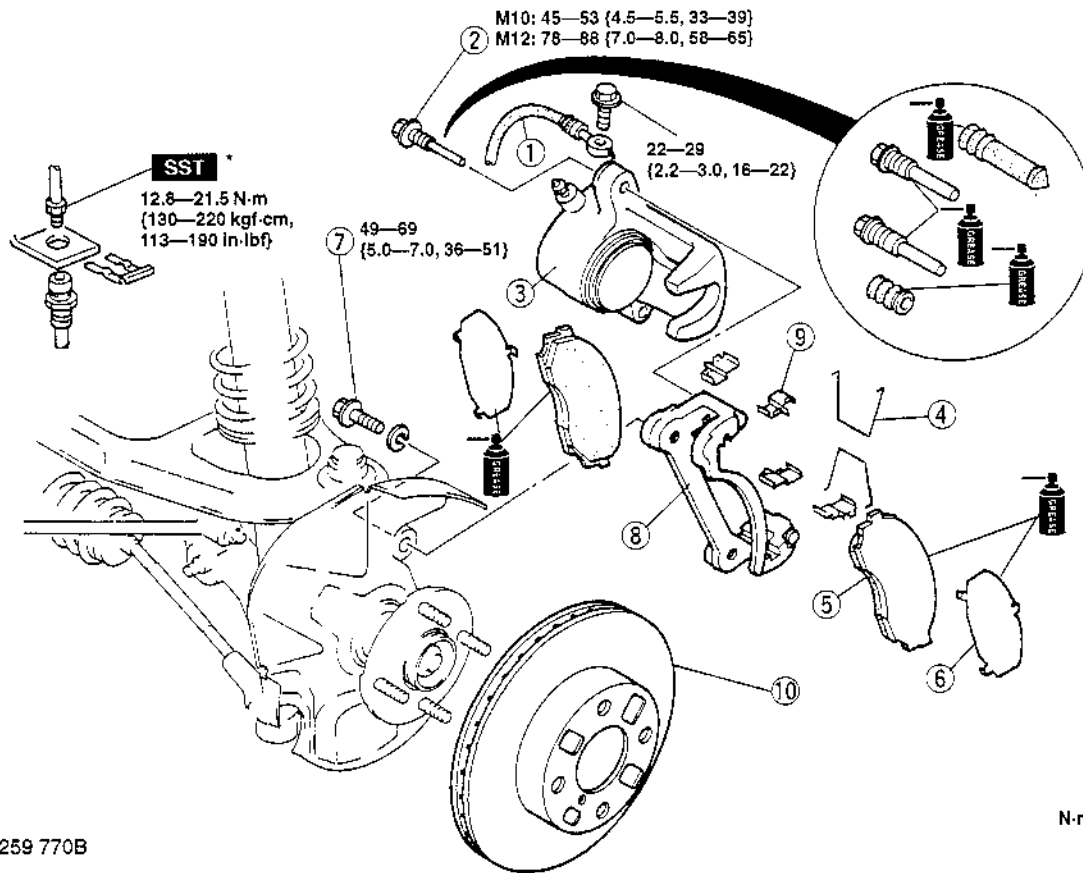
U5U41129

CONVENTIONAL BRAKE SYSTEM

FRONT BRAKE (DISC) REMOVAL/INSTALLATION

X5U411W12

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

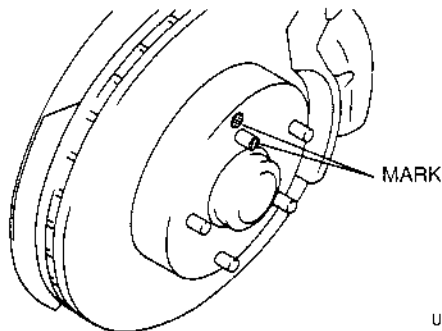


1	Brake hose
2	Lock bolt
3	Caliper
4	Spring
5	Disc pad ☐ Installation Note
6	Shim

7	Bolt
8	Mounting support
9	Guide plate
10	Disc plate ☐ Removal Note ☐ Installation Note

Disc Plate Removal Note

- Mark the wheel hub bolt and disc plate before removal for reference during installation.



U5U41131

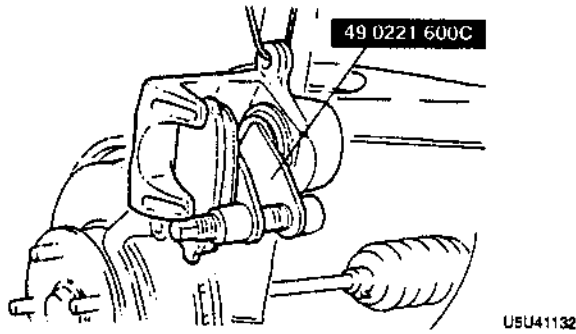
Disc Plate Installation Note

1. Remove any rust or grime on the contact face of the disc plate and wheel hub.
2. Install the disc plate and align the marks made before removal.

CONVENTIONAL BRAKE SYSTEM

Disc Pad Installation Note

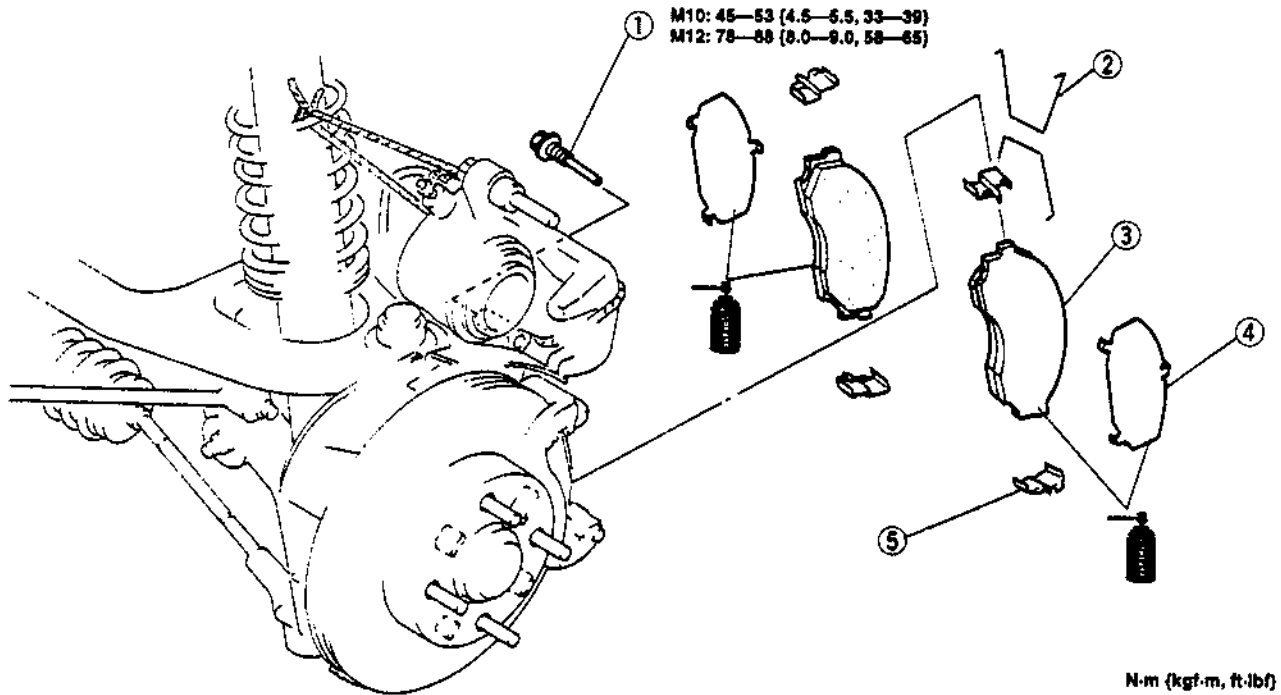
1. Push the piston inward by using the SST.
2. Install the new pads in the mounting support.



DISC PAD (FRONT) REPLACEMENT

X5U411W13

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



X5U411WC1

1	Lock bolt
2	Spring
3	Disc pad 04-11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Pad Installation Note

4	Shim
5	Guide plate