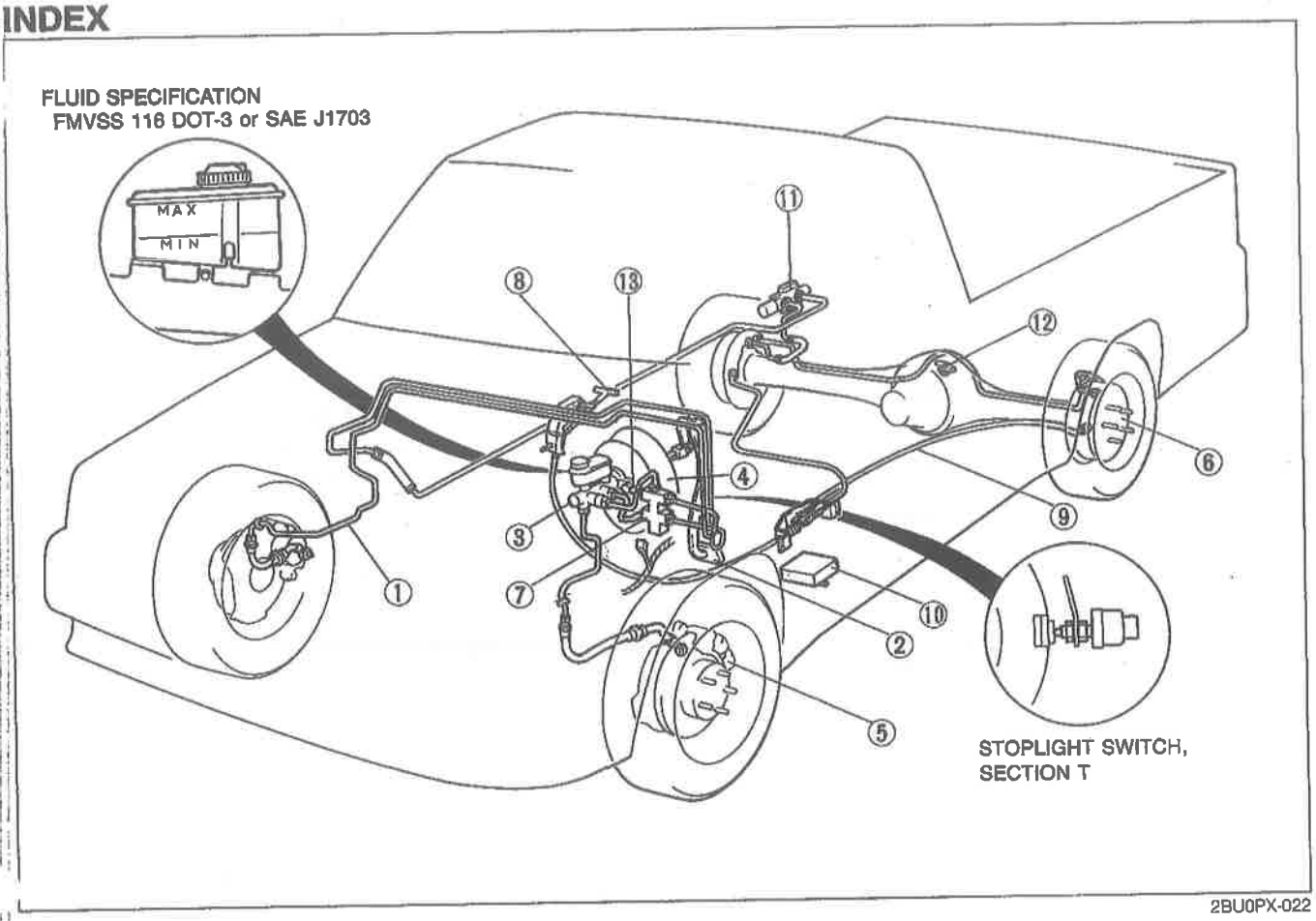
BRAKING SYSTEM

1BU0PX-001

INDEX



OUTLINE

SPECIFICATIONS

Item	Model	4×4	4×2
Brake pedal	Type	Suspended	
	Pedal lever ratio	3.75	4.5
	Max. stroke mm (in)	112.5 (4.43)	135 (5.31)
Master cylinder	Type	Tandem (with level sensor)	
	Cylinder inner diameter mm (in)	22.22 (0.875)	
Front disc brake	Type	Ventilated disc	
	Cylinder inner diameter mm (in)	53.98 (2.125)	
	Pad dimensions (area×thickness) mm^2×mm (in^2 ×in)	4,800×10.0 (7.44×0.39)	
	Disc plate dimensions mm (in) (outer diameter×thickness)	272×22 (10.7×0.87)	256×20 (10.1×0.79)
Rear drum brake	Type	Duo-servo	Leading-trailing
	Wheel cylinder inner diameter mm (in)	17.46 (0.688)	19.05 (0.750)
	Lining dimensions mm (in) (width×length×thickness)	Ⓟ 50×248×5 (1.97×9.76×0.20) Ⓢ 50 × 260 × 5 (1.97×10.24×0.20)	45×261× 6.3 (1.77×10.28×0.25)
	Drum inner diameter mm (in)	260 (10.24)	
	Shoe clearance adjustment	Increment type automatic adjuster	
Power brake unit	Type	Tandem	Single
	Size mm (in)	187 + 213 (7.36 + 8.39)	238 (9.37)
Braking force control device	Type	Rear-wheel Anti-lock Brake System	
Brake fluid		FMVSS 116 DOT-3 or SAE J1703	
Parking brake	Type	Mechanical, 2 rear brakes	
	Operation system	Stick type	

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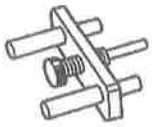
Ⓟ Primary
Ⓢ Secondary

CONVENTIONAL BRAKE SYSTEM

PREPARATION

49 0259 770B Wrench, flare nut 	49 F043 001 Adjust gauge 	49 0221 600C Expand tool, disc brake 

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TROUBLESHOOTING GUIDE

Problem	Possible cause	Remedy	Page
Poor braking	Leakage of brake fluid	Repair	—
	Air in system	Bleed air	P–5
	Worn pad or lining	Replace	P–19,23,27
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	P–19,23,27
	Hardening of pad or lining surface or poor contact	Grind or replace	P–19,23,27
	Malfunction of disc brake piston	Replace	P–21
	Malfunction of master cylinder or wheel cylinder	Repair or replace	P–9
	Malfunction of power brake unit	Repair or replace	P–15
	Malfunction of check valve (vacuum hose)	Repair or replace	P–15
	Damaged vacuum hose	Replace	P–15
	Deterioration of flexible hose	Replace	—
	Malfunction of PBV	Replace	P–30
Brakes pull to one side	Worn pad or lining	Replace	P–19,23,27
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	P–19,23,27
	Hardening of pad or lining surface or poor contact	Grind or replace	P–19,23,27
	Abnormal wear or distortion of disc, drum, pad, or lining	Repair or replace	P–19,23,27
	Malfunction of automatic adjuster	Repair or replace	—
	Looseness of backing plate mounting bolts	Tighten	P–23,27
	Malfunction of wheel cylinder	Repair or replace	P–23,27
	Improperly adjusted wheel alignment	Adjust	Section R
	Unequal tire air pressures	Repair or replace	Section Q
Brakes do not release	No brake pedal play	Adjust	P–7
	Improperly adjusted push rod clearance	Adjust	P–10
	Clogged master cylinder return port	Clean	—
	Weak shoe return spring	Replace	P–23,27
	Wheel cylinder not returning properly	Clean or replace	P–23,27
	Malfunction of piston seal of disc brake	Replace	P–21
	Excessive runout of disc plate	Replace	Section M
Pedal goes too far (too much pedal stroke)	Air in system	Bleed air	P–5
	Improperly adjusted pedal play	Adjust	P–7
	Worn pad or lining	Replace	P–19,23,27
Abnormal noise or vibration during braking	Worn pad or lining	Replace	P–19,23,27
	Deteriorated pad or lining	Grind or replace	P–19,23,27
	Brakes do not release	Repair	—
	Foreign material or scratches on disc plate or drum contact surface	Clean	—
	Looseness of backing plate or caliper mounting bolts	Tighten	P–23,27
	Poor contact of pad or lining	Repair or replace	P–19,23,27
	Insufficient grease on sliding parts	Apply grease	—

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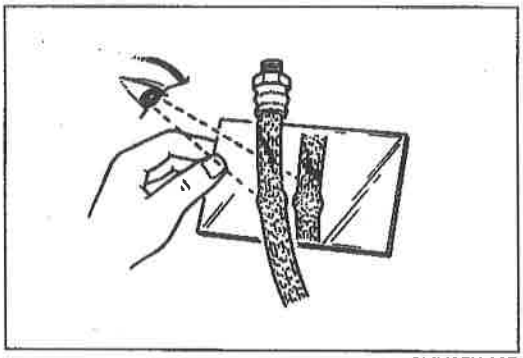

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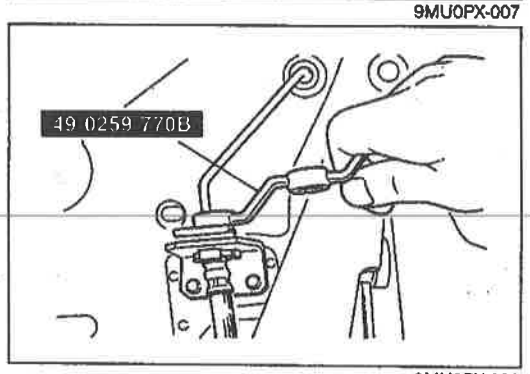

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BRAKE HYDRAULIC LINE

On-vehicle Inspection

Check for the following and replace parts as necessary.
1. Cracking, damage, or corrosion of brake hose
2. Damage to brake hose threads
3. Scars, cracks, or swelling of flexible hose
4. All lines for fluid leakage

Removal and Installation

1. Loosen or tighten the flare nut with the **SST**.

   Flare nut tightening torque:
   13—22 N·m (1.3—2.2 m-kg, 9.4—16 ft-lb)

2. When connecting the flexible hose, do not overtighten or twist it.
3. After installation:
   (1) Check that the hose does not contact other parts when the vehicle bounces or when the steering wheel is turned fully right or left.
   (2) Bleed the air from the brake system.

Air-Bleeding

Air-bleeding locations are as follows:

Removed part			Air-bleeding locations		
			Front		Rear
			Right	Left	Left
Master cylinder			*	*	*
Wheel cylinder or caliper	Front	Right	*	*	—
		Left	*	*	—
	Rear	Right	—	—	*
		Left	—	—	*
Hydraulic unit			—	—	*
Proportioning bypass valve (PBV)			*	*	*

*: Indicates locations where air bleeding is necessary.

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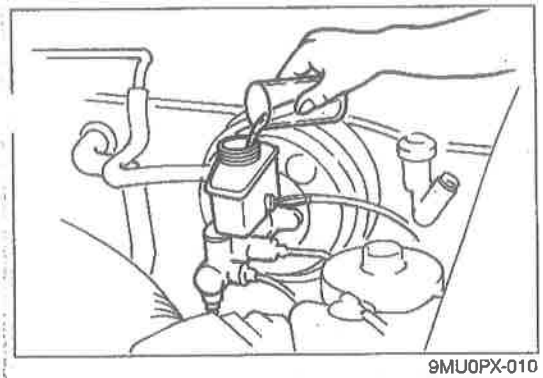
Note

a) Air bleeding must be done from the bleeder screw farthest from the removed parts to the nearest.

b) It is not necessary to energize the solenoid valves electrically to bleed the rear brakes.



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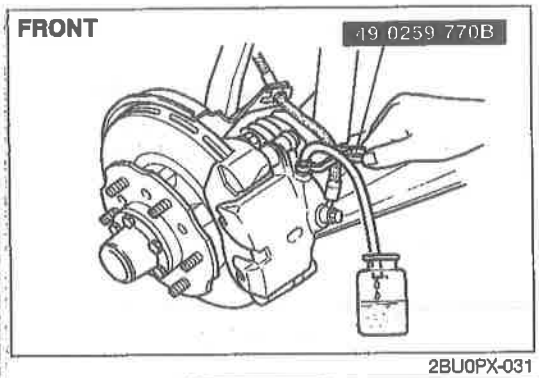

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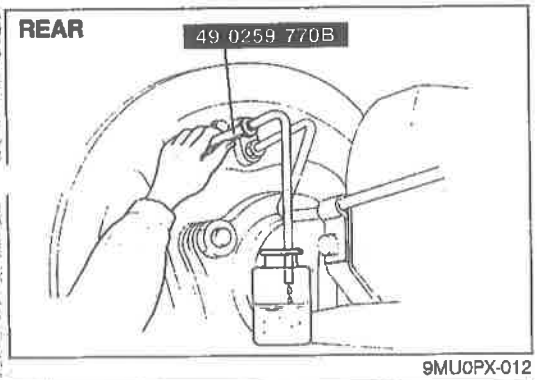

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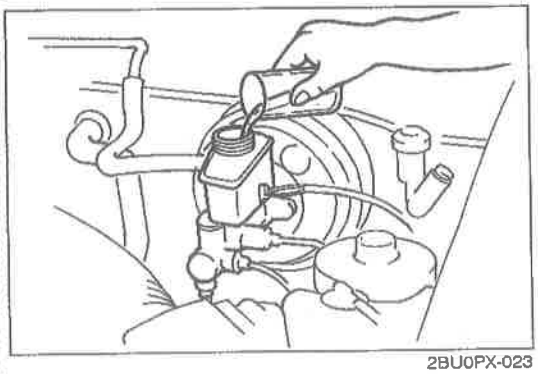

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Bleed air as described below.

1. Jack up the vehicle and support it with safety stands.
2. Fill the reserve tank with brake fluid. Be sure that the reserve tank is at least half full at all times during the air bleeding process.

Caution
a) Be careful not to spill brake fluid onto a painted surface.
b) Use only the specified brake fluid. Do not mix it with any other type.

3. After removing the bleeder cap, connect one end of a transparent vinyl tube to the bleeder screw with the **SST** and place the other end in a receptacle.
4. One person should depress the brake pedal a few times, and then hold it in the depressed position.
5. A second person should loosen the bleeder screw, drain out the fluid, and retighten the screw.

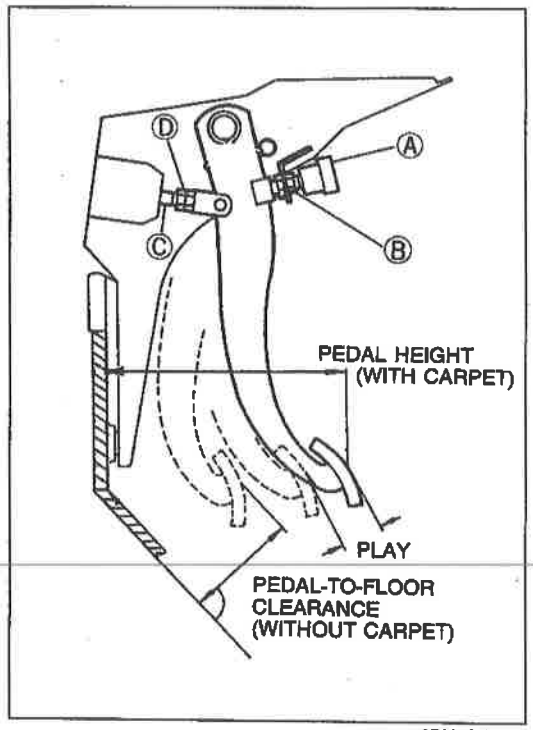
Caution
a) The two people should stay in voice contact with each other.
b) Be sure the pedal remains depressed until the air bleed screw is tightened.

6. Repeat steps 4 and 5 until no air bubbles are seen.

Caution
a) After tightening the bleeder screw, check to be sure that there is no fluid leakage.
b) Be sure to clean away any spilled fluid with rags.

7. After bleeding the air, add brake fluid to the reserve tank up to the specified level.

Bleeder screw tightening torque
Front: 6—9 N·m (60—90 cm-kg, 52—78 in-lb)
Rear : 6—7 N·m (60—70 cm-kg, 52—61 in-lb)



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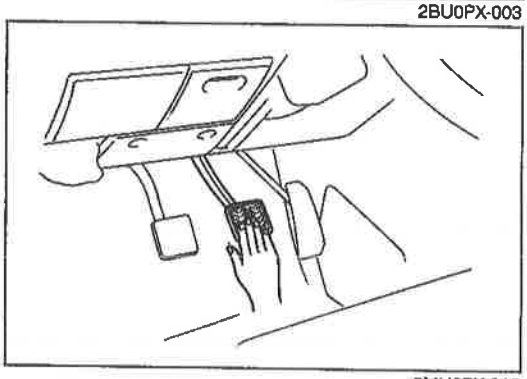
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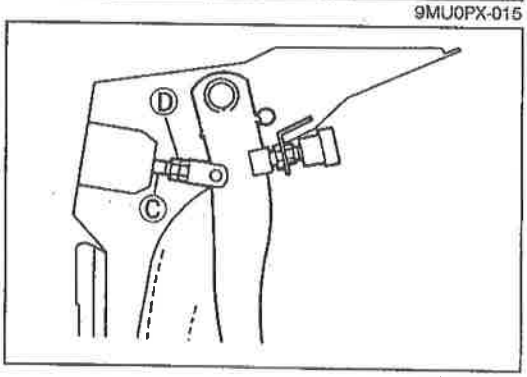

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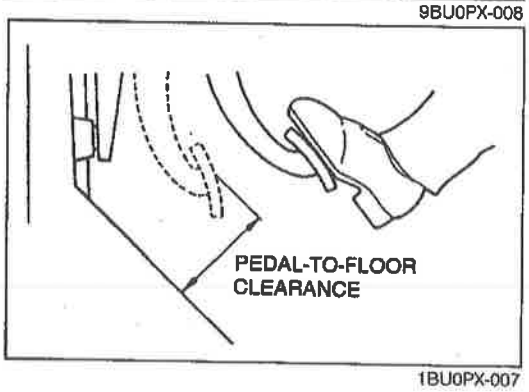

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BRAKE PEDAL

On-vehicle Inspection

Pedal height

Inspection

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

Pedal height: 180—185mm (7.09—7.28 in) (With carpet)

Adjustment

1. Disconnect the stoplight switch connector.
2. Loosen locknut Ⓑ and turn switch Ⓐ until it does not contact the pedal.
3. Loosen locknut Ⓓ and turn rod Ⓒ to adjust the height.
4. Adjust the pedal free play and tighten locknut Ⓓ.
5. Turn the stoplight switch until it contacts the pedal; then turn an additional 1/2 turn. Tighten locknut Ⓑ.

Locknut Ⓑ tightening torque:
14—18 N·m (1.4—1.8 m-kg, 10—13 ft-lb)
Locknut Ⓓ tightening torque:
20—29 N·m (2.0—3.0 m-kg, 14—22 ft-lb)

6. Connect the stoplight switch connector.

Pedal play

Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Gently depress the pedal again by hand and check the free play (until the valve plunger contacts the stopper plate = until the power piston begins to move).

Pedal play: 4.0—7.0mm (0.16—0.28 in)

Adjustment

Loosen locknut Ⓓ of operating rod Ⓒ; then turn the rod to adjust the free play.

Locknut Ⓓ tightening torque:
20—29 N·m (2.0—3.0 m-kg, 14—21 ft-lb)

Pedal-to-floor clearance

Inspection

Check 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 kg, 132 lb)**.

Pedal-to-floor clearance: 105mm (4.1 in) min. (Without carpet)

If the distance is less than specified, check for the following problems:

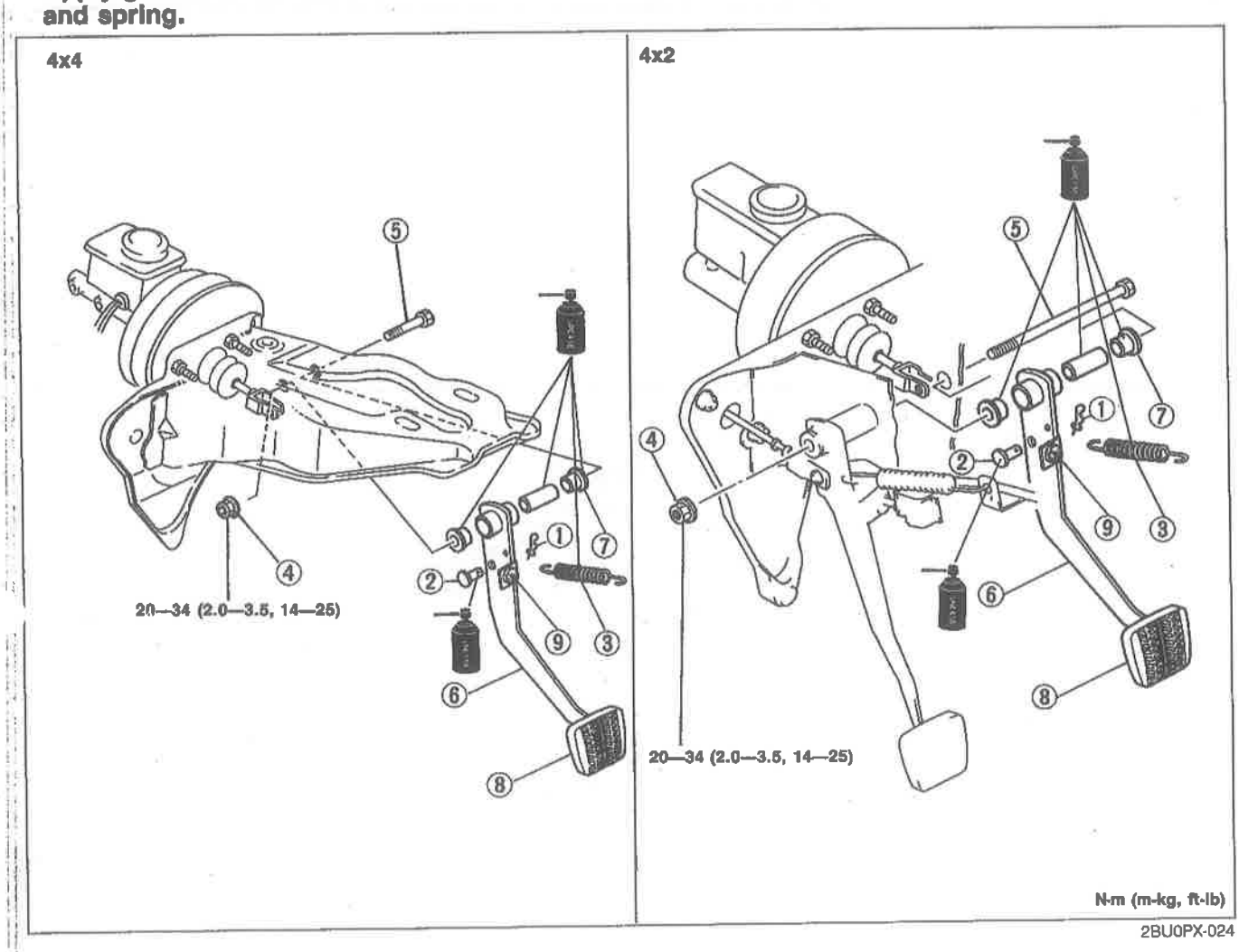
1. Air in brake system
2. Malfunction of automatic adjuster (rear drum brakes)
3. Worn shoes or pads

Removal, Installation, and Inspection

1. Remove in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Install in the reverse order of removal.
4. After installation, check and adjust the pedal height and free play if necessary.

Caution

Apply grease to the inner surface of the bushing and to the contact surfaces of the clevis pin and spring.



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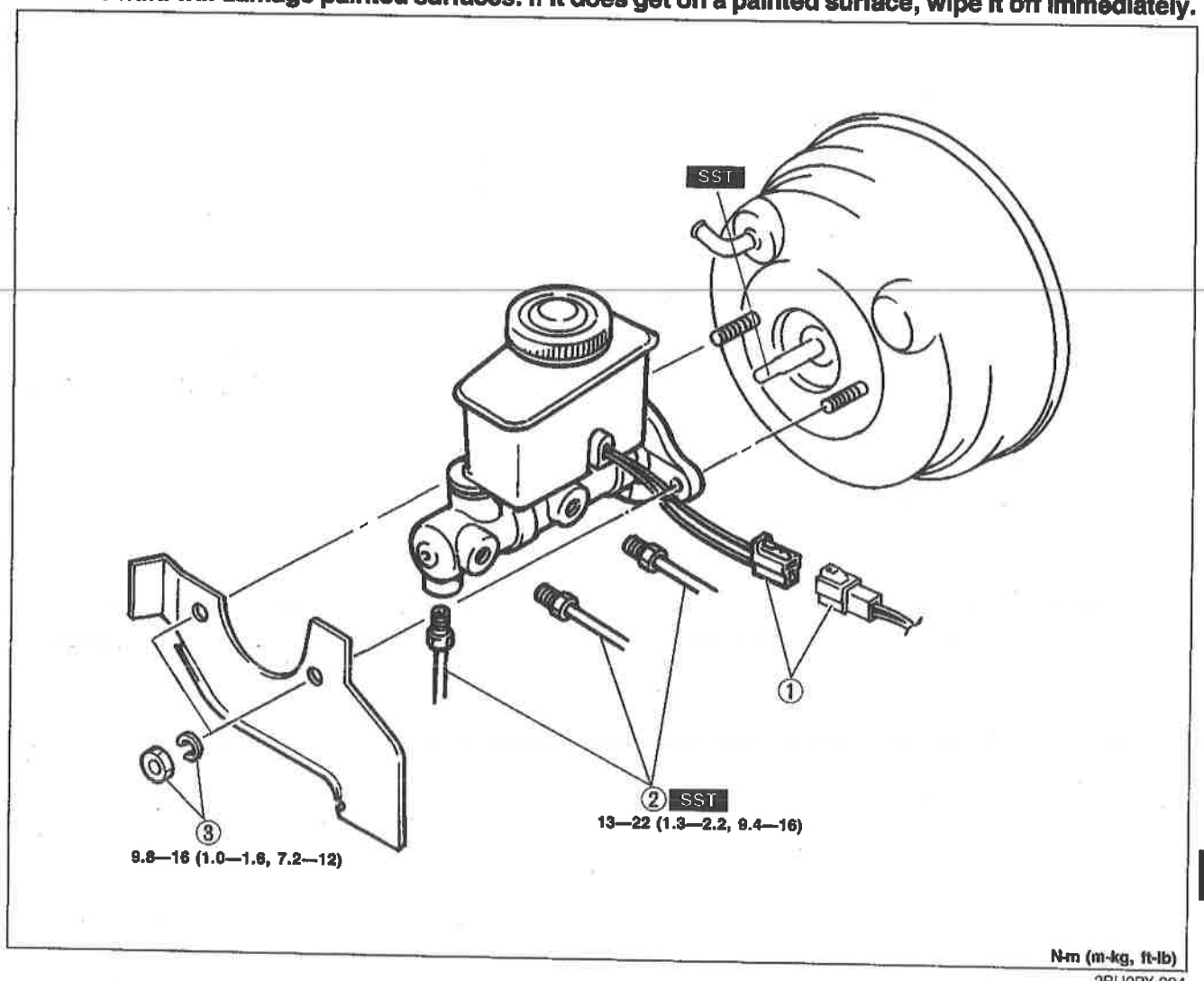
1. Cotter pin
2. Clevis pin
3. Return spring
   Inspect for weakness or damage
4. Nut
5. Bolt
   Inspect for bending
6. Brake pedal
   Inspect for bending
7. Bushing
   Inspect for wear
8. Pedal pad
   Inspect for wear or damage
9. Rubber stopper
   Inspect for wear or damage

MASTER CYLINDER

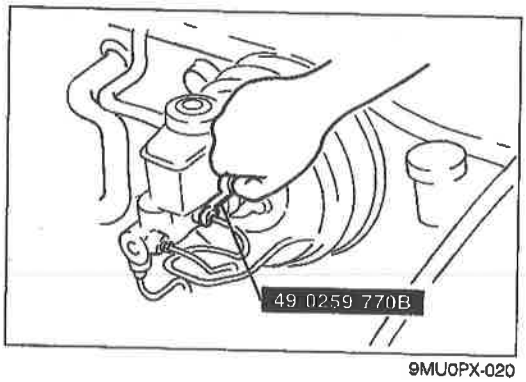
Removal and Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal.
3. After installation, add brake fluid, bleed air, and check for fluid leakage.

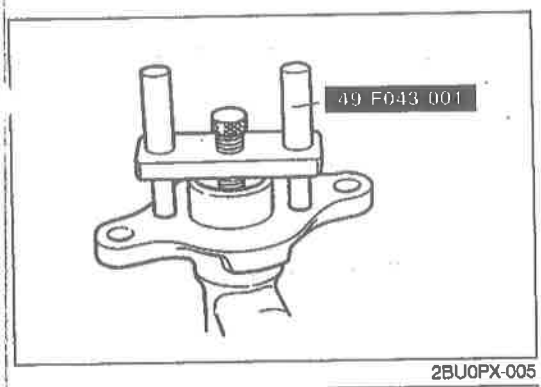
Caution
Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.



1. Fluid level sensor coupler
2. Brake pipe
   Removal Note ..... below
3. Nuts and washers
4. Reserve tank and master cylinder
   Installation Note ..... page P–10
5. Proportioning bypass valve bracket



Removal note
Brake pipe
Disconnect/connect the brake pipe from/to the master cylinder with the **SST**.



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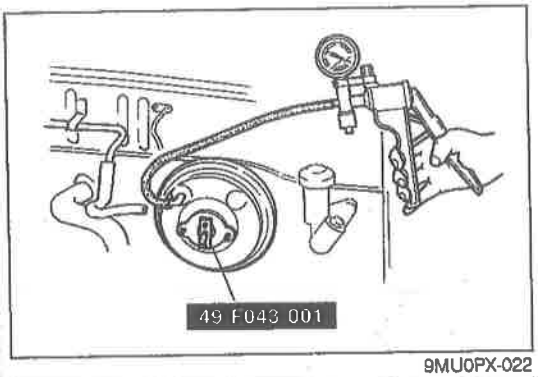

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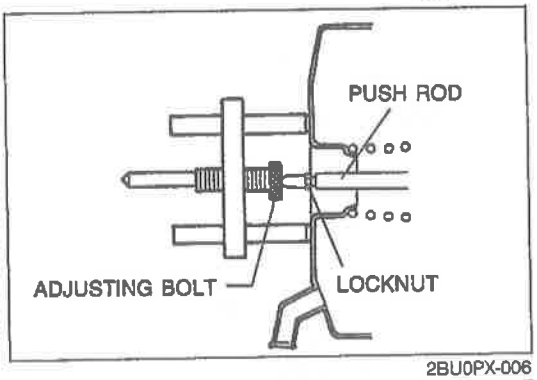

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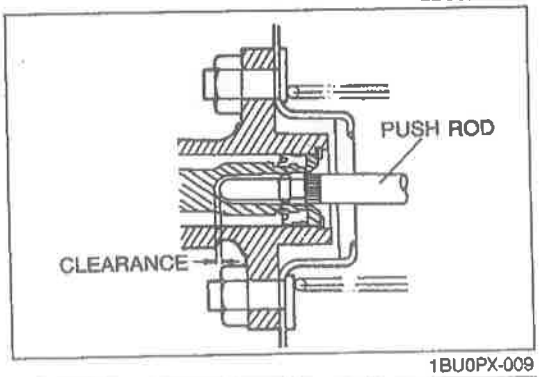

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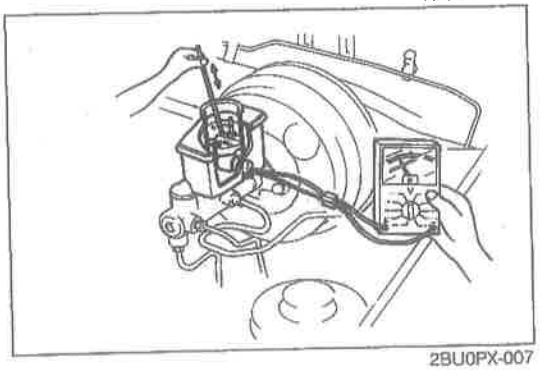
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Installation note
Reserve tank and master cylinder
Push rod clearance
Check the clearance between the push rod of the power brake unit and the piston of the master cylinder.
1. Place the **SST** a top the master cylinder. Turn the adjusting bolt until it bottoms in the push rod hole in the piston.
2. Apply **500 mmHg (19.7 InHg)** vacuum to the power brake unit with a vacuum pump.
3. Invert the adjustment gauge used in Step 1, and place it on the power brake unit.
4. Check the clearance between the end of the adjusting bolt and the push rod of the power brake unit.
   If it is not **0mm (0 in)**, loosen the push rod locknut and turn the push rod to make the adjustment.

Reference
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.

	Push rod-to-piston clearance
When vacuum applied to unit is approx. 500 mmHg (19.7 inHg)	0.1—0.4mm (0.004—0.016 in)

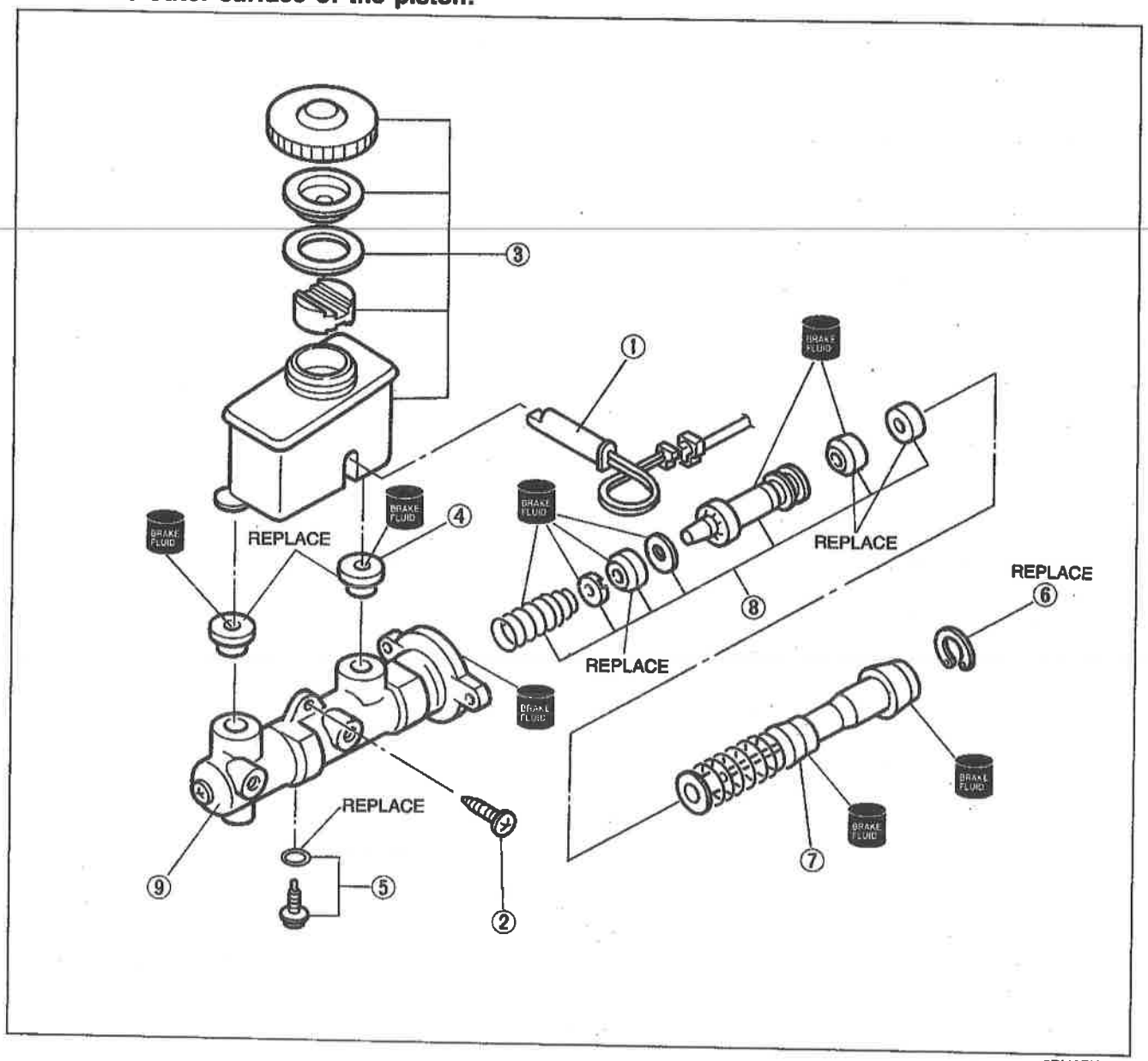
Inspection of fluid level sensor
1. Disconnect the fluid level sensor connector.
2. Fill the reservoir with brake fluid up to the specified level.
3. Connect a circuit tester to the connector.
4. Check for continuity when the float is moved up and down.
5. The sensor is good if there is continuity when the float is below the "MIN" mark, and there is no continuity when the float is above it.
6. Replace the sensor if necessary.

Disassembly, Assembly, and Inspection

1. After removing the brake fluid, disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all components and parts.
3. Assemble in the reverse order of removal, referring to **Assembly Note**.

Caution

a) Secure the master cylinder flange in a vise when necessary.
b) Replace the piston assembly, if necessary.
c) Do not let foreign material enter the cylinder, and do not scratch the inside of the cylinder or the outer surface of the piston.



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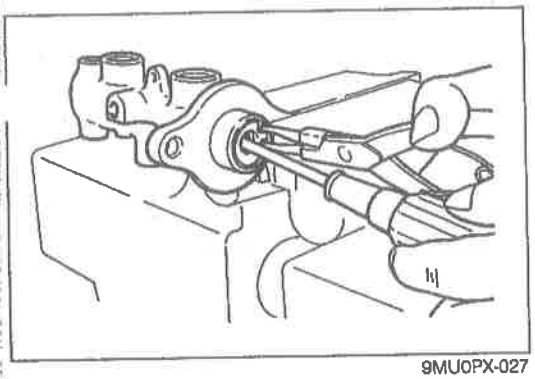
1. Fluid level sensor
2. Screw
3. Reserve tank assembly
   Inspect for damage or deformation
4. Bushings
5. Stopper screw and O-ring
   Assembly Note ..... page P–12
6. Snap ring
   Disassembly Note ..... page P–12
7. Primary piston assembly
   Inspect for abnormal wear, rust, or damage
8. Secondary piston assembly
   Disassembly Note ..... page P–12
   Inspect for abnormal wear, rust, or damage
9. Cylinder
   Inspect for abnormal wear, rust, or damage



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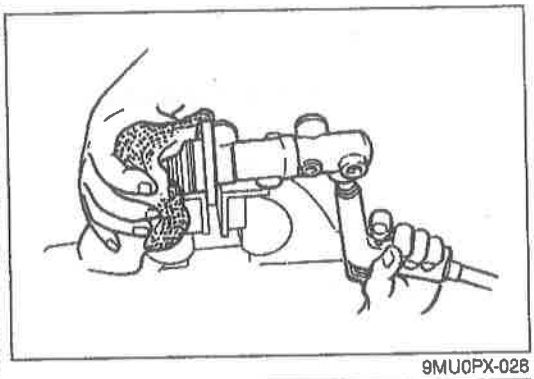
Disassembly note
Snap ring
Push the piston in to remove or install the snap ring with snap-ring pliers.



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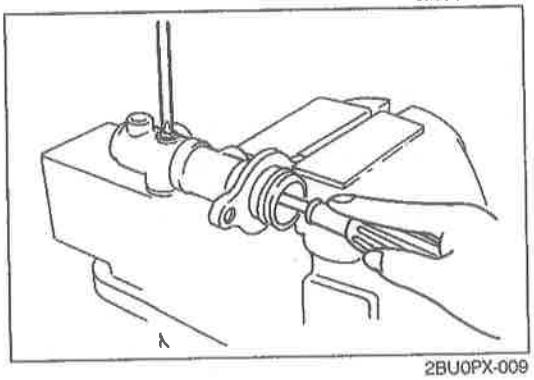
Secondary piston assembly
Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

Caution
Use a rag to catch the secondary piston assembly.



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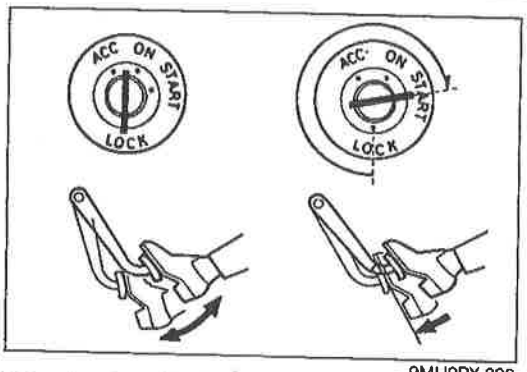
Assembly note
Stopper screw and O-ring
1. Push the primary piston assembly in fully.
2. Install and tighten the stopper screw and new O-ring.
3. Push and release the piston to verify that it is held by the stopper screw.



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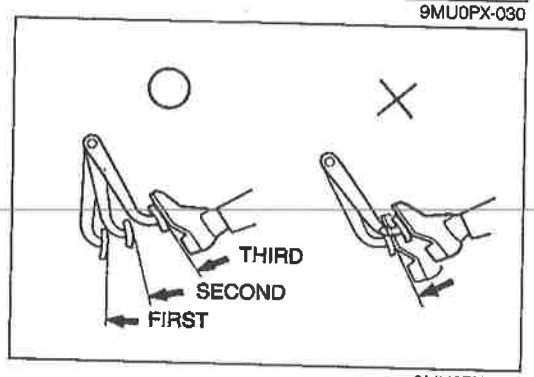

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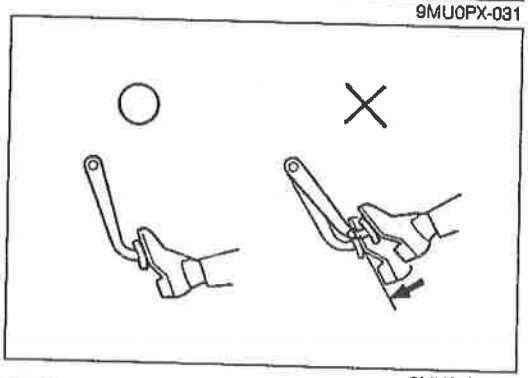
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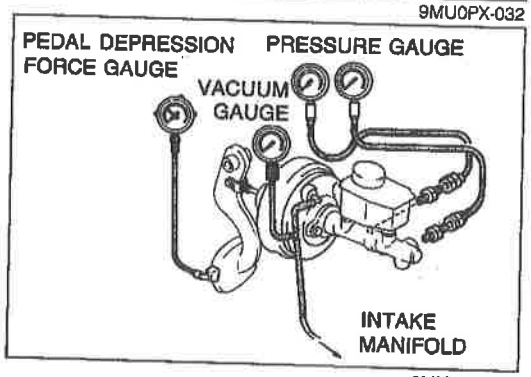

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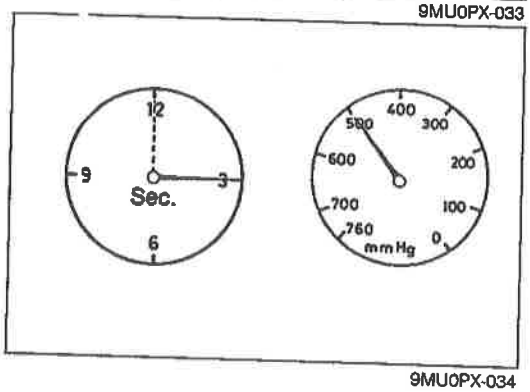

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POWER BRAKE UNIT

On-vehicle Inspection

Power brake unit function check (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 immediately after the engine starts the pedal moves down slightly, the unit is operating.

Step 2

1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
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 of the check valve or vacuum hose, and examine the installation. Repair if 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 held 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, check for damage to the check valve or vacuum hose, and check the connection. Repair if necessary, and check once again.

If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed check described in "Method-using tester," below.

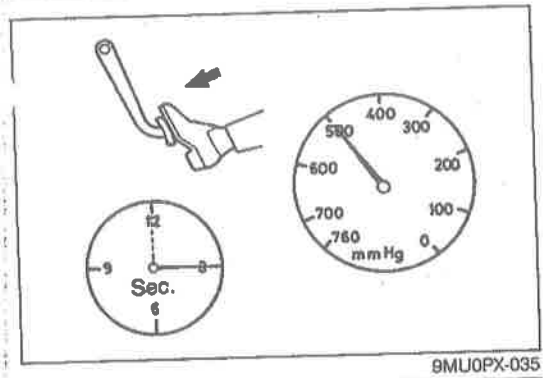
(Method-using tester)

Connect a pressure gauge, vacuum gauge, and pedal depression force gauge as shown in the figure. After bleeding the air from the pressure gauge, conduct the test as described in the 3 steps below.

Note
Use commercially available gauges and pedal depression force gauge.

a) Checking for vacuum loss
Unloaded condition

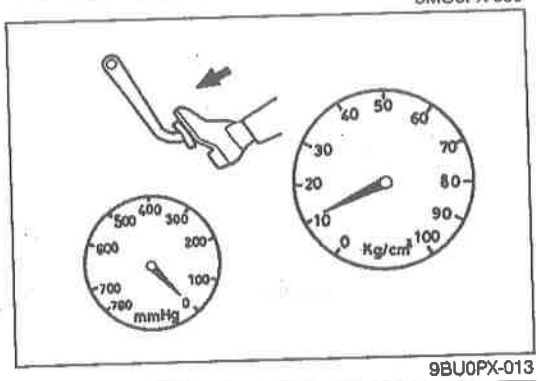
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.



9MU0PX-035

Loaded condition

1. Start the engine.
2. Depress the brake pedal with a force of **196 N (20 kg, 44 lb)**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.

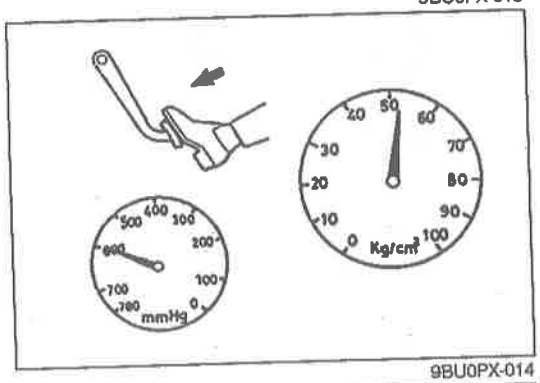


9BU0PX-013

b) Checking for hydraulic pressure

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

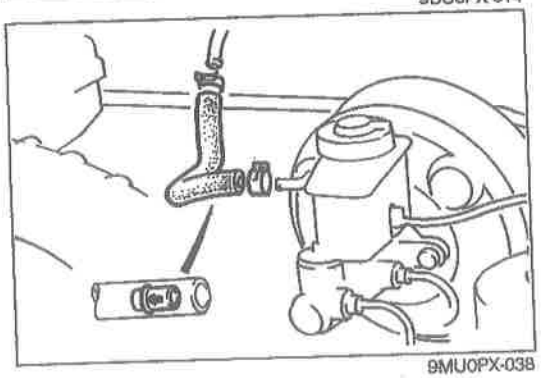
Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	1,962 kPa (20.0 kg/cm², 284 psi) min...Tandem 1,078 kPa (11.0 kg/cm², 156 psi) min...Single



9BU0PX-014

2. Start the engine. Depress the brake pedal when the vacuum reaches **500 mmHg (19.7 inHg)**. If the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	5,886 kPa (60.0 kg/cm², 853 psi) min...Tandem 5,390 kPa (55.0 kg/cm², 782 psi) min...Single



9MU0PX-038

Inspection of check valve

Note
The check valve is pressed into the vacuum hose. There is an arrow on the hose to indicate direction of hose installation.

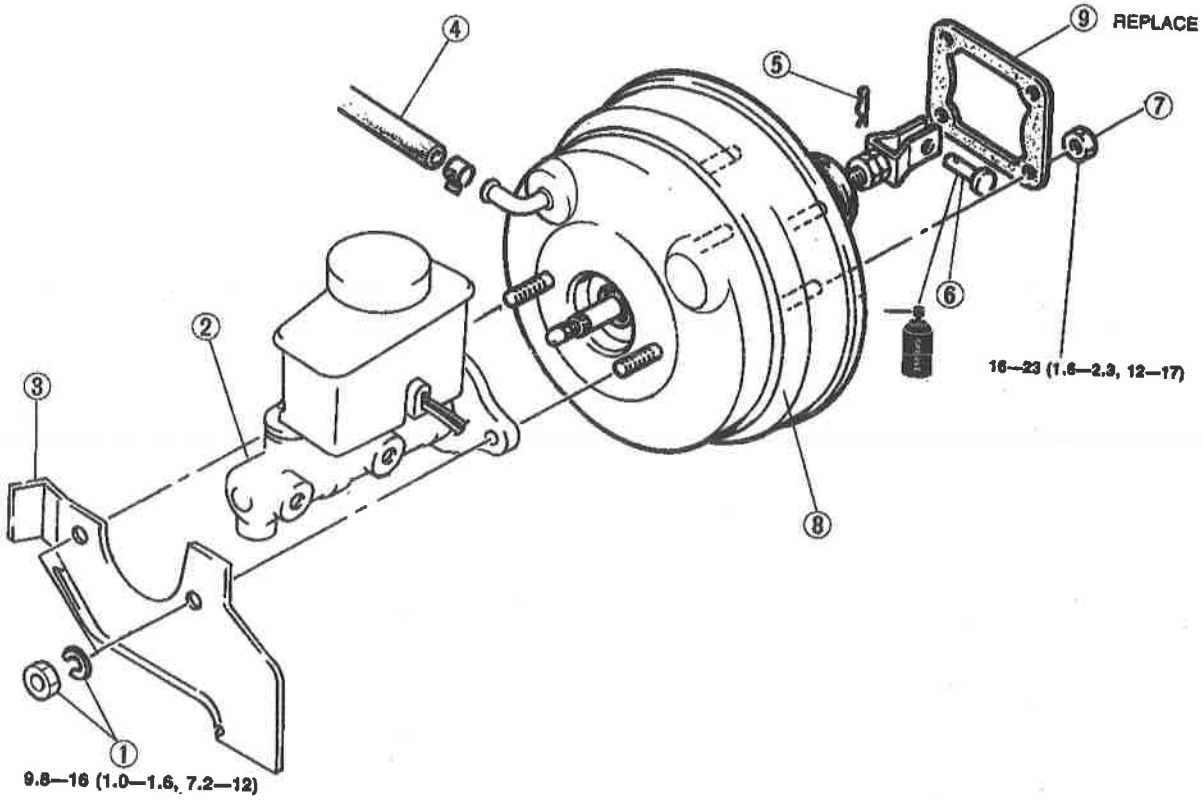
Inspection

1. Disconnect the vacuum hose from the engine.
2. Apply suction and pressure to the hose from the engine side. Check that air flows only toward the engine. If the air passes in both directions or not at all, replace the check valve (along with the hose).

Removal and Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.
3. Take the following steps after installation:
   (1) Check and adjust the push rod and piston clearance. (Refer to page P–10.)
   (2) Add fluid and bleed the air. (Refer to page P–5.)
   (3) Check all parts for fluid leakage.
   (4) Make an on-vehicle check of the unit. (Refer to page P–13.)
   (5) Check that the vacuum hose does not contact other parts.

Caution
Apply sealant to the gasket contact surface.



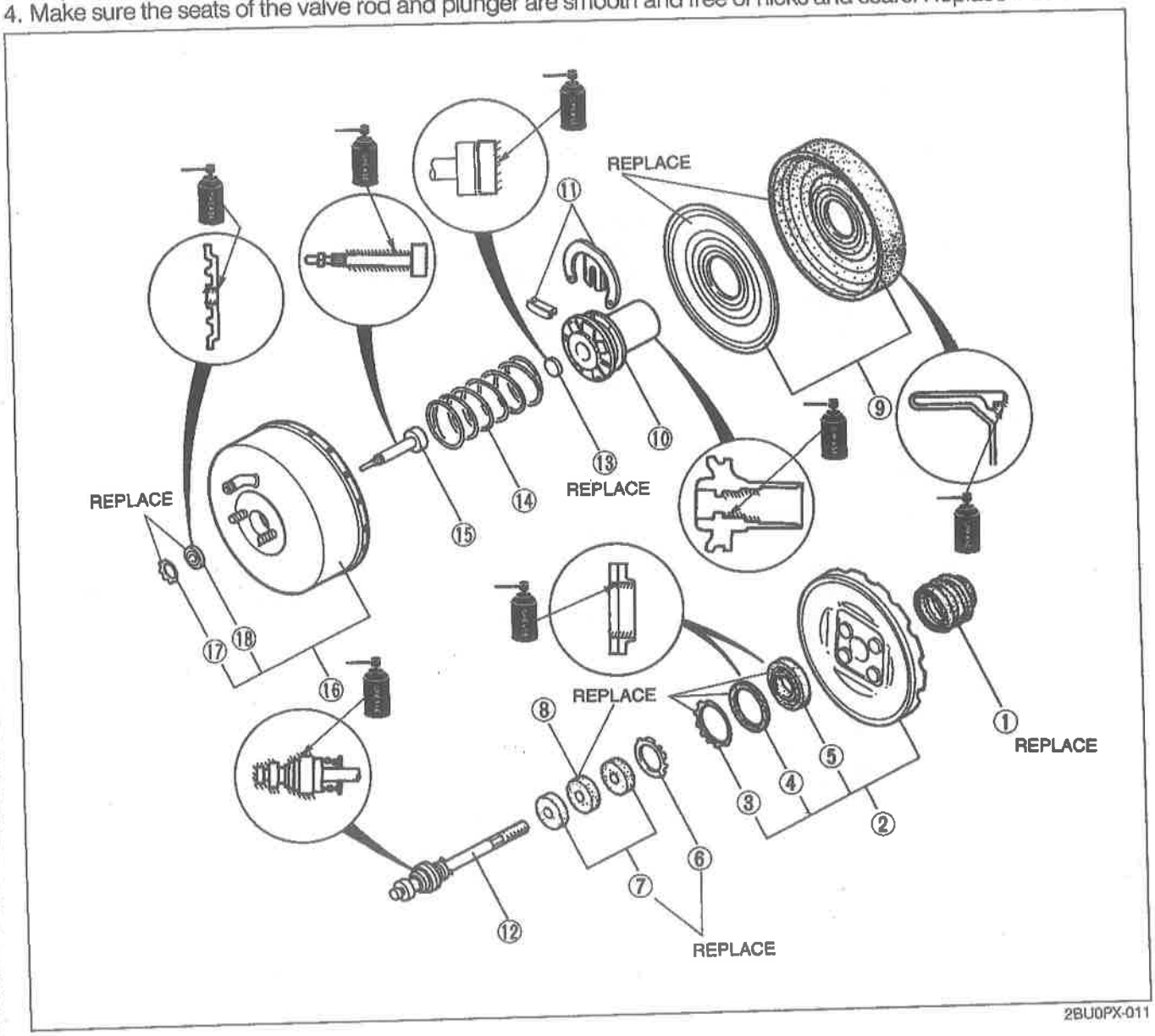
N-m (m-kg, ft-lb)
2BU0PX-010

1. Nuts and washers
2. Master cylinder
   Removal and Installation ..... page P–9
3. Proportioning bypass valve bracket
4. Vacuum hose
5. Cotter pin
6. Clevis pin
7. Nuts
8. Power brake unit
   Disassembly and Inspection
   (Single diaphragm, 4x2) ..... page P–16
   Assembly ..... page P–17
9. Gasket

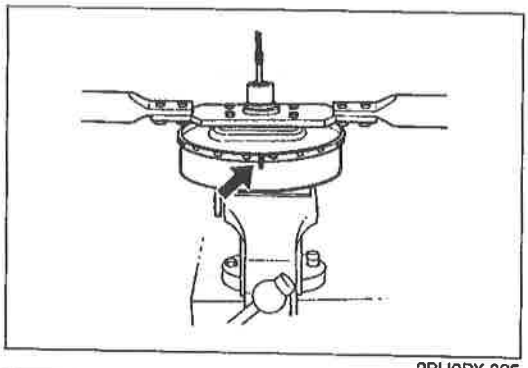
Note
Do not disassemble the tandem diaphragm power brake unit (4x4).

Disassembly and Inspection (Single diaphragm, 4x2)

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Wipe free of fluid and carefully inspect all rubber parts for cuts, nicks, or other damage.
3. Inspect all components and parts. Replace parts if necessary.
4. Make sure the seats of the valve rod and plunger are smooth and free of nicks and scars. Replace if defective.



1. Dust boot
2. Rear shell assembly
   Disassembly Note..... page P–17
   Inspect for scratches, scores, pits, dents, or other damage
3. Retainer
4. Bearing
5. Dust seal
6. Retainer
7. Air filter
8. Air silencer
9. Diaphragm and plate
   Inspect for cuts or other damage
10. Power piston assembly
    Inspect for cracks, distortion, chipping, or damaged seats
11. Retainer key
    Disassembly Note..... page P–17
12. Valve rod and plunger assembly
13. Reaction disc
    Inspect for deterioration
14. Spring
15. Push rod
16. Front shell assembly
    Inspect for scratches, scores, pits, dents, or other damage
17. Retainer
18. Seal

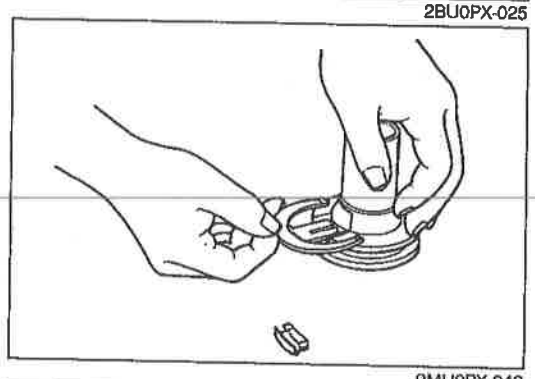


2BU0PX-025

Disassembly note
Rear shell assembly

1. Before separating the front and rear shells, make mating marks to be used in reassembly.
2. Fit a locally obtained spanner onto the studs of the rear shell, and rotate the rear shell counterclockwise to unlock it.

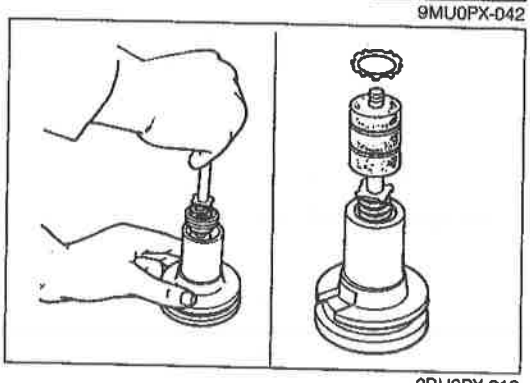
Caution
The rear shell is spring loaded; loosen it carefully.



9MU0PX-042

Retainer key
Press the valve rod in to remove the valve retainer key. Remove the valve rod and plunger assembly.

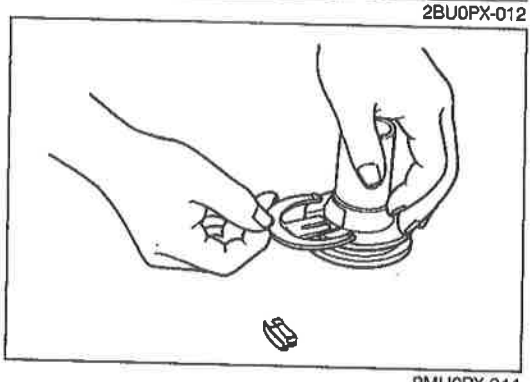
Caution
The valve rod and plunger must be serviced as an assembly.



2BU0PX-012

Assembly (4x2)

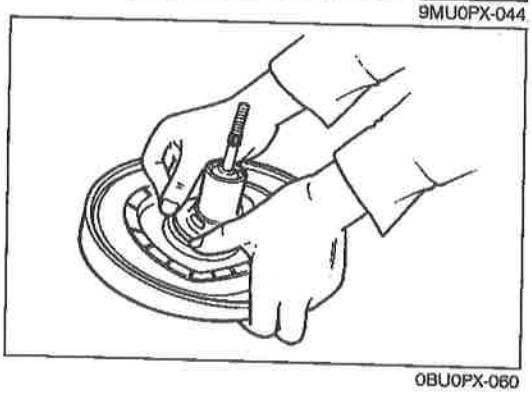
1. Install the valve rod and plunger assembly.
2. Install the new air filter and silencer.
3. Install a new retainer.



9MU0PX-044

4. Install the retainer key.

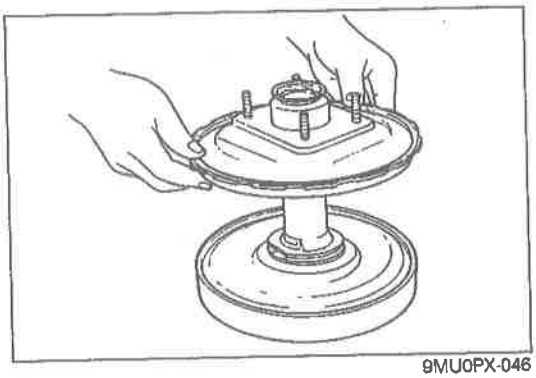
Caution
Push down the valve rod, align the groove in the valve plunger with the slot of the power piston, and insert the valve retainer key.



0BU0PX-060

5. Connect the new diaphragm to the power piston and new plate.

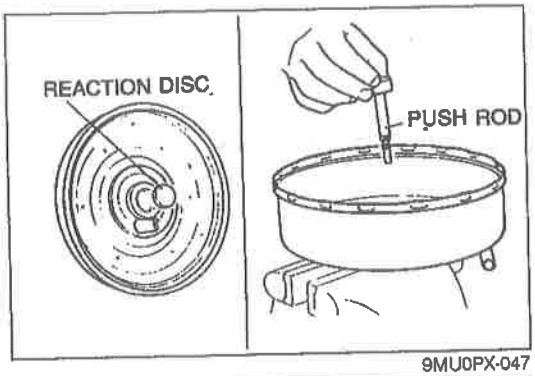
Caution
Make certain the diaphragm is well seated in the groove.



9MU0PX-046

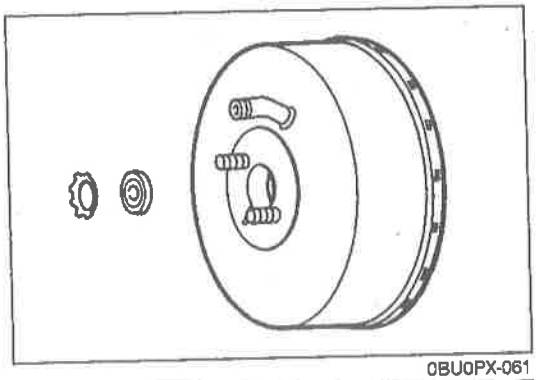
6. Assemble the rear shell assembly.

Caution
Carefully guide the tube end of the power piston through the seal in the rear shell.



9MU0PX-047

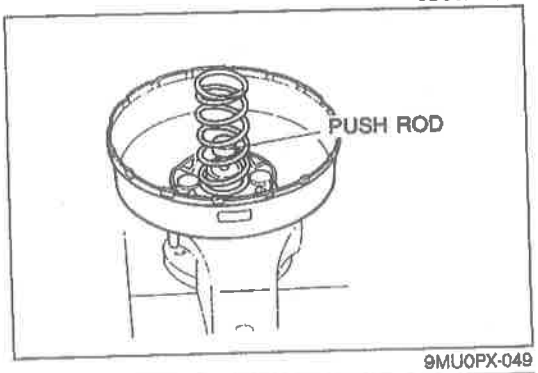
7. Push the reaction disc into the power piston with the push rod.



0BU0PX-061

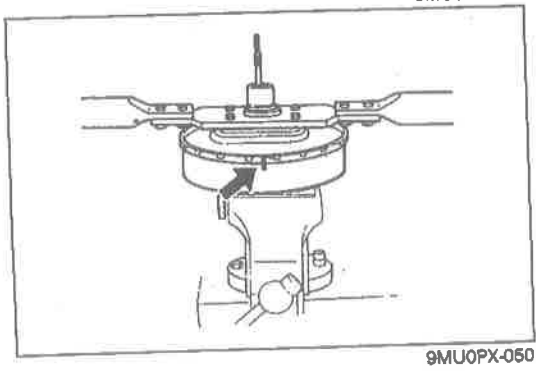
8. Put the new dust seal and new retainer into the front shell.

Caution
Place the front shell assembly in a vise to complete the following operations.



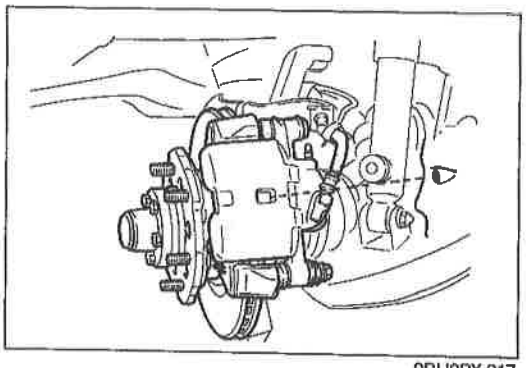
9MU0PX-049

9. Install the push rod.
10. Install the return spring.



9MU0PX-050

11. Press the rear shell down and rotate it clockwise until the matching marks are aligned.
12. Set the dust boot onto the rear shell.



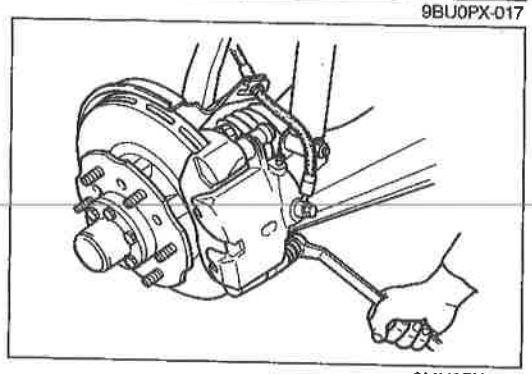
9BU0PX-017

FRONT BRAKE (DISC)

On-vehicle Inspection

Disc pad

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Sight through the caliper inspection hole and see if the remaining thickness of the pad is at least **3.0mm (0.118 in)**.



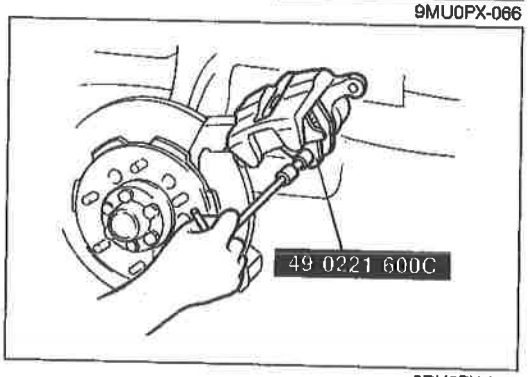
9MU0PX-066

Replacement

Disc pad

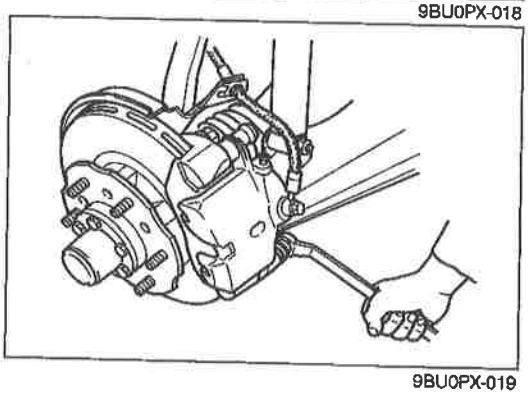
Caution
Replace the left and right pads as a set.

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Remove the lower lock-pin bolt; then lift the caliper and support it.



9BU0PX-018

4. Remove the pads.
5. Push the piston inward with the **SST**.
6. Install the new pads in the mounting support.



9BU0PX-019

7. Lower the caliper assembly onto the mounting support.
8. Tighten the lock bolt to the specified torque.

Tightening torque:
31—41 N·m (3.2—4.2 m-kg, 23—30 ft-lb)

9. Mount the wheels.

Caution
Apply the brakes 2—3 times. Rotate the wheels and check to see if the brakes drag.

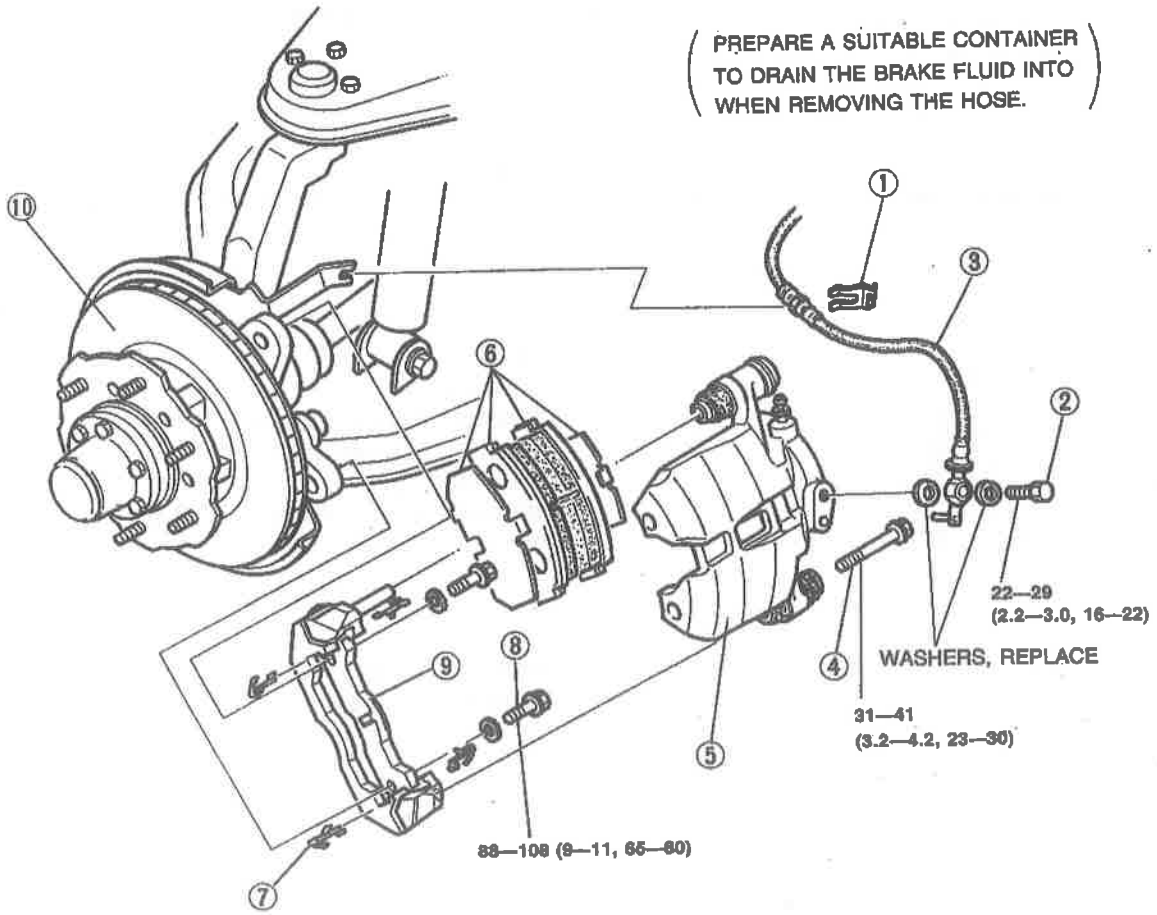
10. Lower the vehicle.

Removal and Installation

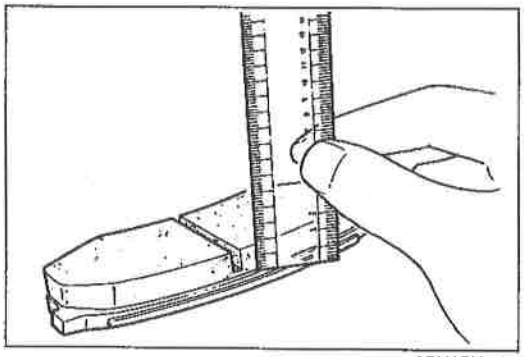
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels; then remove components in the order shown in the figure.
3. Install in the reverse order of removal.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.
5. After installation, add brake fluid, bleed air, and check for fluid leakage.
6. Install the wheels.

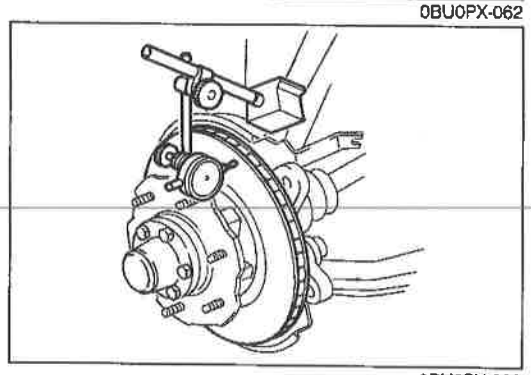
Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m-kg, 65—87 ft-lb)
Styled wheel ..... 118—147 N·m (12—15 m-kg, 87—108 ft-lb)

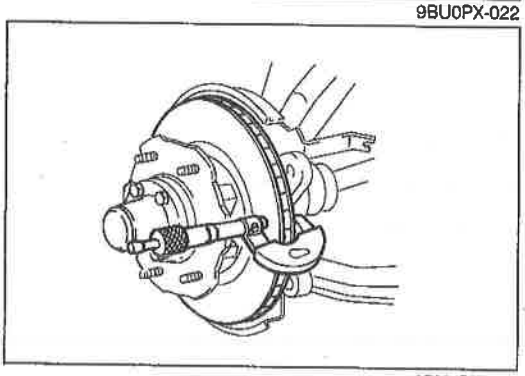
7. Lower the vehicle.

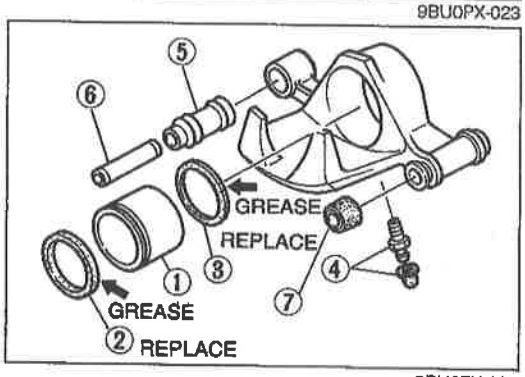


1. Clip
2. Bolt
3. Brake hose
4. Lock bolts
5. Brake caliper assembly
   - Disassembly ..... page P–21
   - Assembly ..... page P–22
6. Disc pad
   - Inspection ..... page P–21
7. Shims
8. Bolts
9. Mounting support
10. Disc plate
    - Removal and Installation ..... Section M
    - Inspection ..... page P–21

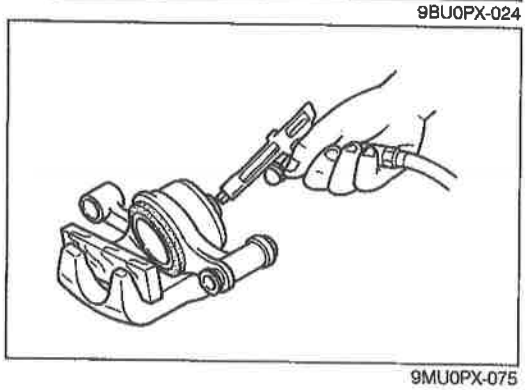

0BU0PX-062


9BU0PX-022


9BU0PX-023



9BU0PX-024


9MU0PX-075

Inspection
Check the following and replace parts as necessary.

Disc pad
1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or damage by heat
4. Remaining lining thickness

Thickness: 3.0mm (0.118 in) min.

Disc plate
1. Runout.

Runout: 0.15mm (0.006 in) max.

Caution
a) There must be no wheel bearing looseness.
b) The measurement location is the outer edge of the disc plate surface.

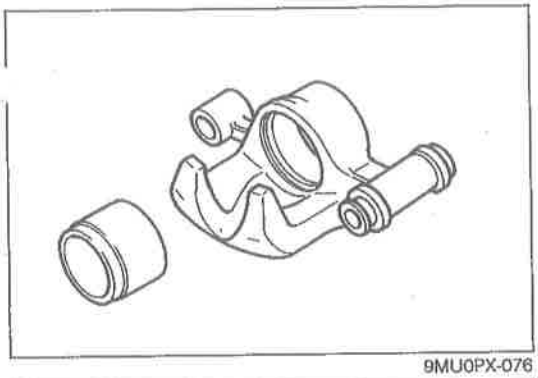
2. Wear or damage.

Thickness
4x4 model
Standard value: 22mm (0.87 in)
Minimum: 20mm (0.79 in)
4x2 model
Standard value: 20mm (0.79 in)
Minimum: 18mm (0.71 in)

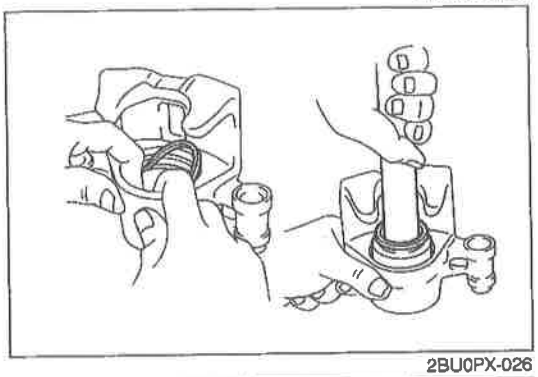
Disassembly (Caliper)
Disassemble in the order shown in the figure, referring to **Disassembly note**.
1. Piston
2. Dust seal
3. Piston seal
4. Bleeder screw and cap
5. Pin boot
6. Pin
7. Bushing

Disassembly note
Piston
Place a piece of wood in the caliper; then blow compressed air through the hole to force the piston out of the caliper.

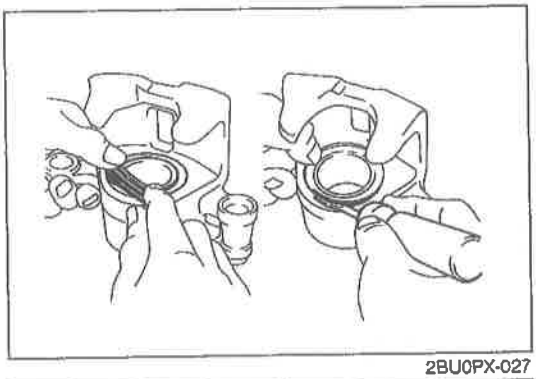
Caution
Blow the compressed air slowly to prevent the piston from popping out.


9MU0PX-076

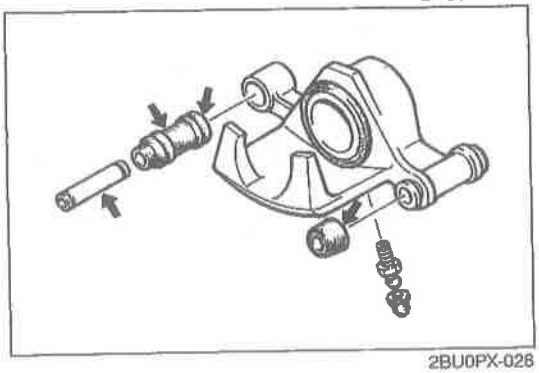
Inspection (Caliper)
Inspect each part; if necessary replace parts.
1. Cylinder and piston for wear or rust
2. Caliper body for damage or cracks
3. Boot for damage or poor sealing


2BU0PX-026

Assembly (Caliper)
1. Coat a new piston seal with the grease supplied in the seal kit; then install it in the caliper.


2BU0PX-027

2. Coat the piston and the cylinder with brake fluid and insert the piston squarely into the cylinder.
3. Coat a new dust seal with the grease supplied in the seal kit; then install it in the caliper.


2BU0PX-028

4. Coat the following parts with pink grease.
   (1) Pin (outside).
   (2) Pin boot (inside and outside)
   (3) Bushing (inside)
   (4) Bleeder screw cap (inside)

   Tightening torque:
   6—9 N·m (60—90 cm-kg, 52—78 in-lb)

5. Install the bleeder screw and cap.
6. Fit the pin boot and pin to the caliper, and fit the bushing to the lock pin.

REAR BRAKE (DRUM, 4x4)

Removal, Installation, and Inspection

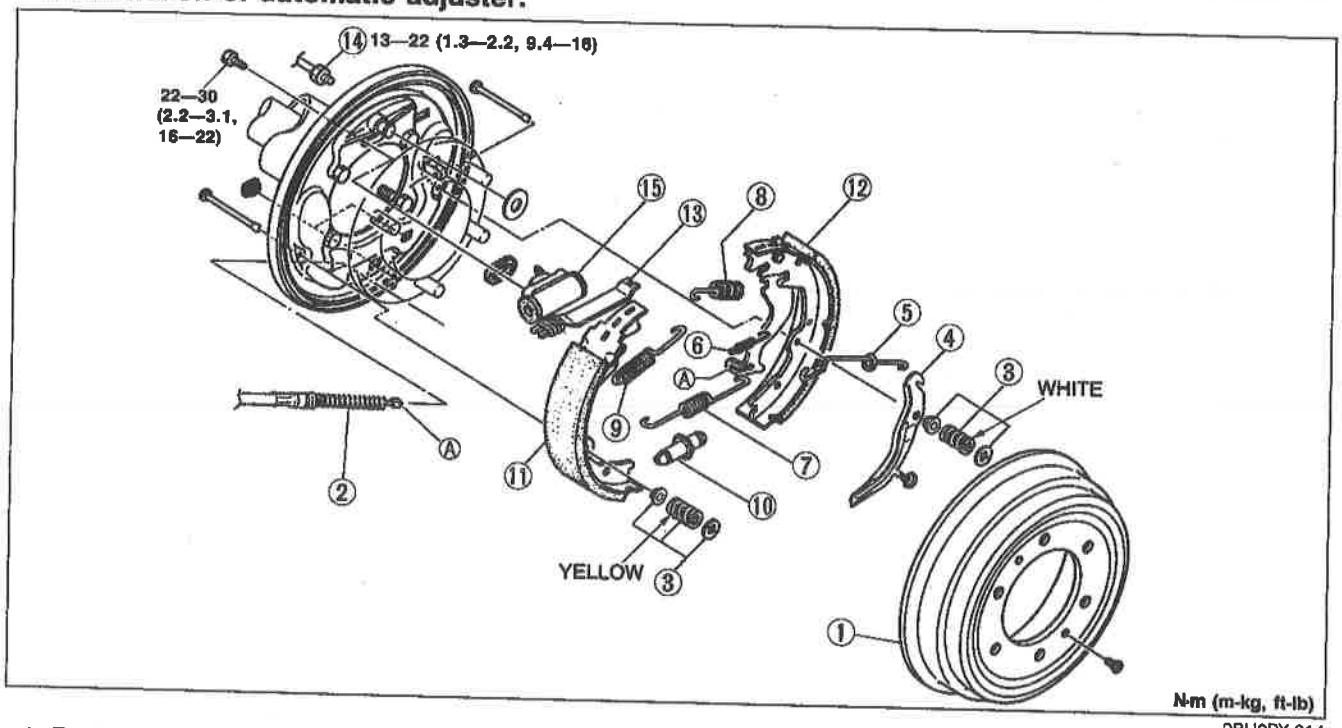
1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels and remove the brakes in the order shown in the figure, referring to **Removal Note**.
3. Inspect all components and parts. Replace parts if necessary.
4. Install in the reverse order of removal.
5. After installation, add brake fluid, bleed the air, and check for fluid leakage.
6. Install the wheels.

Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m-kg, 65—87 ft-lb)
Styled wheel ..... 118—147 N·m (12—15 m-kg, 87—108 ft-lb)

7. Lower the vehicle.
8. Adjust the parking lever stroke. (Refer to page P–31.)

Note
Before removal, release the parking brake.

Caution
There are identification marks in the hold springs because they are different between the primary side and secondary side. Use correct hold springs for each side, otherwise, it may cause the malfunction of automatic adjuster.

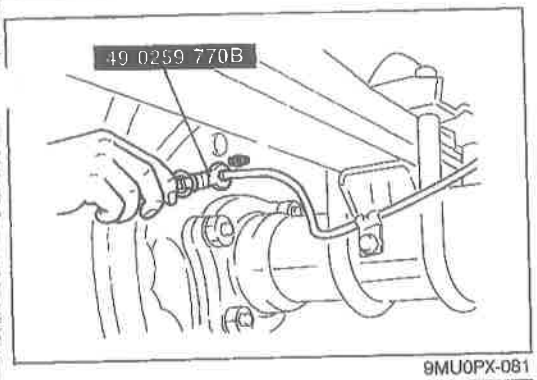


2BU0PX-014

1. Brake drum
   Inspection ..... page P–24
2. Parking brake cable
3. Hold spring and sleeve, pin

Caution
Primary side ..... Yellow
Secondary side ..... White

4. Adjust lever
5. Link
6. Pull-off spring
7. Shoe spring
8. Return spring
9. Return spring
10. Adjuster
11. Primary brake shoe
    Inspection ..... page P–24
    Adjustment of brake shoes ..... page P–25
12. Secondary brake shoe
    Inspection ..... page P–24
    Adjustment of brake shoes ..... page P–25
13. Strut
14. Brake pipe
    Removal Note ..... page P–24
15. Wheel cylinder assembly
    Disassembly, Assembly and Inspection ..... page P–26



9MU0PX-081

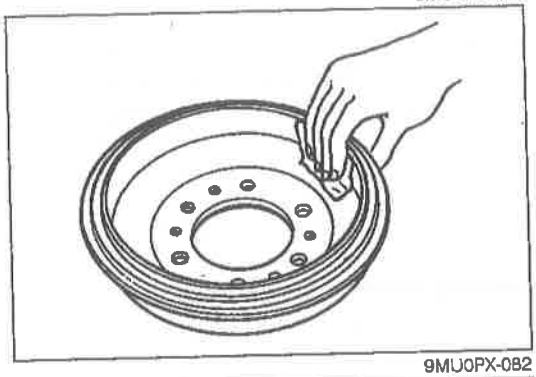
Removal note
Brake pipe
Disconnect or connect the brake pipe from/to the wheel cylinder with the **SST**.

Tightening torque:
13—22 N·m (1.3—2.2 m-kg, 9.4—16 ft-lb)

Inspection
Check for the following and repair or replace parts as necessary.

Brake drum
1. Scratches, uneven or abnormal wear inside drum

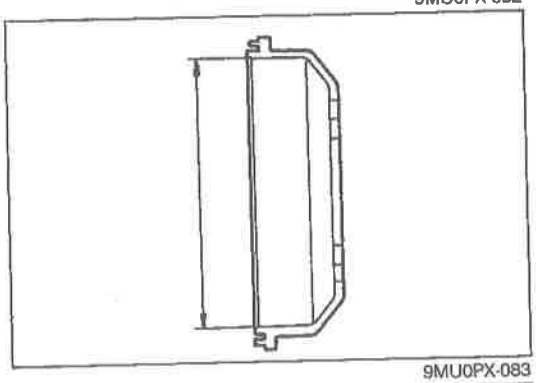
Note
Repair if the problem is minor.


9MU0PX-082

2. Drum inner diameter

Standard diameter: 260mm (10.24 in)
Diameter limit: 261.5mm (10.30 in)

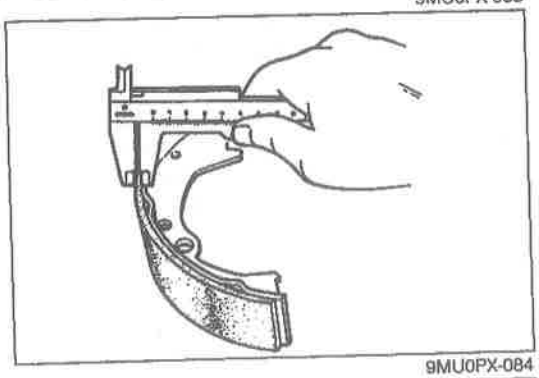
Caution
When repairing or replacing the drum, check the contact with the shoe.


9MU0PX-083

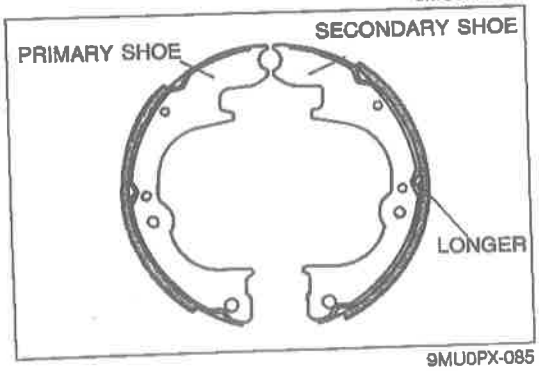
Brake shoe
1. Peeling, cracking, or extremely uneven wear of lining
2. Lining wear

Thickness: 1.0mm (0.04 in) min.

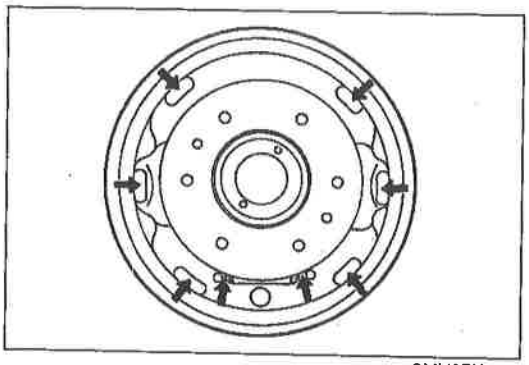
Caution
When replacing the shoe assembly, replace as a set and with shoes of the same quality.


9MU0PX-084

Installation note
Brake shoe
When installing the brake shoes, be careful not to confuse the primary and secondary shoes.



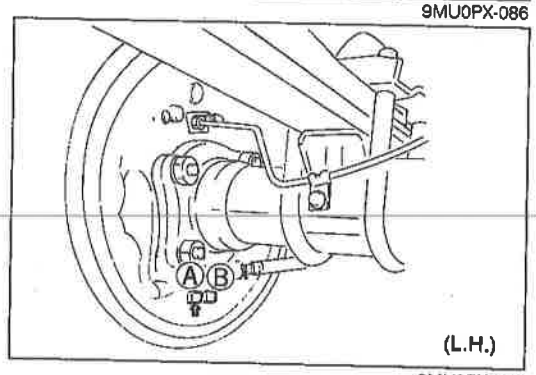
9MU0PX-085



9MU0PX-086

Grease points

(1) Piston of wheel cylinder
(2) Anchor sliding parts
(3) Projection of backing plate
(4) Adjusting screw
(5) Adjusting sleeve contact surfaces



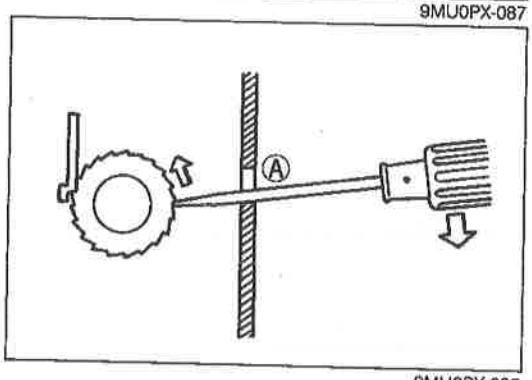
9MU0PX-087

Adjustment of brake shoes

The rear brakes are self-adjusting and require a manual adjustment only after the brake shoes have been replaced or when the operating lever has been moved during some other service operation.

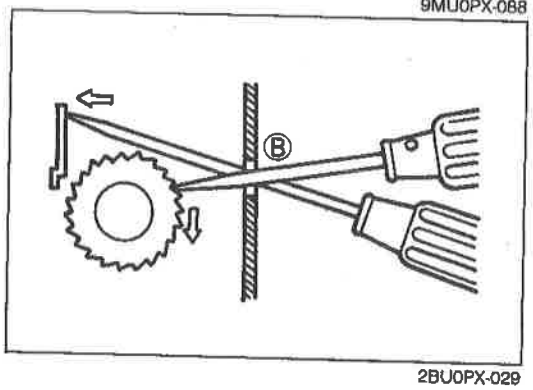
To adjust the rear brake shoes, proceed as follows:

1. Jack up the rear of the vehicle until the wheels are free to turn. Then support it with safety stands.
2. Make sure the parking brake is fully released.
3. Remove the two hole plugs from the backing plate.



9MU0PX-088

4. Place a screwdriver against the adjuster through hole Ⓐ and turn the adjuster in the direction of the arrow marked on the backing plate until the wheel is locked.



2BU0PX-029

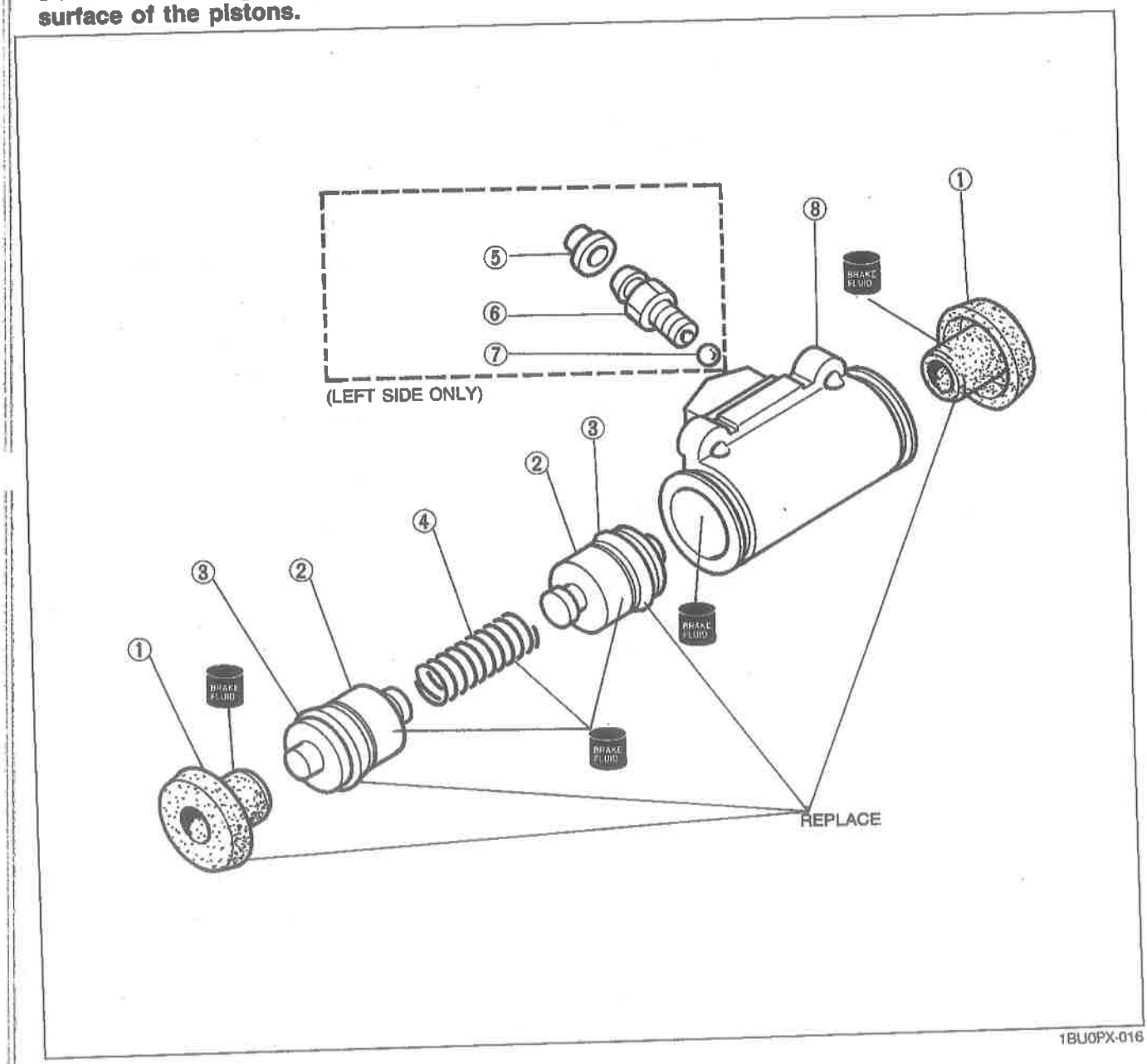
5. Using hole Ⓑ, push the pawl lever of the self-adjuster and back off the star wheel about **8—10 notches** so that the drum rotates freely without drag.
6. Repeat the above adjustment on the other rear wheel. The adjustment must be the same on both rear wheels.
7. Adjust the parking lever stroke. (Refer to page P–31.)
8. Install the hole plugs into the backing plate.

Disassembly, Assembly, and Inspection (Wheel cylinder)

1. Disassemble in the order shown in the figure.
   Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

Note
a) Use a new boot set.
b) Apply brake fluid to the points shown in the figure.

Caution
Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.



1. Dust boot
2. Piston
   Inspect for wear of contact surface
3. Piston rubber cup
4. Spring
   Inspect for wear or breaks
5. Rubber cap
6. Bleeder screw
7. Steel ball
8. Wheel cylinder
   Inspect for wear, rust, or damage

REAR BRAKE (DRUM, 4x2)

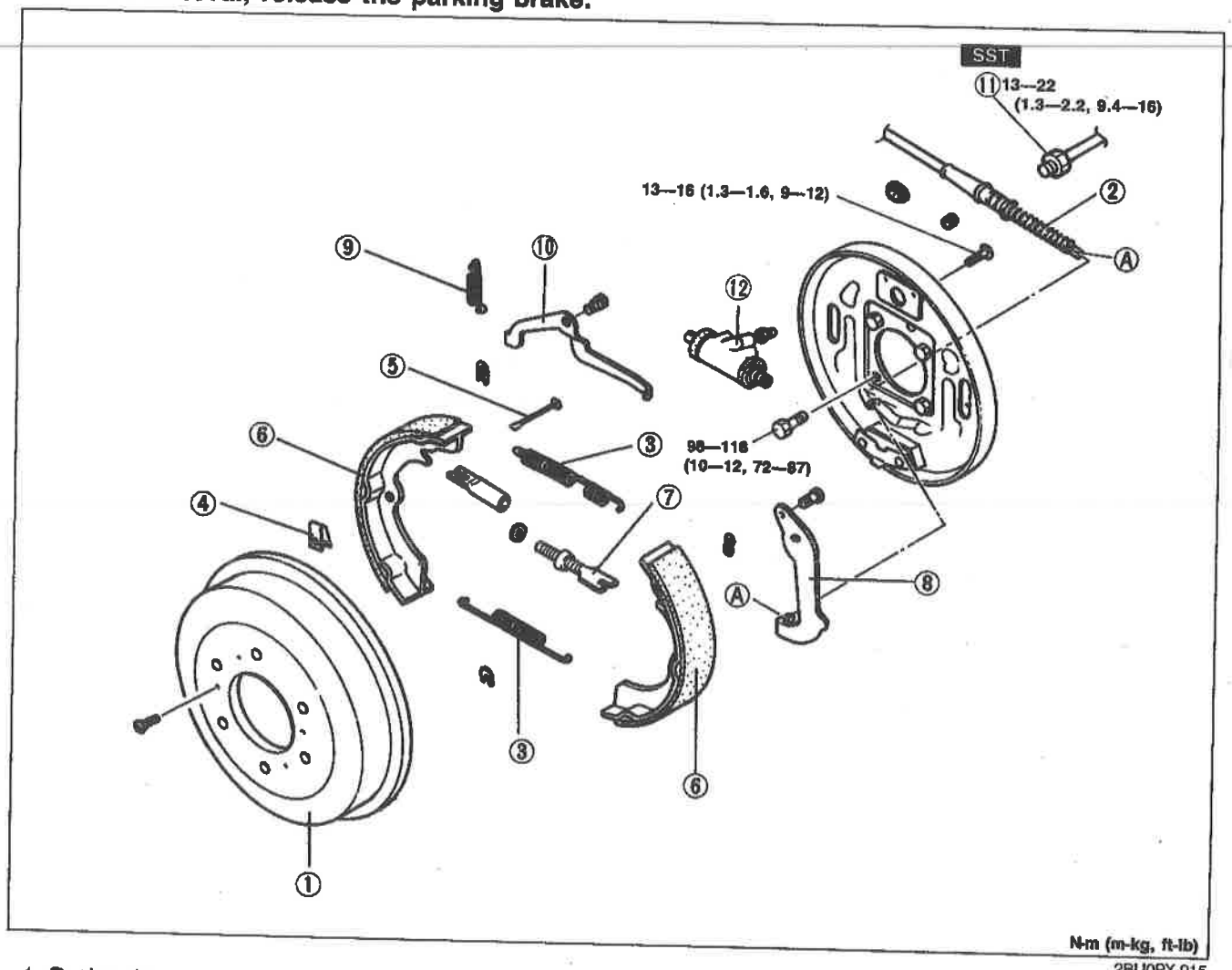
Removal, Installation, and Inspection

1. Jack up the rear of the vehicle, and support it with safety stands.
2. Remove the wheels, then the rear drum brakes in the sequence shown in the figure.
3. Inspect all components and parts. Replace parts if necessary.
4. Install in the reverse order of removal.
5. After installation, add brake fluid and bleed the air; then check for fluid leakage.
6. Install the wheels.

Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m-kg, 65—87 ft-lb)
Styled wheel ..... 118—147 N·m (12—15 m-kg, 87—108 ft-lb)

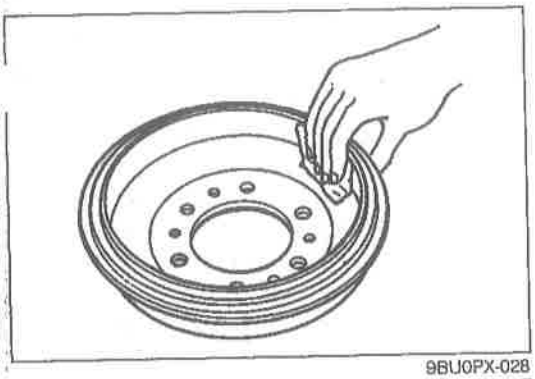
7. Lower the vehicle.
8. Adjust the parking brake lever stroke. (Refer to page P–31.)

Note
Before removal, release the parking brake.



2BU0PX-015

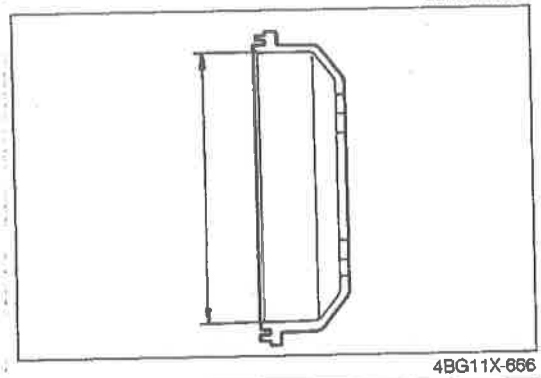
1. Brake drum
   Inspection..... page P–28
2. Parking brake cable
3. Return spring
4. Brake shoe spring
5. Brake shoe pin
6. Brake shoe
   Inspection..... page P–28
   Brake shoe adjustment..... page P–28
7. Adjust screw
8. Operating lever
9. Pawl lever return spring
10. Pawl lever
11. Brake pipe
    Removal Note.. page P–24
12. Wheel cylinder assembly
    Disassembly, Assembly and Inspection
    ..... page P–29


9BU0PX-028

Inspection
Inspect for the following problems, and repair or replace any faulty parts.

Brake drum
1. Scratches and uneven or abnormal wear inside the drum.

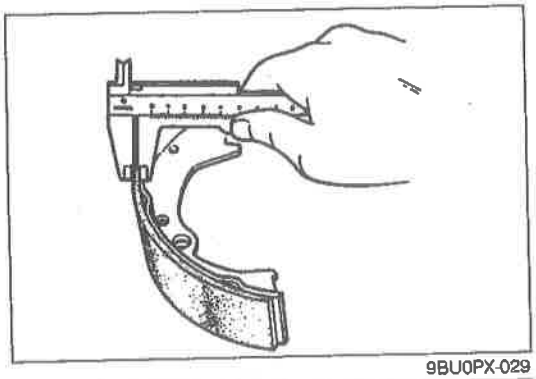
Note
Repair if the problem is minor.


4BG11X-666

2. Drum inner diameter

Standard diameter: 260mm (10.24 in)
Diameter limit : 261.5mm (10.30 in)

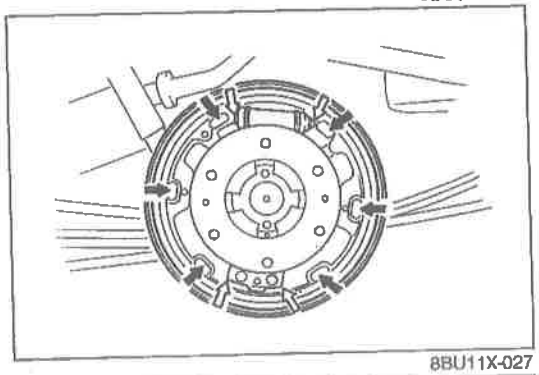
Caution
When repairing or replacing the drum, examine the contact with the shoe.


9BU0PX-029

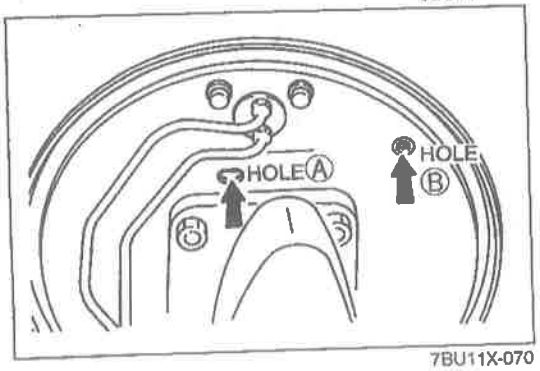
Brake shoe
1. Peeling, cracks, and extremely uneven wear of the lining.
2. Wear of the lining.

Thickness limit: 1.0mm (0.04 in)

Caution
When replacing the shoe assembly, replace it as a set and with an assembly of the same quality.

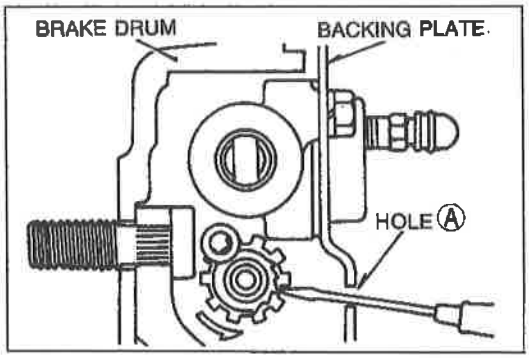

8BU11X-027

Grease points
Before installation, apply grease to the wheel cylinder and anchor sliding parts (⇨), the projections of the backing plate (➡).



7BU11X-070

Brake Shoe Adjustment
To adjust the rear brake shoes, proceed as follows:
1. Jack up the rear of the vehicle until the wheels are free to turn. Then support it with stands.
2. Make sure the parking brake is fully released.
3. Remove the two shoe-adjusting hole plugs from the back of the backing plate.



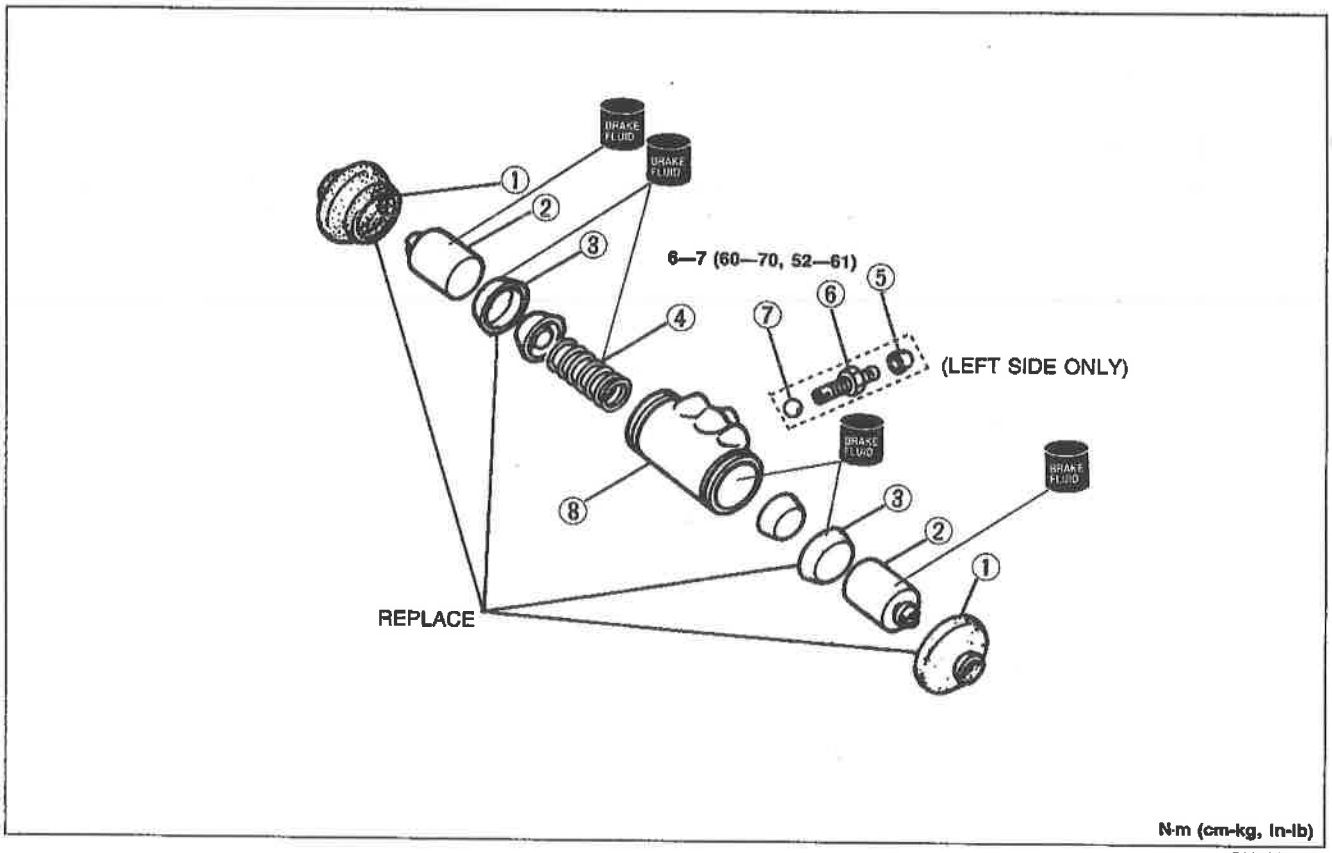
2BU0PX-030

4. Place a screwdriver against the star wheel of the adjust screw through hole Ⓐ, and turn the star wheel toward the arrow direction (⬅) marked on the backing plate until the wheel is locked.
5. Through hole Ⓑ, push the pawl lever of the self-adjuster with a suitable drift, and back off the star wheel about **6—7 notches** so that the drum rotates freely without drag.
6. Repeat this adjustment on the other rear wheel. The adjustment must be the same on both rear wheels.
7. Adjust the parking lever stroke. (Refer to page P–31.)
8. Install the adjusting hole plugs into the backing plate.

Disassembly, Assembly, and Inspection (Wheel cylinder)
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

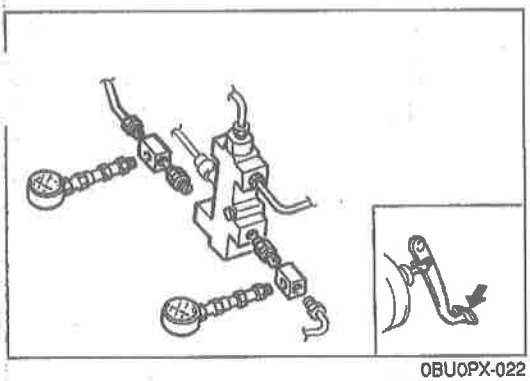
Note
a) Use a new boot set.
b) Apply brake fluid to the points shown in the figure.

Caution
Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.

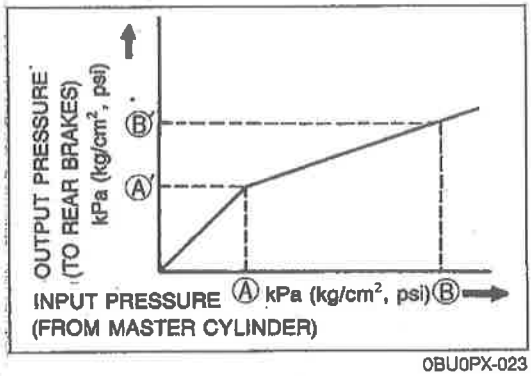


1BU0PX-019

1. Dust boot
2. Piston
   Inspect for wear of contact surface
3. Piston rubber cup
4. Spring
   Inspect for wear or breaks
5. Rubber cap
6. Bleeder screw
7. Steel ball
8. Wheel cylinder
   Inspect for wear, rust, or damage



0BU0PX-022



0BU0PX-023

PROPORTIONING BYPASS VALVE (PBV)

Function Check

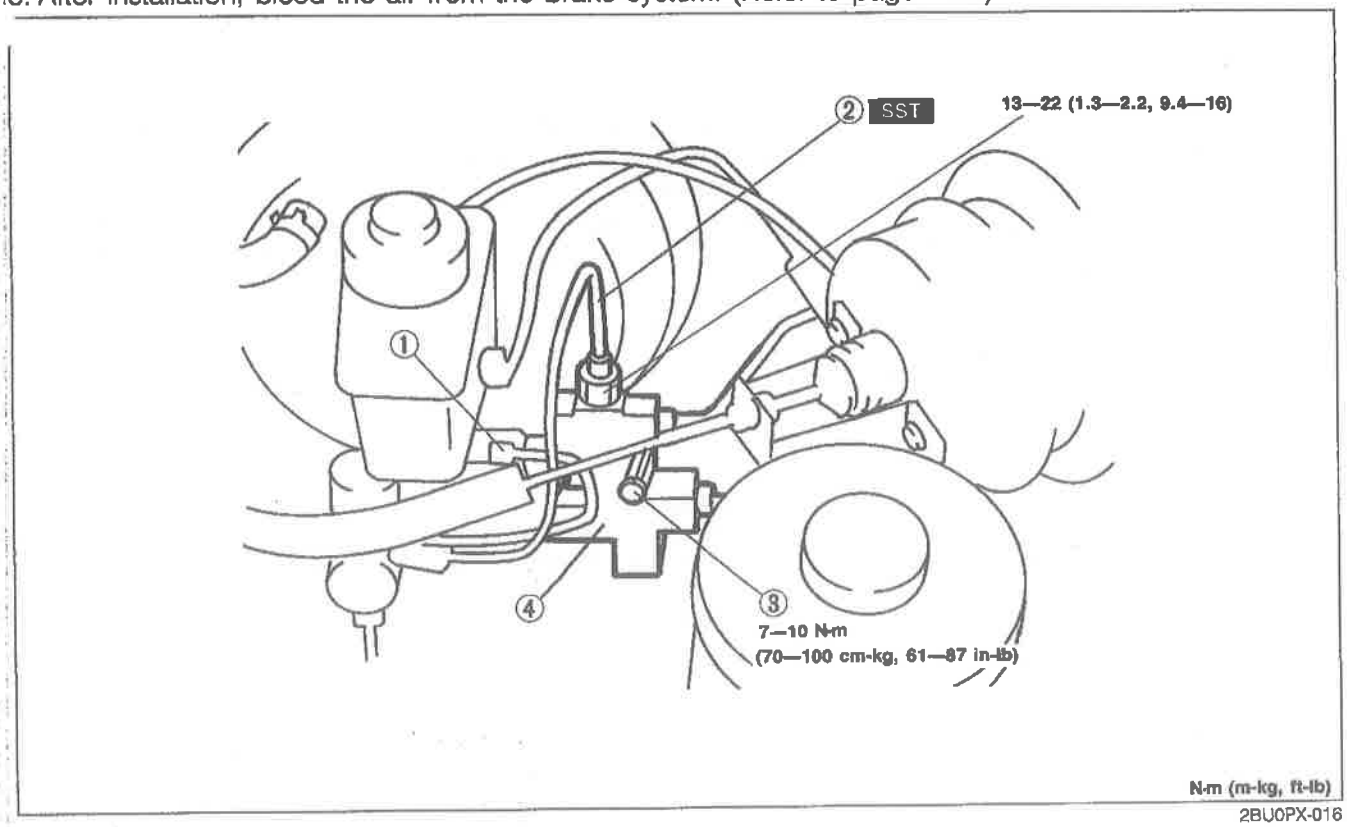
As shown in the figure, connect two pressure gauges (**9,810 kPa [100 kg/cm², 1,422 psi]**), depress the brake pedal, and measure the fluid pressure of the master cylinder and the fluid pressure to the rear brakes.

Fluid pressure kPa (kg/cm², psi)			
A	A'	B	B'
3,826 (39,555)	3,826 ± 294 (39 ± 3.0, 555 ± 43)	7,848 (80, 1,138)	6,180 ± 294 (63 ± 3.0, 896 ± 43)

Caution
If there is a malfunction of the valve, replace it as an assembly.

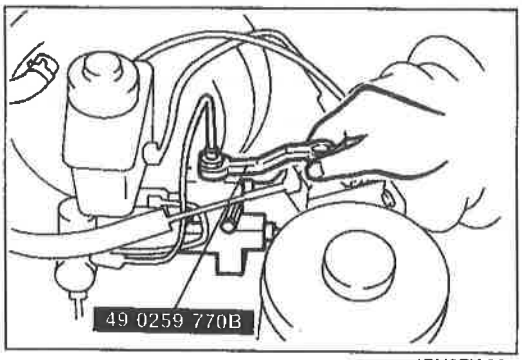
Removal and Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal.
3. After installation, bleed the air from the brake system. (Refer to page P–5.)



2BU0PX-016

1. Pressure differential switch coupler
2. Brake pipes
   Removal Note..... page P–31
3. Bolt
4. Propotioning bypass valve



1BU0PX-021

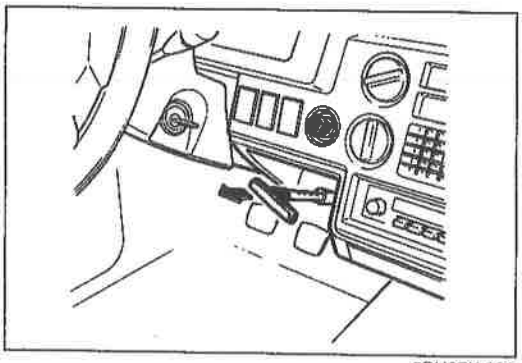
Removal note
Brake pipes
Disconnect or connect the brake pipes from/to the proportioning bypass valve with the **SST**.

PARKING BRAKE SYSTEM

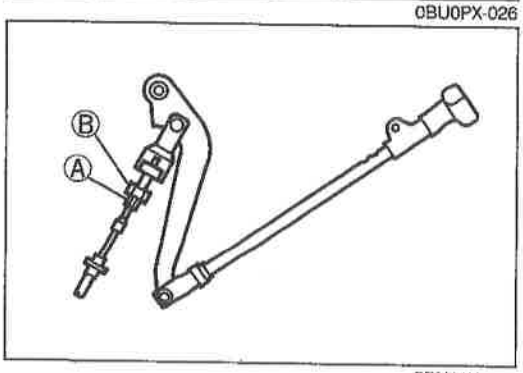
TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Brakes do not release	Improper return of parking brake cable or improper adjustment	Repair or adjust	P–31
Parking brake does not hold well	Excessive lever stroke Brake cable stuck or damaged Brake fluid or oil on lining Hardening of lining surface or poor contact	Adjust Repair or replace Clean or replace Grind or replace	P–31 P–33,34 P–23,27 P–23,27

1BU0PX-022



0BU0PX-026



7BU11X-012

PARKING BRAKE LEVER
On-vehicle Inspection
Inspection
Check that the stroke is within specification when the parking brake lever is pulled with a force of **196 N (20 kg, 44 lb)**.

Stroke: 7—12 notches

Adjustment
1. Before adjustment, depress the brake pedal several times while the vehicle is moving in reverse.
2. Loosen locknut Ⓐ and turn the adjusting nut Ⓑ so that the stroke is within the above range.
3. After adjustment, tighten locknut Ⓐ.

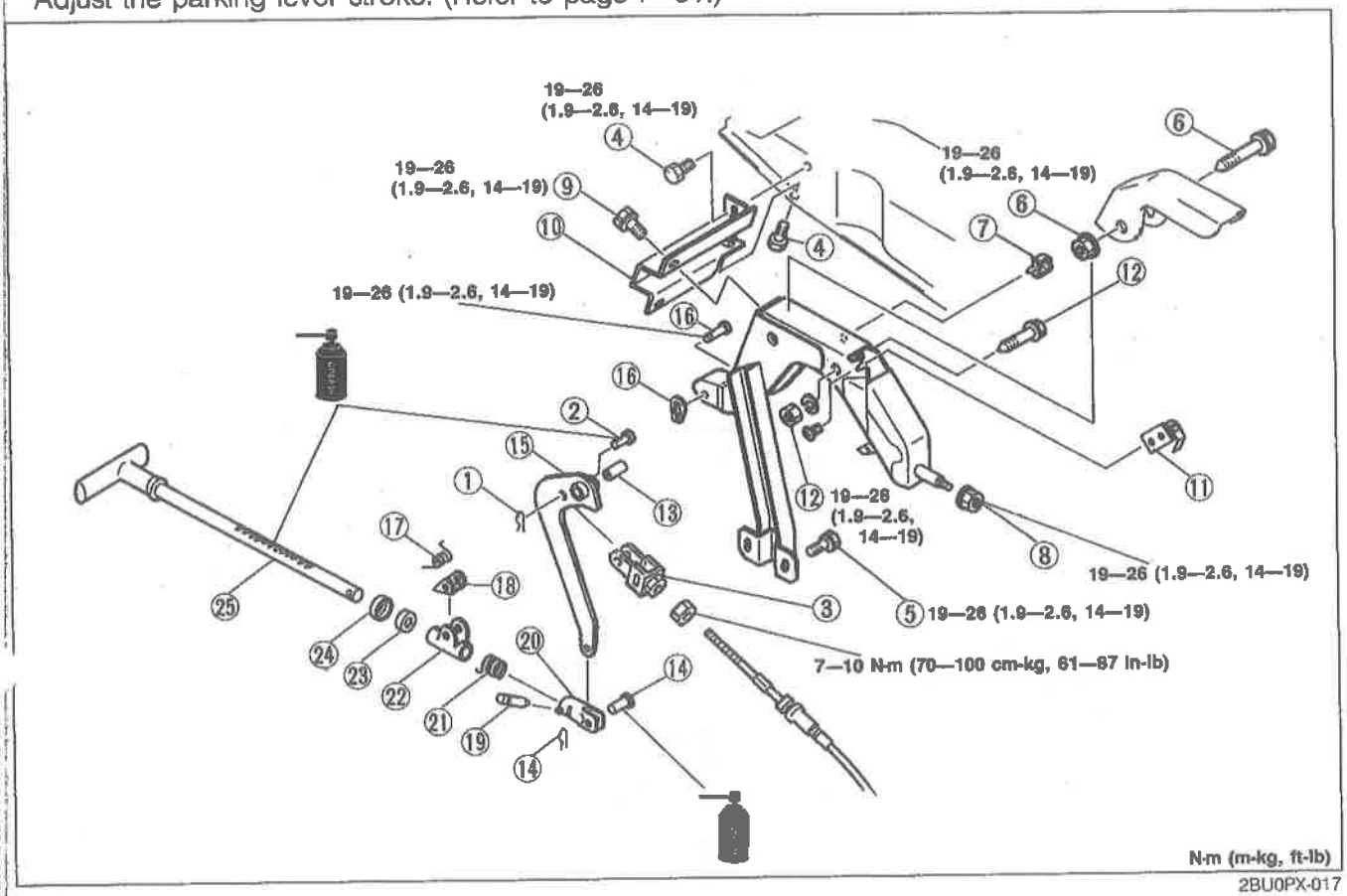
Tightening torque:
7—10 N·m (0.7—1.0 m-kg, 5—7 ft-lb)

4. Make sure that the parking brake warning light illuminates when the brake lever is pulled one notch.

Caution
Be sure that the brakes are not dragging.

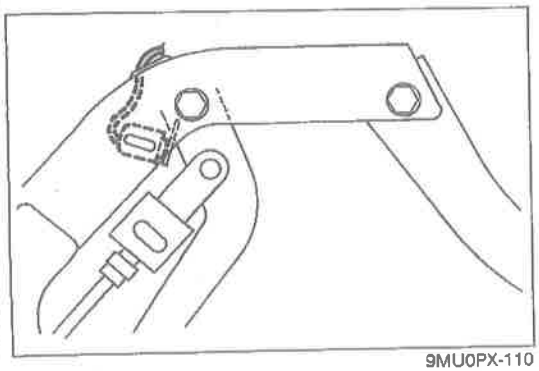
Removal, Installation, and Inspection

1. Block the wheels firmly.
2. Release the parking brake.
3. Remove in the order shown in the figure.
4. Inspect all components and parts. Replace parts if necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. After installation:
   Adjust the parking lever stroke. (Refer to page P–31.)



2BU0PX-017

1. Clip
2. Joint pin
3. Parking cable connector
4. Bolt
5. Bolt
6. Bolt and nut
7. Harness band connector
8. Nut
9. Bolt
10. Bracket
11. Parking-brake switch
    Installation Note.....below
12. Bolt and nut
13. Pin
14. Clip and joint pin
15. Lever
16. Pin and clip
17. Spring
18. Ratchet pawl
19. Stopper
20. Fork joint
21. Spring
    Inspect for weakness or breakage
22. Guide
23. Stopper
24. Stopper seat
25. Rod
    Inspect sector and ratchet pawl for wear or damage



9MU0PX-110

Installation note

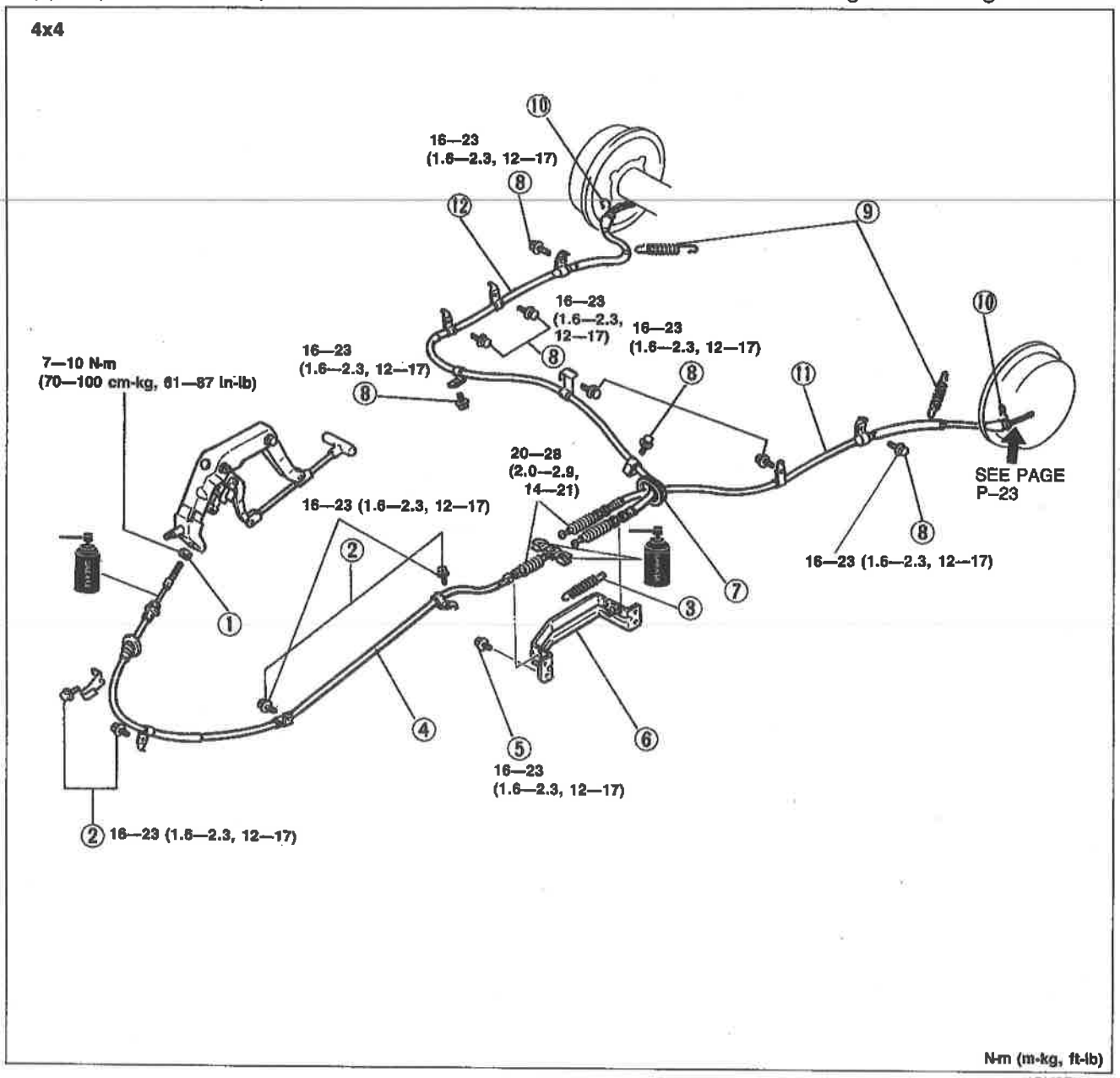
Parking brake switch

1. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever pulled one notch.

PARKING BRAKE CABLE

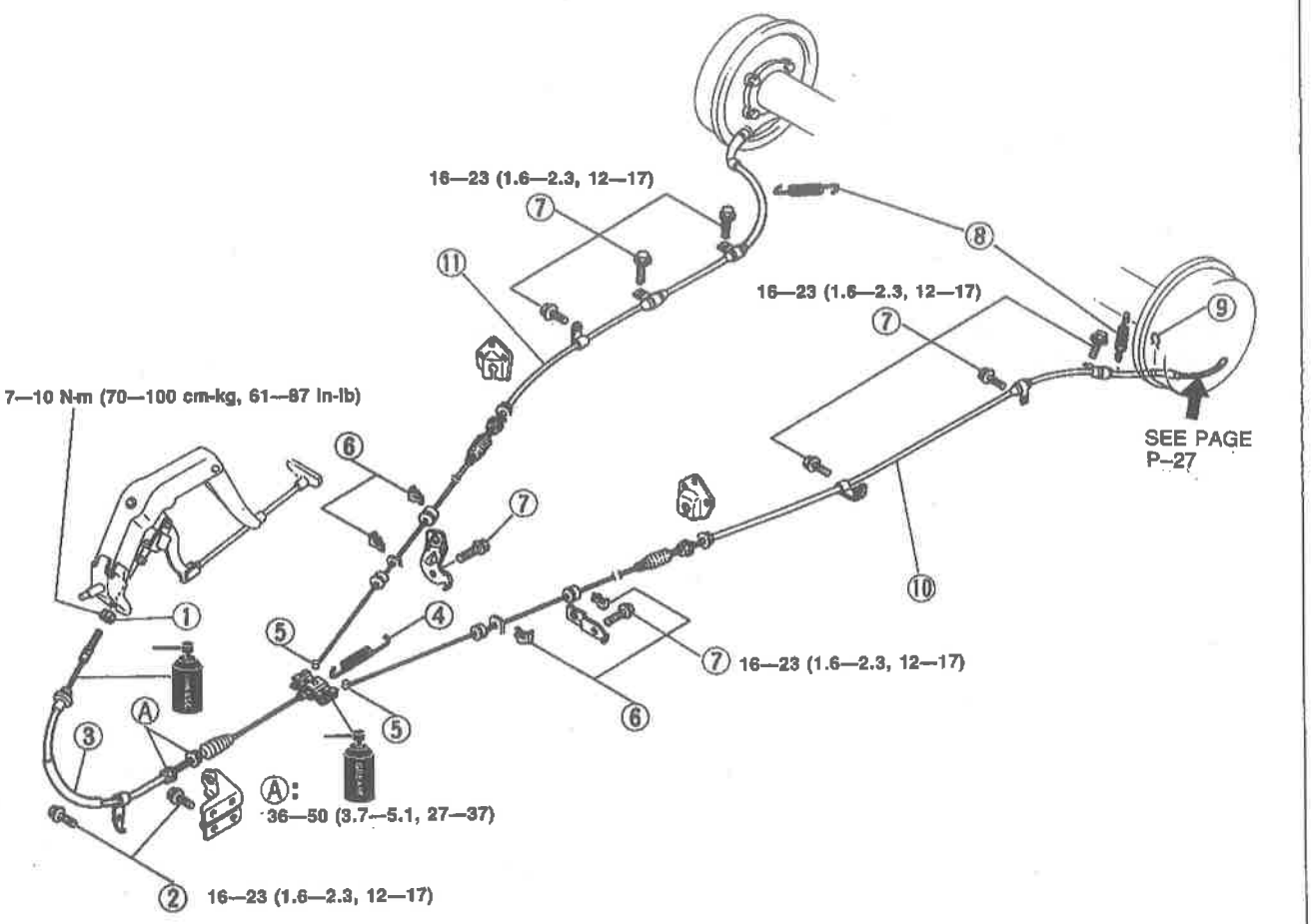
Removal and Installation

1. Block the wheels firmly.
2. Release the parking brake and remove the parking brake lever adjusting nut. (Refer to page P–31.)
3. Remove rear seat No.1, front floormat, and cover. (Refer to Section S.)
4. Jack up the vehicle and support it with safety stands.
5. Remove the parking brake cable in the order shown in the figure.
6. Install in the reverse order of removal.
7. After installation:
   (1) Adjust the parking brake lever stroke. (Refer to page P–31.)
   (2) Depress the brake pedal a few times and check that the rear brakes do not drag while rotating the wheels.



1. Nut
2. Bolt
3. Spring
4. Front brake cable
5. Bolt
6. Bracket
7. Grommet
8. Bolt
9. Spring
10. Clip
11. Rear cable, (left)
12. Rear cable, (right)

4x2



1BU0PX-025

1. Nut
2. Bolt
3. Front brake cable
4. Spring
5. Brake cable connector
6. Clip
7. Bolts
8. Spring
9. Clip
10. Rear cable (left)
11. Rear cable (right)

REAR-WHEEL ANTI-LOCK BRAKE SYSTEM (REAR-WHEEL ABS)

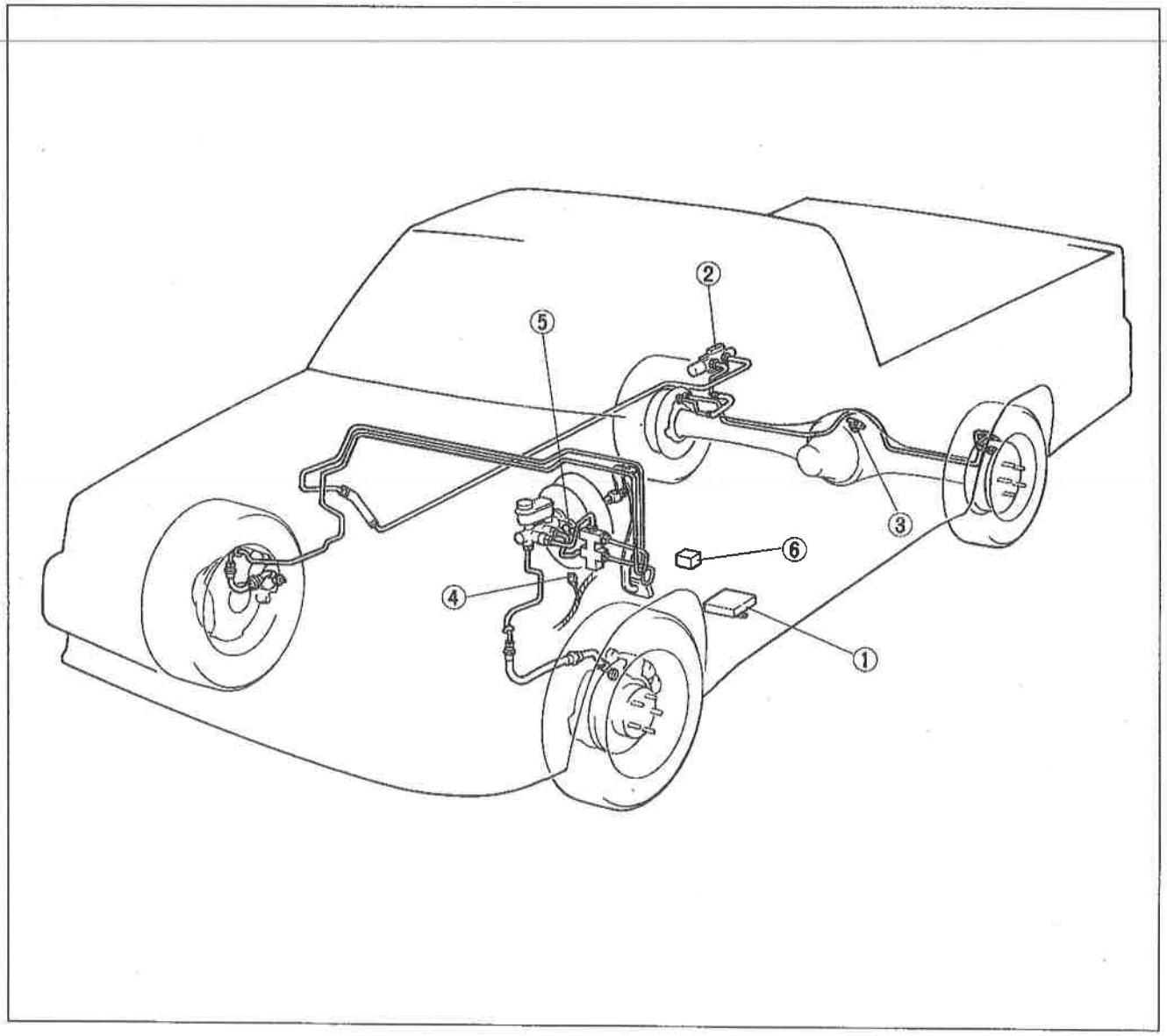
PREPARATION
SST

49 0259 770B Wrench, flare nut 

0MU0PX-021

DESCRIPTION

The Rear-wheel Anti-lock Brake System (Rear-wheel ABS) is equipped on all B2200 and B2600i. The ABS control unit senses the drop in rear wheel speed and modulates hydraulic pressure to the rear brakes, inhibiting lockup.



1BU0PX-026

1. Control unit
2. Hydraulic unit (Solenoid valves)
3. Speed sensor
4. ABS check connector
5. Pressure differential switch
6. ABS fuse

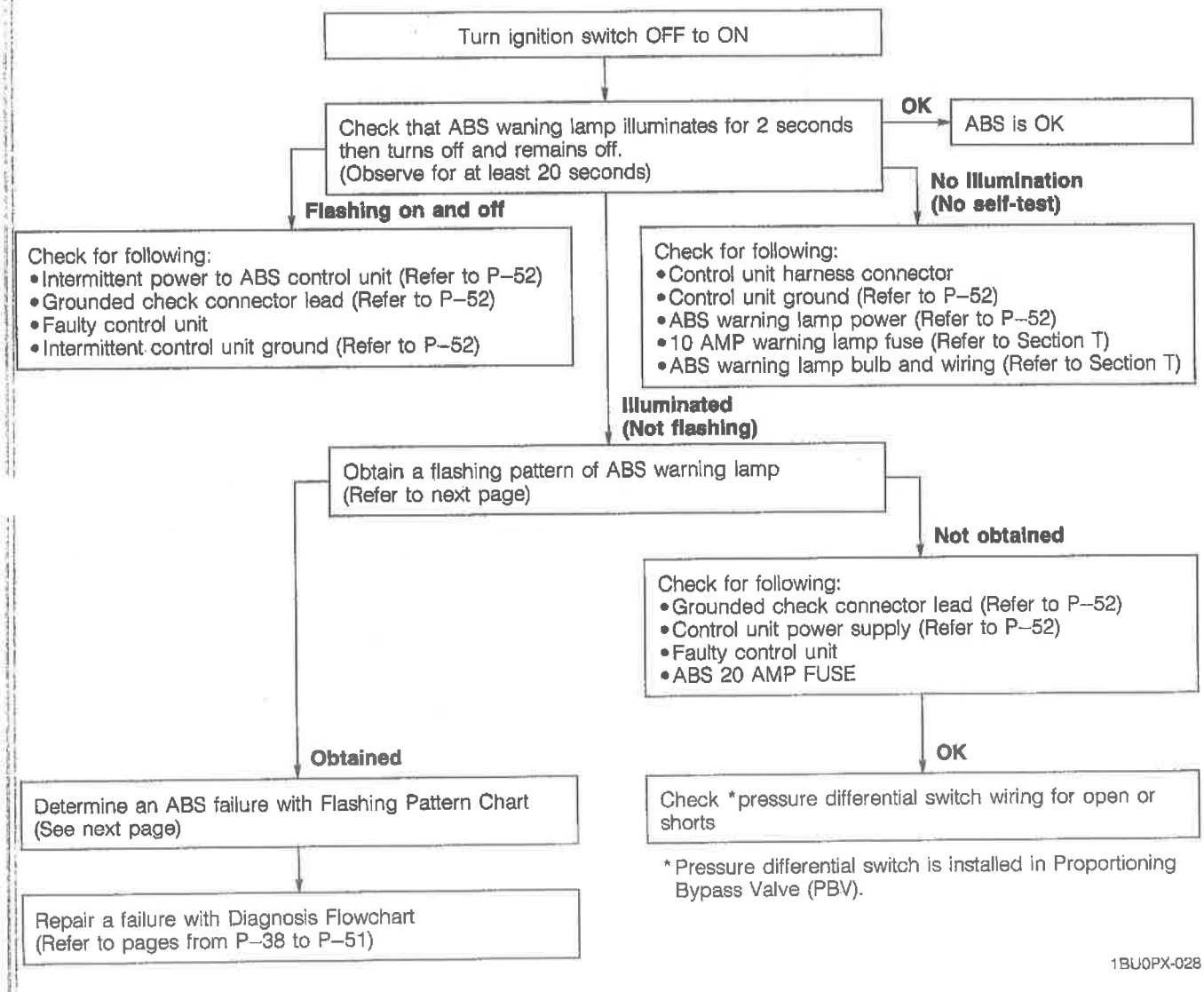
TROUBLESHOOTING GUIDE

Outline

The Rear-wheel ABS is composed of electrical components, mechanical components (hydraulic unit), and ne components of the standard brake system.
Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the self-diagnosis function within the ABS control unit. And malfunctions are indicated by the warning lamp in the instrument panel. The location of a malfunction is indicated by the technician obtaining a flashing pattern of the ABS warning lamp. The self-diagnosis and indication functions must be used when diagnosing malfunctions of the ABS.

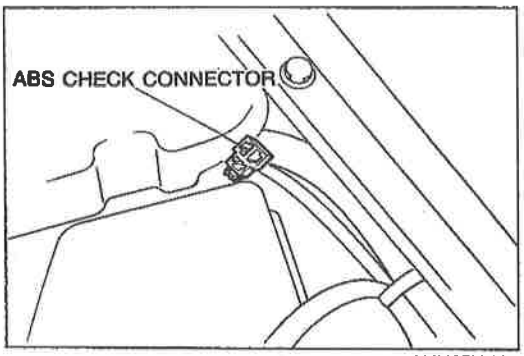
1BU0PX-027

Troubleshooting Main Flowchart



*Pressure differential switch is installed in Proportioning Bypass Valve (PBV).

1BU0PX-028

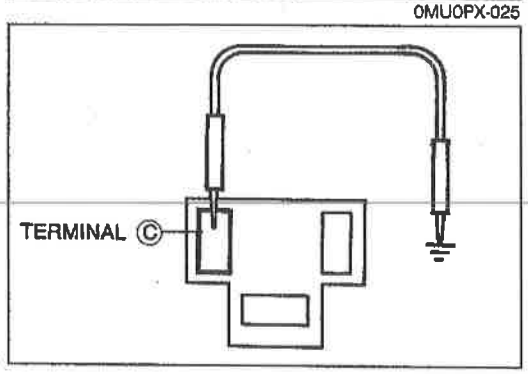


0MU0PX-025

Obtaining A Flashing Pattern

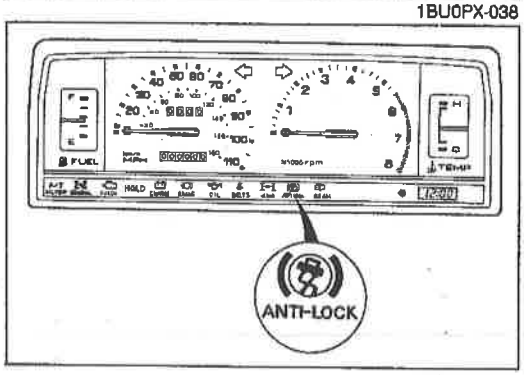
1. Locate the ABS check connector.

Note
The check connector (Blue: 3-pins), is located in the left in the engine compartment.



1BU0PX-038

2. Attach a jumper wire to the terminal Ⓒ (yellow wire) and ground it to the chassis for one second and release it. When the ground is made and broken the ABS warning lamp will begin to flash.



1BU0PX-029

3. Count a flashing number of the ABS warning lamp.

Note
a) A flashing pattern consists of a number of short flashes and ends with a long flash. Count the short flashes and include the long flash in the count.
b) A same flashing pattern repeats until ignition switch is tuned off. After the ignition switch is turned off, then when the ignition switch is turned on again, a same flashing pattern appears.
c) If there is more than one system fault only the first recognized flashing pattern will be obtained.
d) Verify the flashing pattern by reading it several times.

Flashing Pattern Chart

Number of flashing	Failure location	Failure condition	Flowchart number
1	—	(1 flash should not occur)	ABS-1
2	Hydraulic unit	Open in isolation solenoid circuit	ABS-2
3		Open in dump solenoid circuit	ABS-3
4		Solenoid valve switch closed	ABS-4
5	—	System dumps too many times in 4x2 (4x2 and 4x4 vehicles) (condition occurs while making normal or hard stops. Rear brake may lock.)	ABS-5
6	Speed sensor	(Speed sensor signal rapidly cuts in and out) condition only occurs while driving	ABS-6
7	Hydraulic unit	Shorted ground circuit (Isolation solenoid)	ABS-7
8		Shorted ground circuit (Dump solenoid)	ABS-8
9	Speed sensor	High speed sensor resistance	ABS-9
10		Low speed sensor resistance	ABS-10
11	Stoplight switch	Stoplight switch circuit defective. (Condition indicated only when driving above 56 km/h [35 mph])	ABS-11
12	—	(12 flashes should not occur)	ABS-12
13	Control unit	Control unit speed circuit phase lock loop failure detected during self-test	ABS-13
14		Control unit program check sum failure detected during self-test	ABS-14
15		Control unit RAM failure detected during self-test	ABS-15
16	—	(16 or more flashes should not occur)	ABS-16

1BU0PX-030

Diagnosis Flowchart

Caution
When checking resistance at the control unit terminals, always disconnect the battery cable. Improper resistance may occur with the vehicle battery connected.
When using a test lead for testing at the control unit terminals, use a fine needle to prevent damage to the terminal.

ABS-1	(1 flash should not occur)

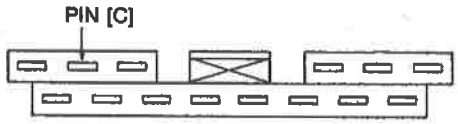
After repeated attempts to take the flashing pattern, 1 flash is still obtained → Check for following:
- Intermittent power to control unit (Refer to page P–52)
- Grounded check connector lead (Refer to page P–52)
- Faulty control unit ground (Refer to page P–52)

1BU0PX-031

ABS-2	Open isolation solenoid circuit

2a	Check for open isolation solenoid wiring or control unit as follows:

1. Turn ignition switch to the OFF position
2. Disconnect battery cable
3. Set the ohmmeter to the 10 ohm scale
4. Disconnect control unit harness connector from control unit
5. Check for resistance between harness connector pin [C] (orange wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

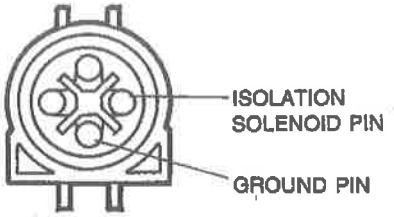
Resistance is 3 to 6 ohms → Replace control unit

Resistance over 6 ohms → Go to 2b

0BU0PX-035

2b	Check for open isolation solenoid or wiring as follows:

1. Disconnect battery cable
2. Set ohmmeter to 10 ohm scale
3. Check resistance between valve connector isolation solenoid pin (orange/white wire) and connector ground pin (black wire)



SOLENOID VALVE CONNECTOR

→ Resistance is 3 to 6 ohms → Repair open in isolation solenoid wire from valve to control unit Check for dirty or loose connector pins

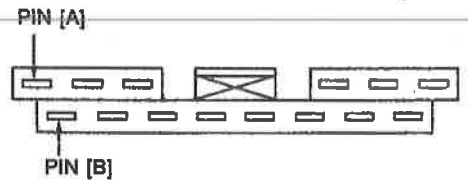
→ Resistance over 6 ohms → Replace hydraulic unit

1MU0PX-026

ABS-3	Open dump solenoid circuit

3a	Check for open dump solenoid wiring or control unit as follows:

1. Turn ignition switch to the off position
2. Disconnect battery cable
3. Disconnect control unit harness connector from control unit
4. Place the ohmmeter on the 10 ohm scale
5. Check resistance between pin [B] (orange/blue wire) or pin [A] (orange/blue wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

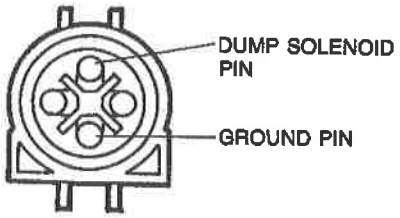
→ Resistance is 1 to 3 ohms → Replace control unit

→ Resistance greater than 3 ohms → Go to Test 3b

0BU0PX-037

3b	Check for open dump solenoid or wiring as follows:

1. Turn the ignition switch to the off position
2. Disconnect battery cable
3. Disconnect solenoid valve harness connector from valve connector
4. Check resistance between valve connector dump solenoid pin (orange/blue wire) and ground pin (black wire)



SOLENOID VALVE CONNECTOR

→ Resistance is 1 to 3 ohms → Repair open dump solenoid wire, from valve to control unit Check for loose or dirty connector pins

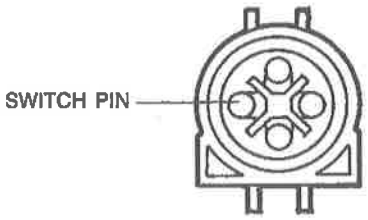
→ Resistance greater than 3 ohms → Replace hydraulic unit

0BU0PX-038

ABS-4	Solenoid valve switch closed

4a	Check for closed solenoid valve switch as follows:

1. Disconnect solenoid valve harness connector from valve connector
2. Place ohmmeter on the 20k ohm scale
3. Check resistance between valve connector switch pin (orange wire) and valve body



SOLENOID VALVE CONNECTOR

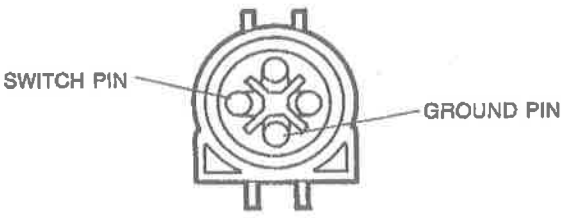
→ Resistance greater than 10k ohms → Go to Test 4b

→ Resistance less than 10k ohms → Replace hydraulic unit

1MU0PX-027

4b	Check for short between solenoid valve switch and valve ground lead as follows:

1. Set the ohmmeter on the 20k ohm scale
2. Check resistance between valve connector switch pin (orange wire) and valve solenoid ground pin (black wire)



SOLENOID VALVE CONNECTOR

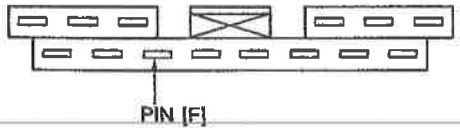
→ Resistance greater than 10k ohms → Go to Test 4c

→ Resistance less than 10k ohms → Replace hydraulic unit

1MU0PX-028

4c	Check for solenoid valve switch wire shorted to ground or control unit as follows:

1. Disconnect battery cable
2. Set the ohmmeter on the 20k ohm scale
3. Disconnect the control unit harness connector from the control unit
4. Check for resistance between harness connector pin [F] (orange/white wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

Resistance greater than 10k ohms → Replace control unit

Resistance less than 10k ohms → Repair short in solenoid valve switch wire from valve to control unit

0BU0PX-040

ABS-5	System dumps too many times in 4x2 (4x2 and 4x4 vehicles) (condition occurs while making normal or hard stops. Rear brake may lock)

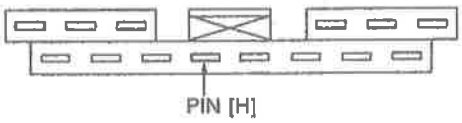
5a	
For 4x2 vehicles or 4x4 vehicles for which the problem was initiated in 4x2 mode	→ Go to test 5b
For 4x4 vehicles for which the problem was initiated in 4x4 mode only	→ Go to test 5c

1BU0PX-039

5b	Check for mechanical problems in rear brake system as follows:		
1. Disconnect the control unit harness connector from the control unit to deactivate the ABS 2. Drive the vehicle (in 4x2 mode) 3. Make normal stops in a safe area to determine the condition of the rear brake system	→	Rear brakes are grabbly or tend to lock-up easily	→ Repair brake system and retest
	→	Rear brakes are satisfactory for normal braking	→ Replace hydraulic unit

1BU0PX-040

5c	Check for missing signal from Remote Freewheel (RFW) switch to control unit as follows:		
1. Disconnect battery cable 2. Disconnect the control unit harness connector from the control unit 3. Turn the Remote Freewheel (RFW) switch on 4. Check continuity between pin [H] (red/blue wire) and chassis ground	→	Continuity	→ Remote Freewheel (RFW) switch is OK
	→	No continuity	→ Repair Remote Freewheel (RFW) switch Refer to Section M for procedures



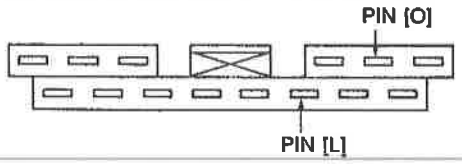
CONTROL UNIT HARNESS CONNECTOR

1BU0PX-032

ABS-6	(Speed sensor Signal rapidly cuts in and out) condition only occurs while driving

6a	Check for erratic speed sensor signal and loose wire connections as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Set ohmmeter on the 2,000 ohm scale
4. Check resistance between pin [O] (blue wire) and pin [L] (green wire) of the harness connector while shaking the harness from sensor to control unit



CONTROL UNIT HARNESS CONNECTOR

→ Constant reading of 1,000 to 2,000 ohms → Go to Test 6b

→ Reading is erratic → Repair loose connection in speed sensor leads. Check for dirty or loose pins, frayed or shorted connectors

1BU0PX-041

6b	Check for metal chips on speed sensor magnet pole piece as follows:

Remove the sensor from the differential and inspect for a build-up of metal chips on sensor magnetic pole

→ No metal chips are present → Go to Test 6c

→ Metal chips are present → Drain and clean differential. Check the sensor rotor for broken or chipped teeth

0MU0PX-042

6c	Check for erratic or low speed sensor output on control unit

1. Locate the ABS check connector (blue: 3-pins)

   Note
   The ABS check connector is located in the left in the engine compartment (Refer to page P–37)

2. Position vehicle on a hoist and raise the rear wheels to clear the floor
3. Start the engine and turn the wheels at 8 km/h (5 mph)
4. Place voltmeter on the 2000 mV AC scale
5. Measure voltage at the two pins (blue and green wires) of the check connector

→ Voltage greater than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) and steady → Replace control unit

→ Voltage less than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) or erratic → Go to Test 6d

1BU0PX-033

6d	Check for sensor rotor damage as follows:

1. Remove sensor from carrier
2. Rotate sensor rotor and check for damage to teeth

→ Teeth are intact and no visible lateral runout is observed → Replace speed sensor and recheck output

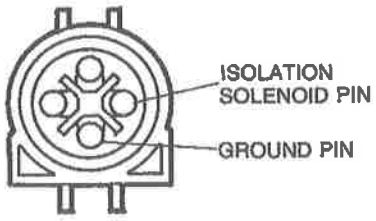
→ Teeth are damaged or lateral runout of sensor rotor is visible → Replace the sensor rotor (Refer to page P–55)

1BU0PX-034

ABS-7	Shorted ground circuit (Isolation solenoid)

7a	Check for isolation solenoid or wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect the solenoid valve harness connector from the solenoid valve connector
3. Set the ohmmeter on the 10 ohm scale
4. Measure the resistance between the isolation solenoid pin (orange/white wire) and the solenoid ground pin (black wire) in the solenoid valve connector



SOLENOID VALVE CONNECTOR

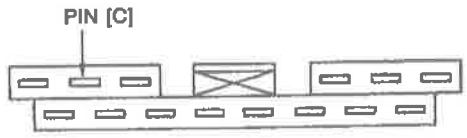
→ Resistance is 3 to 6 ohms → Go to Test 7b

→ Resistance is less than 3 ohms → Replace hydraulic unit

2BU0PX-018

7b	Check for control unit and wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect the solenoid valve harness connector from the solenoid valve
4. Disconnect the control unit harness connector from the control unit
5. Place the ohmmeter on the 20k ohm scale
6. Measure the resistance between control unit harness connector pin [C] (orange wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

→ Resistance greater than 20k ohms → Replace control unit

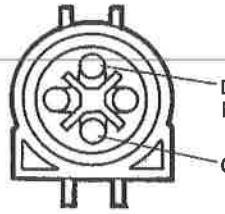
→ Resistance less than 20k ohms → Repair short between solenoid valve and control unit. Reconnect control unit and solenoid valve

0BU0PX-048

ABS-8	Shorted ground circuit (Dump solenoid)

8a	Check for dump solenoid or wiring shorted to ground as follows:

1. Turn ignition switch off
2. Disconnect solenoid valve harness connector from valve connector
3. Set the ohmmeter on the 10 ohm scale
4. Measure the resistance between the dump solenoid pin (orange/blue wire) and the solenoid valve ground pin (black wire) in the solenoid valve connector



SOLENOID VALVE CONNECTOR

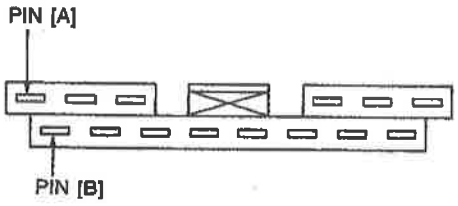
→ Resistance is 1 to 3 ohms → Go to Test 8b

→ Resistance is less than 1 ohm → Replace hydraulic unit

2BU0PX-019

8b	Check for control unit and wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect solenoid valve harness connector from solenoid valve connector
4. Disconnect the control unit harness connector from the control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance between control unit harness connector pin [B] (orange/blue wire) or pin [A] (orange/blue wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

→ Resistance greater than 20k ohms → Replace control unit

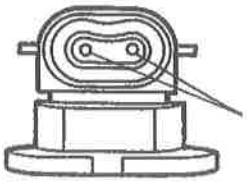
→ Resistance less than 20k ohms → Repair short between solenoid valve and control unit. Reconnect control unit and solenoid valve

0BU0PX-050

ABS-9	High speed sensor resistance

9a	Check for open speed sensor or sensor wiring as follows:

1. Turn key off
2. Disconnect speed sensor harness connector from the speed sensor on the differential
3. Set the ohmmeter on the 20k ohm scale
4. Measure the resistance at the two sensor pins



SPEED SENSOR CONNECTOR

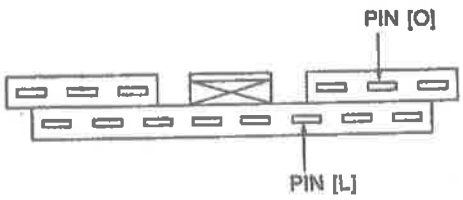
→ Resistance is 1,000 to 2,500 ohms → Go to Test 9b

→ Resistance greater than 2,500 ohms → Replace speed sensor

0BU0PX-051

9b	Check for open speed sensor harness wiring as follows:

1. Turn key off
2. Disconnect battery cable
3. Reconnect speed sensor harness connector to speed sensor
4. Disconnect control unit harness connector from control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance between harness connector pins [L] (green wire) and [O] (blue wire)



CONTROL UNIT HARNESS CONNECTOR

→ Resistance is 1,000 to 2,500 ohms → Replace control unit

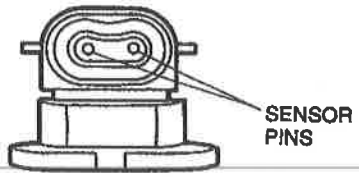
→ Resistance greater than 2,500 ohms → Repair open in speed sensor wires between the speed sensor and control unit. Check for loose or dirty pin connectors

1BU0PX-042

ABS-10	Low speed sensor resistance

10a	Check for shorted speed sensor as follows:

1. Turn ignition off
2. Disconnect the speed sensor harness from the speed sensor
3. Place the ohmmeter on the 20k ohms scale
4. Measure the resistance at the two sensor pins



SPEED SENSOR CONNECTOR

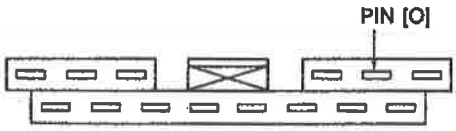
→ Resistance less than 1,000 ohms → Replace speed sensor

→ Resistance is 1,000 to 2,500 ohms → Go to Test 10b

0BU0PX-053

10b	Check for grounded speed sensor wiring as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect the speed sensor harness connector from the speed sensor
4. Disconnect the control unit harness connector from the control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance from pin [O] (blue wire) of the harness connector to chassis ground



CONTROL UNIT HARNESS CONNECTOR

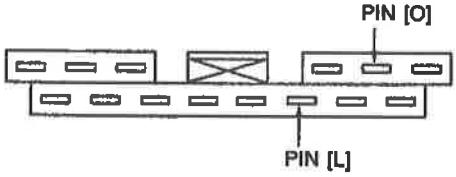
→ Resistance less than 20k ohms → Repair short to ground in sensor HI lead to control unit. Check for frayed wires or shorted connectors

→ Resistance is greater than 20k ohms → Go to Test 10c

1BU0PX-043

10c	Check for shorted speed sensor wiring as follows:

1. Turn ignition off
2. Disconnect speed sensor harness connector from the speed sensor
3. Disconnect the control unit harness connector from the control unit
4. Place the ohmmeter on the 20k ohms scale
5. Measure the resistance from pin [L] (green wire) to pin [O] (blue wire) of the harness connector



CONTROL UNIT HARNESS CONNECTOR

→ Resistance less than 20k ohms → Repair short between the speed sensor circuits. Check for frayed wires or shorted connectors

→ Resistance greater than 20k ohms → Replace control unit

1BU0PX-044

ABS-11	Stoplight switch always closed or stoplight switch circuit defective. (Condition indicated only when driving above 56 km/h [35 mph])

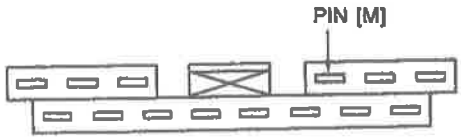
11a	Check for vehicle stoplights as follows:
Apply the service brakes and observe the rear brake lights	

- Lights illuminate → Go to Test 11b
- Lights do not illuminate → Repair or replace vehicle stoplight switch. Check for blown stoplight switch fuse. Investigate reason for blown fuse. Check for open stoplight switch wiring or blown stoplights. Repair as needed

0MU0PX-054

11b	Check for open between the stoplight switch and the control unit as follows:

1. Turn the ignition off
2. Set the voltmeter on the 20 VDC scale
3. Remove the control unit harness connector
4. Measure the voltage between pin [M] (white/green wire) and chassis ground while stepping on the brake pedal



CONTROL UNIT HARNESS CONNECTOR

- Voltage is less than 9V → Repair the open between stoplight switch and control unit circuit
- Voltage is 9V or more → Check 4 way flasher and directional wiring. This condition could create feedback through the stoplight circuit

0MU0PX-055

ABS-12 (12 flashes should not occur)

After repeated attempts to take the flashing pattern, 12 flashes are still obtained → Replace control unit

0MU0PX-056

ABS-13 Control unit speed circuit phase lock loop failure detected during control unit self-test

→ Replace control unit

0MU0PX-057

ABS-14 Control unit program check sum failure detected during self-test

→ Replace control unit

0MU0PX-058

ABS-15 Control unit RAM failure detected during self-test

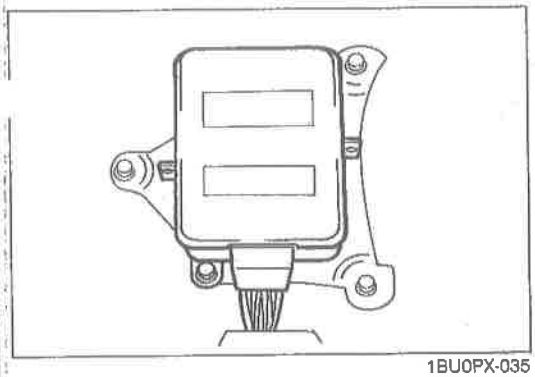
→ Replace control unit

0MU0PX-059

ABS-16 (16 or more flashes should not occur)

After repeated attempts to take the flashing pattern, 16 or more flashes are still obtained → Replace control unit

0MU0PX-060



1BU0PX-035

CONTROL UNIT

Inspection

Inspection of control unit circuit

1. Remove the driver's seat.
2. Disconnect the harness connector from the control unit.
3. Check the control unit harness connector terminals for voltage or resistance referring to the table below.

VB: Battery voltage

Tester connection ( ) indicates wire color	Measured item	Remark	Resistance (Battery cable off)	Voltage (IG switch ON)
L (G) – 0 (L)	Speed sensor	—	Approx. 1.4 kΩ	—
P (L/W) – Ground	Battery	—	∞	VB
N (R) — Ground	Pressure differential switch (PBV)	Parking sw. ON	1Ω	VB
		Parking sw. OFF	540Ω	
L (G) – Ground	Speed sensor	—	∞	—
H (R/L) – Ground	RFW control unit (4x4 only)	4x2 mode	∞	—
		4x4 mode	0Ω	
F (O/W) – Ground	Pressure switch (Hydraulic unit)	—	∞	—
D (LG) –Ground	Warning lamp	—	Approx. 23Ω	VB
B (O/L) – Ground	Dump solenoid	—	1—3Ω	0V
Q (L/W) – Ground	Battery	—	∞	VB
O (L) – Ground	Speed sensor	—	∞	—
M (W/G) – Ground	Stoplight switch	Switch ON	Approx. 1.0Ω	VB
		Switch OFF		0V
E (Y) – Ground	Check connector	—	∞	0V
C (O) – Ground	Isolation solenoid	—	3—6Ω	0V
A (O/L) – Ground	Dump solenoid	—	1—3Ω	0V
J (B) – Ground	Ground	—	Continuity	—

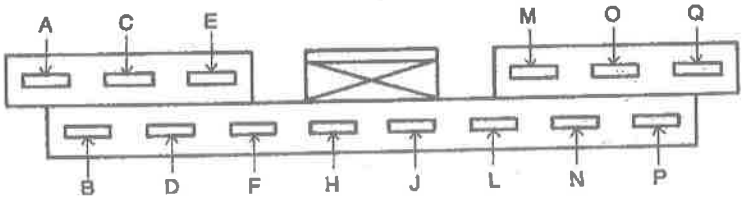
2BU0PX-020

Caution

a) When checking resistance at the control unit terminals, always disconnect the battery cable. Improper resistance may occur with the vehicle battery connected.

b) When using a test lead for testing, use a fine needle to prevent damage to the terminal.

CONTROL UNIT HARNESS CONNECTOR

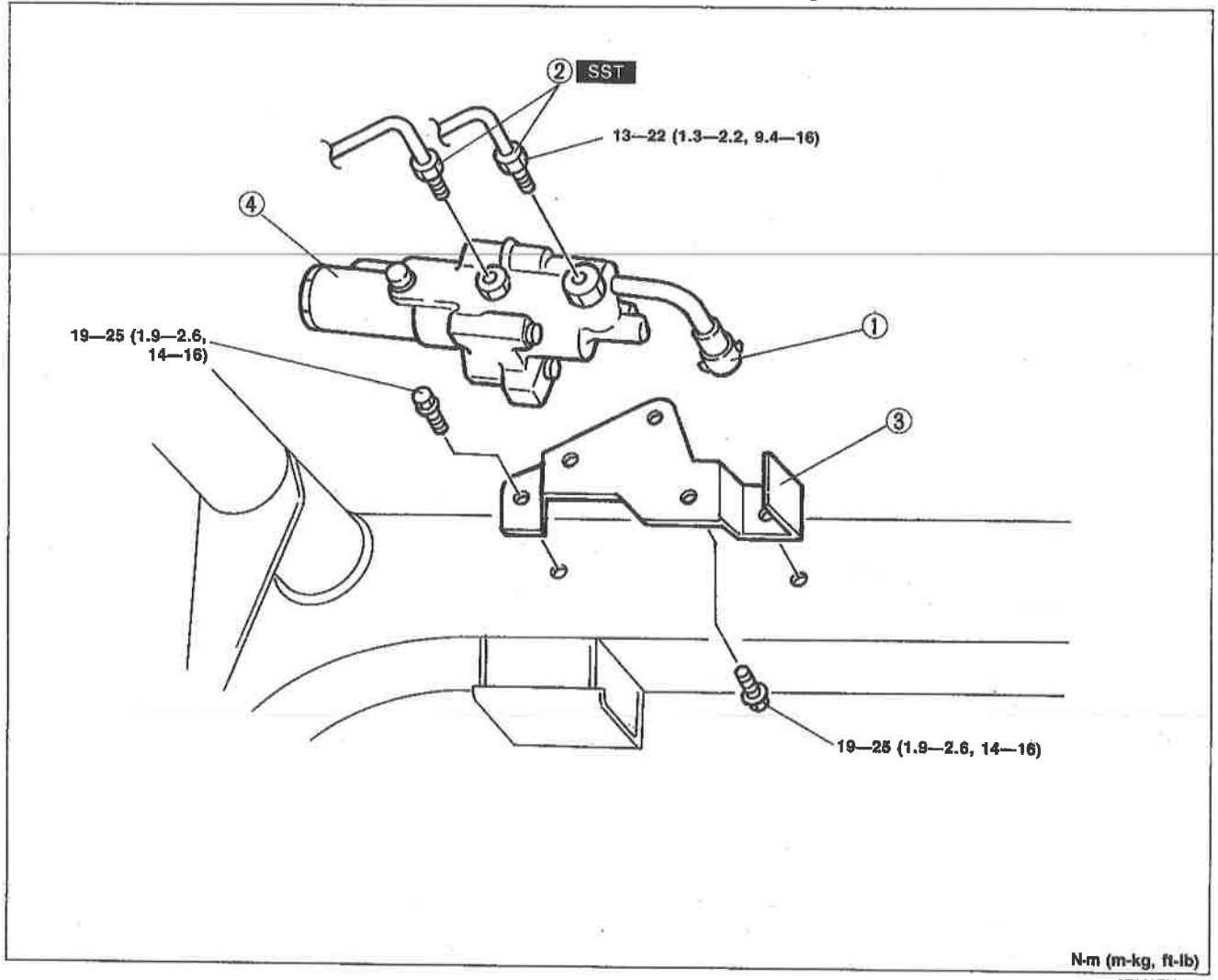


HYDRAULIC UNIT

Removal and Installation

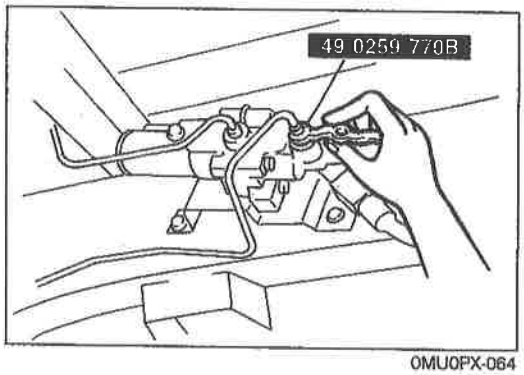
1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal.
4. After installation, bleed air from the system. (Refer to page P–5.)

Note
It is not necessary to energize the solenoid valves electrically to bleed the rear brakes.



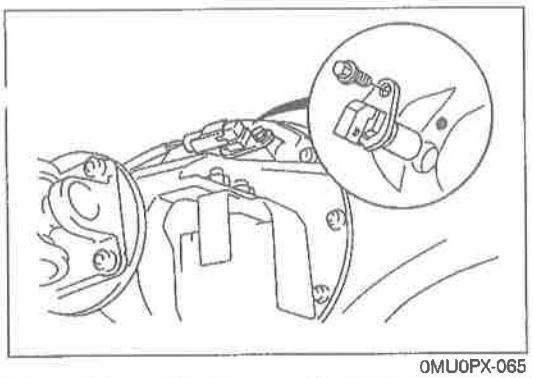
2BU0PX-021

1. Harness coupler
2. Brake pipe
   Removal Note ..... below
3. Hydraulic unit bracket
4. Hydraulic unit



0MU0PX-064

Removal Note
Brake pipe
1. Remove the brake pipes with the **SST**.

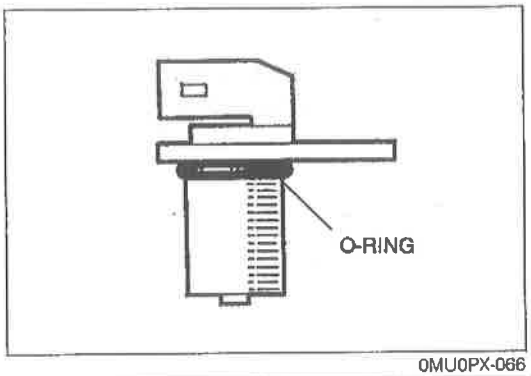


0MU0PX-065

SPEED SENSOR

Removal

1. Remove the harness connector.
2. Remove the sensor fixing bolt and remove the speed sensor from the axle casing.

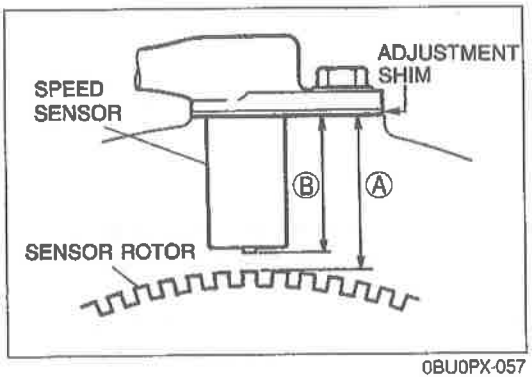


0MU0PX-066

Inspection

Sensor O-ring

1. Check the sensor O-ring for damage and replace if necessary.



0BU0PX-057

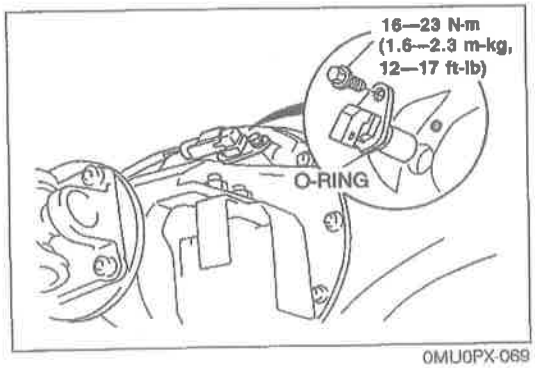
Clearance between sensor and sensor rotor

1. Measure the clearance between the sensor metal tip and the sensor rotor teeth as follows:
   (1) Measure the Ⓐ between the sensor rotor teeth and the sensor attaching surface.
   (2) Measure the Ⓑ between the sensor attaching surface and the sensor metal tip.
   (3) Obtain Ⓐ — Ⓑ.

Specified clearance
B2600I: 0.5—1.2mm (0.020—0.047 in)
B2200 : 0.5—1.0mm (0.020—0.039 in)

Note
If the clearance is less than specification, adjust it using the adjustment shim (P049 27 155) during sensor installation. If the clearance is more than specification, replace the speed sensor with new one.

1BU0PX-037

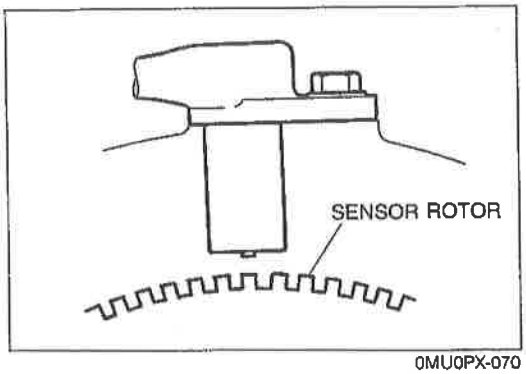


0MU0PX-069

Installation

1. Clean the axle mounting surface.
2. Lubricate the sensor O-ring with motor oil.
3. Install the speed sensor.

Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—17 ft-lb)

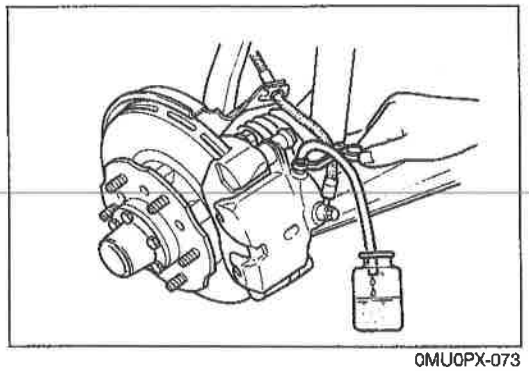


0MU0PX-070

SENSOR ROTOR

Removal and Installation

The sensor rotor is not serviceable. If there is a problem (rotor teeth damage etc.) in the sensor rotor, replace the gear case. (Refer to Section M for service.)

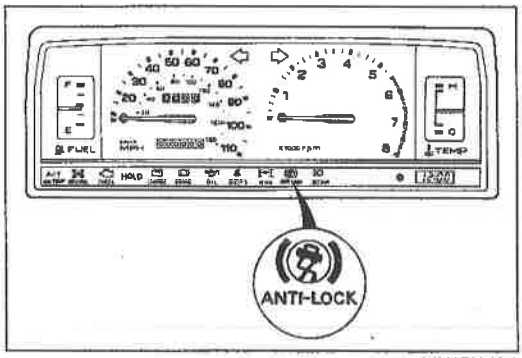


0MU0PX-073

PRESSURE DIFFERENTIAL SWITCH

On-vehicle Inspection

1. Connect one end of a vinyl tube to the front brake bleeder screw and place the other end in a receptacle.
2. Loosen the bleeder screw.



0MU0PX-074

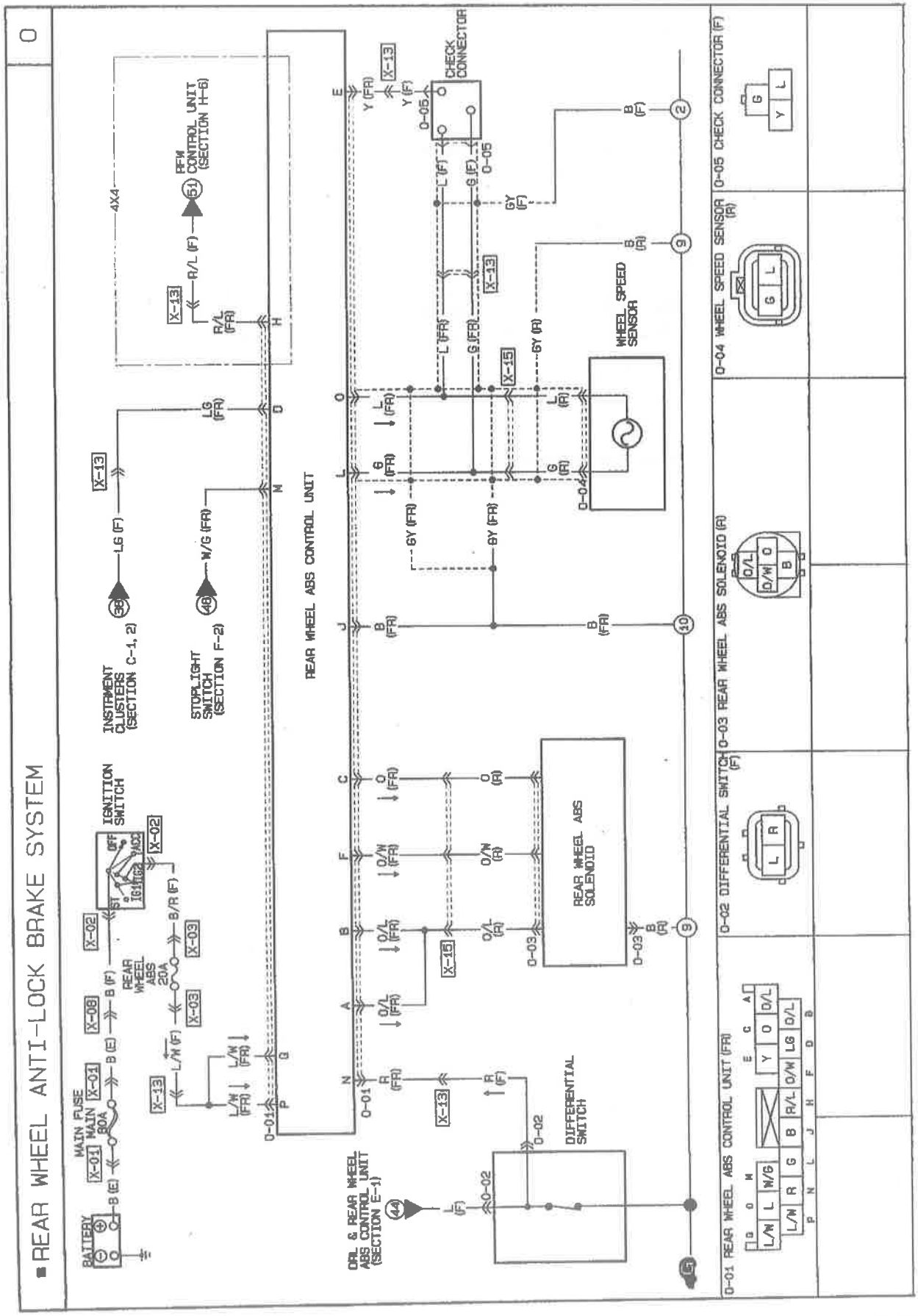
3. Turn the ignition switch ON and make sure that the ABS warning lamp flashes and goes off.
4. Depress the brake pedal several times and check that the ABS warning lamp is illuminated because the pressure differential switch is ON.

Note

a) One person should hold the vinyl tube to prevent the tube from being disconnected when the brake pedal is depressed.

b) The brake warning lamp (red) is also illuminated when the pressure differential switch is ON.

WIRING DIAGRAM



0MU0PX-075