SECTION 4A

HYDRAULIC BRAKES

CAUTION: Disconnect the negative battery cable before removing or installing any electrical unit or when a tool or equipment could easily come in contact with exposed electrical terminals. Disconnecting this cable will help prevent personal injury and damage to the vehicle. The ignition must also be in B unless otherwise noted.

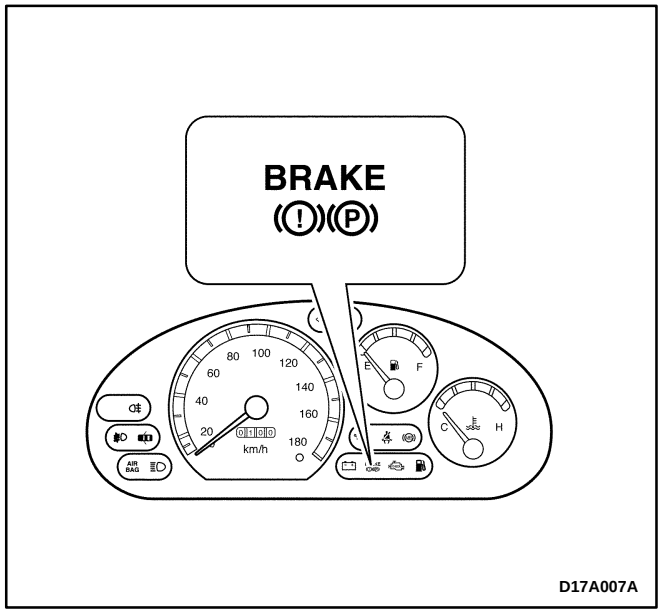
TABLE OF CONTENTS

DESCRIPTION AND OPERATION

WARNING LAMP OPERATION

This brake system uses a BRAKE warning lamp located in the instrument panel cluster. When the ignition switch is in the III position, the BRAKE warning lamp should illuminate. It should go off when the ignition switch return to II position. The following conditions will activate the BRAKE warning lamp.

- The lamp should be on whenever the parking brake applied and the ignition switch is in the II position.
- A low fluid level in the master cylinder will turn the BRAKE warning lamp on.

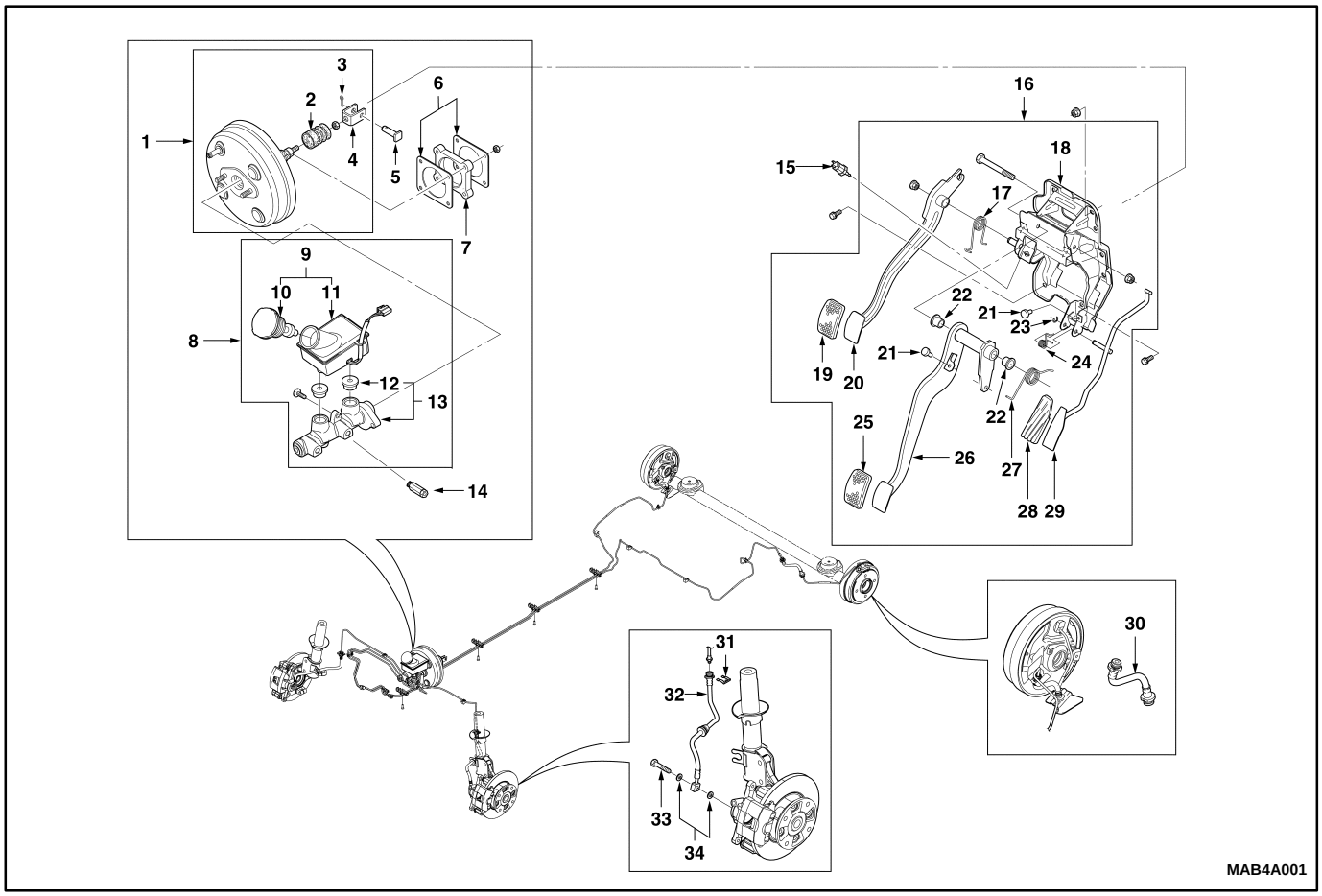


D17A007A

COMPONENT LOCATOR

BRAKE SYSTEM (NON–ABS)

(Left–Hand Drive Shown, Right–Hand Drive Similar)



1. Power Booster
2. Power Booster Boot
3. Cotter Pin
4. Clevis
5. Clevis Pin
6. Packing
7. Spacer
8. Master Cylinder Assembly
9. Fluid Reservoir Assembly
10. Reservoir Cap
11. Reservoir
12. Grommet Seal
13. Master Cylinder
14. Proportioning Valve
15. Stoplamp Switch
16. Brake Pedal Assembly
17. Clutch Pedal Spring
18. Pedal Bracket Assembly
19. Clutch Pedal Pad
20. Clutch Pedal
21. Cushion
22. Bushing
23. Retaining Ring
24. Spring
25. Brake Pedal Pad
26. Brake Pedal
27. Brake Pedal Spring
28. Accelator Pedal Pad
29. Accelator Pedal
30. Rear Drum Brake Hose
31. E Ring
32. Front Disc Brake Hose
33. Brake Hose Coupling Bolt
34. Plain Washer

DIAGNOSITIC INFORMATION AND PROCEDURES

BRAKE SYSTEM TESTING

(Left–Hand Drive Shown, Right–Hand Drive Similar)

Brakes should be tested on a dry, clean, reasonably smooth and level roadway. A true test of brake performance cannot be made if the roadway is wet, greasy, or covered with loose dirt whereby all tires do not grip the road equally. Testing will also be adversely affected if the roadway is crowned so as to throw the weight so roughly that the wheels tend to bounce.

Test the brakes at different vehicle speeds with both light and heavy pedal pressure; however, avoid locking the brakes and sliding the tires. Locked brakes and sliding tires do not indicate brake efficiency since heavily braked, but turning, wheels will stop the vehicle in less distance than locked brakes. More tire-to-road friction is present with a heavily braked, turning tire than with a sliding tire.

Because of the high deceleration capability, a firmer pedal may be felt at higher deceleration levels.

There are three major external conditions that affect brake performance:

- Tires having unequal contact and grip of the road will cause unequal braking. Tires must be equally inflated, and the tread pattern of the right and the left tires must be approximately equal.
- Unequal loading of the vehicle can affect the brake performance since the most heavily loaded wheels require more braking power, and thus more braking effort, than the others.
- Misalignment of the wheels, particularly conditions of excessive camber and caster, will cause the brakes to pull to one side.

To check for brake fluid leaks, hold constant foot pressure on the pedal with the engine running at idle and the shift lever in NEUTRAL. If the pedal gradually falls away with the constant pressure, the hydraulic system may be leaking. Perform a visual check to confirm any suspected leaks.

Check the master cylinder fluid level. While a slight drop in the reservoir level results from normal lining wear, an abnormally low level indicates a leak in the system. The hydraulic system may be leaking either internally or externally. Refer to the procedure below to check the master cylinder. Also, the system may appear to pass this test while still having a slight leak. If the fluid level is normal, check the vacuum booster pushrod length. If an incorrect pushrod length is found, adjust or replace the rod.

Check the master cylinder using the following procedure:

- Check for a cracked master cylinder casting or brake fluid leaking around the master cylinder. Leaks are indicated only if there is at least one drop of fluid. A damp condition is not abnormal.
- Check for a binding pedal linkage and for an incorrect pushrod length. If both of these parts are in satisfactory condition, disassemble the master cylinder and check for an elongated or swollen primary cylinder or piston seals. If swollen seals are found, substandard or contaminated brake fluid should be suspected. If contaminated brake fluid is found, all the components should be disassembled and cleaned, and all the rubber components should be replaced. All of the pipes must also be flushed.

Improper brake fluid, or mineral oil or water in the fluid, may cause the brake fluid to boil or cause deterioration of the rubber components. If the primary piston cups in the master cylinder are swollen, then the rubber parts have deteriorated. This deterioration may also be evidenced by swollen wheel cylinder piston seals on the drum brake wheels.

If rubber deterioration is evident, disassemble all the hydraulic parts and wash the parts with alcohol. Dry these parts with compressed air before reassembly to keep alcohol out of the system. Replace all the rubber parts in the system, including the hoses. Also, when working on the brake mechanisms, check for fluid on the linings. If excessive fluid is found, replace the linings.

If the master cylinder piston seals are in satisfactory condition, check for leaks or excessive heat conditions. If these conditions are not found, drain the fluid, flush the master cylinder with brake fluid, refill the master cylinder, and bleed the system. Refer to “Manual Bleeding the Brakes” in this section.

BRAKE HOSE INSPECTION

The hydraulic brake hoses should be inspected at least twice a year. The brake hose assembly should be checked for road hazard damage, cracks, chafing of the outer cover, and for leaks or blisters. Inspect the hoses for proper routing and mounting. A brake hose that rubs on a suspension component will wear and eventually fail. A light and a mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, adjust or replace the hose as necessary.

WARNING LAMP OPERATION

This brake system uses a BRAKE warning lamp located in the instrument panel cluster. When the ignition switch is in the III position, the BRAKE warning lamp should glow and then go OFF when the ignition switch returns to the II position.

The following conditions will activate the BRAKE lamp:

- Parking brake applied. The light should be on whenever the parking brake is applied and the ignition switch is II.
- Low fluid level. A low fluid level in the master cylinder will turn the BRAKE lamp ON.

BRAKE SYSTEM FAULT

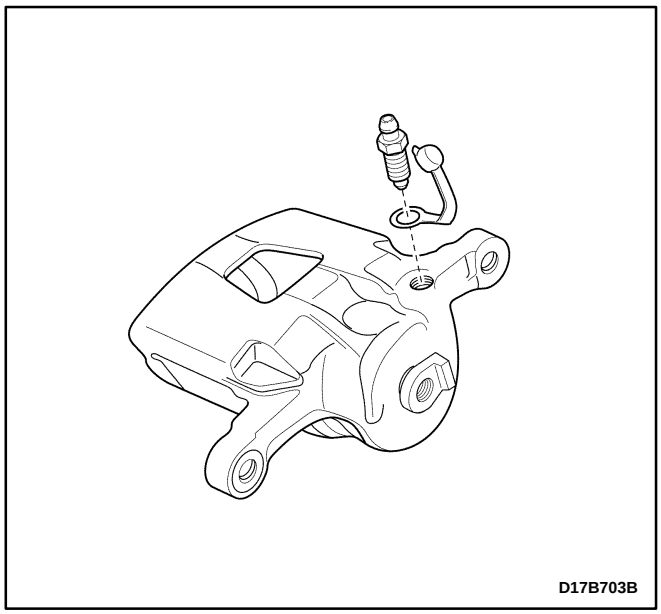
Condition	Probable cause	Correction
Brake Warning Lamp ON	● Brake fluid leaks.	● Repair the leaks or add th fluid.
	● Parking brake switch shorted to ground.	● Repair the short ground.
	● Faulty the fluid level sensor.	● Replace the sensor.
Stoplamp ON	● Faulty the stoplamp switch.	● Replace the stoplamp switch.
	● Push rod length is short.	● Adjust the push rod length of the power booster.
	● Stoplamp switch circuit shorted to battery.	● Repair or Replace the wiring harness.
Poor Braking	● Brake fluid lacks or leaks.	● Repair the leaks or add the fluid.
	● Brake fluid contamination.	● Replace the fluid.
	● Air in the brake system.	● Bleed the brake system.
	● Damaged brake lines.	● Replace the brake lines.
	● Damaged vacuum hose or faulty check valve.	● Replace the vacuum hose or check value.
Dragging Brake	● No free play at the brake pedal.	● Adjust the free play.
	● Weakened the brake pedal return spring.	● Replace the return spring.
	● Faulty master cylinder.	● Replace the master cylinder.
	● Air in the brake system.	● Bleed the brake system.
Pedal Over Stroke	● Brake fluid lacks or leaks.	● Repair the leaks or add the fluid.
	● Poor adjustment of the brake pedal free play.	● Adjust the push rod length of the power booster.

MANUAL BLEEDING THE BRAKES

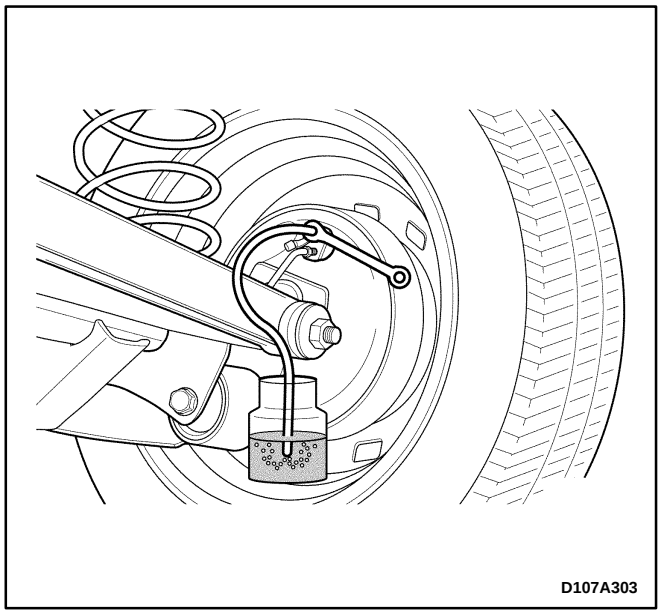
Important: The bleeding sequence is as follows; right rear, left rear, right front, and left front.

Important: Check the fluid level and add the fluid during the bleeding operation.

1. Raise the vehicle.
2. Remove the bleeder screw and cap.



3. Attach a transparent tube over the valve. Allow the tube to hang submerged in brake fluid in a transparent container.



4. Slowly push the brake pedal several times and hold the brake pedal.
5. Tighten the bleeder screw after loosening the bleeder screw and draining the fluid.

Caution: Hold the brake pedal until tightening the bleeder screw.

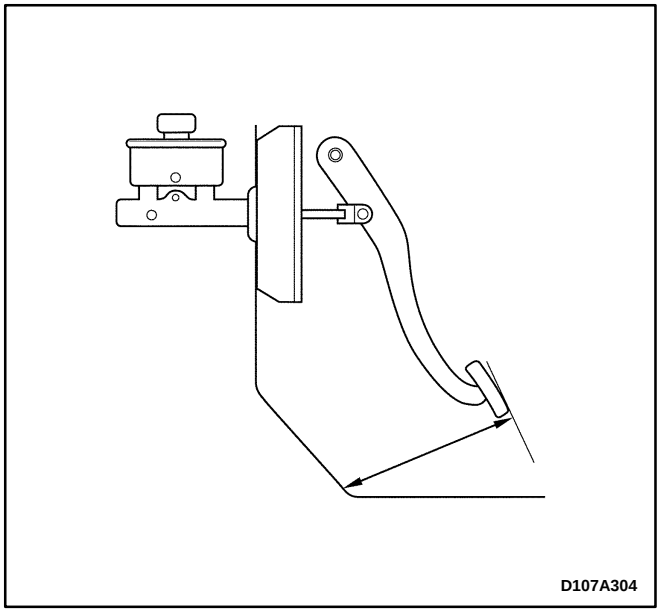
6. Repeat the step 5, 6 until all the air is removed.
7. Check the leaks for the bleeder screw.

PEDAL TRAVEL CHECK

1. Start the engine.
2. Push the pedal three times.
3. With brake pedal depressed with a about 30Kg (66.15 lb) load, measure the clearance between the pedal pad and the lower dash panel.

Unit : mm (in.)

Specification	60 (2.36)



4. If clearance is less than 60mm (2.36 in.), the most possible cause is either rear drum brake shoes are worn out beyond the specification value or air is in lines. Clearance still remains less than 60mm (2.36 in.) even after replacement of brake shoes and bleeding of the brake system, other possible but infrequent cause is malfunction of rear drum brake shoe adjusters or booster push rod length out of adjustment.
5. Automatic clearance adjuster check is performed after removing brake drums. If the faulty is found, repair or replace it.

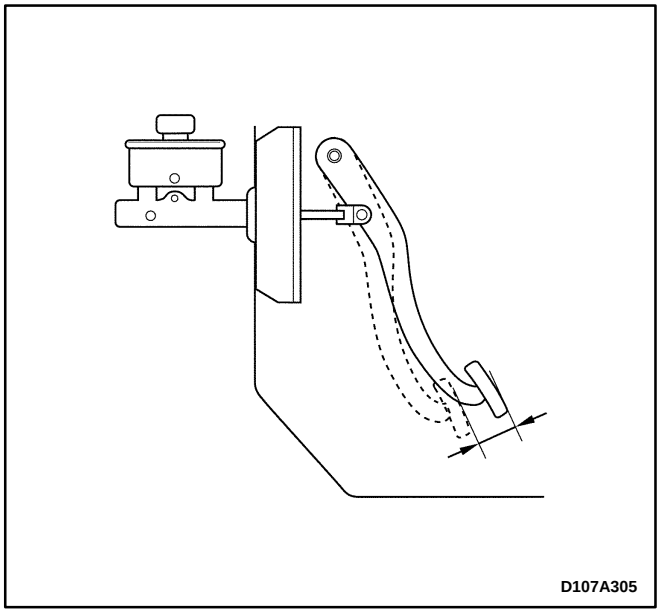
BRAKE PEDAL FREE PLAY INSPECTION

1. Push the brake pedal several times to discharge the vacuum of the power booster.
2. Measure the pedal movement until the hardness is felt when pushing the brake pedal by hand.

Unit : mm (in.)

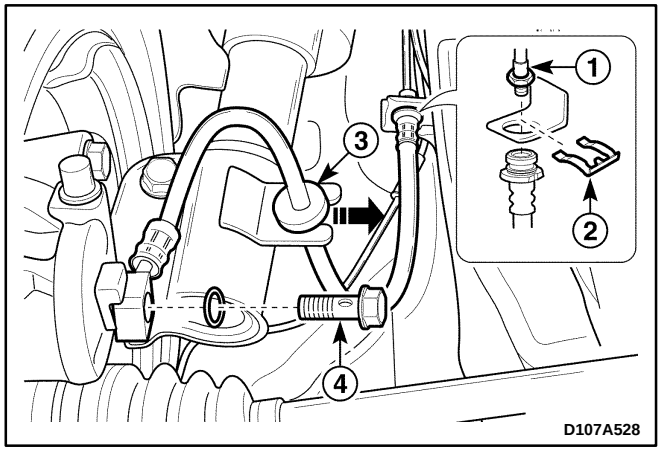
Specification	6–10 (0.24–0.31)

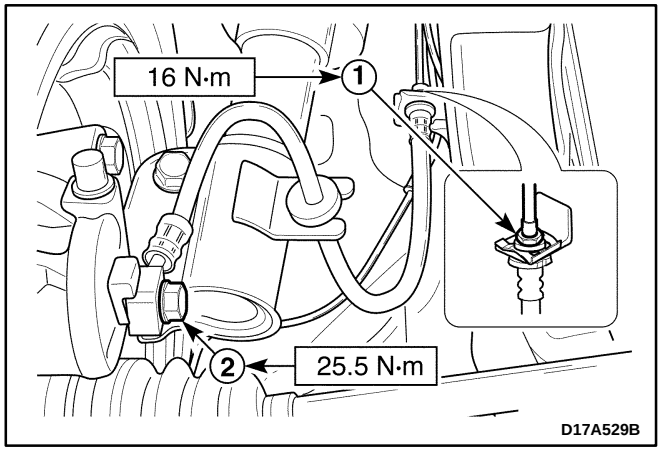
3. Brake pedal free play can not be adjusted.



REPAIR INSTRUCTIONS

ON–VEHICLE SERVICE





BRAKE HOSE (FRONT)

Removal Procedure

1. Remove the wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the brake hose.
   - Remove the fitting (1).
   - Remove the E–ring retainer (2).
   - Disconnect the brake hose mounting from the strut (3).
   - Remove the coupling bolt (4).
   - Plug the opening in the brake pipe and caliper to prevent fluid loss or contamination.

Installation Procedure

1. Connect the brake lines to the brake hose (1).

   Tighten

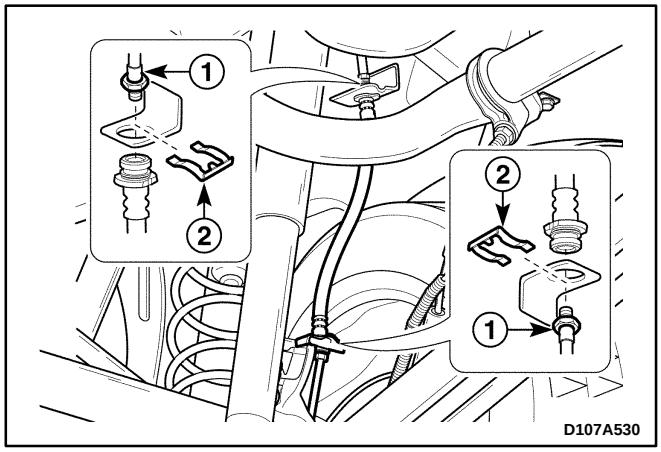
   Tighten the brake pipe–to–hose fitting to 16 N•m (12 lb-ft).
2. Install the brake hose coupling bolt (2).

   Tighten

   Tighten the bolt to 25.5 N•m (19.1 lb-ft).

Important: Use only Daewoo recommended brake fluid.

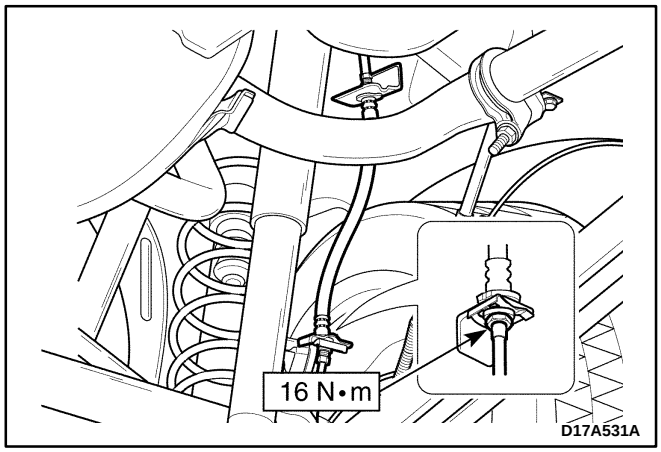
3. Bleed the brake system. Refer to “Manual Bleeding the Brakes” in this section.
4. Check the brake system for leaks.
5. Install the wheels. Refer to *Section 2E, Tires and Wheels*.



BRAKE HOSE (REAR)

Removal Procedure

1. Remove the wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the brake hose.
   - Remove the fittings (1).
   - Remove the E–rings (2).
   - Plug the opening in the brake pipe to prevent fluid loss or contamination.



Installation Procedure

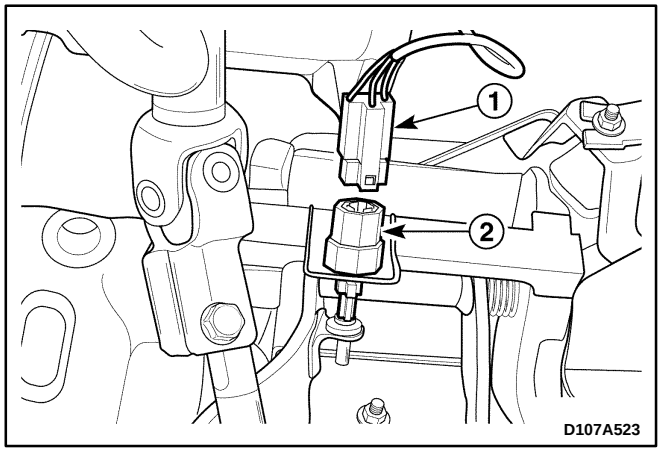
1. Connect the brake lines to the brake hose.
2. Install the fitting and E–rings.

Tighten

Tighten the fitting to 16 N•m (12 lb-ft).

Important: Use only Daewoo recommended brake fluid.

3. Bleed the brake system. Refer to “Manual Bleeding the Brakes” in this section.
4. Check the brake system for leaks.
5. Install the wheels. Refer to *Section 2E, Tires and Wheels*.

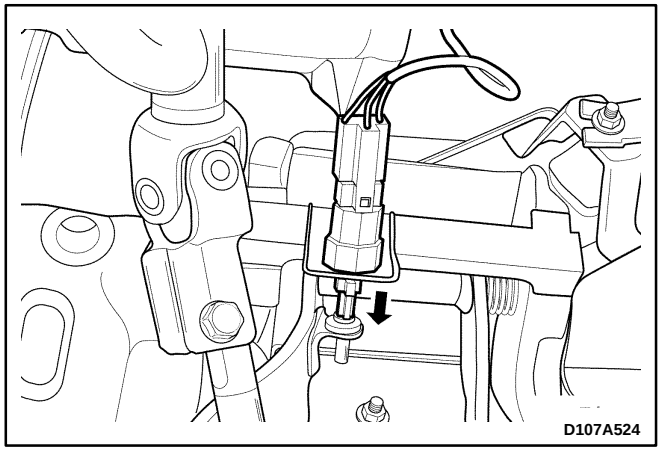


STOPLAMP SWITCH

(Left–Hand Drive Shown, Right–Hand Drive Similar)

Removal Procedure

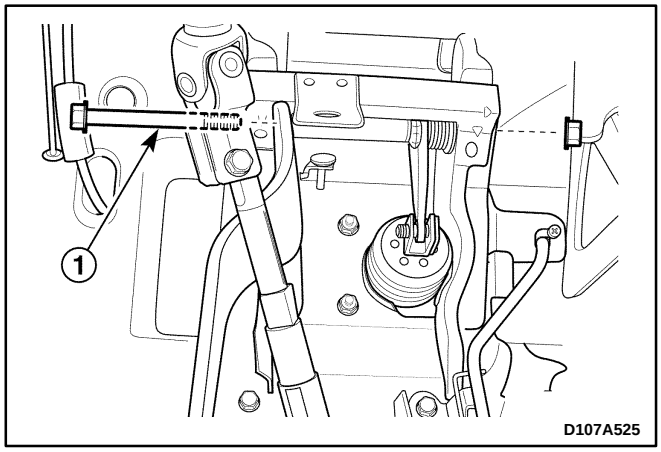
1. Disconnect the negative battery cable.
2. Remove the stoplamp switch.
   - Disconnect the connector (1).
   - Turn the stoplamp switch (2).



Installation Procedure

1. Install the stoplamp switch.
2. Connect the electrical connector.
3. Connect the negative battery cable.

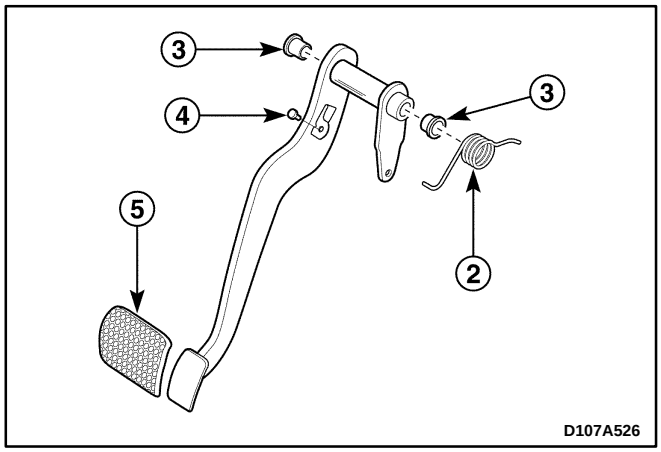
Important: After installing the stoplamp switch, pull the lever completely.



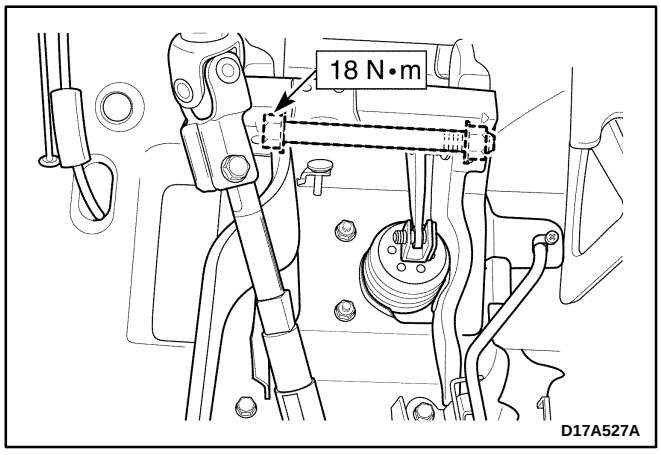
BRAKE PEDAL (LEFT–HAND DRIVE)

Removal Procedure

1. Remove the stoplamp switch. Refer to “Stoplamp Switch” in this section.
2. Disconnect the brake pedal from the power booster. Refer to *Section 4C, Power Booster.*
3. Remove the brake pedal.
   - Remove the bolt (1).



   - Remove the brake pedal spring (2).
   - Remove the bushing (3).
   - Remove the cushion (4).
   - Remove the brake pedal pad (5).

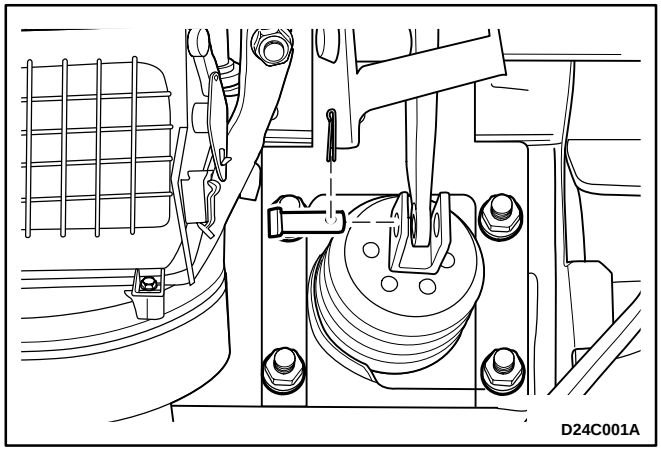


Installation Procedure

1. Install the pad to the brake pedal.
2. Install the brake pedal with spring, bushing, and cushion.
3. Connect the brake pedal to the power booster.

   ### Tighten

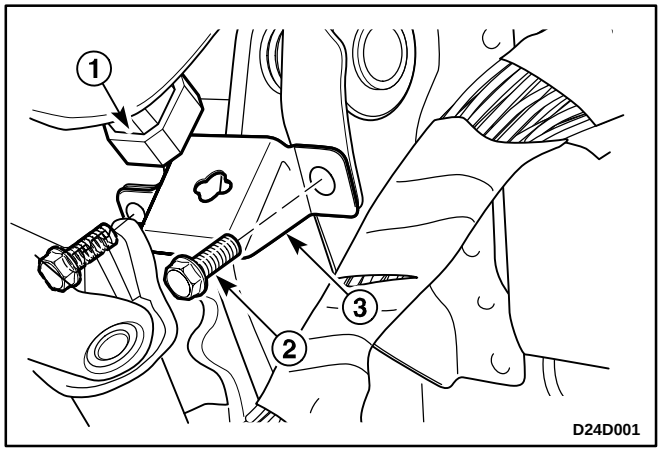
   Tighten the brake pedal–to–pedal bracket bolt to 18 N•m (13 lb-ft).
4. Install the stoplamp switch. Refer to “Stoplamp Switch” in this section.



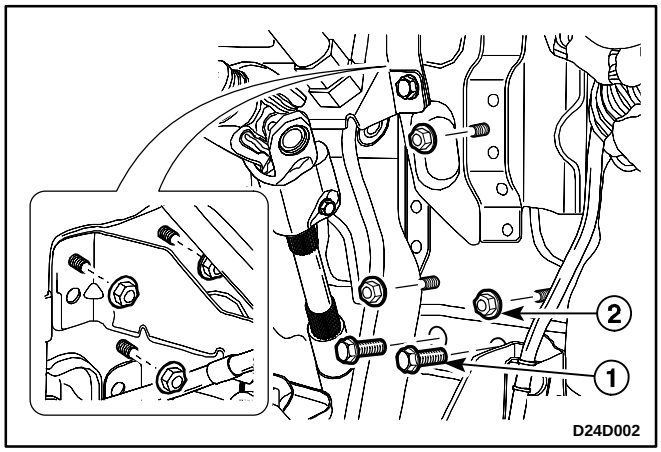
BRAKE PEDAL (RIGHT–HAND DRIVE)

Removal Procedure

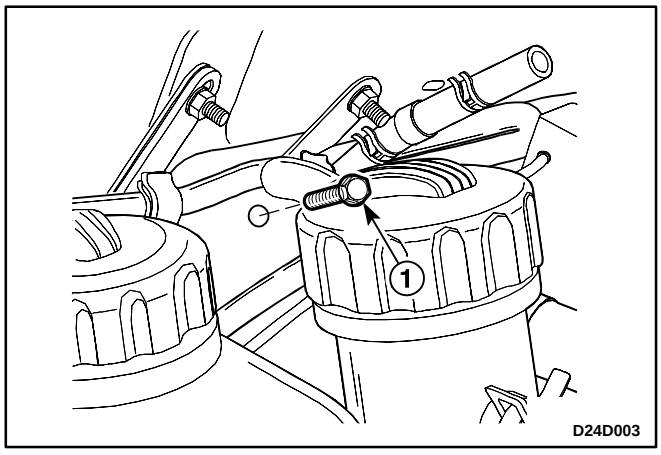
1. Remove the instrument panel assembly. Refer to *Section 9E, Instrument/Driver Information*.
2. Disconnect the brake pedal rod from the power booster. Refer to *Section 4C, Power Booster*.



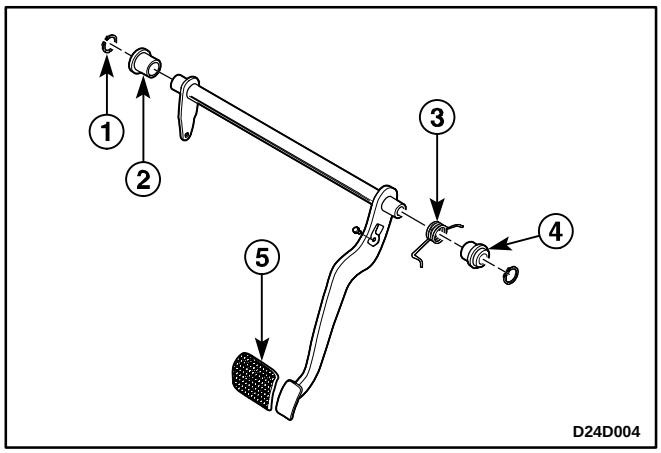
3. Remove the stoplamp switch.
   - Remove the stoplamp switch (1).
   - Remove the bolts (2).
   - Remove the stoplamp switch bracket (3).



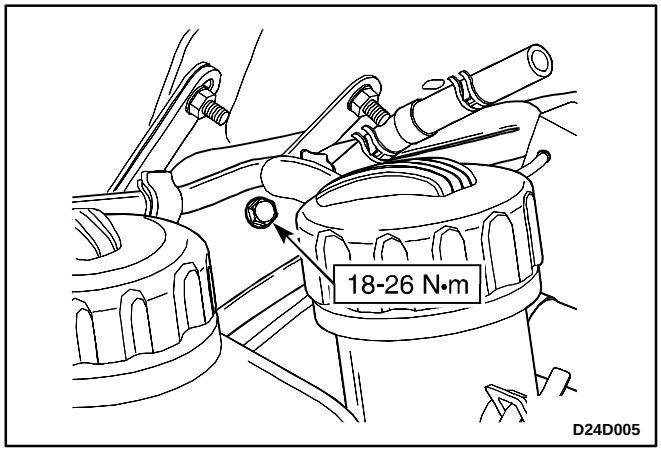
4. Remove the bolts mounting brake pedal bracket (1).
5. Remove the nuts mounting brake pedal bracket (2).



6. Remove the canister. Refer to *Section 1F, Engine Controls*.
7. Remove the bolt mounting brake pedal bracket in the engine compartment (1).



8. Remove the brake pedal.
   - Remove the snap rings (1).
   - Remove the bushings (2).
   - Remove the brake pedal spring (3).
   - Remove the cushion (4).
   - Remove the brake pedal pad (5).



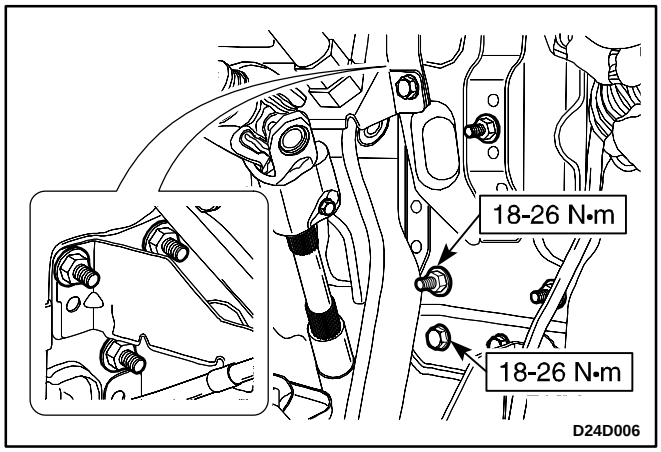
Installation Procedure

1. Install the brake pedal with pad, spring, bushings, and cushion.
2. Install the bolt mounting brake pedal bracket in the engine compartment.

Tighten

Tighten the bolt to 18–26 N•m (13–20 lb-ft).

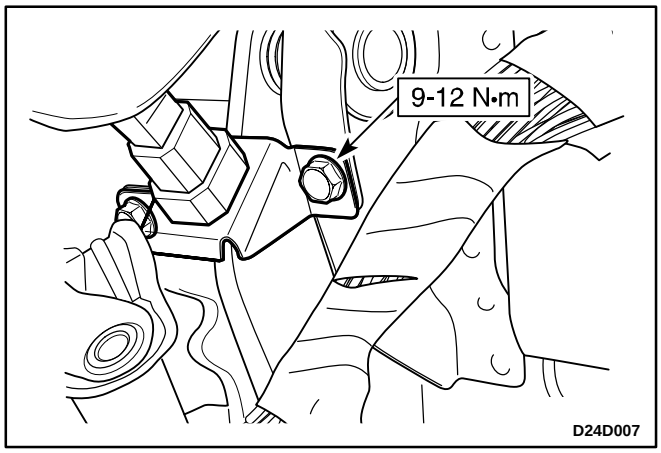
3. Install the canister. Refer to *Section 1F, Engine Controls*.



4. Install the brake pedal with the snap rings.
5. Install the bolts and nuts mounting brake pedal bracket.

Tighten

- Tighten the bolts mounting brake pedal bracket to 18–26 N•m (13–20 lb-ft).
- Tighten the nuts mounting brake pedal bracket to 18–26 N•m (13–20 lb-ft).



6. Install the stoplamp switch with the bracket and the bolts.

Tighten

Tighten the mounting bolts to 9–12 N•m (80–106 lb-in.)

7. Connect the brake pedal rod to the power booster. Refer to Section 4C, Power Booster.
8. Install the instrument panel assembly. Refer to *Section 9E, Instrument/Driver Information*.

SPECIFICATIONS

GENERAL SPECIFICATIONS

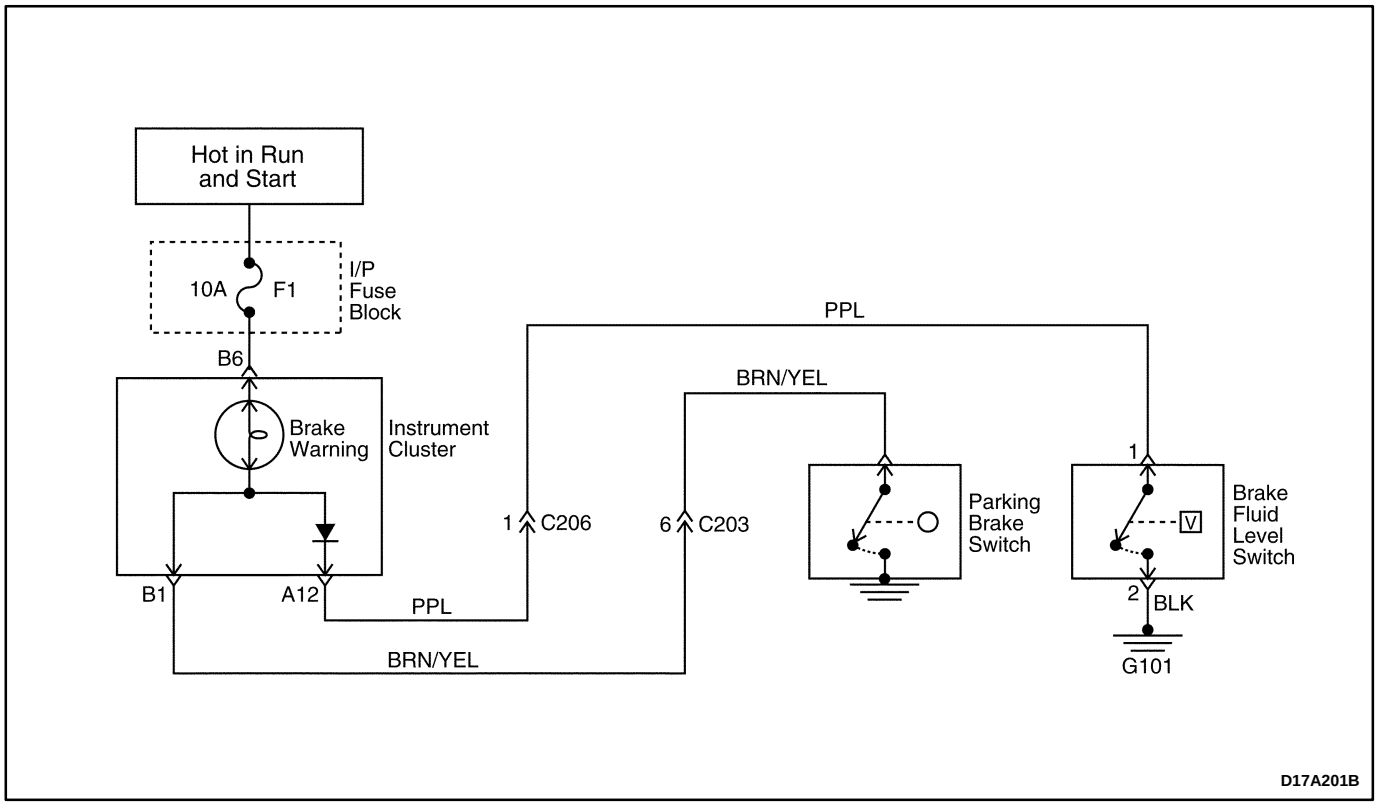
Application		0.8 SOHC Engine	
		Millimeters	Inches
Brake Drums:			
Inside Diameter		180	7.09
Maximum Rebore Diameter		182	7.17
Out-of-Round		0.04	0.0016
Brake Rotors:			
Discard Thickness		10	0.4
Lateral Runout (Installed)		0.05	0.002
Rotor Diameter		236	9.3
Rotor Thickness (New)		12.7	0.5
Master Cylinder:			
Bore Diameter		20.64	0.81
Caliper:			
Piston Diameter		48	1.89
Wheel Cylinder Diameter:		17.46	0.69
Brake Pedal:			
Free Play		6 – 10	0.24 – 0.31
Height		200	7.87
Stroke		30	1.18
Brake Fluid	Type	DOT–3 or DOT–4	
	Capacity	0.45 L (0.48 qt.)	

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Brake Pipe Fittings	16	12	–
Front Brake Hose-to-Caliper Bolt	25.5	19.1	–
Brake Pedal–to–Pedal Bracket Hex Bolt	18	13	–
Brake Pedal Bracket Mounting Bolts	18 – 26	13 – 20	–
Brake Pedal Bracket Mounting Nuts	18 – 26	13 – 20	–
Stoplamp Switch Mounting Bracket Bolts	9 – 12	–	80 – 106

SCHEMATIC AND ROUTING DIAGRAMS

BRAKE LAMP WARNING CIRCUIT



STOPLAMP SWITCH CIRCUIT