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.

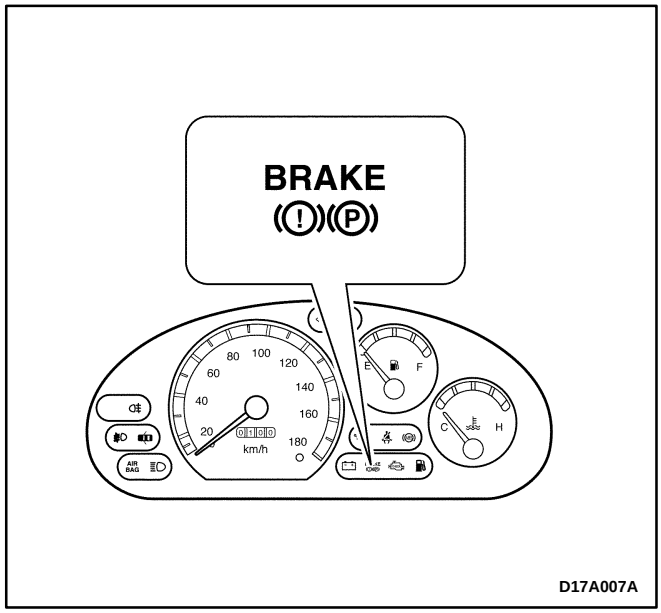
TABLE OF CONTENTS

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.



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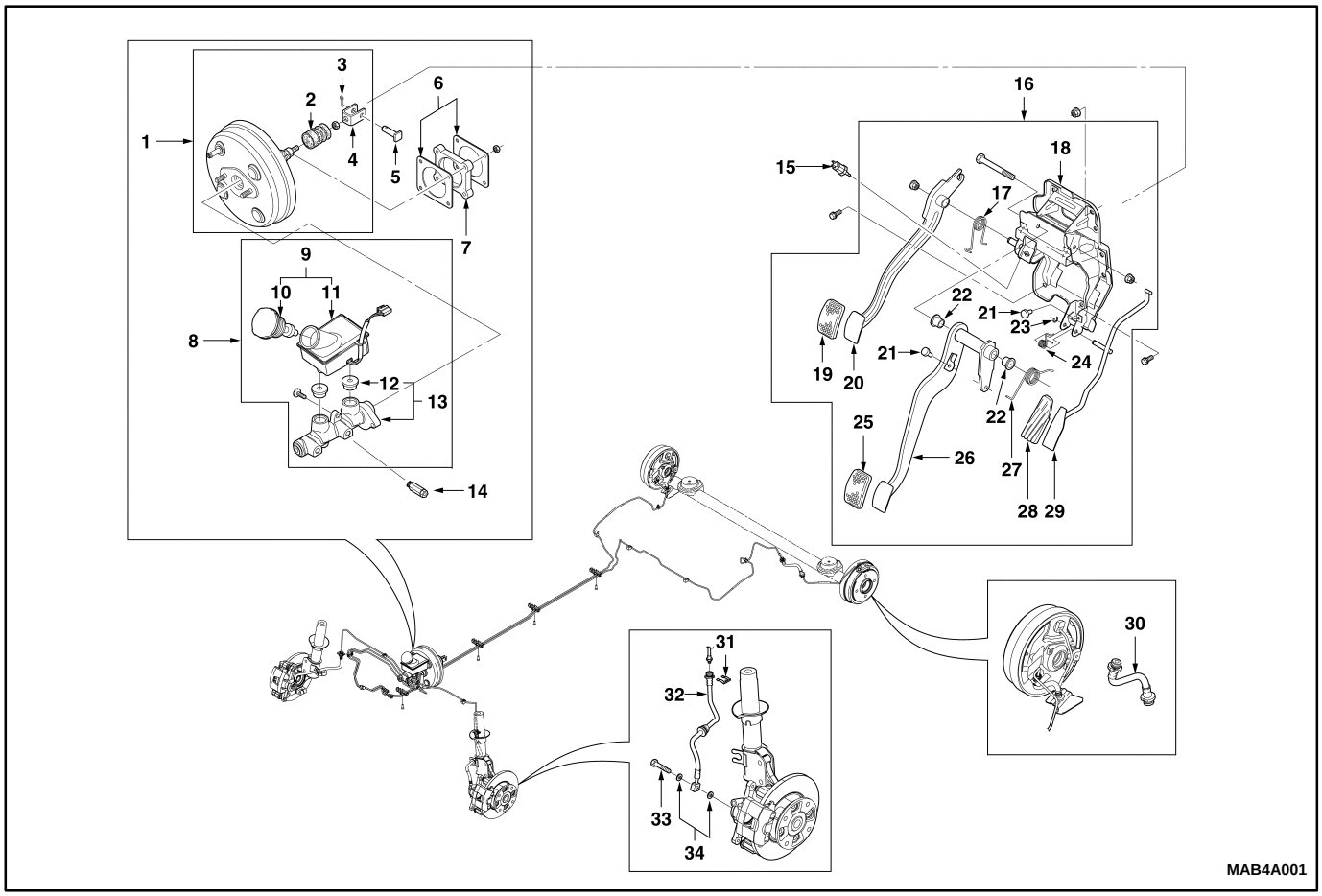
COMPONENT LOCATOR

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

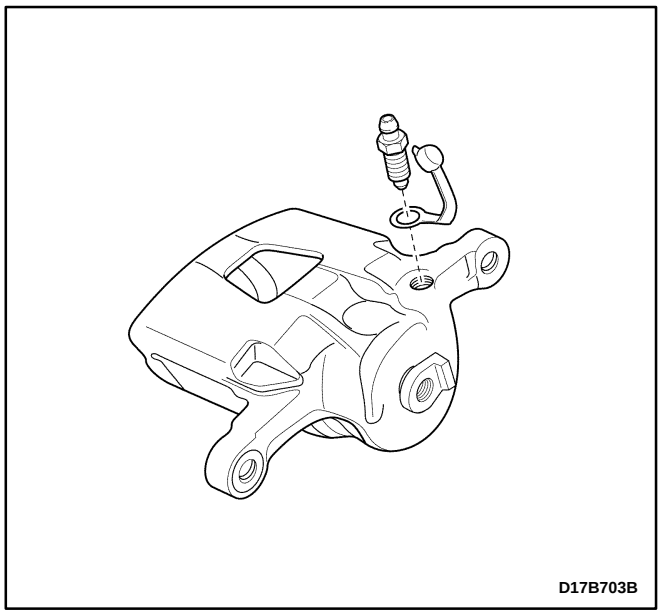
Condition	Probable cause	Correction
Brake Warning Lamp ON	● Brake fluid leaks.	● Repair the leaks or add th fluid.
	● Parking brake switch shorted to ground.	● Repair the short ground.
	● Faulty the fluid level sensor.	● Replace the sensor.
Stoplamp ON	● Faulty the stoplamp switch.	● Replace the stoplamp 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

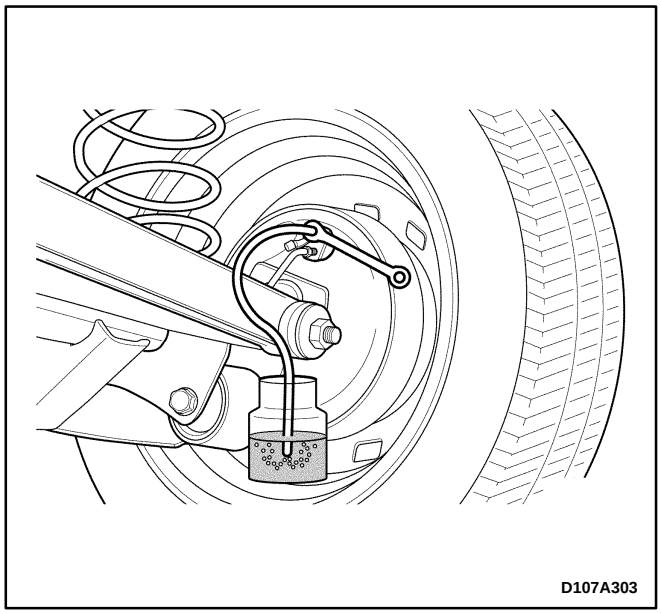
Important: The bleeding sequence is as follows; right rear, left rear, right front, and left front.

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.

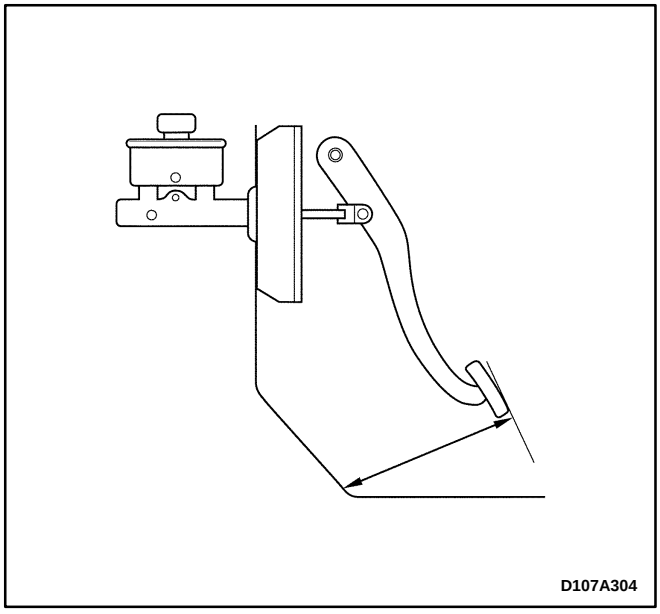
6. Repeat the step 5, 6 until all the air is removed.
7. Check the leaks for the bleeder screw.

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.

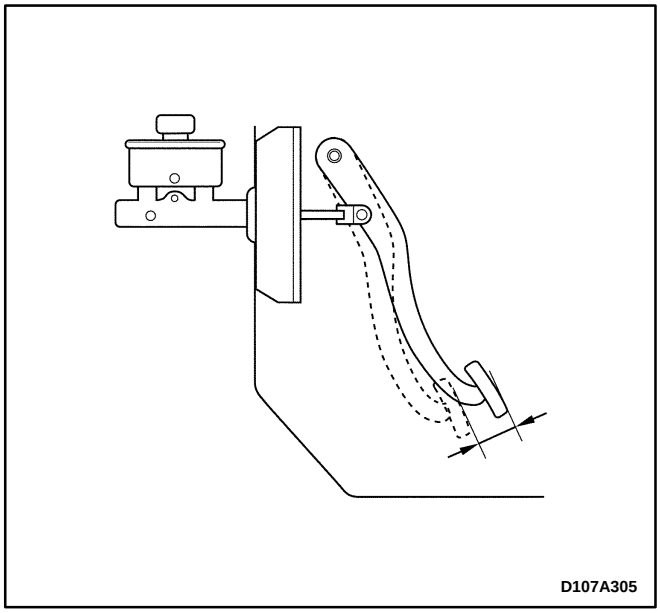
BRAKE PEDAL FREE PLAY INSPECTION

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.)

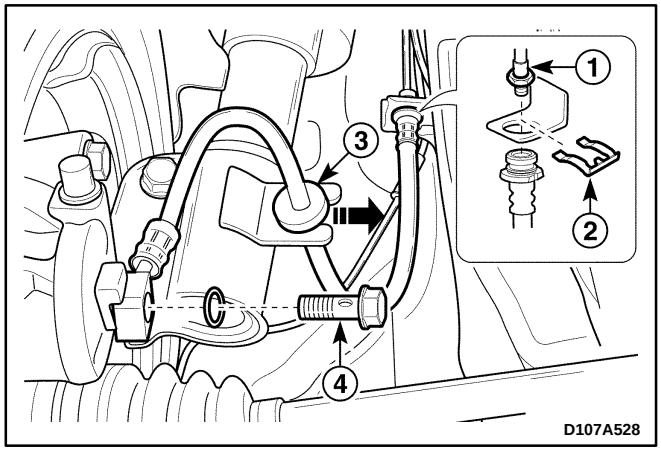
Specification	6–10 (0.24–0.31)

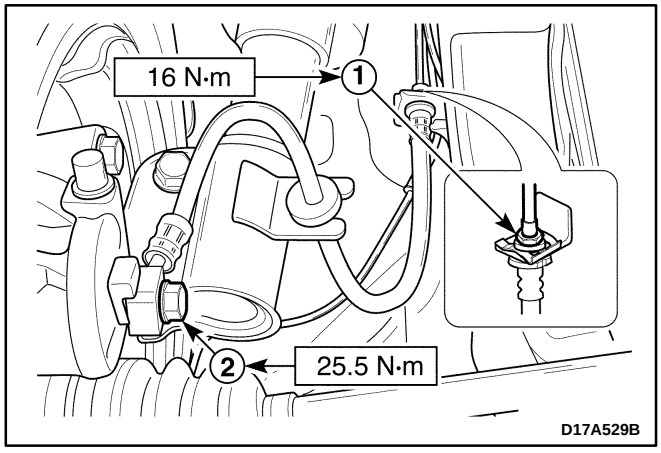
3. Brake pedal free play can not be adjusted.



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

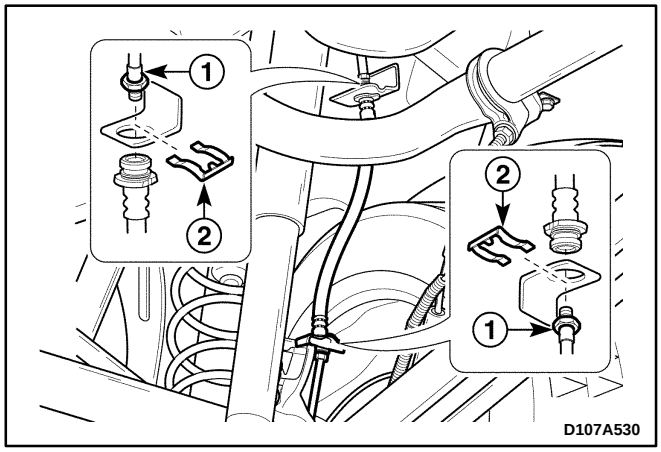
   Tighten the brake pipe–to–hose fitting to 16 N•m (12 lb-ft).
2. Install the brake hose coupling bolt (2).

   Tighten

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

Important: Use only Daewoo recommended brake fluid.

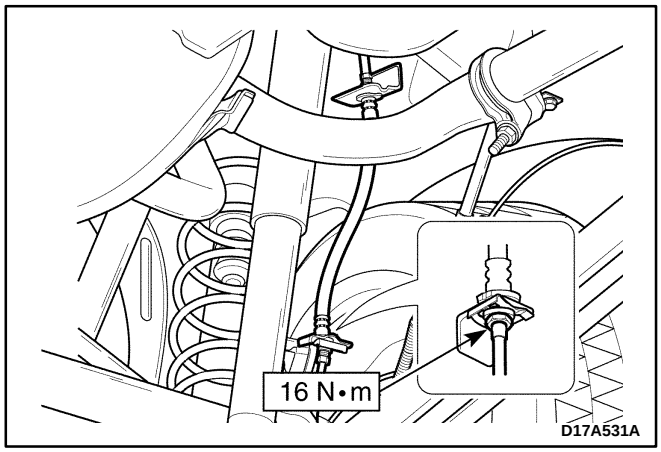
3. Bleed the brake system. Refer to “Manual Bleeding the Brakes” in this section.
4. Check the brake system for leaks.
5. Install the wheels. Refer to *Section 2E, Tires and Wheels*.



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

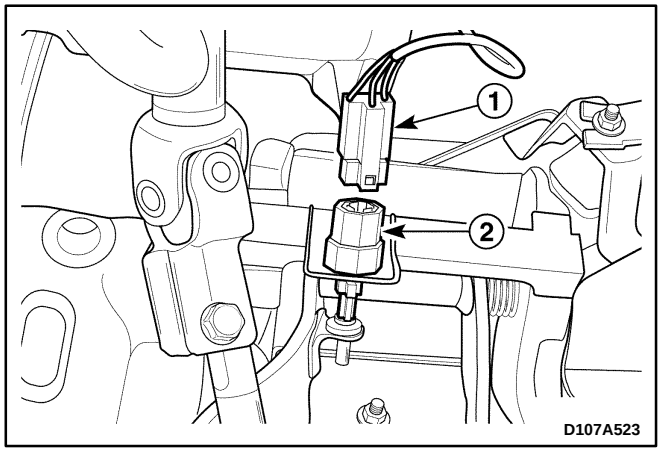
1. Connect the brake lines to the brake hose.
2. Install the fitting and E–rings.

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*.

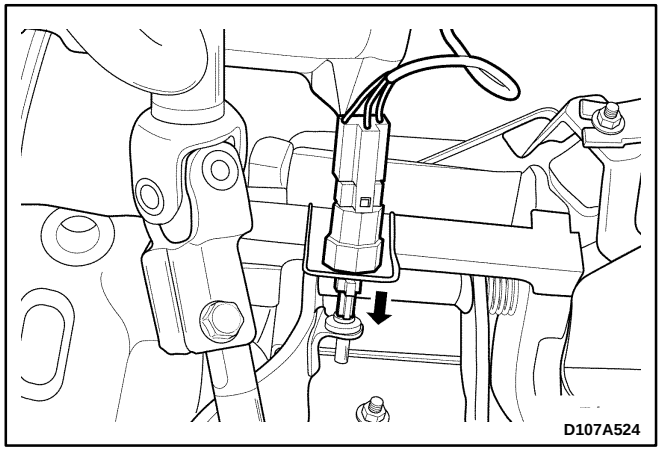


STOPLAMP SWITCH

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

Removal Procedure

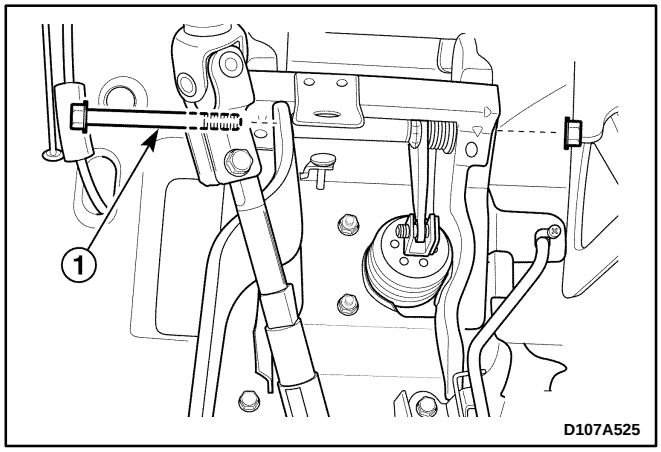
1. Disconnect the negative battery cable.
2. Remove the stoplamp switch.
   - Disconnect the connector (1).
   - Turn the stoplamp switch (2).



Installation Procedure

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

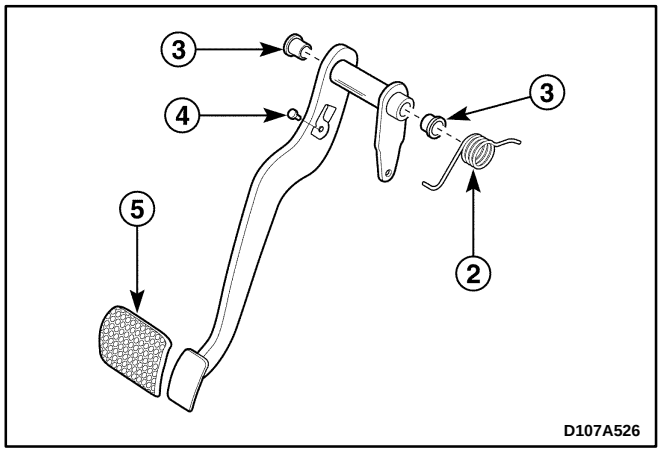
Important: After installing the stoplamp switch, pull the lever completely.



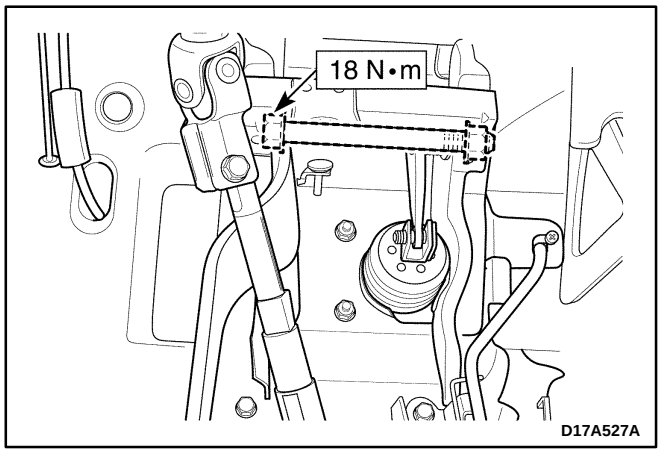
BRAKE PEDAL (LEFT–HAND DRIVE)

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).

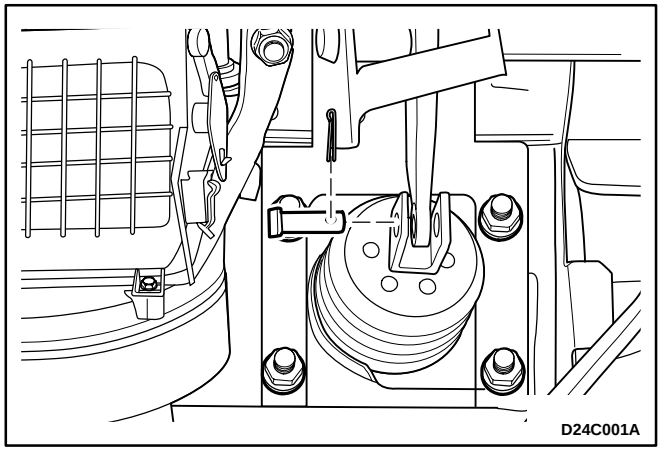


Installation Procedure

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

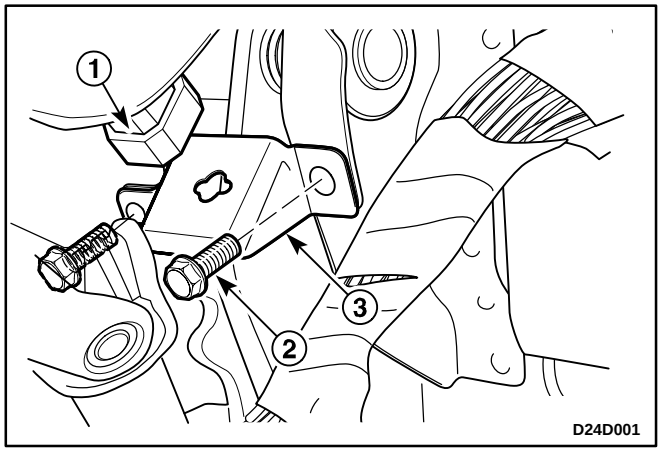
   Tighten the brake pedal–to–pedal bracket bolt to 18 N•m (13 lb-ft).
4. Install the stoplamp switch. Refer to “Stoplamp Switch” in this section.



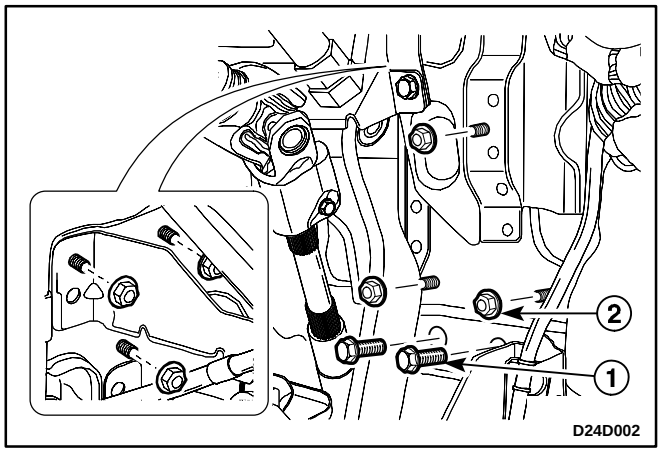
BRAKE PEDAL (RIGHT–HAND DRIVE)

Removal Procedure

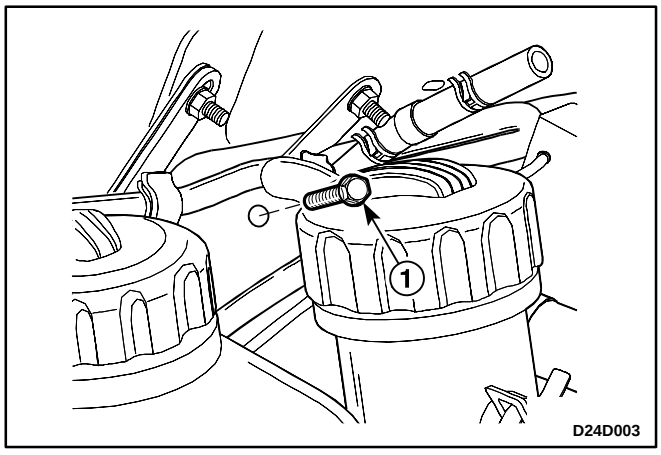
1. Remove the instrument panel assembly. Refer to *Section 9E, Instrument/Driver Information*.
2. Disconnect the brake pedal rod from the power booster. Refer to *Section 4C, Power Booster*.



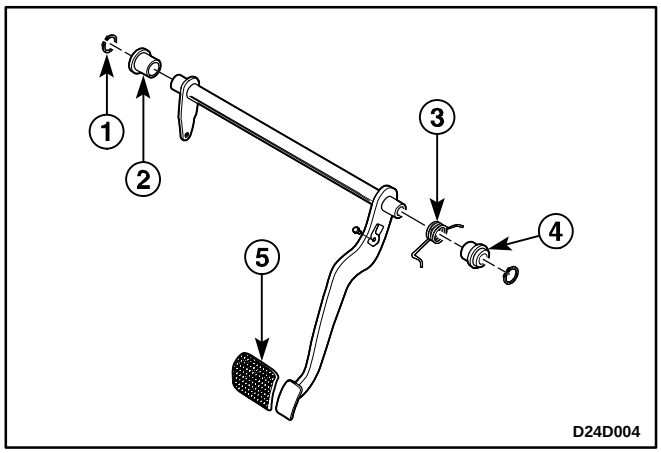
3. Remove the stoplamp switch.
   - Remove the stoplamp switch (1).
   - Remove the bolts (2).
   - Remove the stoplamp switch bracket (3).



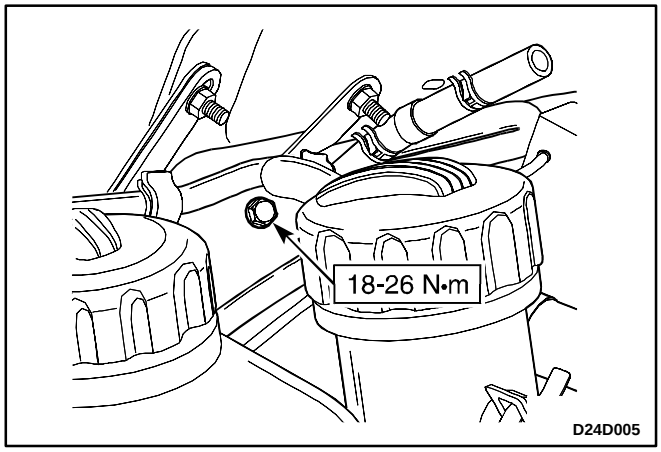
4. Remove the bolts mounting brake pedal bracket (1).
5. Remove the nuts mounting brake pedal bracket (2).



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).



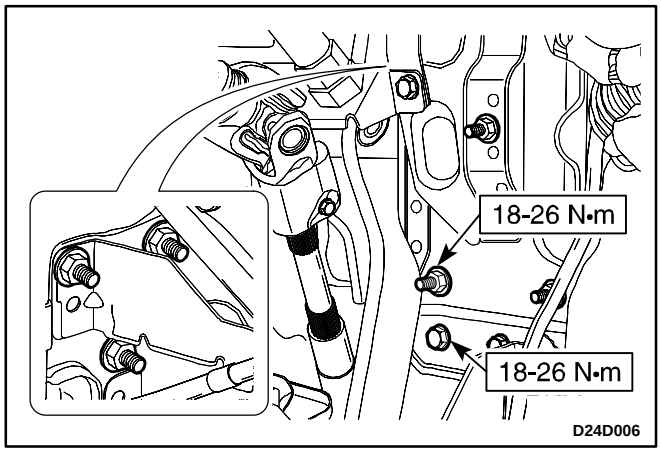
Installation Procedure

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).

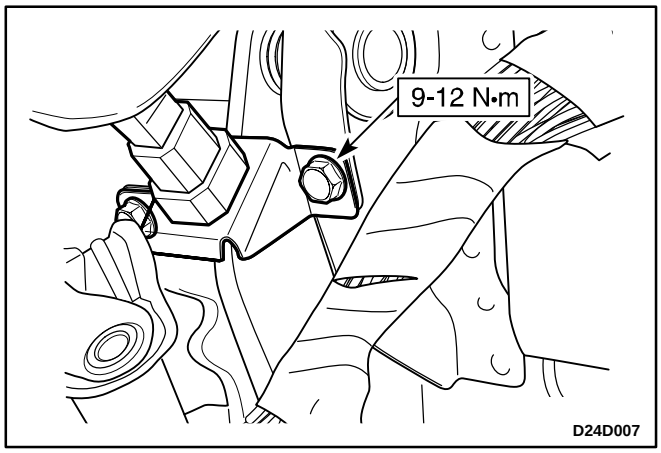
3. Install the canister. Refer to *Section 1F, Engine Controls*.



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

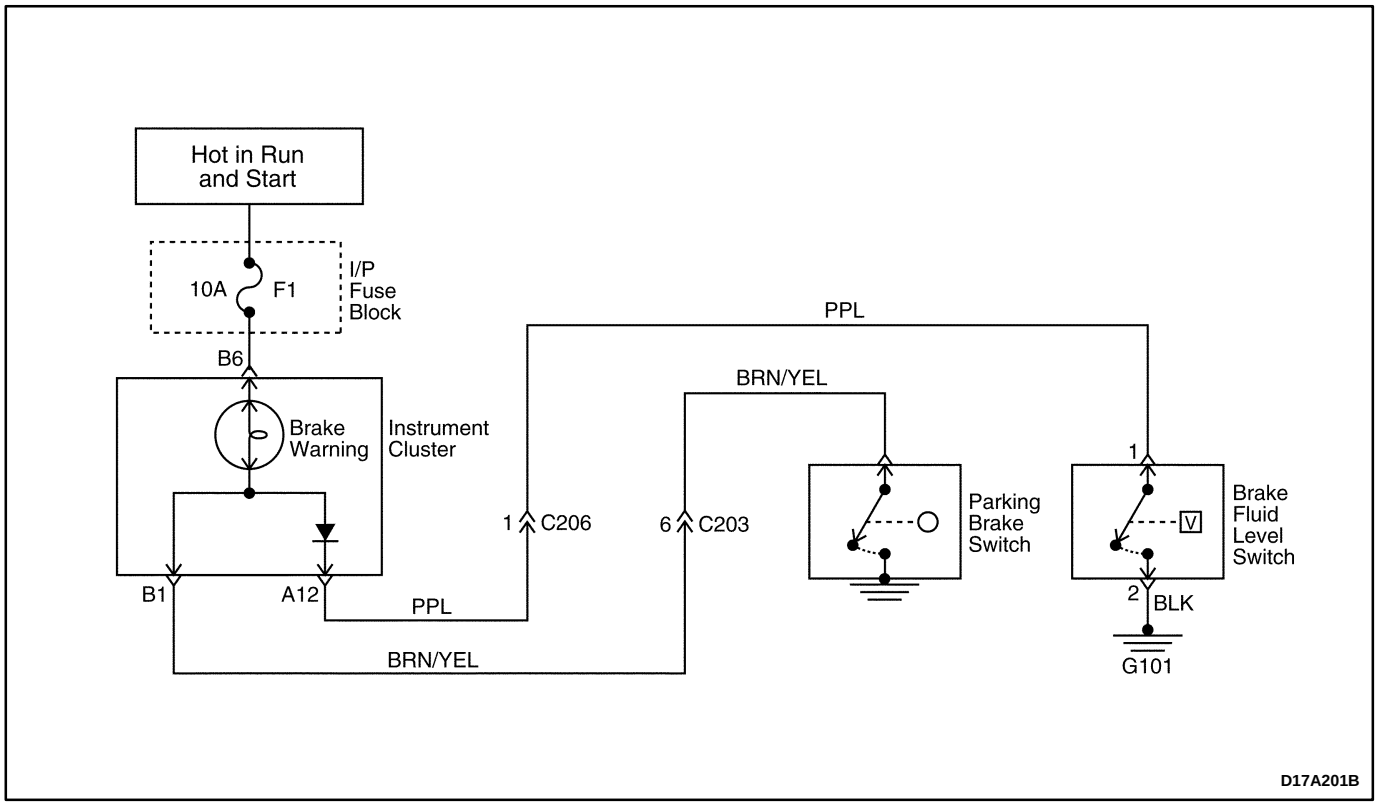
Application		0.8 SOHC Engine	
		Millimeters	Inches
Brake Drums:			
Inside Diameter		180	7.09
Maximum Rebore Diameter		182	7.17
Out-of-Round		0.04	0.0016
Brake Rotors:			
Discard Thickness		10	0.4
Lateral Runout (Installed)		0.05	0.002
Rotor Diameter		236	9.3
Rotor Thickness (New)		12.7	0.5
Master Cylinder:			
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

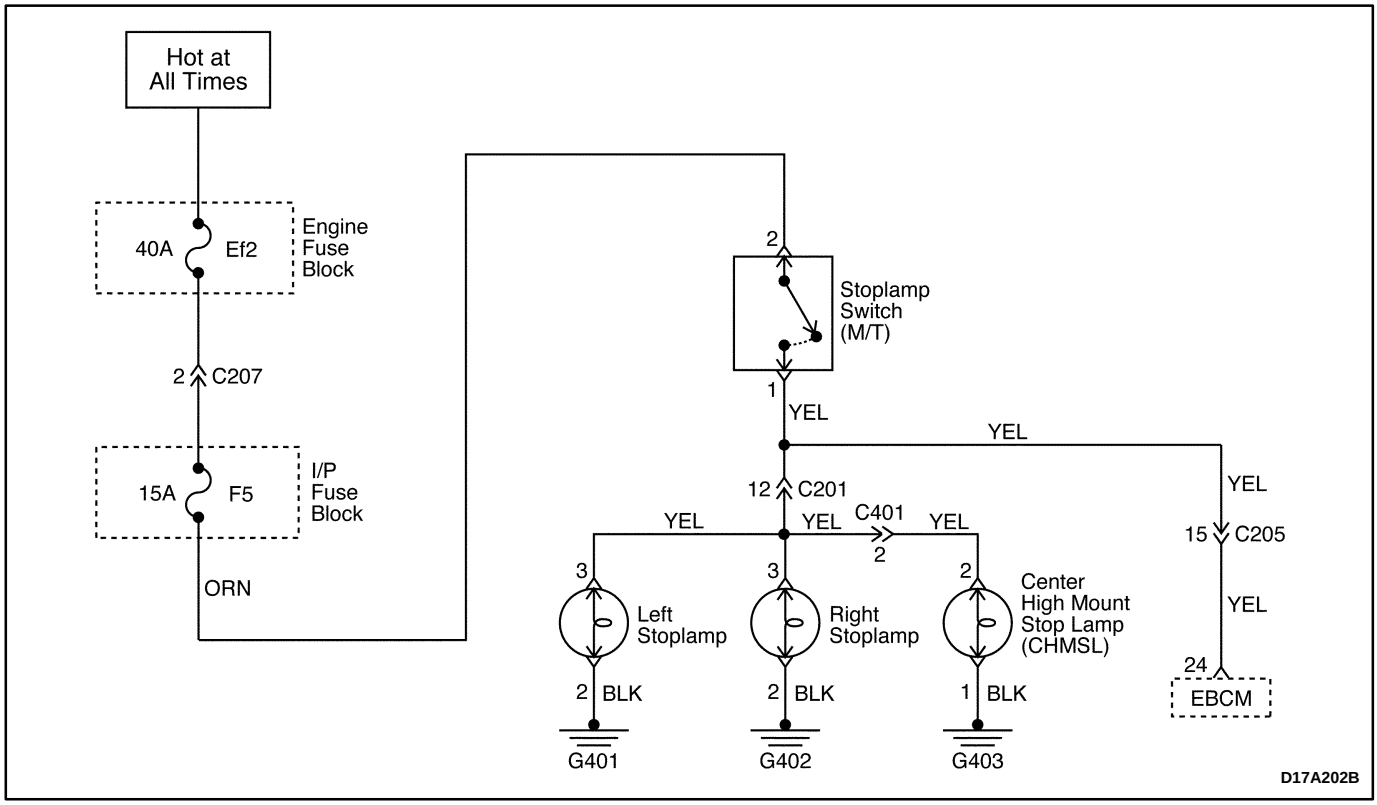
Application	N•m	Lb-Ft	Lb-In
Brake Pipe Fittings	16	12	–
Front Brake Hose-to-Caliper Bolt	25.5	19.1	–
Brake Pedal–to–Pedal Bracket Hex Bolt	18	13	–
Brake Pedal Bracket Mounting Bolts	18 – 26	13 – 20	–
Brake Pedal Bracket Mounting Nuts	18 – 26	13 – 20	–
Stoplamp Switch Mounting Bracket Bolts	9 – 12	–	80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

SCHEMATIC AND ROUTING DIAGRAMS

BRAKE LAMP WARNING CIRCUIT



STOPLAMP SWITCH CIRCUIT



SECTION 4B

MASTER CYLINDER

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DESCRIPTION AND OPERATION

MASTER CYLINDER

The master cylinder is designed for use in a direct–split system. Front right brake and rear left brake are served by the primary piston. Front left brake and rear right brake are served by the secondary piston.

The master cylinder incorporates the functions of the standard dual master cylinder, plus a low fluid level indicator and the proportioning valve in the non–antilock braking system.

The proportioning valves limit the outlet pressure to the rear brakes after a predetermined master cylinder has been reached.

Important:

- Replace all the components included in the repair kits used to service this master cylinder.
- Lubricate rubber parts with clean brake fluid to ease assembly.
- Do not use lubricated shop air on brake parts, as this may damage rubber components.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
- The torque values specified are for dry, unlubricated fasteners.
- Perform all service operations on a clean bench, free from all traces of mineral oil.

PROPORTIONING VALVE

The proportioning valve limits the outlet pressure to the rear brakes on the non-ABS after a predetermined master cylinder pressure has been reached. This is used when less rear apply force is needed to obtain optimum braking and is usually found on disc/drum brake configurations. On ABS-equipped vehicles, refer to *Section 4F, Antilock Brake System*.

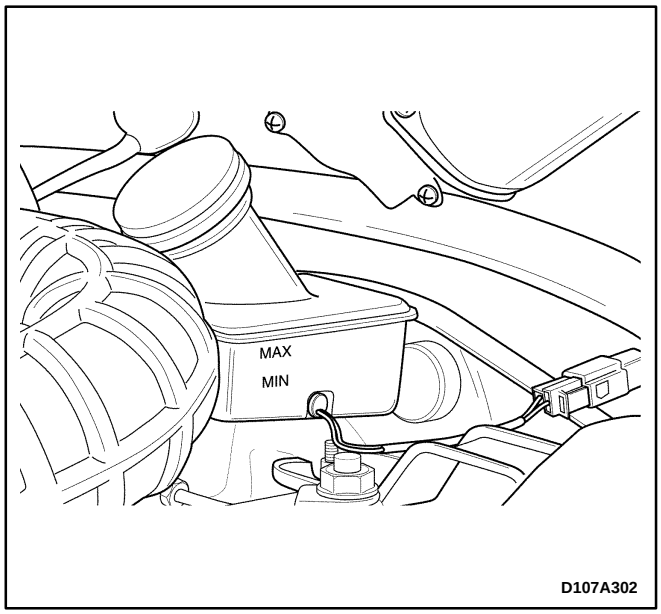
FLUID LEVEL SENSOR

Fluid level sensor is attached at the brake fluid reservoir. This sensor will activate the BRAKE light if a low fluid level condition is detected. Once the fluid level is corrected, the BRAKE light will go out.

DIAGNOSTIC INFORMATION AND PROCEDURES

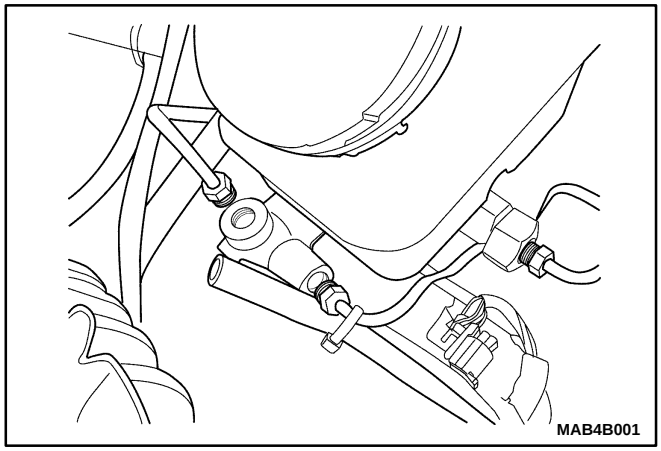
CHECKING THE BRAKE FLUID LEVEL

1. Check the fluid level.
2. If the fluid level is below MAX, refill the fluid to MAX.



REPAIR INSTRUCTIONS

ON–VEHICLE SERVICE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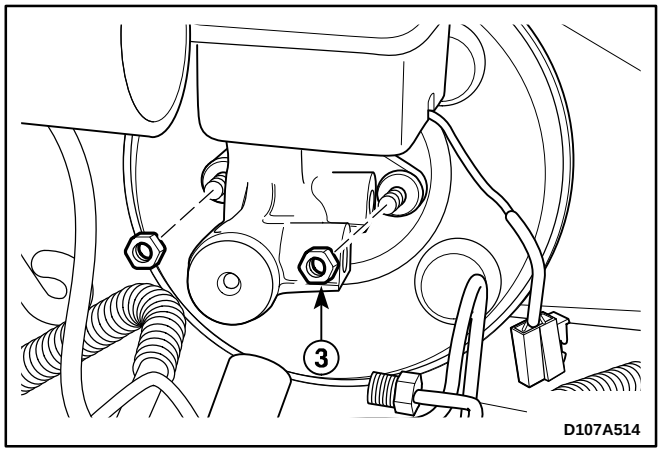
MASTER CYLINDER ASSEMBLY

Removal Procedure

1. Remove the air filter assembly. Refer to *Section 1B, Engine Mechanical*.
2. For vehicles with the non–ABS braking system, remove the proportioning valve. Refer to “Proportioning Valve” in this section.
3. Remove the master cylinder.
   - Disconnect the electrical connector.
   - Loosen the brake pipe fittings.
   - Plug the opening in the master cylinder to prevent fluid loss or contamination.

Notice: Brake fluid may damage paintwork, if spillage onto paintwork, wash with cold water immediately.

- Remove the nuts mounting the master cylinder (3).



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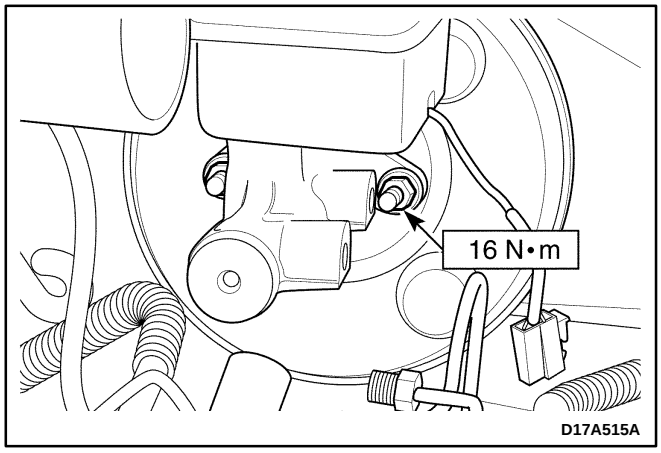
Installation Procedure

Important: Use only Daewoo recommended brake fluid.

1. Install the master cylinder assembly with the nuts.

Tighten

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



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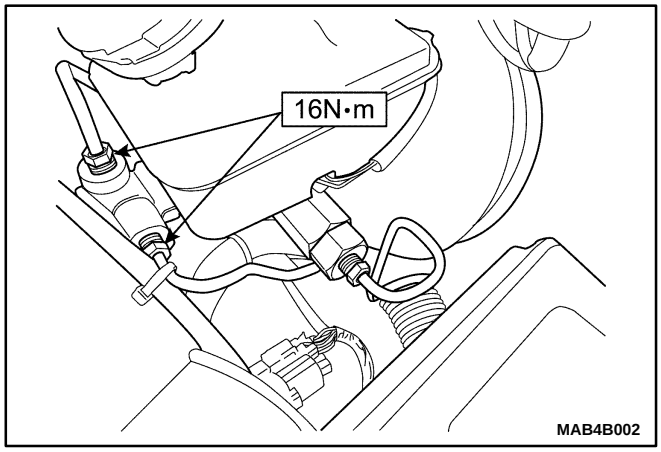
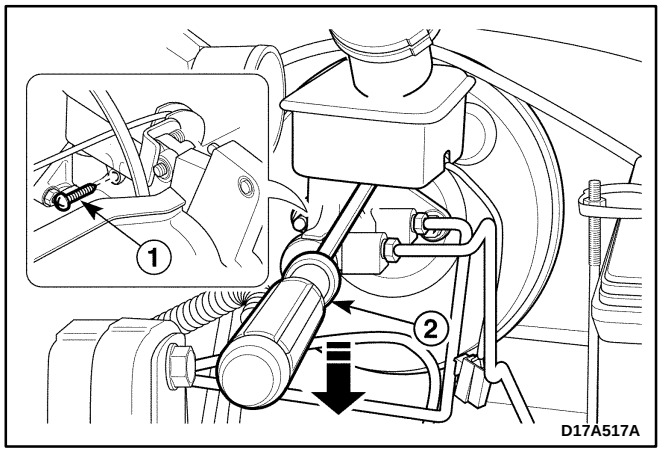


2. Install the brake pipe fittings to the master cylinder.

Tighten

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

3. Connect the electrical connector.
4. For vehicles with the non–ABS braking system, install the proportioning valve. Refer to “Proportioning Valve” in this section.
5. Install the air filter assembly. Refer to *Section 1B, Engine Mechanical*.
6. Bleed the brake system. Refer to Section 4A, Hydraulic Brakes.

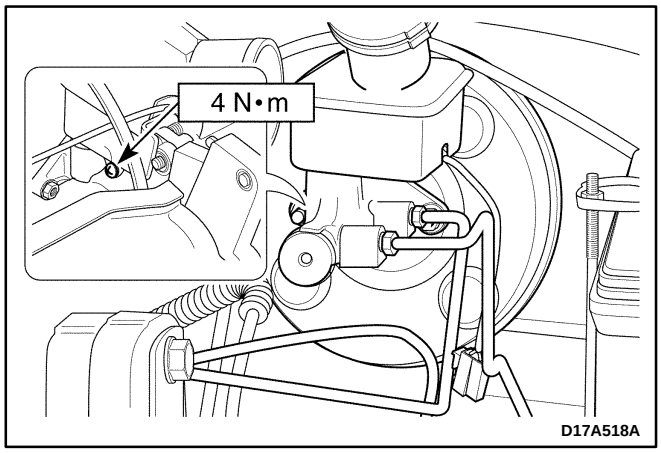


BRAKE FLUID RESERVOIR

Removal Procedure

1. Remove the fluid level switch connector. Refer to “Brake Fluid Level Switch” in this section.
2. Remove the reservoir.
   - Drain the brake fluid.
   - Remove the screw (1).
   - Remove the fluid reservoir using a flathead screwdriver (2).

Notice: Do not force one side strongly to prevent damage of reservoir when removing the reservoir.



Installation Procedure

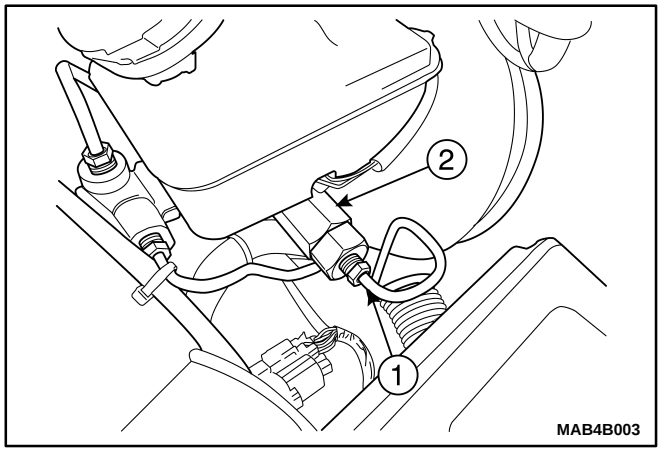
Important: Use only Daewoo recommended brake fluid.

1. Install the reservoir with the screw.

Tighten

Tighten the screw to 4 N•m (35 lb-ft).

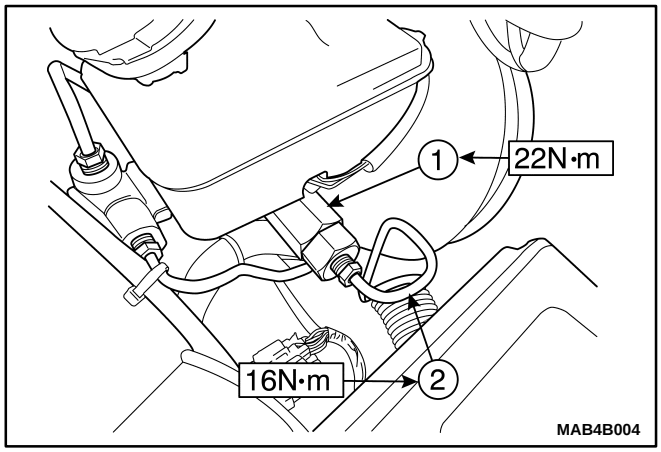
2. Install the fluid level switch connector. Refer to “Brake Fluid Level Switch” in this section.
3. Add brake fluid.
4. Bleed the brake system. Refer to *Section 4A, Hydraulic Brakes*.



PROPORTIONING VALVE (FOR VEHICLE WITH THE NON–ABS BRAKING SYSTEM)

1. Remove the proportioning valve.
   - Loosen the brake pipe fittings–to–proportioning valve (1).
   - Remove the proportioning valve (2).
   - Plug the opening in the proportioning valve and brake pipe fitting to prevent fluid loss or contamination.

Notice: Brake fluid may damage paintwork, if spillage onto paintwork, wash with cold water immediately.



Installation procedure

1. Install the proportioning valve (1).

Tighten

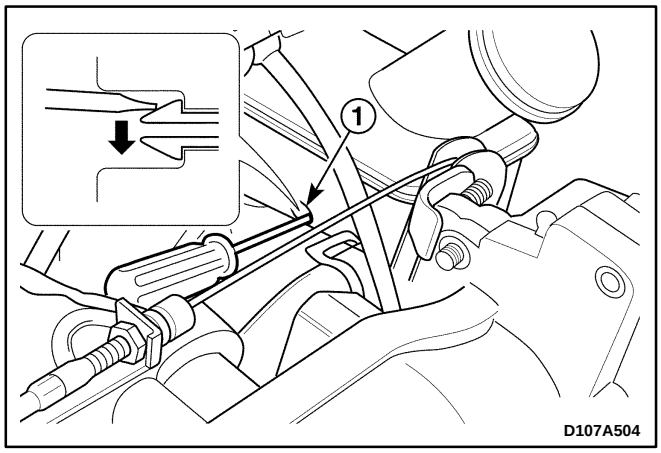
Tighten the proportioning valve to 22 N•m (16 lb-ft).

2. Install the brake pipe fitting (2).

Tighten

Tighten the brake pipe fitting–to–proportioning valve to 16 N•m (12 lb-ft).

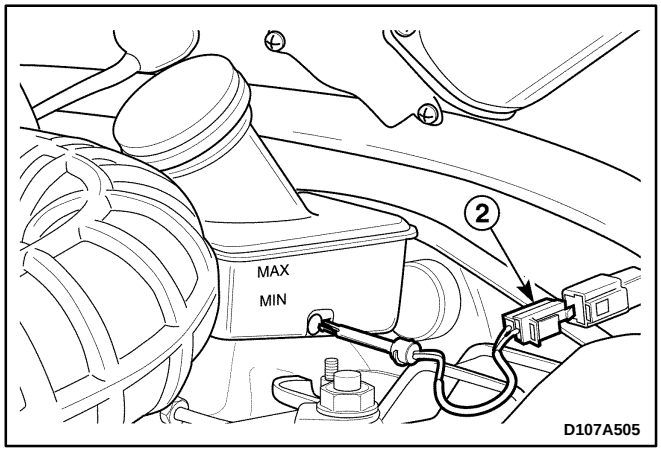
3. Bleed the brake system. Refer to *Section 4A, Hydraulic Brakes*.



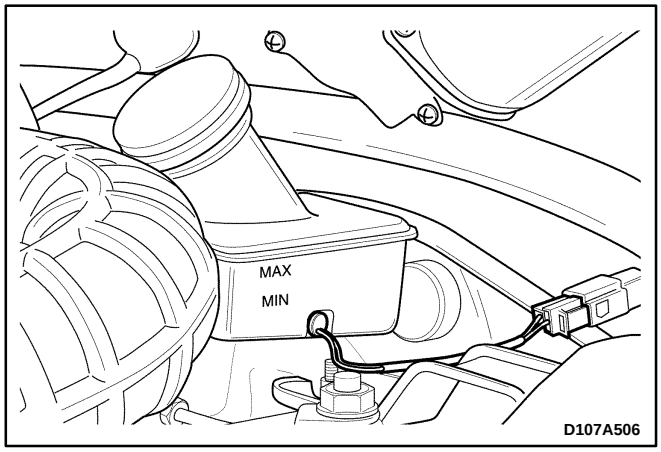
BRAKE FLUID LEVEL SWITCH

Removal procedure

1. Remove the vacuum hose from the power booster. Refer to *Section 4C, Power Booster.*
2. Remove the brake fluid level switch.
   - Remove the brake fluid level switch locking system by the flathead screwdriver (1).



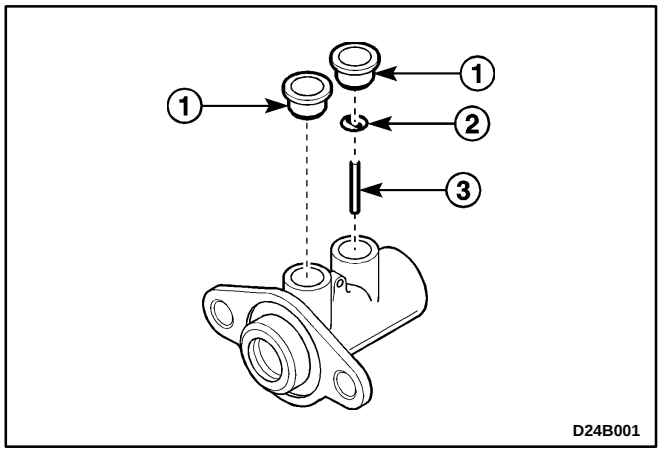
- Disconnect the electrical connector (2).



Installation procedure

1. Install the brake fluid level switch.
2. Connect the electrical connector.
3. Install the vacuum hose to the power booster. Refer to *Section 4C, Power Booster.*

UNIT REPAIR

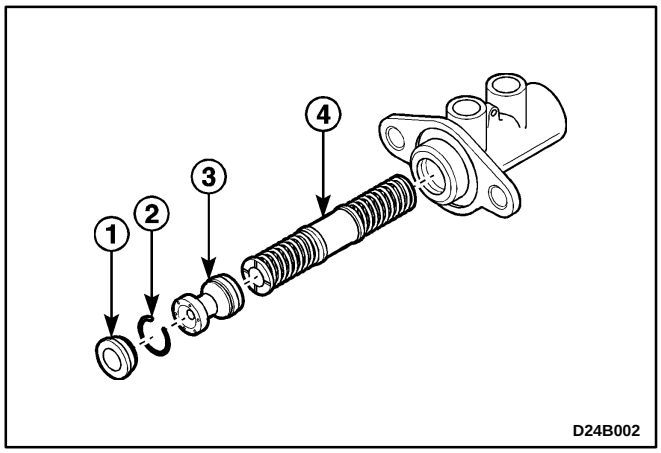


MASTER CYLINDER

(ABS Type Master Cylinder is Shown, Non–ABS Type Master Cylinder is Similar)

Disassembly Procedure

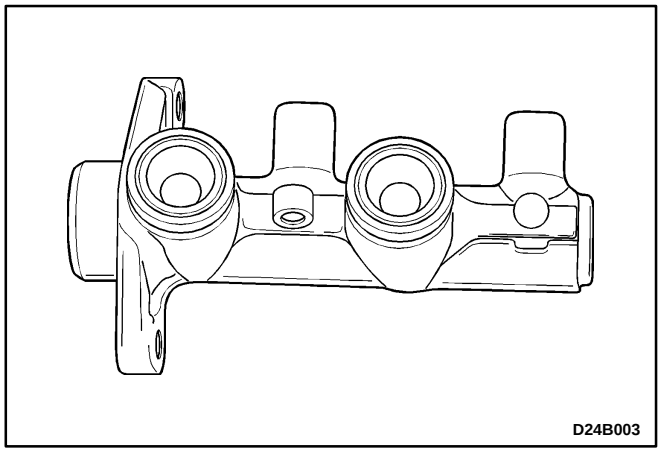
1. Remove the master cylinder. Refer to “Master Cylinder Assembly” in this section.
2. Remove the brake fluid reservoir. Refer to “Brake Fluid Reservoir” in this section.
3. Remove the reservoir seals (1).
4. Remove the washer (2).
5. Remove the stop pin (3).



6. Remove the boot (1).
7. Remove the retaining ring (2).

Notice: When removing the retaining ring, avoid damaging the piston or the cylinder wall.

8. Remove the primary piston (3).
9. Carefully remove the secondary piston assembly and the spring from the master cylinder bore (4).



Assembly Procedure

1. Install the secondary piston assembly .
2. Install the stop pin.
3. Install the primary piston.
4. Install the retaining ring.
5. Install the boot.
6. Install the washer.
7. Install the reservoir seals.
8. Install the brake fluid reservoir. Refer to “Brake Fluid Reservoir” in this section.
9. Install the master cylinder. Refer to “Master Cylinder Assembly” in this section.
10. Raise and suitably support the vehicle.
11. Bleed the braking system. Refer to *Section 4A, Hydraulic Brakes*.
12. Lower the vehicle.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application		Unit	Description
Master Cylinder	Type	–	Tandem
	Bore Diameter	mm (in.)	20.64 (0.81)
Proportioning Valve	Cut–In Pressure	kPa (psi)	3,000(435.1)
	Pressure Ratio	–	0.25 : 30

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Fluid Reservoir Screw	4	–	35
Master Cylinder Attaching Nuts	16	12	–
Brake Pipe Fittings to Master Cylinder	16	12	–
Brake Pipe Fittings to Proportioning Valve	16	12	–
Brake Pipe Fittings to Rear Wheel Cylinder	16	12	–
Brake Pipe Fittings to Front Caliper	16	12	–
Proportioning Valve	22	16	–

SECTION 4C

POWER BOOSTER

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

POWER BOOSTER

This booster is a single diaphragm, vacuum-suspended unit. In a normal operating mode, with the service brakes in the release position, a vacuum-suspended booster operates with a vacuum on both sides of its diaphragm. When the brakes are applied, air at atmospheric pressure is admitted to one side of the diaphragm to provide the power assist. When the brakes are released, atmospheric air is shut off from that side of the diaphragm. The air is then drawn from the booster through the vacuum check valve by the vacuum source.

Important: If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.

DIAGNOSTIC INFORMATION AND PROCEDURES

POWER BOOSTER FUNCTIONAL CHECK

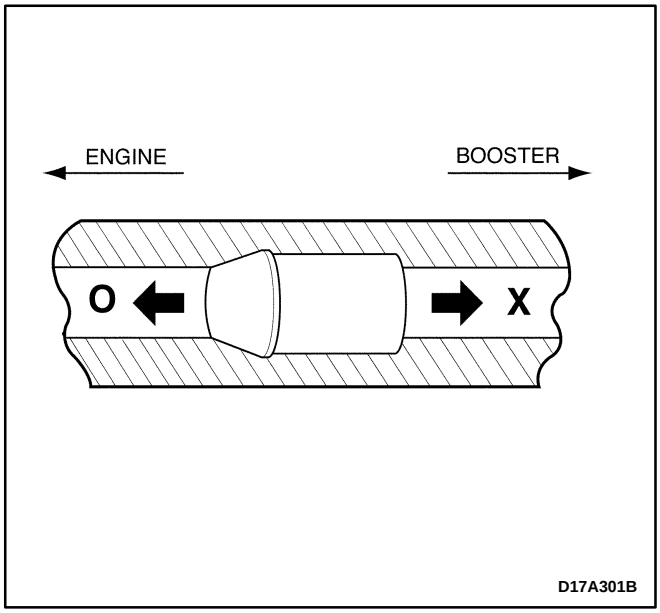
1. With the engine stopped, eliminate the vacuum in the booster by pumping the brake pedal several times.
2. Push the pedal down and hold it in this position.
3. Start the engine.
4. The booster is OK if the pedal drops further because of extra force produced.

If the brake pedal does not drop, the vacuum system (vacuum hoses, check valve, etc.) is probably defective and should be checked.

If no defect is revealed by checking the vacuum system, the defect is in the booster itself.

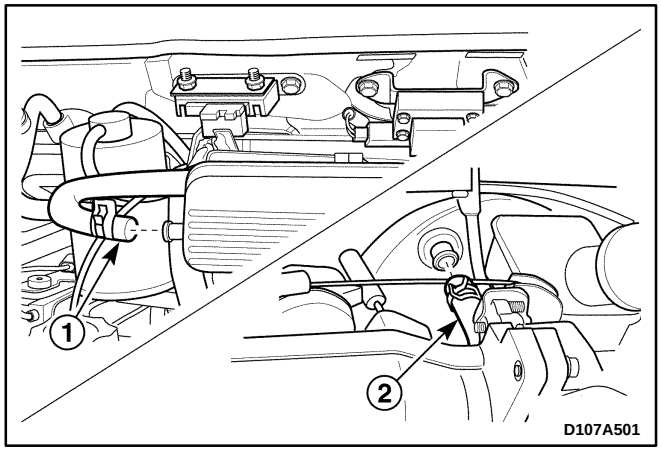
CHECK VALVE FUNCTIONAL CHECK

1. Remove the vacuum hose.
2. Suck the vacuum hose to power booster. And also, suck the vacuum hose to engine.
3. If the air pass through the check valve or not, replace the check valve. And if the vacuum hose to engine is only sucked, the check valve OK.



REPAIR INSTRUCTIONS

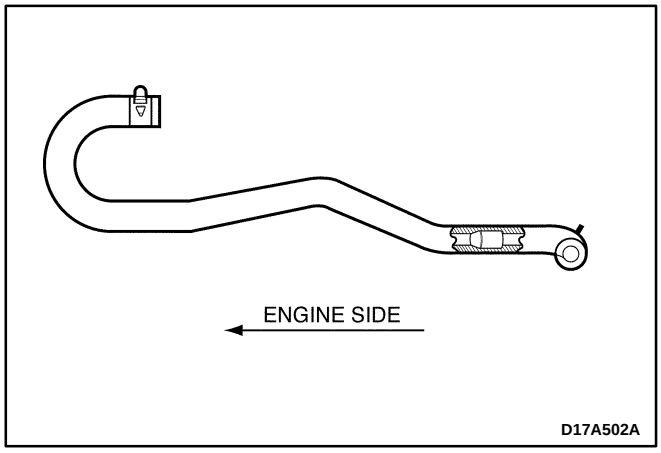
ON–VEHICLE SERVICE



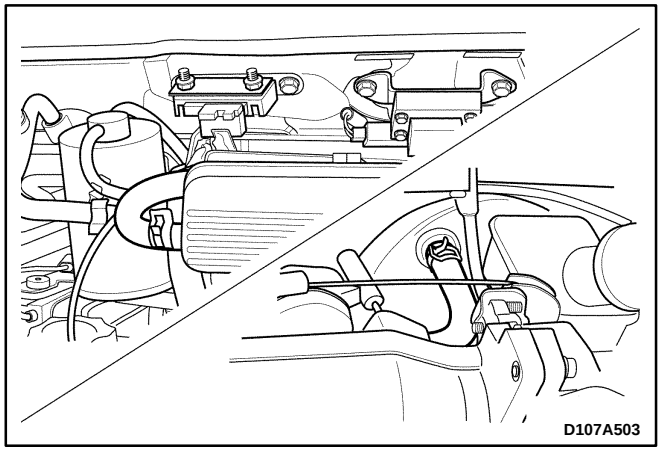
VACUUM HOSE AND CHECK VALVE

Removal Procedure

1. Remove the vacuum hose.
   - Disconnect the vacuum hose from the intake manifold (1).

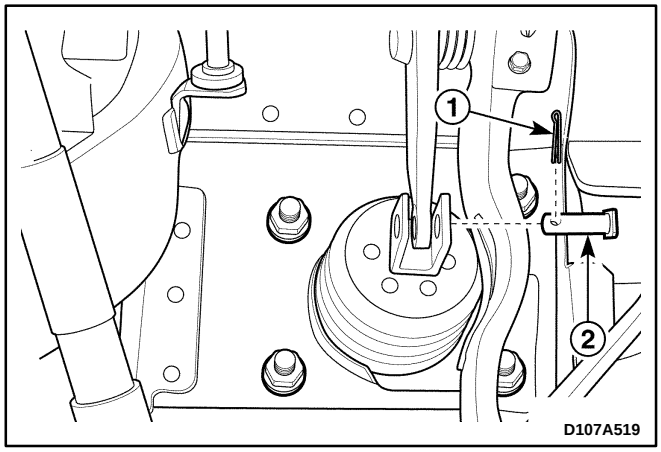


   - Disconnect the vacuum hose from the power booster (2).



Installation Procedure

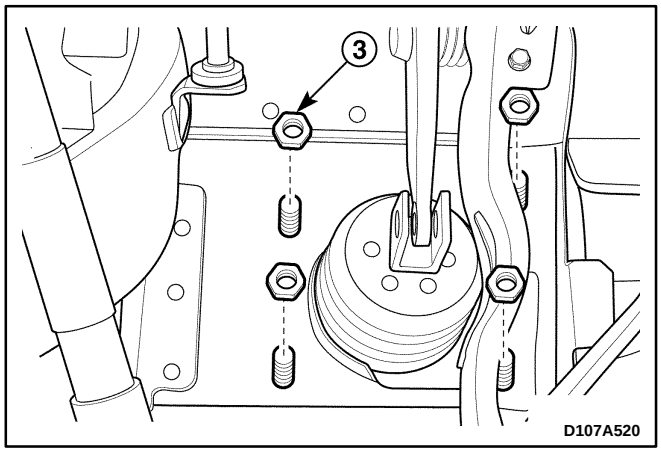
1. Connect the vacuum hose to the power booster.
2. Connect the vacuum hose to the intake manifold.



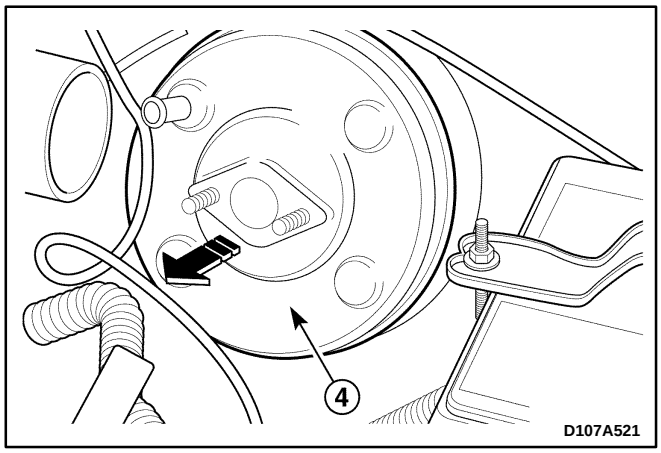
POWER BOOSTER ASSEMBLY (LEFT–HAND DRIVE)

Removal Procedure

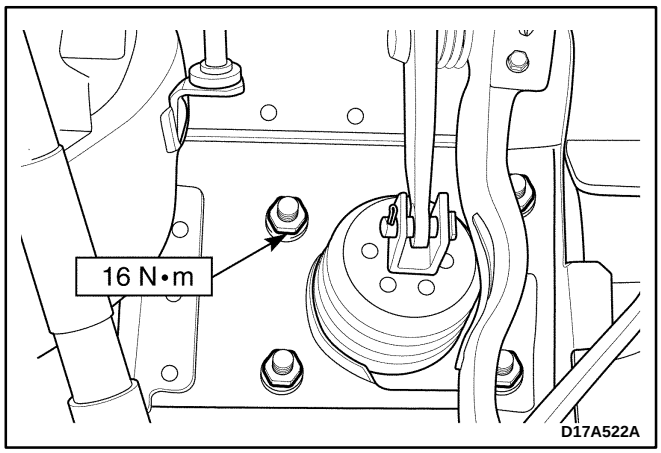
1. Remove the master cylinder assembly. Refer to *Section 4B, Master Cylinder.*
2. Disconnect the vacuum hose from the power booster.
3. Remove the power booster.
   - Straighten the cotter pin and remove it (1).
   - Remove the clevis pin (2).



   - Remove the nuts (3).



   - Remove the power booster (4).



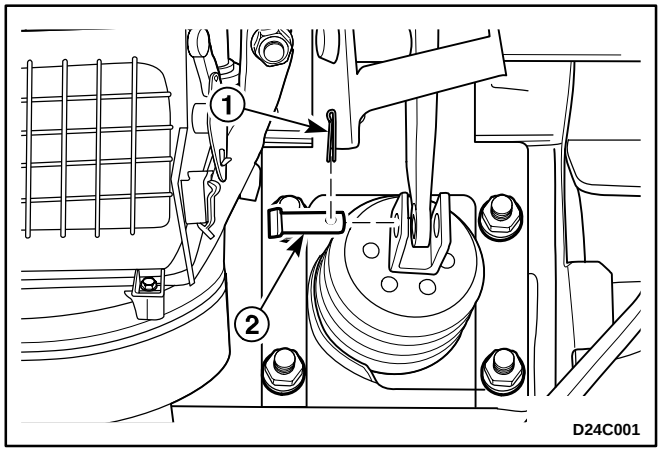
Installation Procedure

1. Install the power booster with the new cotter pin, clevis pin and nuts.

   ### Tighten

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

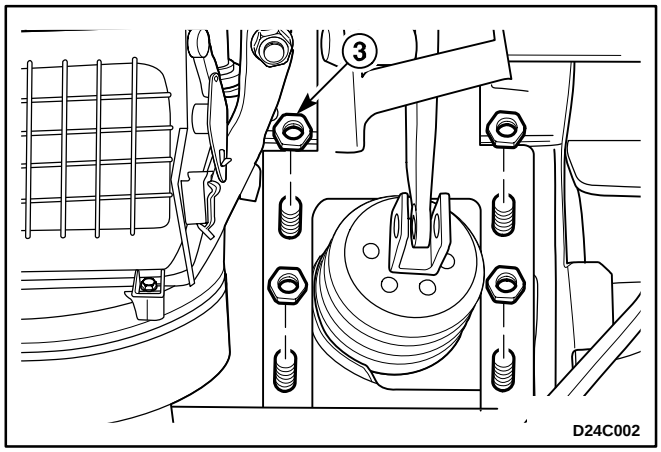
   Important: Make sure the distance from the booster to the center of the clevis bore should be 100mm (3.94 in.).
2. Install the master cylinder assembly. Refer to *Section 4B, Master Cylinder*.
3. Connect the vacuum hose to the power booster.
4. Bleed the brake system. Refer to Section 4A, Hydraulic Brakes.



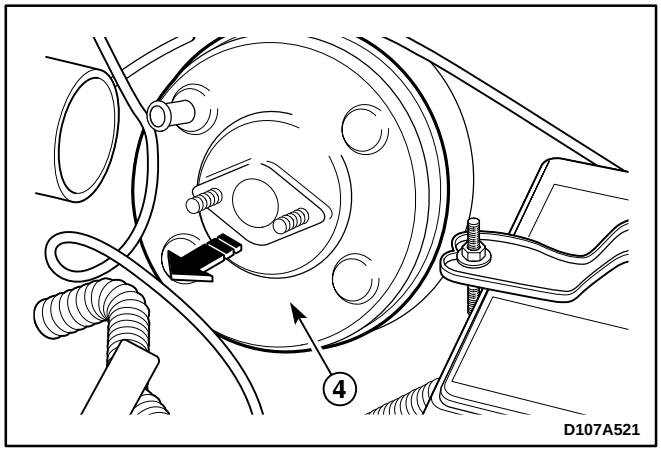
POWER BOOSTER ASSEMBLY (RIGHT–HAND DRIVE)

Removal Procedure

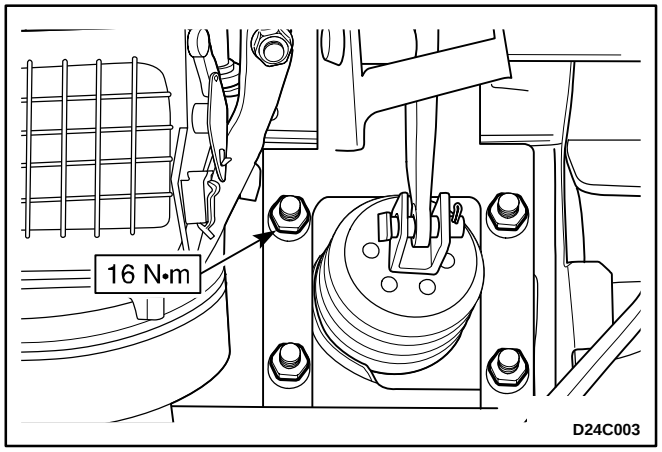
1. Remove the master cylinder assembly. Refer to *Section 4B, Master Cylinder.*
2. Disconnect the vacuum hose from the power booster.
3. Remove the instrument panel assembly. Refer to *Section 9E, Instrument/Driver Information*.
4. Remove the evaporator unit mounting screws and take off the evaporator unit a little. Refer to *Section 7B, Manual Control Heating, Ventilation, and Air Conditioning System*.
5. Remove the power booster.
   - Straighten the cotter pin and remove it (1).
   - Remove the clevis pin (2).



- Remove the nuts (3).



- Remove the power booster (4).



Installation Procedure

1. Install the power booster with the new cotter pin, clevis pin and nuts.

Tighten

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

Important: Make sure the distance from the booster to the center of the clevis bore should be 100mm (3.94 in.).

2. Install the evaporator unit with the screws. Refer to *Section 7B, Manual Control Heating, Ventilation, and Air Conditioning System*.
3. Install the instrument panel assembly. Refer to Section 9E, Instrument/Driver Information.
4. Connect the vacuum hose to the power booster.
5. Install the master cylinder assembly. Refer to *Section 4B, Master Cylinder*.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application		Unit	Description
Power Booster	Type	–	Vacuum–Suspended
	Diameter	mm (inch)	177.8 (7)
	Servo Force Ratio	–	3.7 : 1
	Distance from the booster to the center of the clevis bore	mm (inch)	96(3.78)

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Booster–to-Dash Panel Nuts	16	12	–
Master Cylinder Attaching Nuts	16	12	–

SECTION 4D

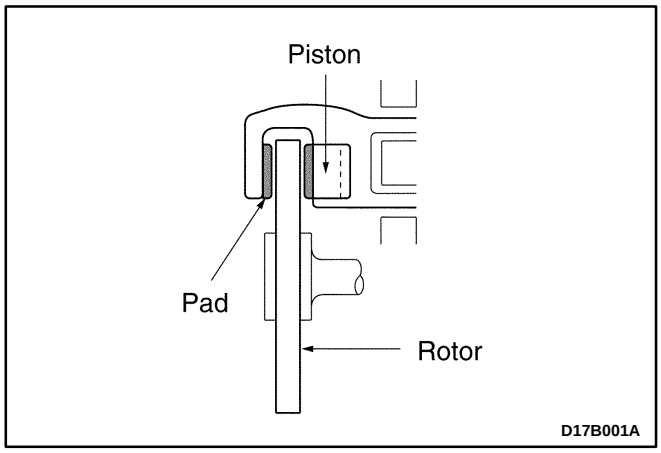
FRONT DISC BRAKES

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

DISC BRAKE CALIPER ASSEMBLY

This caliper has a single bore and is mounted to the steering knuckle with two mounting bolts. Hydraulic pressure, created by applying the brake pedal, is converted by the caliper to a stopping force. This force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to slide the caliper inward, resulting in a clamping action on the rotor. This clamping action forces the linings against the rotor, creating friction to stop the vehicle.



Important:

- Replace all components included in the repair kits used to service this caliper.
- Lubricate the rubber parts with clean brake fluid to ease assembly.
- Do not use lubricated shop air on brake parts, as damage to the rubber components may result.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the brake system.
- Replace the pads in axle sets only.
- The torque values specified are for dry, unlubricated fasteners.
- Perform the service operations on a clean bench, free from all mineral oil materials.

CLEARANCE CALIBRATION

When the hydraulic pressure is applied to the piston, the piston moves leftward. The piston seal, which extent considerable pressure against the piston, moves with cylinder.

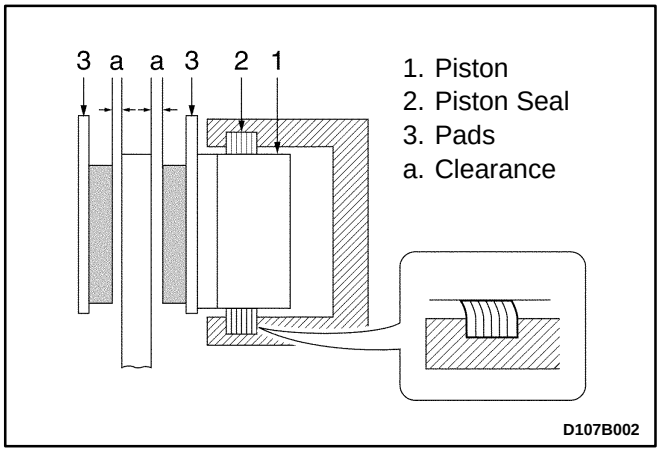
However, as a part of the piston seal is fixed into a grove in the cylinder shape of the seal is as shown in below figure, distorted toward the piston moving direction.

When the pressure is taken off from the brake pedal and the hydraulic pressure is released from the piston, a restoring elastic force is generated at the seal and pushes the piston rightward and back it in original position.

As the pads wear away and the clearance between rotor and pads becomes larger, the piston moves larger.

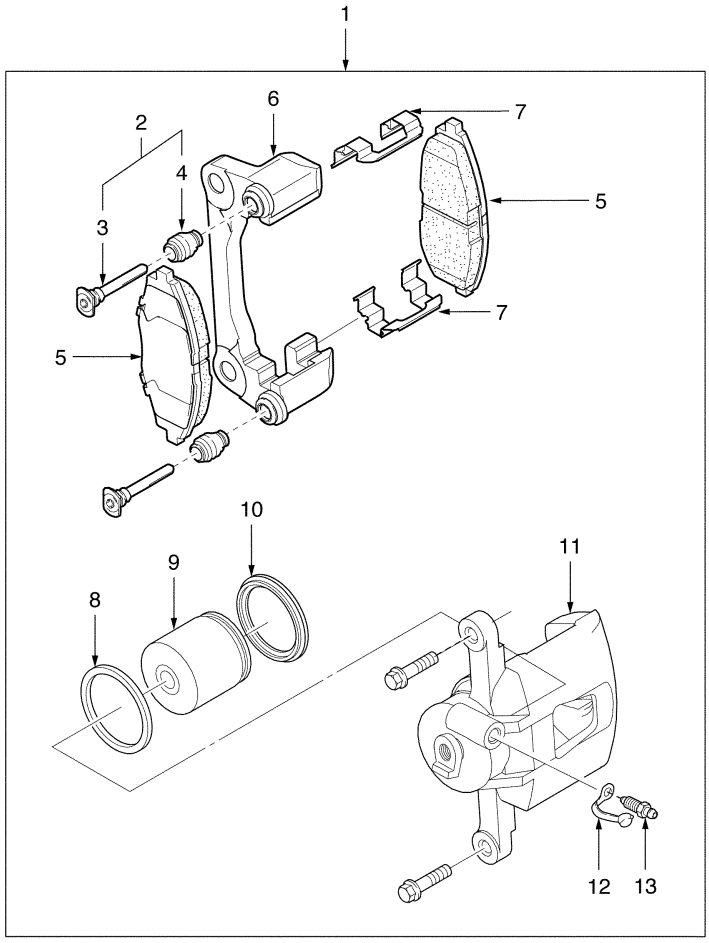
The seal then could change in shape further, but since end of the seal is fixed into the groove in the cylinder, the distortion is limited to the same amount as previously described.

The piston moves further to cover the distance of clearance. As the piston returns by the same distance and the rubber seal recovers its original shape, the clearance between the rotor and pads is maintained in original condition.



COMPONENT LOCATOR

FRONT DISC BRAKES



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1. Front Brake Caliper Assembly
2. Front Brake Boot Assemblies
3. Pins
4. Pin Boots
5. Front Brake Pads
6. Carrier
7. Pad Spring
8. Piston Boot
9. Piston
10. Piston Seal
11. Cylinder
12. Bleeder Screw Cap
13. Bleeder Screw

DIAGNOSTIC INFORMATION AND PROCEDURES

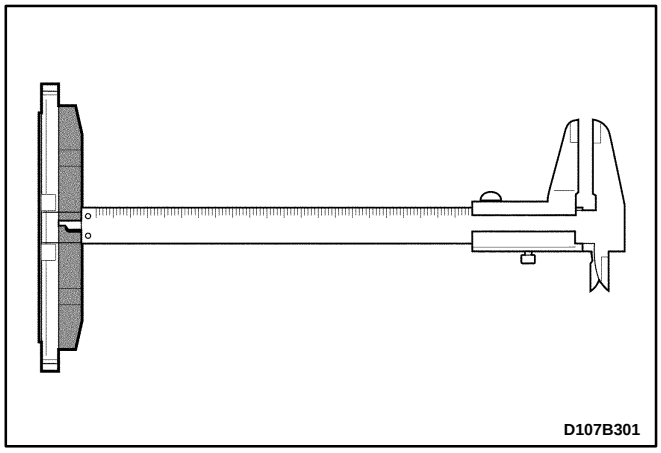
FRONT DISC BRAKE

Condition	Probable cause	Correction
Uneven Braking	● Inoperative carrier.	● Replace the carrier.
	● Sticked caliper piston.	● Repair the caliper piston or replace the caliper assembly, if needed.
Dragging Brake	● Sticked caliper piston.	● Repair the caliper piston or replace the caliper assembly if needed.
Noise and Vibration When Brake Applied	● Excessive rotor run out.	● Replace the rotor.
	● Interference of the dust cover.	● Repair the dust cover.
	● Loose caliper mounting bolts.	● Tighten the mounting bolts.

LINING INSPECTION

1. Raise and suitably support the vehicle.
2. Remove the front wheels. Refer to *Section 2E, Tires and Wheels*.
3. Visually check the linings for minimum thickness and wear.
4. Measure the thickness.

Important: The minimum thickness of the shoe and lining together is 8 mm (0.31 in.).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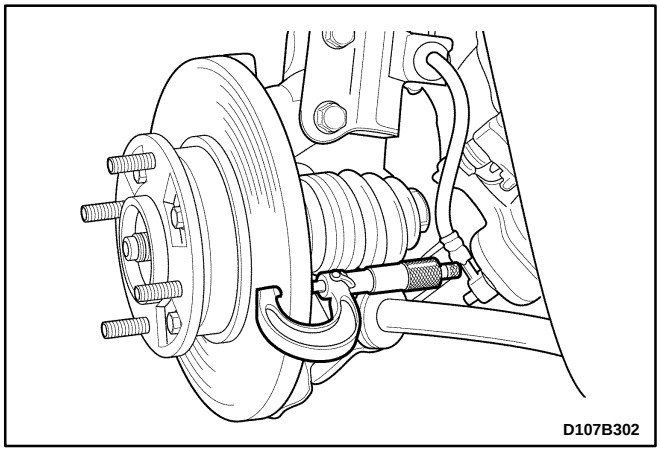
5. Install the shoe and linings in axle sets only.
6. Install the front wheels. Refer to *Section 2E, Tires and Wheels*.
7. Lower the vehicle.

ROTOR INSPECTION

Thickness variation can be checked by measuring the thickness of the rotor at four or more points around the circumference of the rotor. All measurements must be made at the same distance in from the edge of the rotor.

If the thickness of the rotor is below 10 mm (0.40 in.), replace the brake rotor.

During manufacturing, the brake rotor and the tolerances of the braking surface regarding flatness and lateral runout are held very close. The maintenance of close tolerances on the shape of the braking surfaces is necessary to prevent brake roughness.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In addition to these tolerances, the surface finish must be held to a specified range. The control of the braking surface finish is necessary to avoid pulls and erratic performance and to extend lining life.

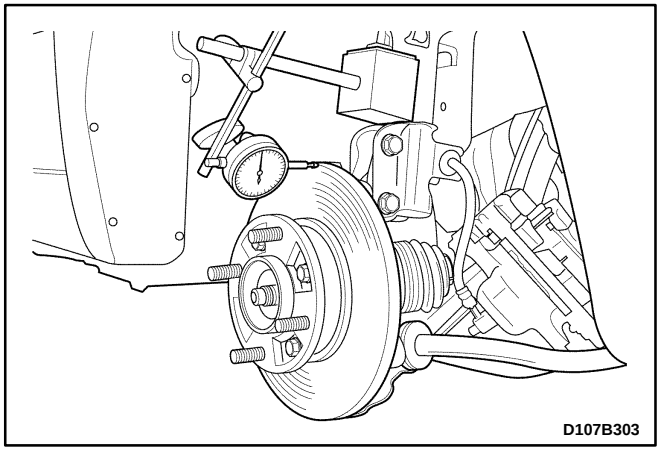
Using a commercially-available dial indicator, check lateral runout as follows:

Notice: Permissible lateral runout is a maximum 0.05 mm (0.002 in.). If lateral runout exceeds the specification, ensure there is no dirt between the rotor and the hub and that contact surfaces are smooth and free from burrs.

1. Position the transaxle in NEUTRAL.
2. Remove the rotor. Refer to “Rotor” in this section.
3. Fasten a dial indicator to the strut.
4. Set the gauge probe tip to approximately 10 mm (0.4 in.) from the outer edge of the brake rotor, perpendicular to the disc and under slight preload.
5. Remove the dial indicator.

Important: Since accurate control of the rotor tolerances is necessary for proper performance of the disc brakes, refinishing of the rotor should be done only with precision equipment.

6. Refinish the rotor, if required, with precision equipment. Discard the rotor if it fails to meet the above specifications after refinishing.
7. Install the rotor. Refer to “Rotor” in this section.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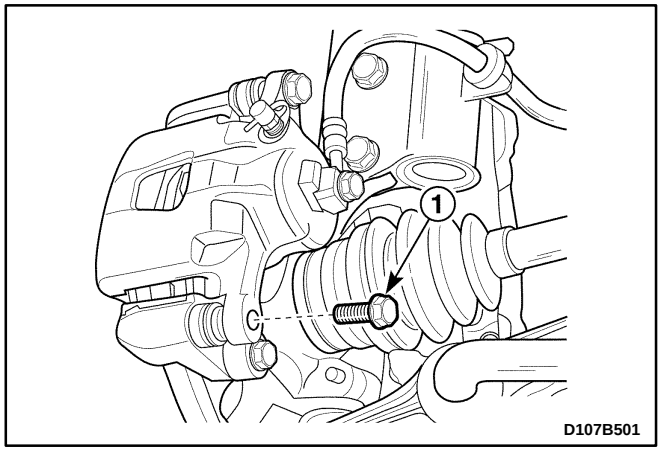
REPAIR INSTRUCTIONS

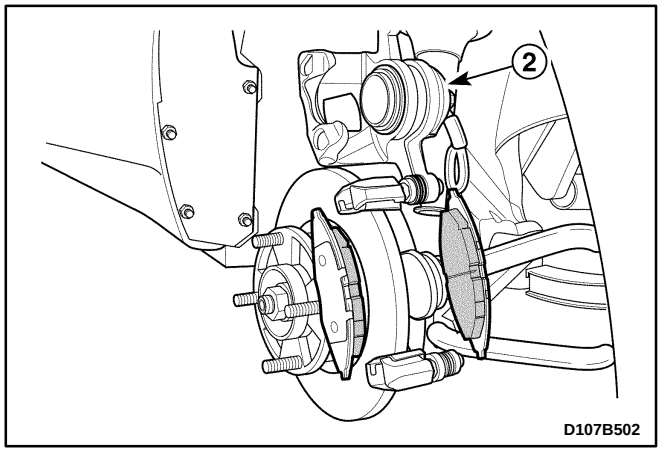
ON–VEHICLE SERVICE



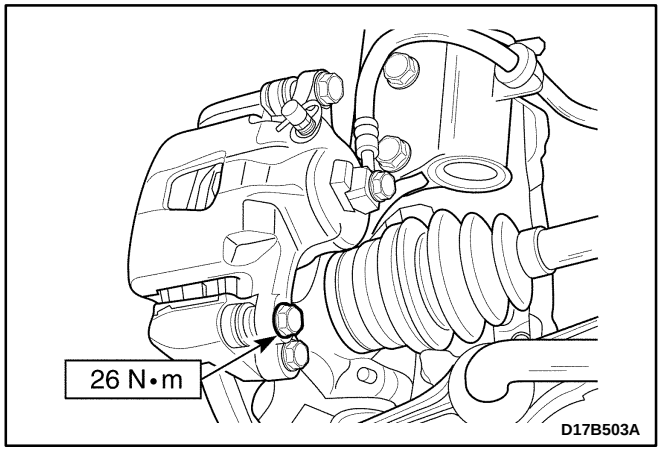
SHOE AND LINING

Removal Procedure

1. Remove the front wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the brake pads.
   - Remove the pin bolt (1).



   - Lift up the cylinder assembly (2).

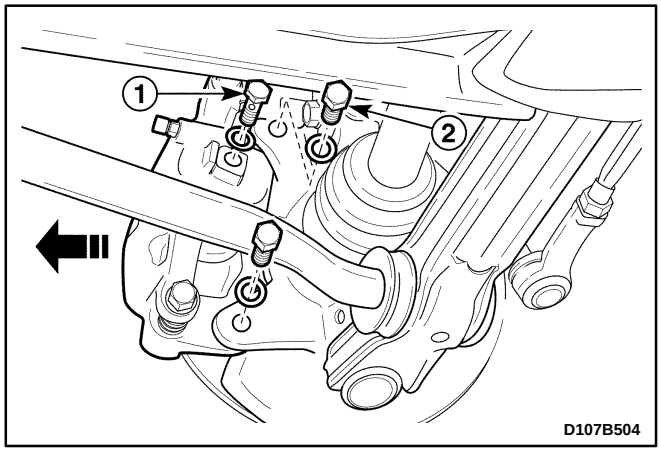


Installation Procedure

1. Install the brake pads and the cylinder assembly with the pin bolt.

   Tighten

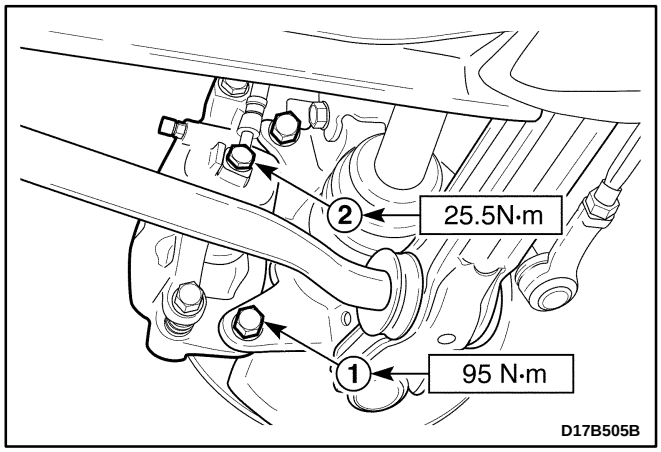
   Tighten the pin bolt to 26 N•m (19 lb-ft).
2. Install the front wheels. Refer to *Section 2E, Tires and Wheels*.



CALIPER ASSEMBLY

Removal Procedure

1. Remove the front wheels. Refer to *Section 2E, Tires and Wheels.*
2. Remove the caliper assembly.
   - Remove the brake hose coupling bolt (1).
   - Plug the opening in the brake hose to prevent fluid loss and contamination.
   - Remove the caliper mounting bolts (2).



Installation Procedure

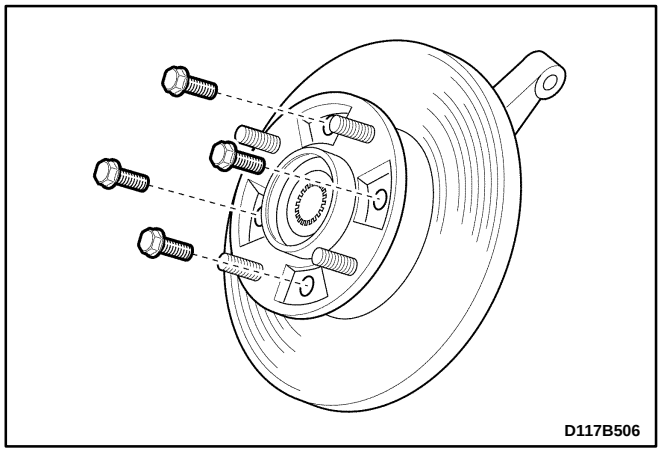
1. Install the caliper assembly with the bolts (1).

   Tighten

   Tighten the caliper–to–steering knuckle bolts to 95 N•m (70 lb-ft).
2. Connect the brake hose (2).

   Tighten

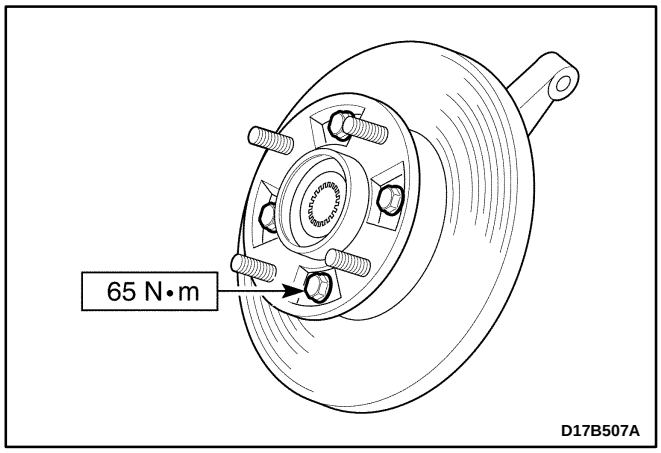
   Tighten the brake hose inlet fitting–to–coupling bolt to 25.5 N•m (19.1 lb-ft).
3. Install the front wheels. Refer to *Section 2E, Tires and Wheels.*
4. Bleed the brake system. Refer to *Section 4A, Hydraulic Brakes.*



ROTOR

Removal Procedure

1. Remove the steering knuckle. Refer to *Section 2C, Front Suspension*.
2. Remove the rotor bolts from the front wheel hub.
3. Remove the rotor. Refer to *Section 2C, Front Suspension*.



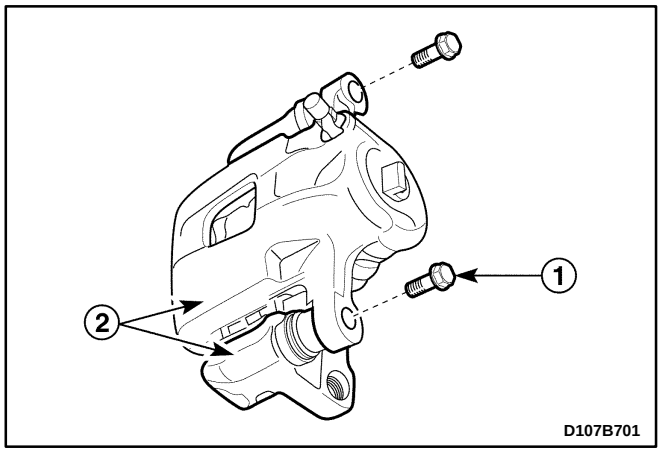
Installation Procedure

1. Install the rotor to the front wheel hub by tightening the detent bolts.

   Tighten

   Tighten the rotor–to–front wheel hub detent bolts to 65 N•m (48 lb-ft).
2. Install the steering knuckle. Refer to *Section 2C, Front Suspension*.

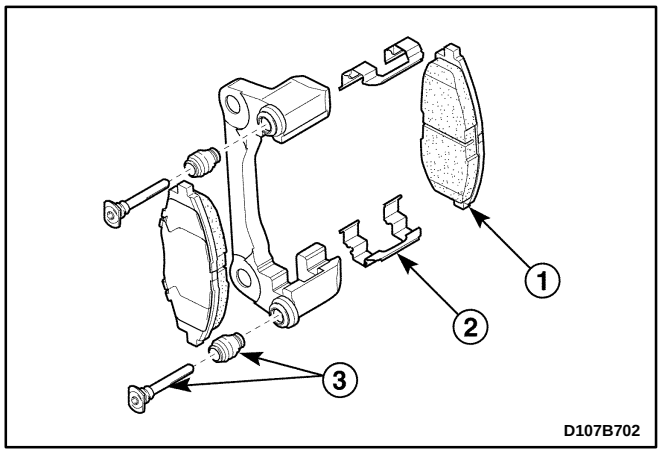
UNIT REPAIR



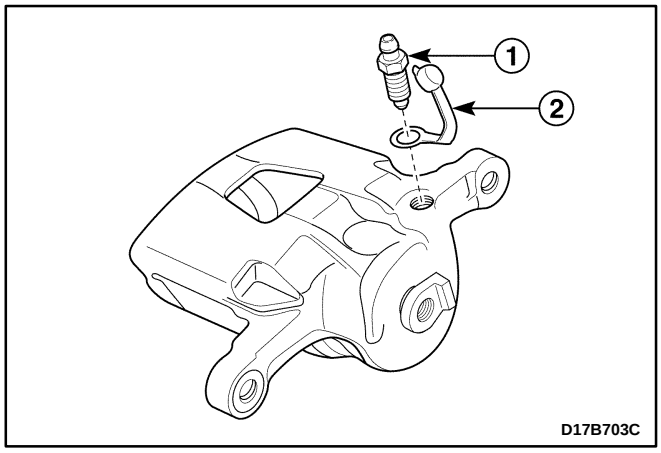
CALIPER OVERHAUL

Disassembly Procedure

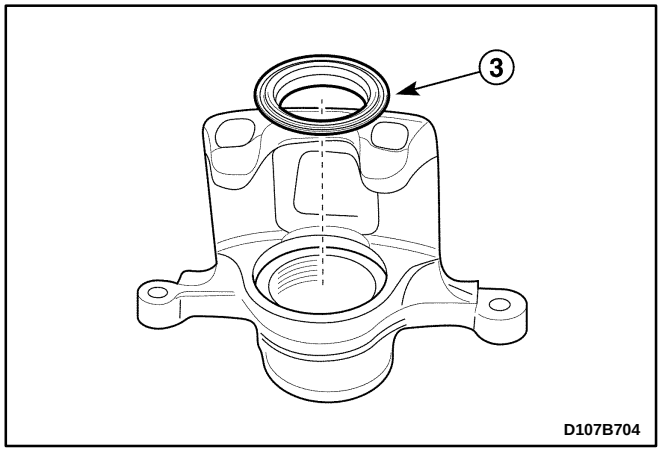
1. Remove the caliper assembly. Refer to “Caliper Assembly” in this section.
2. Separate the cylinder assembly and the carrier.
   - Remove the pin bolts (1).
   - Separate the cylinder assembly and the carrier (2).



3. Disassemble the carrier.
   - Remove the front brake pad set (1).
   - Remove the springs (2).
   - Remove the guide pins and boots (3).
     Refer to “Shoe and Lining” in this section.

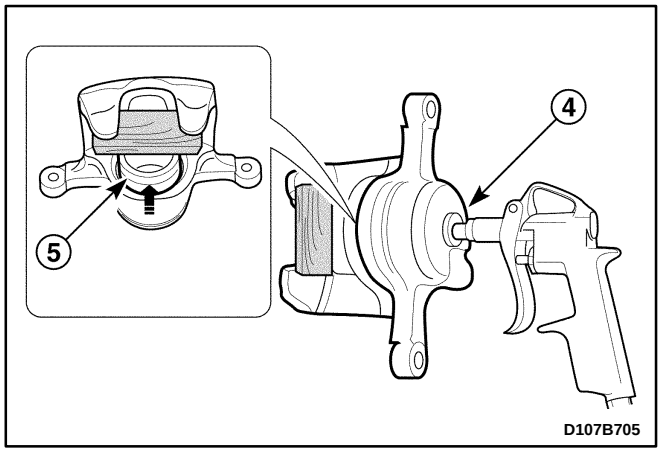


   - Remove the bleeder plug (1).
   - Remove the bleeder plug cap (2).

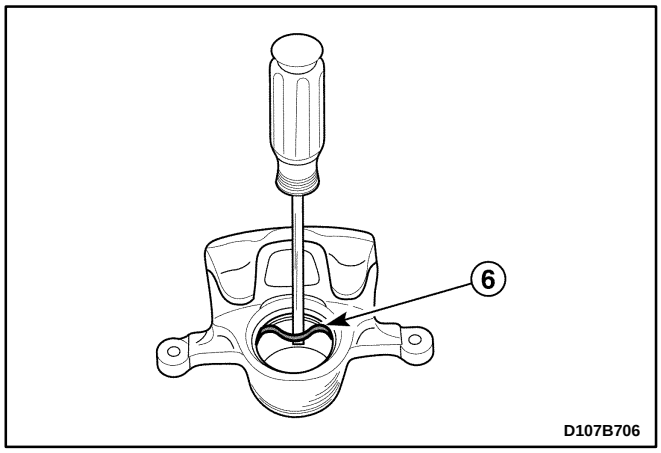


- Remove the piston boot (3).

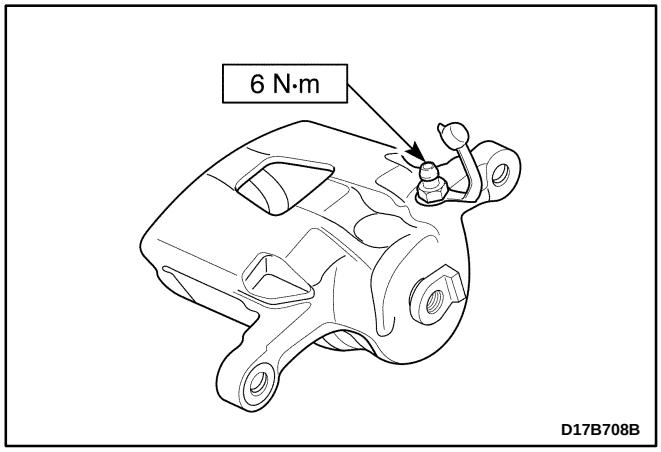
Caution: Do not face in the direction of removing.

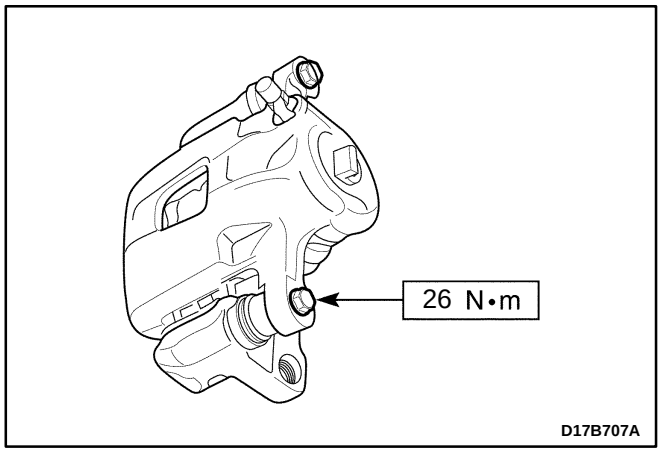


- Using compressed air, blow out the piston from the cylinder (4).
- Remove the piston (5).



- Remove the piston seal (6).





Assembly Procedure

Important: Clean all parts in denatured alcohol. Dry the parts with unlubricated compressed air.

Important: Lubricate the piston with brake fluid.

1. Assembly the cylinder assembly.
   - Install the piston seal.
   - Push the piston inward until it is properly seated.
   - Install the piston boot.
   - Install the bleeder plug.

   ### Tighten

   Tighten the bleeder plug to 6 N•m (53 lb-in).
   - Install the bleeder plug cap.
2. Assemble the carrier.
   - Install the guide pin and boot.
   - Install the spring.
   - Install the pads.
3. Install the pin bolt connecting the cylinder assembly and carrier.

   ### Tighten

   Tighten the pin bolt to 26 N•m (19 lb-ft).
4. Install the caliper assembly. Refer to “Caliper Assembly” in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application		Unit	Description
Rotor	Outer Diameter	mm (in.)	236 (9.3)
	Thickness	mm (in.)	12.7 (0.5)
	Discard Thickness	mm (in.)	10 (0.4)
	Runout	mm (in.)	0.05 (0.002)
Caliper	Pad Thickness	mm (in.)	10 (0.40)
	Pad Discard Thickness	mm (in.)	8 (0.31)
	Diameter of the Position	mm (in.)	48 (1.89)

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Rotor Bolts	65	48	–
Caliper Mounting Bolts	95	70	–
Pin Bolts	26	19	–
Brake Hose Coupling Bolt	25.5	19.1	–
Bleeder Screw	6	–	53

SECTION 4E

REAR DRUM BRAKES

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

DRUM BRAKES

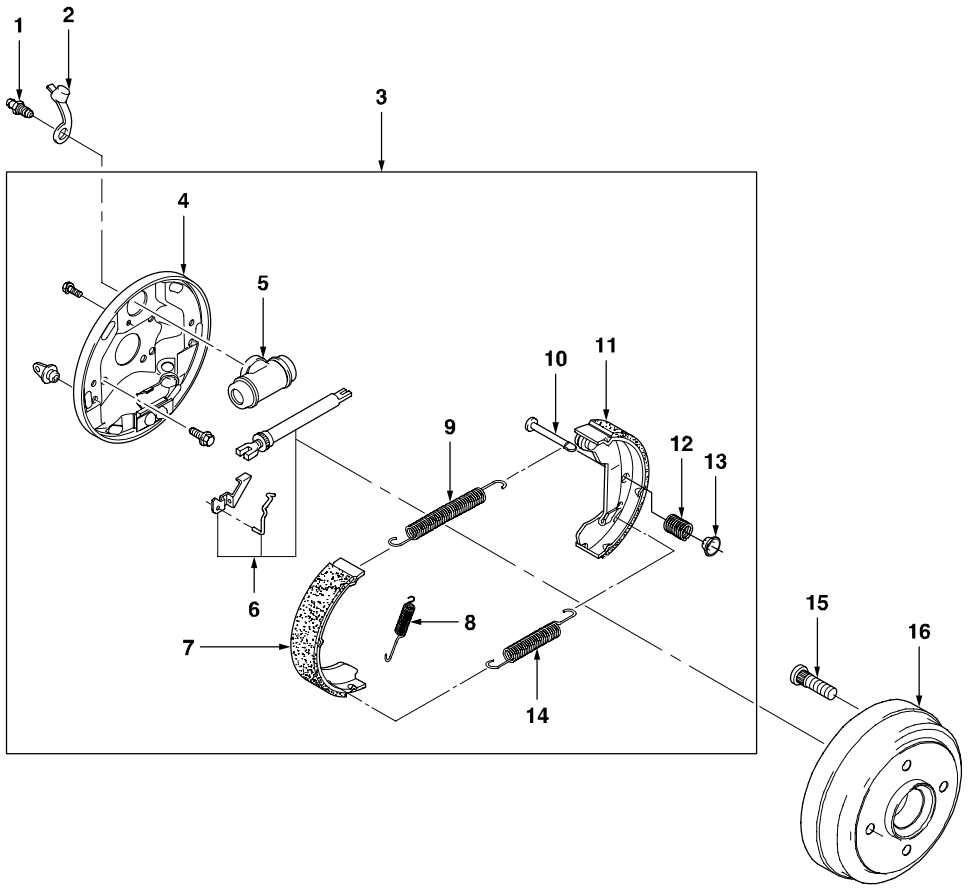
This drum brake assembly is a leading/trailing shoe design. Both brake shoes are held against the wheel cylinder pistons by the lower return spring and the fixed anchor plate near the lower return spring. When the brakes are applied, the wheel cylinder pistons move both shoes out to contact the drum. With forward wheel rotation, the forward brake shoe will wrap into the drum and become self-energized. With reverse wheel rotation, the rear brake shoe is self-energized. Force from the brake shoes is transferred to the anchor plate through the backing plate to the axle flange. Adjustment is automatic and occurs on any service brake application. Do not switch the position of shoes that have been in service, as this may render the self-adjustment feature inoperative and result in increased pedal travel.

Notice:

- Replace all the components included in the repair kits used to service this drum brake.
- Do not use lubricated shop air on the brake parts, as damage to the rubber components may result.
- If any hydraulic component is removed or disconnected, it may be necessary to bleed all or part of the braking system.
- The torque values specified are for dry, unlubricated fasteners.
- Perform service operations on a clean bench that is free from all mineral oil materials.

COMPONENT LOCATOR

REAR DRUM BRAKES



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1. Bleeder Screw
2. Bleeder Screw
3. Rear Brake Assembly
4. Rear Brake Plate
5. Wheel Cylinder
6. Strut Assembly
7. Brake Leading Shoe
8. Middle Return Spring
9. Upper Return Spring
10. Brake Shoe Retain Spring Pin
11. Trailing Shoe
12. Brake Shoe Retain Spring
13. Brake Shoe Retain Spring Cap
14. Lower Return Spring
15. Hub Bolt
16. Rear Brake Drum

DIAGNOSTIC INFORMATION AND PROCEDURES

REAR DRUM BRAKE

Condition	Probable cause	Correction
Not Enough Braking Force	● Badly worn brake shoe lining.	● Replace the lining.
	● Lining stained with oil.	● Check the wheel cylinder leaks and then replace the wheel cylinder or the lining, if needed.
	● Wheel cylinder condition faulty.	● Replace the wheel cylinder.
	● Malfunctioning self–adjustment feature.	● Repair the self–adjustment feature.
Uneven Braking	● Lining stained with oil.	● Check the wheel cylinder leaks and then replace the wheel cylinder or the lining, if needed.
	● Wheel cylinder condition faulty.	● Replace the wheel cylinder.
	● Malfunctioning self–adjustment feature.	● Repair the self–adjustment feature.
Dragging Brakes After Pedal is Released	● Weakened brake shoe return spring.	● Replace the brake shoe return spring.
	● Wheel cylinder condition faulty.	● Replace the wheel cylinder.
Excessive Pedal Travel	● Excessively worn lining.	● Replace the lining.
	● Malfunctioning self–adjustment feature.	● Repair the self–adjustment feature.
Braking Noise or Vibration	● Foreign material stuck to drum.	● Clean the rear drum brake.
	● Loosen brake plate bolt.	● Tighten the brake plate bolt.
	● Damaged drum.	● Replace the drum.
Poor Braking Force of Parking Brake	● Lining stained with oil.	● Check the wheel cylinder leaks and then replace the wheel cylinder or the lining, if needed.
	● Damaged self–adjustment feature.	● Repair the self–adjustment feature.
	● Poor adjustment of parking brake cable.	● Adjust the parking brake cable.

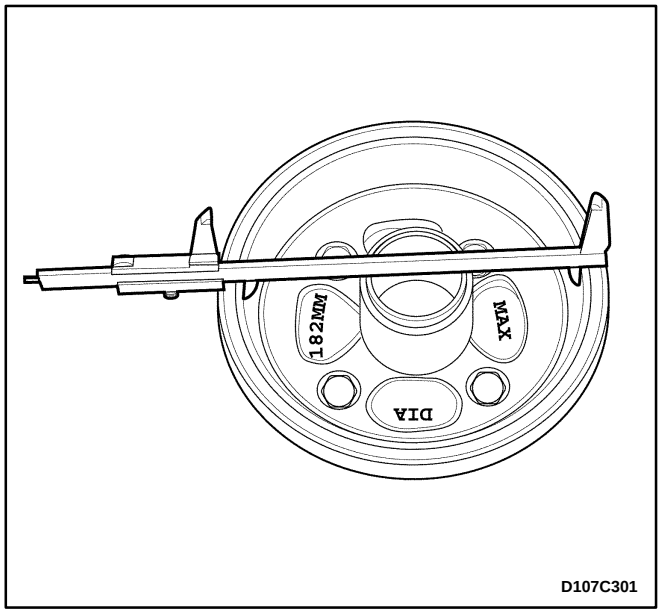
DRUMS

Inspect the brake drum as follows ;

1. Inspect the drum for crack or damage.
2. Measure the inside diameter.

Unit : mm (in.)

Inside Diameter Wear Limit Value	182 (7.165)



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3. If the measured value is over the limit value, or if the defect is found, replace the drum.

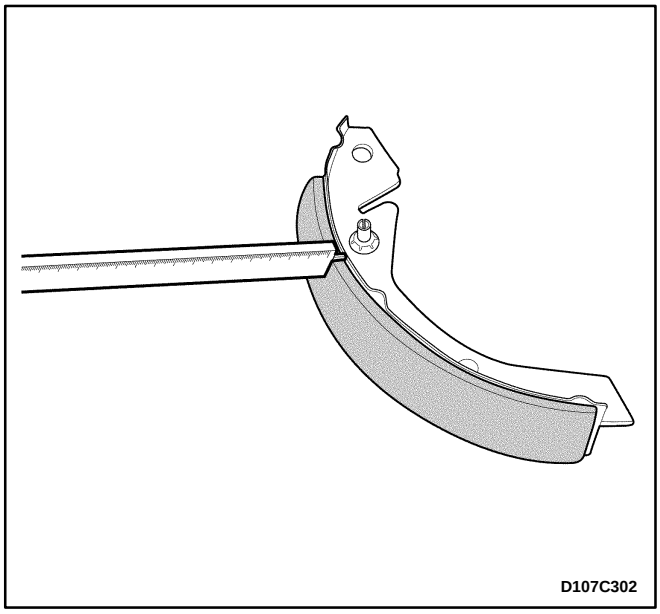
LINING

Inspect the brake drum as follows ;

1. Inspect the lining for wear or stain with oil.
2. Measure the thickness.

Unit : mm (in.)

Lining Wear Limit Value	1 (0.039)



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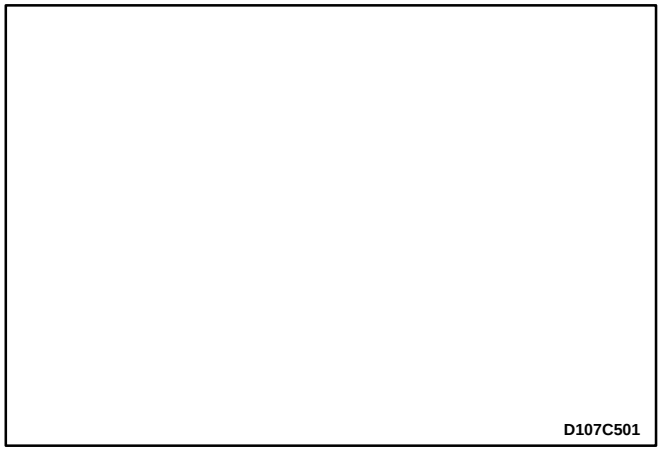
3. If the measured value is within the limit value, or if the defect is found, replace the lining.

REPAIR INSTRUCTIONS

ON–VEHICLE SERVICE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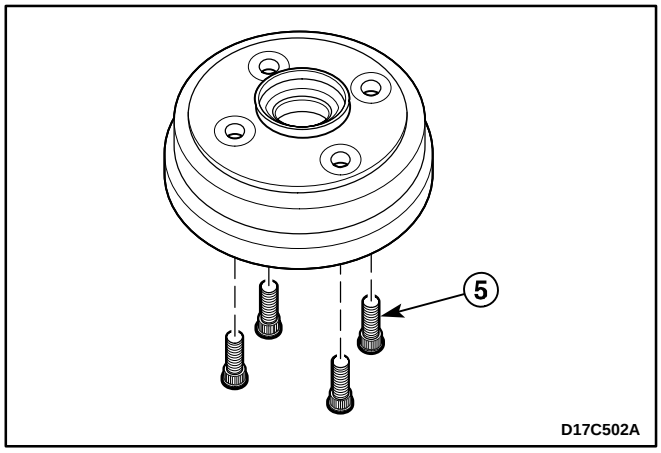

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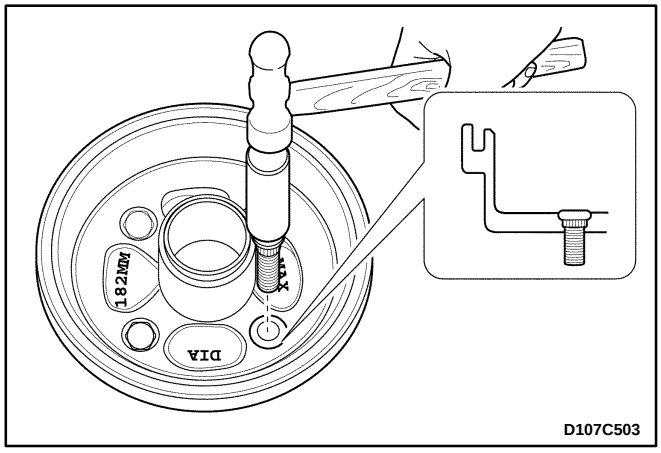

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REAR BRAKE DRUM

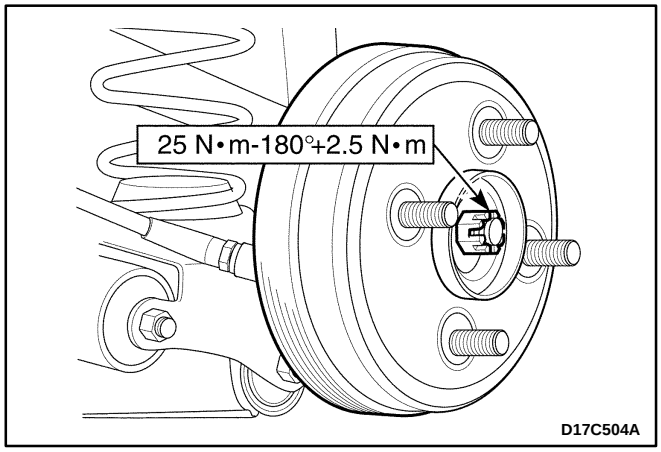
Removal Procedure

1. Remove the rear wheels. Refer to *Section 6E, Tires and Wheels.*
2. Release the parking brake.
3. Remove the brake drum.
   - Remove the spindle cap (1).
   - Remove the cotter pin and do not reuse it (2).
   - Remove the castellated nut (3).
   - Remove the rear axle washer (4).
   - Remove the bearing, race and oil seal. Refer to *Section 2D, Rear Suspension*.
   - Remove the hub bolts using a hammer (5).

Important: Do not reuse removed hub bolts.

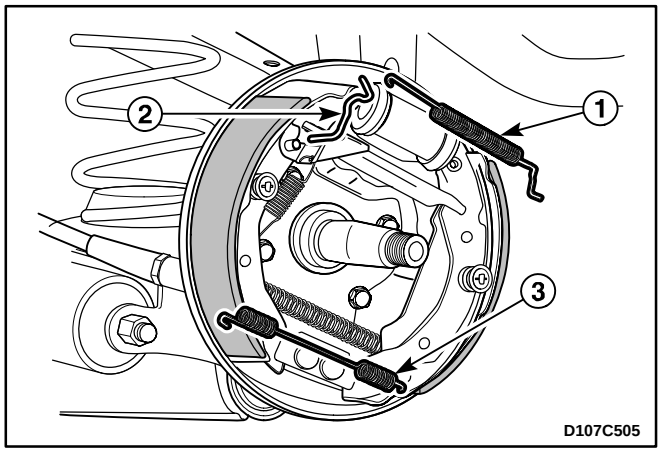
Installation Procedure

1. Install the brake drum.
   - Insert the new hub bolts using a hammer.
   - Install the bearing, race, oil seal and rear axle washer.



- Tighten the castellated nut to 25 N•m (18 lb-ft).
- Loosen the castellated nut to 180°.
- Retighten the castellated nut to 2.5 N•m (22 lb-in).
- Install the new cotter pin and spindle cap.

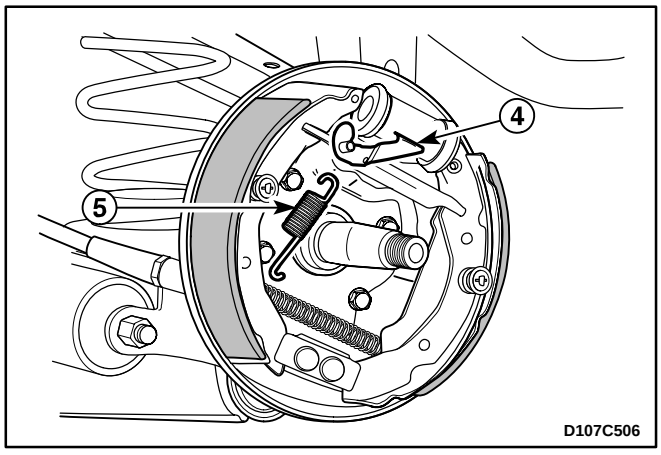
2. Adjust the parking brake.
3. Install the rear wheels. Refer to *Section 6E, Tires and Wheels.*



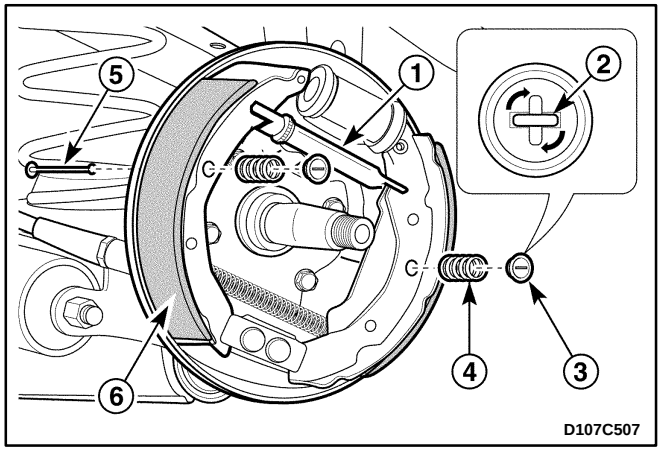
BRAKE SHOE

Removal Procedure

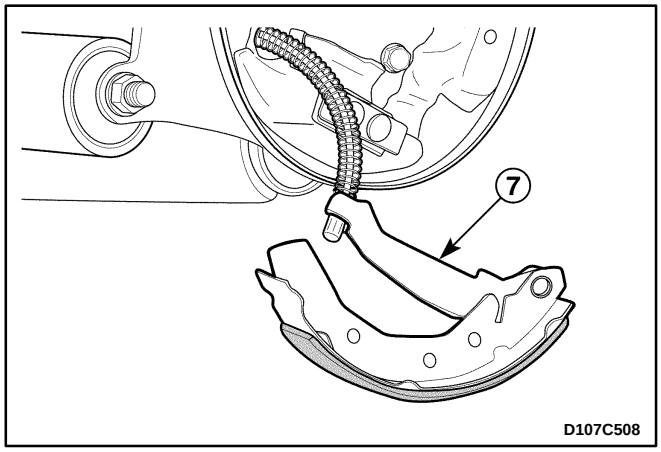
1. Remove the brake drum. Refer to “Brake Drum” in this section.
2. Remove the return spring.
   - Remove the upper return spring (1).
   - Remove the upper return spring bracket (2).
   - Remove the lower return spring (3).



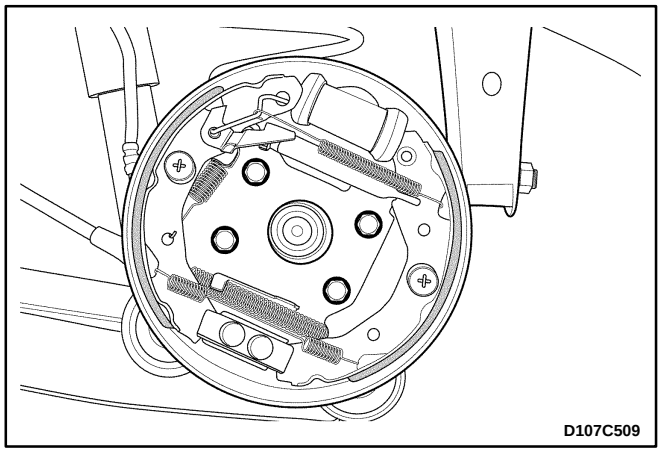
- Remove the adjust lever (4).
- Remove the middle return spring (5).



3. Remove the brake shoe.
   - Remove the readjusting unit (1).
   - Turn the brake shoe retaining spring pin rectangularly by the pliers (2).
   - Remove the brake shoe retain spring cap (3).
   - Remove the retaining spring (4).
   - Remove the retaining spring pin (5).
   - Remove the leading shoe (6).



4. Disconnect the parking brake cable from the trailing shoe and remove the trailing shoe (7).

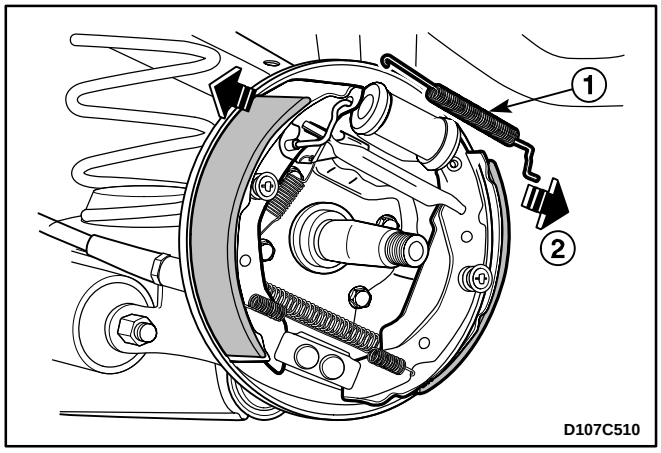


Installation Procedure

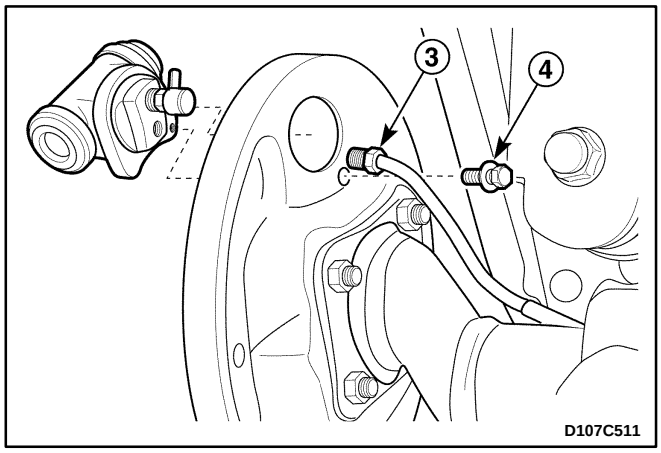
1. Install in the reverse of removal.
2. Clean the adjust assembly and apply grease.
3. Connect the parking brake cable from the trailing shoe.
4. Install the brake shoe.
5. Install the return spring.
   - Install the middle return spring and adjust lever.
   - Install the lower return spring.
   - Install the upper return spring bracket.
   - Install the upper return spring.
6. Install the brake drum. Refer to “Brake Drum” in this section.

WHEEL CYLINDER ASSEMBLY

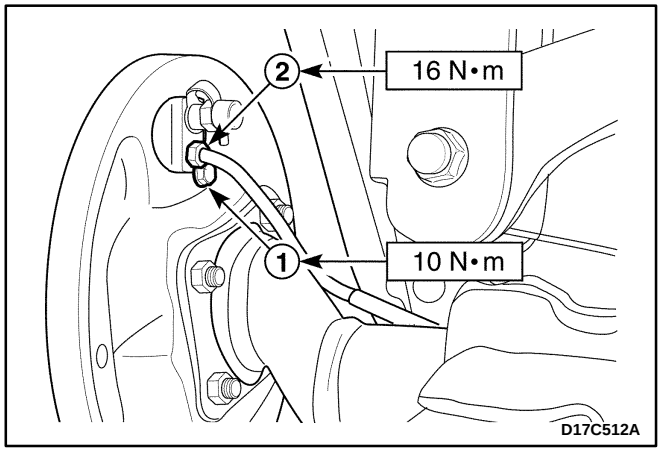
Removal Procedure



1. Remove the brake drum. Refer to “Rear Brake Drum” in this section.
2. Remove the wheel cylinder.
   - Remove the brake shoe upper spring (1).
   - Widen the leading shoe and trailing shoe (2).



   - Disconnect the brake line fitting (3).
   - Plug the opening in the brake line to prevent fluid loss or contamination.
   - Remove the wheel cylinder–to–backing plate bolt (4).



Installation Procedure

1. Install the wheel cylinder to the backing plate with the wheel cylinder bolt (1).

   Tighten

   Tighten the wheel cylinder–to–backing plate bolt to 10 N•m (89 lb-in).
2. Connect the brake line fitting (2).

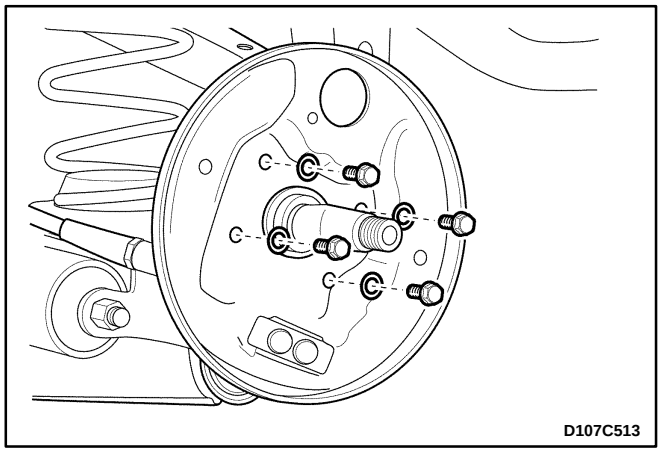
   Tighten

   Tighten the brake line fitting to 16 N•m (12 lb-ft).
3. Install the brake shoe. Refer to “Brake Shoe” in this section.
4. Install the brake drum. Refer to “Rear Brake Drum” in this section.

BACKING PLATE

Removal Procedure

1. Remove the brake drum. Refer to “Rear Brake Drum” in this section.
2. Remove the brake shoe components. Refer to “Brake Shoe” in this section.
3. Remove the wheel cylinder assembly. Refer to “Wheel Cylinder Assembly” in this section.
4. Remove the bolts and the backing plate.

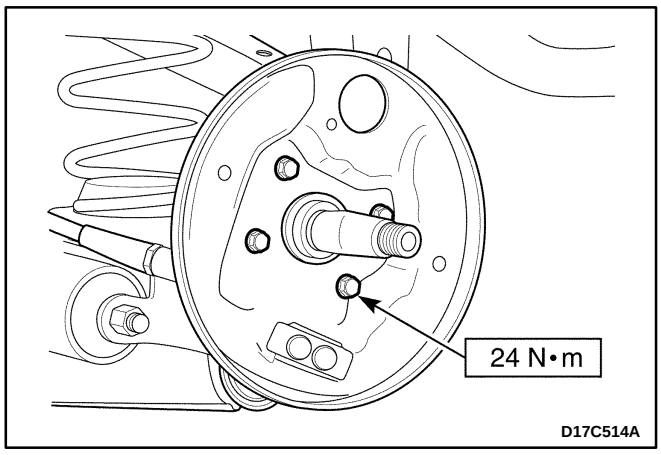


Installation Procedure

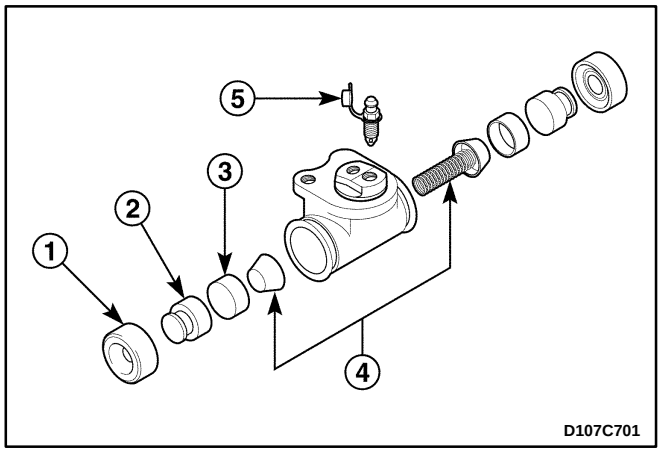
1. Install the bolts and the backing plate.

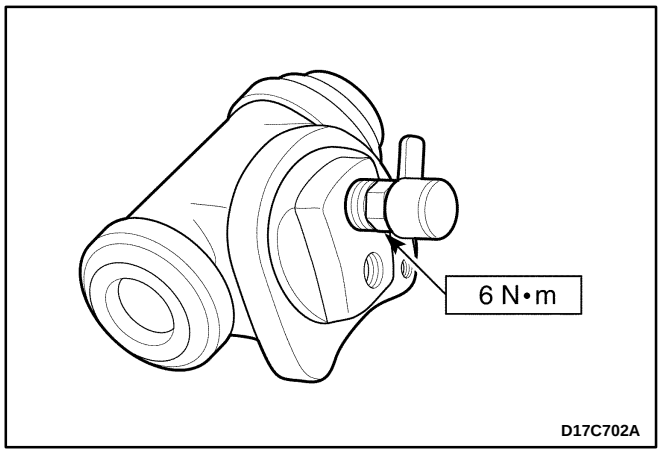
   Tighten

   Tighten the backing plate–to–rear axle bolts to 24 N•m (18 lb-ft).
2. Install the wheel cylinder assembly. Refer to “Wheel Cylinder Assembly” in this section.
3. Install the brake shoe components. Refer to “Brake Shoe” in this section.
4. Install the brake drum.



UNIT REPAIR





WHEEL CYLINDER

Disassembly Procedure

1. Remove the wheel cylinder assembly. Refer to “Wheel Cylinder Assembly” in this section.
2. Disassemble wheel cylinder assembly.
   - Remove the dust boots and do not reuse them (1).
   - Remove the piston (2).
   - Remove the piston cup and do not reuse it (3).
   - Remove the spring assembly (4).
   - Remove the bleeder screw (5).
3. Clean all parts with denatured alcohol. Dry the parts with unlubricated compressed air.

Assembly Procedure

Important: Lubricate the new seals, the piston, the piston cup and the wheel cylinder bore with clean brake fluid before assembly.

1. Assemble wheel cylinder assembly.
   - Insert the bleeder screw.

   #### Tighten

   Tighten the bleeder screw to 6 N•m (53 lb-in).
   - Install the spring and the new piston cup.
   - Install the piston and the new boots.
2. Inspect the piston for free movement.
3. Install the wheel cylinder assembly. Refer to “Wheel Cylinder Assembly” in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application		Unit	Description
Drum	Inside Diameter	mm (in.)	180 (7.086)
	Wear Limit	mm (in.)	182 (7.165)
	Out of Round	mm (in.)	0.04 (0.001)
	Cylindricty	mm (in.)	0.02 (0.0008)
Brake Lining	Thickness	mm (in.)	4 (0.157)
	Wear Limit	mm (in.)	1 (0.039)
	Distance Between Lining and Drum	mm (in.)	0.3 (0.011)
Wheel Cylinder	Inside Diameter	mm (in.)	17.46 (0.687)

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Castellated Nut*	–	–	–
Wheel Cylinder Bolt	10	–	89
Brake Backing Plate Bolt	24	18	–
Brake Pipe Fitting	16	12	–
Bleeder Screw	6	–	53

✻ Castellated Nut : 25 N•m – 180° + 2.5 N•m (18 lb-ft – 180° + 22 lb-in.)

SECTION 4F

ANTILOCK BRAKE SYSTEM

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.

CAUTION: Don't diagnosis the Antilock Brake System (ABS) under the vehicle moving status. Because the ABS function will be stopped.

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

ABS SYSTEM COMPONENTS

The Antilock Braking System (ABS) consists of a conventional hydraulic brake system plus antilock components. The conventional brake system includes a vacuum booster, master cylinder, front disc brakes, rear drum brakes, interconnecting hydraulic brake pipes and hoses, brake fluid level sensor and the BRAKE indicator.

The ABS components include a hydraulic unit, an electronic brake control module (EBCM), two system fuses, four wheel speed sensors (one at each wheel), interconnecting wiring, the ABS indicator, and the rear drum brake. See “ABS Component Locator” in this section for the general layout of this system.

HYDRAULIC UNIT

The hydraulic unit with the attached EBCM is located between the surge tank and the fire wall on the right side of the vehicle. The basic hydraulic unit configuration consists of return pump motor, return pump, four isolation valves, four dump valves, two Low Pressure Accumulators (LPA), two High Pressure Attenuators (HPA). The hydraulic unit controls hydraulic pressure to the front calipers and rear wheel cylinders by modulating hydraulic pressure to prevent wheel lockup.

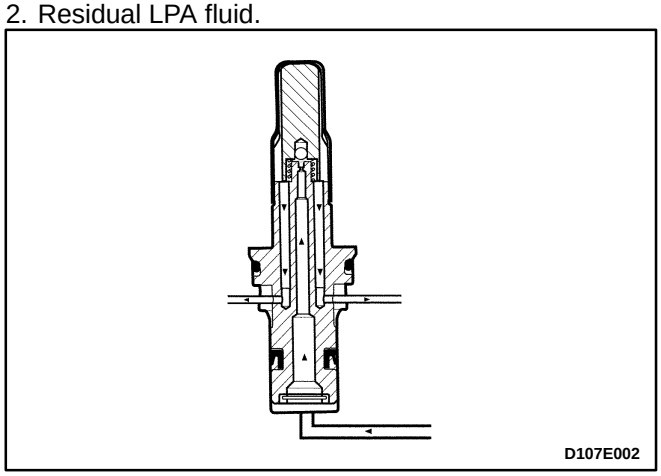
Isolation valve

The isolation valve is placed in the brake fluid path from the master cylinder to the relevant brake caliper and allows free flow as commanded by the driver during normal braking and reapply phases.

In the isolation phase the coil moves the armature down, which closes the normally open isolation orifice and prevents any further increase of pressure in the brake. The valve also remains closed during the dump phase.

The lip seal provides a one way return path for brake fluid to flow through in:

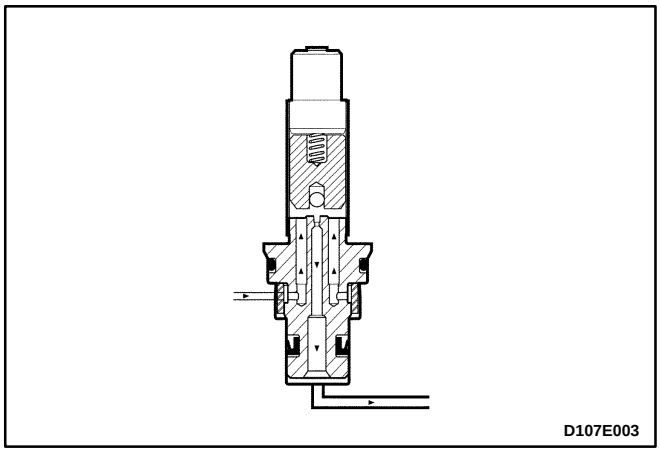
1. Foot off pedal during isolation.
2. Residual LPA fluid.



Dump Valve

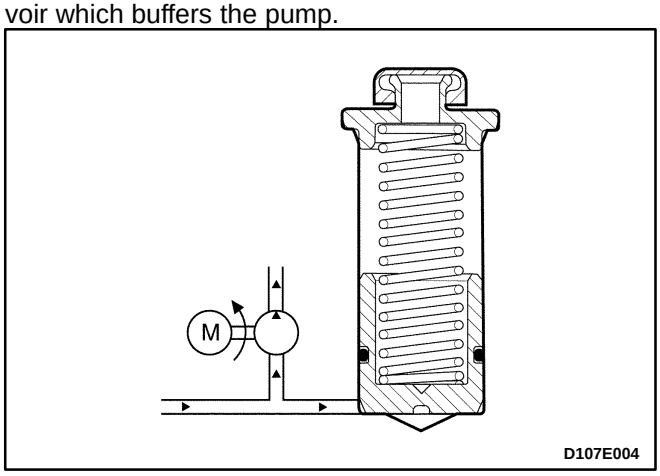
The dump valve creates a flow path from the isolation cartridge (brake side) to the low pressure accumulator (LPA). The valve keeps this path permanently closed except during the dump phase in the ABS mode. On activation (dump phase), the coil moves up the armature which opens the normally closed dump orifice and allow to drain the pressure in the brake line with the brake fluid flowing into the LPA.

The lip seal provides a return path for residual brake fluid in the LPA.



Low Pressure Accumulator (LPA)

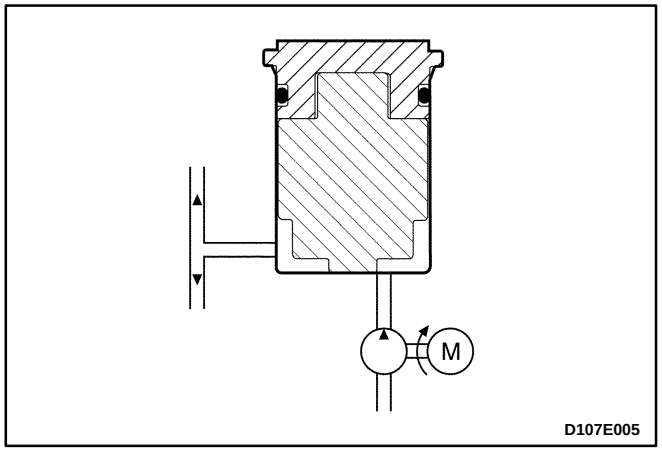
LPA provides a variable chamber for brake fluid to be quickly pushed in through the dump valve at the beginning of a departure. This chamber then acts as a reservoir which buffers the pump.



High Pressure Attenuator (HPA)

The HPA is in between the pump and the ISO valve (master cylinder side) and uses the bulk mode of the contained plastic damper and orifice size to dump out the pressure oscillations from the pump to reduce the

feed back to the master cylinder and brake pedal.



Return Pump Motor

The motor drives two pump elements through the eccentric wheel on its shaft.

Return Pump

Description: Each pump element consists of a fixed displacement piston driven by an eccentric on the end of the eccentric motor. It has two check valves (inlet and outlet) and is fed with fluid by the low pressure accumulator.

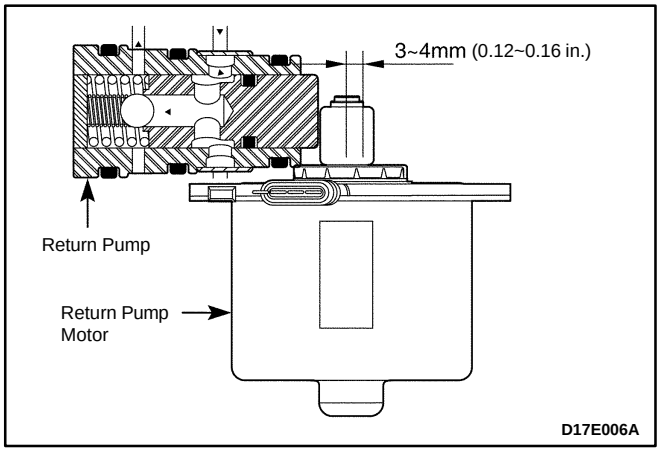
Operation:

Compression stroke: the pump is filled via the inlet ball seat, then the motor eccentric rotates moving the piston to displace the fluid. After the pressure build-up closes the inlet valve the piston displacement increases the pressure until the outlet ball opens. The outlet pressure will continue to increase for the rest of the piston stroke.

Return Stroke: The piston retracts, forced by its spring, as the motor eccentric returns to its low end position. The pressure at the inlet side of the outlet ball then decreases due to the displaced volume and the pressure difference across this ball holds it closed.

The pressure at the outlet side of the inlet ball seat, which is set to open at a certain pressure level also decreases until this valve opens. With the outlet ball closed, the pump is filled with additional fluid from the low pressure accumulator.

The pressure will continue until a stall point is reached and compression of the piston cannot generate enough differential pressure anymore to open the outlet ball seat.



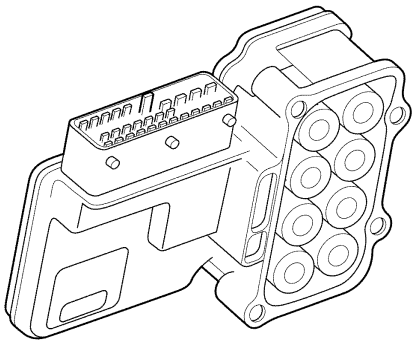
EBCM (ELECTRONIC BRAKE CONTROL MODULE)

Notice: There is no serviceable. The EBCM must be replaced as an assembly.

The EBCM is attached to the hydraulic unit in the engine compartment. The controlling element of ABS is a microprocessor-based EBCM. Inputs to the system include the four wheel speed sensors, the stoplamp switch, the ignition switch, and the unswitched battery voltage. There is an output to a bi-directional serial data link, located in pin M of the assembly line diagnostic link (ALDL), for service diagnostic tools and assembly plat testing.

The EBCM monitors the speed of each wheel. If any wheel begins to approach lockup and the brake switch is closed (brake pedal depressed), the EBCM controls the dump valve to reduce brake pressure to the wheel approaching lockup. Once the wheel regains traction, brake pressure is increased until the wheel again begins to approach lockup. The cycle repeats until either the vehicle comes to a stop, the brake pedal is released or no wheels approach lockup.

Additionally, the EBCM monitors itself, each input (except the serial data link), and each output for proper operation. If it detects any system malfunction, the EBCM will store a DTC in nonvolatile memory (DTCs will not disappear if the battery is disconnected).



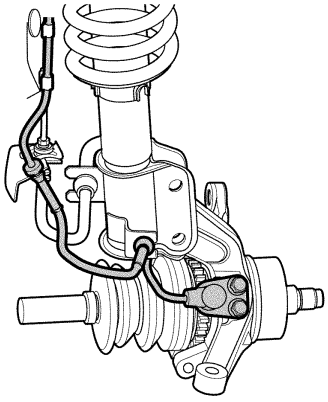
D107E001

WHEEL SPEED SENSORS AND RINGS

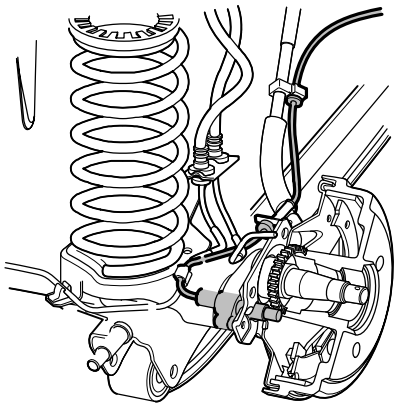
Front wheel speed sensors are installed to the front knuckle and rear wheel speed sensors are installed to the backing plate.

Wheel speed sensors are no serviceable. And the air cap is not adjusted. Front wheel speed sensor ring is pressed onto the drive axle shaft. Each ring contains 40 equally spaced teeth. Exercise care during service procedures to avoid prying or contacting this ring. Excessive contact may cause damage to one or more teeth.

Rear wheel speed sensor rings are incorporated into the hub drum.



D107E007

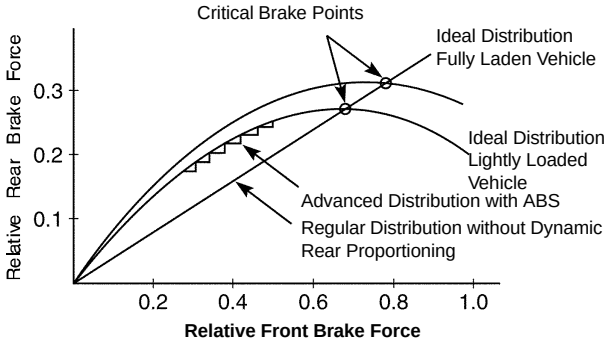


D107E008

ELECTRONIC BRAKE DISTRIBUTION

ABS features an enhanced algorithm which includes control of the brake force distribution between the front and rear axles. This is called Electronic Brake Distribution or Dynamic Rear Proportioning valve. In an unladen car condition the brake efficiency is comparable to the conventional system but for a fully loaden vehicle the efficiency of the Dynamic Rear Proportioning System is higher due to the better use of rear axle braking capability.

No indication is given to the driver when Dynamic Rear Proportioning is activated. Also, DRP remains active even in such cases where the anti-lock function of the ABS is disabled.

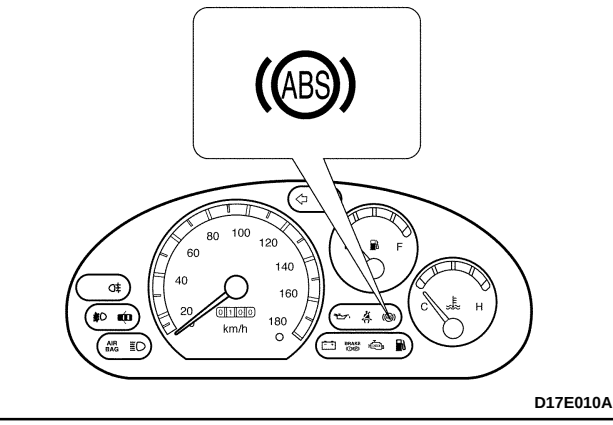


D17E009A

INDICATOR

It illuminates for four seconds immediately after the ignition has been turned on to show that the anti-lock system self-test is being carried out. If the light does not go off after this time it means that there may be a problem and ABS operation is not available.

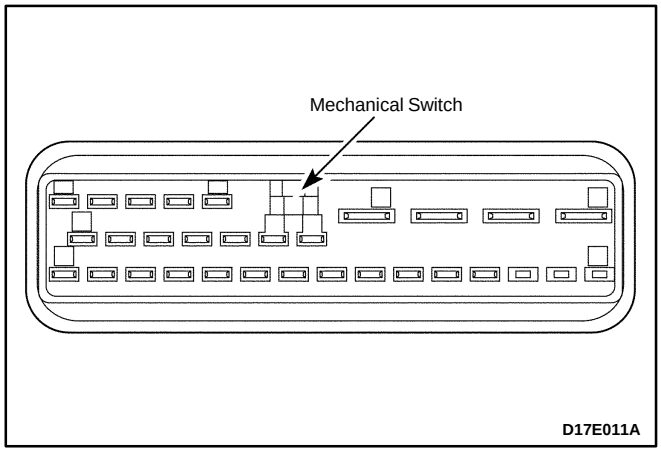
If any malfunction or error, including an unplugged EBCM connector, is detected during vehicle operation, the light will come on, warning the driver that the ABS is not operative and brake operation is in conventional, non-ABS mode.



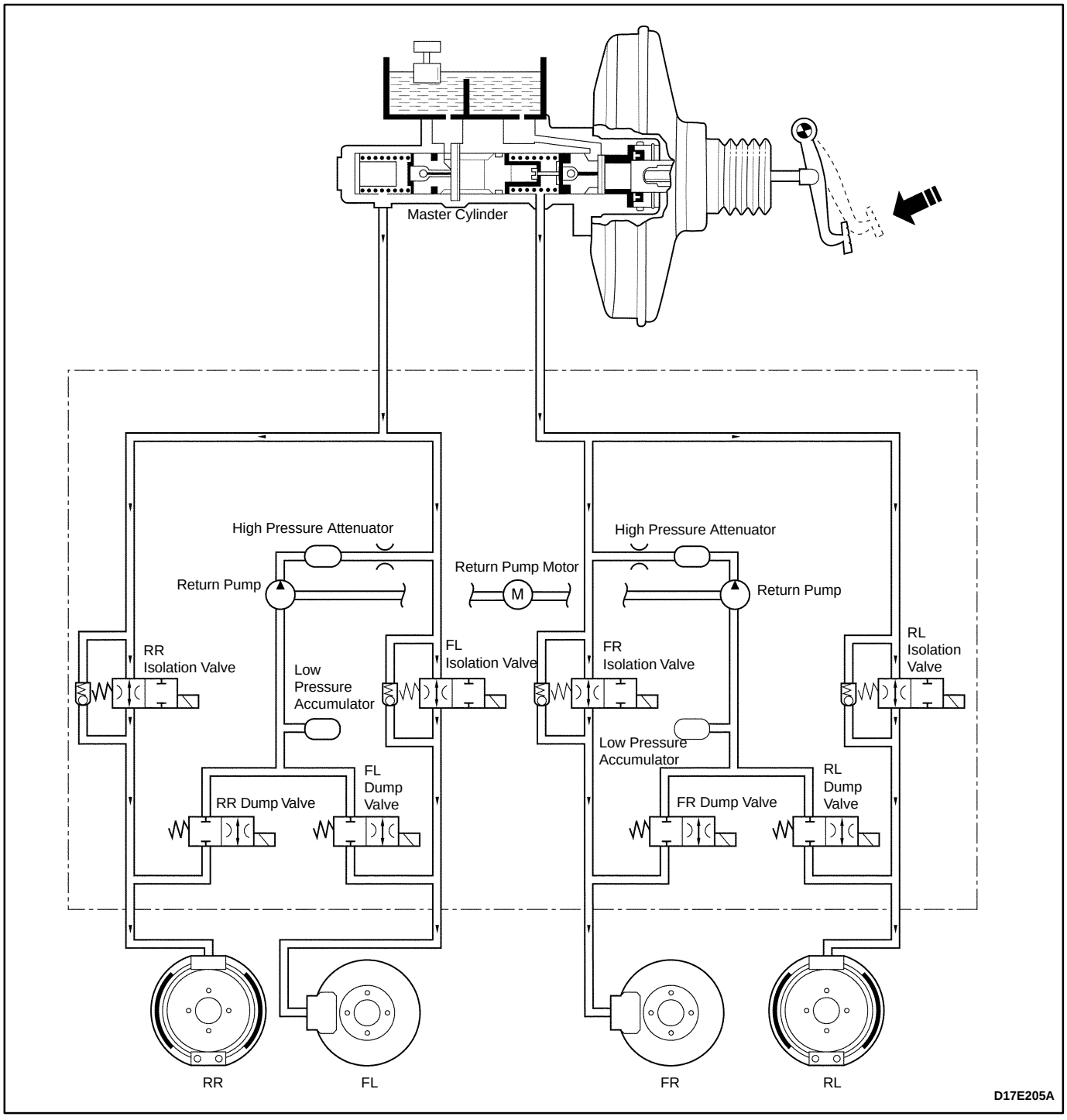
D17E010A

EBCM CONNECTOR

A Connector has 31 pins which are shown below figure. And a connector includes a warning switch which grounds and lights the ABS warning lamp if there is No EBCM unit plugged in, so that an indication is given that ABS is not available.

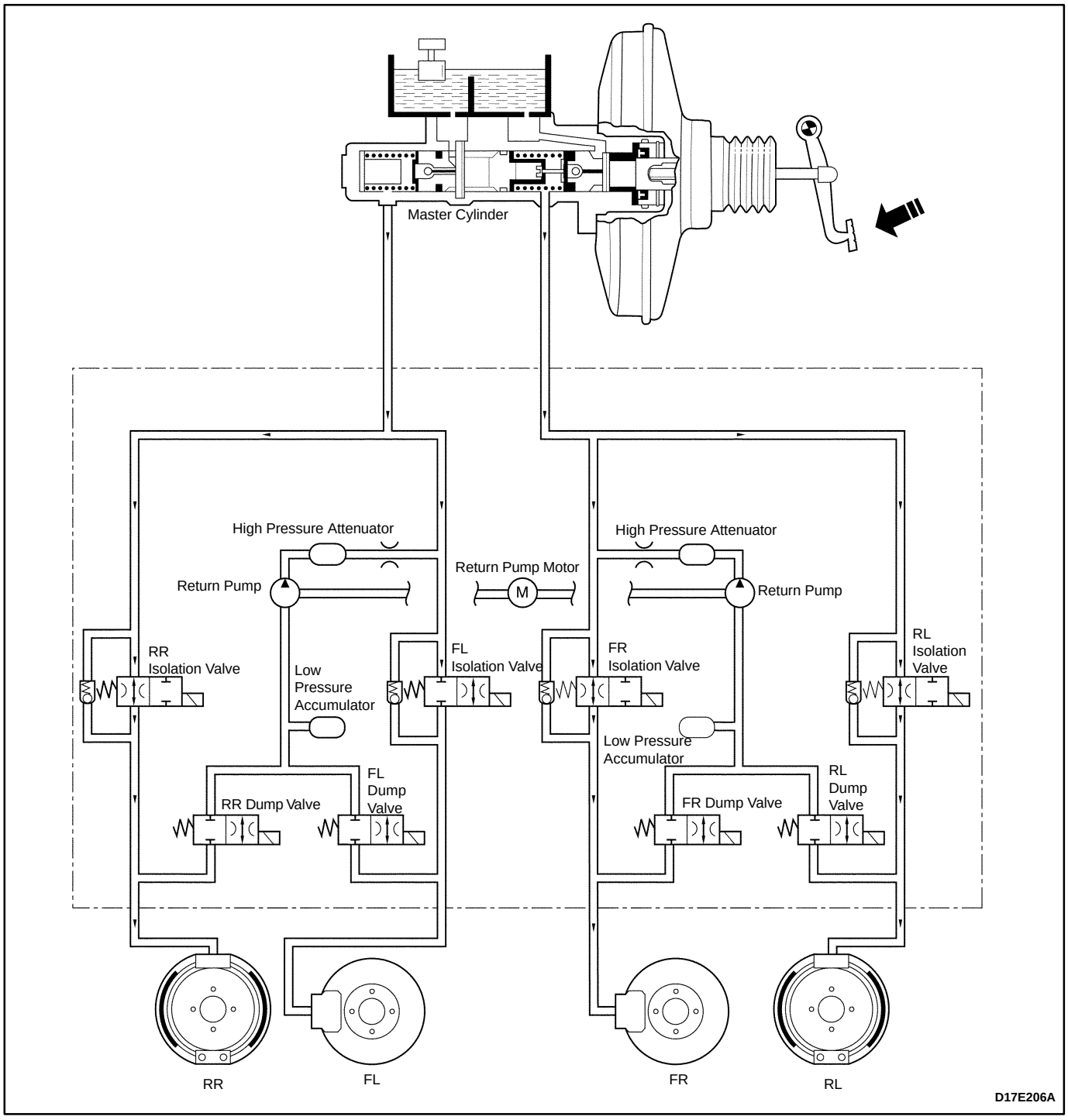


HYDRAULIC FLUID FLOW DIAGRAMS



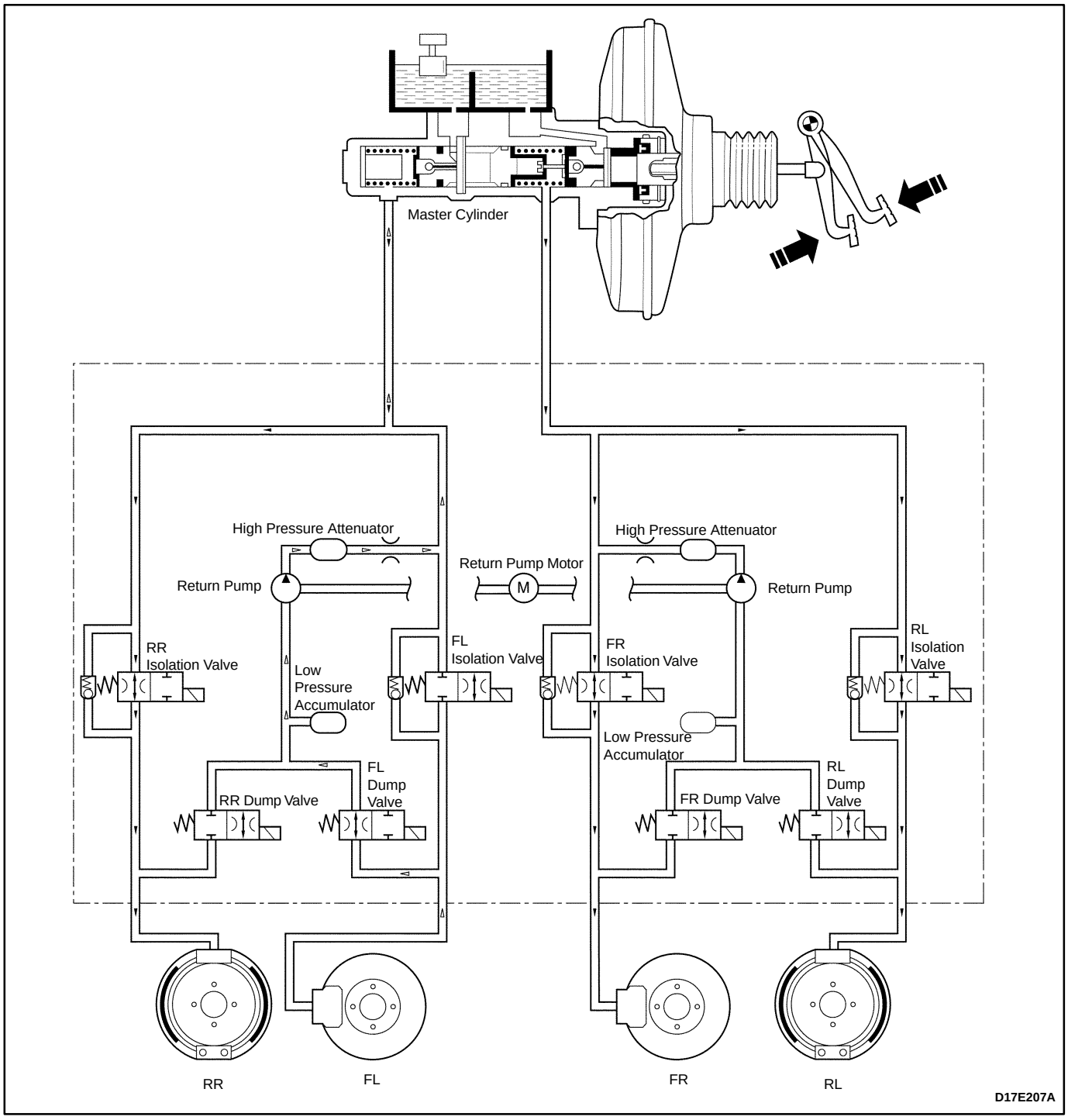
NORMAL BRAKE MODE

During non-antilock braking, pressure is applied through the brake pedal and fluid comes from the master cylinder into the hydraulic unit. The normally open isolation cartridge and normally closed dump cartridge would remain in these positions to allow fluid pressure to the calipers and the wheel cylinders. And each wheel begins locking.



ISOLATION MODE (PRESSURE MAINTAIN)

If the information from the wheel speed sensors indicate excessive wheel deceleration (imminent lockup), the first step in the antilock sequence is to isolate the brake pressure being applied by the driver. The EBCM sends a voltage to the coil to energize and close the isolation valves by pulling down on the armature. This prevents any additional fluid pressure applied by the driver from reaching the wheel. Though each channel of the 4-channel system can operate independently, once any front channel (brake) sees excessive deceleration, both front isolation valves are energized and close thus, with the isolation valves closed, further unnecessary increases in the brake pressure will be prohibited.

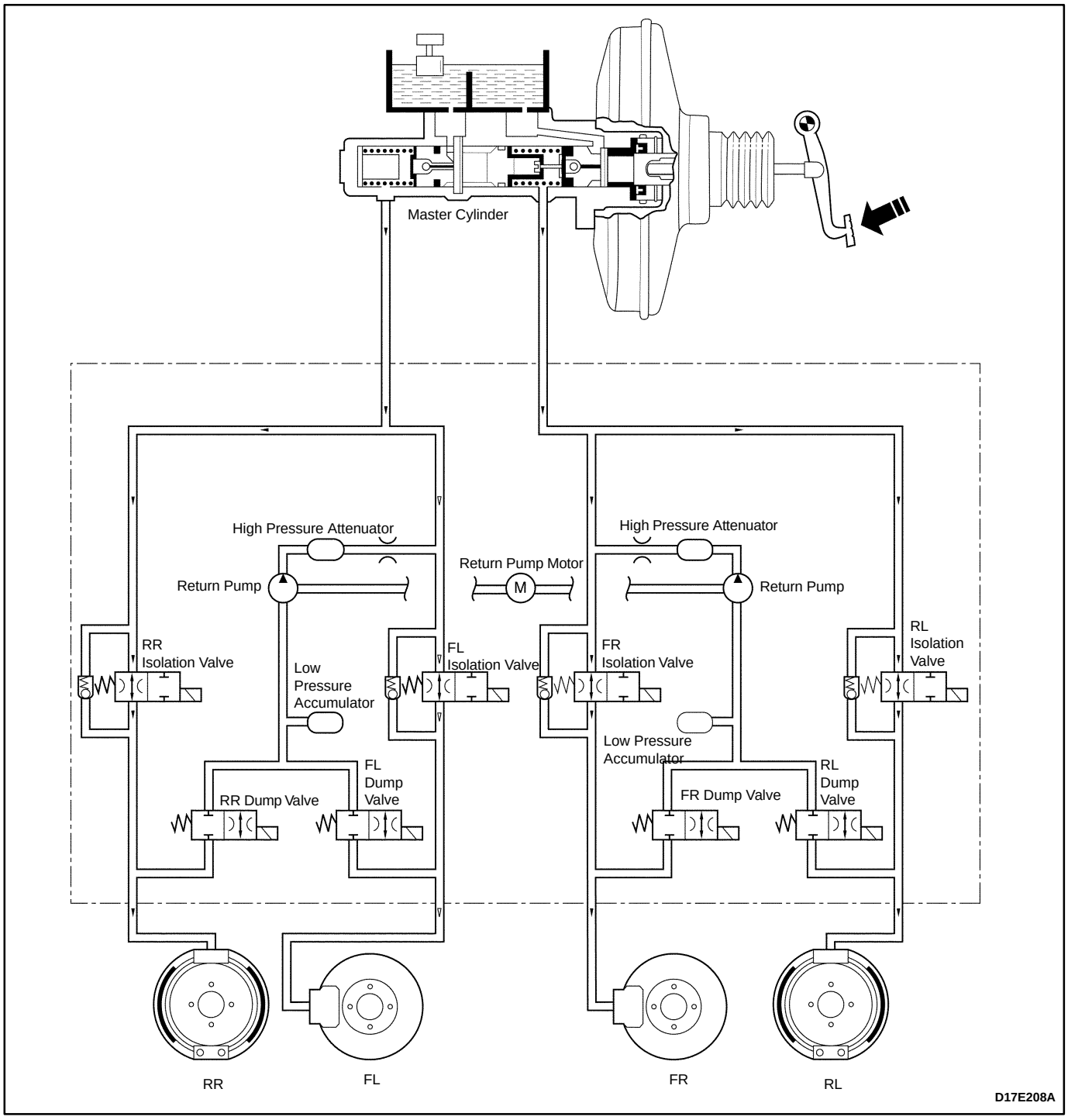


DUMP MODE (PRESSURE DECREASE)

Once the pressure is isolated, it must be reduced to get the wheels rolling once again. This is accomplished by dumping a portion of the brake fluid pressure into a low pressure accumulator (LPA).

The EBCM energizes the dump cartage coil(s) to open the dump cartridge, allowing fluid from the wheels to be dumped into the LPA. This done with very short activation pulses opening and closing the dump cartridge passageway. Brake pressure is lowered at the wheel and allows the wheel to begin spinning again.

The fluid taken from the wheels forces the spring back and is stored in the LPA. A portion of the fluid also primes the pump. The dump cartridges are operated independently to control the deceleration of the wheel.



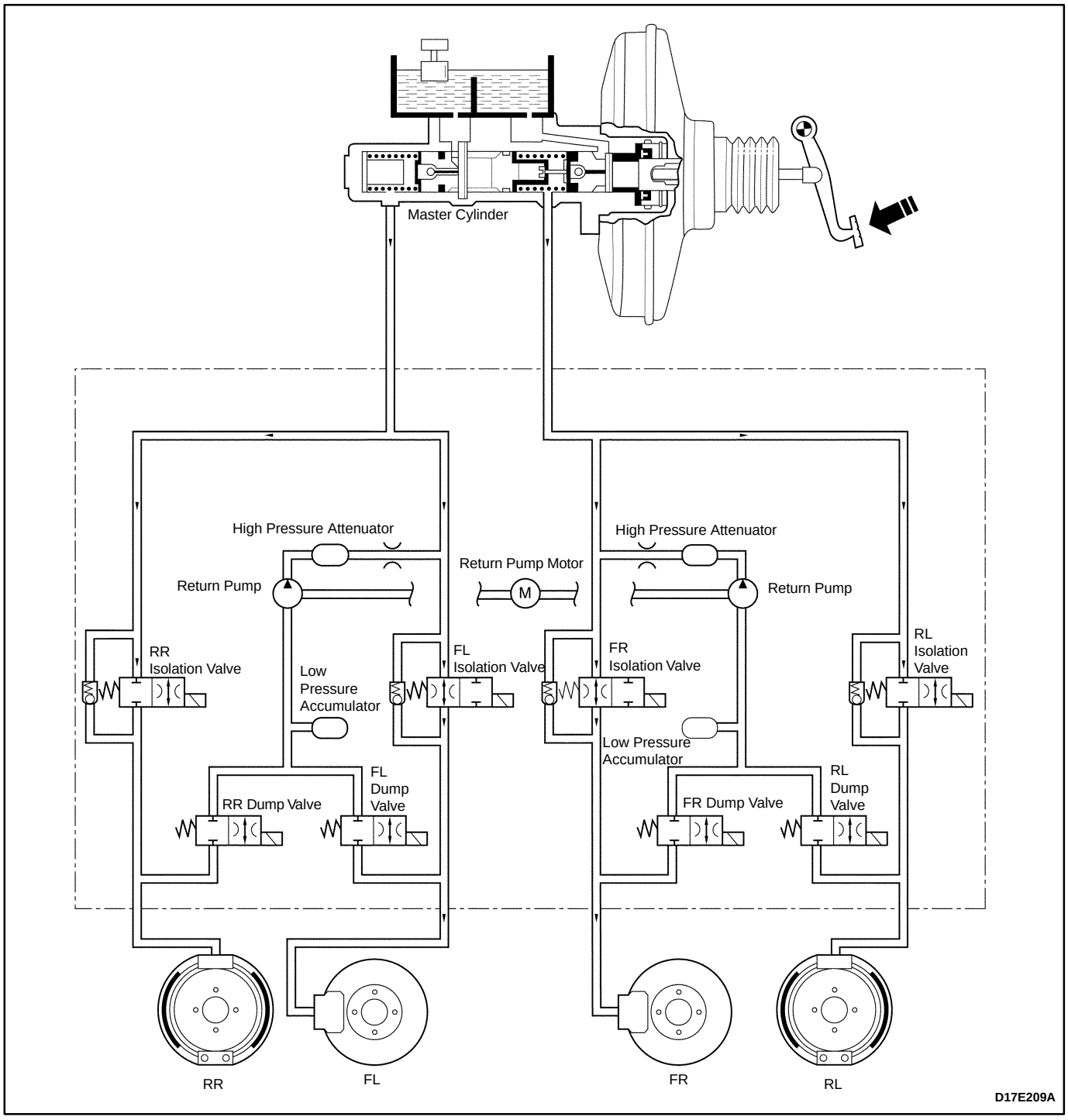
REAPPLY MODE (PRESSURE INCREASE)

This reapply sequence is initiated to obtain optimum braking. The isolation valve is momentarily pumped open to allow master cylinder and pump pressure to reach the brakes. This controlled pressure rise continues unitl the wheel is at optimum brake output or until the brake pressure is brough up to the master cylinder output pressure.

If more pressure is required, more fluid is drawn from the master cylinder and applied to the brakes. The driver may feel slight pedal pulsations, or pedal drop, this is normal and expected.

As fluid is reapplied to the wheel, they begin to slow down. If they approach imminent lockup again, the EBCM will isolate, dump and reapply again. The control cycle (isolation, dump, reapply) occurs in milli-second intervals, allowing seveal cycles to occur each second.

It is a much faster and more controlled way of “pumping the pedal”.



PROPORTIONING FUNCTION

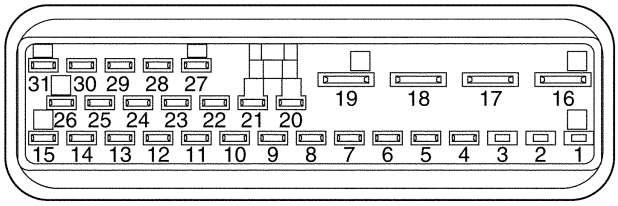
If the rear wheels lock formerly during braking, the vehicle may lose the stability. Therefore to prevent this, the ECM processes the speed sensor signal and brake signal to determine when the rear wheels are tending to lock up. The EBCM then actuates the rear wheel isolation valves to reduce the rear brake pressure and keep the wheels rolling.

VISUAL IDENTIFICATION

EBCM CONNECTOR FACE VIEW

Terminal 9 is identified as they appear from the wire entry end of the harness connector.

EBCM Connector

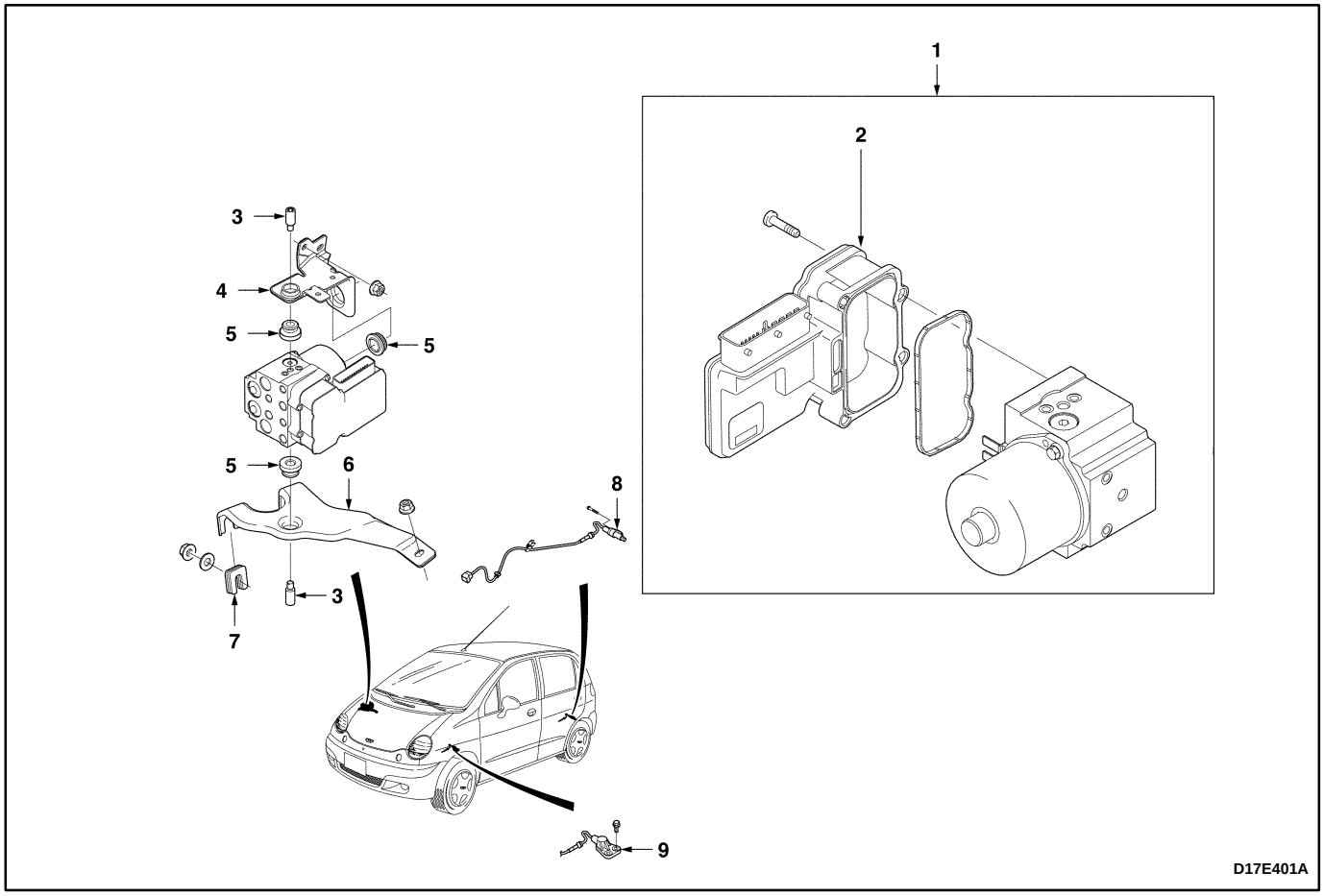


D107E204

Pin	Signal Name	Color	Circuit
2	ROUGH ROAD	GRY/YEL	Buffered Wheel Speed Signal : to ECM–55 (Sirius D3)
9	RRWSHI	BRN	Right Rear Wheel Speed High
10	RRWSLO	WHT	Right Rear Wheel Speed Low
11	SDLUART	BRN/DK GRN	Serial Data Link
12	RFWSHI	DK GRN/BLK	Right Front Wheel Speed High
13	RFWSLO	BRN/DK GRN	Right Front Wheel Speed Low
14	LFWSHI	DK BLU	Left Front Wheel Speed High
15	IGN	RED/YEL	Switched Ignition
16	GND	BLK	Negative Battery Terminal
17	BATT	RED	Battery
18	BATT	RED	Battery
19	GND	BLK	Negative Battery Terminal
20	ABSWARN	DK GRN/GRY	ABS Warning Indicator
22	LRWSHI	BLK	Left Rear Wheel Speed High
23	LRWSLO	RED	Left Rear Wheel Speed Low
24	BRAKESW	YEL	Brake Switch
25	LFWSLO	YEL	Left Front Wheel Speed Low

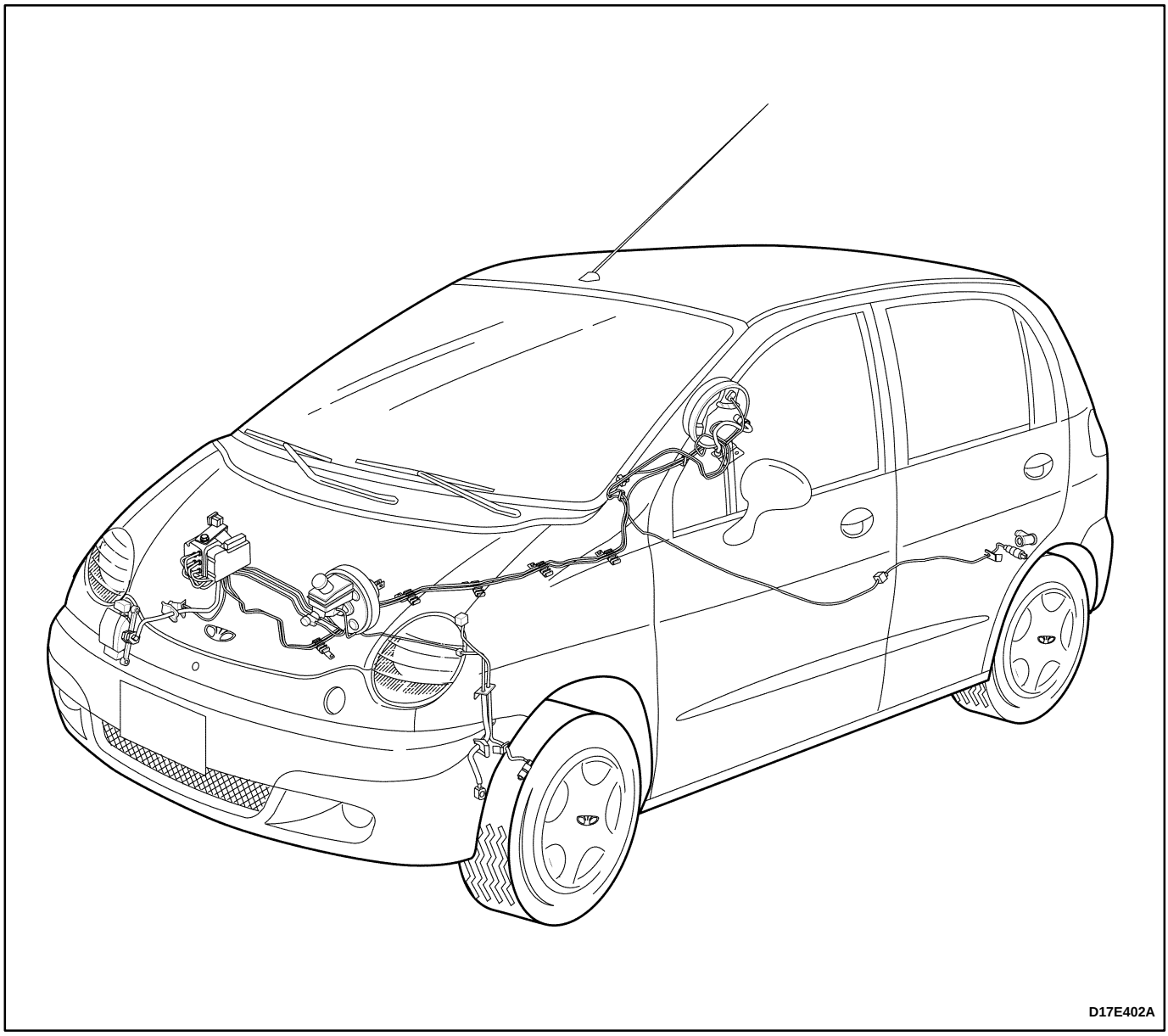
COMPONENT LOCATOR

ABS



1. Hydraulic Modulator Unit
2. Electronic Brake Control Module (EBCM)
3. Bolt
4. Upper Mounting Bracket
5. Grommet
6. Lower Mounting Bracket
7. Bracket Grommet
8. Rear Wheel Speed Sensor
9. Front Wheel Speed Sensor

ABS (Cont'd)



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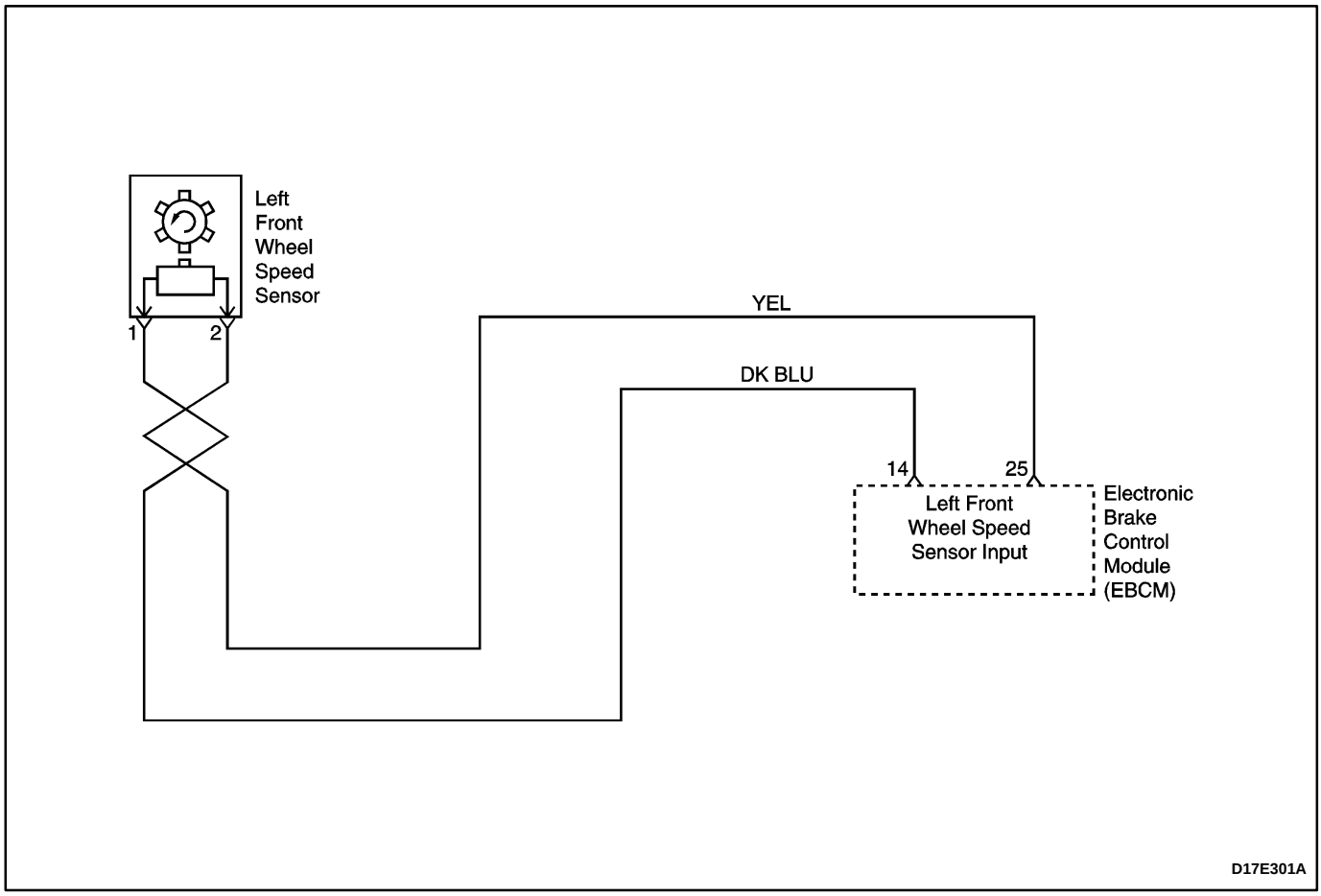
DIAGNOSTIC INFORMATION AND PROCEDURES



DIAGNOSTIC TROUBLE CODE (DTC) 0354
LEFT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test detects a short to battery, ground, or open in the left front wheel speed sensor circuit.

Cause(s)

- The wheel speed circuit is open or shorted to the battery or ground.
- There is a loose connection in the wheel speed circuit.
- The wheel speed sensor resistance is very high.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0354 – Left Front Wheel Speed Sensor Circuit Open or Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 14 and 25 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the left front wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the left front wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between terminal 14 of the EBCM harness connector, and terminal 1 of the left front wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the high resistance in circuit DK BLU. 2. If the wheel speed sensor harness is damaged, replace it. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between terminal 25 of the EBCM harness connector, and terminal 2 of the left front wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1Ω	Go to *Step 8*	Go to *Step 7*
7	1. Repair the high resistance in circuit YEL. 2. If the wheel speed sensor harness is damaged, replace it. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between ground and terminal 14 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 10*	Go to *Step 9*
9	Repair the short to ground in circuit DK BLU. Is the repair complete?	–	System OK	–

DTC 0354 – Left Front Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
10	Use a DVM to measure the resistance between ground and terminal 25 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 12*	Go to *Step 11*
11	Repair the short to ground in circuit YEL. Is the repair complete?	–	System OK	–
12	1. Reconnect all of the connectors. 2. Turn the ignition to ON. 3. Use a DVM to measure the voltage between ground and terminal 14 of EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 14*	Go to *Step 13*
13	Repair the short to voltage in circuit DK BLU. Is the repair complete?	–	System OK	–
14	Use a DVM to measure the voltage between ground and terminal 25 of EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 16*	Go to *Step 15*
15	Repair the short to voltage in circuit YEL. Is the repair complete?	–	System OK	–
16	Replace the EBCM. Is the repair complete?	–	System OK	–

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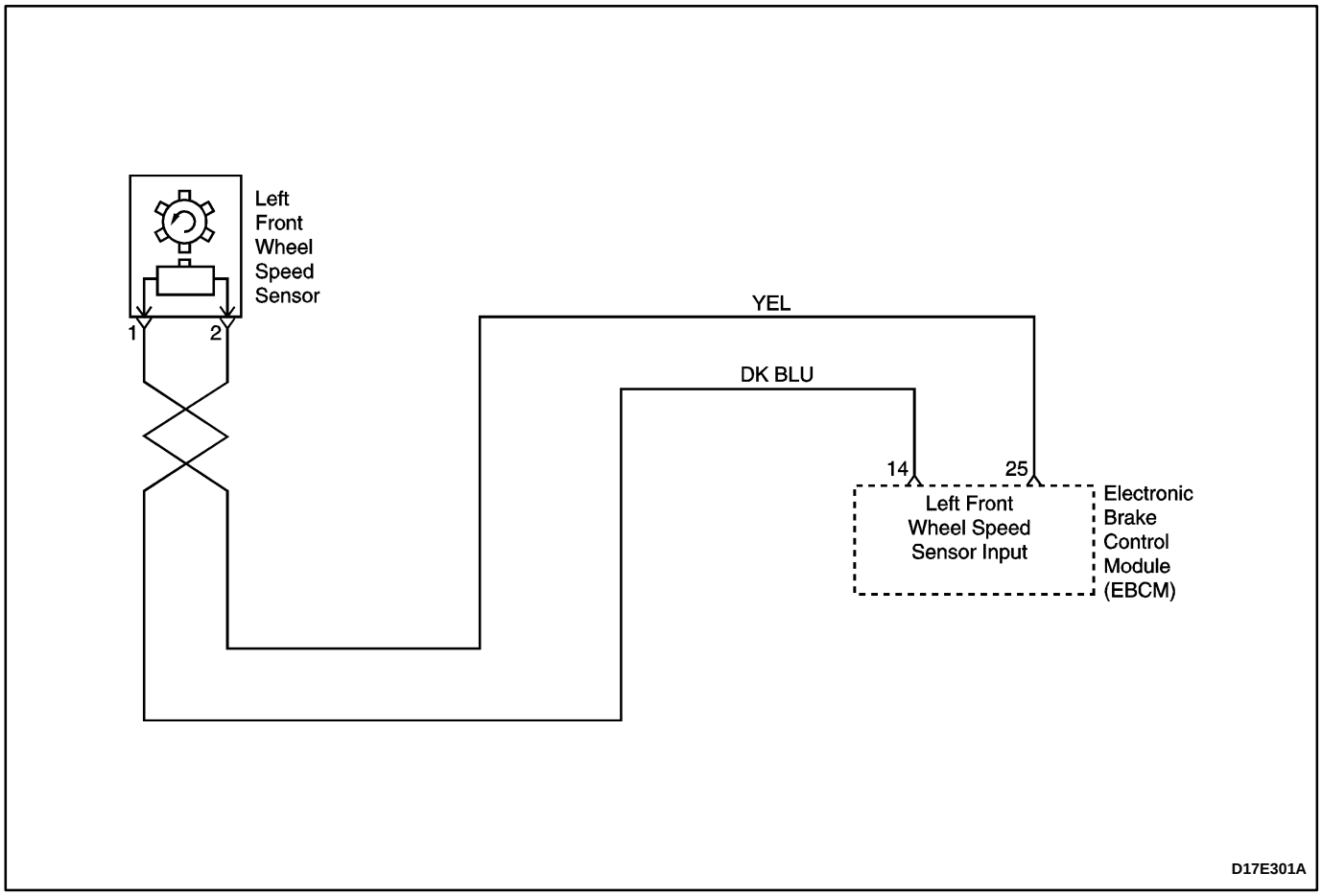


DIAGNOSTIC TROUBLE CODE (DTC) 0355 LEFT FRONT WHEEL SPEED SENSOR POOR AIR GAP OR MISSING TOOTH RING

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test checks for the left front wheel speed equal to 0 km/h (0 mph) for greater than 6 km/h (3.8 mph).

Cause(s)

- The tooth ring is missing.
- The air gap exceeds the required specifications.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

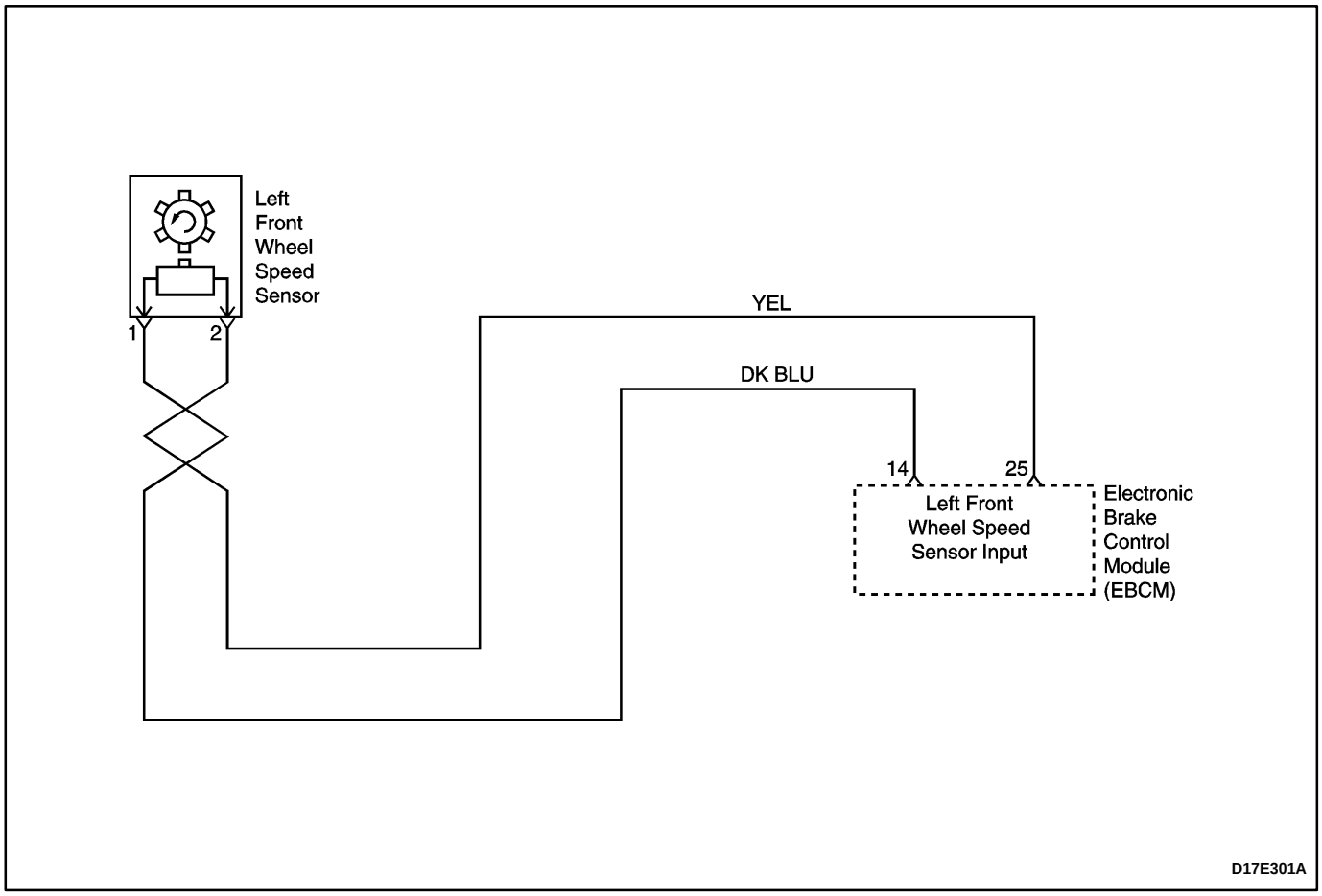
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed

sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0355 – Left Front Wheel Speed Sensor poor air Gap or Missing Tooth Ring

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Physically inspect the following components for damage. ● Wheel speed sensor is loose. ● The air gap exceeds the required specifications. ● The speed ring is missing or damaged. 3. Repair or replace the damaged. Is the repair complete?	–	System OK	Go to *Step 2*
2	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0356
LEFT FRONT WHEEL SPEED SENSOR CIRCUIT
INTERMITTENT SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test intermittent the left front wheel speed sensor circuit.

Cause(s)

- The wheel speed sensor is intermittent shorted to the battery or ground.
- There is a loose connection in the wheel speed sensor circuit.
- There is a loose connection in the EBCM.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp repeat intermittent turned on, and off. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

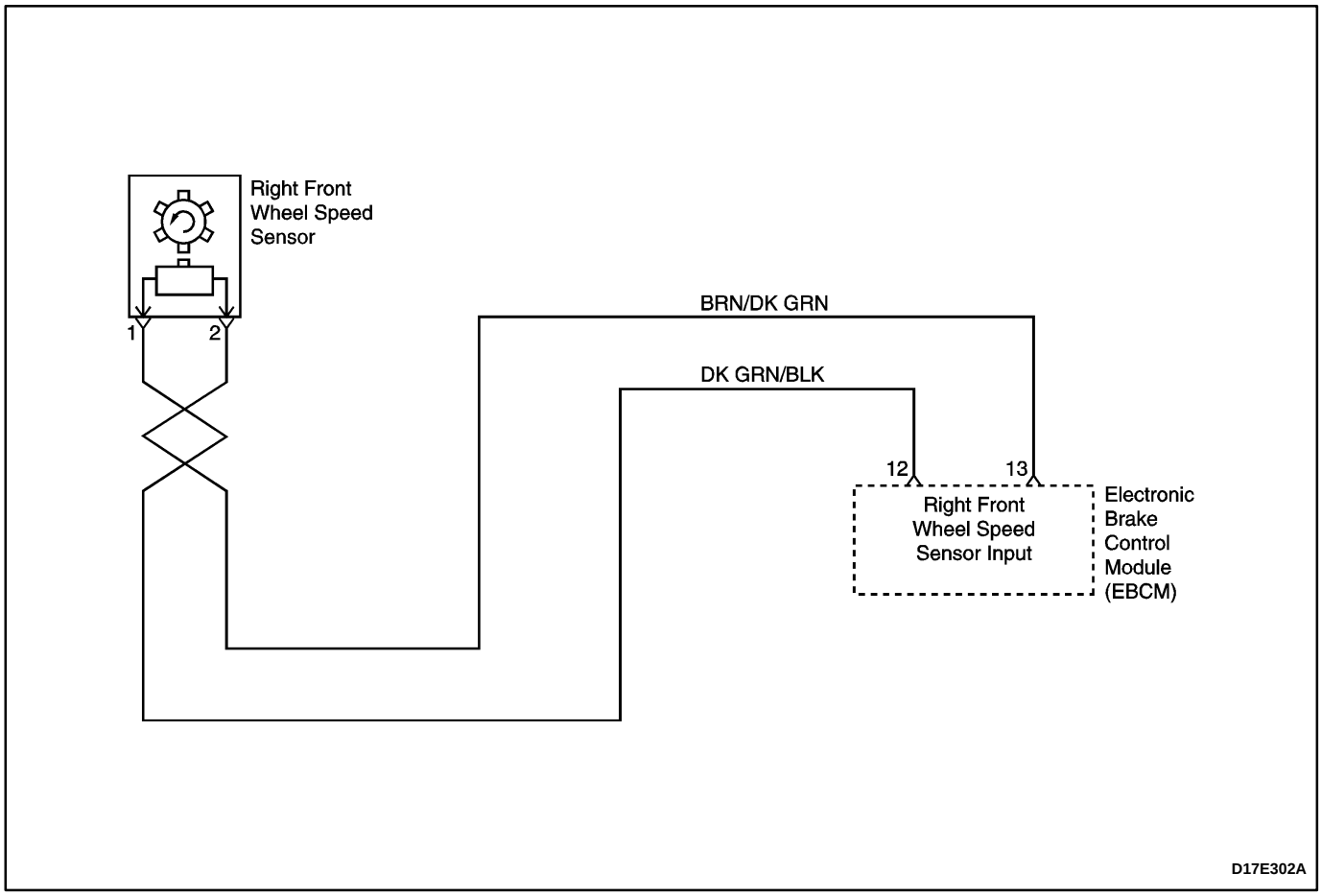
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0356 – Left Front Wheel Speed Sensor Circuit Intermittent Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 14 and 25 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the left front wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the left front wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between ground and terminal 14 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the short to ground in circuit DK BLU. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between ground and terminal 25 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 8*	Go to *Step 7*
7	Repair the short to ground in circuit YEL. Is the repair complete?	–	System OK	–
8	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 14 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 10*	Go to *Step 9*
9	Repair the short to voltage in circuit DK BLU. Is the repair complete?	–	System OK	–
10	Use a DVM to measure the resistance between ground and terminal 25 of the EBCM connector. Does the voltage within the specified value?	0 v	Go to *Step 12*	Go to *Step 11*
11	Repair the short to voltage in circuit YEL. Is the repair complete?	–	System OK	–
12	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0404
RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test detects a short to battery, ground, or open in the right front wheel speed sensor circuit.

Cause(s)

- The wheel speed circuit is open or shorted to the battery or ground.
- There is a loose connection in the wheel speed circuit.
- The wheel speed sensor resistance is very high.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0404 – Right Front Wheel Speed Sensor Circuit Open or Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 12 and 13 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the right front wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the right front wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between terminal 12 of the EBCM harness connector, and terminal 1 of the right front wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1 Ω	Go to *Step 6*	Go to *Step 5*
5	1. Repair the high resistance in circuit DK GRN/BLK. 2. If the wheel speed sensor harness is damaged, replace it. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between terminal 13 of the EBCM harness connector, and terminal 2 of the right front wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1 Ω	Go to *Step 8*	Go to *Step 7*
7	1. Repair the high resistance in circuit BRN/DK GRN. 2. If the wheel speed sensor harness is damaged, replace it. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between ground and terminal 12 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 10*	Go to *Step 9*
9	Repair the short to ground in circuit DK GRN/BLK. Is the repair complete?	–	System OK	–

DTC 0404 – Right Front Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
10	Use a DVM to measure the resistance between ground and terminal 13 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 12*	Go to *Step 11*
11	Repair the short to ground in circuit BRN/DK GRN. Is the repair complete?	–	System OK	–
12	1. Reconnect all of the connectors. 2. Turn the ignition to ON. 3. Use a DVM to measure the voltage between ground and terminal 12 of EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 14*	Go to *Step 13*
13	Repair the short to voltage in circuit DK GRN/BLK. Is the repair complete?	–	System OK	–
14	Use a DVM to measure the voltage between ground and terminal 13 of EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 16*	Go to *Step 15*
15	Repair the short to voltage in circuit BRN/DK GRN. Is the repair complete?	–	System OK	–
16	Replace the EBCM. Is the repair complete?	–	System OK	–

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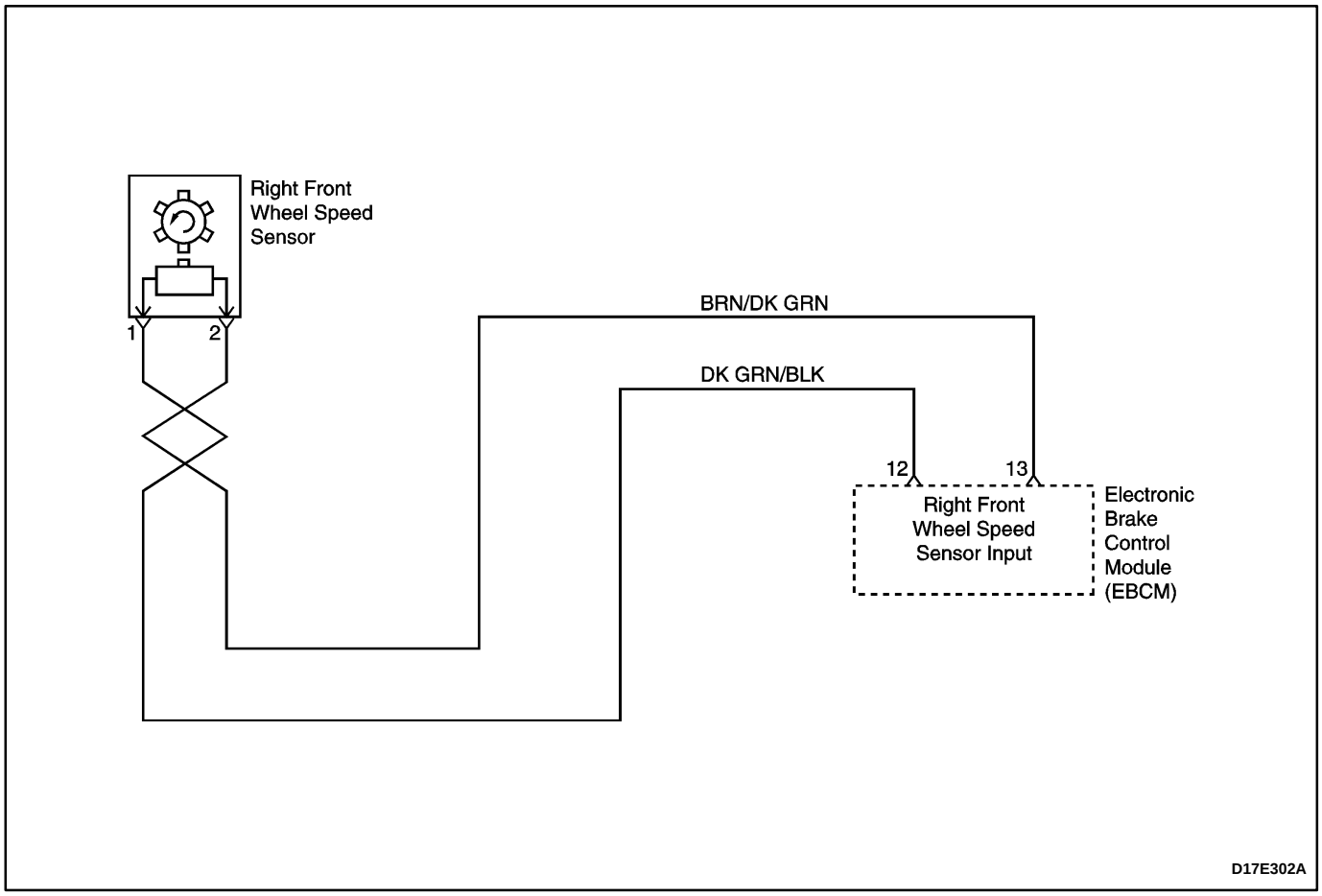


DIAGNOSTIC TROUBLE CODE (DTC) 0405 RIGHT FRONT WHEEL SPEED SENSOR POOR AIR GAP OR MISSING TOOTH RING

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test checks for the right front wheel speed equal to 0 km/h (0 mph) for greater than 6 km/h (3.8 mph).

Cause(s)

- The tooth ring is missing.
- The air gap exceeds the required specifications.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

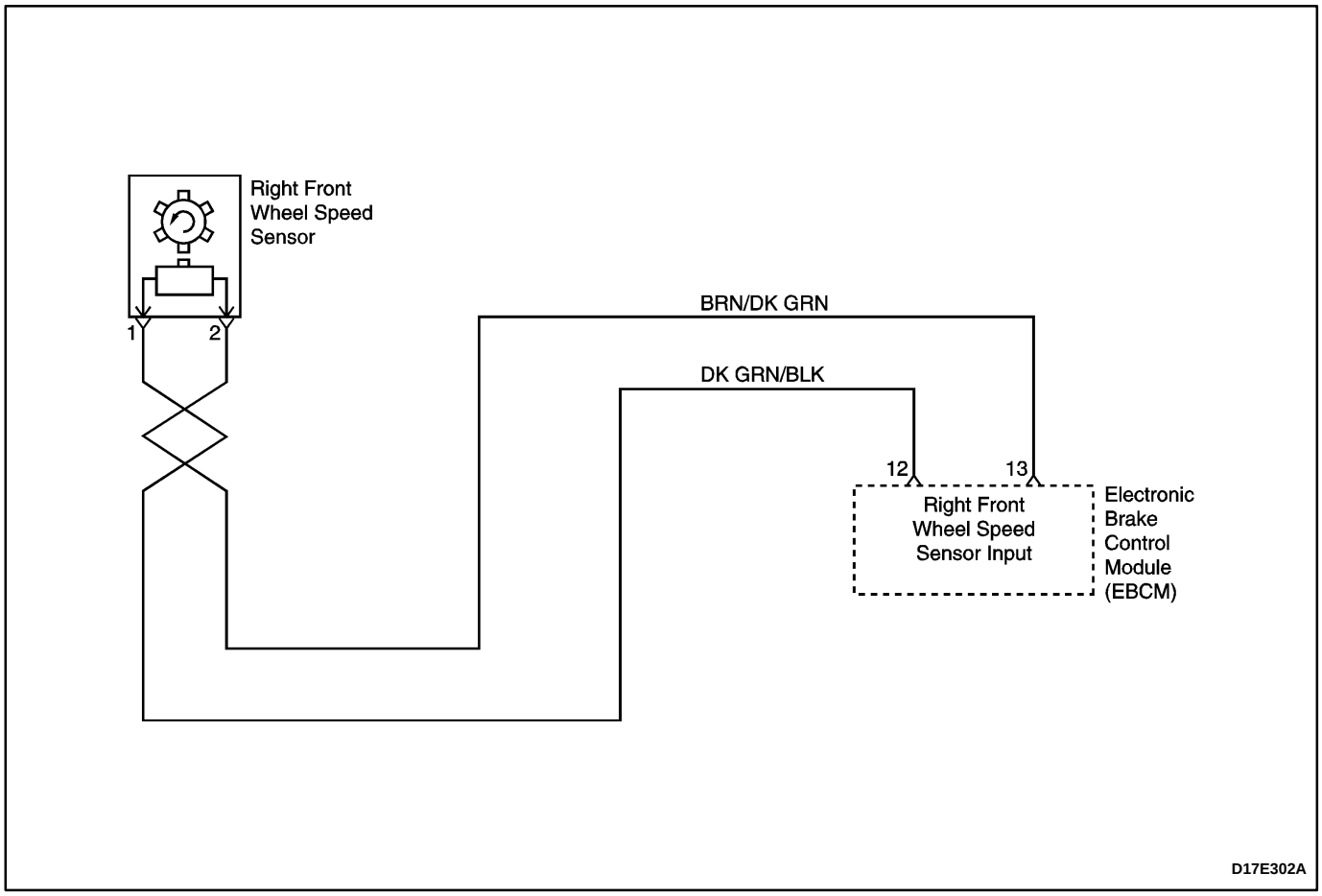
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed

sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0405 – Right Front Wheel Speed Sensor poor air Gap or Missing Tooth Ring

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Physically inspect the following components for damage. ● Wheel speed sensor is loose. ● The air gap exceeds the required specifications. ● The speed ring is missing or damaged. 3. Repair or replace the damaged. Is the repair complete?	–	System OK	Go to *Step 2*
2	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0406
RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT
INTERMITTENT SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test intermittent the right front wheel speed sensor circuit.

Cause(s)

- The wheel speed sensor is intermittent shorted to the battery or ground.
- There is a loose connection in the wheel speed sensor circuit.
- There is a loose connection in the EBCM.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp repeat intermittent turned on, and off. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

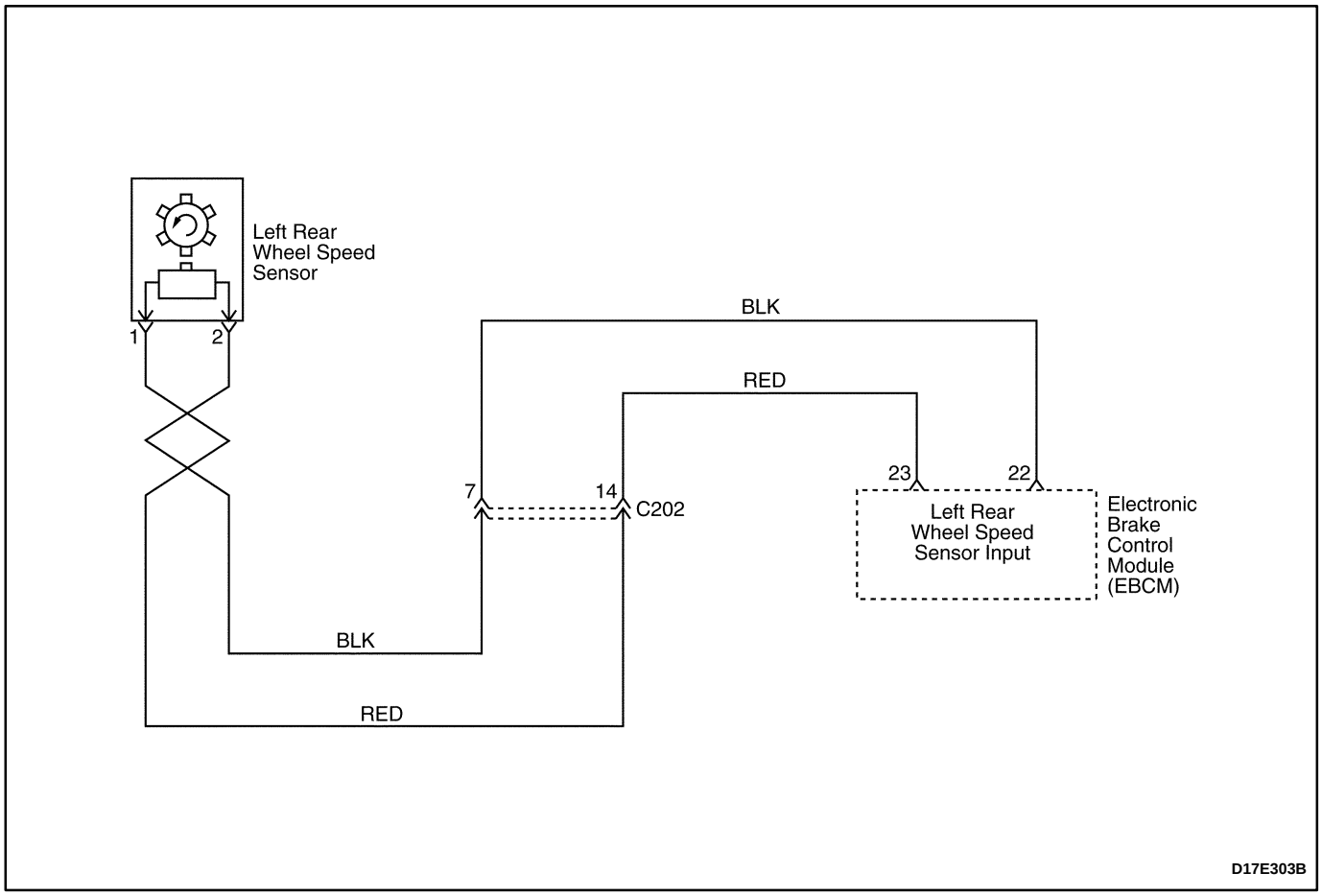
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Front Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0406 – Right Front Wheel Speed Sensor Circuit Intermittent Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 12 and 13 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the right front wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the right front wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between ground and terminal 12 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the short to ground in circuit DK GRN/BLK. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between ground and terminal 13 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 8*	Go to *Step 7*
7	Repair the short to ground in circuit BRN/DK GRN. Is the repair complete?	–	System OK	–
8	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 12 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 10*	Go to *Step 9*
9	Repair the short to voltage in circuit DK GRN/BLK. Is the repair complete?	–	System OK	–
10	Use a DVM to measure the resistance between ground and terminal 13 of the EBCM connector. Does the voltage within the specified value?	0 v	Go to *Step 12*	Go to *Step 11*
11	Repair the short to voltage in circuit BRN/DK GRN. Is the repair complete?	–	System OK	–
12	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0454
LEFT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test detects a short to battery, ground, or open in the left rear wheel speed sensor circuit.

Cause(s)

- The wheel speed circuit is open or shorted to the battery or ground.
- There is a loose connection in the wheel speed circuit.
- The wheel speed sensor resistance is very high.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0454 – Left Rear Wheel Speed Sensor Circuit Open or Shorted

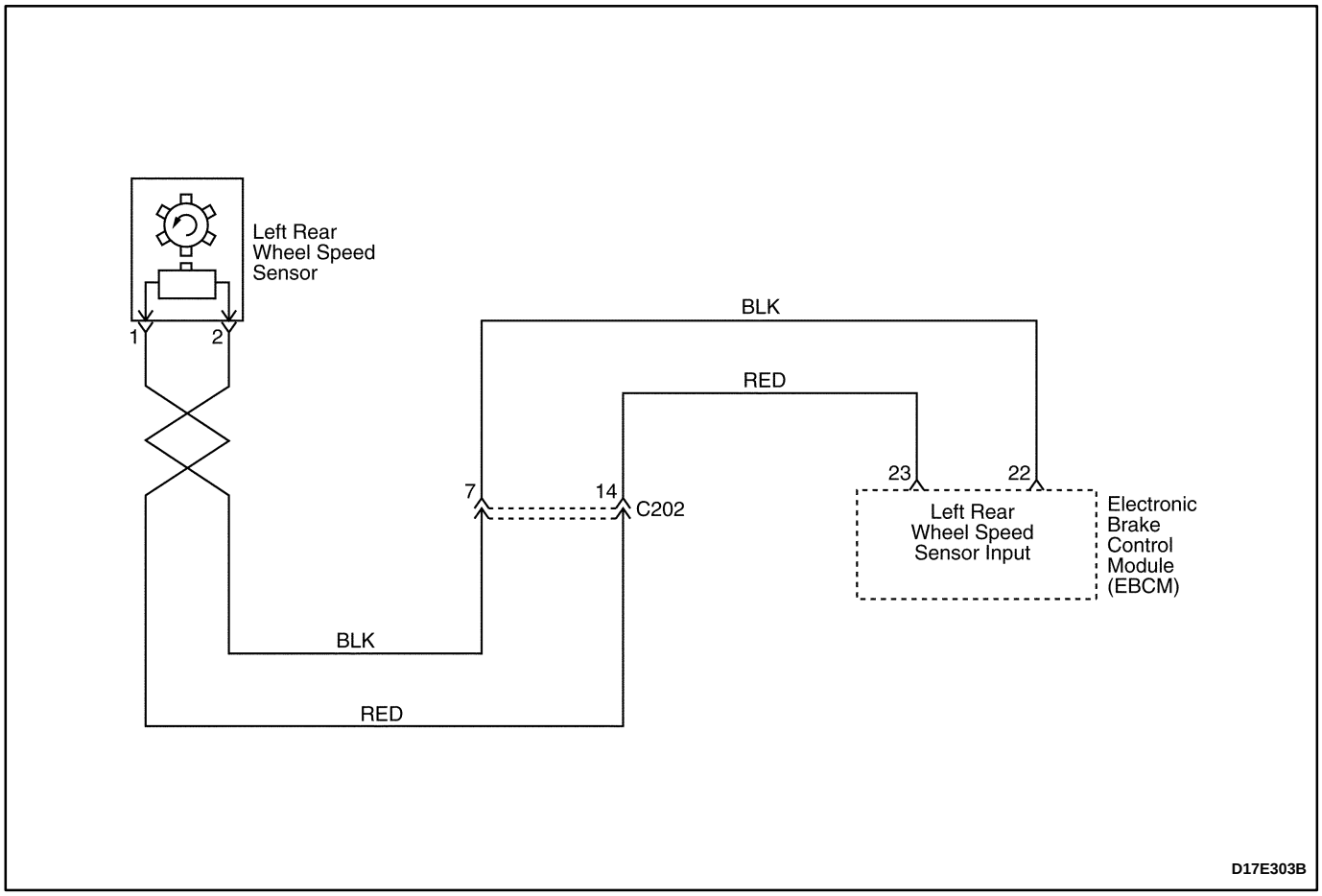
Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 22 and 23 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the left rear wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the left rear wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	1. Disconnect the connector C202. 2. Use a DVM to measure the resistance between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Does the DVM show the specified value?	less than 1 Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the high resistance between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1 Ω	Go to *Step 8*	Go to *Step 7*
7	Repair the high resistance between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Does the DVM show the specified value?	less than 1 Ω	Go to *Step 10*	Go to *Step 9*
9	Repair the high resistance between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the repair complete?	–	System OK	–

DTC 0454 – Left Rear Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
10	Use a DVM to measure the resistance between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the resistance within specified value?	less than 1 Ω	Go to *Step 12*	Go to *Step 11*
11	Repair the high resistance between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
12	Use a DVM to measure the resistance between ground and terminal 22 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 14*	Go to *Step 13*
13	Repair the short to ground between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Is the repair complete?	–	System OK	–
14	Use a DVM to measure the resistance between ground and terminal 7 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 16*	Go to *Step 15*
15	Repair the short to ground between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
16	Use a DVM to measure the resistance between ground and terminal 23 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 18*	Go to *Step 17*
17	Repair the short to ground between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the repair complete?	–	System OK	–
18	Use a DVM to measure the resistance between ground and terminal 14 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 20*	Go to *Step 19*
19	Repair the short to ground between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
20	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 22 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 22*	Go to *Step 21*
21	Repair the short to voltage between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Is the repair complete?	–	System OK	–
22	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 7 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 24*	Go to *Step 23*

DTC 0454 – Left Rear Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
23	Repair the short to voltage between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
24	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 26*	Go to *Step 25*
25	Repair the short to voltage between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the repair complete?	–	System OK	–
26	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 14 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 28*	Go to *Step 27*
27	Repair the short to voltage between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
28	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0455 LEFT REAR WHEEL SPEED SENSOR POOR AIR GAP OR MISSING TOOTH RING

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test checks for the left rear wheel speed equal to 0 km/h (0 mph) for greater than 6 km/h (3.8 mph).

Cause(s)

- The tooth ring is missing.
- The air gap exceeds the required specifications.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An ‘‘intermittent’’ malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

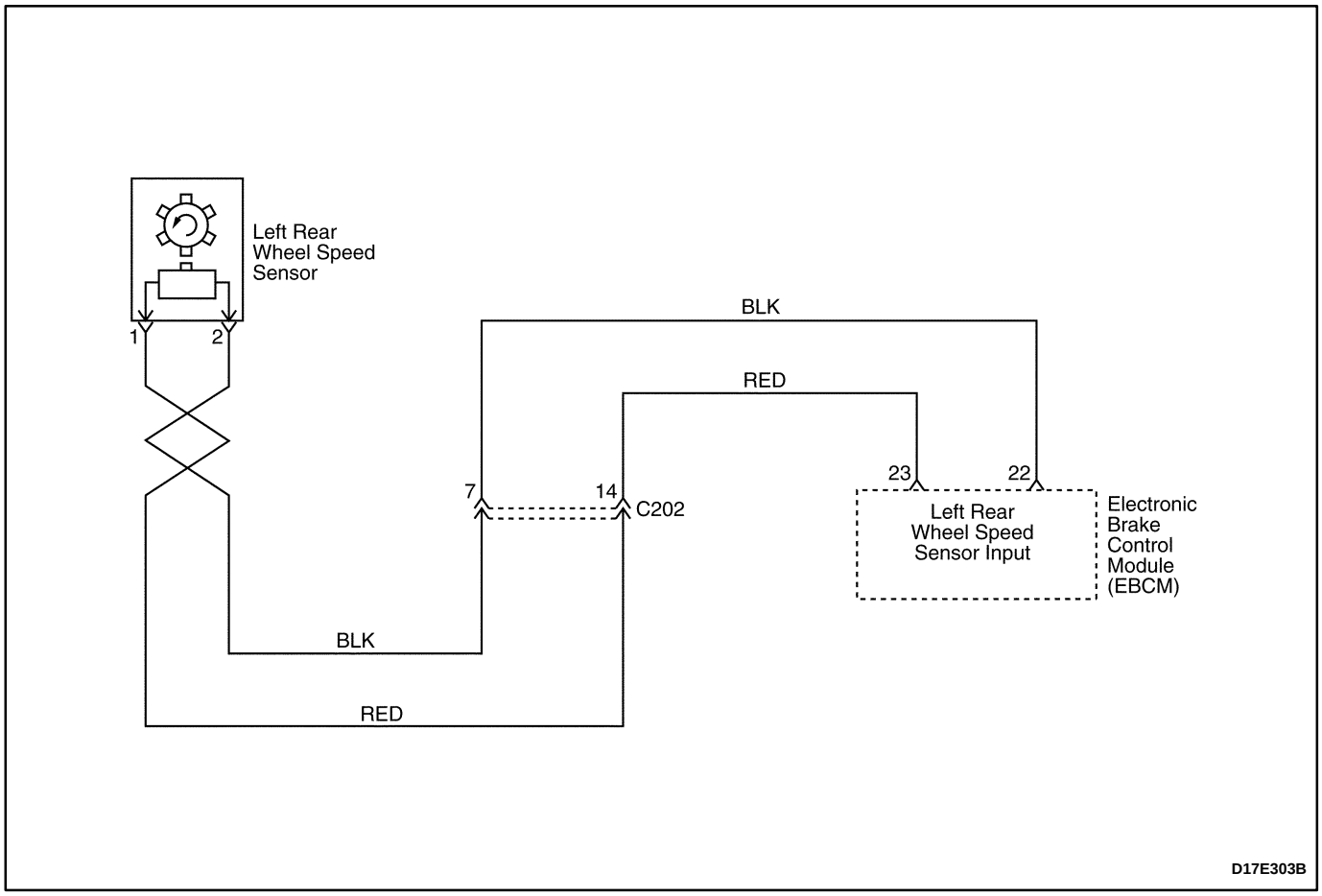
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed

sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0455 – Left Rear Wheel Speed Sensor poor air Gap or Missing Tooth Ring

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Physically inspect the following components for damage. ● Wheel speed sensor is loose. ● The air gap exceeds the required specifications. ● The speed ring is missing or damaged. 3. Repair or replace the damaged. Is the repair complete?	–	System OK	Go to *Step 2*
2	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0456
LEFT REAR WHEEL SPEED SENSOR CIRCUIT
INTERMITTENT SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test intermittent the left rear wheel speed sensor circuit.

Cause(s)

- The wheel speed sensor is intermittent shorted to the battery or ground.
- There is a loose connection in the wheel speed sensor circuit.
- There is a loose connection in the EBCM.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp repeat intermittent turned on, and off. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0456 – Left Rear Wheel Speed Sensor Circuit Intermittent Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 22 and 23 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the left rear wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the left rear wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between ground and terminal 22 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the short to ground between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between ground and terminal 7 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 8*	Go to *Step 7*
7	Repair the short to ground between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between ground and terminal 23 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 10*	Go to *Step 9*
9	Repair the short to ground between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the repair complete?	–	System OK	–
10	Use a DVM to measure the resistance between ground and terminal 14 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 12*	Go to *Step 11*

DTC 0456 – Left Rear Wheel Speed Sensor Circuit Intermittent Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
11	Repair the short to ground between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
12	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 22 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 14*	Go to *Step 13*
13	Repair the short to voltage between terminal 7 of the connector C202 and terminal 22 of the EBCM connector. Is the repair complete?	–	System OK	–
14	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 7 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 16*	Go to *Step 15*
15	Repair the short to voltage between terminal 7 of the connector C202 and terminal 2 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
16	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 18*	Go to *Step 17*
17	Repair the short to voltage between terminal 14 of the connector C202 and terminal 23 of the EBCM connector. Is the repair complete?	–	System OK	–
18	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 14 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 20*	Go to *Step 19*
19	Repair the short to voltage between terminal 14 of the connector C202 and terminal 1 of the left rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
20	Replace the EBCM. Is the repair complete?	–	System OK	–

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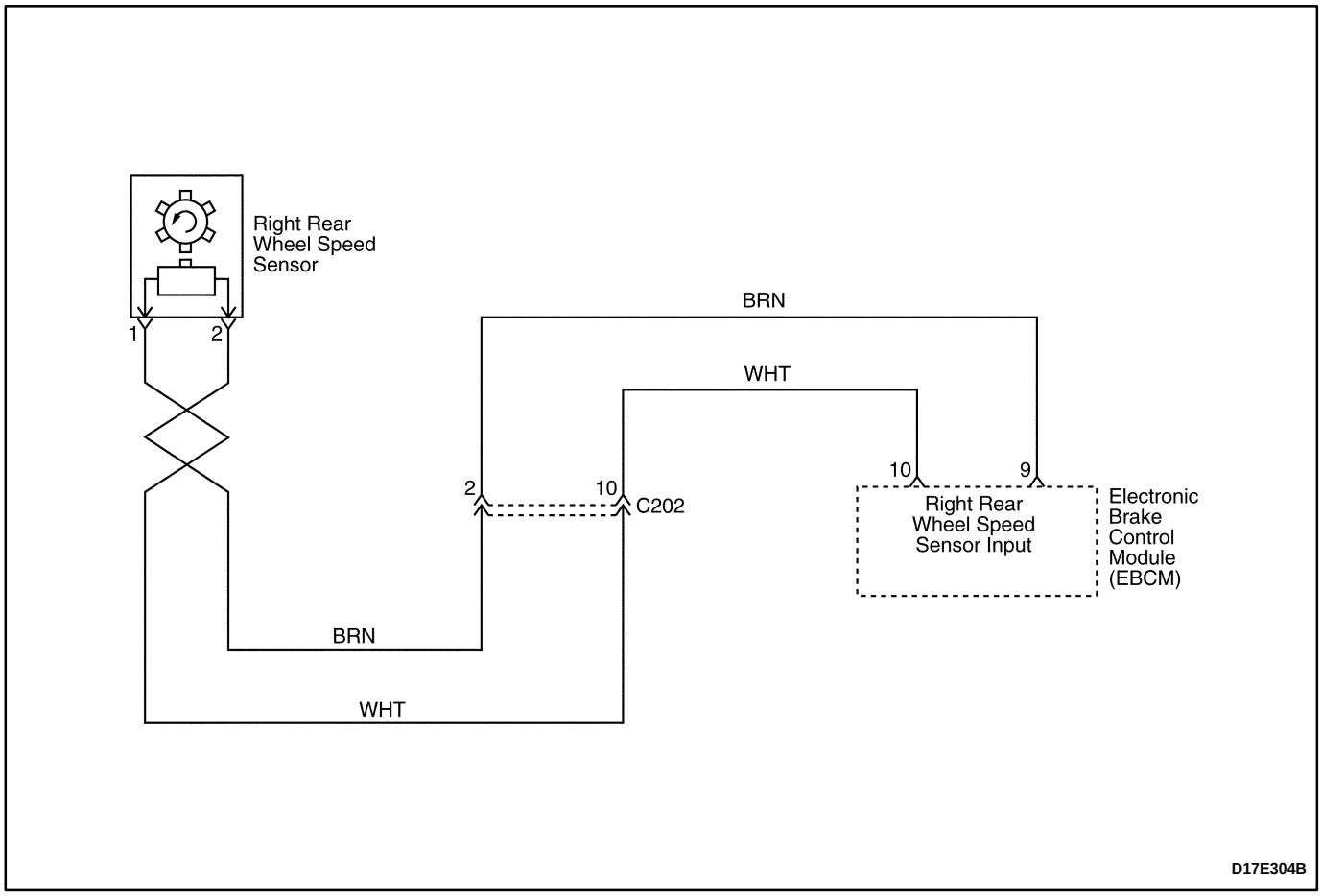


DIAGNOSTIC TROUBLE CODE (DTC) 0504
RIGHT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test detects a short to battery, ground, or open in the right rear wheel speed sensor circuit.

Cause(s)

- The wheel speed circuit is open or shorted to the battery or ground.
- There is a loose connection in the wheel speed circuit.
- The wheel speed sensor resistance is very high.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0504 – Right Rear Wheel Speed Sensor Circuit Open or Shorted

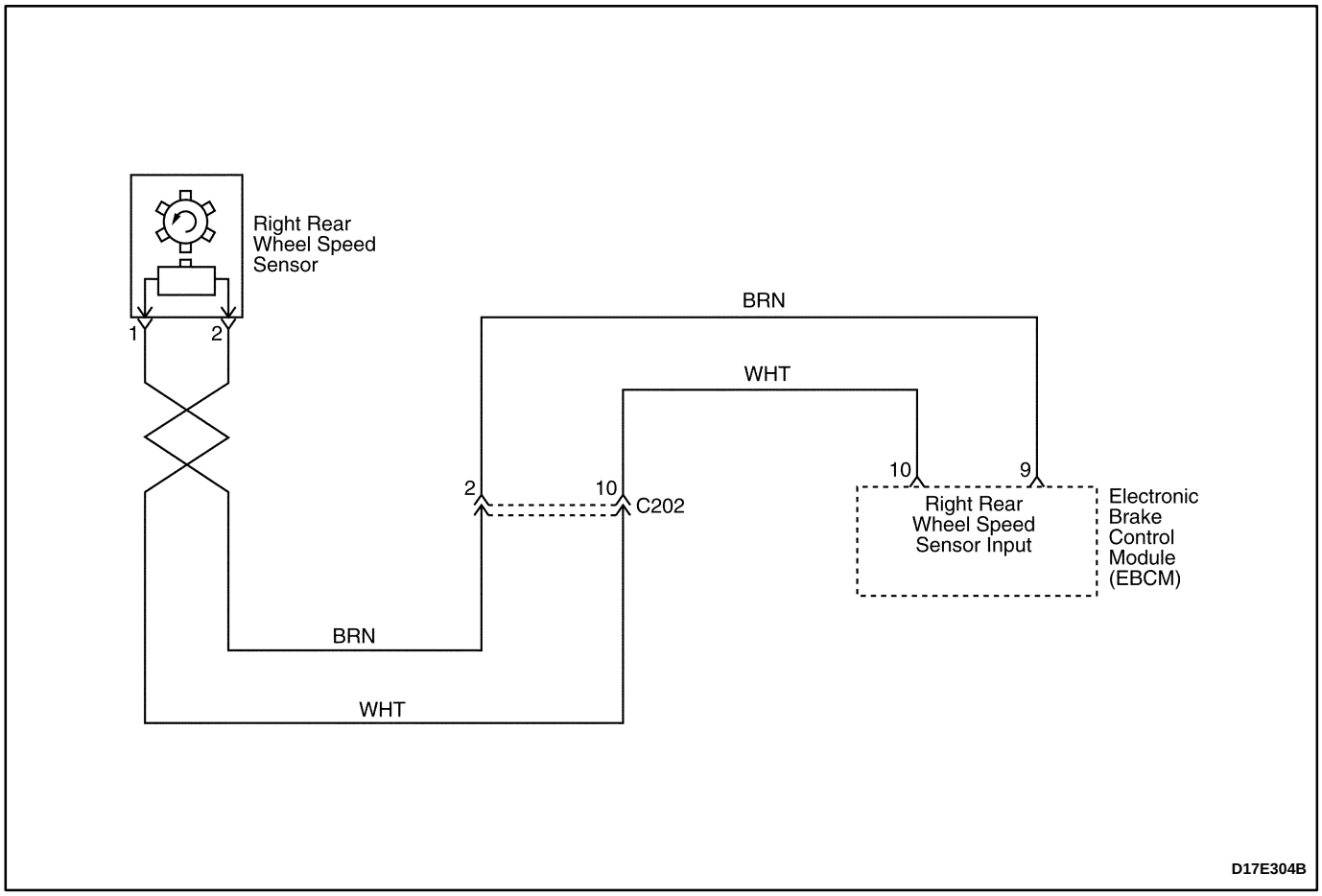
Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 9 and 10 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the right rear wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the right rear wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	1. Disconnect the connector C202. 2. Use a DVM to measure the resistance between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Does the DVM show the specified value?	less than 1 Ω	Go to *Step 6*	Go to *Step 5*
5	Repair the high resistance between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the resistance within the specified value?	less than 1 Ω	Go to *Step 8*	Go to *Step 7*
7	Repair the high resistance between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Does the DVM show the specified value?	less than 1 Ω	Go to *Step 10*	Go to *Step 9*
9	Repair the high resistance between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Is the repair complete?	–	System OK	–

DTC 0504 – Right Rear Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
10	Use a DVM to measure the resistance between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the resistance within specified value?	less than 1 Ω	Go to *Step 12*	Go to *Step 11*
11	Repair the high resistance between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
12	Use a DVM to measure the resistance between ground and terminal 9 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 14*	Go to *Step 13*
13	Repair the short to ground between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
14	Use a DVM to measure the resistance between ground and terminal 2 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 16*	Go to *Step 15*
15	Repair the short to ground between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
16	Use a DVM to measure the resistance between ground and terminal 10 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 18*	Go to *Step 17*
17	Repair the short to ground between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Is the repair complete?	–	System OK	–
18	Use a DVM to measure the resistance between ground and terminal 10 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 20*	Go to *Step 19*
19	Repair the short to ground between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
20	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 9 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 22*	Go to *Step 21*
21	Repair the short to voltage between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
22	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 2 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 24*	Go to *Step 23*

DTC 0504 – Right Rear Wheel Speed Sensor Circuit Open or Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
23	Repair the short to voltage between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
24	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 26*	Go to *Step 25*
25	Repair the short to voltage between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
26	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 10 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 28*	Go to *Step 27*
27	Repair the short to voltage between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
28	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0505 RIGHT REAR WHEEL SPEED SENSOR POOR AIR GAP OR MISSING TOOTH RING

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test checks for the right rear wheel speed equal to 0 km/h (0 mph) for greater than 6 km/h (3.8 mph).

Cause(s)

- The tooth ring is missing.
- The air gap exceeds the required specifications.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

Diagnostic Aids

An ‘‘intermittent’’ malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

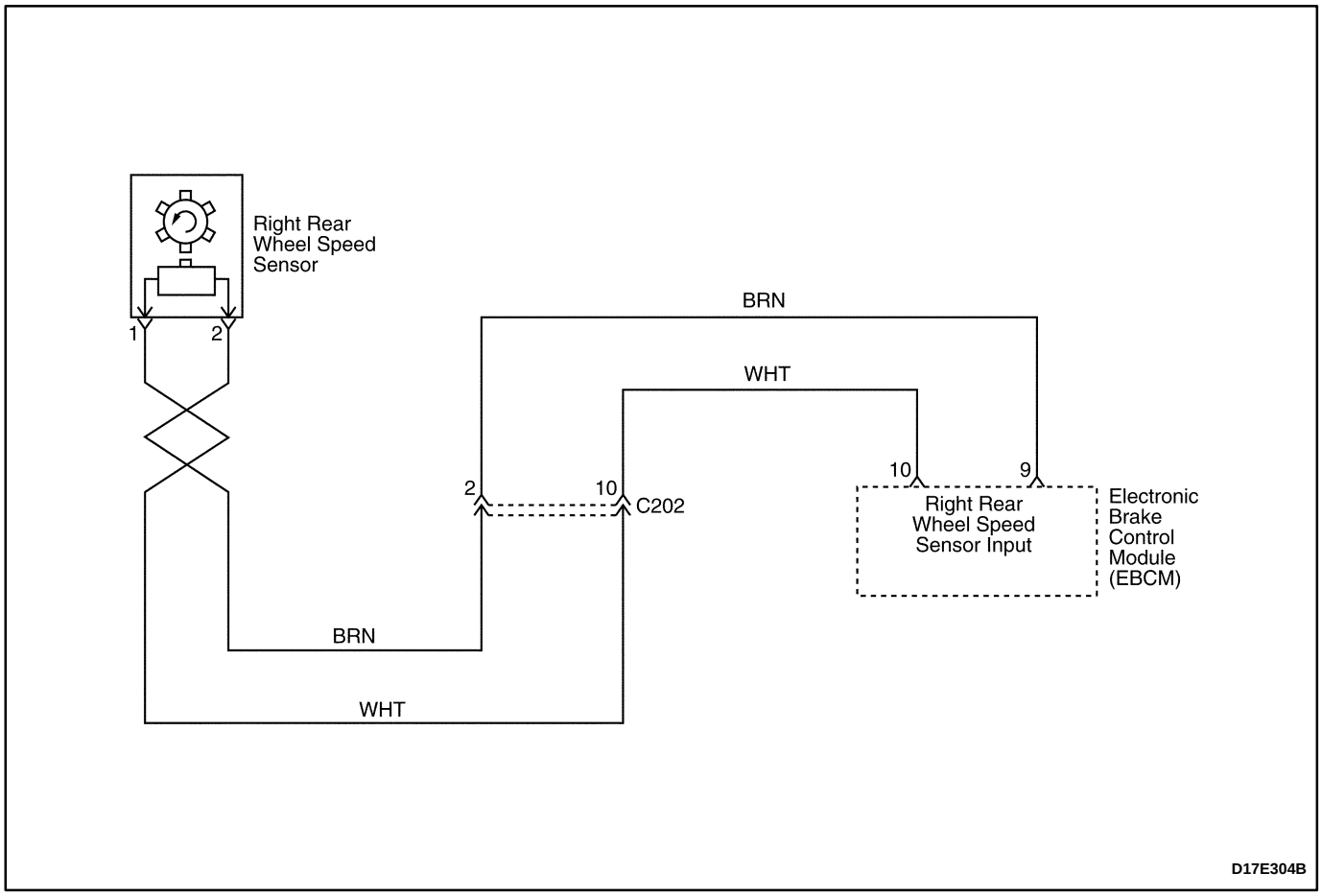
When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed

sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0505 – Right Rear Wheel Speed Sensor poor air Gap or Missing Tooth Ring

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Physically inspect the following components for damage. ● Wheel speed sensor is loose. ● The air gap exceeds the required specifications. ● The speed ring is missing or damaged. 3. Repair or replace the damaged. Is the repair complete?	–	System OK	Go to *Step 2*
2	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0506
RIGHT REAR WHEEL SPEED SENSOR CIRCUIT
INTERMITTENT SHORTED

Circuit Description

As a toothed ring passes by the wheel speed sensor, changes in the electromagnetic field cause the wheel speed sensor to produce a sinusoidal (AC) voltage signal whose frequency is proportional to the wheel speed. The magnitude of this signal is directly related to wheel speed and the proximity of the wheel speed sensor to the toothed ring often referred to as the air gap.

Diagnosis

This test intermittent the right rear wheel speed sensor circuit.

Cause(s)

- The wheel speed sensor is intermittent shorted to the battery or ground.
- There is a loose connection in the wheel speed sensor circuit.
- There is a loose connection in the EBCM.
- The EBCM is malfunctioning.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp repeat intermittent turned on, and off. The proportioning is operation.

Diagnostic Aids

An “intermittent” malfunction may be caused by a poor connection, rubbed through wire insulation, or a wire that is broken inside the insulation.

Thoroughly check any circuitry suspected of causing the intermittent complaint. Look for backed out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wiring connections, or physical damage to the wiring harness.

Wheel speed sensor resistance will increase as the sensor temperature increases.

When replacing a wheel speed sensor, inspect the sensor terminals and harness connector for corrosion and/or water intrusion. If evidence of corrosion or water

intrusion exists, replace the wheel speed sensor harness. If replacing a wheel speed sensor harness, inspect the sensor terminals. If you find evidence of corrosion or water intrusion, replace the wheel speed sensor. Refer to “Rear Wheel Speed Sensor” in this section.

Important: Wheel speed sensor intermittent malfunctions may be difficult to locate. Take care not to disturb any electrical connections before performing an indicated step of this table. That will ensure that an intermittent connection will not be corrected before the source of the malfunction is found.

DTC 0506 – Right Rear Wheel Speed Sensor Circuit Intermittent Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Disconnect the EBCM harness connector from the EBCM. 3. Use a digital voltmeter (DVM) to measure the resistance between terminals 9 and 10 of connector on the EBCM harness. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 2*
2	1. Disconnect the harness from the right rear wheel speed sensor. 2. Use a DVM to measure the resistance between terminals 1 and 2 of the right rear wheel speed sensor connector. Is the resistance within the specified value?	1.0 kΩ to 1.5 kΩ	Go to *Step 4*	Go to *Step 3*
3	Replace the wheel speed sensor. Is the repair complete?	–	System OK	–
4	Use a DVM to measure the resistance between ground and terminal 9 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 6*	Go to *Step 5*
5	Repair the short to ground between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
6	Use a DVM to measure the resistance between ground and terminal 2 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 8*	Go to *Step 7*
7	Repair the short to ground between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
8	Use a DVM to measure the resistance between ground and terminal 10 of the EBCM connector. Does the DVM show the specified value?	∞	Go to *Step 10*	Go to *Step 9*
9	Repair the short to ground between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Is the repair complete?	–	System OK	–
10	Use a DVM to measure the resistance between ground and terminal 10 of the connector C202. Does the DVM show the specified value?	∞	Go to *Step 12*	Go to *Step 11*

DTC 0506 – Right Rear Wheel Speed Sensor Circuit Intermittent Shorted (Cont'd)

Step	Action	Value(s)	Yes	No
11	Repair the short to ground between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
12	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 9 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 14*	Go to *Step 13*
13	Repair the short to voltage between terminal 2 of the connector C202 and terminal 9 of the EBCM connector. Is the repair complete?	–	System OK	–
14	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 2 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 16*	Go to *Step 15*
15	Repair the short to voltage between terminal 2 of the connector C202 and terminal 2 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
16	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Is the voltage within the specified value?	0 v	Go to *Step 18*	Go to *Step 17*
17	Repair the short to voltage between terminal 10 of the connector C202 and terminal 10 of the EBCM connector. Is the repair complete?	–	System OK	–
18	1. Turn the ignition switch to ON. 2. Use a DVM to measure the voltage between ground and terminal 10 of the connector C202. Is the voltage within the specified value?	0 v	Go to *Step 20*	Go to *Step 19*
19	Repair the short to voltage between terminal 10 of the connector C202 and terminal 1 of the right rear wheel speed sensor harness connector. Is the repair complete?	–	System OK	–
20	Replace the EBCM. Is the repair complete?	–	System OK	–

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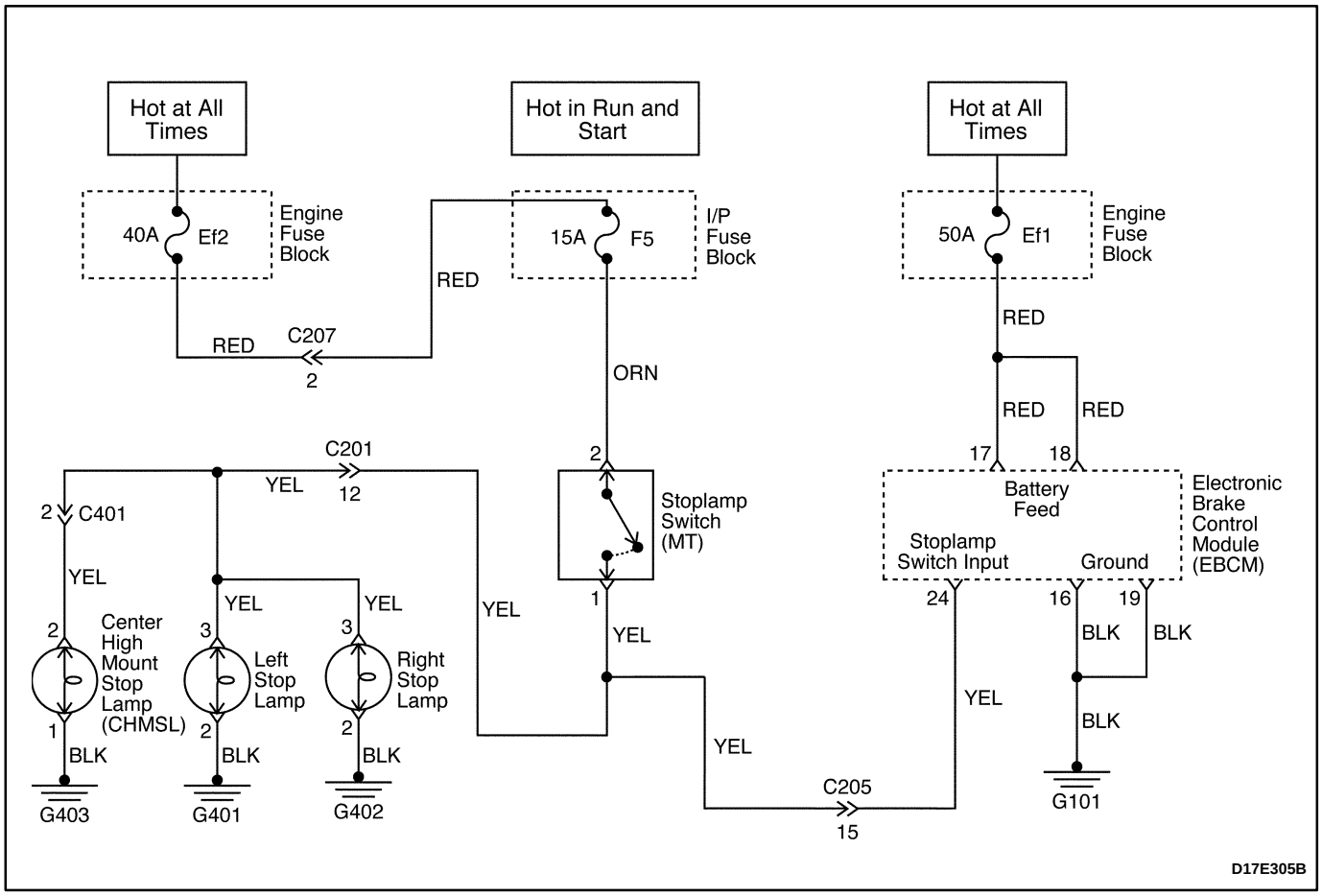


DIAGNOSTIC TROUBLE CODE (DTC) 0601
LEFT FRONT DUMP SHORTED OR DRIVER OPEN

Circuit Description

EBCM proceeds the self–test about the dump valve or the motor driver, if the EBCM senses the brake signal.

Diagnosis

If the EBCM proceeds the self–test about the dump valve or the motor driver and senses the fault, the EBCM may make the fault code.

Cause(s)

- EBCM internal fault (Left front dump voltage shorted or ground open).

Warning Lamp Operation

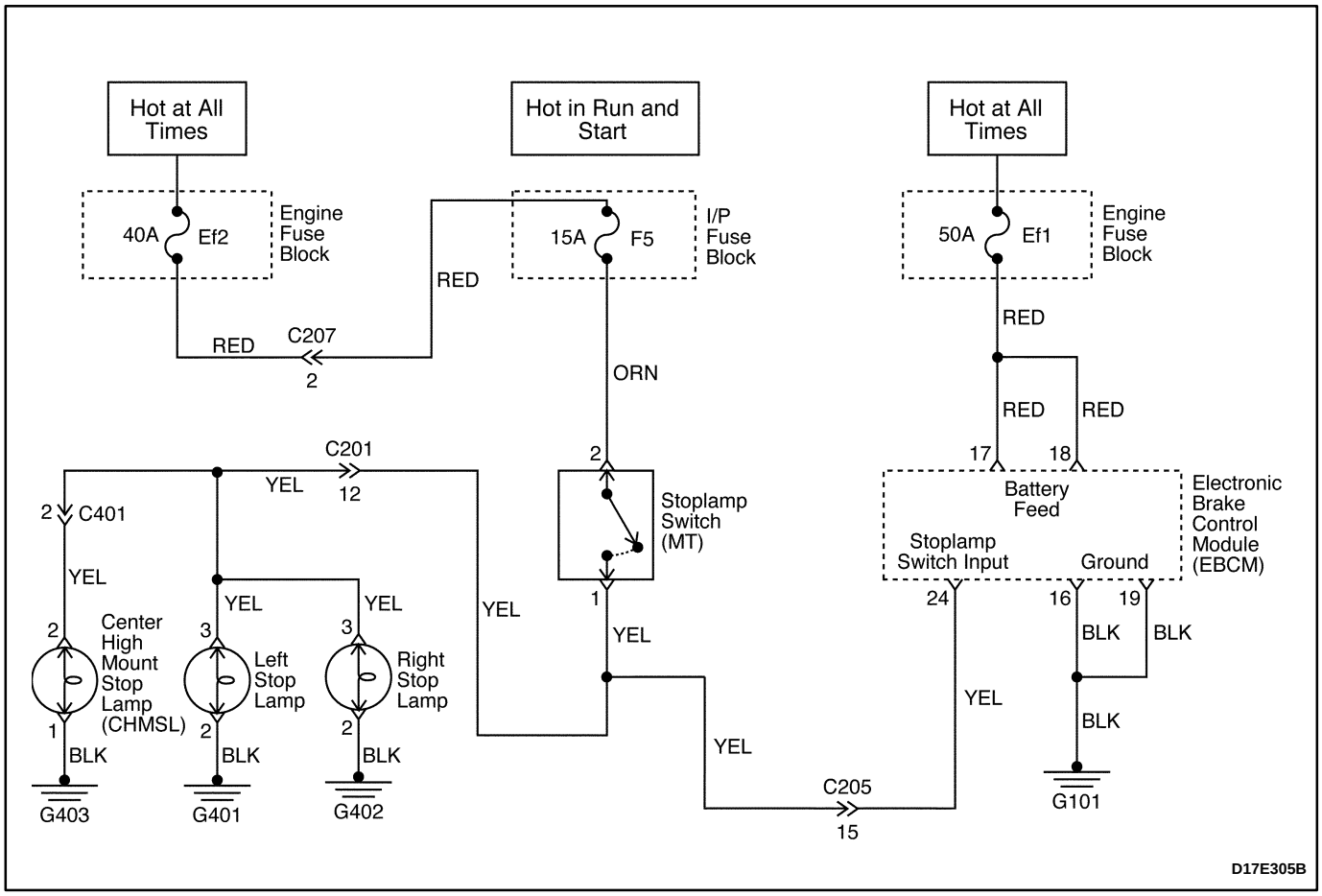
- ABS warning lamp ON.
- ABS warning lamp OFF if the ignition switch ON/OFF.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

DTC 0601 – Left Front Dump Shorted or Drive Open

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Remove the fuse Ef1 in the engine fuse block. 3. Check for an open in fuse Ef1. Is the fuse open?	–	Go to *Step 3*	Go to *Step 2*
2	Replace the fuse Ef1. Is the repair complete?	–	System OK	–
3	1. Disconnect the EBCM harness connector. 2. Turn the ignition switch to ON. 3. Use a digital voltmeter (DVM) to measure the voltage between ground and terminal 18 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 5*	Go to *Step 4*
4	Repair the short to voltage between terminal 18 of the EBCM connector and engine fuse block Ef1 output. Is the repair complete?	–	System OK	–
5	Use a DVM to measure the voltage between terminal 18 and terminal 19 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 7*	Go to *Step 6*
6	Repair the open between terminal 19 of the EBCM connector and ground G101. Is the repair complete?	–	System OK	–
7	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0602
LEFT FRONT DUMP OPEN OR DRIVER SHORTED

Circuit Description

EBCM proceeds the self–test about the dump valve or the motor driver, if the EBCM senses the brake signal.

Diagnosis

If the EBCM proceeds the self–test about the dump valve or the motor driver and senses the fault, the EBCM may make the fault code.

Cause(s)

- EBCM internal fault (Left front dump voltage open or ground shorted).

Warning Lamp Operation

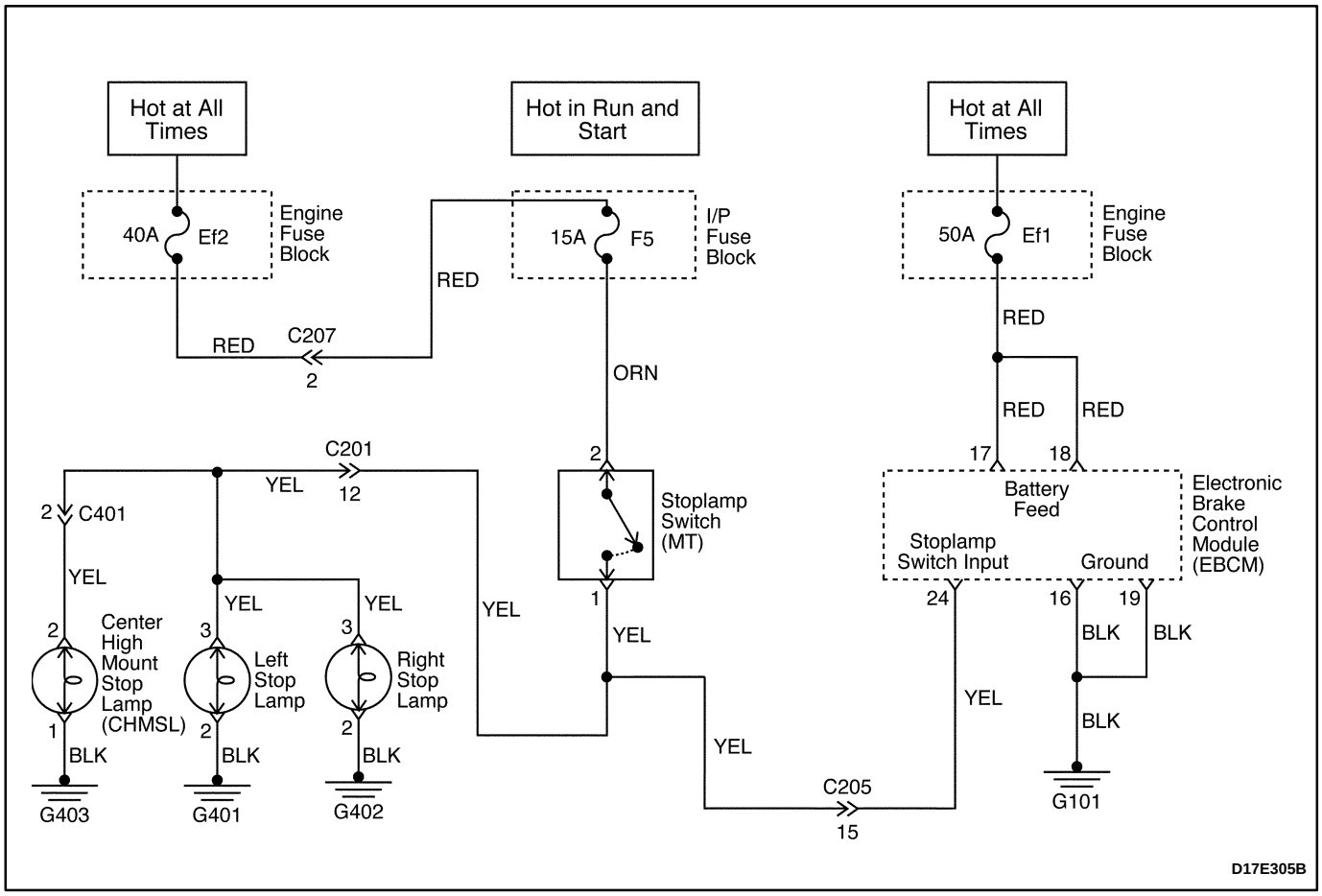
- ABS warning lamp ON.
- ABS warning lamp OFF if the ignition switch ON/OFF.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

DTC 0602 – Left Front Dump Open or Driver Shorted

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Remove the fuse Ef1 in the engine fuse block. 3. Check for an open in fuse Ef1. Is the fuse open?	–	Go to *Step 3*	Go to *Step 2*
2	Replace the fuse Ef1. Is the repair complete?	–	System OK	–
3	1. Disconnect the EBCM harness connector. 2. Turn the ignition switch to ON. 3. Use a digital voltmeter (DVM) to measure the voltage between ground and terminal 18 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 5*	Go to *Step 4*
4	Repair the short to voltage between terminal 18 of the EBCM connector and engine fuse block Ef1 output. Is the repair complete?	–	System OK	–
5	Use a DVM to measure the voltage between terminal 18 and terminal 19 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 7*	Go to *Step 6*
6	Repair the open between terminal 19 of the EBCM connector and ground G101. Is the repair complete?	–	System OK	–
7	Replace the EBCM. Is the repair complete?	–	System OK	–



DIAGNOSTIC TROUBLE CODE (DTC) 0651
LEFT FRONT ISOLATION SHORTED OR DRIVER OPEN

Circuit Description

EBCM proceeds the self–test about the dump valve or the motor driver, if the EBCM senses the brake signal.

Diagnosis

If the EBCM proceeds the self–test about the dump valve or the motor driver and senses the fault, the EBCM may make the fault code.

Cause(s)

- EBCM internal fault (Left front isolation voltage shorted or ground open).

Warning Lamp Operation

- ABS warning lamp ON.
- ABS warning lamp OFF if the ignition switch ON/OFF.

Fail Action

This is a critical operational fault. The ABS is disabled and the ABS warning lamp is turned on. The proportioning is operation.

DTC 0651 – Left Front Isolation Shorted or Driver Open

Step	Action	Value(s)	Yes	No
1	1. Turn the ignition switch to OFF. 2. Remove the fuse Ef1 in the engine fuse block. 3. Check for an open in fuse Ef1. Is the fuse open?	–	Go to *Step 3*	Go to *Step 2*
2	Replace the fuse Ef1. Is the repair complete?	–	System OK	–
3	1. Disconnect the EBCM harness connector. 2. Turn the ignition switch to ON. 3. Use a digital voltmeter (DVM) to measure the voltage between ground and terminal 18 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 5*	Go to *Step 4*
4	Repair the short to voltage between terminal 18 of the EBCM connector and engine fuse block Ef1 output. Is the repair complete?	–	System OK	–
5	Use a DVM to measure the voltage between terminal 18 and terminal 19 of the EBCM connector. Is the voltage within the specified value?	10.5 v to 13.5 v	Go to *Step 7*	Go to *Step 6*
6	Repair the open between terminal 19 of the EBCM connector and ground G101. Is the repair complete?	–	System OK	–
7	Replace the EBCM. Is the repair complete?	–	System OK	–

SECTION 4G

PARKING BRAKE

TABLE OF CONTENTS

DESCRIPTION AND OPERATION

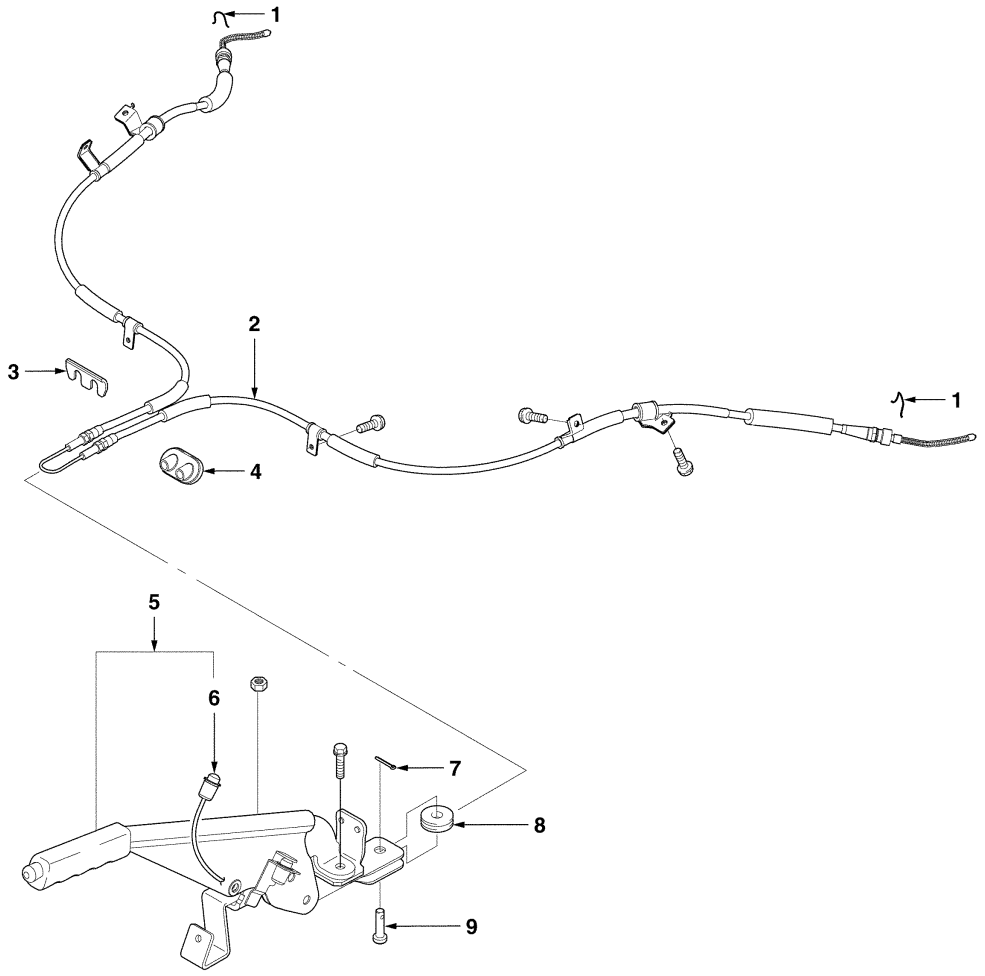
PARKING BRAKE

This braking system uses a BRAKE warning light located in the instrument panel cluster. When the ignition switch is in the III position, the BRAKE warning light should glow and go OFF when the parking brake lever is released. Whenever the parking brake is applied and the ignition switch is II, the BRAKE warning light should glow.

When the brake is firmly applied, the parking brake should securely hold the vehicle with ample pedal travel remaining. Check for frayed cables, rust, etc., or any condition that may inhibit present (or future) free movement of the parking brake lever assembly.

COMPONENT LOCATOR

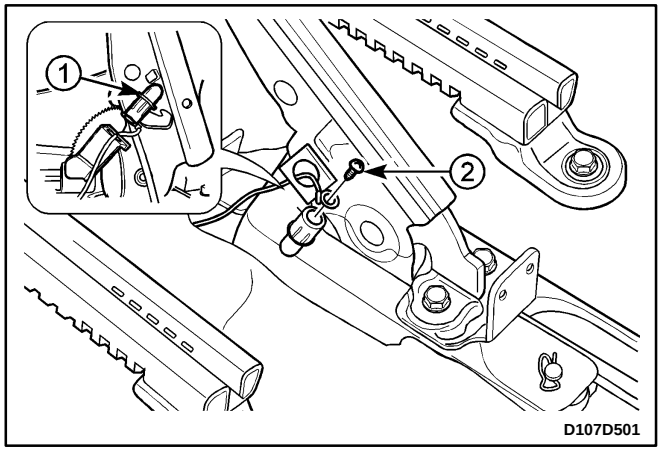
PARKING BRAKE



1. Parking Brake Cable Clip
2. Parking Brake Cable
3. Strengthener
4. Cable Grommet
5. Parking Brake Lever Assembly
6. Parking Brake Warning Lamp Switch
7. Cotter Pin
8. Cable Pulley
9. Pin

REPAIR INSTRUCTIONS

ON-VEHICLE SERVICE

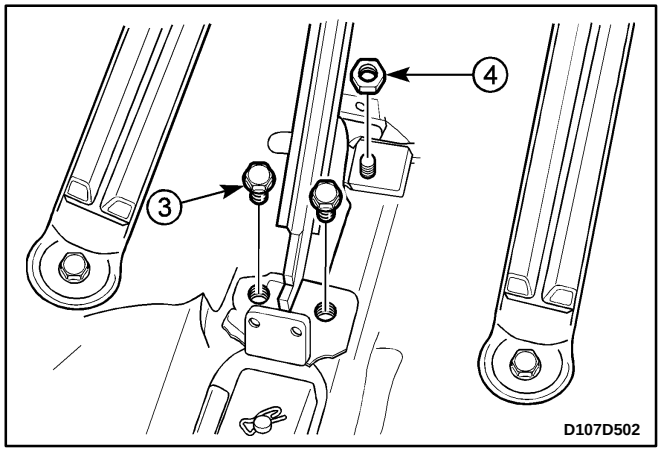


PARKING BRAKE LEVER

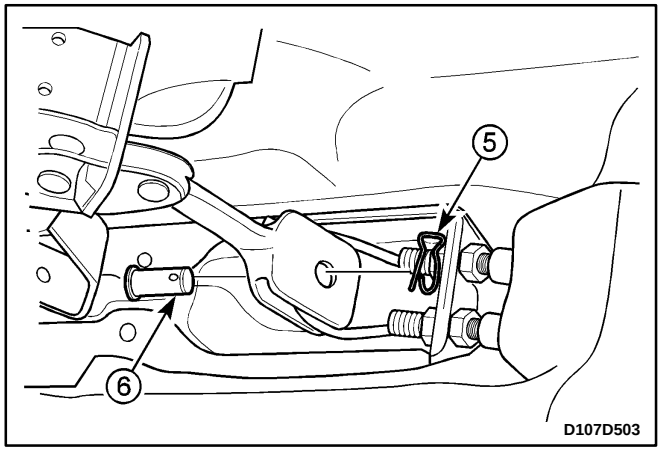
Removal Procedure

1. Remove the parking brake lever cover. Refer to *Section 9G, Interior Trim*.
2. Remove the parking brake cable cover. Refer to *Section 9G, Interior Trim*.
3. Remove the parking brake lever.
   - Disconnect the brake warning lamp switch (1).
   - Remove the brake warning switch lamp screw (2).

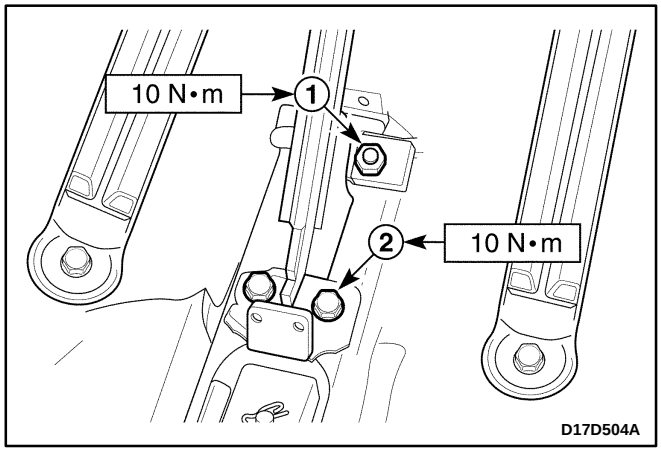
Important: The brake warning lamp switch screw should be removed with the lever fixed.



- Remove the bolts (3).
- Remove the nut (4).



- Remove the cotter pin (5).
- Remove the pin (6).



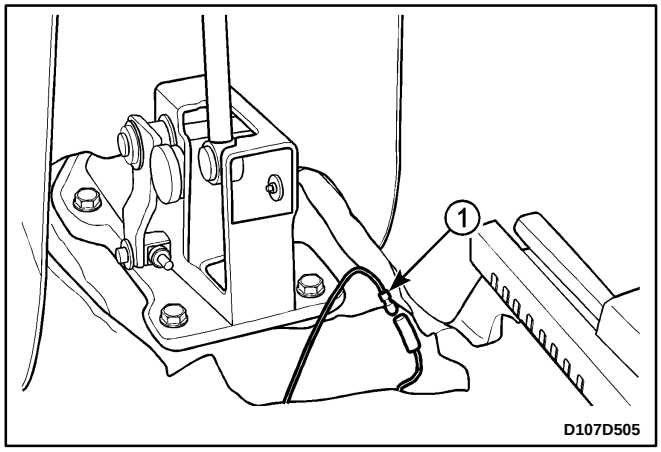
Installation Procedure

1. Install the parking brake lever with the cotter pin, pin, bolts, and nut.

Tighten

- Tighten the parking brake nut to 10 N•m (89 lb-in) (1).
- Tighten the parking brake bolts to 10 N•m (89 lb-in) (2).

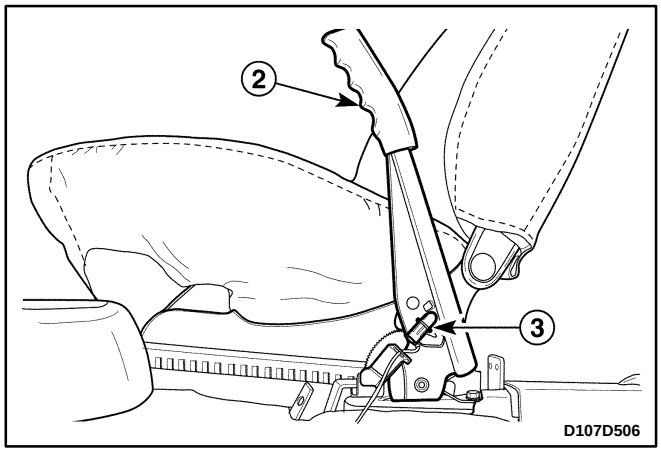
2. Connect the brake warning lamp switch.
3. Install the brake warning lamp switch screw.
4. Install the parking brake cable cover. Refer to *Section 9G, Interior Trim*.
5. Install the parking brake lever cover. Refer to *Section 9G, Interior Trim*.



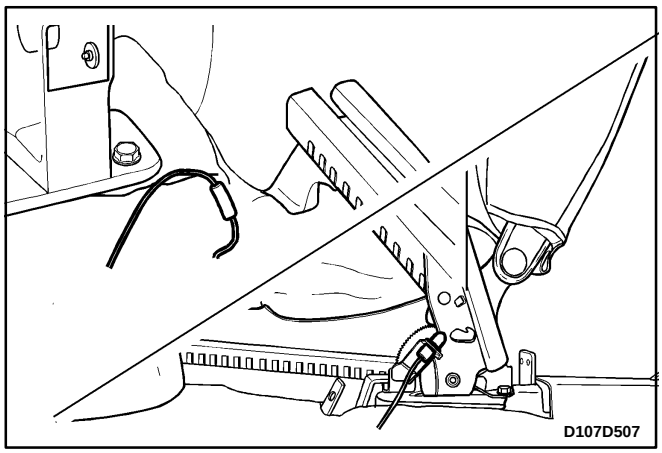
PARKING BRAKE WARNING LAMP SWITCH

Removal Procedure

1. Remove the gear shift lever cover. Refer to *Section 5B, Five–Speed Manual Transaxle*.
2. Remove the parking brake warning lamp switch.
   - Disconnect the parking brake warning lamp switch (1).

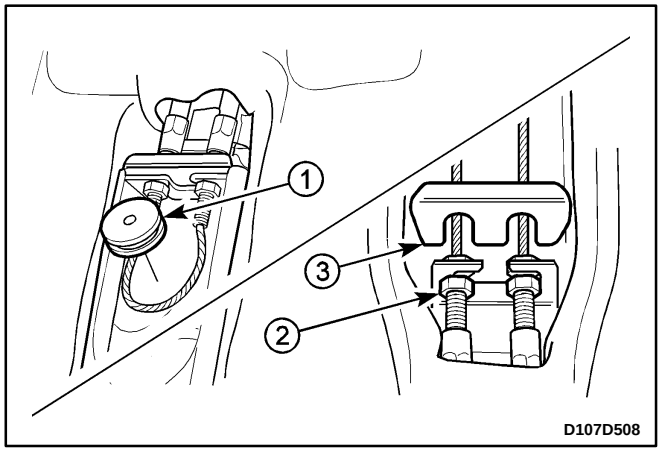


   - Apply the parking brake (2).
   - Remove the parking brake warning lamp switch carefully (3).



Installation Procedure

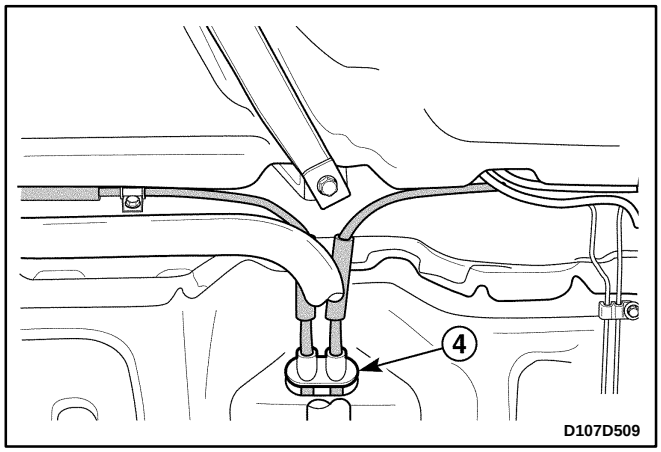
1. Install the parking brake warning lamp switch.
2. Release the parking brake.
3. Connect the parking brake warning lamp switch.
4. Install the gear shift lever cover. Refer to *Section 5B, Five–Speed Manual Transaxle*.



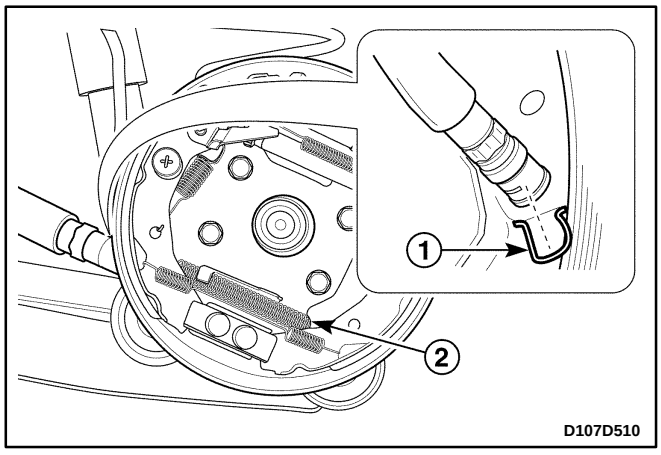
PARKING BRAKE CABLE

Removal Procedure

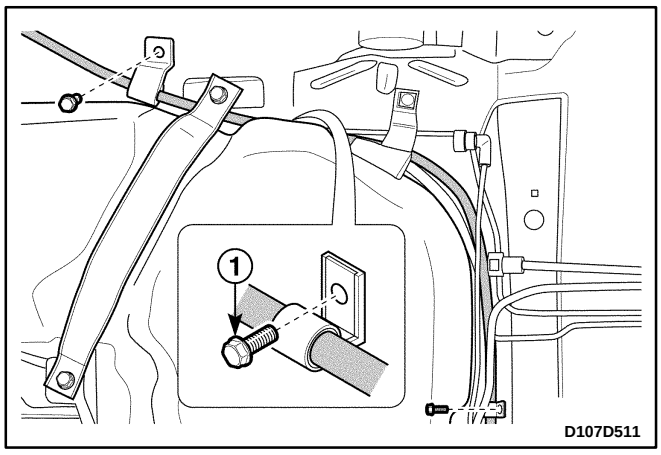
1. Remove the parking brake lever. Refer to “Parking Brake Lever” in this section.
2. Remove the parking brake cable.
   - Remove the cable pulley (1).
   - Loosen the adjustment nuts (2).
   - Remove the strengthener (3).



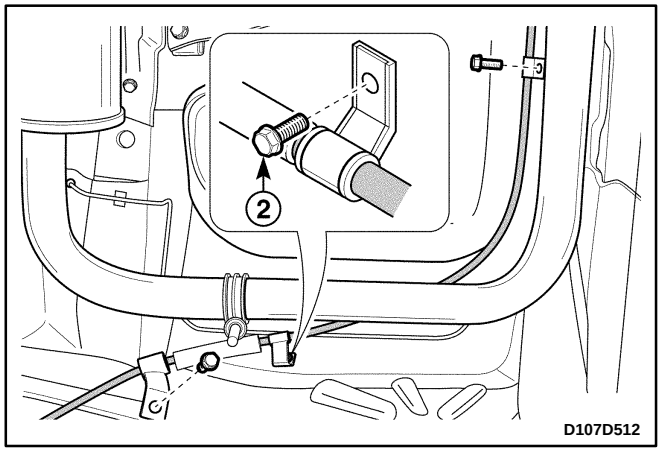
   - Remove the grommet (4).



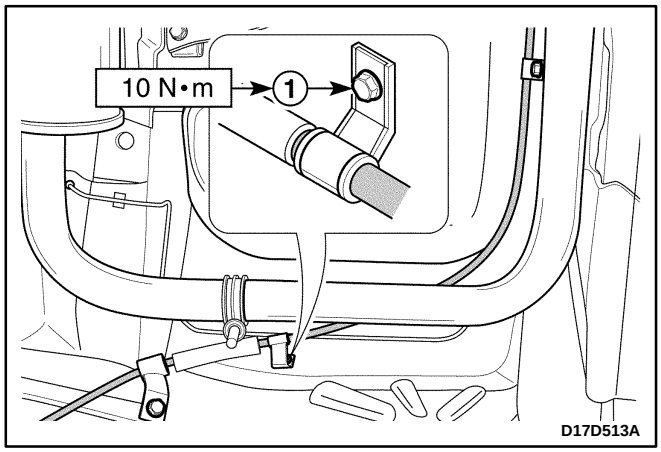
3. Remove the rear brake drum assembly. Refer to *Section 2D, Rear Suspension*.
4. Disconnect the parking brake cable from the rear brake drum assembly.
   - Remove the clip from the brake plate (1).
   - Disconnect the parking brake cable from the trailing shoe (2). Refer to *Section 4E, Rear Drum Brake*.



5. Remove the parking brake cable.
   - Remove the clamp bolts fastening the brake cable (RH Rear Brake Side) (1).
   - Remove the fuel filter. Refer to *Section 1F, Engine Controls*.



- Remove the clamp bolts fastening the brake cable (LH Rear Brake Side) (2).

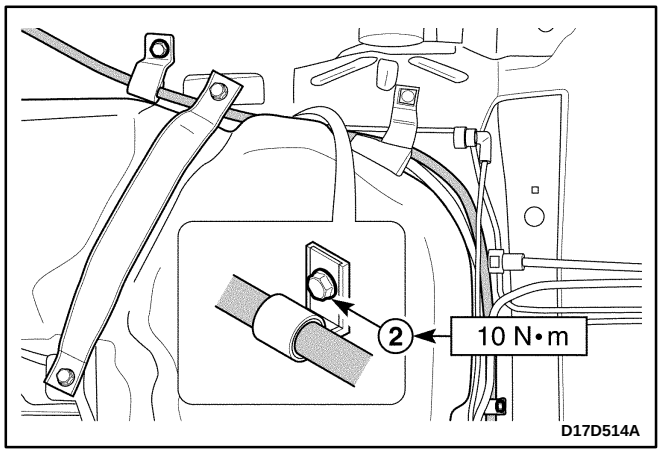


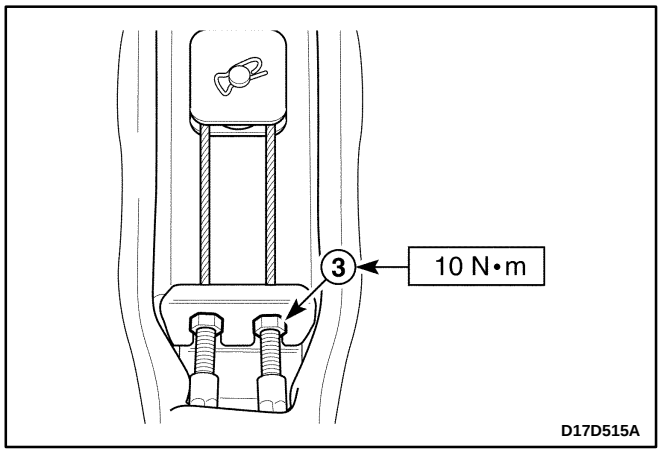
Installation Procedure

1. Install the fuel filter.
2. Install the parking brake cable with the clamp bolts.

Tighten

Tighten the parking brake cable clamp bolts to 10 N•m (89 lb-in) (1, 2).





3. Connect the parking brake cable to the rear brake drum assembly. Refer to *Section 4E, Rear Drum Brake*.
4. Install the rear brake drum assembly. Refer to *Section 2D, Rear Suspension*.
5. Install the grommet and the strengthener.
6. Install the cable pulley with the adjustment nuts.

Tighten

Tighten the adjustment nuts to 10 N•m (89 lb-in) (3).

7. Install the parking brake lever. Refer to “Parking Brake Lever” in this section.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Description
Parking Brake Lever Notch Number	5–7 (Loaded 44.1 lb)

FASTENER TIGHTENING SPECIFICATIONS

Application	N•m	Lb-Ft	Lb-In
Parking Brake Cable Clamp Bolts	10	–	89
Parking Brake Lever Bolts	10	–	89
Parking Brake Lever Nut	10	–	89
Parking Brake Cable Adjusting Nuts	10	–	89

SCHEMATIC AND ROUTING DIAGRAMS

PARKING BRAKE SYSTEM