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When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

PRECAUTIONS AND PREPARATION

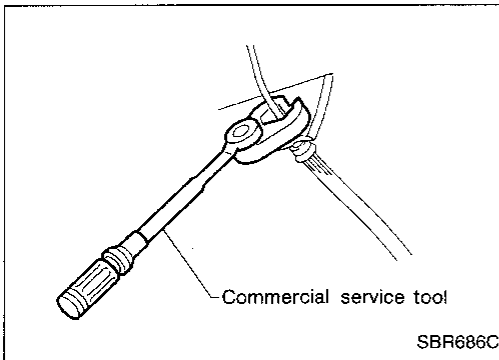
Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS** section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.



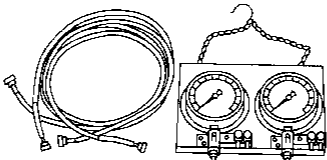
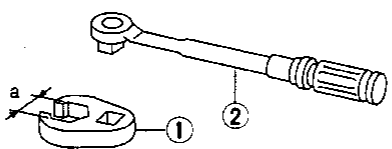
BRAKE SYSTEM

- Use brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
- To clean master cylinder parts, disc brake caliper parts or wheel cylinder parts, use clean brake fluid.
- Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of hydraulic system.
- Use flare nut wrench when removing and installing brake tubes.
- Always torque brake lines when installing.

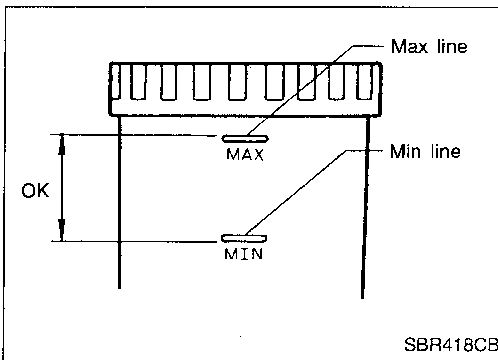
WARNING:

- Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.

Commercial Service Tools

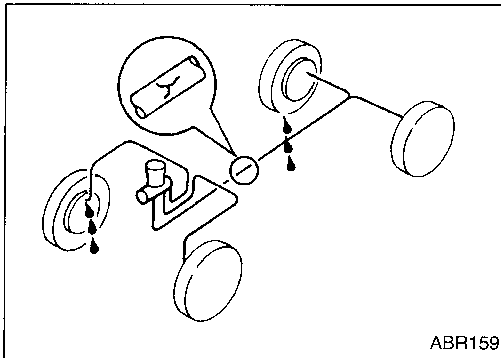
| Tool name | Description |
|---|--|
| Brake fluid pressure gauge | Measuring brake fluid pressure  NT151 |
| ① Flare nut crows foot ② Torque wrench |  NT360 a: 10 mm (0.39 in) |

CHECK AND ADJUSTMENT



Checking Brake Fluid Level

- Check fluid level in reservoir tank. It should be between Max. and Min. lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- If the brake warning lamp comes on, check brake fluid level switch and parking brake switch.

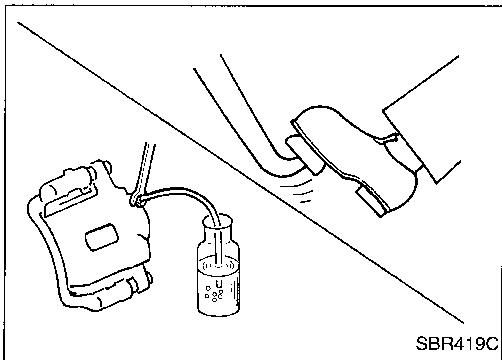


Checking Brake Line

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.

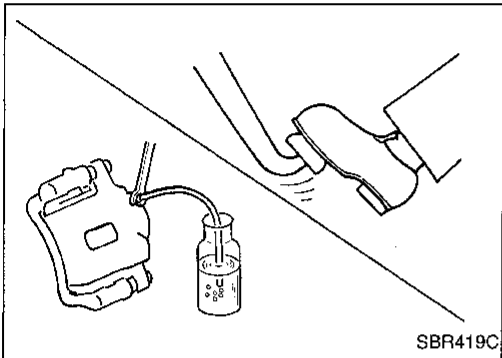
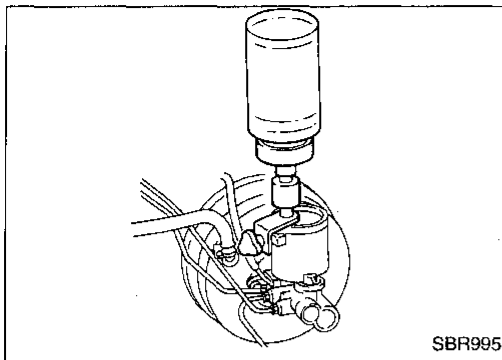


Changing Brake Fluid

CAUTION:

- Refill with new brake fluid "DOT 3".
 - Always keep fluid level higher than minimum line on reservoir tank.
 - Never reuse drained brake fluid.
 - Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
1. Clean inside of reservoir tank, and refill with new brake fluid.
 2. Connect a vinyl tube to each air bleeder valve.
 3. Drain brake fluid from each air bleeder valve by depressing brake pedal.
 4. Refill until new brake fluid comes out of each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid.
- Refer to "Bleeding Procedure", BR-5.

CHECK AND ADJUSTMENT



Bleeding Procedure

CAUTION:

- Carefully monitor brake fluid level at master cylinder during bleeding operation.
- If master cylinder is suspected to have air inside, bleed air from master cylinder first. Refer to "Installation", "MASTER CYLINDER", BR-12.
- Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.
- Place a container under master cylinder to avoid spillage of brake fluid.
- For models with ABS, turn ignition switch OFF and disconnect ABS actuator connector or battery cable.
- Bleed each wheel in the following procedure.

Left rear brake



Right front brake



Left front brake




Front side air bleeder on ABS actuator



Rear side air bleeder on ABS actuator

1. Connect a transparent vinyl tube to air bleeder valve.
2. Fully depress brake pedal several times.
3. With brake pedal depressed, open air bleeder valve to release air.
4. Close air bleeder valve.
5. Release brake pedal slowly.
6. Repeat steps 2. through 5. until clear brake fluid comes out of air bleeder valve.
7. Tighten air bleeder valve.

 : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

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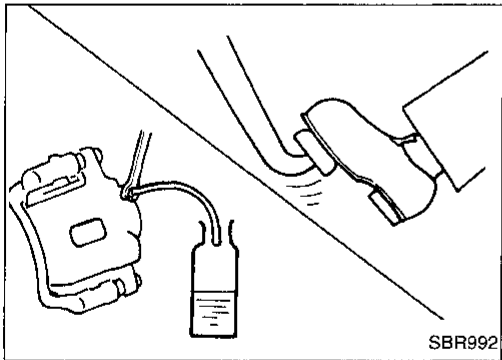
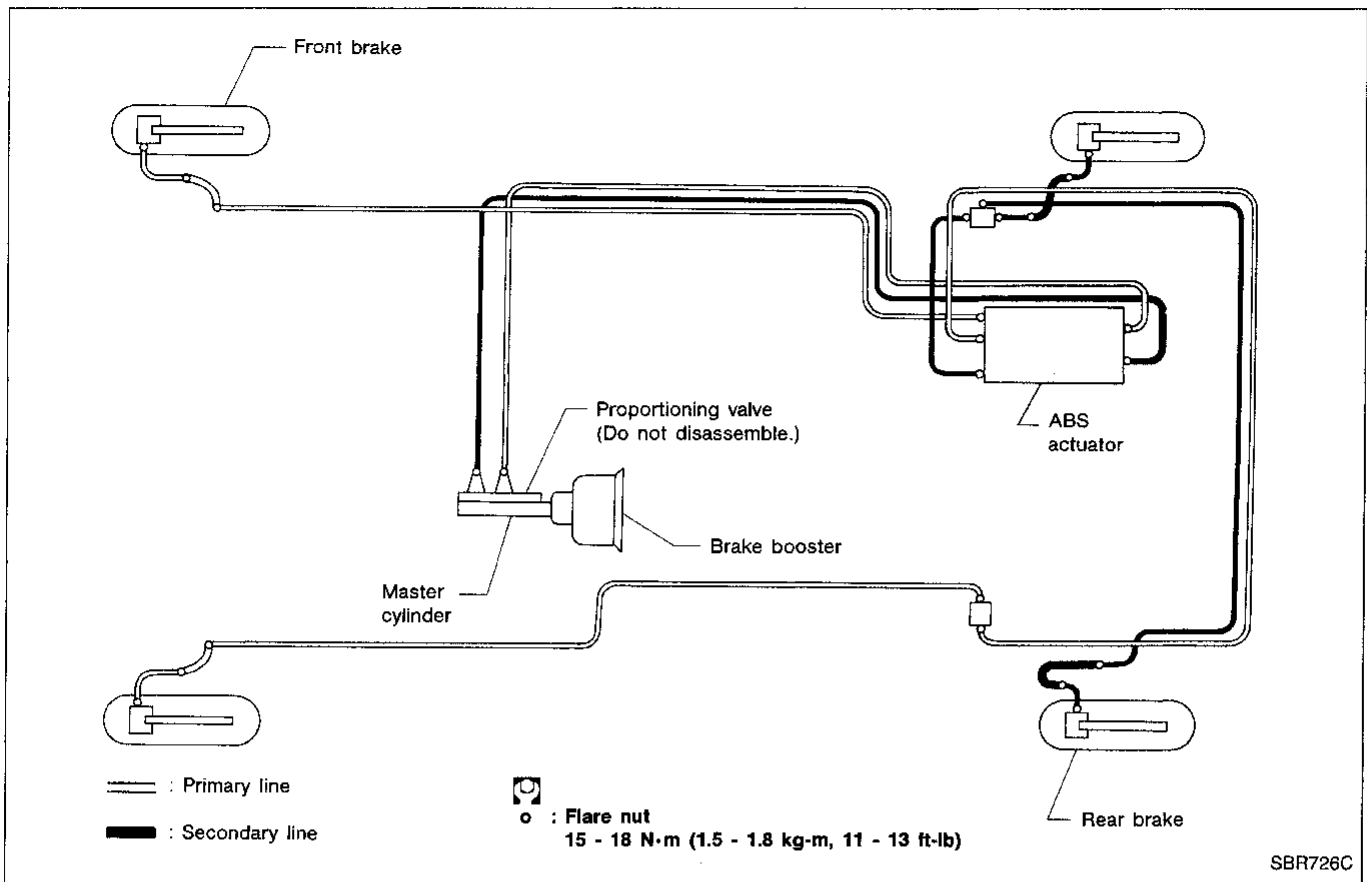
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BRAKE HYDRAULIC LINE



Removal

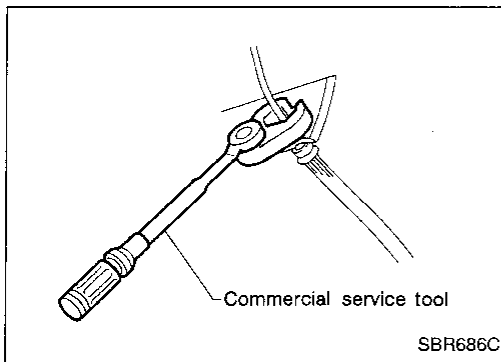
CAUTION:

- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
 - All hoses must be free from excessive bending, twisting and pulling.
1. Connect a vinyl tube to air bleeder valve.
 2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
 3. Remove flare nut securing brake tube to hose, then withdraw lock spring.
 4. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.

Inspection

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

BRAKE HYDRAULIC LINE



Installation

CAUTION:

- Refill with new brake fluid "DOT 3".
 - Never reuse drained brake fluid.
1. Tighten all flare nuts and connecting bolts.
Flare nut:
Ⓜ: 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
 2. Refill until new brake fluid comes out of each air bleeder valve.
 3. Bleed air. Refer to "Bleeding Procedure", BR-5.

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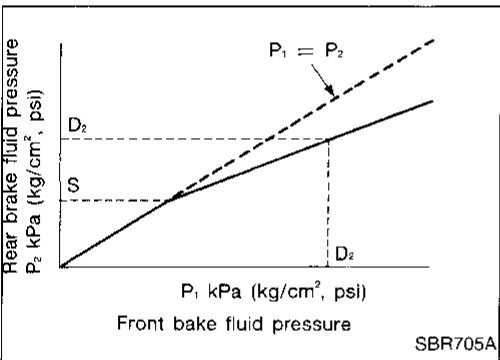
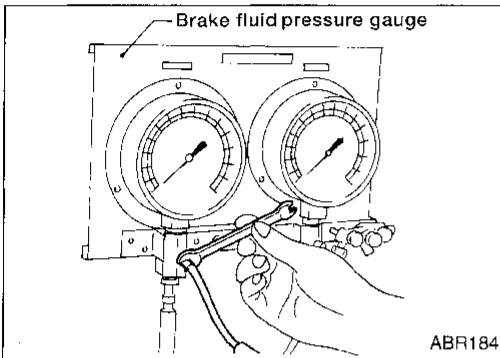
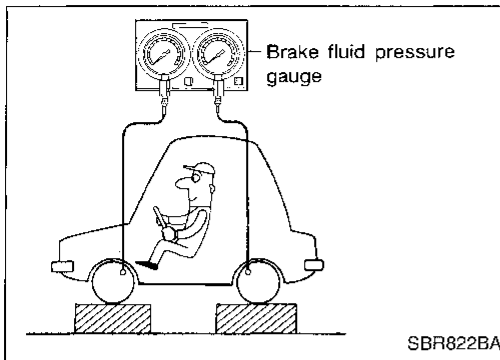
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CONTROL VALVE



Proportioning Valve

INSPECTION

CAUTION:

- Carefully monitor brake fluid level at master cylinder.
 - Use new brake fluid "DOT 3".
 - Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.
 - Depress pedal slowly when raising front brake pressure.
 - Check rear brake pressure 2 seconds after front brake pressure reaches specified value.
 - For models with ABS, disconnect harness connectors from ABS actuator relay box before checking.
1. Connect Tool to air bleeders of front and rear brakes on either LH or RH side.
 2. Bleed air from the Tool.
 3. Check fluid pressure by depressing brake pedal.

| | | |
|--------------------------------|--------------------------------|---------------------------------------|
| Applied pressure (Front brake) | kPa (kg/cm ² , psi) | 5,884 (60, 853) |
| Output pressure (Rear brake) | kPa (kg/cm ² , psi) | 3,629 - 4,021 (37 - 41, 526 - 583) |

If output pressure is out of specifications, replace master cylinder assembly (built-in type).

4. Bleed air after disconnecting the Tool. Refer to "Bleeding Procedure", BR-5.

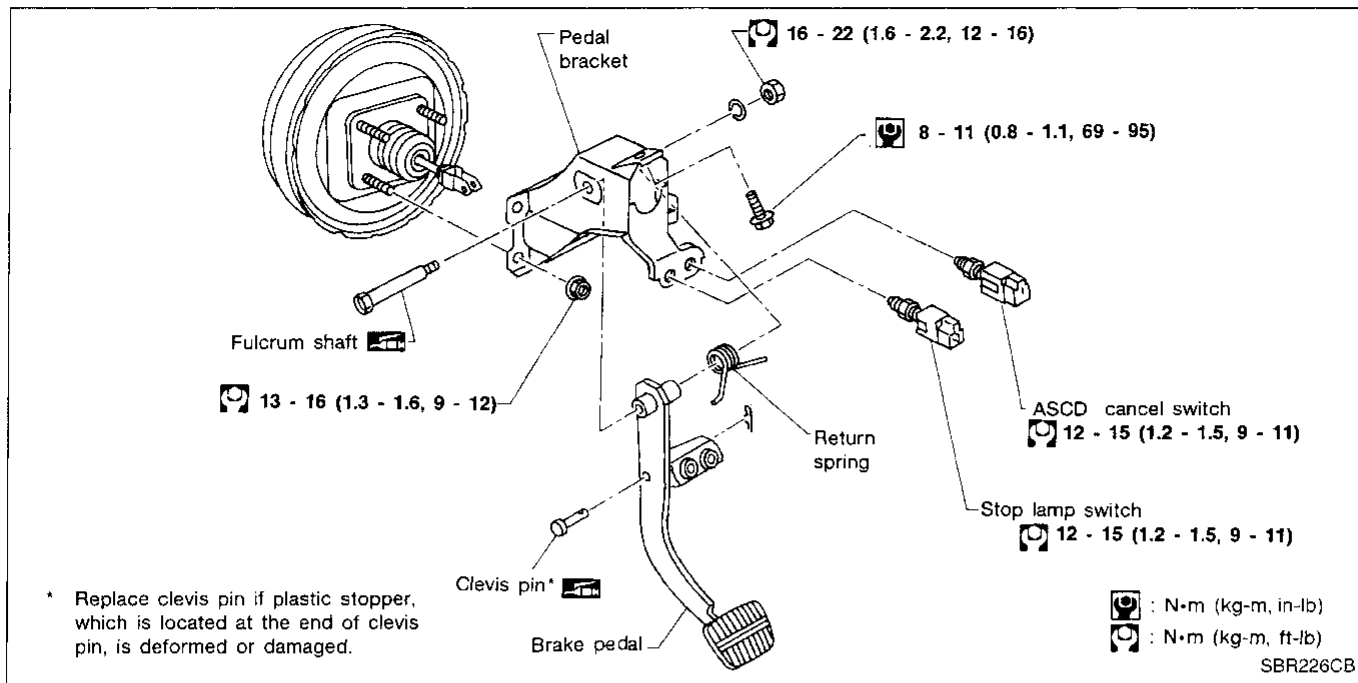
REMOVAL AND INSTALLATION (Built-in type)

Always replace together with master cylinder as an assembly.

- Refer to "MASTER CYLINDER", BR-12.

BRAKE PEDAL AND BRACKET

Removal and Installation



Inspection

Check brake pedal for following items:

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper

Adjustment

Check brake pedal free height from dash reinforcement panel. Adjust if necessary.

H: Free height

Refer to SDS.

D: Depressed height

Refer to SDS.

Under force of 490 N (50 kg, 110 lb) with engine running

C₁: Clearance between pedal stopper and threaded end of stop lamp switch

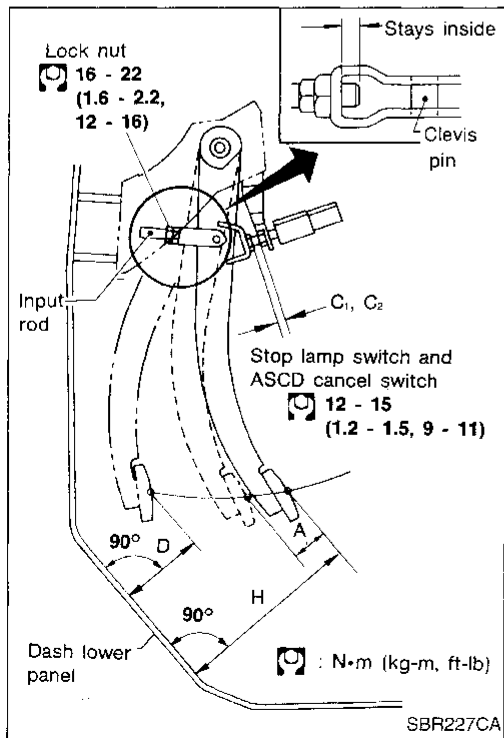
0.3 - 1.0 mm (0.012 - 0.039 in)

C₂: Clearance between pedal stopper and threaded end of ASCD switch

0.3 - 1.0 mm (0.012 - 0.039 in)

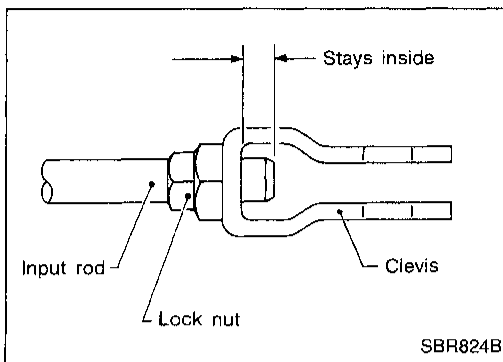
A: Pedal free play

1 - 3 mm (0.04 - 0.12 in)



BRAKE PEDAL AND BRACKET

Adjustment (Cont'd)



1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

Make sure that tip of input rod stays inside.

2. Adjust clearance "C₁" and "C₂" with stop lamp switch and ASCD switch respectively. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamp is off when pedal is released.

4. Check brake pedal's depressed height while engine is running. If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.). Then make necessary repairs.

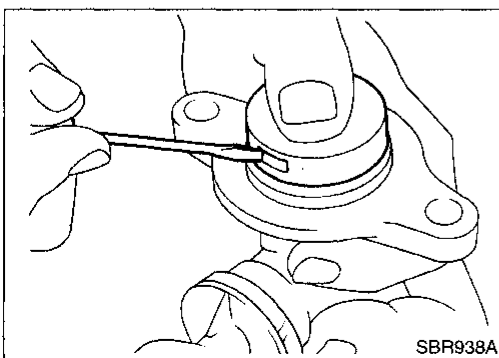
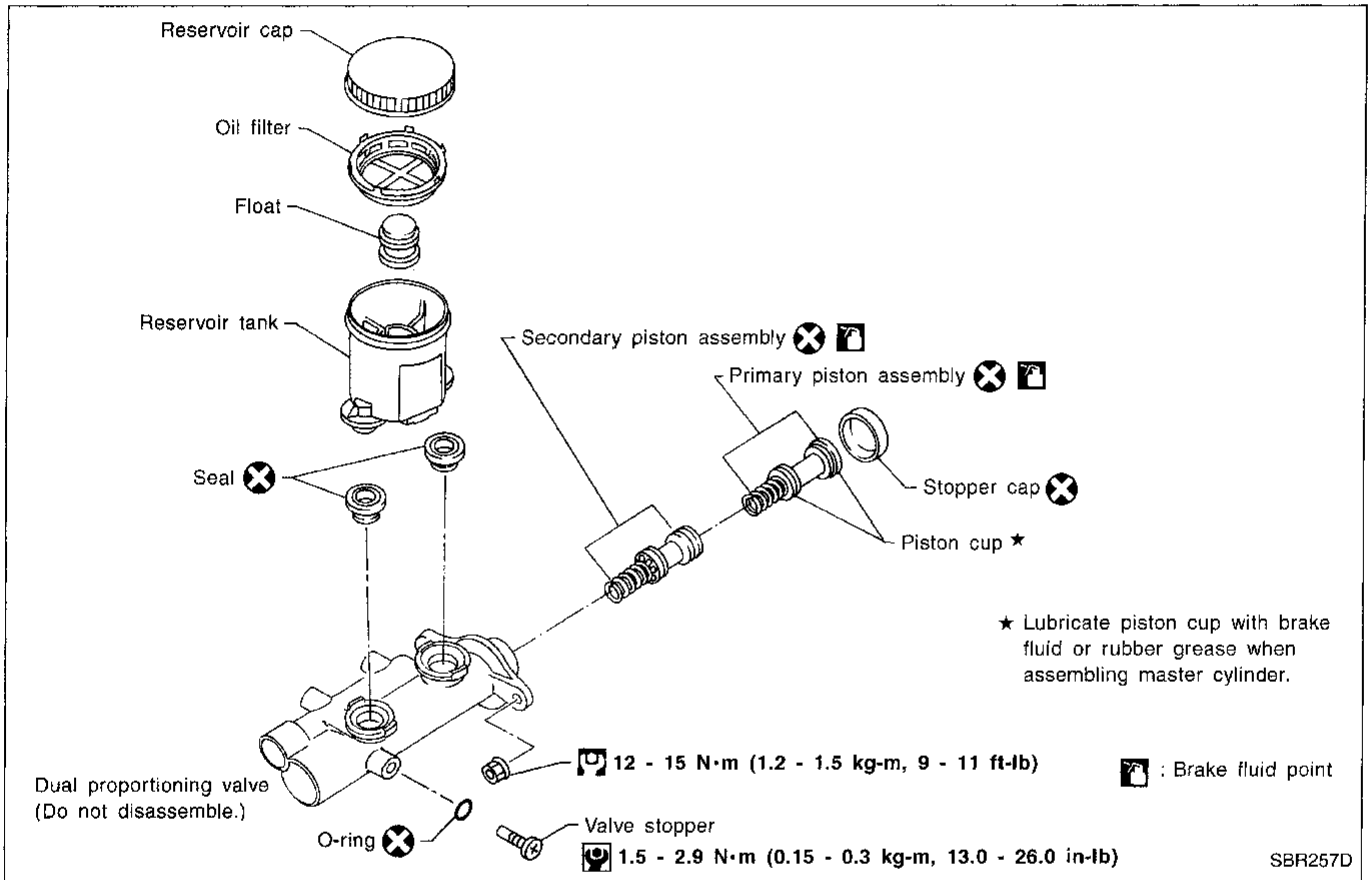
MASTER CYLINDER

Removal

CAUTION:

- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
- In the case of brake fluid leakage from the master cylinder, disassemble the cylinder. Then check piston cups for deformation or scratches and replace necessary parts.

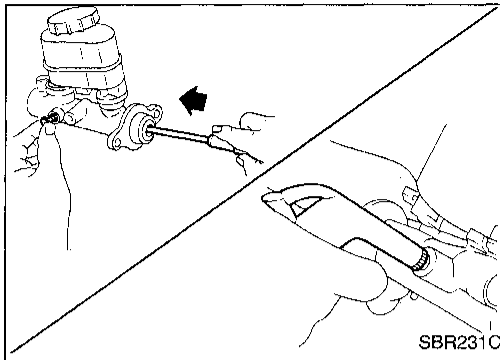
1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake pipe flare nuts.
4. Remove master cylinder mounting nuts.



Disassembly

1. Remove valve stopper while pushing valve into cylinder lightly.
2. Bend claws of stopper cap outward.

MASTER CYLINDER

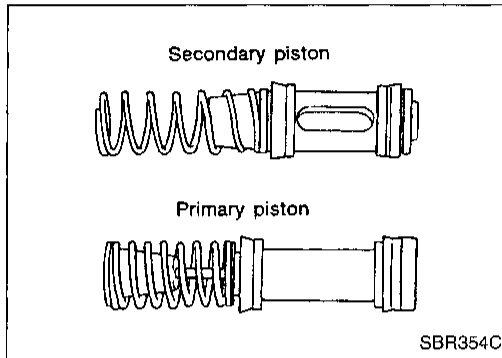


Disassembly (Cont'd)

3. Remove valve stopper while piston is pushed into cylinder.
4. Remove piston assemblies.

If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.

5. Draw out reservoir tank.



Inspection

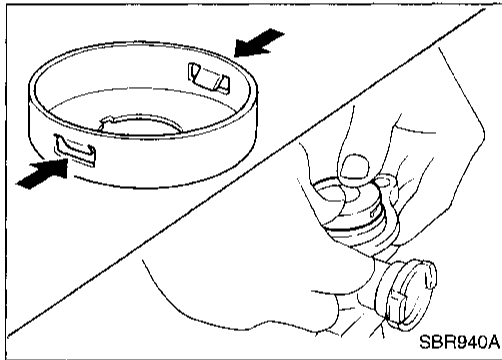
Check master cylinder inner wall for pin holes or scratches. Replace if damaged.

Assembly

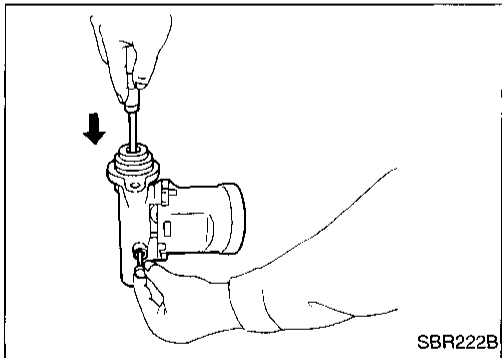
1. Insert secondary piston assembly. Then insert primary piston assembly.
 - Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.
 - Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.
2. Install stopper cap.

Before installing stopper cap, ensure that claws are bent inward.

3. Push reservoir tank seals into cylinder body.
4. Push reservoir tank into cylinder body.



5. Install valve stopper while piston is pushed into cylinder.



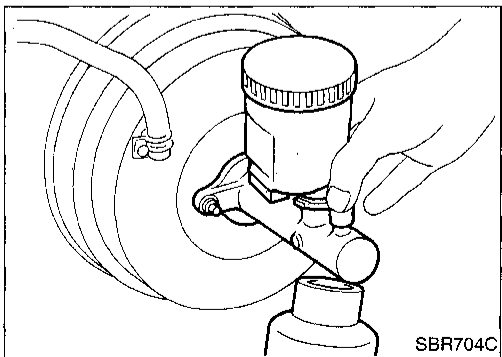
Installation

CAUTION:

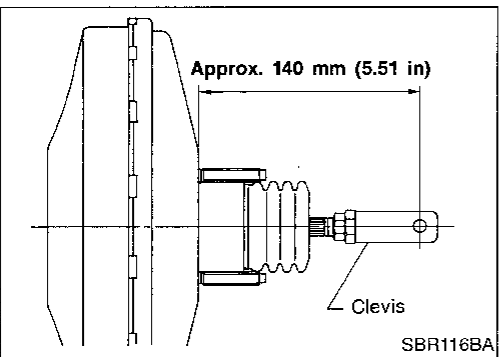
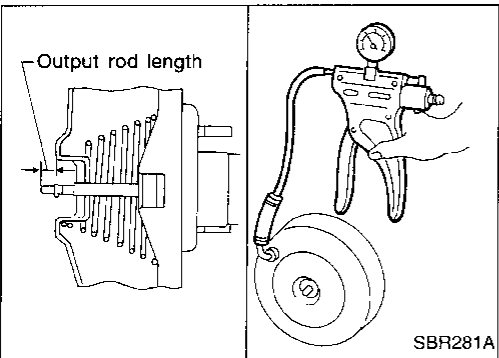
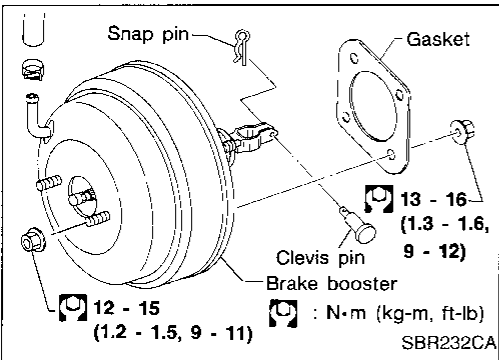
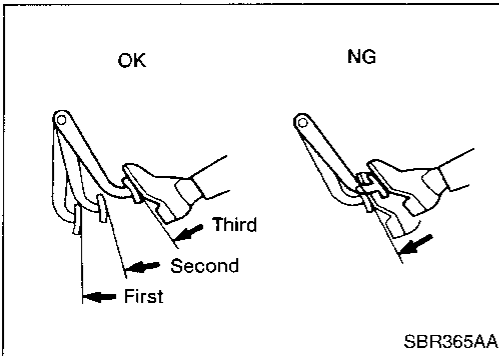
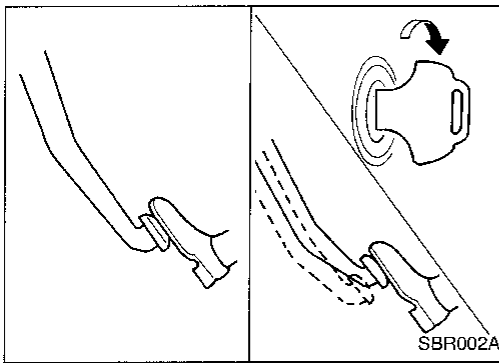
- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.

1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Torque mounting nuts.
12 - 15 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)
3. Fill up reservoir tank with new brake fluid.
4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal.
5. Have driver depress brake pedal slowly several times until no air comes out of master cylinder.
6. Fit brake lines to master cylinder.
7. Tighten flare nuts.

8. Bleed air. Refer to "Bleeding Procedure", BR-5.



BRAKE BOOSTER



On-vehicle Service

OPERATING CHECK

- Depress brake pedal several times with engine off. After exhausting vacuum, make sure there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

AIRTIGHT CHECK

- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. Booster is airtight if pedal stroke is less each time.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for **30 seconds**.

Removal

CAUTION:

- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
- Be careful not to deform or bend brake pipes, during removal of booster.

Inspection

Output rod length check

1. Apply vacuum of -66.7 kPa (-500 mmHg , -19.69 inHg) to brake booster with a hand vacuum pump.
2. Check output rod length.

Specified length:

10.275 - 10.525 mm (0.4045 - 0.4144 in)

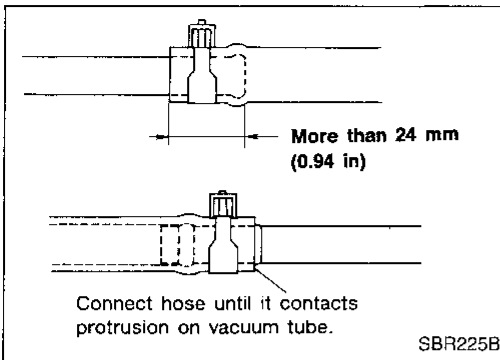
Installation

CAUTION:

- Be careful not to deform or bend brake pipes during installation of booster.
- Replace clevis pin if damaged.
- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Take care not to damage brake booster mounting bolt thread when installing. Due to the narrow angle of installation, the threads can be damaged by the dash panel.

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VACUUM HOSE

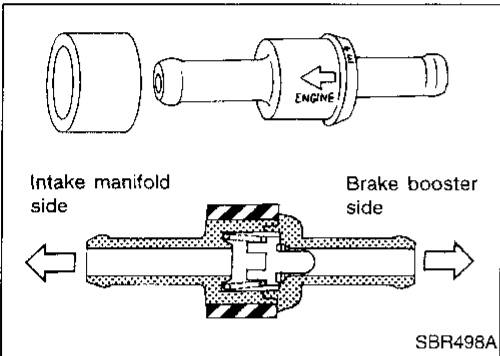


Removal and Installation

CAUTION:

When installing vacuum hoses, pay attention to the following points.

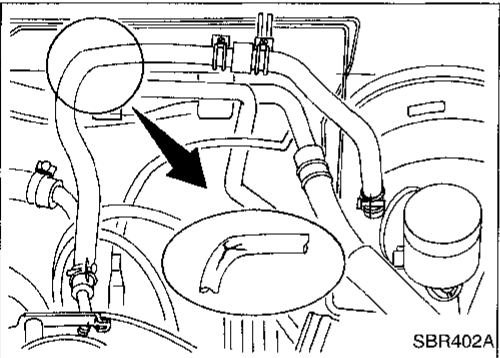
- Do not apply any oil or lubricants to vacuum hose and check valve.
- Insert vacuum tube into vacuum hoses as shown.
- Install check valve, paying attention to its direction.



Inspection

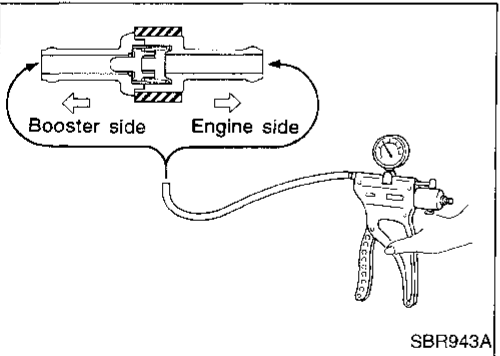
HOSES AND CONNECTORS

- Check vacuum lines, connections and check valve for airtightness, improper attachment chafing or deterioration.



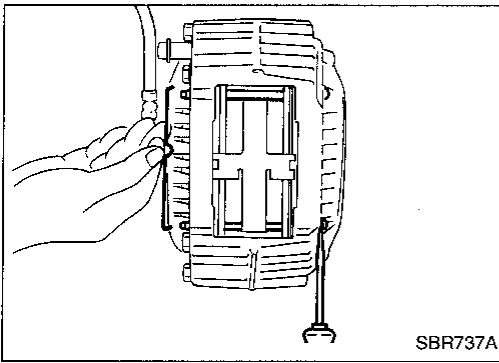
CHECK VALVE

Check vacuum with a vacuum pump.



| | |
|-------------------------|--------------------------|
| Connect to booster side | Vacuum should exist. |
| Connect to engine side | Vacuum should not exist. |

FRONT DISC BRAKE (OPF25VA)



Pad Replacement

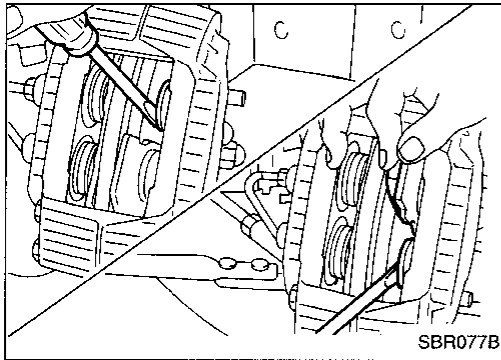
WARNING:

Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

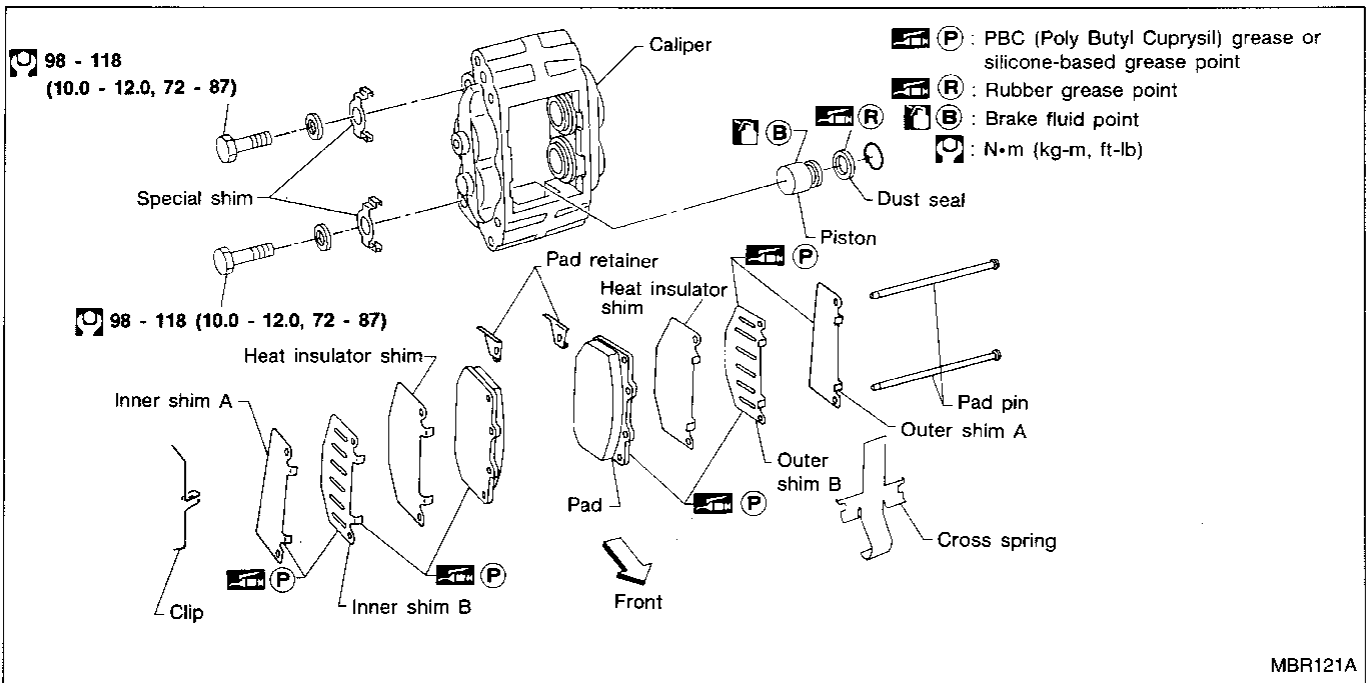
CAUTION:

- When cylinder body is open, do not depress brake pedal because piston will pop out.
- Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.
- If shims are rusted or show peeling of the rubber coat, replace them with new shims.
- It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.

1. Remove clip from pad pin and then remove pad pin.
2. Remove cross spring.

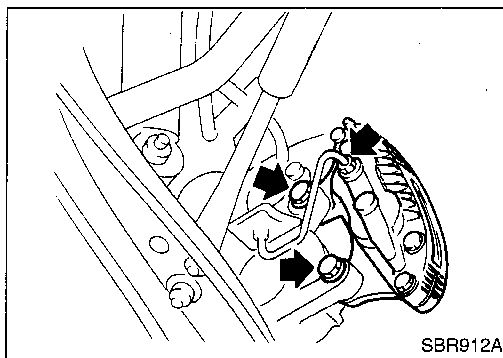


3. Pull out outer pad and insert it temporarily between lower piston and rotor as shown.
4. Push back upper piston with a suitable tool and insert new pad so it contacts upper piston as shown.
5. Pull out old pad.
6. Push back lower piston with a suitable tool.
7. Pull out new pad and reinstall it in the proper position.
8. Repeat step 3 to 7 for inner pad.
9. Install cross spring, pad pin and clip.



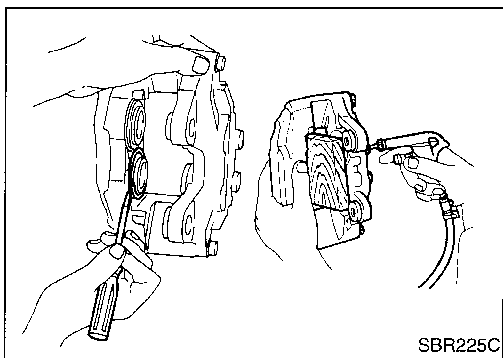
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FRONT DISC BRAKE (OPF25VA)



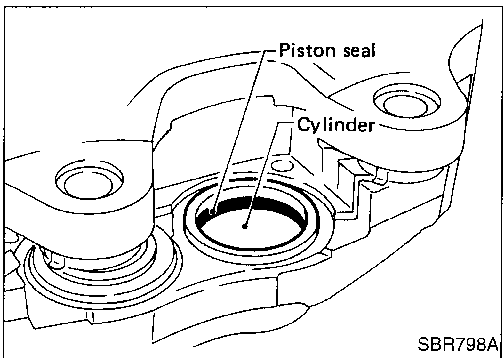
Removal and Installation

1. Disconnect brake tube.
2. Remove brake pad.
3. Remove brake caliper mounting bolts.

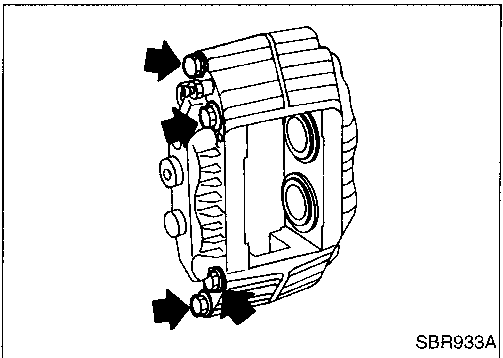


Disassembly

1. Remove retaining ring.
2. Push out piston with dust seal using compressed air.



3. Remove piston seal.



CAUTION:

Be careful not to loosen or remove bolts joining both sides of caliper.

If there is any fluid leakage, replace caliper assembly.

Inspection

CALIPER

- Check dust seals for damage.
- Check calipers for damage, rust or foreign objects.
- Check inside surface of cylinder for scoring, rust, wear, damage or foreign objects. Replace if any such condition exists.
- Eliminate minor damage from rust or foreign objects by polishing surface with fine emery paper.

CAUTION:

Use brake fluid to clean.

FRONT DISC BRAKE (OPF25VA)

Inspection (Cont'd)

PISTON

Check piston for scoring, rust, wear, damage or foreign objects. Replace if any condition exists.

CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to surface.

PAD PIN AND CLIPS

Check for wear, cracks deformation, deterioration, rust or other damage. Replace if any such condition exists.

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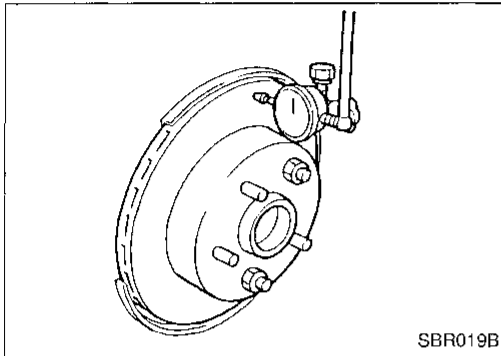
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RUNOUT

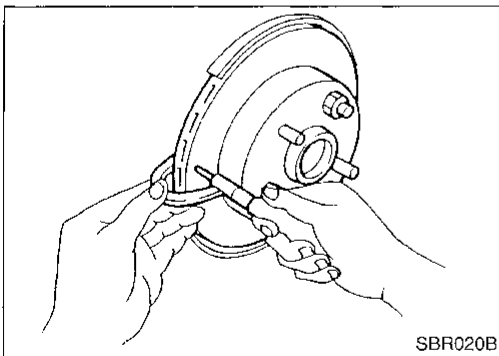
1. Secure rotor to wheel hub with at least two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to "Front Wheel Bearing" in FA section.

Maximum runout:

0.05 mm (0.0020 in)

3. If the runout is out of specification, find minimum runout position as follows:
 - a. Remove nuts and rotor from wheel hub.
 - b. Shift the rotor one hole and secure rotor to wheel hub with nuts.
 - c. Measure runout.
 - d. Repeat steps a. to c. so that minimum runout position can be found.
4. If the runout is still out of specification, turn rotor with on-car brake lathe ("MAD, DL-8700", "AMMCO 700 and 705" or equivalent).



THICKNESS

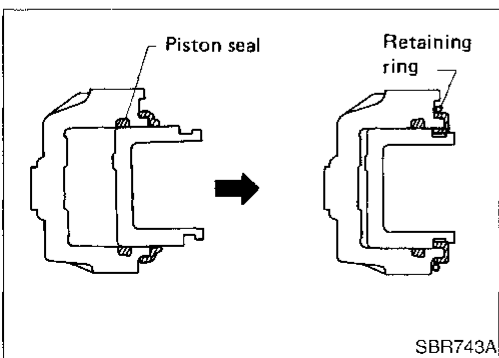
Thickness variation (At least 8 positions):

Maximum 0.01 mm (0.0004 in)

If thickness variation exceeds the specification, turn rotor with on-car brake lathe.

Rotor repair limit:

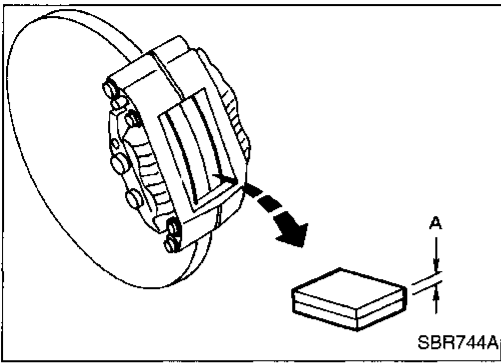
28.0 mm (1.102 in)



Assembly

1. Insert piston seal into groove on cylinder body.
2. With dust seal fitted to piston, install piston into cylinder body.
3. Secure dust seal properly.
4. Install retaining ring.

FRONT DISC BRAKE (OPF25VA)



Inspection (On-vehicle)

DISC PAD

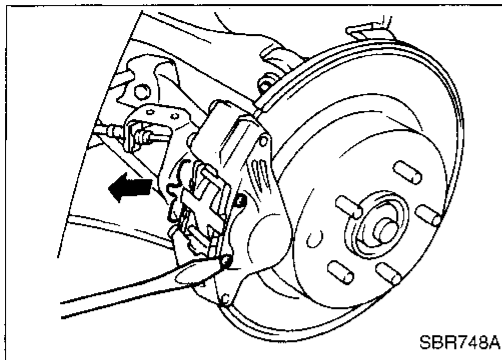
- Check pad shims for deformation or damage.
- Check disc pad for wear or damage.

Pad standard thickness (A):

10.0 mm (0.394 in)

Pad wear limit (A):

2.0 mm (0.079 in)



Pad Replacement

WARNING:

Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:

- When cylinder body is open, do not depress brake pedal, otherwise piston will pop out.
- Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.
- If shims are rusted or show peeling of rubber coat, replace them with new shims.
- It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.
- Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

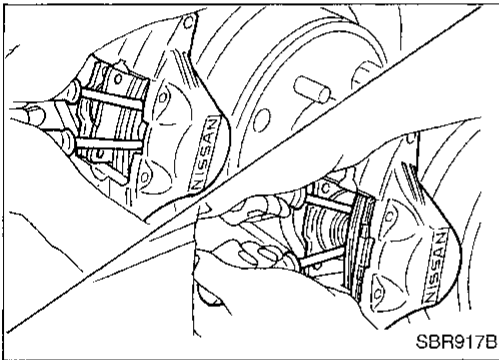
1. Remove clip from pad pin and then remove pad pin.
2. Remove cross spring.

Standard pad thickness:

11.5 mm (0.453 in)

Pad wear limit:

2.0 mm (0.079 in)

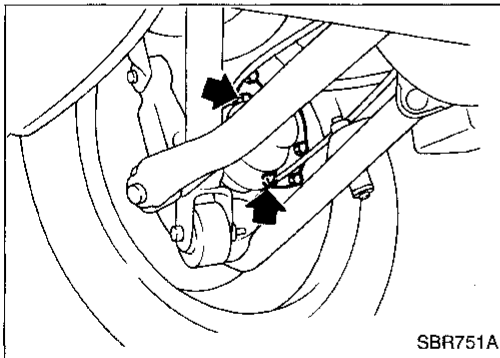
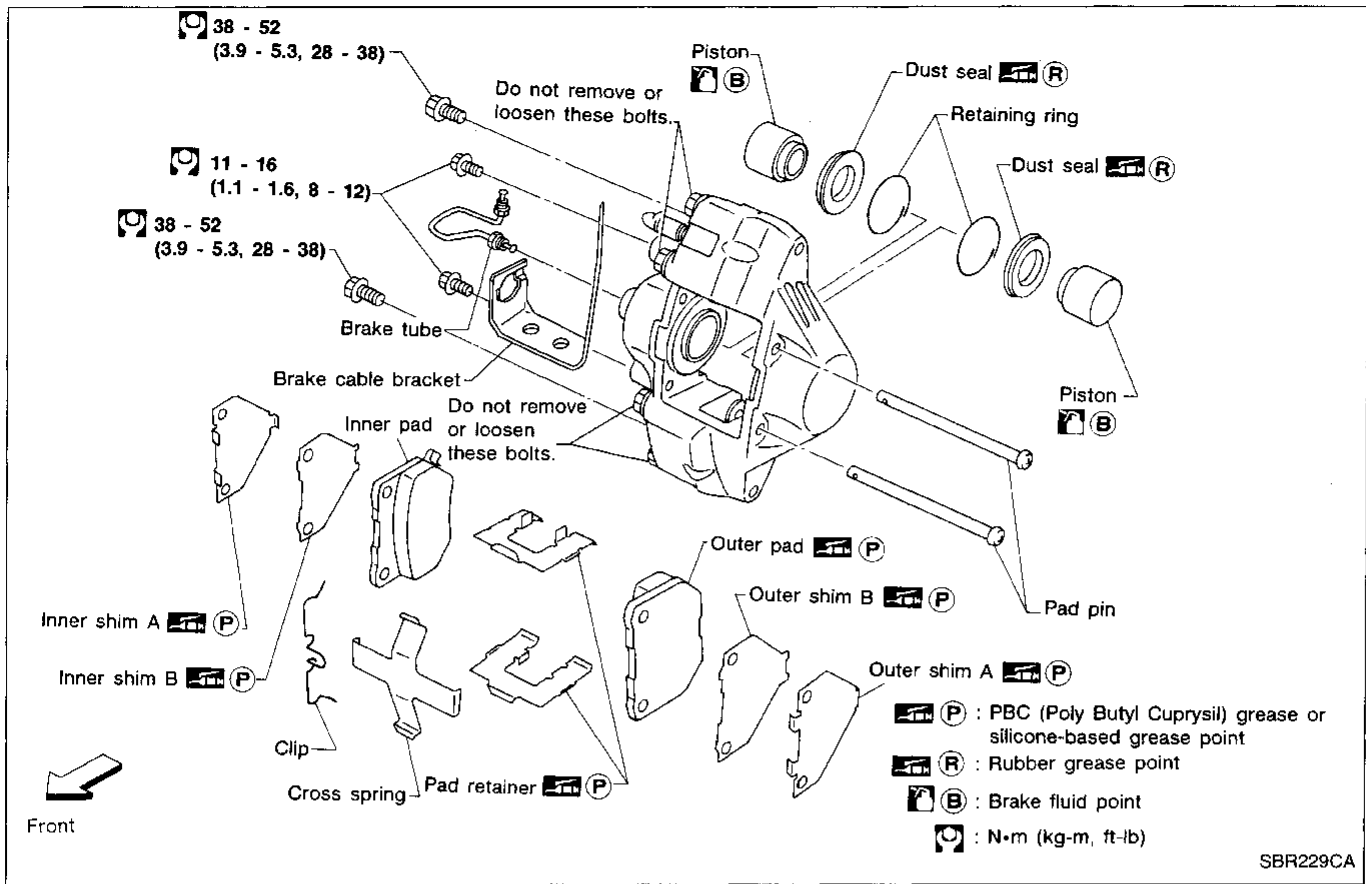


3. Pull out outer pad.
4. Push back outer piston with a suitable tool and install new pad.
5. Pull out inner pad.
6. Push back inner piston with a suitable tool and install new pad.
7. Install cross spring, pad pin and clip.

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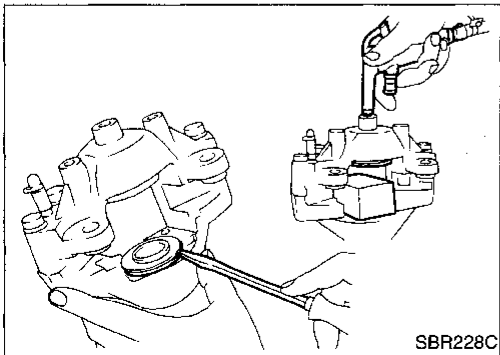
REAR DISC BRAKE (OPZ11V)

Pad Replacement (Cont'd)



Removal and Installation

1. Disconnect brake tube.
2. Remove brake pad.
3. Remove brake cable and bracket.
4. Remove axle housing fixing bolts.



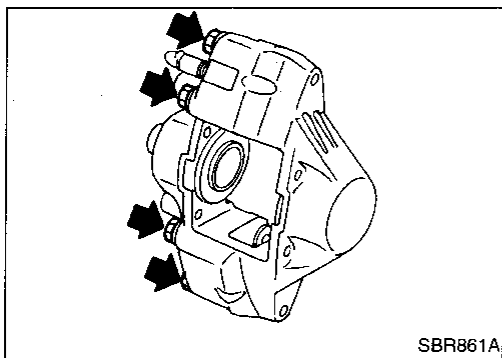
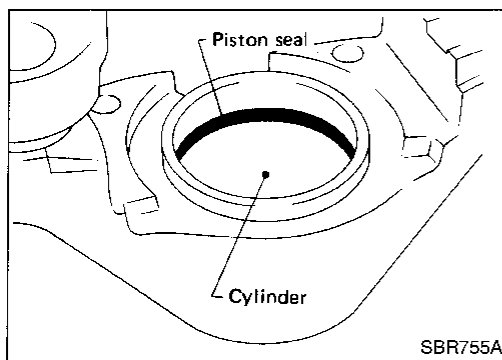
Disassembly

1. Remove retaining ring.
2. Push out piston with dust seal using compressed air.

REAR DISC BRAKE (OPZ11V)

Disassembly (Cont'd)

3. Remove piston seal.



CAUTION:

Be careful not to loosen or remove bolts joining both sides of caliper.

If there is any fluid leakage, replace caliper assembly.

Inspection

CALIPER

- Check dust seals for damage.
- Check calipers for damage, rust or foreign materials.
- Check inside surface of cylinder for score, rust, wear or other damage.
- Minor damage from rust of foreign materials may be eliminated by polishing surface with a fine emery paper. Replace if necessary.

CAUTION:

Use brake fluid to clean.

PISTON

Check piston for score, rust, wear or other damage. Replace if necessary.

CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

PAD PIN AND CLIP

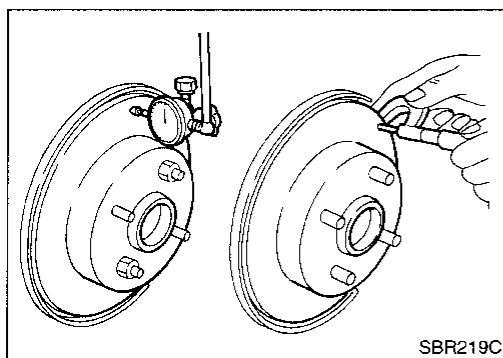
Check for wear, cracks deformation, deterioration, rust or other damage. Replace if necessary.

RUNOUT

- Secure rotor to wheel hub with at least two nuts (M12 x 1.25). Make sure that axial end play is within the specifications before measuring. Refer to "Rear Wheel Bearing" in RA section.

Maximum runout: 0.07 mm (0.0028 in)

(Total indicator reading at center of rotor pad contact surface)

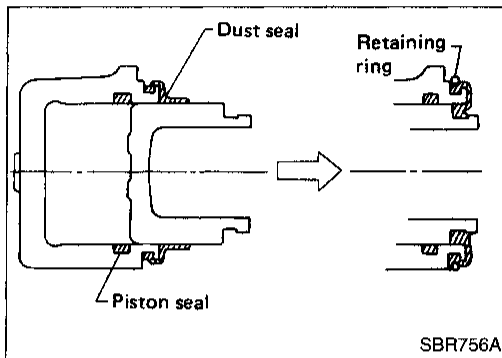


REAR DISC BRAKE (OPZ11V)

Inspection (Cont'd)

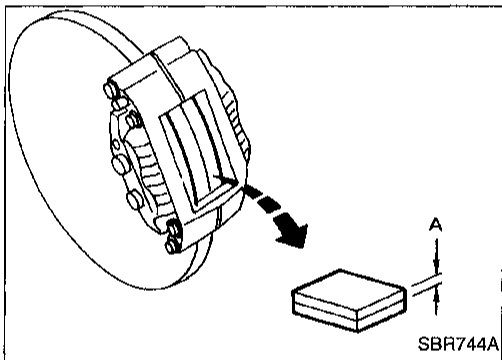
THICKNESS

Rotor repair limit: 16.0 mm (0.630 in)



Assembly

1. Insert piston seal into groove on cylinder body.
2. With dust seal fitted to piston, install piston into cylinder body.
3. Secure dust seal properly.
4. Install retaining ring.



Inspection (On-vehicle)

DISC PAD

- Check pad shims for deformation or damage.
- Check disc pad for wear or damage.

Standard thickness (A):

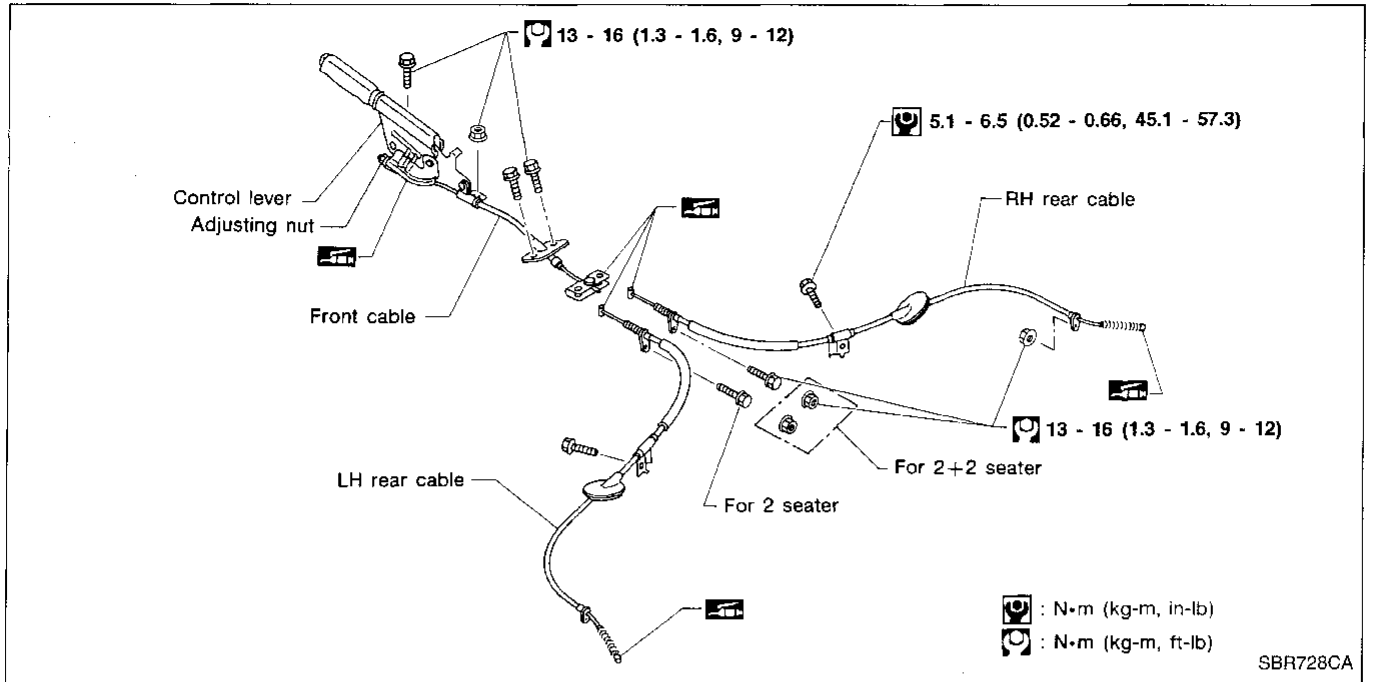
11.5 mm (0.453 in)

Pad wear limit (A):

2.0 mm (0.079 in)

PARKING BRAKE CONTROL

Removal and Installation



- Before removing parking brake control, remove console box.
- Loosen cable using control lever adjuster, and separate front and rear cables.

Apply multi-purpose grease to areas between control lever drum and cables.

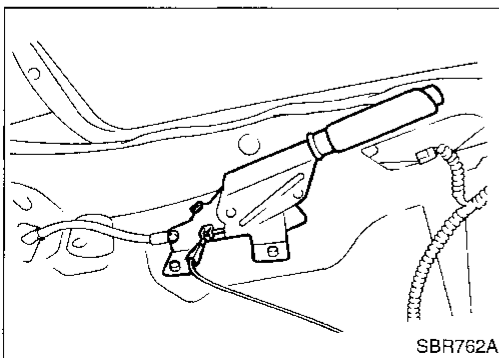
Be careful not to damage boot and inner cable.

Inspection

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if deformed or damaged, replace.

Adjustment

Perform shoe clearance adjustment before adjusting control lever stroke.



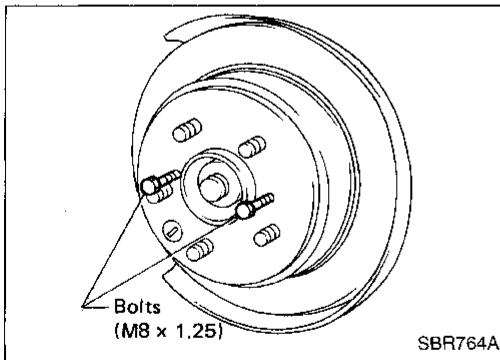
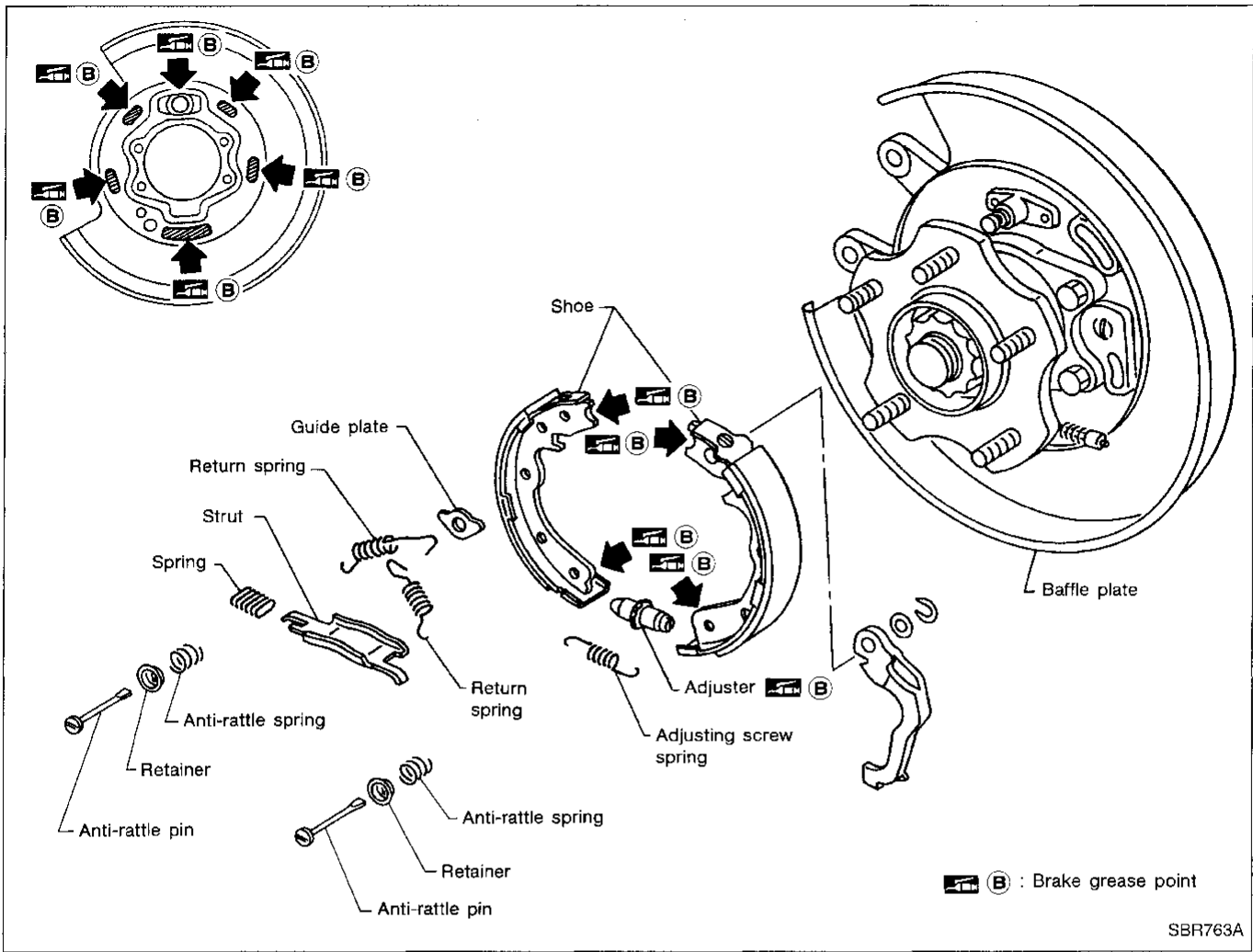
1. Turn adjusting nut.
2. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.

Number of notches at 196 N (20 kg, 44 lb): 6 - 7

3. Bend warning lamp switch plate. Warning lamp should come on when lever is pulled "A" notches. It should go off when the lever is fully released.

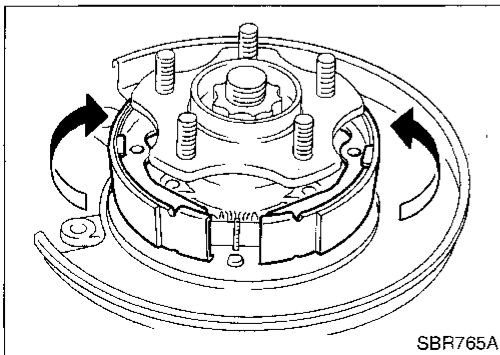
Number of notches "A": 1

PARKING DRUM BRAKE (DS17HD)



Shoe Replacement

1. Remove disc rotor (With parking drum brake).
Tighten two bolts gradually if disc rotor is hard to remove.

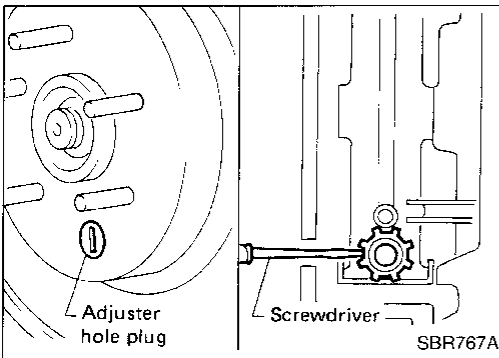
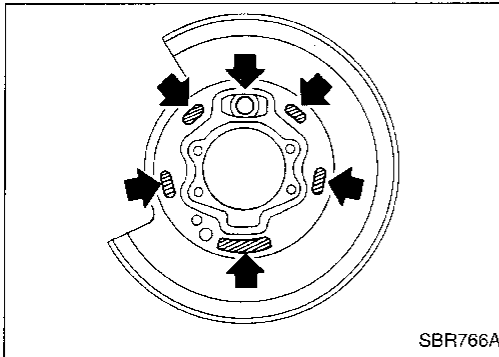


2. After removing anti-rattle pin, remove spring by rotating shoes.
Be careful not to damage parking brake cable when separating it.

PARKING DRUM BRAKE (DS17HD)

Shoe Replacement (Cont'd)

3. Apply brake grease to the contact areas shown at left.



Shoe Clearance Adjustment

1. Remove adjuster hole plug, and turn adjuster wheel with a screwdriver until shoe touches brake drum.

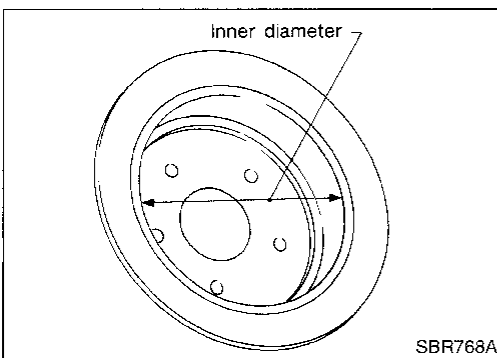
Make sure that parking control lever is released completely.

2. Return adjuster wheel 5 to 6 latches.
3. Install adjuster hole plug, and make sure that there is no drag between shoes and brake drum when rotating disc rotor.

Breaking in Parking Brake Shoes

When a new rotor/parking brake shoe is installed, or when braking performance is poor, perform the following break-in procedure.

1. Drive the unloaded vehicle on a safe, level and dry road.
2. Depress the release button of parking brake lever, then pull the lever with a force of 98 N (10 kg, 22 lb).
3. While holding the lever, continue to drive the vehicle forward 100 m (328 ft) at approximately 35 km/h (22 MPH).
4. Cool down parking brake for approx. five minutes.
5. After releasing the lever, drive the vehicle under the normal conditions for two minutes to cool down the parking drum brake.
6. Repeat steps 1 through 5 three times and then repeat only step 5 one more time.



Drum Inspection

Standard inner diameter:

172.0 mm (6.77 in)

Maximum inner diameter:

173.0 mm (6.81 in)

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ANTI-LOCK BRAKE SYSTEM

Purpose

The Anti-Lock Brake System (ABS) consists of electronic and hydraulic components. It allows for control of braking force so that locking of the wheels can be avoided.

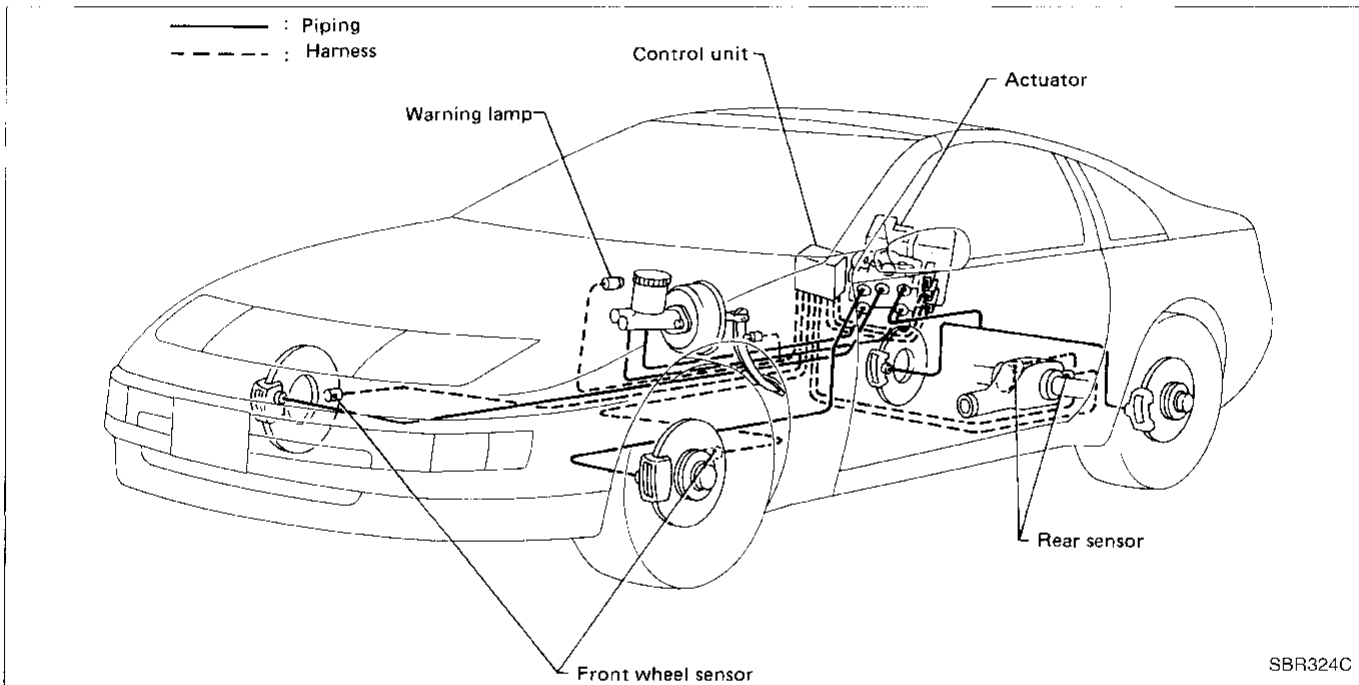
The ABS:

- 1) Improves proper tracking performance through steering wheel operation.
- 2) Increases obstacle avoidance through steering wheel operation.
- 3) Improves vehicle stability.

Operation

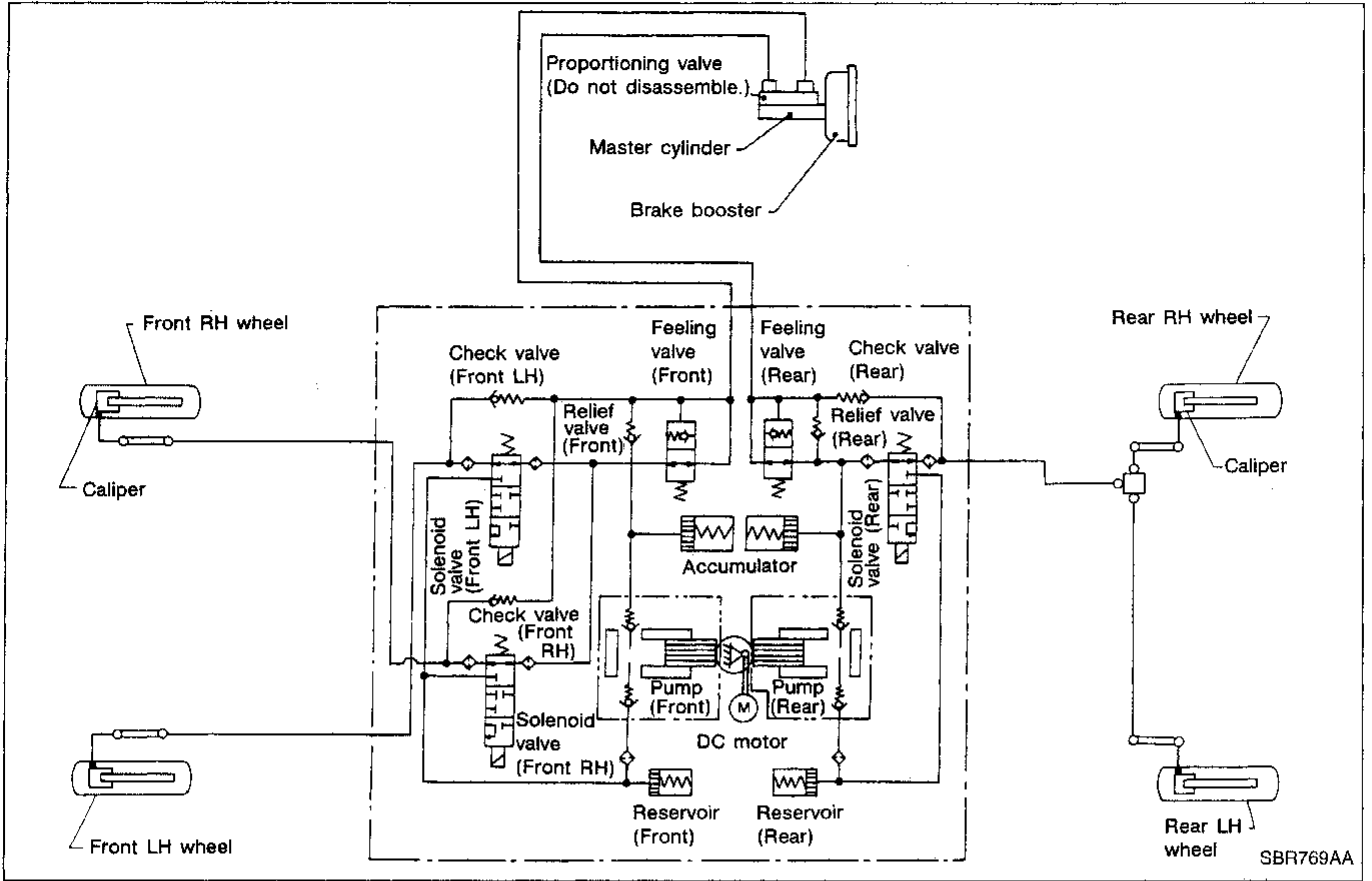
- When the vehicle speed is less than 10 km/h (6 MPH) this system does not work.
- The Anti-Lock Brake System (ABS) has self-test capabilities. The system turns on the ABS warning lamp for 1 second each time the ignition switch is turned "ON". After the engine is started, the ABS warning lamp turns off. The system performs a test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs this self-test. This is a normal part of the self-test feature. If a malfunction is found during this check, the ABS warning lamp will stay on.
- While driving, a mechanical noise may be heard during ABS operation. This is a normal condition.

System Components



ANTI-LOCK BRAKE SYSTEM

Hydraulic Circuit



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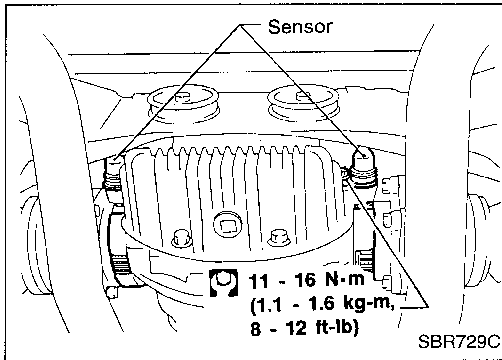
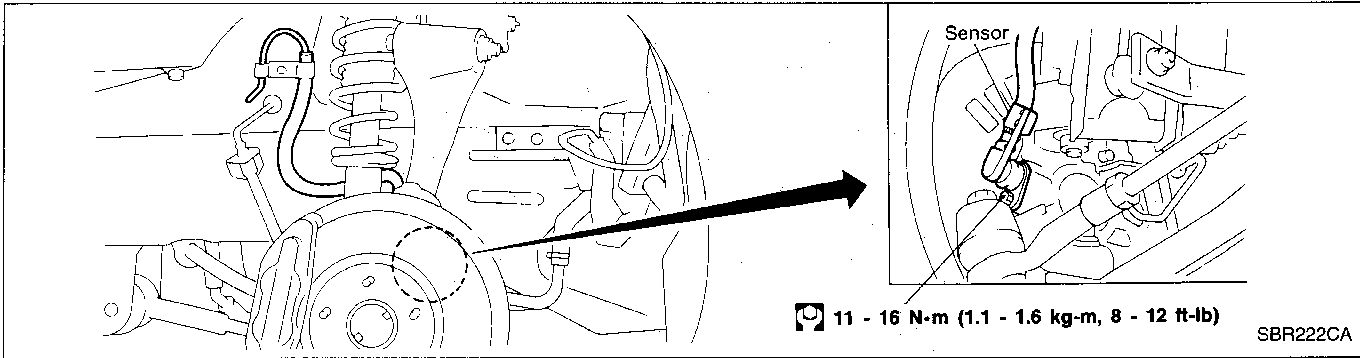
ANTI-LOCK BRAKE SYSTEM

Removal and Installation

CAUTION:

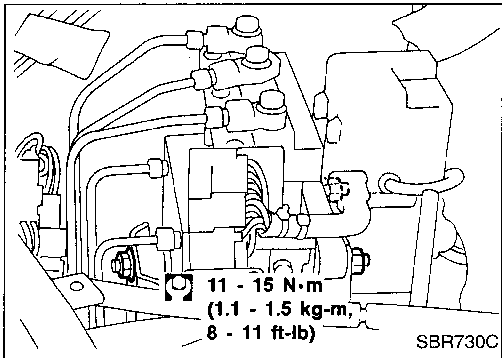
Be careful not to damage sensor edge and sensor rotor teeth. When removing the front wheel hub or final drive assemblies, first remove the ABS wheel sensor from the assembly. Failure to do so may result in damage to the sensor wires making the sensor inoperative.

FRONT WHEEL SENSOR



REAR SENSOR

- Remove rear sensor rotor with differential side flange after drive shaft removal. Refer to "Drive Shaft" in RA section.



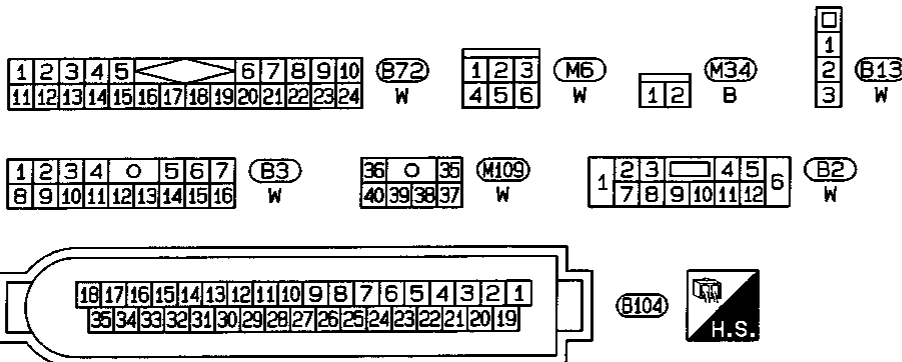
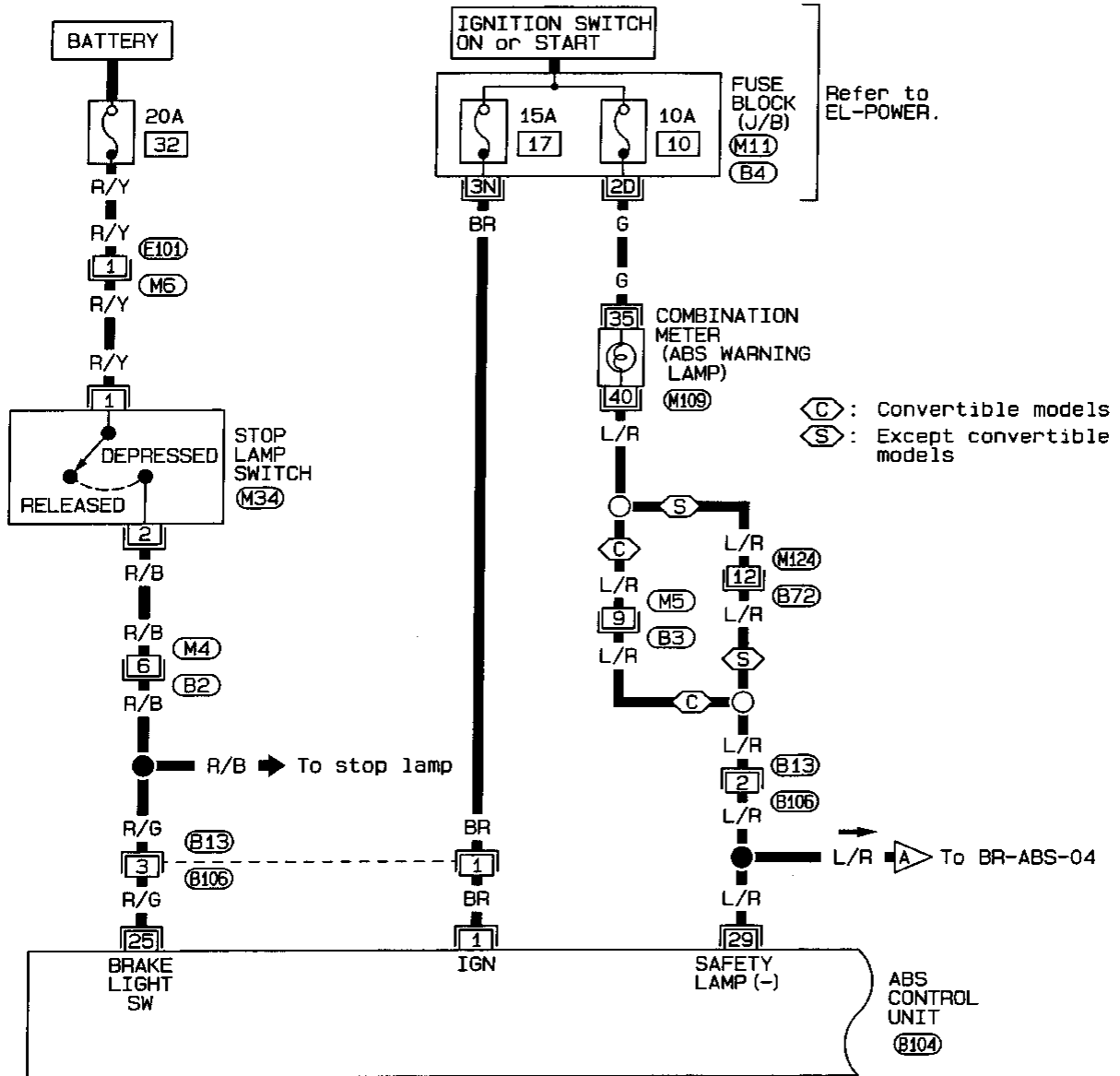
ACTUATOR

- Disconnect 3 connectors and brake tubes.
- Remove 3 nuts fixing actuator to bracket.

TROUBLE DIAGNOSES

Wiring Diagram — ABS —

BR-ABS-01



Refer to last page (Foldout page).

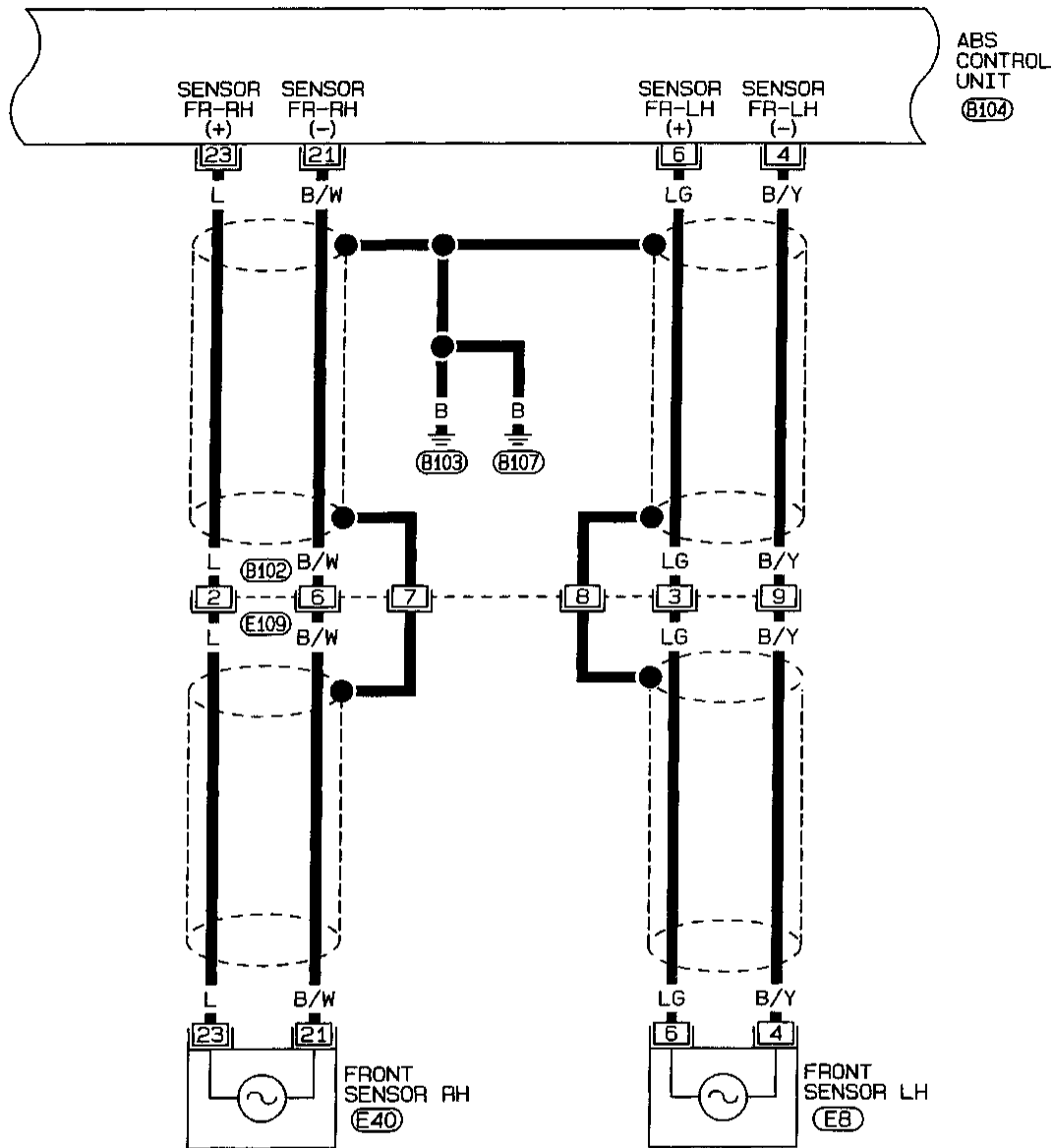
(M11) (B4)

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TROUBLE DIAGNOSES

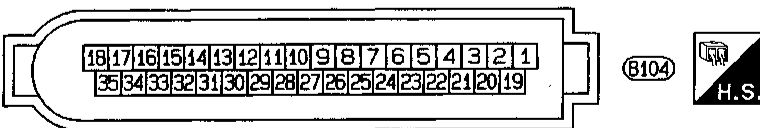
Wiring Diagram — ABS — (Cont'd)

BR-ABS-02



| | | | | | |
|---|---|---|---|---|-------------|
| 1 | 2 | 0 | 3 | 4 | (E109) W |
| 5 | 6 | 7 | 8 | 9 | |

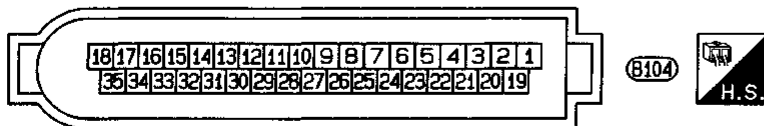
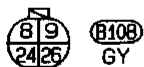
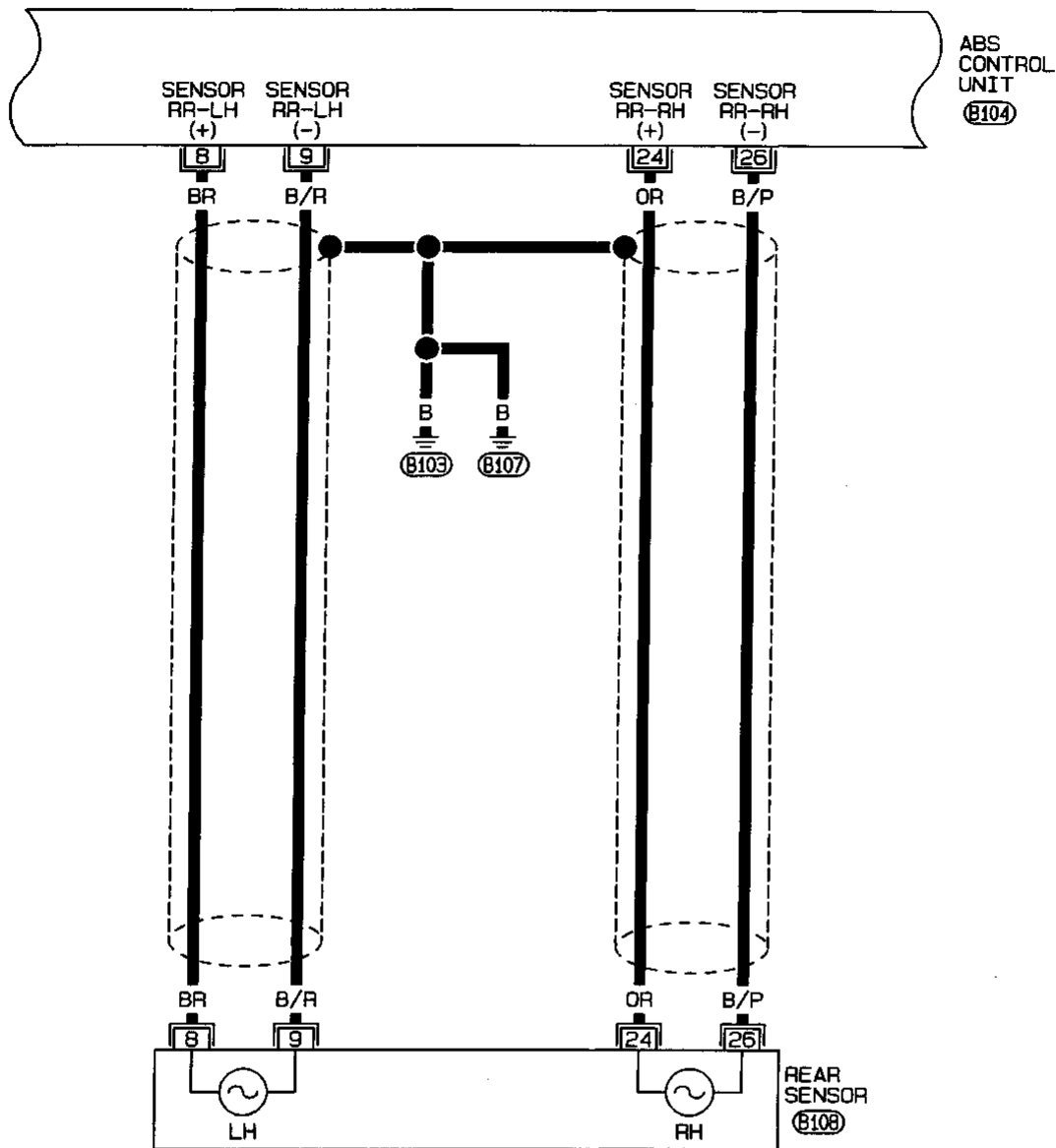
| | | | |
|----------------|----|-------------|----|
| (E40) 23 21 | GY | (E8) 6 4 | GY |
|----------------|----|-------------|----|



TROUBLE DIAGNOSES

Wiring Diagram — ABS — (Cont'd)

BR-ABS-03

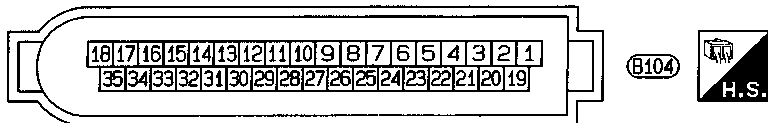
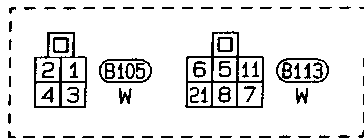
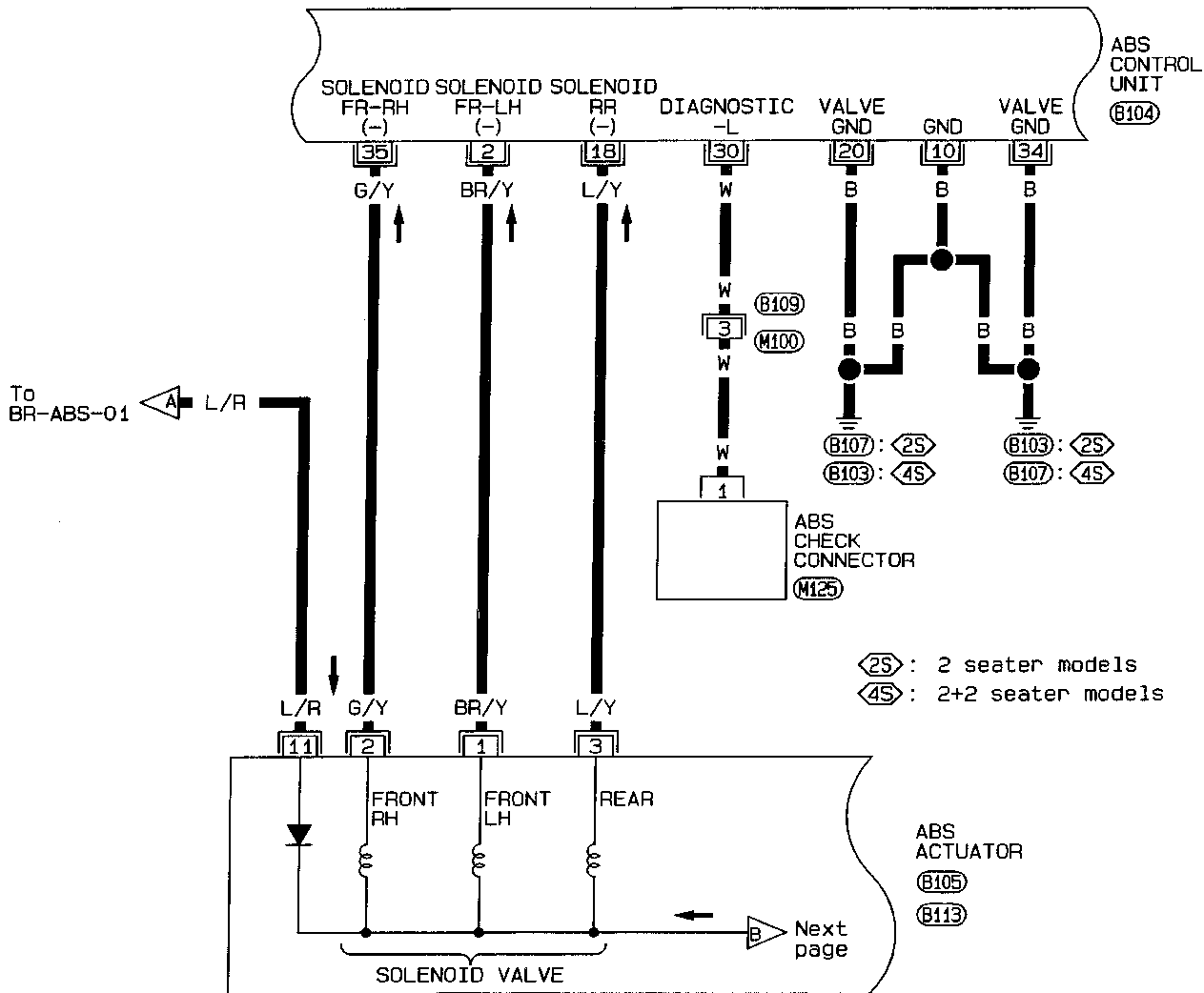


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TROUBLE DIAGNOSES

Wiring Diagram — ABS — (Cont'd)

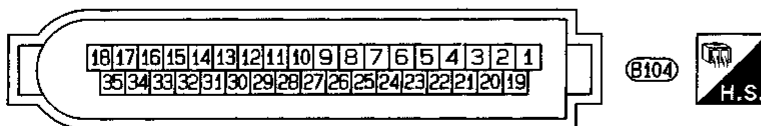
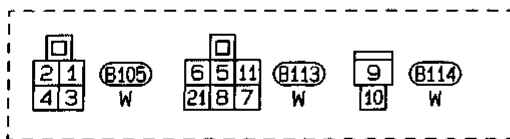
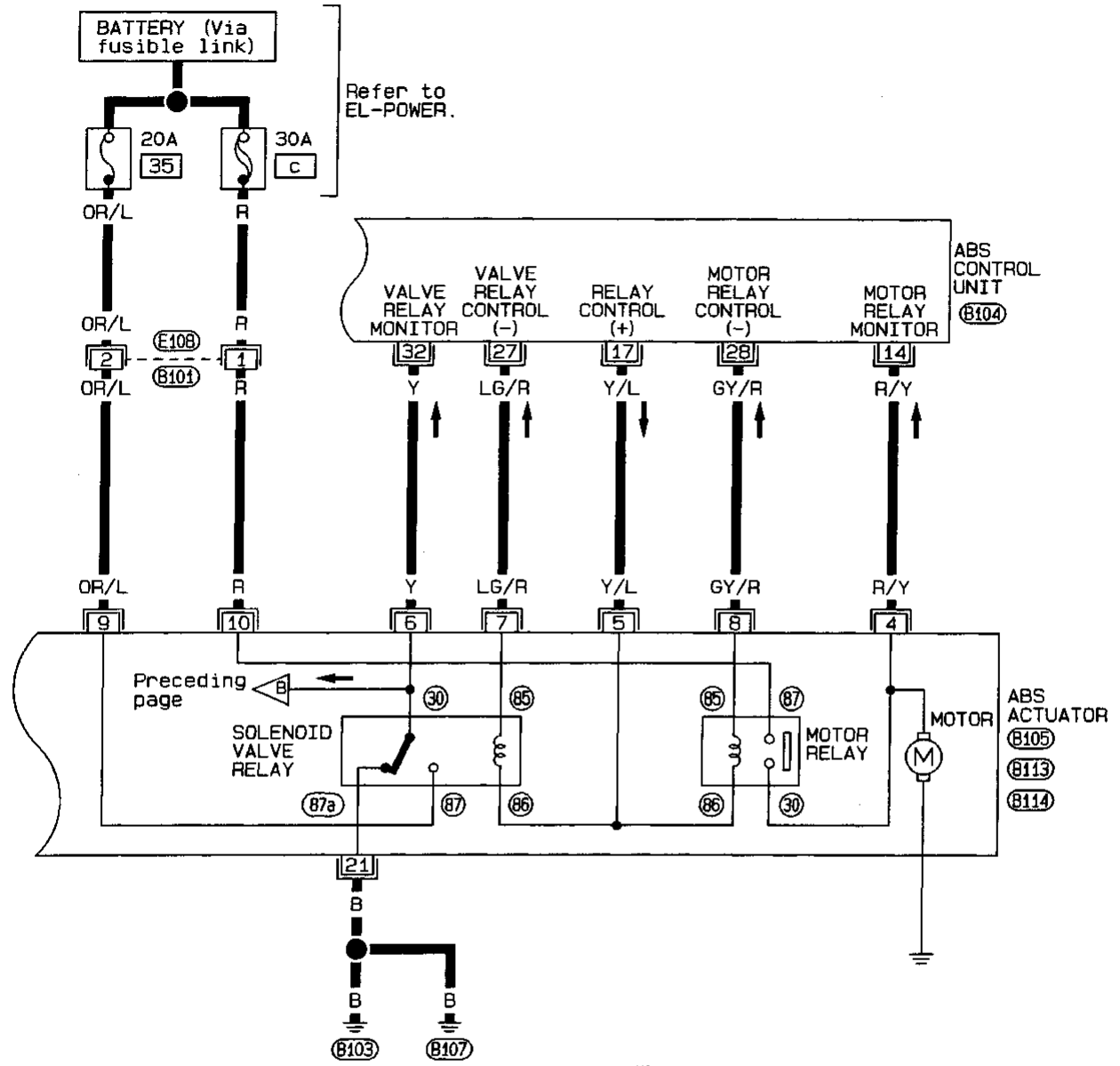
BR-ABS-04



TROUBLE DIAGNOSES

Wiring Diagram — ABS — (Cont'd)

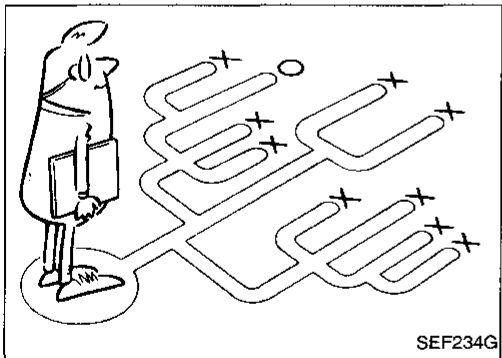
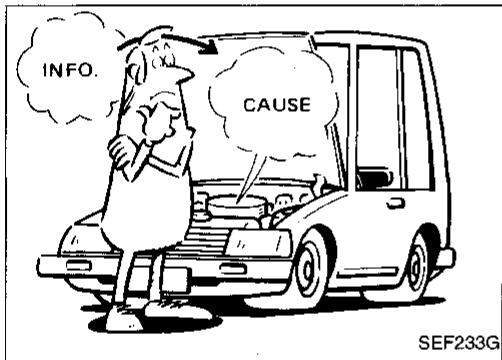
BR-ABS-05



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Contents

| | |
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| How to Perform Trouble Diagnoses for Quick and Accurate Repair | BR-34 |
| Self-diagnosis | BR-35 |
| Component Parts and Harness Connector Location | BR-38 |
| Preliminary Check | BR-39 |
| Ground Circuit Check | BR-40 |
| Circuit Diagram for Quick Pinpoint Check | BR-41 |
| Diagnostic Procedure 1 | BR-42 |
| Diagnostic Procedure 2 | BR-43 |
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| Diagnostic Procedure 4 | BR-47 |
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| Diagnostic Procedure 8 | BR-54 |
| Diagnostic Procedure 9 | BR-54 |
| Electrical Components Inspection | BR-55 |



How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

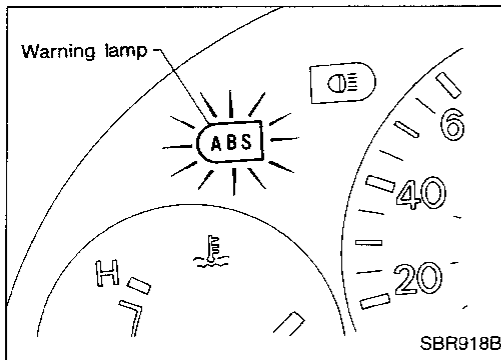
The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives the actuators. It is essential that both kinds of signals are proper and stable. It is also important to check for conventional problems: such as air leaks in booster lines, lack of brake fluid, or other problems with the brake system.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems, so a road test should be performed.

Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with the customer, find out what symptoms are present and under what conditions they occur.

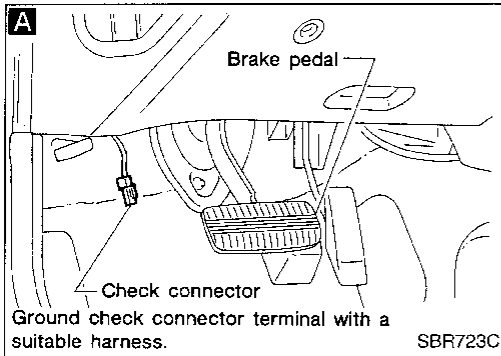
Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot brake problems on an ABS controlled vehicle.



Self-diagnosis

FUNCTION

- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. To start the self diagnostic results mode, ground the self-diagnostic (check) terminal located on the "Data Link Connector for CONSULT". The location of the malfunction is indicated by the warning lamp flashing on the instrument panel.



SELF-DIAGNOSIS PROCEDURE

Drive vehicle over 30 km/h (20 MPH) for at least one minute.

Turn ignition switch "OFF".

A Ground terminal of check connector with a suitable harness.

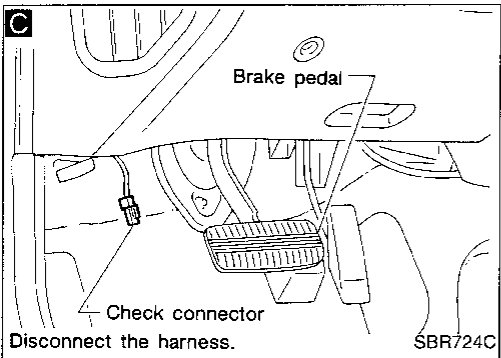
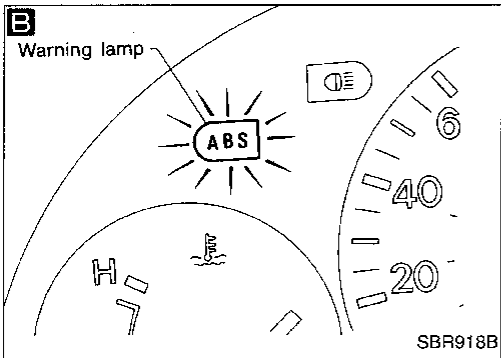
Turn ignition switch "ON" while grounding terminal.
Do not depress brake pedal.

B After 3.6 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE 1.)

Identify the location of the malfunction with the malfunction code chart. Then, make the necessary repairs following the instructions in the diagnostic procedures.

After the malfunctions are repaired, erase the malfunction codes stored in the control unit. See "HOW TO ERASE SELF-DIAGNOSTIC RESULTS", BR-36.

Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.



C Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.

A

NOTE 1: The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the indication starts flashing again.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

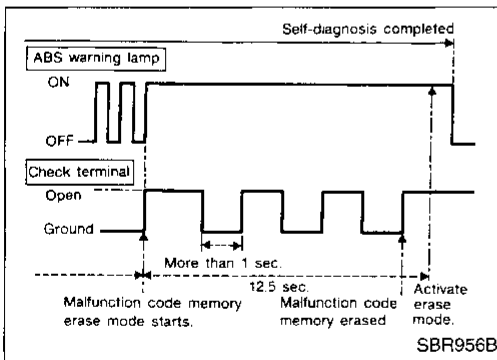
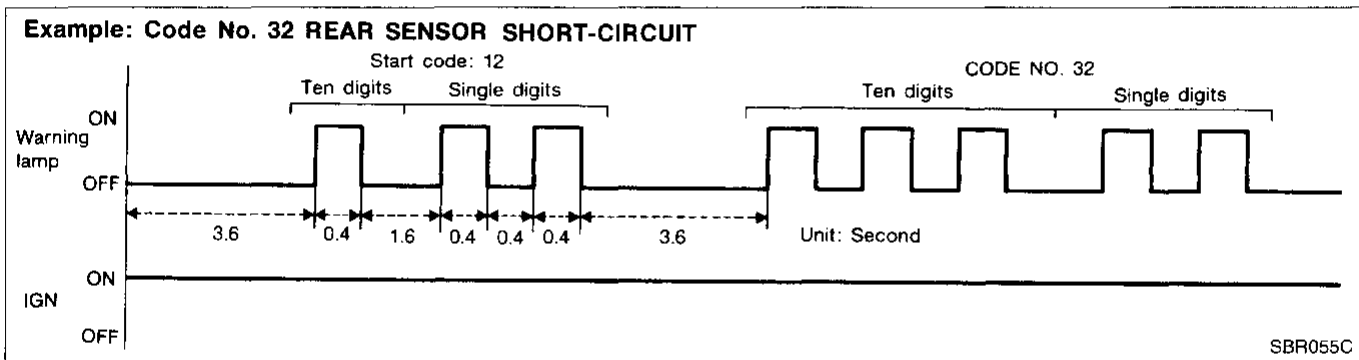
(A)

Check warning lamp for deactivation after driving vehicle over 30 km/h (20 MPH) for at least one minute.

Make sure that warning lamp does not come on. Then, test the ABS in a safe area to verify that it functions properly.

HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Determine the code No. by counting the number of times the warning lamp flashes on and off.
- When several malfunctions occur at one time, up to three code numbers can be stored; the latest malfunction will be indicated first.
- The indication begins with the start code 12. After that, a maximum of three code numbers appear in the order of the latest one first. Then, the indication returns to the start code to repeat. It will continue for five minutes at the most.
- The malfunction code chart is given on the next page.



HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

1. Disconnect the check terminal from ground. (ABS warning lamp will stay lit.)
2. Within 12.5 seconds, ground the check terminal 3 times. Each terminal ground must last more than 1 second. The ABS warning lamp goes out after the erase operation has been completed.
3. Again, perform self-diagnosis, refer to BR-35. Only the start-code should appear, no malfunction codes.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

MALFUNCTION CODE/SYMPTOM CHART

| Code No. | Malfunctioning part | Diagnostic procedure | |
|---|--|----------------------|----|
| 45 | Front left actuator solenoid valve | 3 | GI |
| 41 | Front right actuator solenoid valve | | |
| 55 | Rear actuator solenoid valve | | |
| 25 | Front left sensor (open-circuit) | 4 | MA |
| 26 | Front left sensor (short-circuit) | | |
| 21 | Front right sensor (open-circuit) | | |
| 22 | Front right sensor (short-circuit) | | |
| 35 | Rear left sensor (open-circuit) | | |
| 36 | Rear left sensor (short-circuit) | | |
| 31 | Rear right sensor (open-circuit) | | |
| 32 | Rear right sensor (short-circuit) | | |
| 18 | Sensor rotor | | |
| 61 | Actuator motor or motor relay | | |
| 63 | Solenoid valve relay circuit (except power supply for relay coil) | 6 | FE |
| 57 | Power supply (Low voltage) | 7 | CL |
| 16 | Stop lamp switch circuit | 8 | |
| 71 | Control unit | 9 | MT |
| Warning lamp stays on when ignition switch is turned on | Control unit power supply circuit Warning lamp bulb circuit Control unit or control unit connector Solenoid valve relay stuck Power supply for solenoid valve relay coil | 2 | AT |
| Warning lamp stays on only during self-diagnosis | Control unit | — | PD |
| Warning lamp does not come on when ignition switch is turned on | Fuse, warning lamp bulb or warning lamp circuit Control unit | 1 | FA |
| Warning lamp does not come on only during self-diagnosis | Control unit | — | RA |

BR

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RS

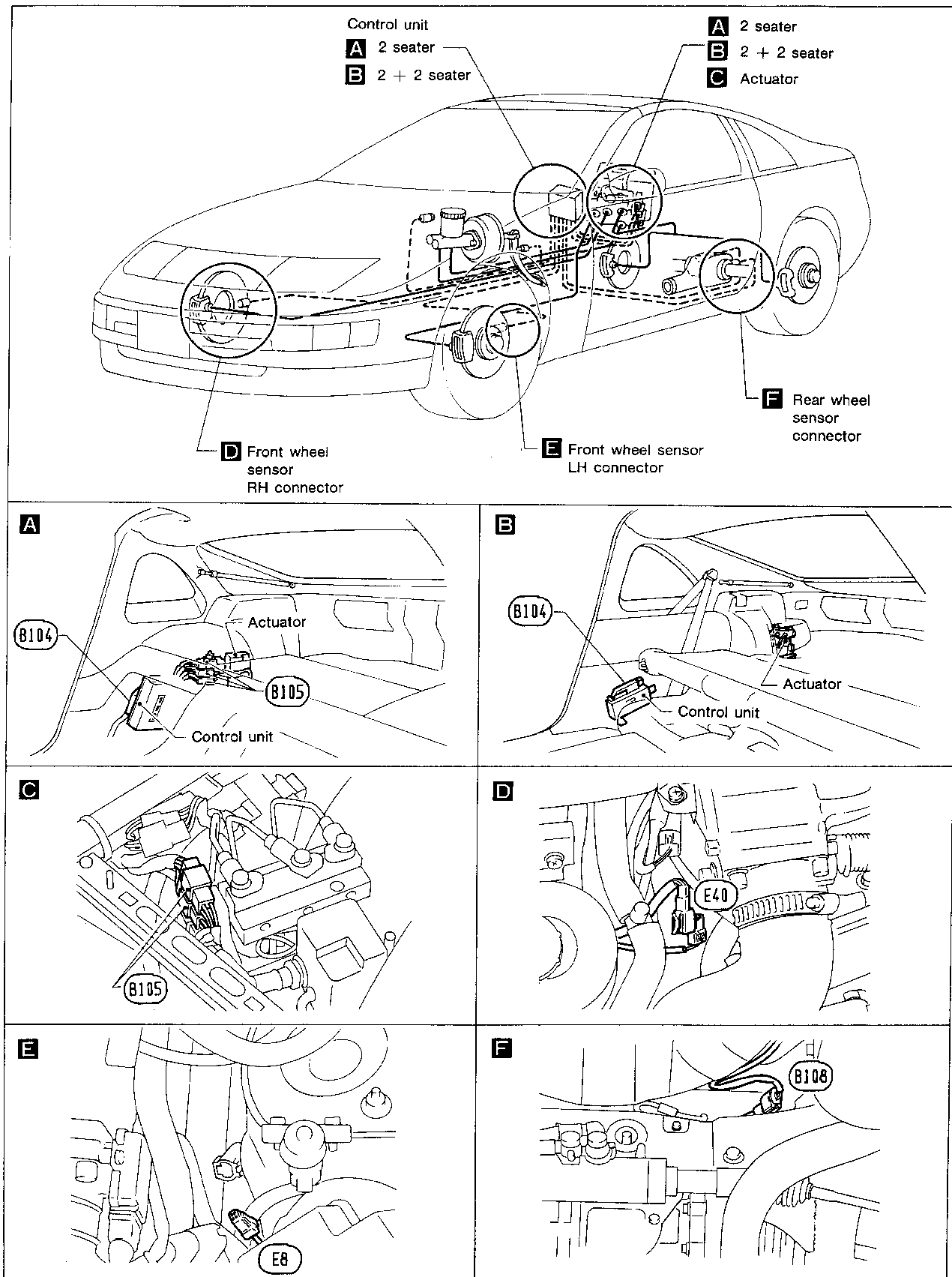
BT

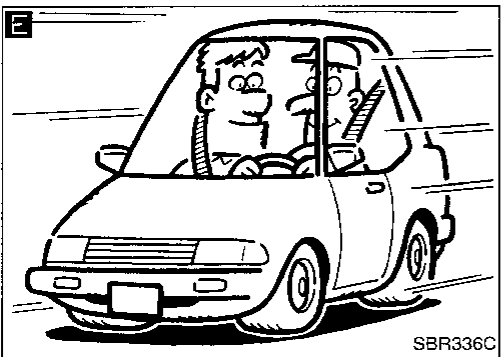
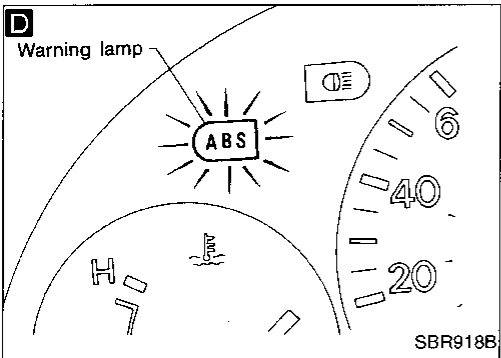
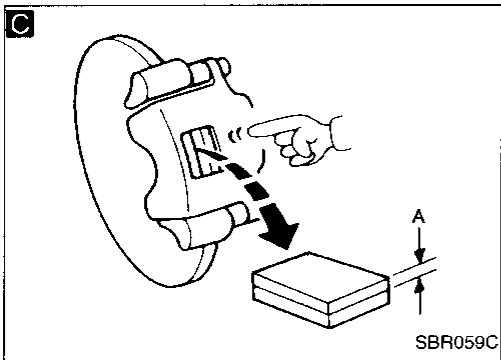
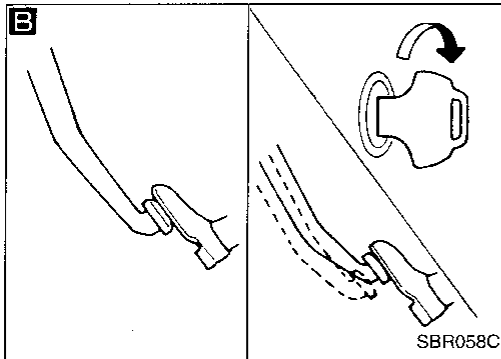
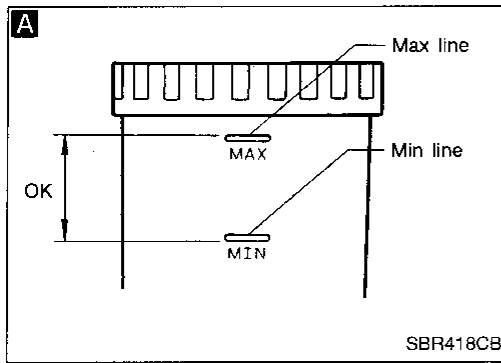
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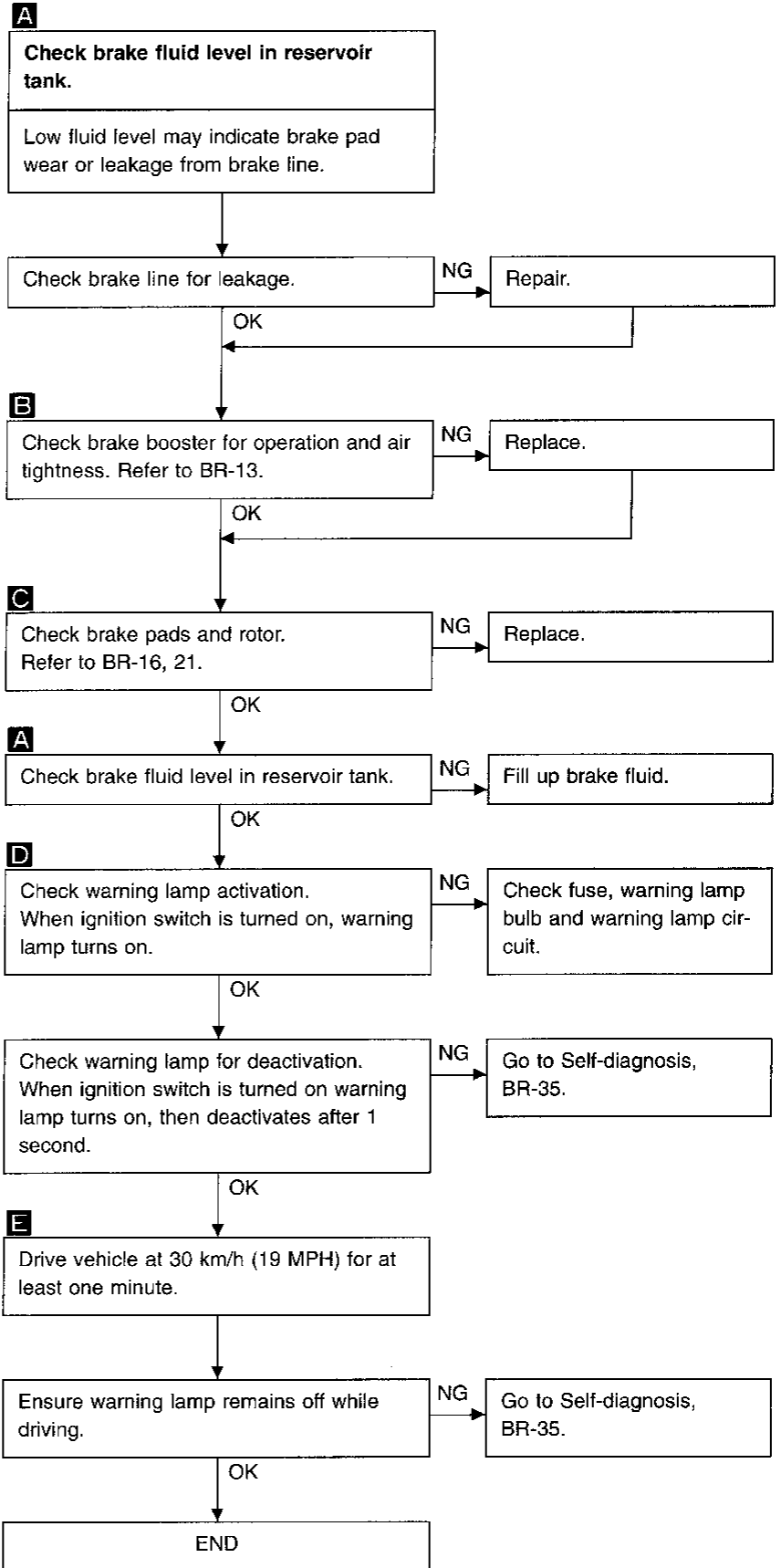
IDX

Component Parts and Harness Connector Location

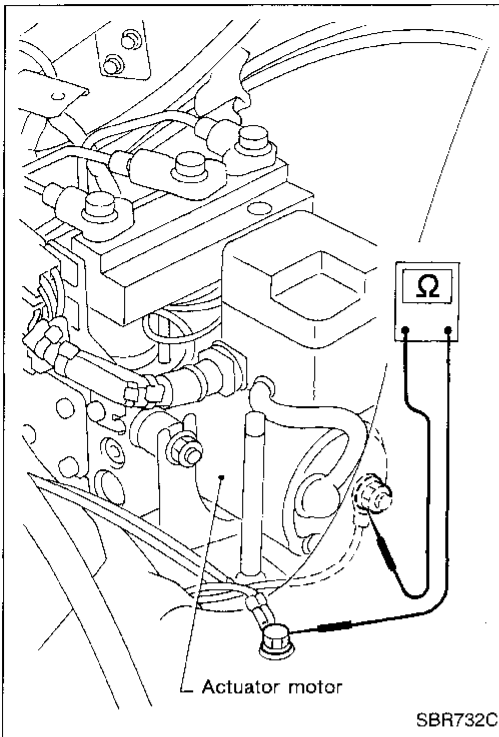




Preliminary Check



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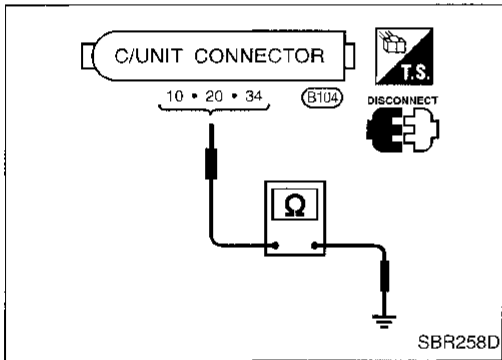


Ground Circuit Check

ACTUATOR MOTOR GROUND

- Check resistance between actuator motor ground terminal and body ground.

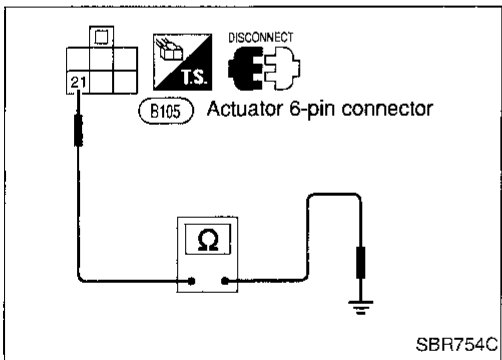
Resistance: 0Ω



CONTROL UNIT GROUND

- Check resistance between both terminals.

Resistance: 0Ω



ACTUATOR GROUND

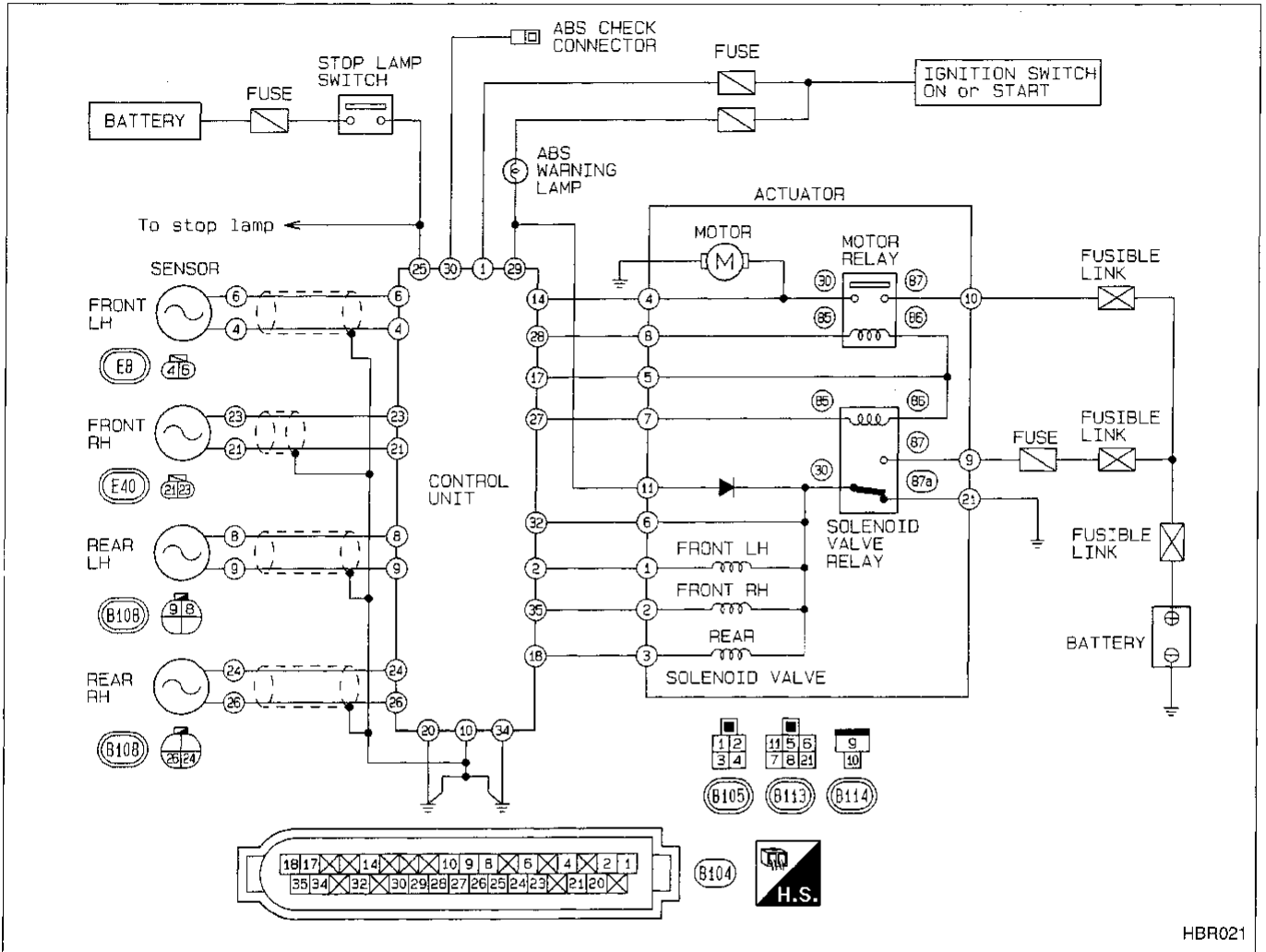
- Check resistance between actuator harness 6-pin connector (actuator side) terminal ②① and ground.

Resistance: 0Ω

TROUBLE DIAGNOSES

Circuit Diagram for Quick Pinpoint Check

- The unit side connectors with a double circle "⊖" are connected to the harness side connectors shown in the "Component Parts and Connector Location".
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".



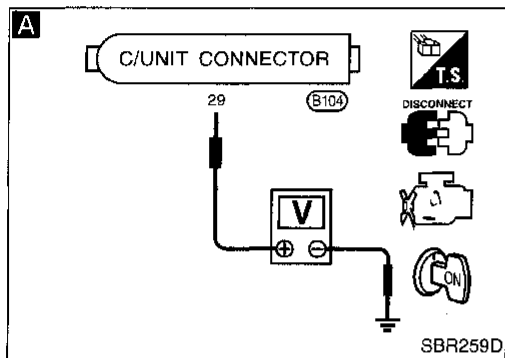
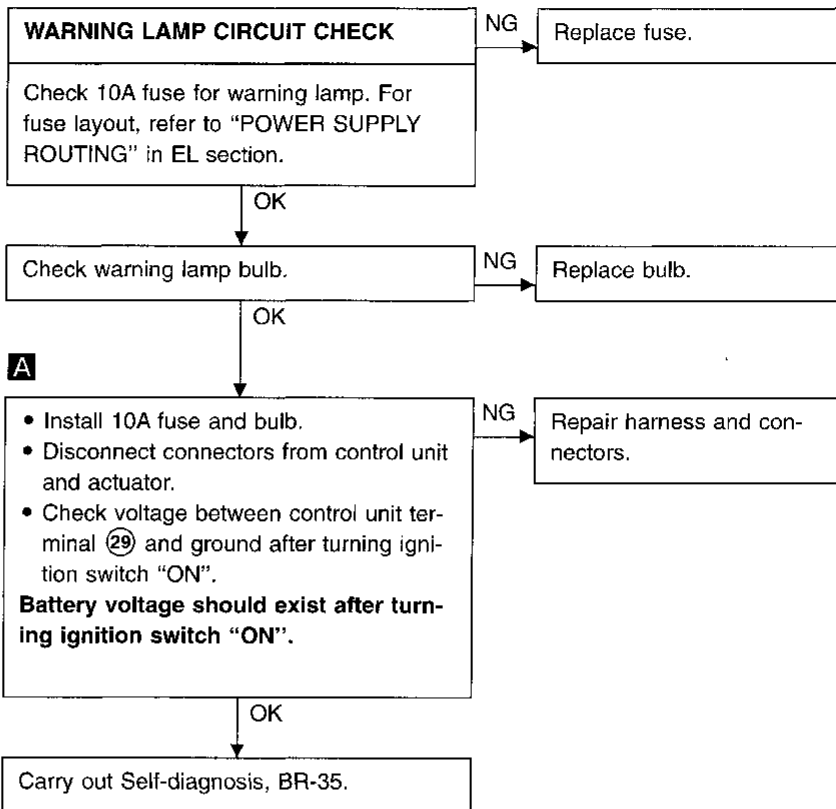
HBR021

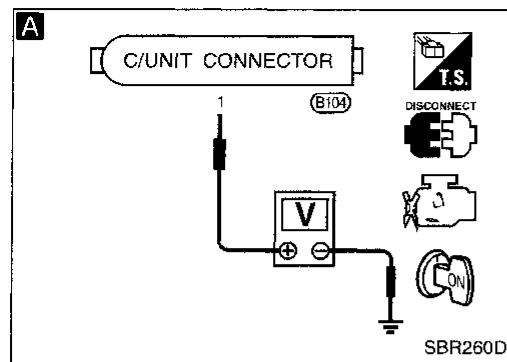
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TROUBLE DIAGNOSES

Diagnostic Procedure 1 (Not self-diagnostic item)

Warning lamp does not work before engine starts.





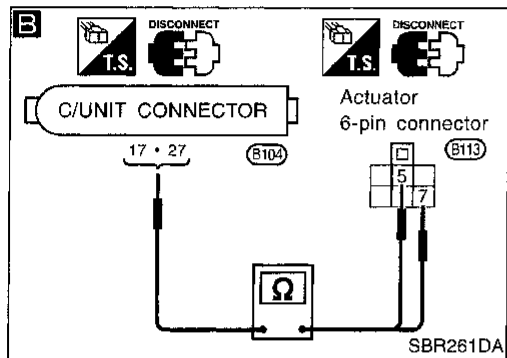
Diagnostic Procedure 2 (Not Self-diagnostic item)

Warning lamp stays on continuously.

CONTROL UNIT POWER SUPPLY CIRCUIT

Check 15A fuse for control unit. For fuse layout, refer to "POWER SUPPLY ROUTING" in EL section.

NG → (B) (Skip page.)



- Disconnect connector from control unit.
 - Check voltage between control unit connector terminal ① and ground after turning ignition switch "ON".
- Battery voltage should exist.**

NG → Repair harness and connector.

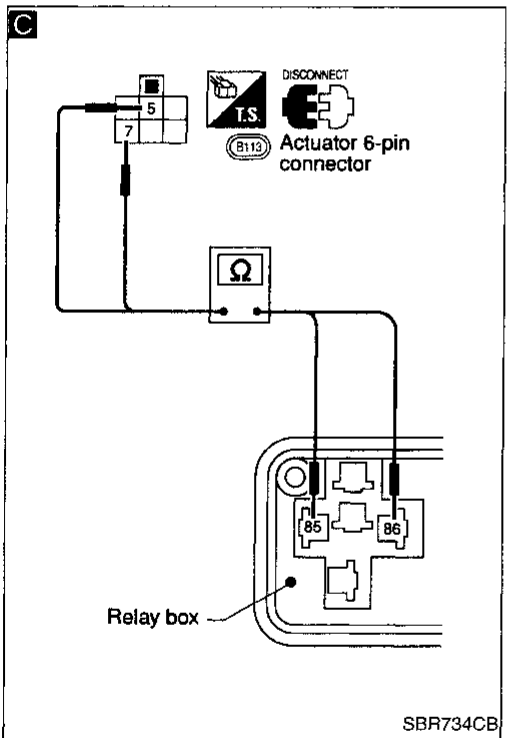
SOLENOID VALVE RELAY COIL POWER SUPPLY CIRCUIT.

- Turn ignition switch "OFF". Disconnect actuator 6-pin connector.
- Check continuity between control unit connector terminals and actuator 6-pin connector (actuator side) terminals.

NG → Repair harness and connector.

| Control unit | Actuator |
|--------------|----------|
| ①7 | ⑤ |
| ②7 | ⑦ |

Continuity should exist.



CIRCUIT CHECK

- Disconnect solenoid valve relay.
- Check continuity between actuator 6-pin connector (actuator side) terminals and solenoid valve relay box terminals.

NG → Replace actuator.

| Actuator | Relay box |
|----------|-----------|
| ⑤ | ⑧6 |
| ⑦ | ⑧5 |

Continuity should exist.

SOLENOID VALVE RELAY CHECK

Refer to SOLENOID VALVE RELAY in Electrical Components Inspection, BR-55.

NG → Replace solenoid valve relay.

OK

(A)

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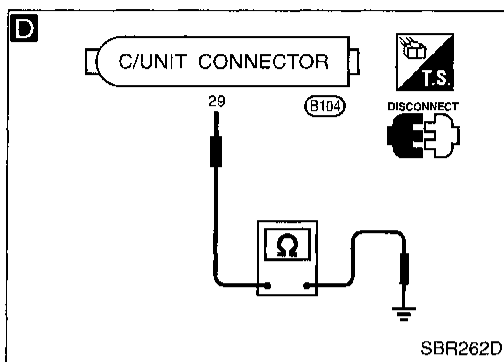
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TROUBLE DIAGNOSES

Diagnostic Procedure 2 (Not Self-diagnostic item) (Cont'd)



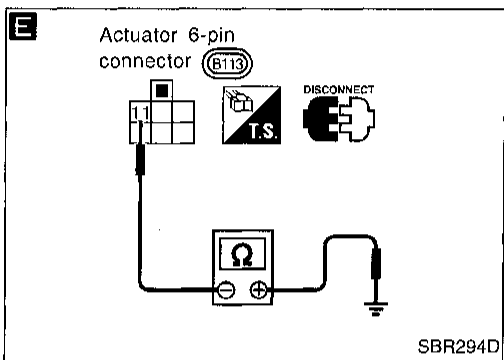
D

GROUND-SHORT CHECK FOR WARNING LAMP CIRCUIT.

NG → Repair harness and connector.

- Turn ignition switch "OFF".
- Disconnect connectors from control unit and actuator.
- Check continuity between control unit connector terminal ②⑨ and body ground.

Continuity should not exist.



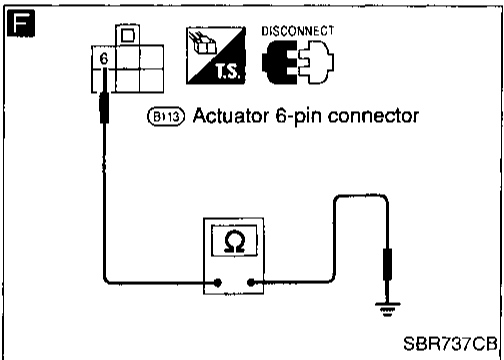
E

- Disconnect actuator 6-pin connector.
- Check continuity between actuator 6-pin connector (actuator side) terminal ①① and body ground.

Continuity should not exist.

Pay attention to tester polarity.*

NG → Replace actuator assembly.



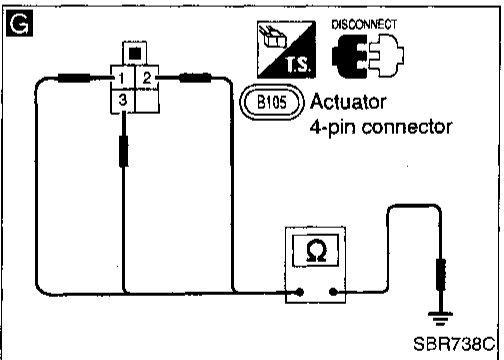
F

SOLENOID VALVE CHECK CIRCUIT

NG → Repair harness and connector.

- Check continuity between actuator 6-pin connector (body side) terminal ⑥ and body ground.

Continuity should not exist.



G

SOLENOID VALVE CIRCUIT

NG → Replace actuator assembly.

- Disconnect actuator 4-pin connector.
- Check continuity between actuator 4-pin connector (actuator side) terminals ①, ②, ③ and body ground.

Continuity should not exist.

OK

Check control unit pin terminals for damage or the connection of control unit harness connector.

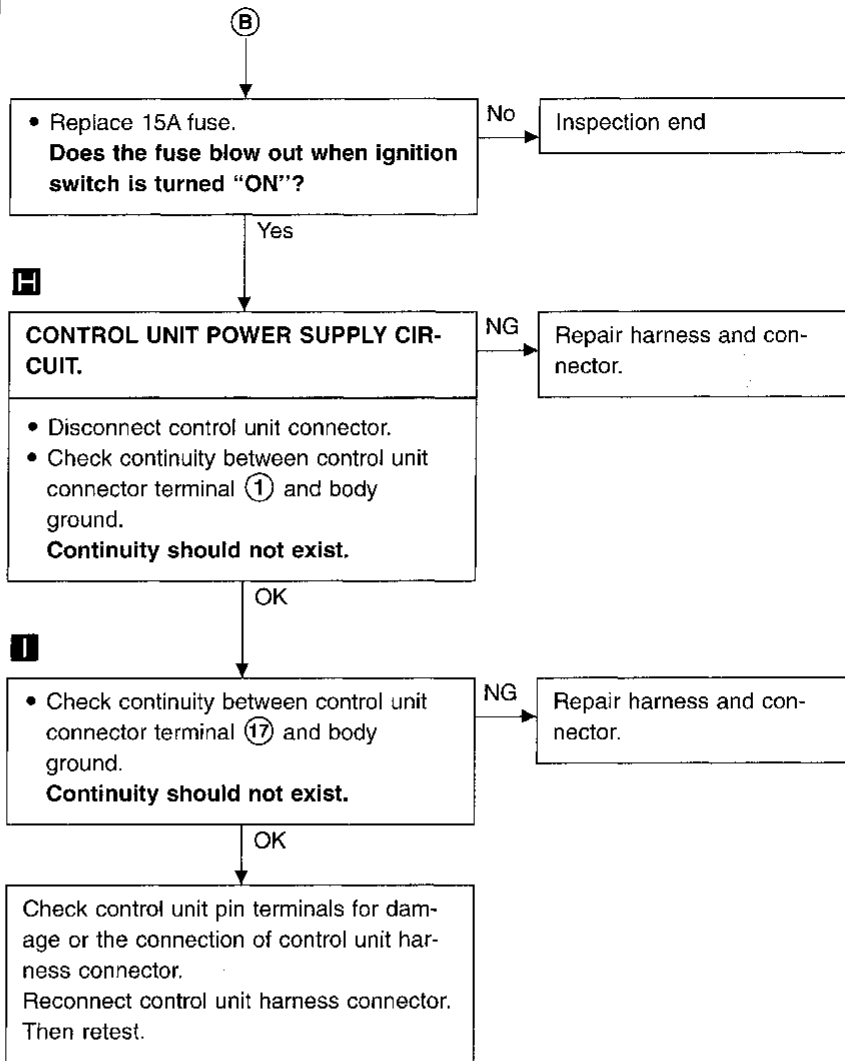
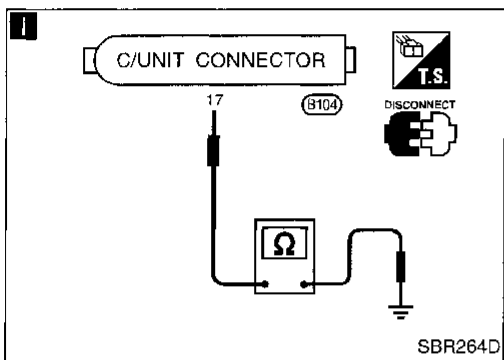
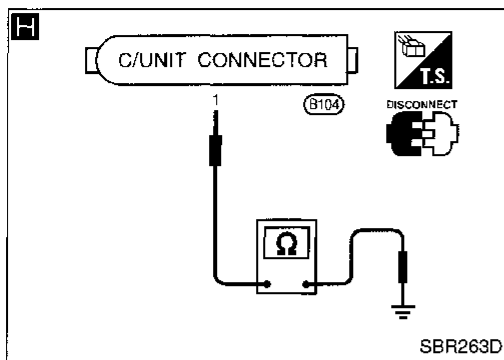
Reconnect control unit harness connector.

Then retest.

*: Specifications may vary depending on the type of tester. Before performing this inspection, refer to the instruction manual of the tester.

TROUBLE DIAGNOSES

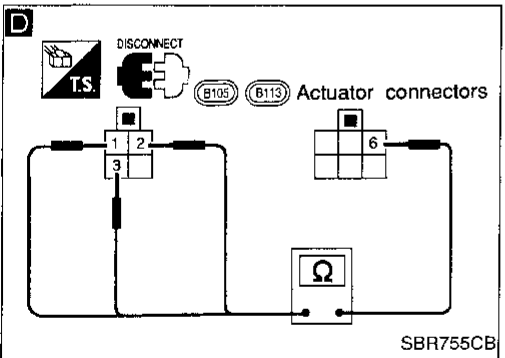
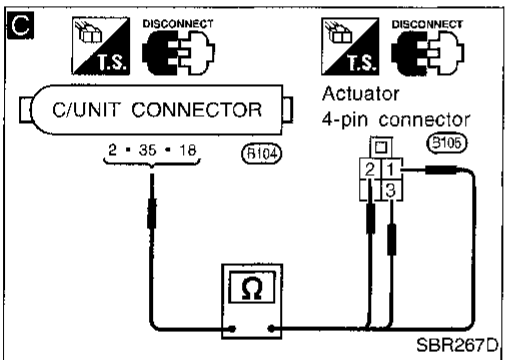
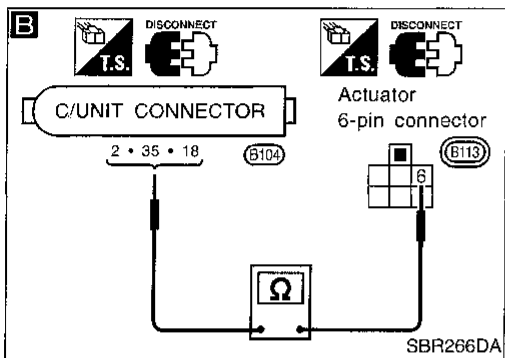
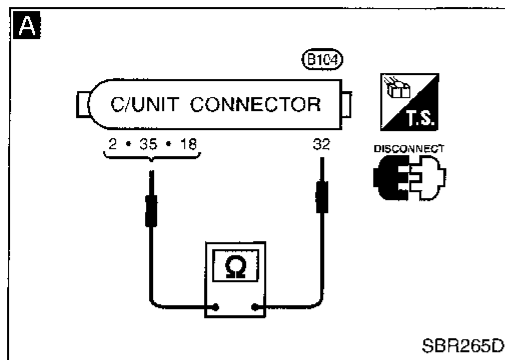
Diagnostic Procedure 2 (Not Self-diagnostic item) (Cont'd)



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Diagnostic Procedure 3

ACTUATOR SOLENOID VALVE (Malfunction code No. 45, 41 or 55)



A
ACTUATOR SOLENOID VALVE CHECK.

- Disconnect control unit connector.
- Check resistance between control unit connector terminals.

| Code No. | Terminals |
|----------|-----------|
| 45 | ③② - ② |
| 41 | ③② - ③⑤ |
| 55 | ③② - ①⑧ |

Resistance: 0.8 - 1.5Ω

OK → Replace control unit.

B
NG

- Disconnect actuator 6-pin connector.
- Check resistance between control unit connector terminals and actuator 6-pin connector (actuator side) terminal.

| Code No. | Control unit | Actuator |
|----------|--------------|----------|
| 45 | ② | ⑥ |
| 41 | ③⑤ | ⑥ |
| 55 | ①⑧ | ⑥ |

Resistance: 0.8 - 1.5Ω

OK → Repair harness and connector between control unit connector terminal ③② and actuator 6-pin connector terminal ①②.

C
NG

- Disconnect actuator 4-pin connector.
- Check continuity between control unit connector terminals and actuator 4-pin connector (body side) terminals.

| Code No. | Control unit | Actuator |
|----------|--------------|----------|
| 45 | ② | ① |
| 41 | ③⑤ | ② |
| 55 | ①⑧ | ③ |

Continuity should exist.

NG → Repair harness and connector.

D
OK

- Disconnect actuator connectors.
- Check resistance between actuator connector (actuator side) terminals.

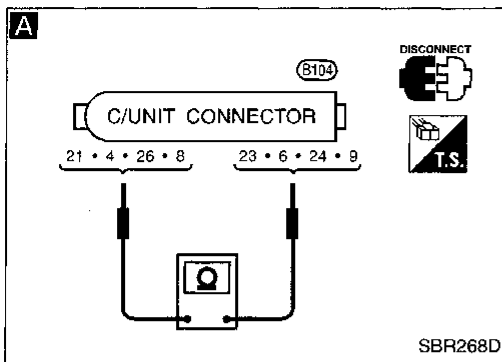
| Code No. | Terminals |
|----------|-----------|
| 45 | ⑥ - ① |
| 41 | ⑥ - ② |
| 55 | ⑥ - ③ |

Resistance: 0.8 - 1.5Ω

OK → Repair harness between actuator relay connector and control unit connector.

NG

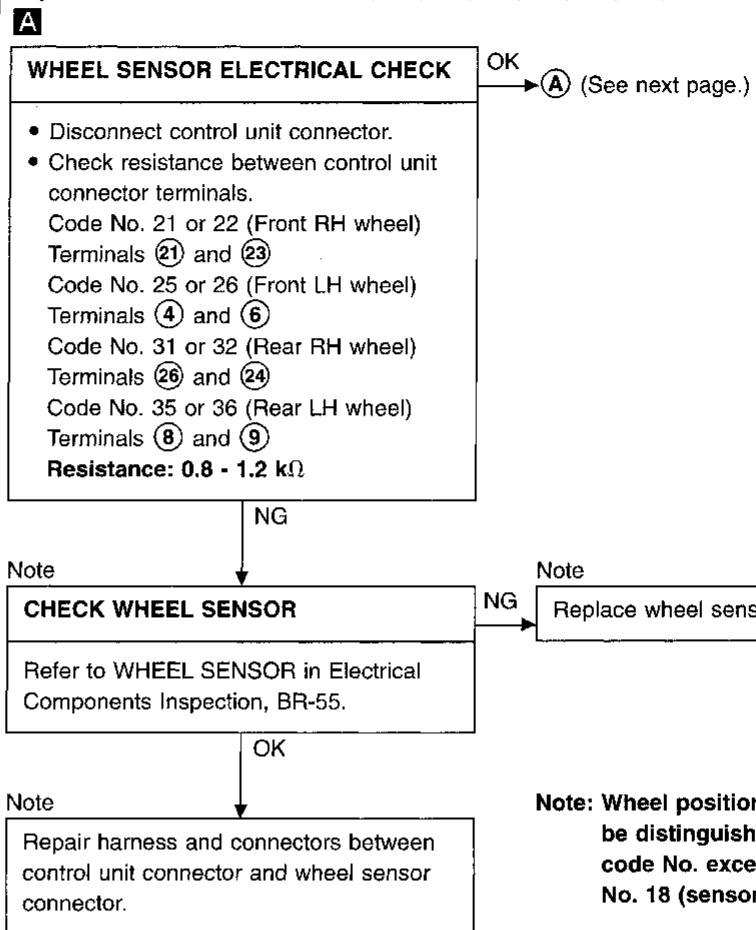
Replace actuator.



Diagnostic Procedure 4

WHEEL SENSOR OR ROTOR

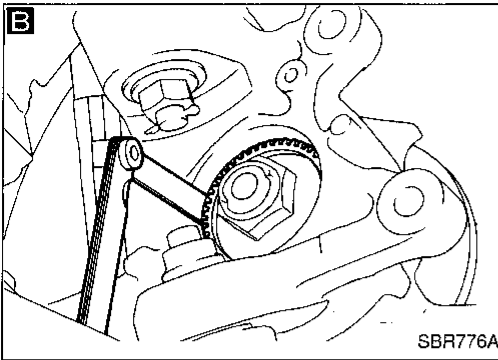
(Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18)



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TROUBLE DIAGNOSES

Diagnostic Procedure 4 (Cont'd)



Note

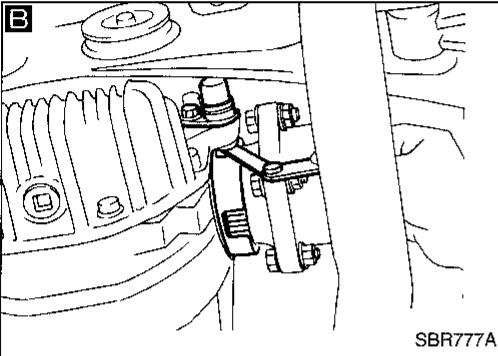
WHEEL SENSOR MECHANICAL CHECK

Check for inflation pressure, wear and size of each tire.

Note

Adjust tire pressure or replace tire(s).

OK



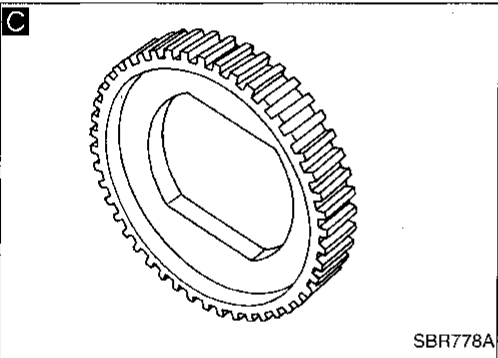
Note

Check wheel bearing axial end play. Refer to "Front/Rear Wheel Bearing" in FA/RA section.

Note

Follow the direction in FA/RA section.

OK



B Note

Check clearance between sensor and rotor.

Clearance:

Front:

0.22 - 0.71 mm
(0.0087 - 0.0280 in)

Rear:

0.06 - 0.93 mm
(0.0024 - 0.0366 in)

Note

Clean sensor fixing portion, or replace sensor.

OK

C Note

Check sensor rotor for teeth damage.
Number of teeth: 46

Note

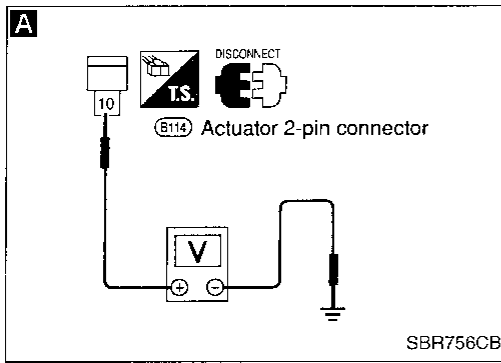
Replace sensor rotor (with drive shaft, wheel hub).

OK

Check control unit pin terminals for damage or the connection of control unit harness connector.
Reconnect control unit harness connector.
Then retest.

Note: Wheel position should be distinguished by code No. except code No. 18 (sensor rotor).

Diagnostic Procedure 5 MOTOR RELAY OR MOTOR (Malfunction code No. 61)

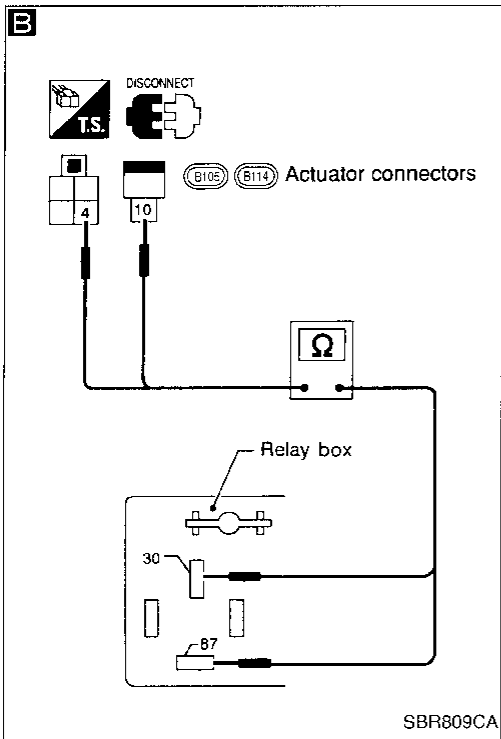


MOTOR POWER SUPPLY CIRCUIT

NG → **B** (Skip page.)

- Check fusible link for actuator. For fusible link layout, refer to wiring diagram, BR-30.

OK



A

- Disconnect actuator 2-pin connector.
- Check voltage between connector (body side) terminal **10** and ground.
Battery voltage should exist.

NG → Repair harness and connectors.

OK

B

MOTOR RELAY CIRCUIT

NG → Replace actuator assembly.

- Remove motor relay.
- Disconnect actuator connectors.
- Check continuity between actuator connector (actuator side) terminals and relay connector terminals.

| Actuator connector | Relay connector |
|--------------------|-----------------|
| 10 | 87 |
| 4 | 30 |

Continuity should exist.

OK

C

MOTOR CHECK

NG → Replace actuator assembly.

- Connect actuator connectors.
- Connect suitable wire between relay connector terminals **87** and **30**.
Motor should operate.
Do not connect wire for more than 5 seconds.

OK

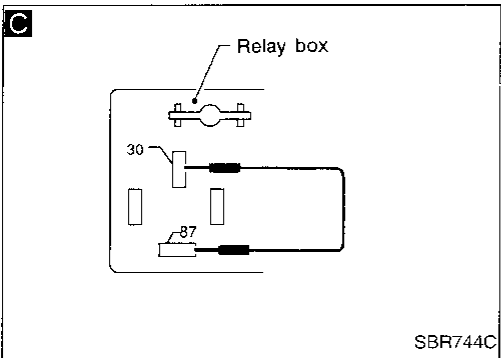
MOTOR RELAY CHECK

NG → Replace motor relay.

Refer to MOTOR RELAY in Electrical Components Inspection, BR-55.

OK

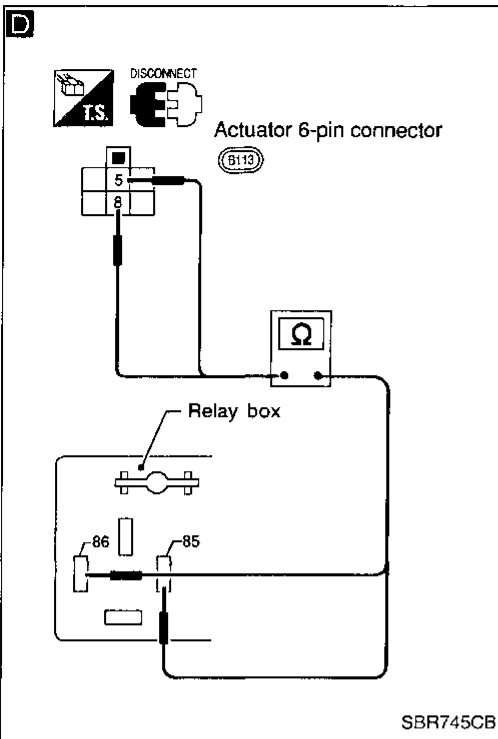
A



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TROUBLE DIAGNOSES

Diagnostic Procedure 5 (Cont'd)



D

MOTOR RELAY CIRCUIT

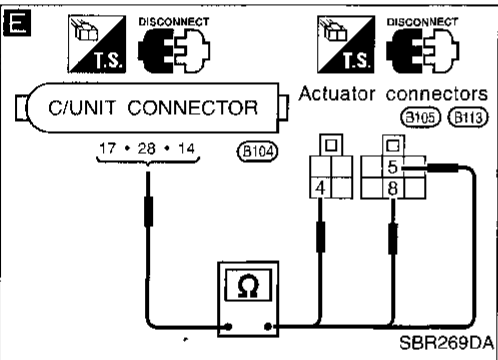
NG → Replace actuator assembly.

- Disconnect actuator 6-pin connector.
- Check continuity between actuator connector (actuator side) terminals and relay connector terminals.

| Actuator connector | Relay connector |
|--------------------|-----------------|
| 5 | 86 |
| 8 | 85 |

Continuity should exist.

OK



E

CIRCUIT CHECK

NG → Repair harness and connectors.

- Disconnect control unit connector.
- Check continuity between control unit connector terminals and actuator connector (body side) terminals.

| Control unit | Actuator relay |
|--------------|----------------|
| 17 | 5 |
| 28 | 8 |
| 14 | 4 |

Continuity should exist.

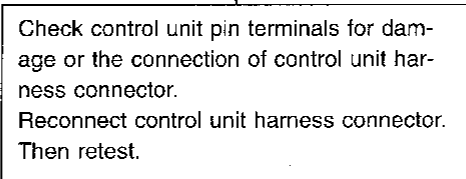
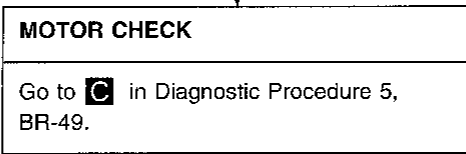
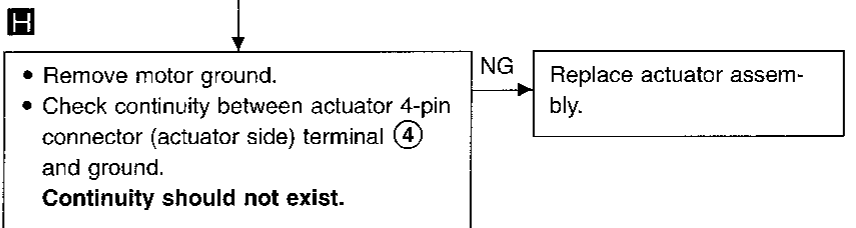
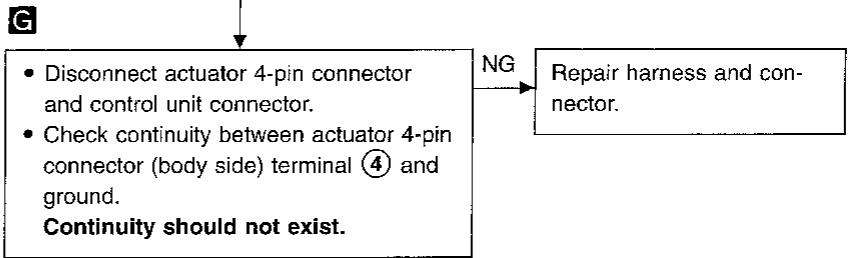
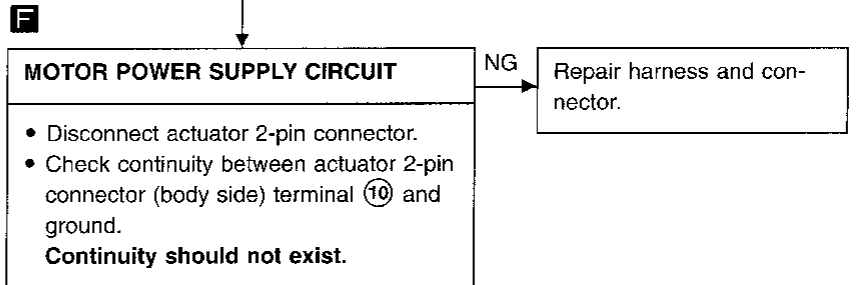
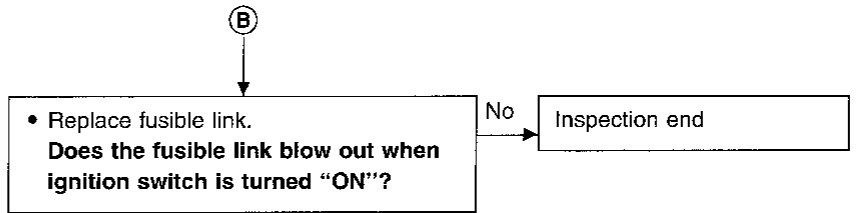
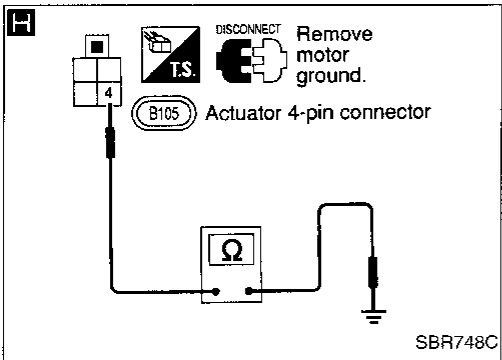
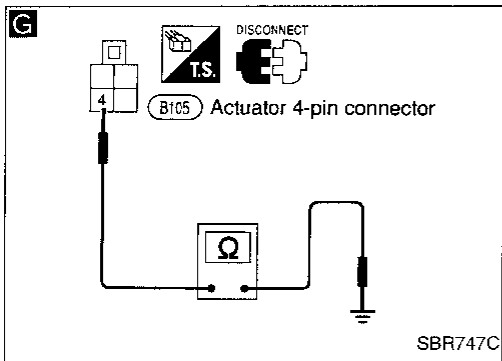
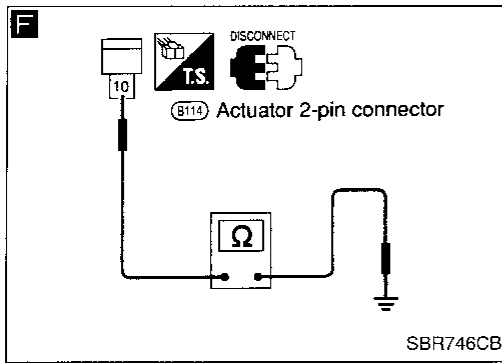
OK

Check control unit pin terminals for damage or the connection of control unit harness connector.
Reconnect control unit harness connector. Then retest.

NG → Repair harness and connectors.

TROUBLE DIAGNOSES

Diagnostic Procedure 5 (Cont'd)



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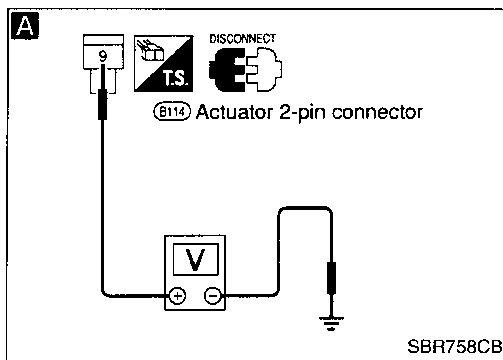
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Diagnostic Procedure 6

SOLENOID VALVE RELAY

(Malfunction code No. 63)

SOLENOID VALVE POWER SUPPLY CHECK

Check fusible link **C**. For fusible link layout, refer to BR-29.

NG → **A** (See next page.)

OK

1. Disconnect connectors from control unit and ABS actuator. Check terminals for damage or loose connections. Then reconnect connectors.
 2. Carry out self-diagnosis again.
- Does warning lamp activate again?**

No → Inspection end

Yes

GROUND CIRCUIT CHECK

Refer to CONTROL UNIT GROUND and ACTUATOR GROUND in Ground Circuit Check, BR-40.

NG → Repair harness and connectors.

OK

A

SOLENOID VALVE POWER SUPPLY CHECK

1. Disconnect connector from ABS relay box.
 2. Check voltage between ABS relay box 2-pin connector (body side) terminal **9** and ground.
- Battery voltage should exist.**

NG → Repair harness and connector.

OK

B

CIRCUIT CHECK

1. Disconnect control unit connector.
2. Check continuity between control unit connector terminals and ABS relay box 6-pin connector (body side) terminals.

| Control unit | ABS relay box |
|--------------|---------------|
| (17) | (5) |
| (27) | (7) |
| (29) | (11) |

Continuity should exist.

NG → Repair harness and connectors.

OK

SOLENOID VALVE RELAY CHECK

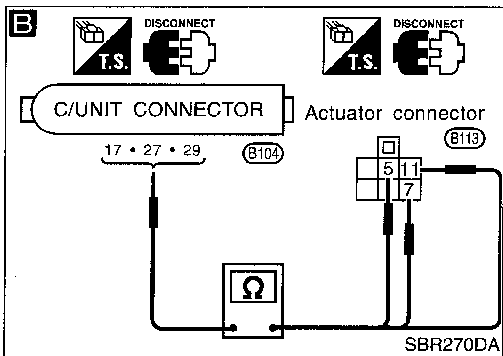
Refer to SOLENOID VALVE RELAY in Electrical Components Inspection, BR-55.

NG → Replace solenoid valve relay.

OK

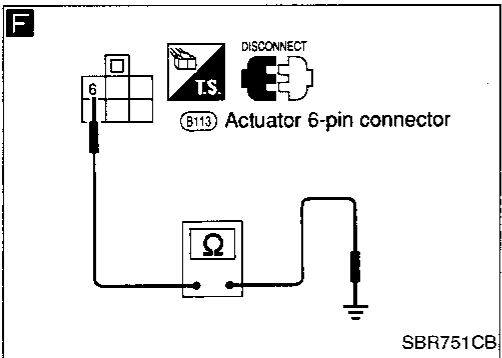
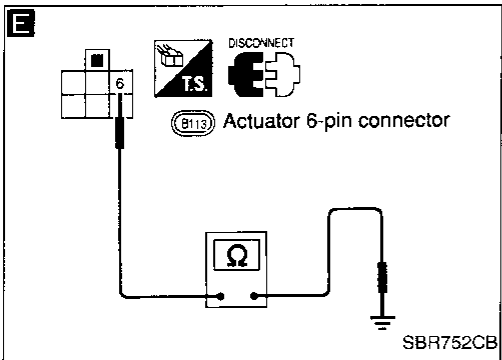
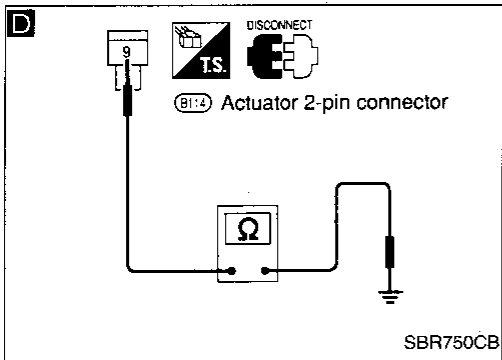
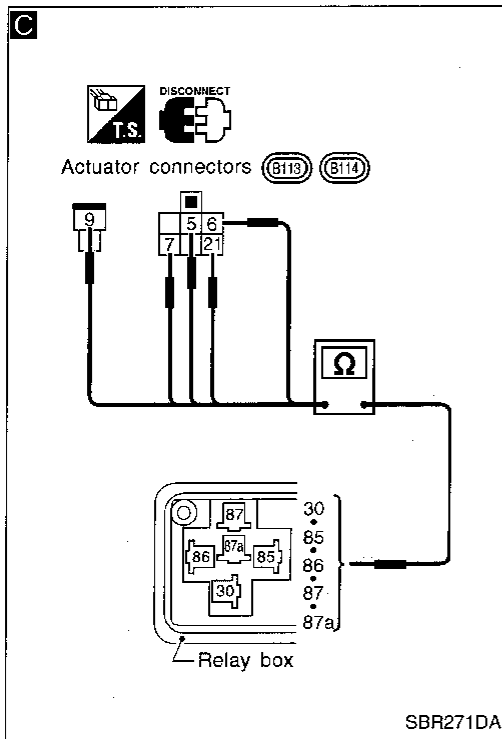
B

(Go to next page.)



TROUBLE DIAGNOSES

Diagnostic Procedure 6 (Cont'd)



B

C

SOLENOID VALVE RELAY CIRCUIT CHECK

Check continuity between ABS relay terminals and ABS actuator connector and ABS relay box connector (ABS relay box side) terminals.

| ABS actuator terminal | ABS actuator connector |
|-----------------------|------------------------|
| 87 | 9 |
| 87a | 21 |
| 86 | 5 |
| 85 | 7 |
| 30 | 6 |

Continuity should exist.

OK

Go to Diagnostic Procedure 3, BR-46.

NG

- Replace ABS relay box.

A

Replace fusible link.
Does the fusible link blow out when ignition switch is turned "ON"?

No

Inspection end

Yes

D

RELAY UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS relay box 2-pin connector.
2. Check continuity between ABS relay box 2-pin connector (body side) terminal 9 and ground.
Continuity should not exist.

NG

Repair harness and connector.

OK

E

1. Disconnect ABS relay box connectors and control unit connector.
2. Check continuity between ABS actuator 2-pin connector (ABS relay box side) terminal 6 and ground.
Continuity should not exist.

NG

Replace ABS relay box.

OK

F

Check continuity between ABS actuator 2-pin connector (ABS actuator side) terminal 6 and ground.
Continuity should not exist.

NG

Replace ABS actuator.

OK

Go to Diagnostic Procedure 3, BR-46.

CI
MA
EM
LC
EC
FE
CL
MT
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
DX

Diagnostic Procedure 7

POWER SUPPLY (Low voltage)

(Malfunction code No. 57)

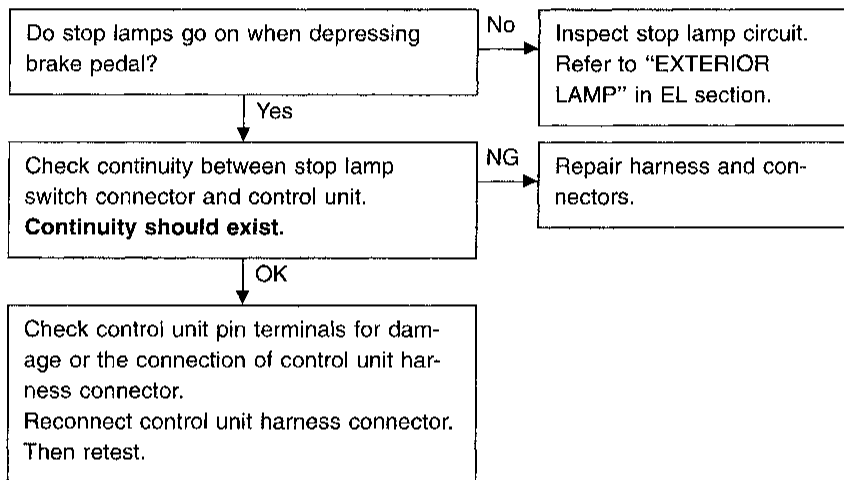
BATTERY CHECK

Check battery.
Refer to "BATTERY" in EL section.

Diagnostic Procedure 8

STOP LAMP SWITCH CIRCUIT

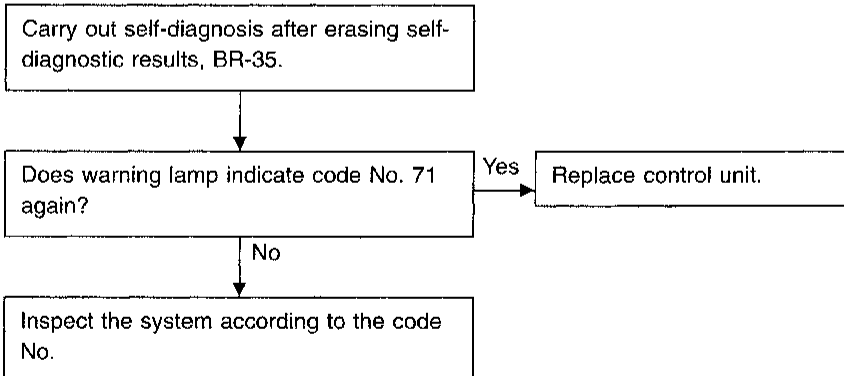
(Malfunction code No. 16)



Diagnostic Procedure 9

CONTROL UNIT

(Malfunction code No. 71)



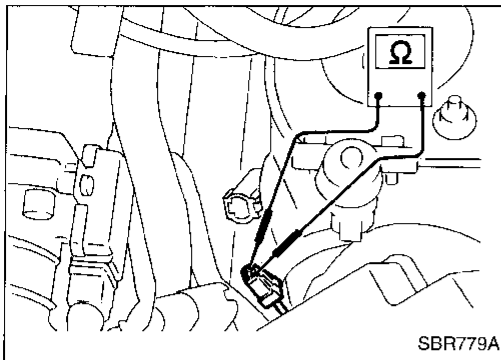
TROUBLE DIAGNOSES

Electrical Components Inspection

WHEEL SENSOR

Check resistance for each sensor.

Resistance: 0.8 - 1.2 kΩ



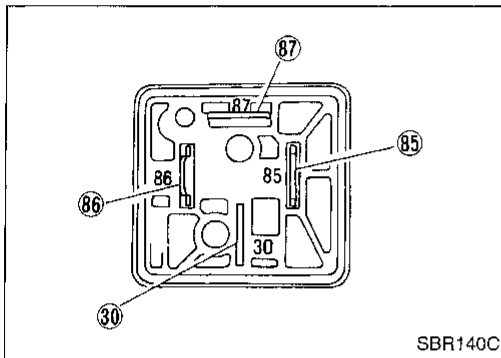
SBR779A

GI

MA

EM

ACTUATOR MOTOR RELAY



SBR140C

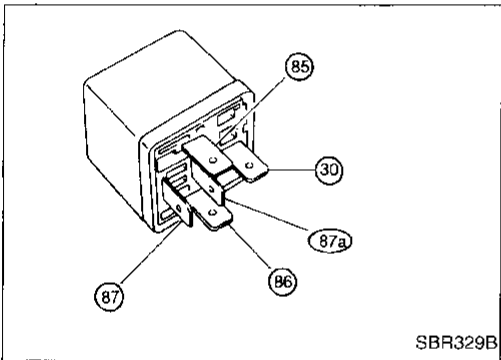
LC

EC

FE

CL

SOLENOID VALVE RELAY



SBR329B

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

IDX

| Condition | Continuity existence between terminals (30) and (87) |
|--|--|
| Battery voltage not applied between terminals (85) and (86). | No |
| Battery voltage applied between terminals (85) and (86). | Yes |

| Condition | Continuity existence between terminals (30) and (87a) | Continuity existence between terminals (30) and (87) |
|--|---|--|
| Battery voltage not applied between terminals (85) and (86). | Yes | No |
| Battery voltage applied between terminals (85) and (86). | No | Yes |

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

| | |
|--|---|
| Front brake | |
| Brake model | OPF25VA |
| Cylinder bore diameter mm (in) | 40.45 (1.5925) x 2 |
| Pad length x width x thickness mm (in) | 116 x 50 x 10 (4.57 x 1.97 x 0.39) |
| Rotor outer diameter x thickness mm (in) | 280 x 30 (11.02 x 1.18) |
| Rear brake | |
| Brake model | OPZ11V |
| Cylinder bore diameter mm (in) | 38.1 (1.500) |
| Pad length x width x thickness mm (in) | 71.8 x 36.5 x 11.5 (2.827 x 1.437 x 0.453) |
| Rotor outer diameter x thickness mm (in) | 297 x 18 (11.69 x 0.71) |
| Master cylinder | |
| Cylinder bore diameter mm (in) | 25.40 (1) |

| | |
|---|---|
| Control valve | |
| Valve model | Proportioning valve (within master cylinder) |
| Split point x reducing ratio kPa (kg/cm ² , psi) | 2,452 (25, 356) x 0.4 |
| Brake booster | |
| Booster model | M215T |
| Diaphragm diameter mm (in) | Primary: 230 (9.06) Secondary: 205 (8.07) |
| Brake fluid | |
| Recommended brake fluid | DOT 3 |
| Parking drum brake | |
| Brake model | DS17HD |
| Lining Length x width x thickness mm (in) | 154.1 x 25.0 x 3.0 (6.07 x 0.984 x 0.118) |
| Drum inner diameter mm (in) | 172.0 (6.77) |

Inspection and Adjustment

DISC BRAKE

Unit: mm (in)

| | Front | Rear |
|--------------------|--------------|--------------|
| Pad wear limit | | |
| Minimum thickness | 2.0 (0.079) | |
| Rotor repair limit | | |
| Minimum thickness | 28.0 (1.102) | 16.0 (0.630) |

PARKING DRUM BRAKE

Unit: mm (in)

| | |
|--------------------------|--------------|
| Lining replacement limit | |
| Minimum thickness | 1.5 (0.059) |
| Drum repair limit | |
| Maximum inner diameter | 173.0 (6.81) |

BRAKE PEDAL

Unit: mm (in)

| Applied model | M/T | A/T |
|---|----------------------------|----------------------------|
| Free height | 186 - 196 (7.32 - 7.72) | 195 - 205 (7.68 - 8.07) |
| Depressed height [under force of 490 N (50 kg, 110 lb) with engine running] | 100 (3.94) | 105 (4.13) |
| Clearance between pedal stop- per and threaded end of switches | 0.3 - 1.0 (0.012 - 0.039) | |
| Pedal free play clevis | 1 - 3 (0.04 - 0.12) | |

PARKING BRAKE

| | |
|---|-------|
| Number of notches [under force of 196 N (20 kg, 44 lb)] | 6 - 7 |
| Number of notches (when warning switch comes on) | 1 |