

## SECTION **BR**

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## PRECAUTIONS

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

### Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

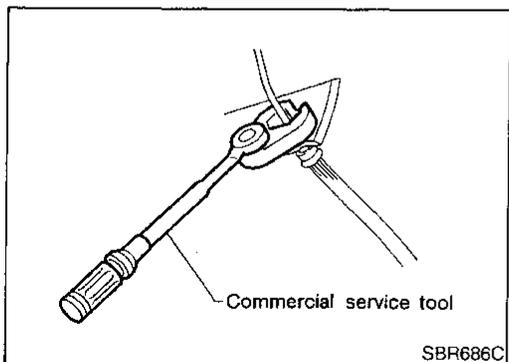
NCBR0001

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help 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), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (which is one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (which is one of components of supplemental air bags for a frontal collision). 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 INFINITI 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 (except "SEAT BELT PRE-TENSIONER" connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).



#### Precautions for Brake System

NCBR0002

- Recommended fluid is brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.
- Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of the hydraulic system.
- Use flare nut wrench when removing and installing brake tube.
- Always torque brake lines when installing.
- Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to "Brake Burnishing Procedure", "ON-VEHICLE SERVICE", BR-6

#### WARNING:

- Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.

# PRECAUTIONS

## Wiring Diagrams and Trouble Diagnosis

NCBR0003

When you read wiring diagrams, refer to the followings:

- "HOW TO READ WIRING DIAGRAMS" in GI section
- "POWER SUPPLY ROUTING" for power distribution circuit in EL section

When you perform trouble diagnosis, refer to the followings:

- "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS" in GI section
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section

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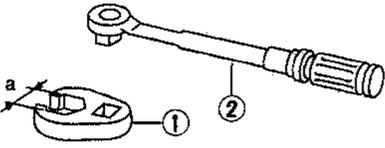
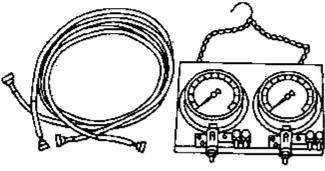
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# PREPARATION

Commercial Service Tools

## Commercial Service Tools

NCBR0004

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench	 <p>Removing and installing each brake piping a: 10 mm (0.39 in)</p> <p>NT360</p>
Brake fluid pressure gauge	 <p>Measuring brake fluid pressure</p> <p>NT151</p>

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

## NVH Troubleshooting Chart

NCBR0005S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

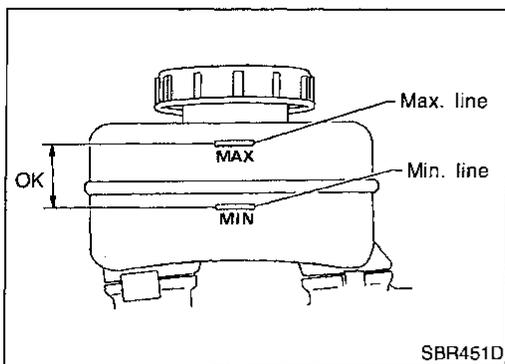
Symptom		BRAKE	Possible cause and SUSPECTED PARTS													Reference page							
			Pads - damaged	Pads - uneven wear	Shims damaged	Rotor imbalance	Rotor damage	Rotor runout	Rotor deformation	Rotor deflection	Rotor rust	Rotor thickness variation	DRIVE SHAFT	AXLE	SUSPENSION		TIRES	ROAD WHEEL	STEERING				
Noise	Shake	Shimmy, Judder	X	X	X											X	X	X	X	X	X	BR-19, 23	
						X											X	X	X	X	X	X	BR-19, 23
						X	X	X	X	X	X	X					X	X	X	X	X	X	X

X: Applicable

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# ON-VEHICLE SERVICE

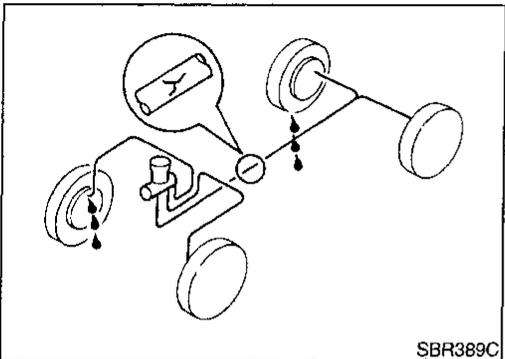
## Checking Brake Fluid Level



## Checking Brake Fluid Level

NCBR0006

- 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.
- Release parking brake lever and see if brake warning lamp goes off. If not, check brake system for leaks.



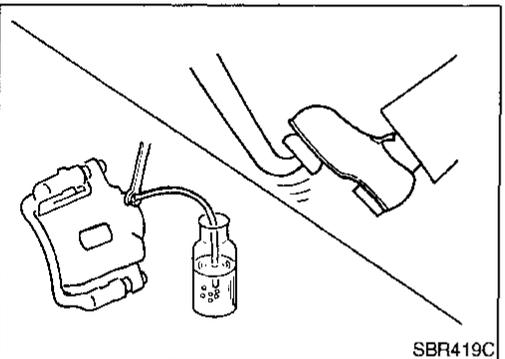
## Checking Brake Line

NCBR0007

### 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

NCBR0008

### 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 brake fluid comes out of each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to "Bleeding Brake System", BR-7.

## Brake Burnishing Procedure

NCBR0036

Burnish the brake contact surfaces according to the following procedure after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.

### CAUTION:

Only perform this procedure under safe road and traffic conditions. Use extreme caution.

1. Drive the vehicle on a straight smooth road at 50 km/h (31 MPH).
2. Use medium brake pedal/foot effort to bring the vehicle to a complete stop from 50 km/h (31 MPH). Adjust brake pedal/foot

pressure such that vehicle stopping time equals 3 to 5 seconds.

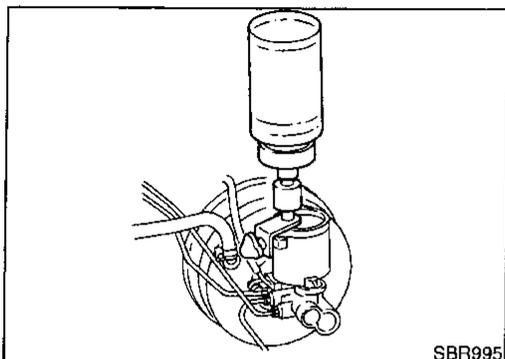
3. To cool the brake system, drive the vehicle at 50 km/h (31 MPH) for 1 minute without stopping.
4. Repeat steps 1 to 3, 10 times or more to complete the burnishing procedure.

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## Bleeding Brake System

NCBR0009

### CAUTION:

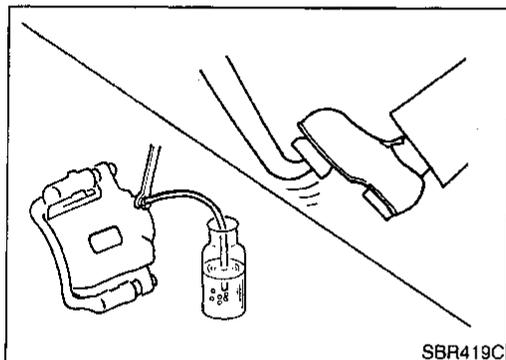
- Carefully monitor brake fluid level at master cylinder during bleeding operation.
- Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.
- Place a container under master cylinder to avoid spillage of brake fluid.
- For models with ABS, turn ignition switch OFF and disconnect ABS actuator connectors or battery ground cable.

EC

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- Bleed air in the following order:  
Right rear brake → Left front brake → Left rear brake → Right front brake

AT

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.

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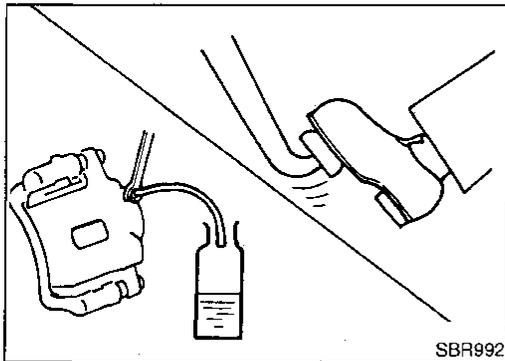
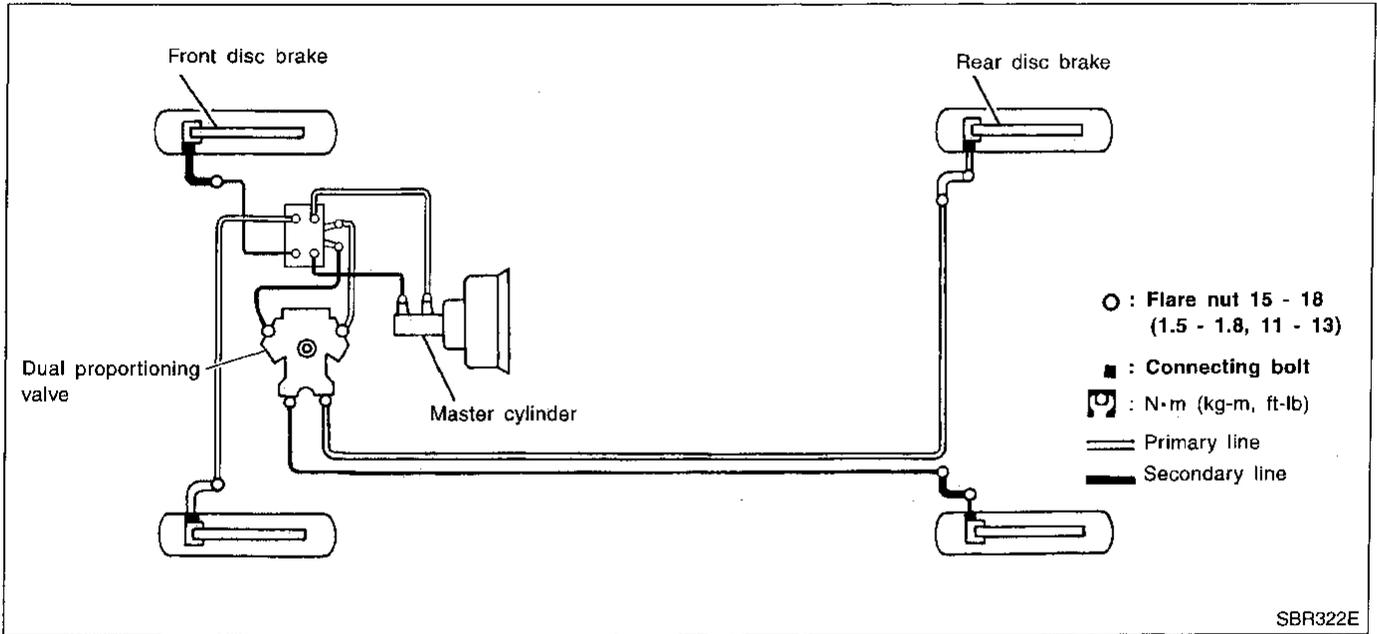
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# BRAKE HYDRAULIC LINE

Hydraulic Circuit

## Hydraulic Circuit

NCBR0010



## Removal

NCBR0011

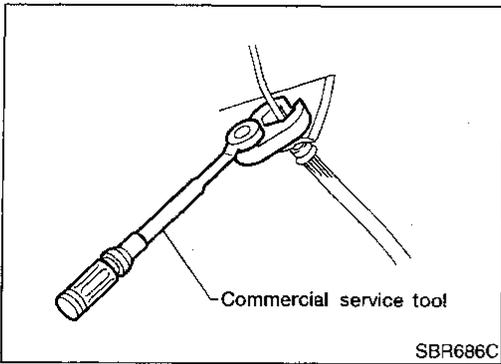
### CAUTION:

- 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 vinyl tube to air bleeder valve.
  2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
  3. Remove flare nut connecting brake tube and hose, then withdraw lock spring.
  4. Cover openings to prevent entrance of dirt whenever disconnecting brake line.

## Inspection

NCBR0012

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



## Installation

NCBR0013

### CAUTION:

- Refill with new brake fluid "DOT 3".
  - Never reuse drained brake fluid.
1. Tighten all flare nuts and connecting bolts.

### Specification:

#### Flare nut

15 - 18 N-m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

#### Connecting bolt

17 - 20 N-m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)

2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Brake System", BR-7.

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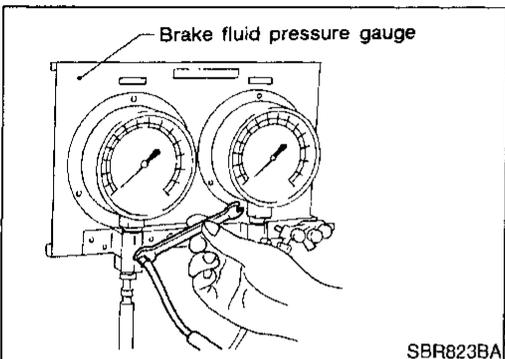
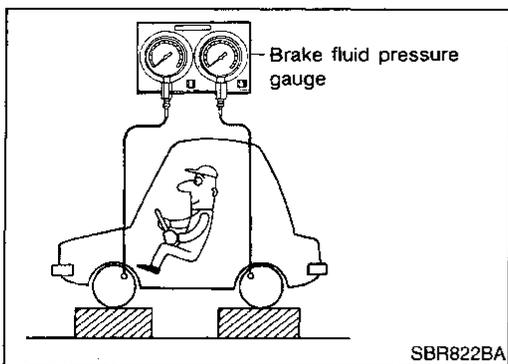
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# DUAL PROPORTIONING VALVE

## Inspection



## Inspection

NCBR0014

### 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.
1. Connect Tool to air bleeders of front and rear brakes on either LH and RH side.
  2. Bleed air from the Tool.
  3. Check fluid pressure by depressing brake pedal.

Unit: kPa (kg/cm<sup>2</sup>, psi)

Applied pressure (Front brake)	7,355 (75, 1,067)
Output pressure (Rear brake)	5,100 - 5,492 (52 - 56, 739 - 796)

If output pressure is out of specification, replace dual proportioning valve.

4. Bleed air after disconnecting the Tool. Refer to "Bleeding Brake System", BR-7.

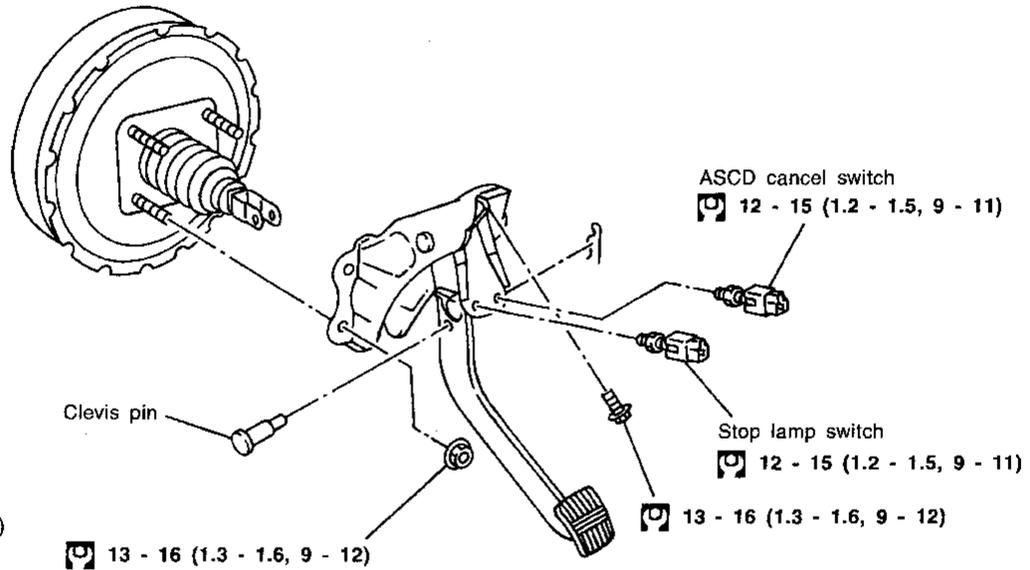
# BRAKE PEDAL AND BRACKET

Removal and Installation

## Removal and Installation

NCBR0015

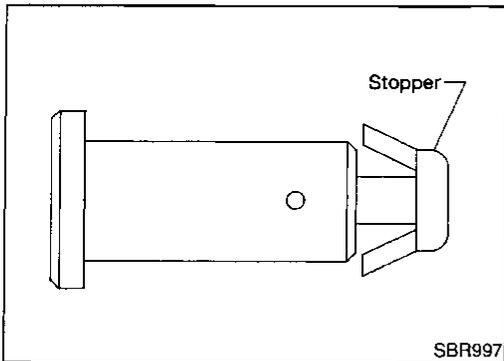
SEC. 465-470



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### 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

NCBR0017

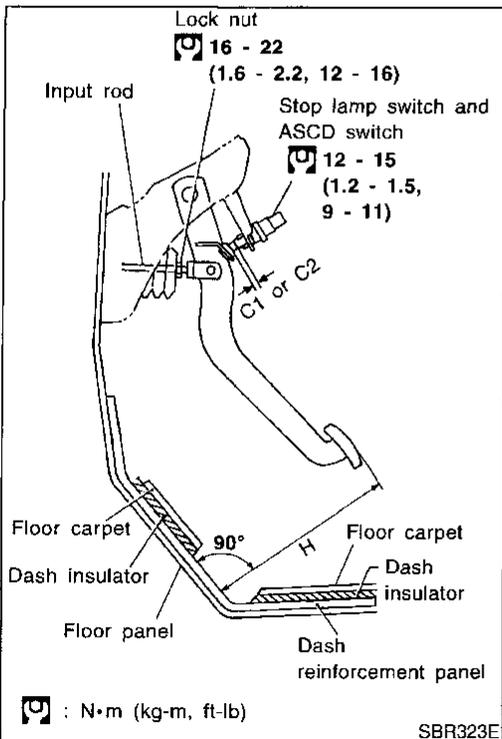
Check brake pedal free height from dash reinforcement panel. Adjust if necessary.

**H: Free height**

Refer to SDS, BR-79.

**C<sub>1</sub>, C<sub>2</sub>: Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch**

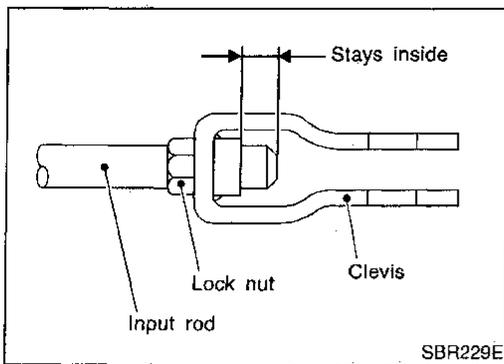
0.3 - 1.0 mm (0.012 - 0.039 in)



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## 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.
2. Check pedal free play.  
**Make sure that stop lamps go off when pedal is released.**
3. Check brake pedal's depressed height while engine is running. If lower than specification, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.); then make necessary repairs.

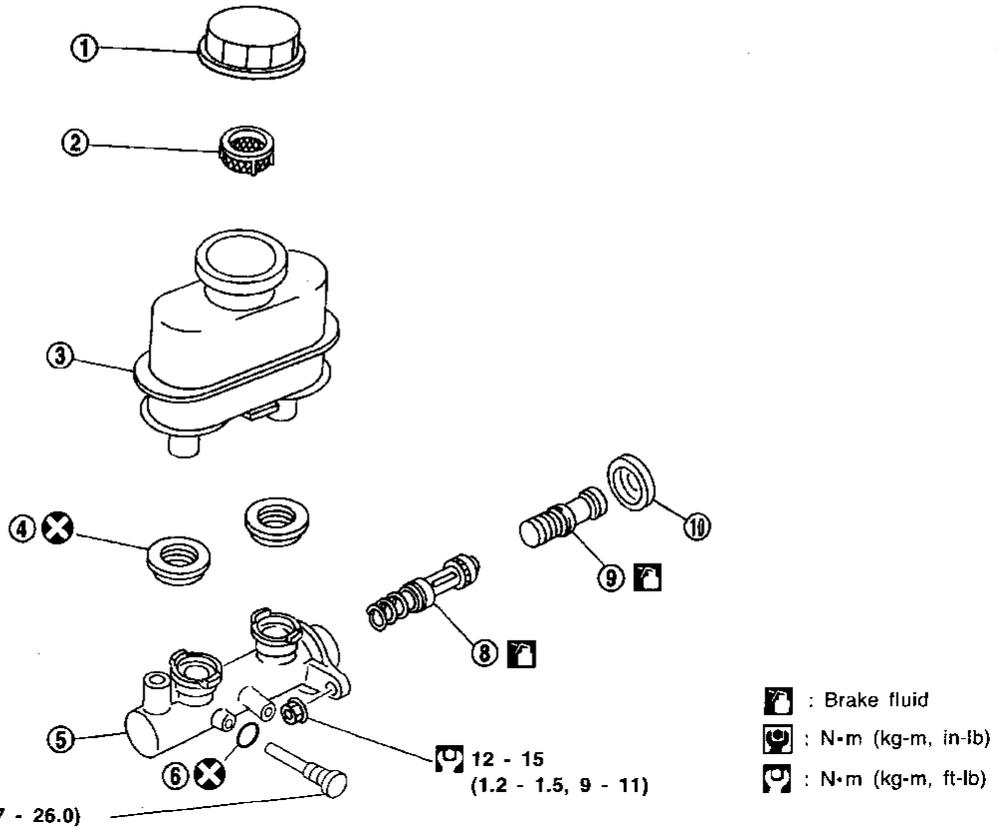
# MASTER CYLINDER

Removal

## Removal

NCBR0018

SEC. 460



SBR324E

- |                   |                   |                              |
|-------------------|-------------------|------------------------------|
| 1. Reservoir cap  | 5. Cylinder body  | 8. Secondary piston assembly |
| 2. Oil filter     | 6. O-ring         | 9. Primary piston assembly   |
| 3. Reservoir tank | 7. Piston stopper | 10. Stopper cap              |
| 4. Seal           |                   |                              |

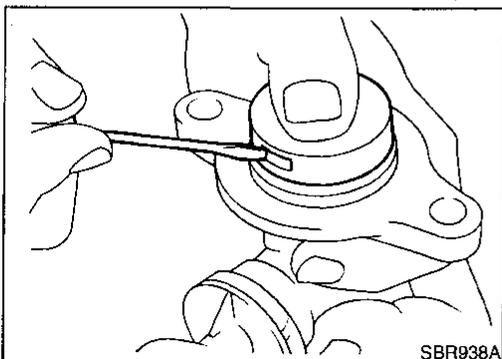
### CAUTION:

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.

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. Bend claws of stopper cap outward.



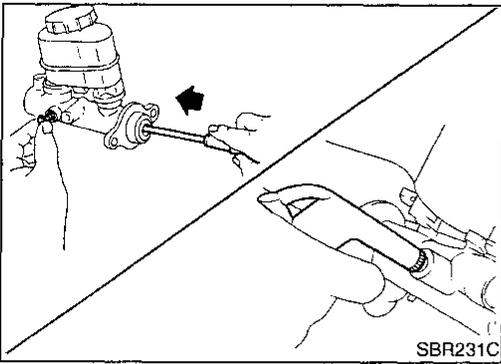
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IDX

# MASTER CYLINDER

Disassembly (Cont'd)



2. Remove valve stopper while piston is pushed into cylinder.
3. Remove piston assemblies.  
**If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.**
4. Draw out reservoir tank.

## Inspection

Check for the following items.

NCBR0020

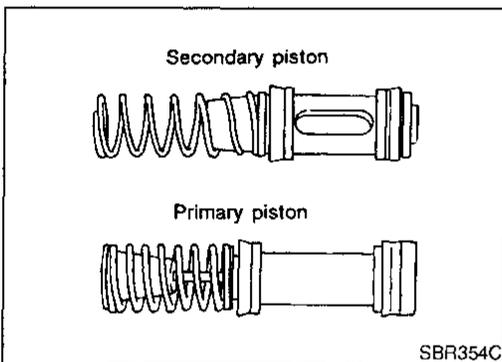
**Replace any part if damaged.**

**Master cylinder:**

- Pin holes or scratches on inner wall.

**Piston:**

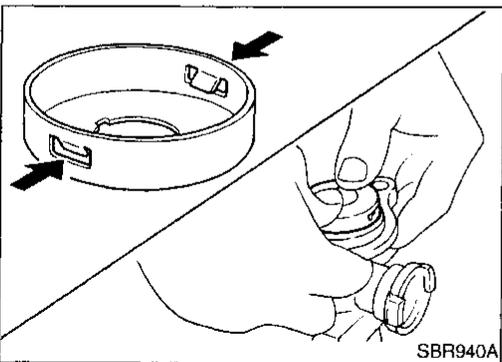
- Deformation of or scratches on piston cups.



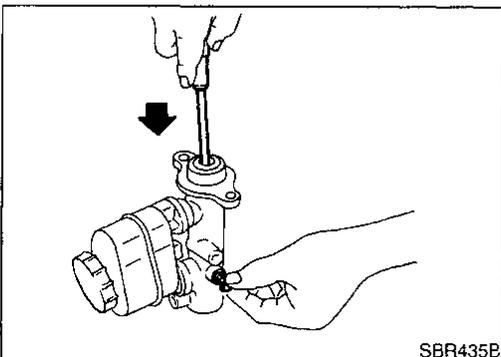
## Assembly

NCBR0021

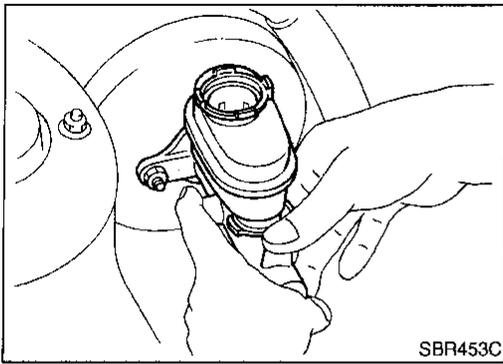
1. Insert secondary piston assembly. Then insert primary piston assembly.
  - Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.



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

NCBR0022

### 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.  
 ☐ : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
  8. Bleed air from brake system. Refer to "Bleeding Brake System", BR-7.

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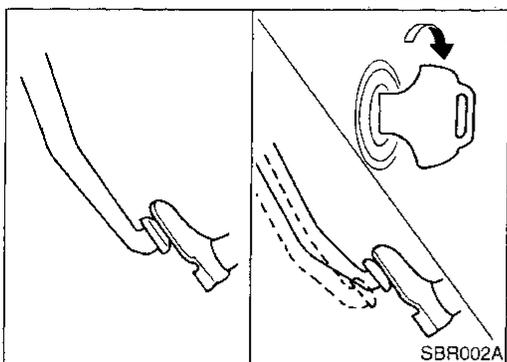
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# BRAKE BOOSTER

On-vehicle Service



## On-vehicle Service

NCBR0023

### OPERATING CHECK

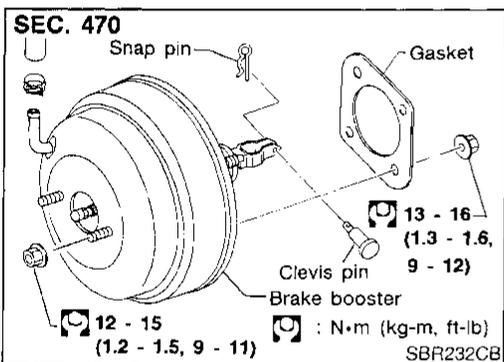
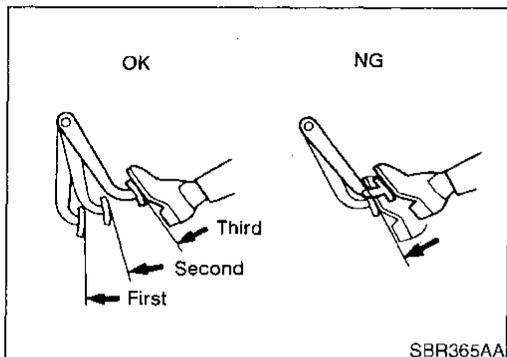
NCBR0023S01

1. Stop engine and depress brake pedal several times. Check that pedal stroke does not change.
2. Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

### AIRTIGHT CHECK

NCBR0023S02

1. Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. The pedal should go further down the first time, and then it should gradually rise thereafter.
2. 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**.

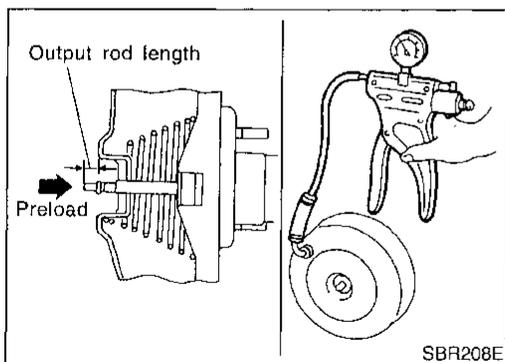


## Removal

NCBR0024

### 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

NCBR0025

### OUTPUT ROD LENGTH CHECK

NCBR0025S01

1. Apply vacuum of  $-66.7$  kPa ( $-500$  mmHg,  $-19.69$  inHg) to brake booster with a handy vacuum pump.
2. Add preload of  $19.6$  N ( $2$  kg,  $4.4$  lb) to output rod.
3. Check output rod length.

#### Specified length:

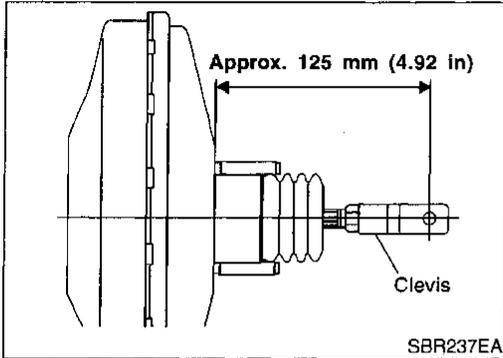
**10.275 - 10.525 mm (0.4045 - 0.4144 in)**

## Installation

NCBR0026

### 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 acute angle of installation, the threads can be damaged with the dash panel.



1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to master cylinder) lightly.
3. Connect brake pedal and booster input rod with clevis pin.
4. Secure mounting nuts.

### Specification:

**13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)**

5. Install master cylinder. Refer to "Installation" in "MASTER CYLINDER", BR-15.
6. Bleed air. Refer to "Bleeding Brake System", BR-7.

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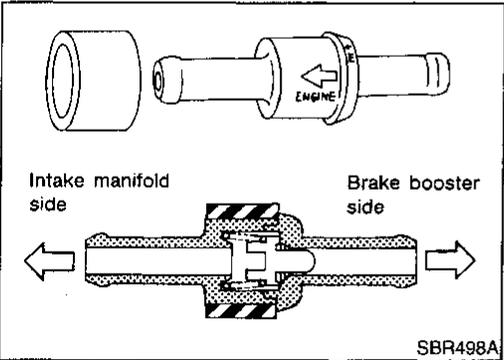
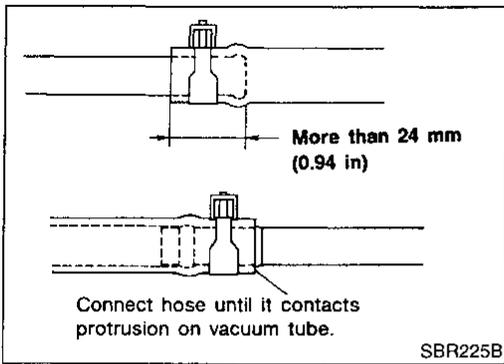
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# VACUUM HOSE

## Removal and Installation



## Removal and Installation

NCBR0027

### 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 hose as shown.
- Install check valve, paying attention to its direction.

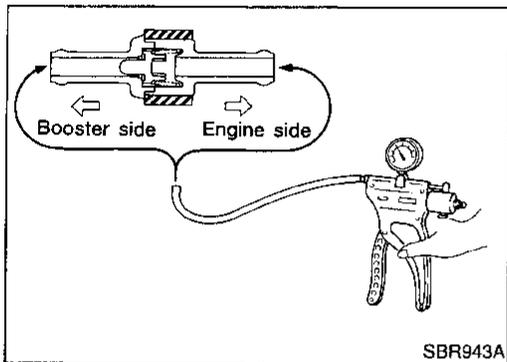
## Inspection

NCBR0026

### HOSES AND CONNECTORS

NCBR0028S01

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

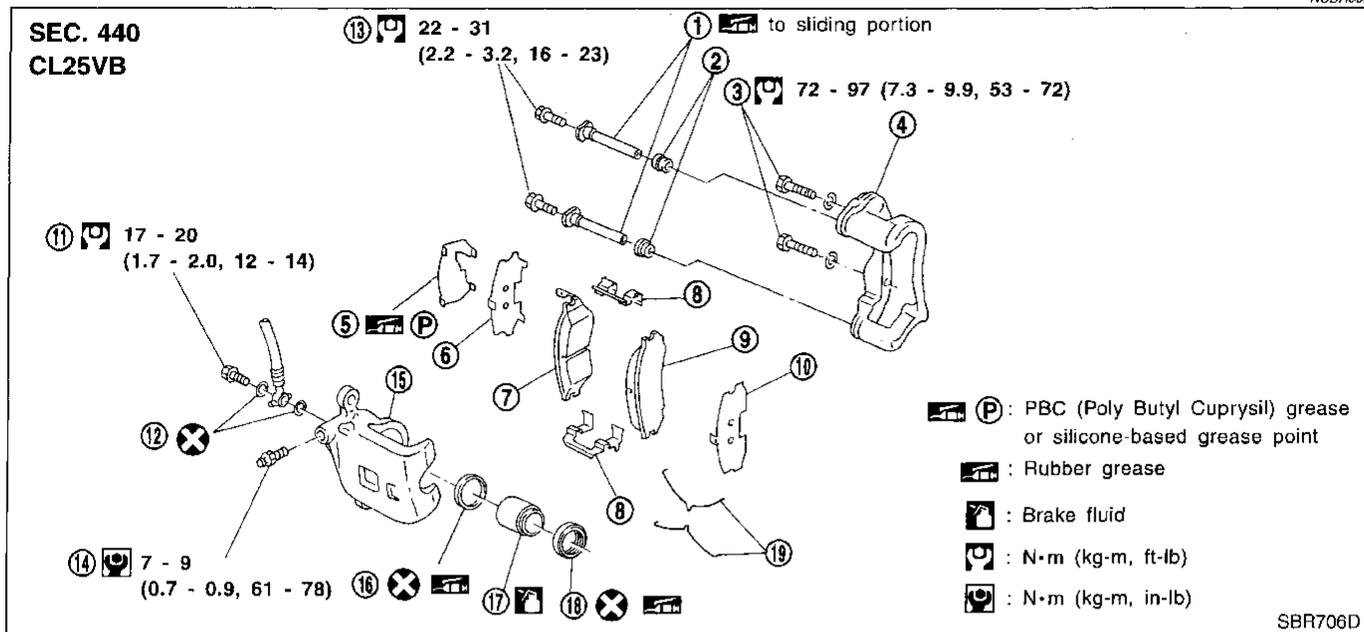


## CHECK VALVE

NCBR0028S02

Check vacuum with a vacuum pump.

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



- |                              |                     |                       |
|------------------------------|---------------------|-----------------------|
| 1. Main pin                  | 8. Pad retainer     | 14. Bleed valve       |
| 2. Pin boot                  | 9. Outer pad        | 15. Cylinder body     |
| 3. Torque member fixing bolt | 10. Outer shim      | 16. Piston seal       |
| 4. Torque member             | 11. Connecting bolt | 17. Piston            |
| 5. Shim cover                | 12. Copper washer   | 18. Piston boot       |
| 6. Inner shim                | 13. Main pin bolt   | 19. Pad return spring |
| 7. Inner pad                 |                     |                       |

## Pad Replacement

### WARNING:

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

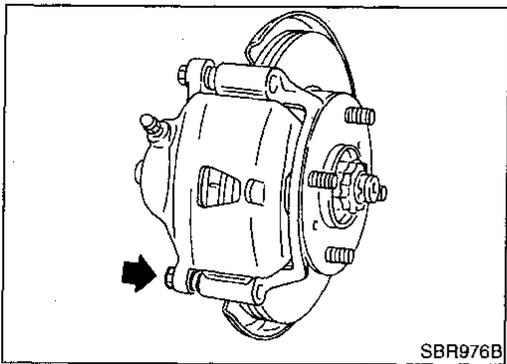
### CAUTION:

- 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.
- Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to "Brake Burnishing Procedure", "ON-VEHICLE SERVICE", BR-6.

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# FRONT DISC BRAKE

## Pad Replacement (Cont'd)



1. Remove master cylinder reservoir cap.
2. Remove pin bolt.
3. Open cylinder body upward. Then remove pad with retainers, inner and outer shims.

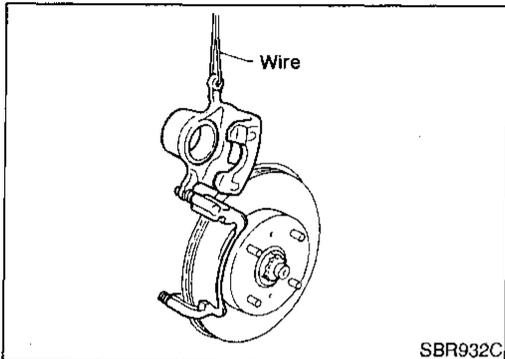
**Standard pad thickness:**

**11 mm (0.43 in)**

**Pad wear limit:**

**2.0 mm (0.079 in)**

**Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**



## Removal

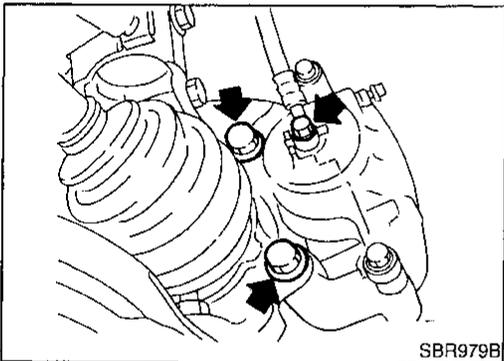
NCBR0031

### WARNING:

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

Remove torque member fixing bolts and connecting bolt.

**It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.**



## Disassembly

NCBR0032

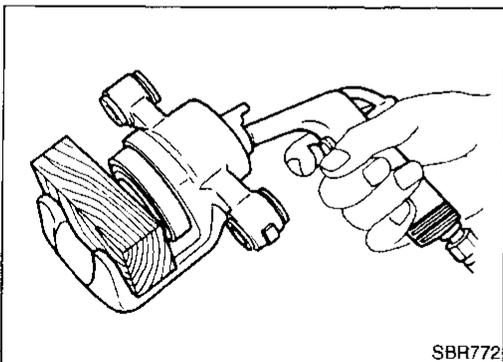
### WARNING:

**Do not place your fingers in front of piston.**

### CAUTION:

**Do not scratch or score cylinder wall.**

1. Push out piston with piston boot with compressed air.
2. Remove piston seal with a suitable tool.



## Inspection

NCBR0033

### CALIPER

NCBR0033S01

#### Cylinder Body

NCBR0033S0101

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

# FRONT DISC BRAKE

Inspection (Cont'd)

## CAUTION:

Use brake fluid to clean. Never use mineral oil.

### Piston

NCBR0033S0102

## CAUTION:

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

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

### Slide Pin, Pin Bolt and Pin Boot

NCBR0033S0103

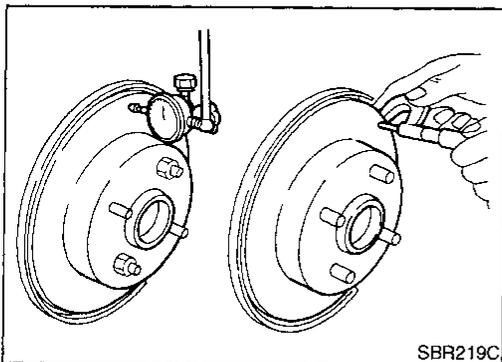
Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

## ROTOR

### Rubbing Surface

NCBR0033S02

Check rotor for roughness, cracks or chips.



## Runout

NCBR0033S0202

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 AX section ("Front Wheel Bearing", "ON-VEHICLE SERVICE").**

**Maximum runout:**

**0.07 mm (0.0028 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

NCBR0033S0203

**Thickness variation (At least 8 positions):**

**Maximum 0.01 mm (0.0004 in)**

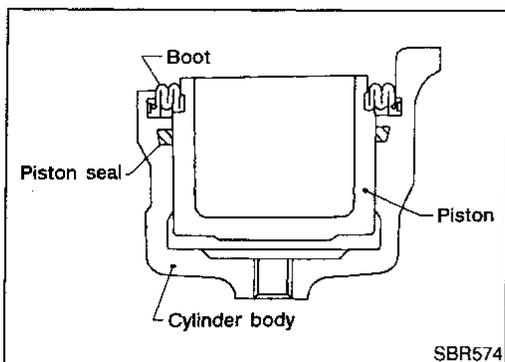
If thickness variation exceeds the specification, turn rotor with on-car brake lathe.

**Rotor repair limit:**

**20.0 mm (0.787 in)**

# FRONT DISC BRAKE

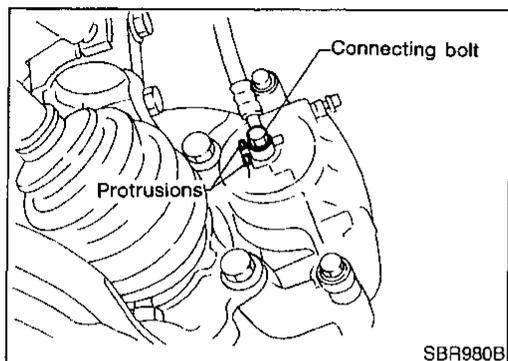
## Assembly



## Assembly

NCBR0034

1. Insert piston seal into groove on cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot.



## Installation

NCBR0035

### CAUTION:

- Refill with new brake fluid "DOT 3".
  - Never reuse drained brake fluid.
1. Install brake hose to caliper securely.
  2. Install all parts and secure all bolts.
  3. Bleed air. Refer to "Bleeding Brake System", BR-7.

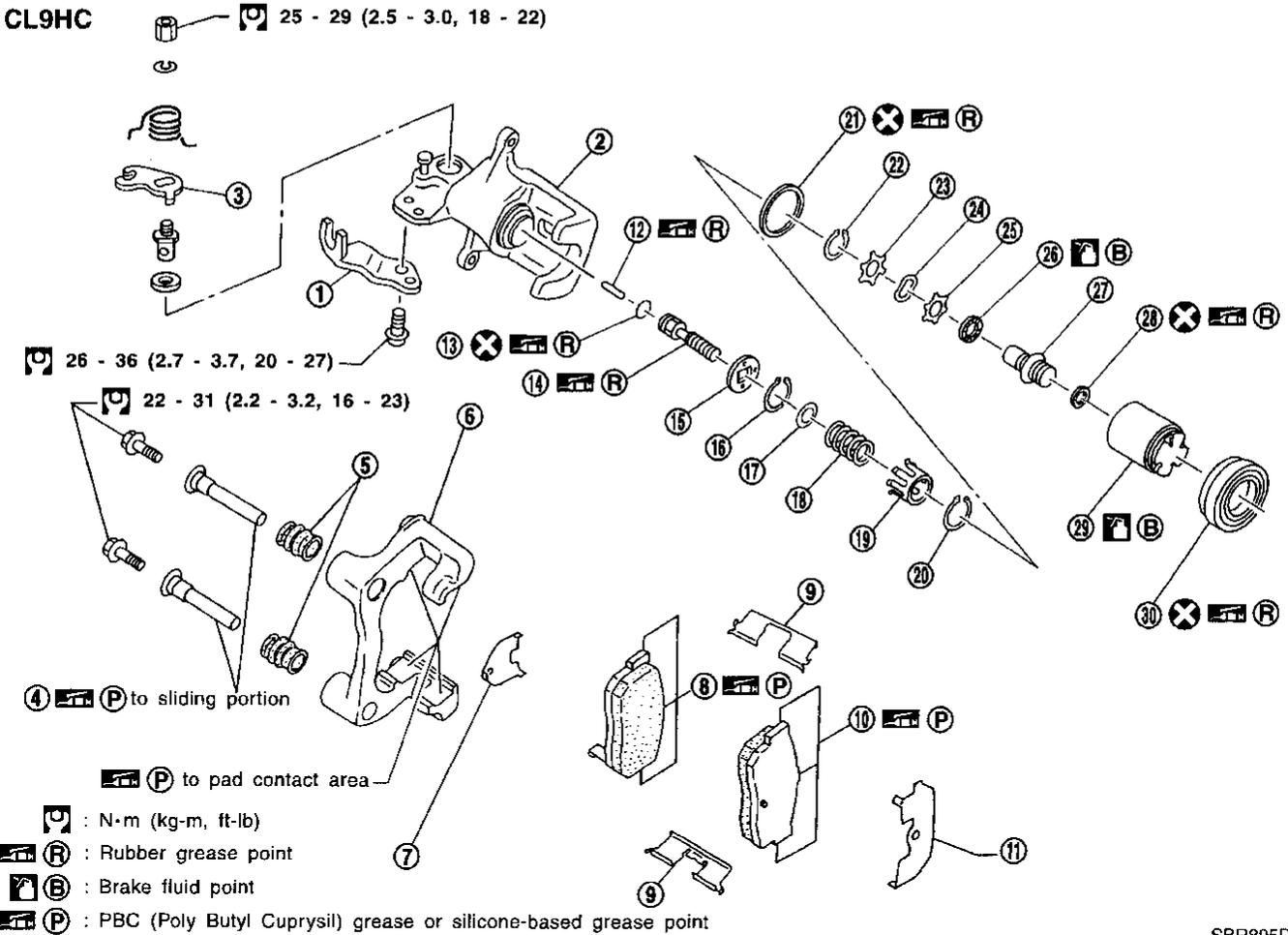
# REAR DISC BRAKE

Component

## Component

NCBR0038

SEC. 440  
CL9HC



SBR895D

- |                  |                  |                 |
|------------------|------------------|-----------------|
| 1. Cable guide   | 11. Outer shim   | 21. Piston seal |
| 2. Cylinder      | 12. Strut        | 22. Snap ring A |
| 3. Toggle lever  | 13. O-ring       | 23. Spacer      |
| 4. Pin           | 14. Push rod     | 24. Wave washer |
| 5. Pin boot      | 15. Key plate    | 25. Spacer      |
| 6. Torque member | 16. Snap ring C  | 26. Bearing     |
| 7. Inner shim    | 17. Seat         | 27. Adjuster    |
| 8. Inner pad     | 18. Spring       | 28. Cup         |
| 9. Pad retainer  | 19. Spring cover | 29. Piston      |
| 10. Outer pad    | 20. Snap ring B  | 30. Piston boot |

## 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 in replacing pads.
- If shims are rusted or show peeling of rubber coat, replace them with new shims.

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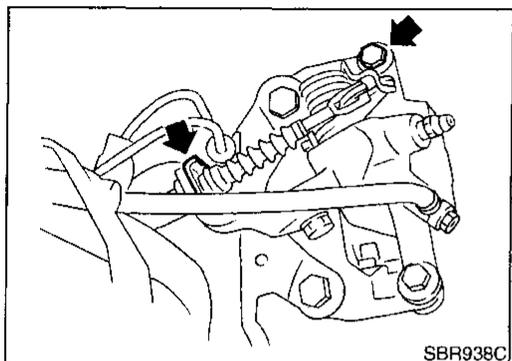
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NCBR0037

## REAR DISC BRAKE

### Pad Replacement (Cont'd)

- 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.
- Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to "Brake Burnishing Procedure", "ON-VEHICLE SERVICE", BR-6.



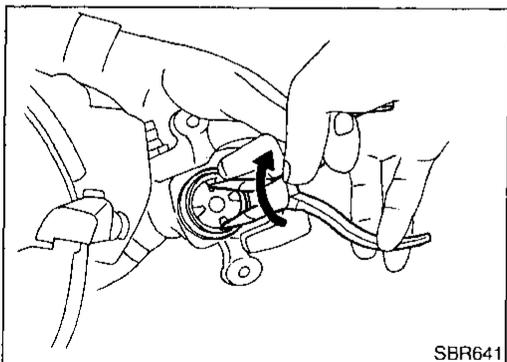
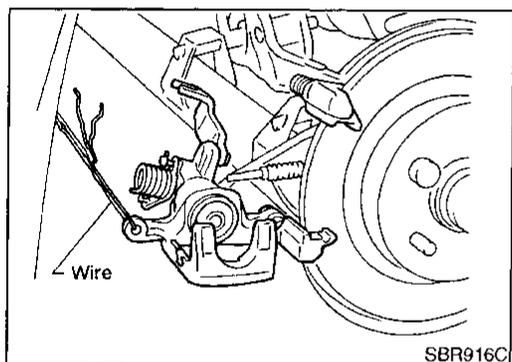
1. Remove master cylinder reservoir cap.
2. Remove brake cable mounting bolt and lock spring.
3. Release parking brake control lever, then disconnect cable from the caliper.
4. Remove upper pin bolt.
5. Open cylinder body downward. Then remove pad retainers, and inner and outer shims.

**Standard pad thickness:**

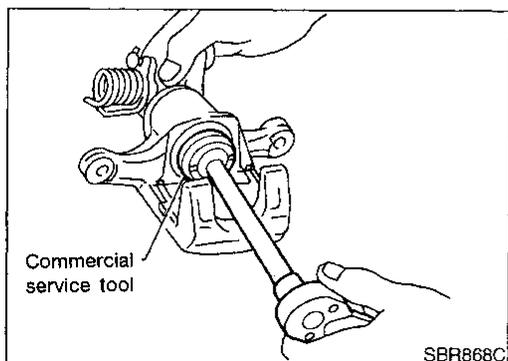
10 mm (0.39 in)

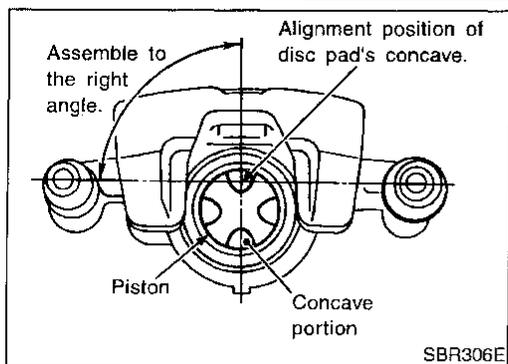
**Pad wear limit:**

1.5 mm (0.059 in)

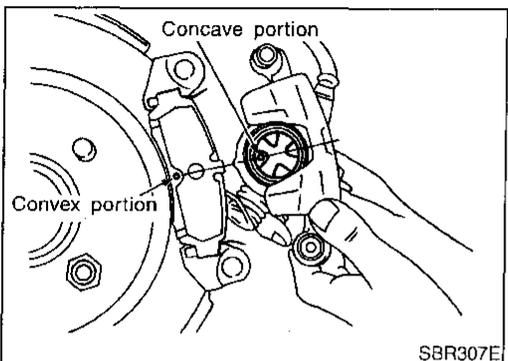


6. When installing new pads, push piston into cylinder body by gently turning piston clockwise, as shown. **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**

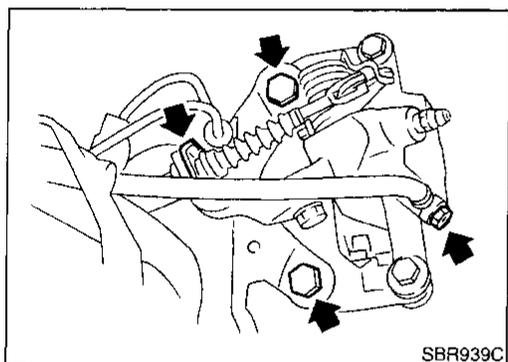




7. Adjust the piston to the right angle as shown in the figure.



8. As shown in the figure, align the piston's concave to the pad's convex, then install the cylinder body to the torque member.



## Removal

### WARNING:

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

1. Remove brake cable mounting bolt and lock spring.
2. Release parking brake control lever, then disconnect cable from the caliper.
3. Remove torque member fixing bolts and connecting bolt.

It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.

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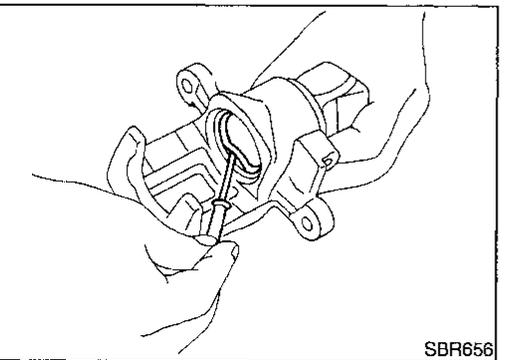
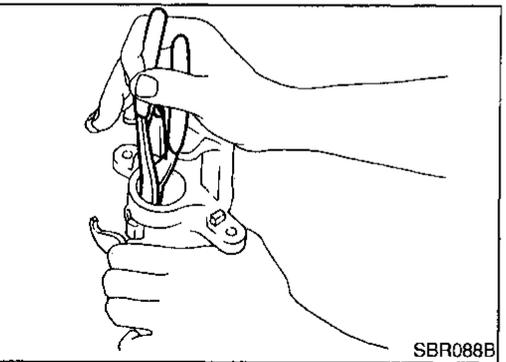
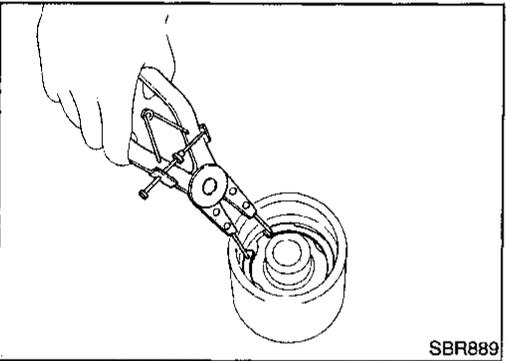
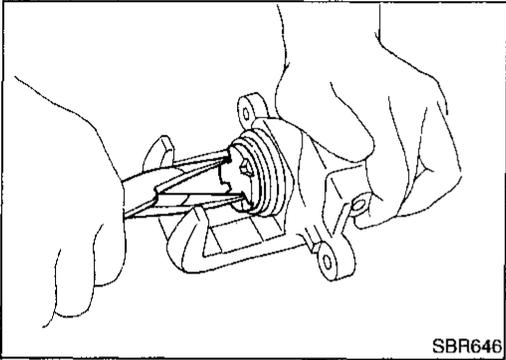
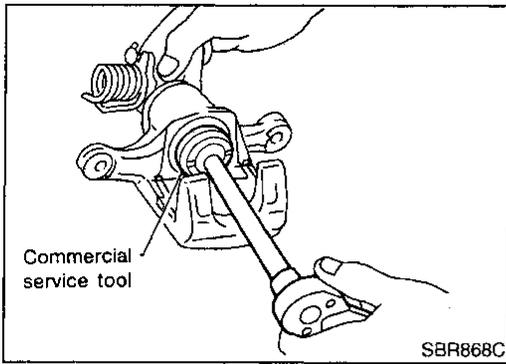
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# REAR DISC BRAKE

## Disassembly



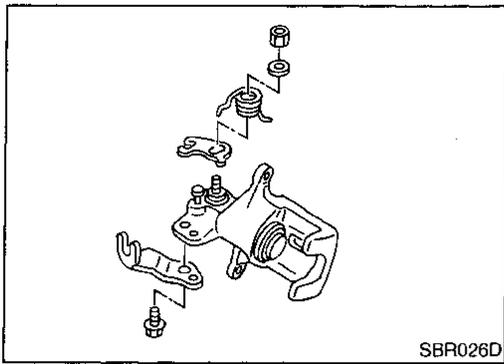
## Disassembly

NCBR0040

1. Remove piston by turning it counterclockwise with suitable commercial service tool or long nose pliers.
2. Pry off ring A from piston with suitable pliers and remove adjusting nut.
3. Disassemble cylinder body.
  - a. Pry off ring B with suitable pliers, then remove spring cover, spring and seat.
  - b. Pry off ring C, then remove key plate, push rod and rod.
  - c. Remove piston seal.  
**Be careful not to damage cylinder body.**

# REAR DISC BRAKE

Disassembly (Cont'd)



4. Remove return spring, toggle lever and cable guide.

## Inspection

### CALIPER

NCBR0041

#### CAUTION:

NCBR0041S01

Use brake fluid to clean cylinder. Never use mineral oil.

### Cylinder Body

NCBR0041S0101

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

### Torque Member

NCBR0041S0102

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

### Piston

NCBR0041S0103

#### CAUTION:

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

Check piston for score, rust, wear, damage or presence of foreign materials.

Replace if any of the above conditions are observed.

### Pin and Pin Boot

NCBR0041S0104

Check for wear, cracks or other damage.

Replace if any of the above conditions are observed.

## ROTOR

### Rubbing Surface

NCBR0041S02

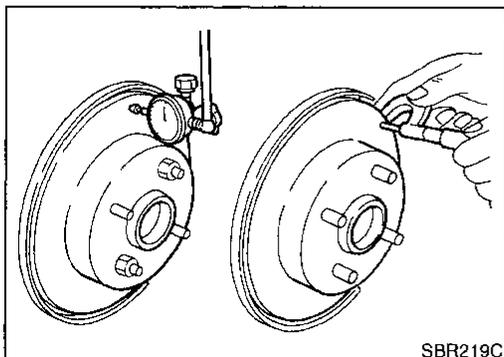
Check rotor for roughness, cracks or chips.

### Runout

NCBR0041S0201

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

Make sure that axial end play is within the specifications before measuring. Refer to AX section ("REAR WHEEL BEARING", "On-vehicle Service").



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# REAR DISC BRAKE

Inspection (Cont'd)

3. Change relative positions of rotor and wheel hub so that runout is minimized.

**Maximum runout:**  
0.07 mm (0.0028 in)

## Thickness

**Rotor repair limit:**

**Standard thickness**

9 mm (0.35 in)

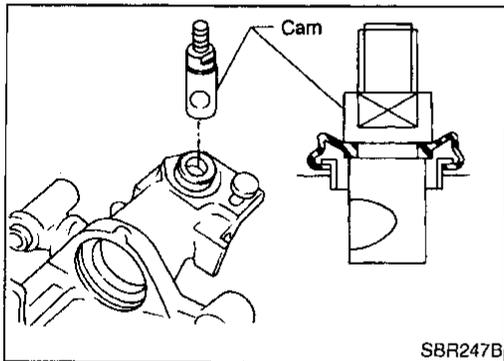
**Minimum thickness**

8 mm (0.31 in)

**Thickness variation (At least 8 portions)**

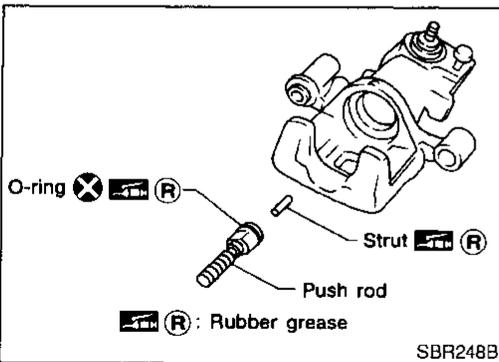
Maximum 0.02 mm (0.0008 in)

NCBR0041S0203

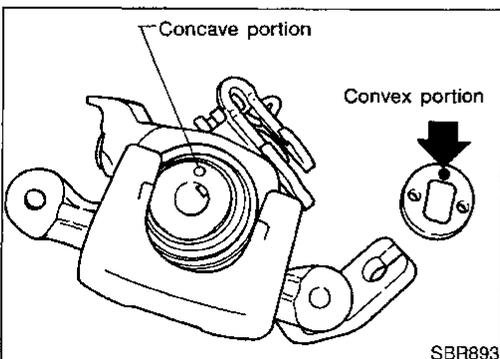


## Assembly

1. Insert cam with depression facing towards open end of cylinder. NCBR0042



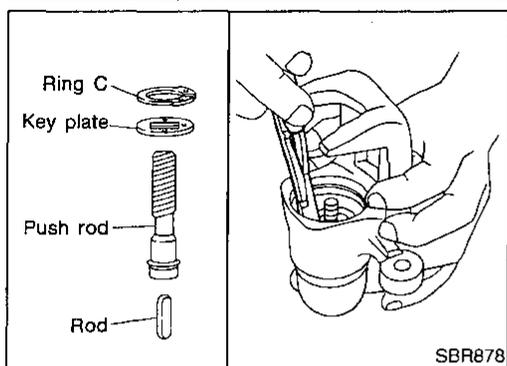
2. Generously apply rubber grease to strut and push rod to make insertion easy.



3. Fit push rod into square hole in key plate. Also match convex portion of key plate with concave portion of cylinder.

# REAR DISC BRAKE

Assembly (Cont'd)



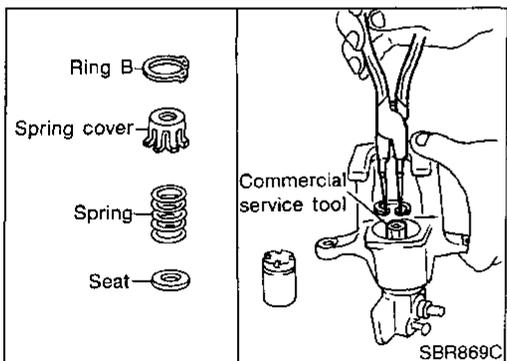
4. Install ring C with a suitable tool.

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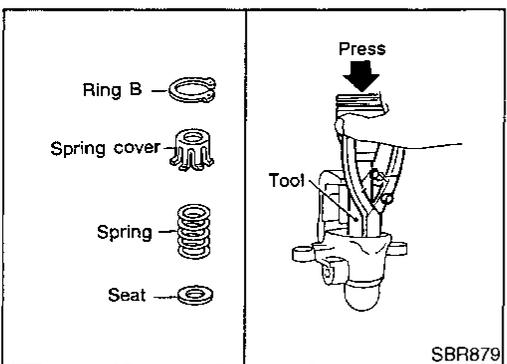
5. Install seat, spring, spring cover and ring B with suitable press and drift.

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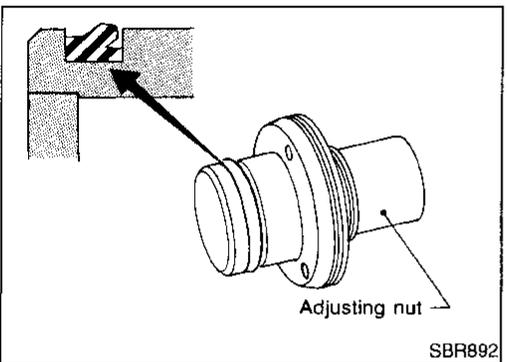


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SU

**BR**



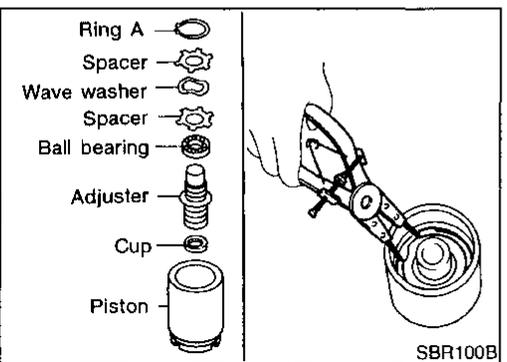
6. Install cup in the specified direction.

ST

RS

BT

HA



7. Install adjuster, bearing, spacers, washers and ring A with a suitable tool.

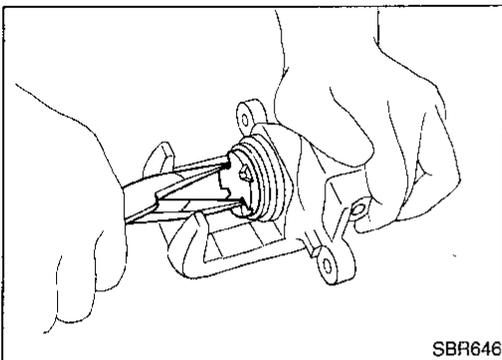
SC

EL

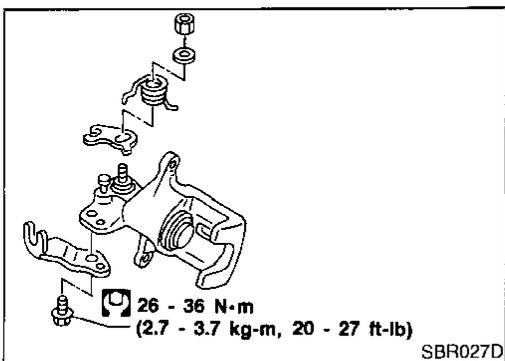
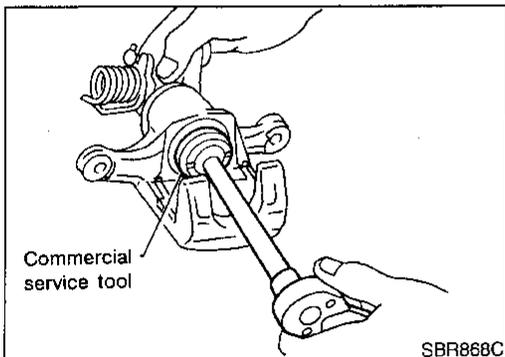
IDX

# REAR DISC BRAKE

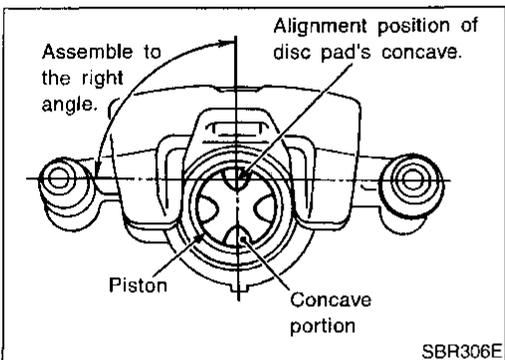
Assembly (Cont'd)



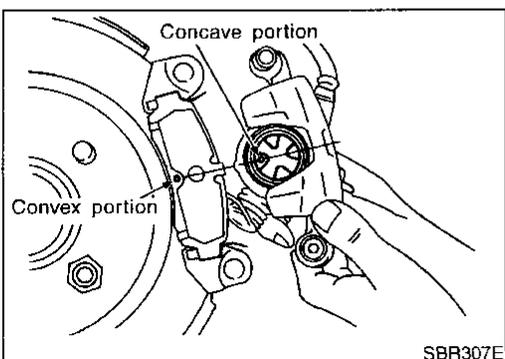
8. Insert piston seal into groove on cylinder body.
9. With piston boot fitted to piston, insert piston boot into groove on cylinder body and fit piston by turning it clockwise with long nose pliers, or suitable tool.



10. Fit toggle lever, return spring and cable guide.



11. Adjust the piston to the right angle as shown in the figure.



## Installation

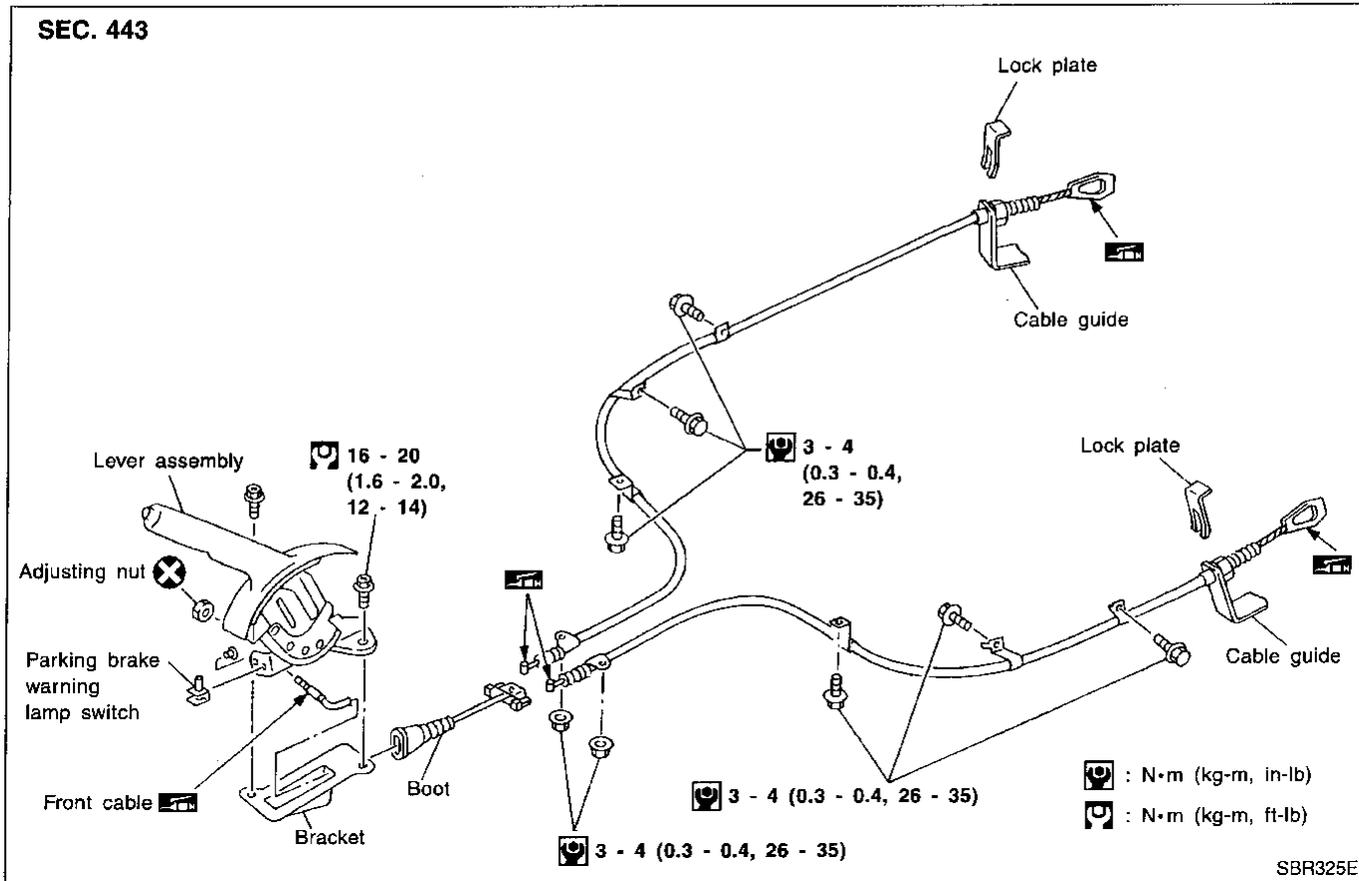
NCBR0043

### CAUTION:

- Refill with new brake fluid "DOT 3".
  - Never reuse drained brake fluid.
1. Install caliper assembly.
  - As shown in the figure, align the piston's concave to the pad's convex, then install the cylinder body to the torque member.
  2. Install brake hose to caliper securely.
  3. Install all parts and secure all bolts.
  4. Bleed air. Refer to "Bleeding Brake System", BR-7.

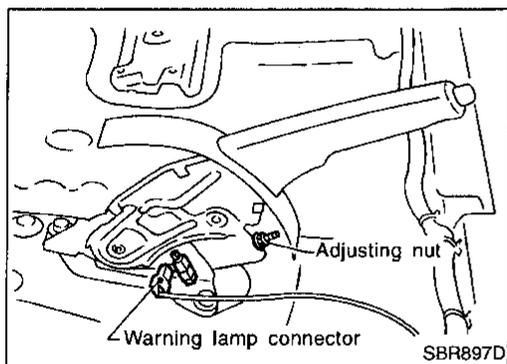
## Components

NCBR0044



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
SU

**BR**

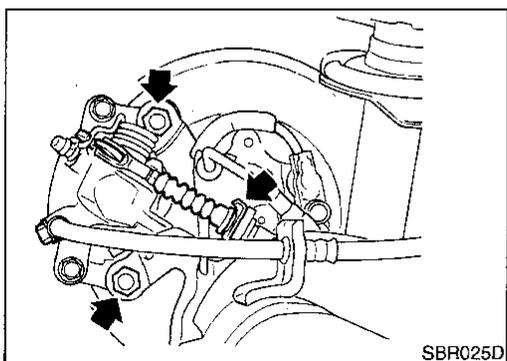


### Removal and Installation

NCBR0045

1. To remove parking brake cable, first remove center console.
2. Disconnect warning switch connector.
3. Remove bolts, slacken off and remove adjusting nut.

ST  
RS  
BT  
HA  
SC  
EL  
IDX



4. Remove lock plate and disconnect cable.

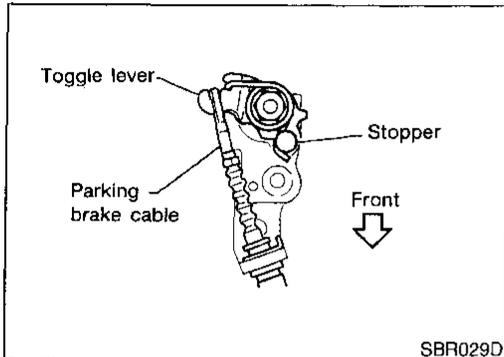
# PARKING BRAKE CONTROL

Inspection

## Inspection

NCBR0046

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 found deformed or damaged, replace.

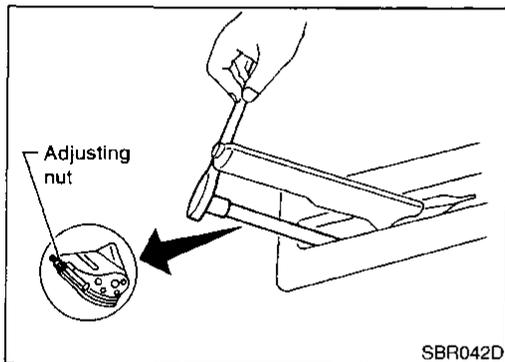


## Adjustment

NCBR0047

Pay attention to the following points after adjustment.

- 1) There is no drag when control lever is being released.
- 2) Be sure that toggle lever returns to stopper when parking brake lever is released.



1. Loosen parking brake cable.
2. Depress brake pedal fully more than five times.
3. Operate control lever 10 times or more with a full stroke [203.5 mm (8.01 in)].
4. Adjust control lever by turning adjusting nut.
5. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.

**Number of notches:**

**6 - 7 [196 N (20 kg, 44 lb)]**

6. 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 "A" notches: 1**

## Purpose

The ABS consists of electronic and hydraulic components. It allows for control of braking force so that locking of the wheels can be avoided.

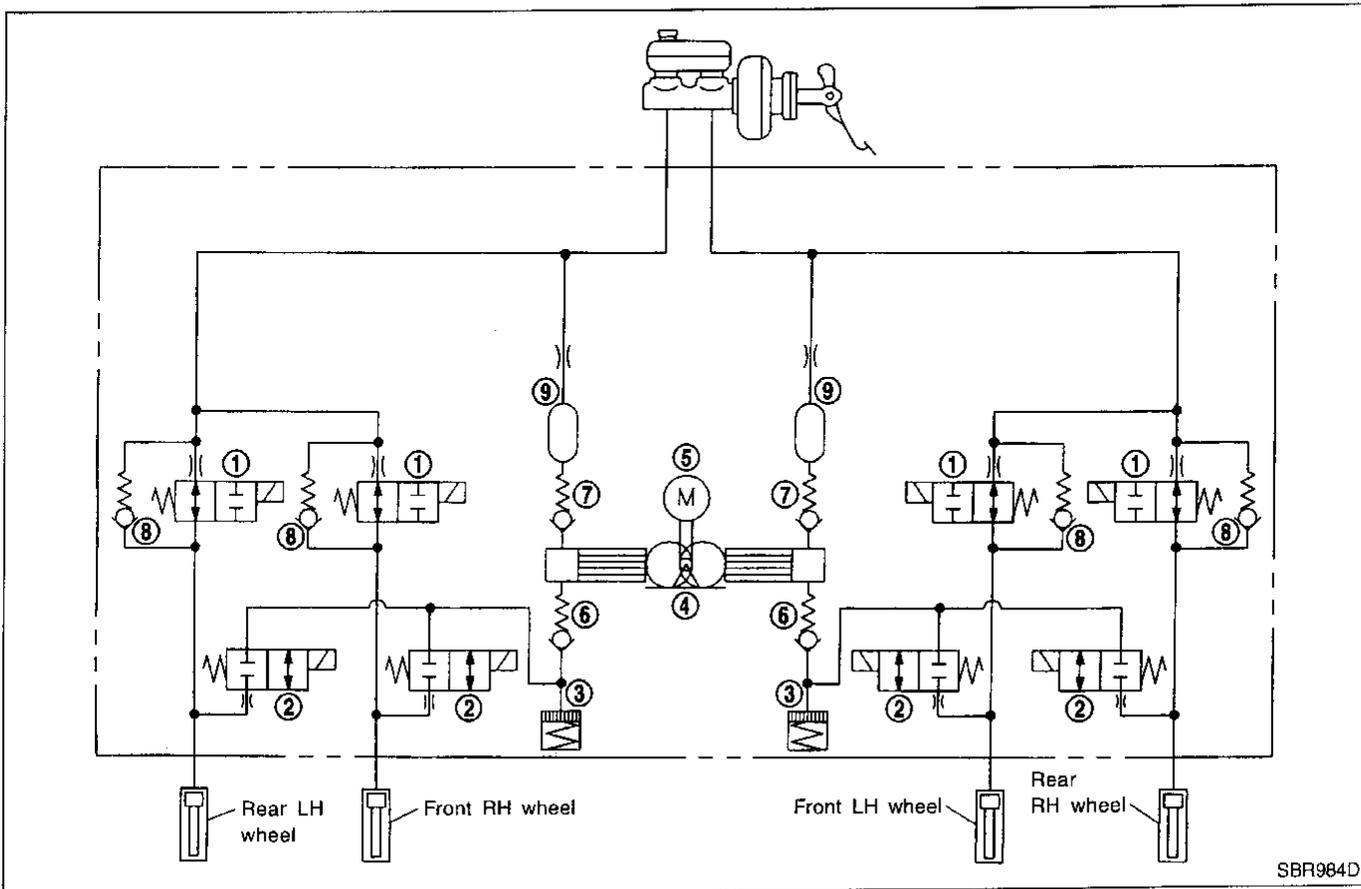
The ABS:

- 1) Ensures proper tracking performance through steering wheel operation.
- 2) Enables obstacles to be avoided through steering wheel operation.
- 3) Ensures vehicle stability by preventing flat spins.

## 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 after turning the ignition switch ON. The system performs another test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs a 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 come on.
- During ABS operation, a mechanical noise may be heard. This is a normal condition.

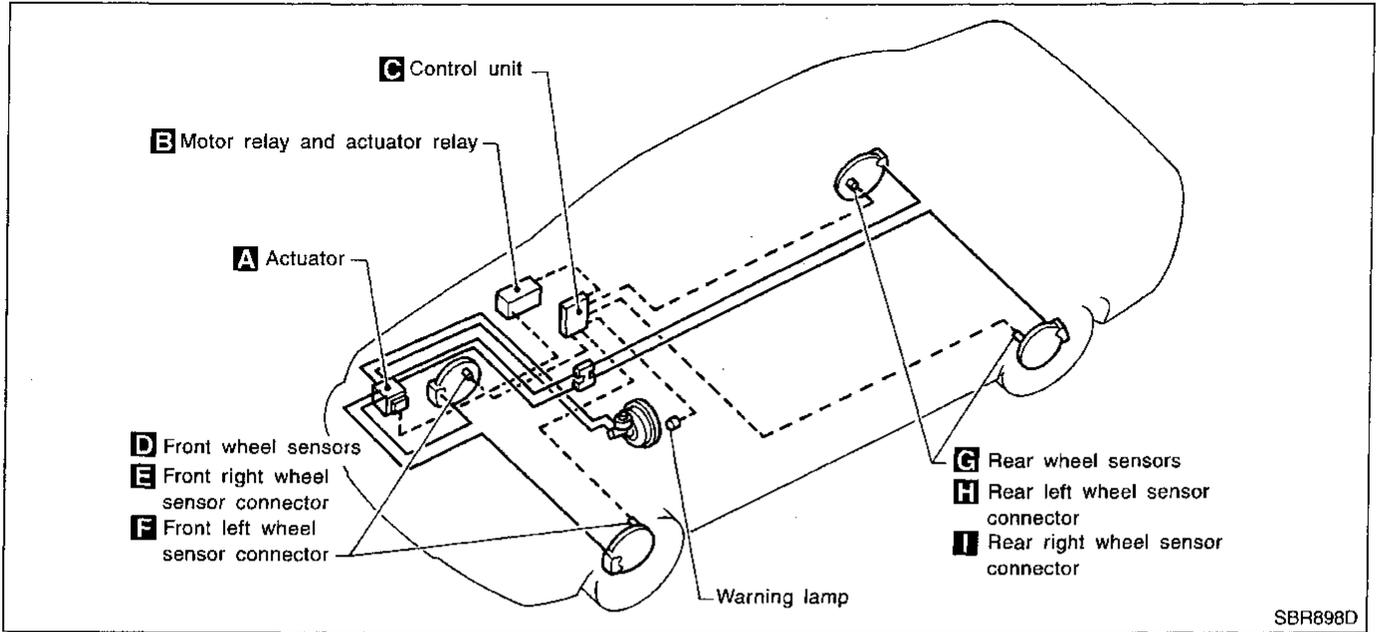
## ABS Hydraulic Circuit



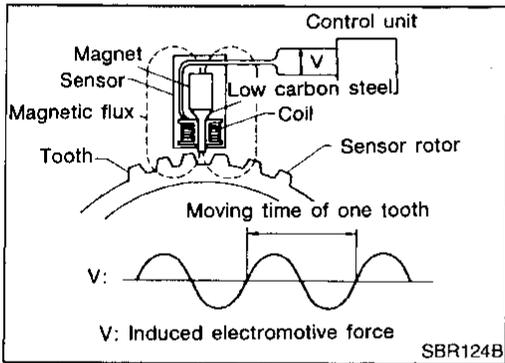
- |                          |                |                       |
|--------------------------|----------------|-----------------------|
| 1. Inlet solenoid valve  | 4. Pump        | 7. Outlet valve       |
| 2. Outlet solenoid valve | 5. Motor       | 8. Bypass check valve |
| 3. Reservoir             | 6. Inlet valve | 9. Damper             |

System Components

NCBR0051



SBR898D



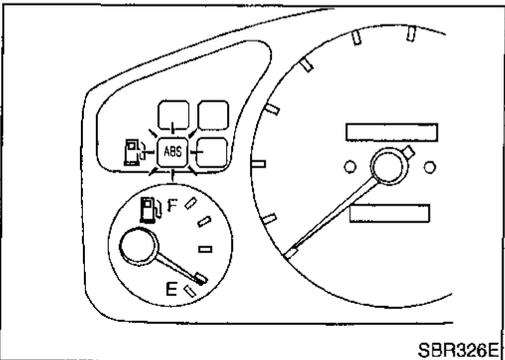
SBR124B

System Description  
SENSOR

NCBR0052

NCBR0052S01

The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet around which a coil is wound. The sensor is installed on the back side of the brake rotor. Sine-wave current is generated by the sensor as the wheel rotates. The frequency and voltage increase(s) as the rotating speed increases.

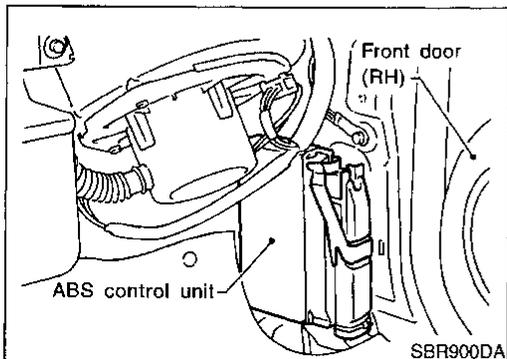


SBR326E

CONTROL UNIT

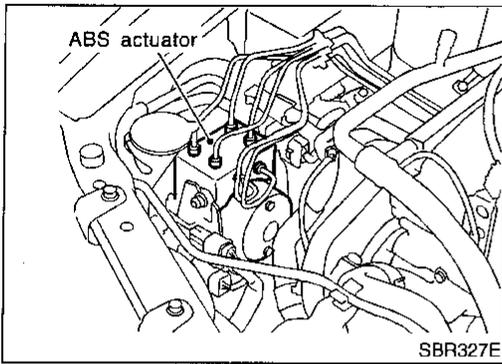
NCBR0052S02

The control unit computes the wheel rotating speed by the signal current sent from the sensor. Then it supplies a DC current to the actuator solenoid valve. It also controls ON-OFF operation of the valve relay and motor relay. If any electrical malfunction should be detected in the system, the warning lamp is turned on. In this condition, the ABS will be deactivated, and the vehicle's brake system reverts to normal operation.



SBR900DA

NCBR0052S03



**ACTUATOR**

The actuator contains:

- An electric motor and pump
- Two relays
- Eight solenoid valves, each inlet and outlet for
  - LH front
  - RH front
  - LH rear
  - RH rear

These components control the hydraulic circuit. The ABS control unit directs the actuator to increase, hold or decrease hydraulic pressure to all or individual wheels.

**ABS Actuator Operation**

NCBR0052S0301

		Inlet solenoid valve	Outlet solenoid valve	
Normal brake operation		OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is directly transmitted to caliper via the inlet solenoid valve.
ABS operation	Pressure hold	ON (Closed)	OFF (Closed)	Hydraulic circuit is shut off to hold the caliper brake fluid pressure.
	Pressure decrease	ON (Closed)	ON (Open)	Caliper brake fluid is sent to reservoir via the outlet solenoid valve. Then it is pushed up to the master cylinder by pump.
	Pressure increase	OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is transmitted to caliper.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

**BR**

ST

RS

BT

HA

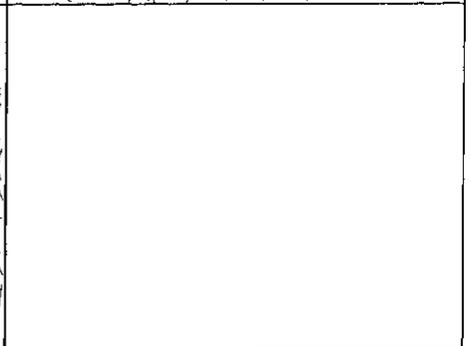
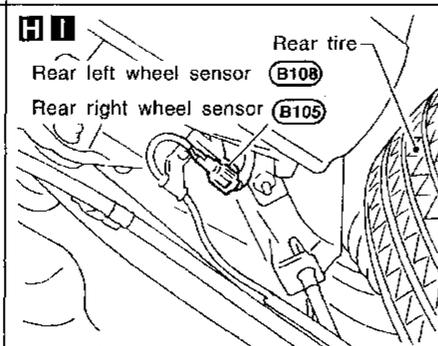
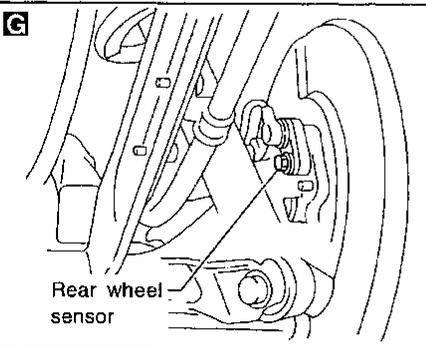
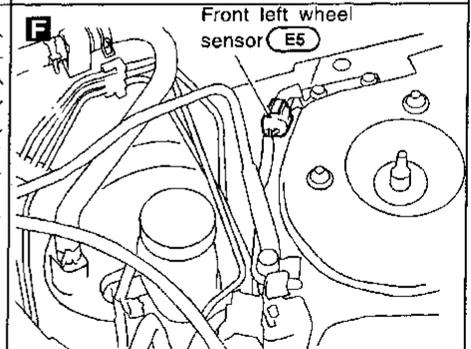
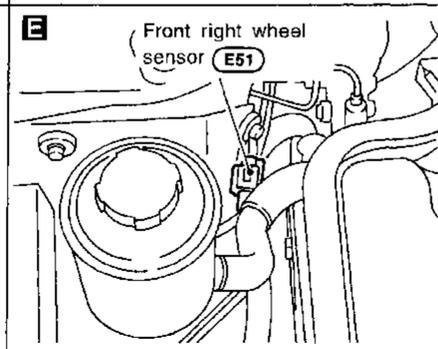
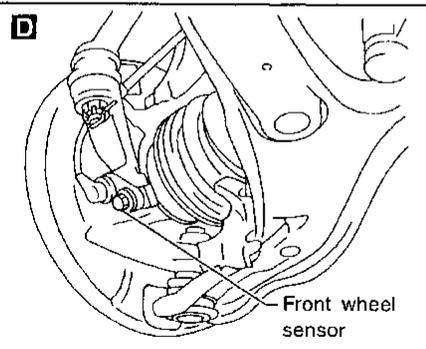
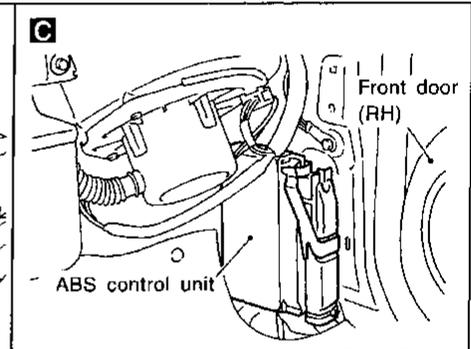
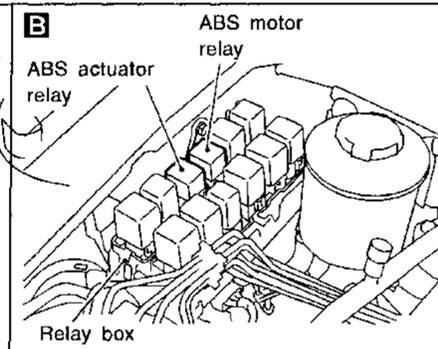
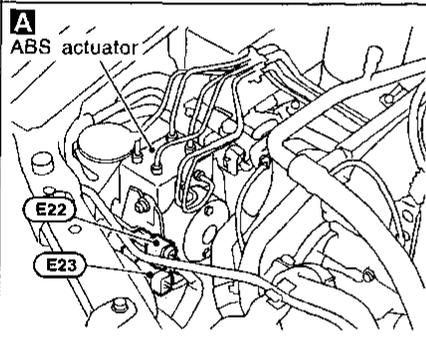
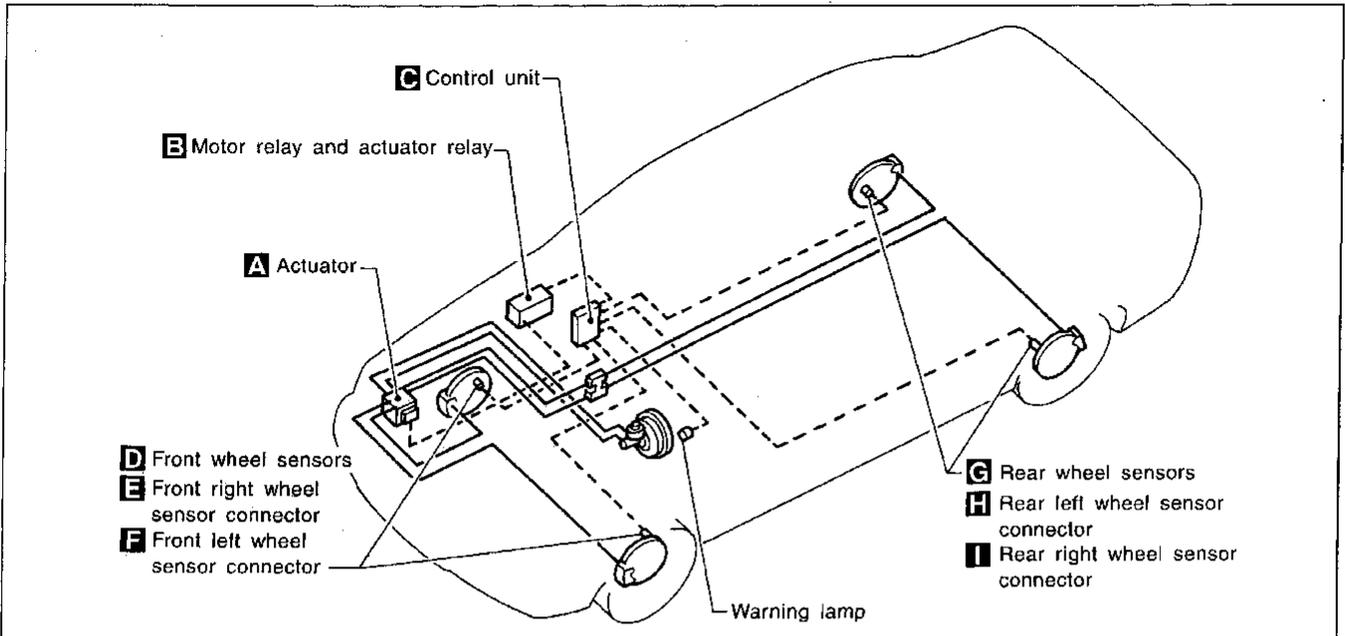
SC

EL

IDX

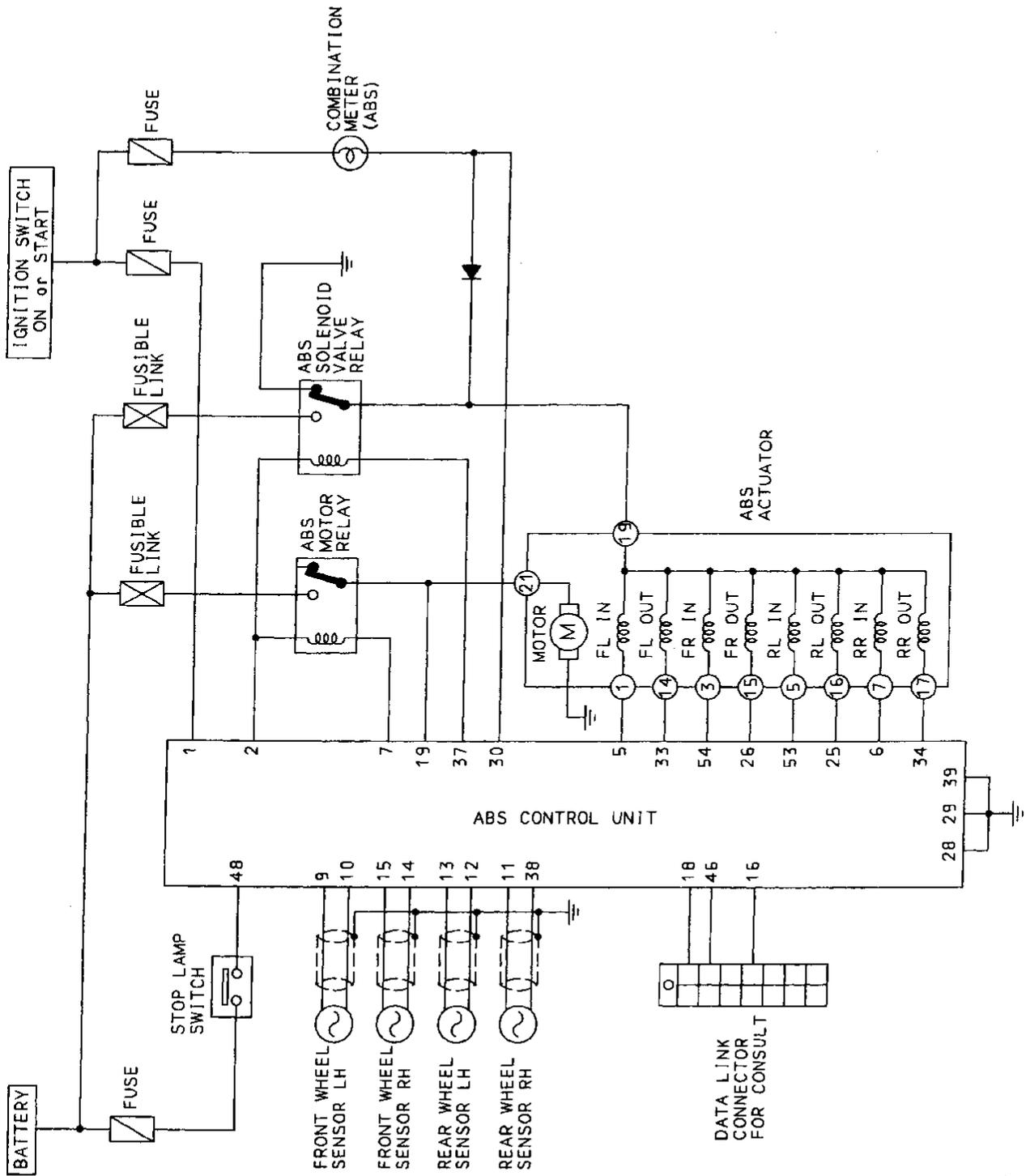
Component Parts and Harness Connector Location

NCBR0053



Schematic

NCBR0064



GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

**BR**

ST

RS

BT

HA

SC

EL

IDX

TBR129



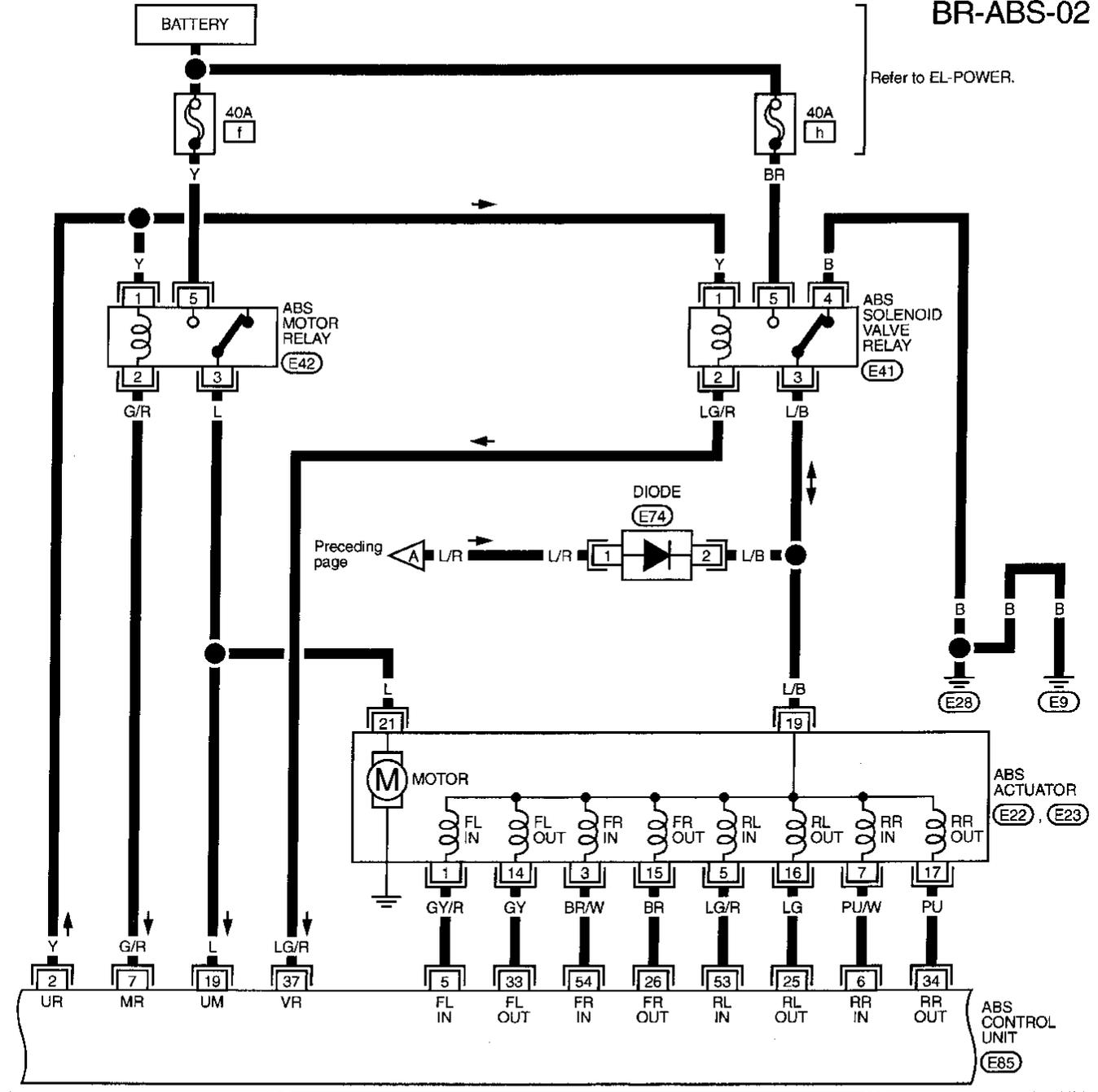
# DESCRIPTION

**ABS**

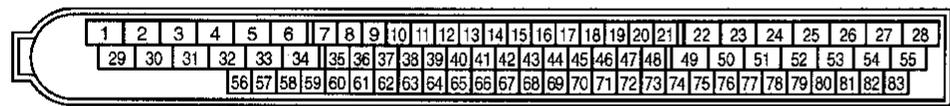
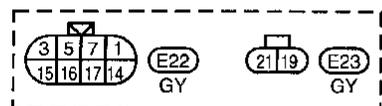
Wiring Diagram — ABS — (Cont'd)

**BR-ABS-02**

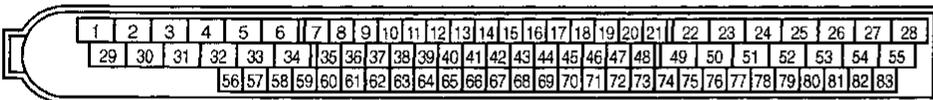
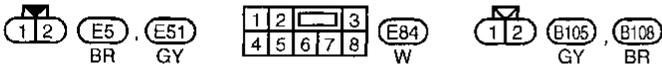
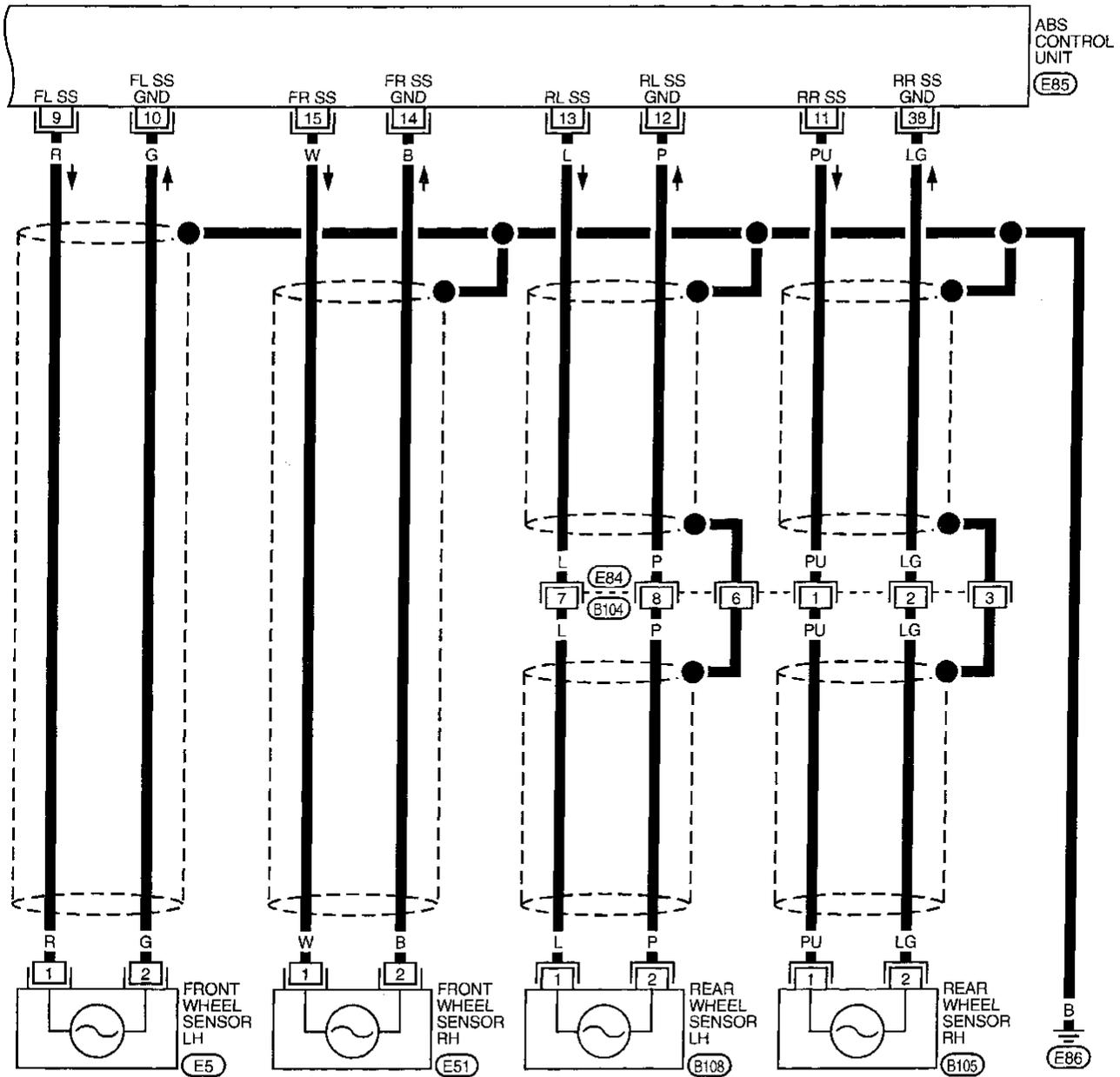
Refer to EL-POWER.



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
SU  
**BR**  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



TBR131



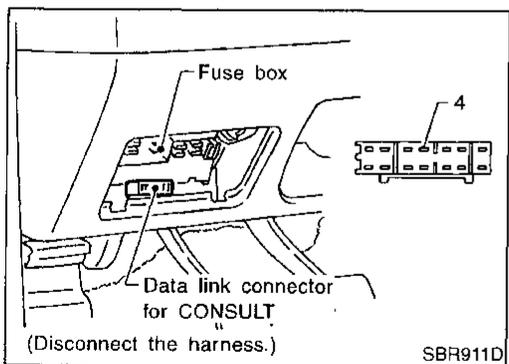
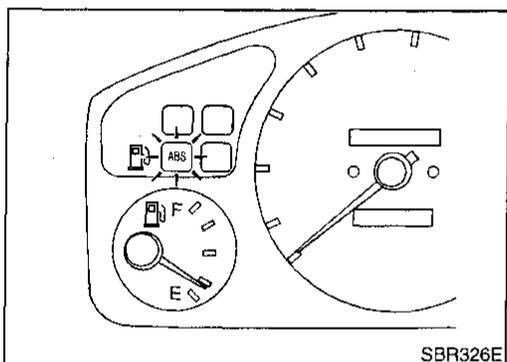
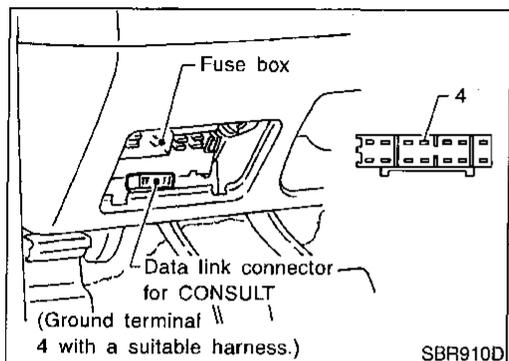
## Self-diagnosis

### FUNCTION

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

### SELF-DIAGNOSIS PROCEDURE

- Drive vehicle over 30 km/h (19 MPH) for at least one minute.
- Turn ignition switch "OFF".
- Ground terminal "4" of "Data link connector for CONSULT" with a suitable harness.
- Turn ignition switch "ON" while grounding terminal "4".  
**Do not depress brake pedal.**



- After 3.0 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE.)
- Verify the location of the malfunction with the malfunction code chart. Refer to BR-54. Then make the necessary repairs following the diagnostic procedures.
- After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to BR-42.
- Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.
- Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.
- Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
- After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly.

#### NOTE:

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

### 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. The indication then returns to the start code 12 to repeat (the indication will stay on for five minutes at the most).
- The malfunction code chart is given on the BR-54 page.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

BR

ST

RS

BT

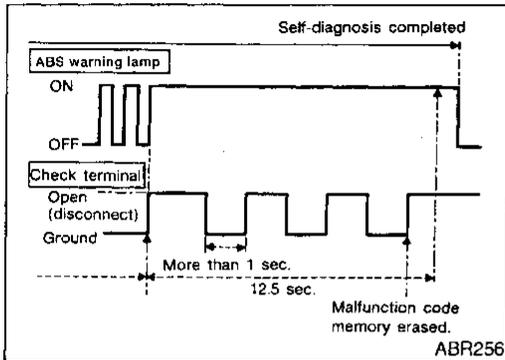
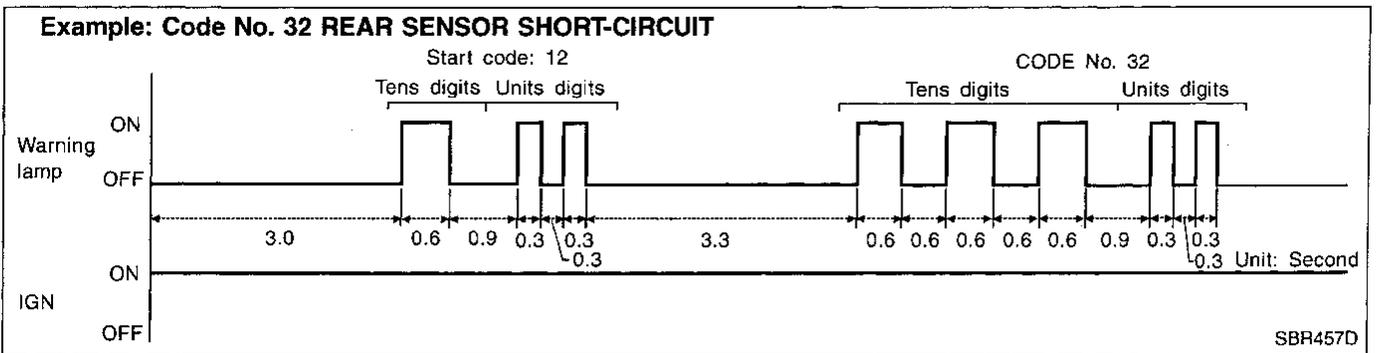
HA

SC

EL

IDX

Self-diagnosis (Cont'd)



## HOW TO ERASE SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)

NCBR0056S04

1. Under the self-diagnostic results mode, the malfunction memory erase mode starts when the check terminal is disconnected from the ground.
2. The self-diagnostic results (malfunction codes) can be erased by grounding the check terminal more than three times in succession within 12.5 seconds after the erase mode starts. (Each grounding must be longer than one second.)  
The ABS warning lamp stays on while the self-diagnosis is in the erase mode, and goes out after the erase operation has been completed.
3. The self-diagnosis is also completed at the same time. (Refer to BR-41.)

**After the erase operation is completed, it is necessary to rerun the self-diagnostic mode to verify that malfunction codes no longer appear. Only the start code (12) should be indicated when erase operation is completed and system is functioning normally.**

## CONSULT

NCBR0057

### CONSULT APPLICATION TO ABS

NCBR0057S01

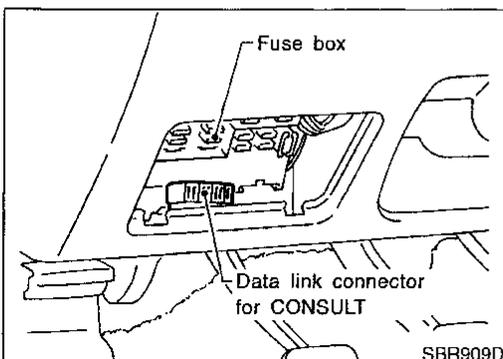
ITEM	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	
Front right wheel sensor	X	X	—	GI
Front left wheel sensor	X	X	—	MA
Rear right wheel sensor	X	X	—	EM
Rear left wheel sensor	X	X	—	LC
ABS sensor	X	—	—	
Stop lamp switch	—	X	—	EC
Front right inlet solenoid valve	X	X	X	
Front right outlet solenoid valve	X	X	X	FE
Front left inlet solenoid valve	X	X	X	
Front left outlet solenoid valve	X	X	X	CL
Rear right inlet solenoid valve	X	X	X	
Rear left inlet solenoid valve	X	X	X	MT
Rear right outlet solenoid valve	X	X	X	
Rear left outlet solenoid valve	X	X	X	AT
Actuator solenoid valve relay	X	X	—	
Actuator motor relay (ABS MOTOR is shown on the Data Monitor screen.)	X	X	X	AX
ABS warning lamp	—	X	—	SU
Battery voltage	X	X	—	BR
Control unit	X	—	—	

X: Applicable

—: Not applicable

### ECU (ABS CONTROL UNIT) PART NUMBER MODE

Ignore the ECU part number displayed in the ECU PART NUMBER MODE. Refer to parts catalog to order the ECU.

NCBR0057S02


### CONSULT Inspection Procedure

#### SELF-DIAGNOSIS PROCEDURE

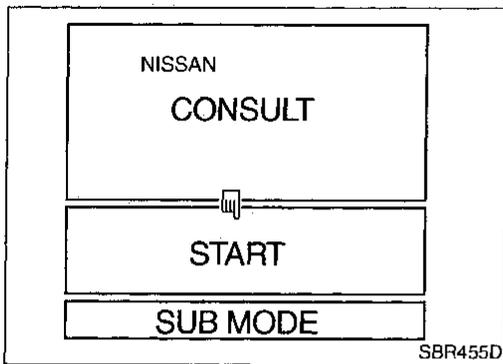
NCBR0058
NCBR0058S01

1. Turn ignition switch OFF.
2. Connect CONSULT to Data Link Connector for CONSULT.
3. Start engine.
4. Drive vehicle over 30 km/h (19 MPH) for at least one minute.

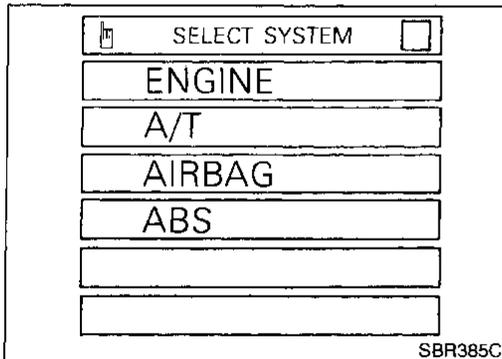
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

ABS

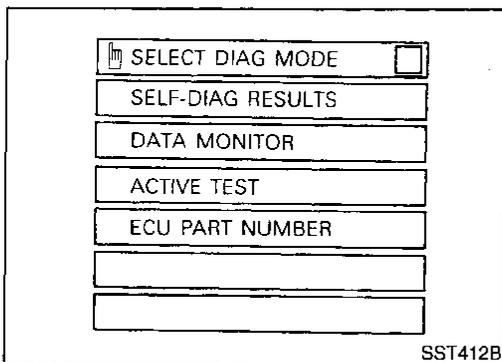
CONSULT Inspection Procedure (Cont'd)



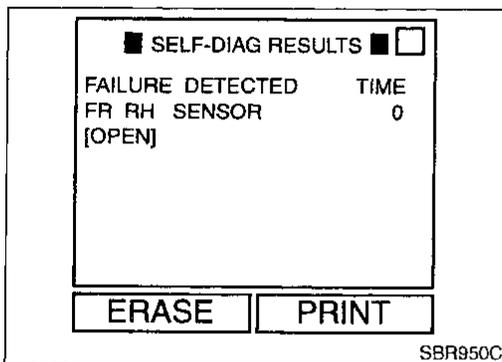
5. Stop vehicle with engine running and touch "START" on CONSULT screen.



6. Touch "ABS".



7. Touch "SELF-DIAG RESULTS".
  - The screen shows the detected malfunction and how many times the ignition switch has been turned since the malfunction.
8. Make the necessary repairs following the diagnostic procedures.



9. After the malfunctions are repaired, erase the self-diagnostic results stored in the control unit by touching "ERASE".
10. Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
11. Test the ABS in a safe area to verify that it functions properly.

**NOTE:**

"SELF-DIAG RESULTS" screen shows the detected malfunction and how many times the ignition switch has been turned since the malfunction.

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

**ABS**

*CONSULT Inspection Procedure (Cont'd)*

## SELF-DIAGNOSTIC RESULTS MODE

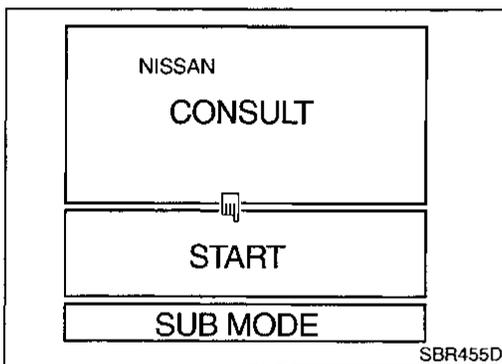
-NCBR0058S02

Diagnostic item	Diagnostic item is detected when ...	Reference page	
FR RH SENSOR [OPEN]*1	<ul style="list-style-type: none"> <li>● Circuit for front right wheel sensor is open. (An abnormally high input voltage is entered.)</li> </ul>	BR-55	GI
FR LH SENSOR [OPEN]*1	<ul style="list-style-type: none"> <li>● Circuit for front left wheel sensor is open. (An abnormally high input voltage is entered.)</li> </ul>	BR-55	MA
RR RH SENSOR [OPEN]*1	<ul style="list-style-type: none"> <li>● Circuit for rear right sensor is open. (An abnormally high input voltage is entered.)</li> </ul>	BR-55	EM
RR LH SENSOR [OPEN]*1	<ul style="list-style-type: none"> <li>● Circuit for rear left sensor is open. (An abnormally high input voltage is entered.)</li> </ul>	BR-55	LC
FR RH SENSOR [SHORT]*1	<ul style="list-style-type: none"> <li>● Circuit for front right wheel sensor is shorted. (An abnormally low input voltage is entered.)</li> </ul>	BR-55	EC
FR LH SENSOR [SHORT]*1	<ul style="list-style-type: none"> <li>● Circuit for front left wheel sensor is shorted. (An abnormally low input voltage is entered.)</li> </ul>	BR-55	FE
RR RH SENSOR [SHORT]*1	<ul style="list-style-type: none"> <li>● Circuit for rear right sensor is shorted. (An abnormally low input voltage is entered.)</li> </ul>	BR-55	CL
RR LH SENSOR [SHORT]*1	<ul style="list-style-type: none"> <li>● Circuit for rear left sensor is shorted. (An abnormally low input voltage is entered.)</li> </ul>	BR-55	MT
ABS SENSOR [ABNORMAL SIGNAL]	<ul style="list-style-type: none"> <li>● Teeth damage on sensor rotor or improper installation of wheel sensor. (Abnormal wheel sensor signal is entered.)</li> </ul>	BR-55	AT
FR RH IN ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for front right inlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	AX
FR LH IN ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for front left inlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	SU
RR RH IN ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for rear right inlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	<b>BR</b>
RR LH IN ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for rear left inlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	ST
FR RH IN ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for front right inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	RS
FR LH IN ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for front left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	BT
RR RH IN ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for rear right inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	HA
RR LH IN ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for rear left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	SC
FR RH OUT ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for front right outlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	EL
FR LH OUT ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for front left outlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	IDX
RR RH OUT ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for rear right outlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	
RR LH OUT ABS SOL [OPEN]	<ul style="list-style-type: none"> <li>● Circuit for rear left outlet solenoid valve is open. (An abnormally low output voltage is entered.)</li> </ul>	BR-57	
FR RH OUT ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for front right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	
FR LH OUT ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for front left outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57	

CONSULT Inspection Procedure (Cont'd)

Diagnostic item	Diagnostic item is detected when ...	Reference page
RR RH OUT ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for rear right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57
RR LH OUT ABS SOL [SHORT]	<ul style="list-style-type: none"> <li>● Circuit for rear left outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)</li> </ul>	BR-57
ABS ACTUATOR RELAY [ABNORMAL]	<ul style="list-style-type: none"> <li>● Actuator solenoid valve relay is ON, even control unit sends off signal.</li> <li>● Actuator solenoid valve relay is OFF, even control unit sends on signal.</li> </ul>	BR-59
ABS MOTOR [ABNORMAL]	<ul style="list-style-type: none"> <li>● Circuit for actuator motor is open or shorted.</li> <li>● Actuator motor relay is stuck.</li> </ul>	BR-62
BATTERY VOLT [VB-LOW]	<ul style="list-style-type: none"> <li>● Power source voltage supplied to ABS control unit is abnormally low.</li> </ul>	BR-65
CONTROL UNIT	<ul style="list-style-type: none"> <li>● Function of calculation in ABS control unit has failed.</li> </ul>	BR-66

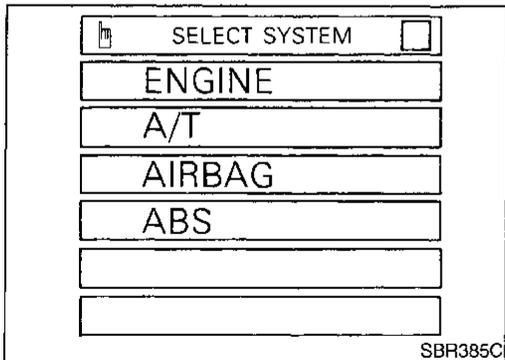
\*1: Be sure to confirm the ABS warning lamp illuminates when the ignition switch is turned ON after repairing the shorted sensor circuit, but the lamp goes out when driving the vehicle over 30 km/h (20 MPH) for one minute in accordance with SELF-DIAGNOSIS PROCEDURE.



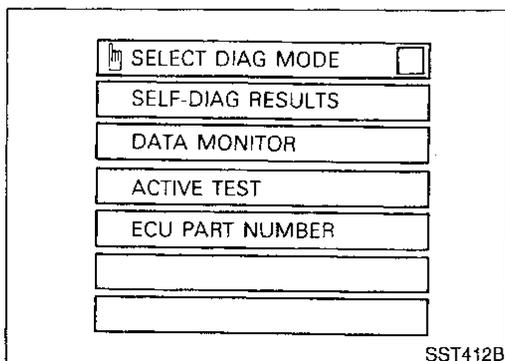
## DATA MONITOR PROCEDURE

NCBR0058503

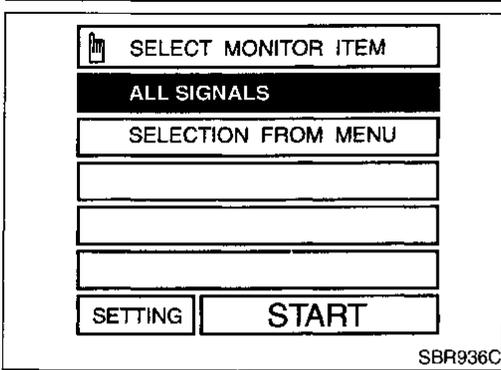
1. Turn ignition switch OFF.
2. Connect CONSULT to Data Link Connector for CONSULT.
3. Turn ignition switch ON.
4. Touch "START" on CONSULT screen.



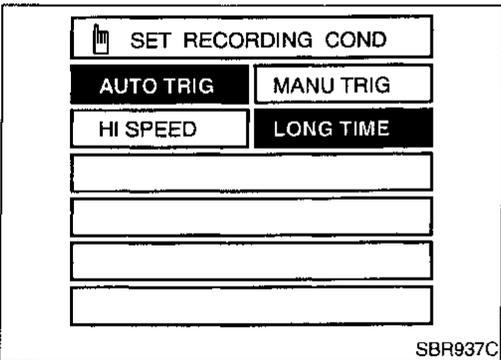
5. Touch "ABS".



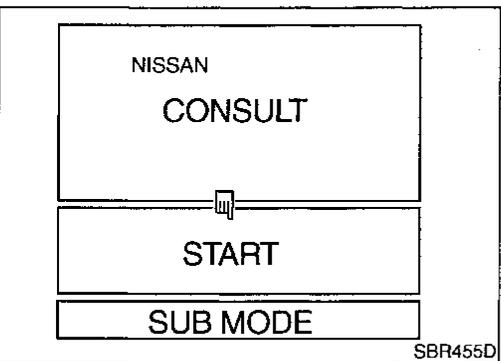
6. Touch "DATA MONITOR".



7. Touch "SETTING" on "SELECT MONITOR ITEM" screen.



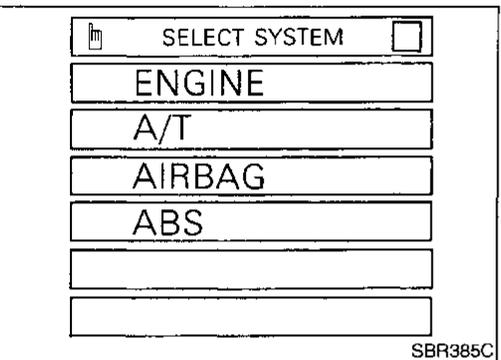
8. Touch "LONG TIME" on "SET RECORDING COND" screen.  
 9. Touch "START" on "SELECT MONITOR ITEM".



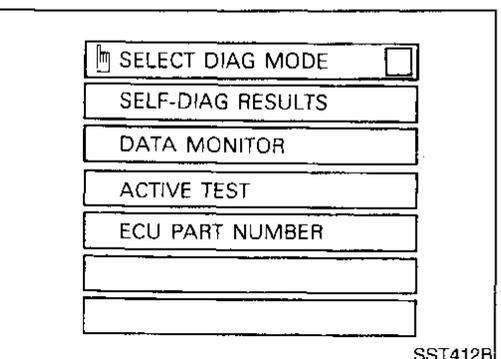
### ACTIVE TEST PROCEDURE

NCBR0058S04

- When conducting Active test, vehicle must be stationary.
  - When ABS warning lamp stays on, never conduct Active test.
1. Turn ignition switch OFF.
  2. Connect CONSULT to Data Link Connector for CONSULT.
  3. Start engine.
  4. Touch "START" on CONSULT screen.



5. Touch "ABS".



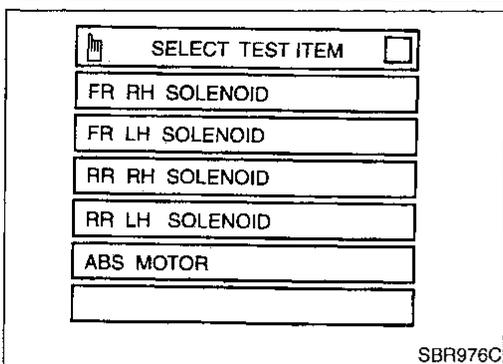
6. Touch "ACTIVE TEST".

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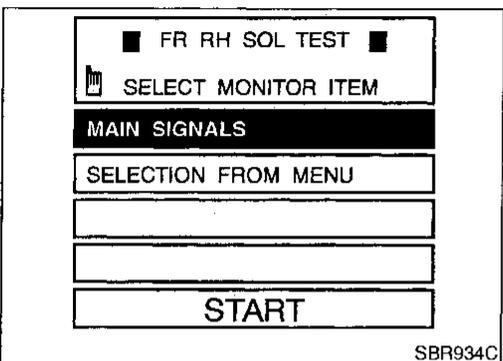
# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

**ABS**

CONSULT Inspection Procedure (Cont'd)



7. Select active test item by touching screen.



8. Touch "START".

9. Carry out the active test by touching screen key.

## DATA MONITOR MODE

NCBR0058S05

MONITOR ITEM	CONDITION	SPECIFICATION
FR RH SENSOR FR LH SENSOR RR RH SENSOR RR LH SENSOR	Drive vehicle. (Each wheel is rotating.)	Displays computed vehicle speed from wheel sensor signal. Almost the same speed as speedometer.
STOP LAMP SW	Turn ignition switch ON and depress brake pedal.	Depress the pedal: ON Release the pedal: OFF
FR RH IN SOL FR RH OUT SOL FR LH IN SOL FR LH OUT SOL RR RH IN SOL RR RH OUT SOL RR LH IN SOL RR LH OUT SOL	Ignition switch is turned ON or engine is running.	Operating conditions for each solenoid valve are indicated. ABS is not operating: OFF
ACTUATOR RLY	Ignition switch is turned ON or engine is running.	Displays ON/OFF condition of ABS actuator relay. When turning ignition switch ON, ABS actuator relay is operated.
MOTOR RELAY		ABS is not operating: OFF ABS is operating: ON
WARNING LAMP		Warning lamp is turned on: ON Warning lamp is turned off: OFF
BATTERY VOLT		Power supply voltage for control unit

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

**ABS**

*CONSULT Inspection Procedure (Cont'd)*

## ACTIVE TEST MODE

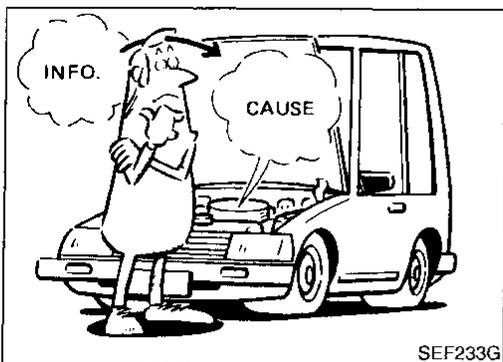
NCBR0058S06

TEST ITEM	CONDITION	JUDGEMENT			
FR RH SOLENOID FR LH SOLENOID RR RH SOLENOID RR LH SOLENOID	Ignition switch is turned ON.	Brake fluid pressure control operation		GI	
			IN SOL	OUT SOL	MA
		UP (Increase):	OFF	OFF	
		KEEP (Hold):	ON	OFF	EM
		DOWN (Decrease):	ON	ON	
ABS MOTOR		ABS actuator motor ON: Motor runs OFF: Motor stops	LC		

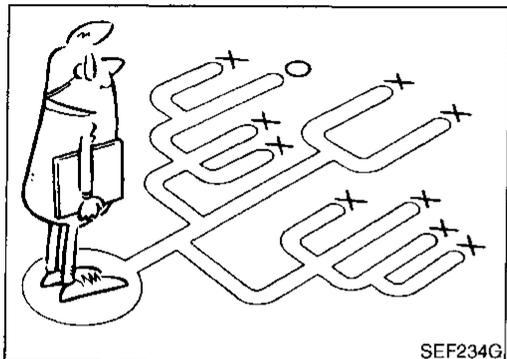
**NOTE:**

Active test will automatically stop ten seconds after the test starts. (TEST IS STOPPED monitor shows ON.)

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SEF233G



SEF234G

## How to Perform Trouble Diagnoses for Quick and Accurate Repair

NCBR0059

### INTRODUCTION

NCBR0059S01

The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives actuator. 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 the booster or 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.

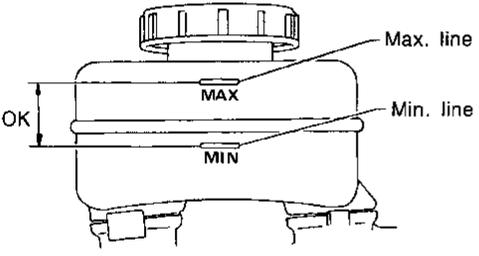
A visual check only may not find the cause of the problems, so a road test should be performed.

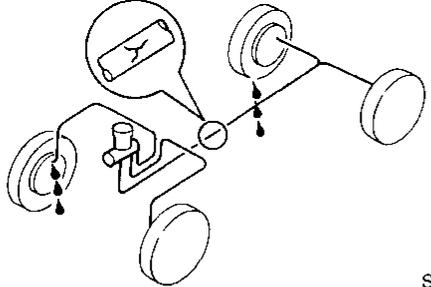
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with the customer, find out what symptoms are present and under what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

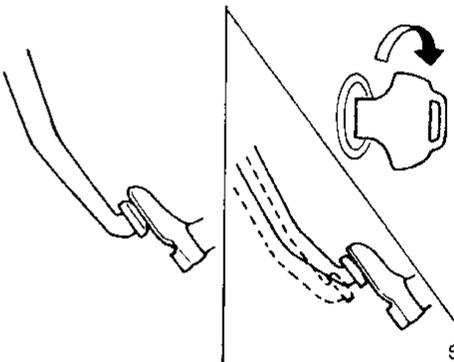
Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot brake problems on an ABS controlled vehicle. Also check related Service Bulletins for information.

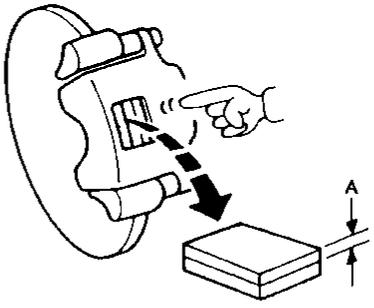
## Preliminary Check

NCBR0060

<b>1</b>	<b>CHECK BRAKE FLUID LEVEL</b>
<p>Check brake fluid level in reservoir tank. Low fluid level may indicate brake pad wear or leakage from brake line.</p>	
	
SBR451D	
<p><b>Is brake fluid filled between MAX and MIN lines on reservoir tank and/or has brake fluid been contaminated?</b></p>	
Yes	▶ GO TO 2.
No	▶ Repair. GO TO 2.

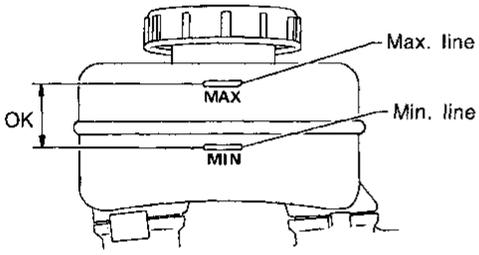
<b>2</b>	<b>CHECK BRAKE LINE</b>
<p>Check brake line for leakage.</p>	
	
SBR389C	
<p><b>Is leakage present at or around brake lines, tubes or hoses or are any of these parts cracked or damaged?</b></p>	
Yes	▶ GO TO 3.
No	▶ Repair. GO TO 3.

<b>3</b>	<b>CHECK BRAKE BOOSTER OPERATION</b>
<p>Check brake booster for operation and air tightness. Refer to BR-16.</p>	
	
SBR058C	
<p><b>Is brake booster airtight and functioning properly?</b></p>	
Yes	▶ GO TO 4.
No	▶ Replace. GO TO 4.

<b>4</b>	<b>CHECK BRAKE PAD AND ROTOR</b>
<p>Check brake pad and rotor. Refer to BR-19, 21, 23, 27.</p>	
	
SBR059C	
<p><b>Are brake pads and rotors functioning properly?</b></p>	
Yes	▶ GO TO 5.
No	▶ Replace.

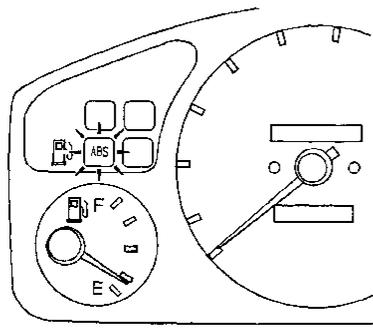
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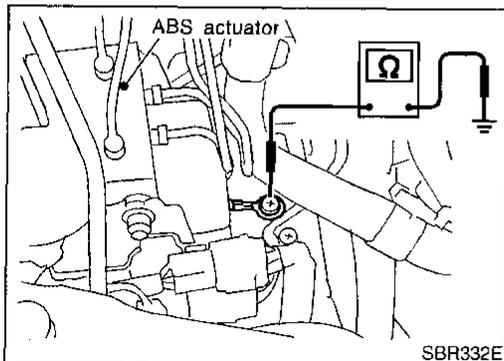
*Preliminary Check (Cont'd)*

<b>5</b>	<b>RECHECK BRAKE FLUID LEVEL</b>
Check brake fluid level in reservoir tank again.	
	
SBR451D	
Is brake fluid filled between MAX and MIN lines on reservoir tank and/or has brake fluid been contaminated?	
Yes	▶ GO TO 6.
No	▶ Fill up brake fluid.

<b>7</b>	<b>CHECK WARNING LAMP DEACTIVATION</b>
Check warning lamp for deactivation after engine is started.	
Does warning lamp turn off when engine is started?	
Yes	▶ GO TO 8.
No	▶ Go to Self-diagnosis. Refer to BR-41, 43.

<b>8</b>	<b>DRIVE VEHICLE</b>
Drive vehicle at speeds over 30 km/h (19 MPH) for at least one minute.	
Does warning lamp remain off after vehicle has been driven at 30 km/h (19 MPH) for at least one minute?	
Yes	▶ END
No	▶ Go to Self-diagnosis. Refer to BR-41, 43.

<b>6</b>	<b>CHECK WARNING LAMP ACTIVATION</b>
Check warning lamp activation.	
	
SBR326E	
Does warning lamp turn on when ignition switch is turned "ON"?	
Yes	▶ GO TO 7.
No	▶ Check fuse, warning lamp bulb and warning lamp circuit.



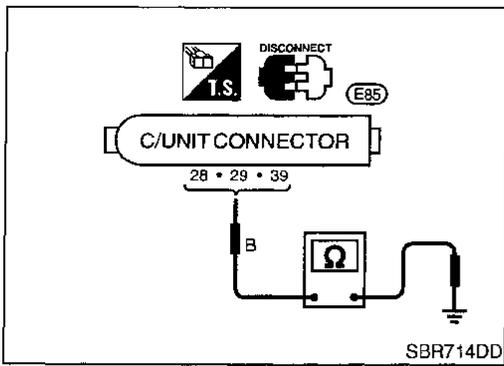
### Ground Circuit Check ACTUATOR MOTOR GROUND

NCBR0061

NCBR0061S01

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

**Resistance: 0Ω**

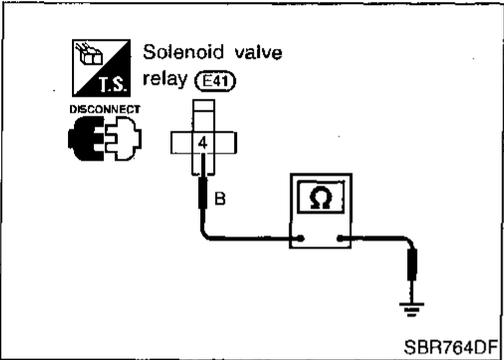


**CONTROL UNIT GROUND**

NCBR0061S02

- Check resistance between the terminals and ground.

Resistance: 0Ω



**ABS SOLENOID VALVE RELAY GROUND**

NCBR0061S03

- Check resistance between solenoid valve relay terminal 4 and ground.

Resistance: 0Ω

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# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

**ABS**

Malfunction Code/Symptom Chart

## Malfunction Code/Symptom Chart

NCBR0062

Code No. (No. of LED flashes)	Malfunctioning part	Reference page
12	Self-diagnosis could not detect any malfunctions.	—
45	Actuator front left outlet solenoid valve	BR-57
46	Actuator front left inlet solenoid valve	BR-57
41	Actuator front right outlet solenoid valve	BR-57
42	Actuator front right inlet solenoid valve	BR-57
51	Actuator rear right outlet solenoid valve	BR-57
52	Actuator rear right inlet solenoid valve	BR-57
55	Actuator rear left outlet solenoid valve	BR-57
56	Actuator rear left inlet solenoid valve	BR-57
25	Front left sensor (open-circuit)	BR-55
26	Front left sensor (short-circuit)	BR-55
21	Front right sensor (open-circuit)	BR-55
22	Front right sensor (short-circuit)	BR-55
35	Rear left sensor (open-circuit)	BR-55
36	Rear left sensor (short-circuit)	BR-55
31	Rear right sensor (open-circuit)	BR-55
32	Rear right sensor (short-circuit)	BR-55
18	Sensor rotor	BR-55
61	Actuator motor or motor relay	BR-62
63	Solenoid valve relay	BR-59
57	Power supply (Low voltage)	BR-65
71	Control unit	BR-66
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	BR-73
Warning lamp stays on, during self-diagnosis.	Control unit	—
Warning lamp does not come on when ignition switch is turned on.	Fuse, warning lamp bulb or warning lamp circuit Control unit	BR-71
Warning lamp does not come on during self-diagnosis.	Control unit	—
Pedal vibration and noise	—	BR-70
Long stopping distance	—	BR-69
Unexpected pedal action	—	BR-68
ABS does not work.	—	BR-69
ABS works frequently.	—	BR-68

## Wheel Sensor or Rotor DIAGNOSTIC PROCEDURE

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

**NOTE:**

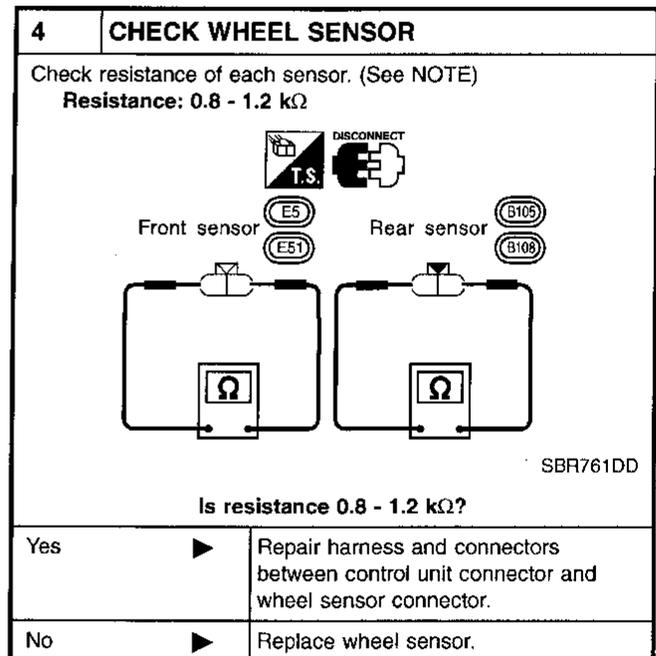
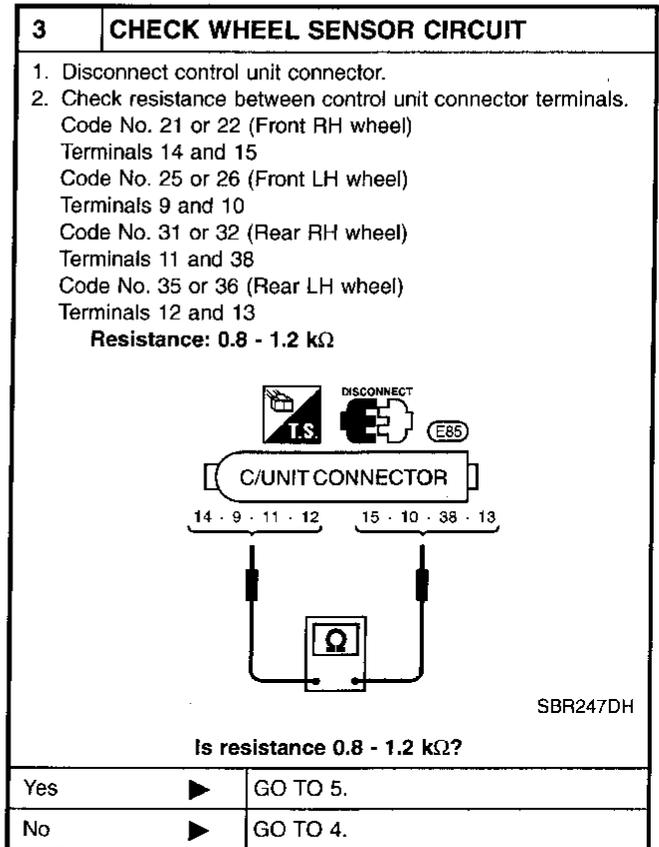
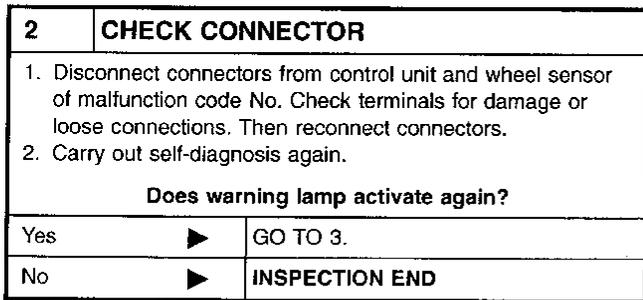
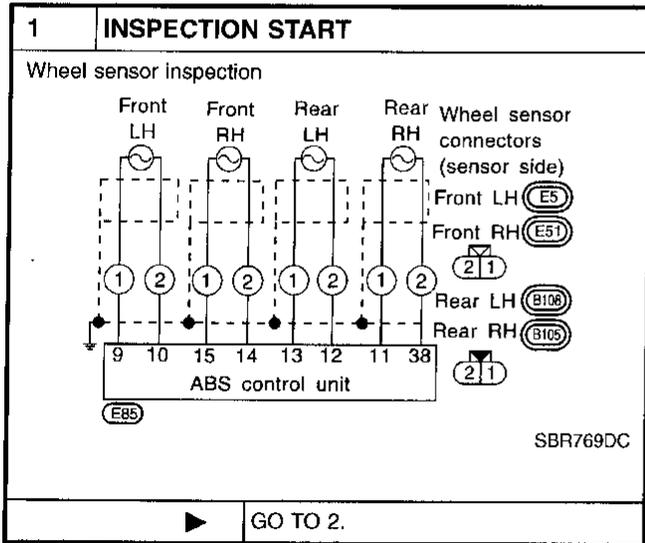
Wheel position should be identified by code No. except code No. 18 (sensor rotor).

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NCBR0064S01

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# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

**ABS**

Wheel Sensor or Rotor (Cont'd)

<b>5</b>	<b>CHECK TIRE</b>
Check for inflation pressure, wear and size of each tire. (See NOTE)	
<b>Are tire pressure and size correct and is tire wear within specifications?</b>	
Yes	▶ GO TO 6.
No	▶ Adjust tire pressure or replace tire(s). (See NOTE)

<b>7</b>	<b>CHECK SENSOR ROTOR</b>
Check sensor rotor for teeth damage. (See NOTE)	
<b>Is sensor rotor free from damage?</b>	
Yes	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.
No	▶ Replace sensor rotor. (See NOTE)

<b>6</b>	<b>CHECK WHEEL BEARING</b>
Check wheel bearing axial end play. Check clearance between sensor and rotor. (See NOTE)	
<b>Clearance:</b>	
<b>Front</b>	
0.749 - 1.355 mm (0.0295 - 0.0533 in)	
<b>Rear</b>	
0.75 - 1.338 mm (0.0295 - 0.0527 in)	
<b>Is axial end play and clearance within specifications?</b>	
Yes	▶ GO TO 7.
No	▶ Clean sensor fixing portion, or replace sensor.

**ABS Actuator Solenoid Valve  
DIAGNOSTIC PROCEDURE**

=NCBR0063

NCBR0063S01

Malfunction code No. 41, 45, 51, 55, 42, 46, 52, 56

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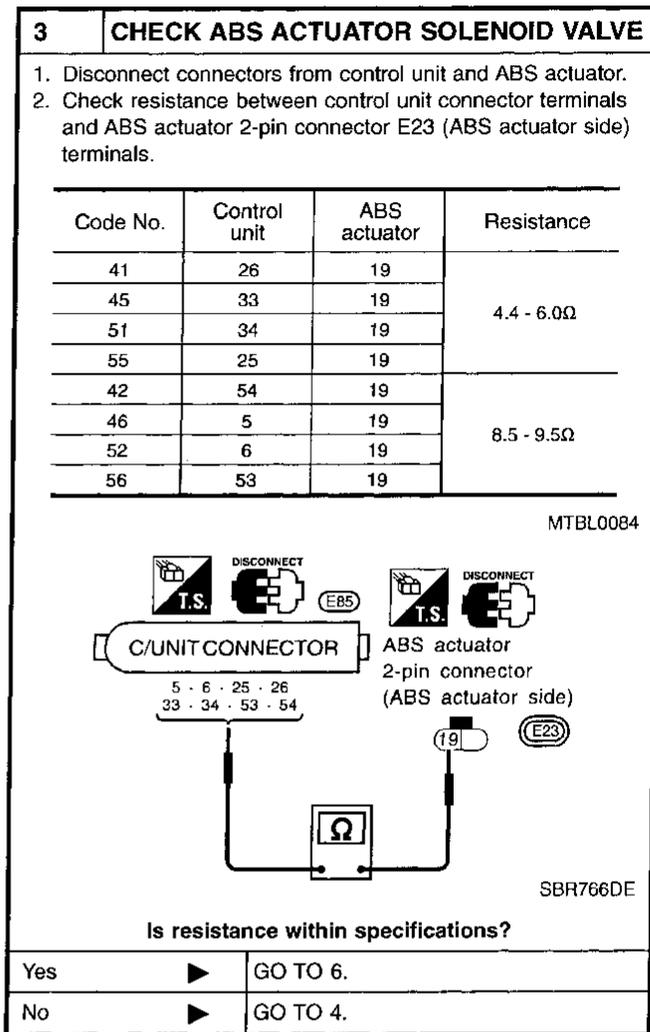
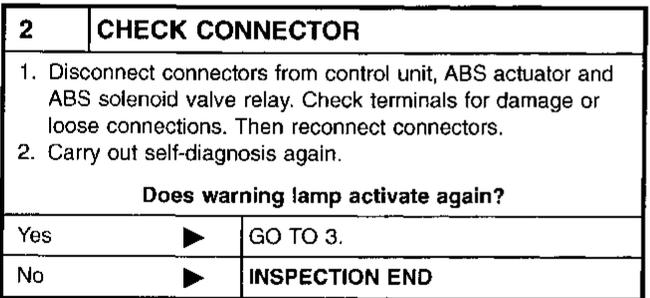
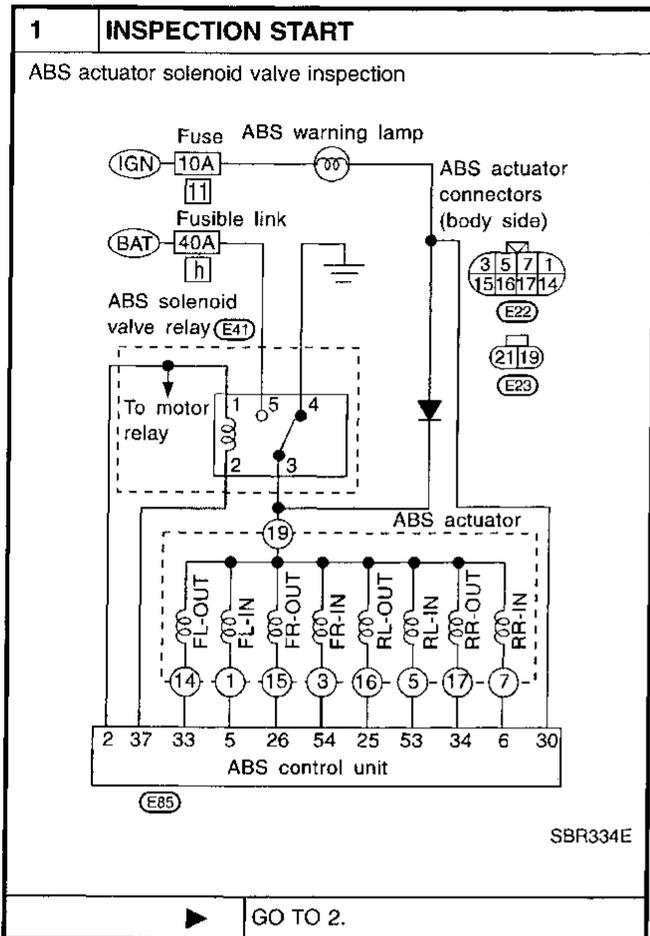
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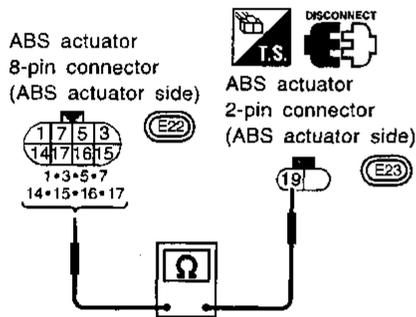
*ABS Actuator Solenoid Valve (Cont'd)*

### 4 CHECK ABS ACTUATOR SOLENOID VALVE

1. Disconnect ABS actuator 8-pin connector.
2. Check resistance between ABS actuator 8-pin connector E62 (ABS actuator side) terminals and ABS actuator 2-pin connector E18 (ABS actuator side) terminals.

Code No.	ABS actuator		Resistance
41	15	19	4.4 - 6.0Ω
45	14	19	
51	17	19	
55	16	19	
42	3	19	
46	1	19	8.5 - 9.5Ω
52	7	19	
56	5	19	

MTBL0085



SBR767DD

**Is resistance within specifications?**

Yes	▶	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connectors E22, E23</li> <li>● Harness for open or short between actuator connector and control unit</li> <li>● Harness for open or short between actuator 8-pin connector and actuator 2-pin connector</li> </ul> <p>If NG, repair harness or connectors.</p>
No	▶	GO TO 5.

### 5 CHECK ABS ACTUATOR SOLENOID VALVE

Check resistance between solenoid valve terminals 1, 3, 5, 7, 14, 15, 16, 17.

ABS actuator				Resistance
OUT solenoid valve		14	15, 16, 17	8.8 - 12.0Ω
		15	16, 17	
		16	17	
Solenoid valve	IN	1, 3, 5, 7	—	12.9 - 15.5Ω
	OUT	—	14, 15, 16, 17	
IN solenoid valve		1	3, 5, 7	17.0 - 19.0Ω
		3	5, 7	
		5	7	

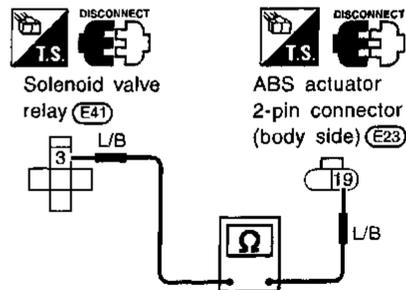
MTBL0086

**Is resistance within specifications?**

Yes	▶	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connectors E22, E23</li> <li>● Harness for open or short between actuator connector and control unit</li> <li>● Harness for open or short between actuator 8-pin connector and actuator 2-pin connector</li> </ul> <p>If NG, repair harness or connectors.</p>
No	▶	Replace ABS actuator.

### 6 CHECK ABS ACTUATOR SOLENOID VALVE RELAY

1. Remove solenoid valve relay.
  2. Check continuity between ABS actuator 2-pin connector E18 (body side) terminal 19 and solenoid valve relay terminal 3.
- Continuity should exist.**



SBR768DE

**Does continuity exist?**

Yes	▶	Go to "Solenoid Valve Relay", BR-59.
No	▶	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connectors E23, E41</li> <li>● Harness for open or short between actuator connector and solenoid valve relay terminal (relay box side)</li> </ul> <p>If NG, repair harness or connectors.</p>

**Solenoid Valve Relay**  
**DIAGNOSTIC PROCEDURE**  
Malfunction code No. 63

NCBR0066

NCBR0066S01

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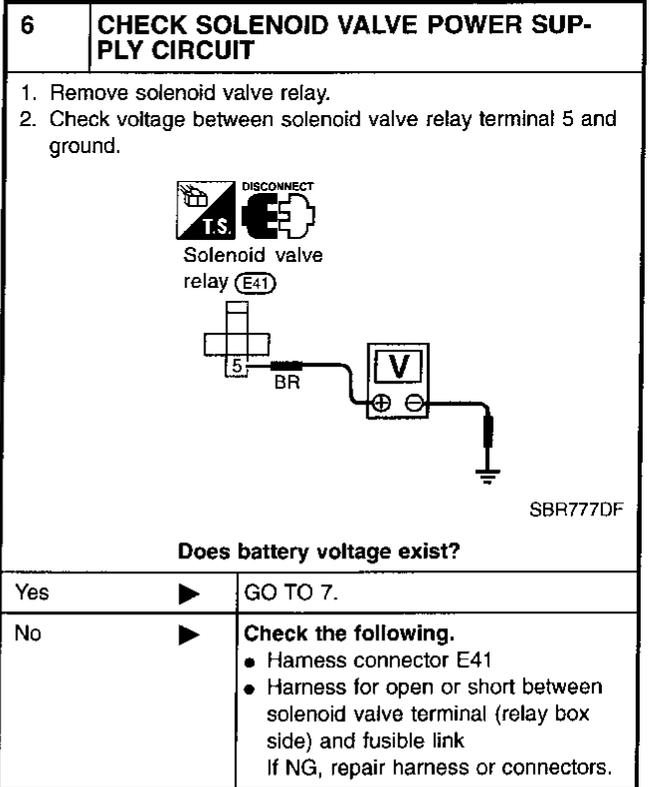
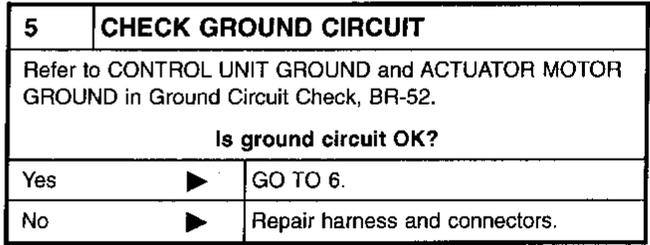
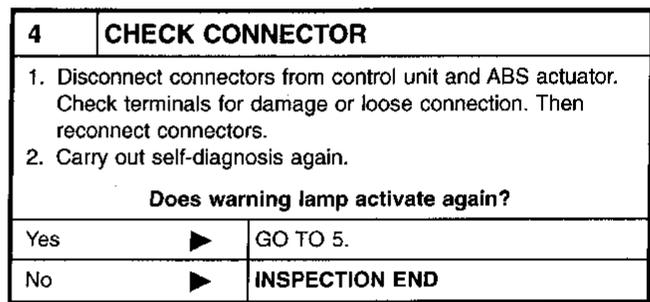
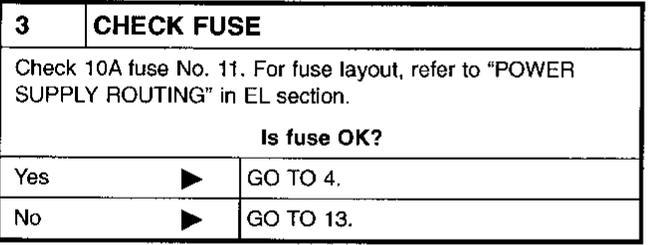
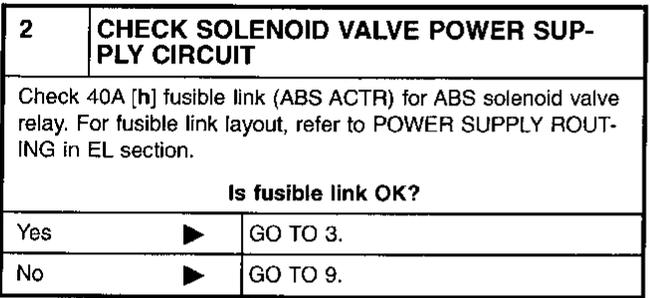
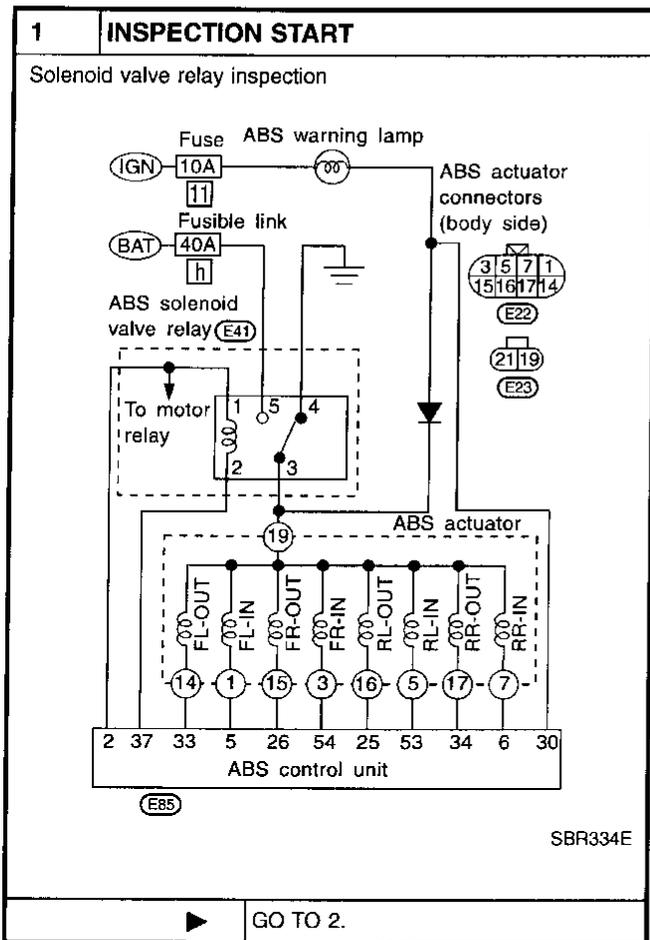
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*Solenoid Valve Relay (Cont'd)*

<b>7</b>	<b>CHECK CIRCUIT</b>
<p>1. Disconnect control unit connector.                  2. Check continuity between control unit connector terminals and solenoid valve relay terminals.</p>	
Control unit	Solenoid valve relay
37	2
2	1
30	3

MTBL0089

SBR778DE

<b>Does continuity exist?</b>	
Yes	▶ GO TO 8.
NG	▶ <b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E85</li> <li>● Harness for open or short between solenoid valve relay terminal (relay box side) and control unit</li> </ul> If NG, repair harness or connectors.

<b>8</b>	<b>CHECK SOLENOID VALVE RELAY</b>																		
<table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2">Relay type</th> <th rowspan="2">Condition</th> <th colspan="2">Solenoid valve relay</th> </tr> <tr> <th colspan="2">Continuity existence between terminals</th> </tr> <tr> <td></td> <td></td> <th>3 and 4</th> <th>3 and 5</th> </tr> </thead> <tbody> <tr> <td>Battery voltage not applied between each terminal</td> <td>1 and 2</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td>Battery voltage applied between each terminal</td> <td>1 and 2</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Relay type	Condition	Solenoid valve relay		Continuity existence between terminals				3 and 4	3 and 5	Battery voltage not applied between each terminal	1 and 2	Yes	No	Battery voltage applied between each terminal	1 and 2	No	Yes
Relay type	Condition			Solenoid valve relay															
		Continuity existence between terminals																	
		3 and 4	3 and 5																
Battery voltage not applied between each terminal	1 and 2	Yes	No																
Battery voltage applied between each terminal	1 and 2	No	Yes																
MTBL0090																			
<p><b>While applying battery voltage to relay terminals, insert fuse into the circuit.</b></p>																			
SBR776D																			
<p><b>Is solenoid valve relay OK?</b></p>																			
Yes	▶ Go to "ABS Actuator Solenoid Valve", BR-57.																		
No	▶ Replace solenoid valve relay.																		

<b>9</b>	<b>REPLACE FUSIBLE LINK</b>
<p>Replace fusible link.</p>	
<p><b>Does the fusible link blow out when ignition switch is turned "ON"?</b></p>	
Yes	▶ GO TO 10.
No	▶ <b>INSPECTION END</b>

<b>10</b>	<b>CHECK RELAY UNIT POWER SUPPLY CIRCUIT</b>
<p>1. Remove solenoid valve relay. 2. Check continuity between solenoid valve relay terminal 5 and ground.</p>	
<p style="text-align: center;">SBR779DF</p>	
<b>Does continuity exist?</b>	
Yes	▶ GO TO 11.
No	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E41</li> <li>● Harness for open or short between solenoid valve terminal (relay box side) and fusible link</li> </ul> <p>If NG, repair harness or connectors.</p>

<b>12</b>	<b>CHECK ABS SOLENOID VALVE</b>
<p>Check continuity between ABS actuator 2-pin connector E23 (ABS actuator side) terminal 19 and ground.</p>	
<p style="text-align: center;">SBR494DF</p>	
<b>Does continuity exist?</b>	
Yes	▶ Replace ABS actuator.
No	▶ Go to "ABS Actuator Solenoid Valve", BR-57.

<b>11</b>	<b>CHECK ABS SOLENOID VALVE RELAY</b>
<p>1. Disconnect ABS actuator 2-pin connectors and control unit connector. 2. Check continuity between ABS actuator 2-pin connector E23 (body side) terminal 19 and ground.</p>	
<p style="text-align: center;">SBR493DF</p>	
<b>Does continuity exist?</b>	
Yes	▶ Replace ABS relay box.
No	▶ GO TO 12.

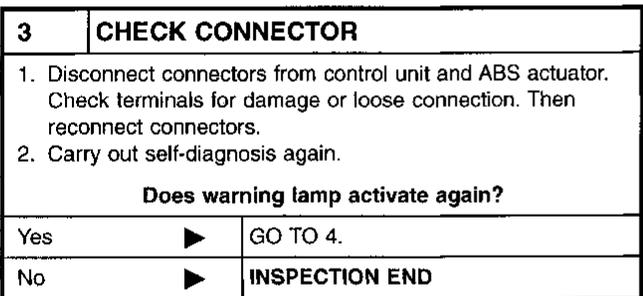
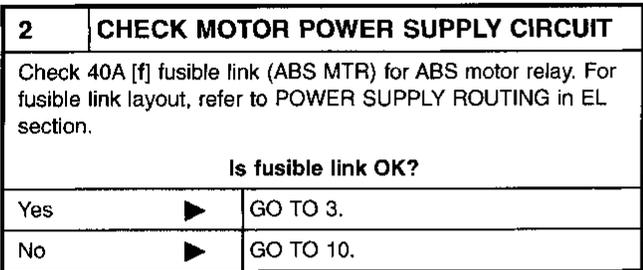
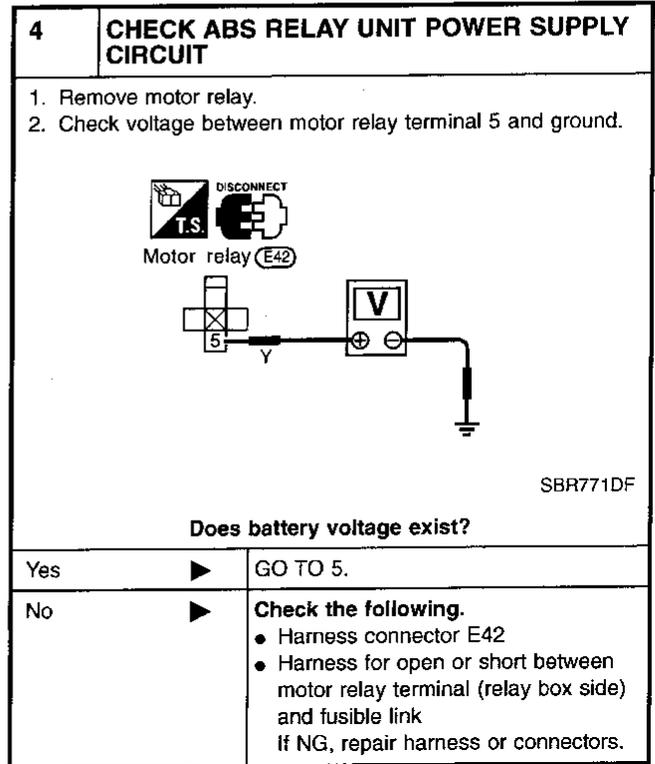
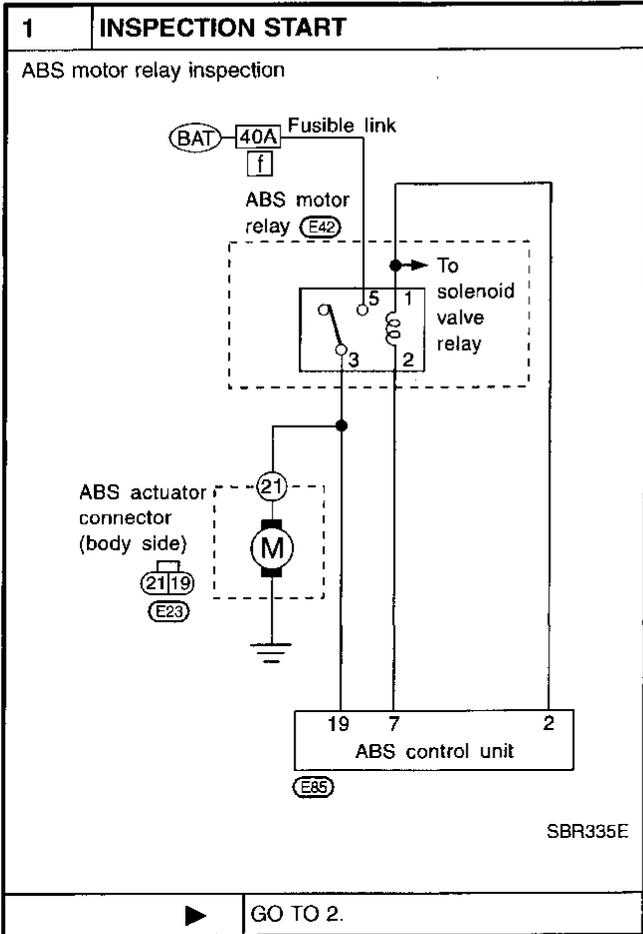
<b>13</b>	<b>REPLACE FUSE</b>
<p>Replace fuse.</p> <p style="text-align: center;"><b>Does the fuse blow out when ignition switch is turned "ON"?</b></p>	
Yes	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E85</li> <li>● Harness for open or short between ABS control unit connector and fuse</li> </ul> <p>If NG, repair harness or connectors.</p>
NG	▶ <b>INSPECTION END</b>

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**Motor Relay or Motor  
DIAGNOSTIC PROCEDURE**  
Malfunction code No. 61

NCBR0065

NCBR0065S01

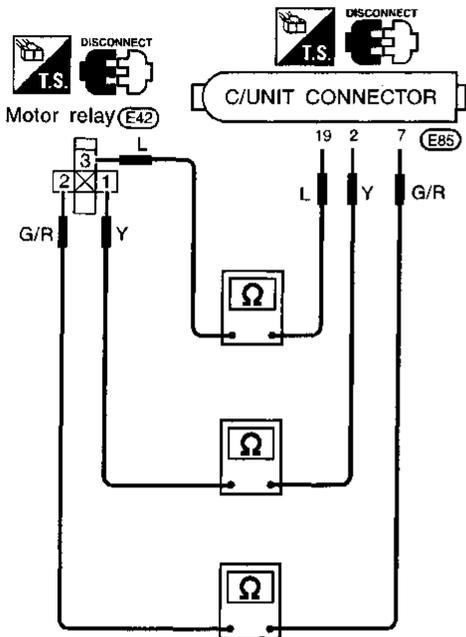


**5 CHECK CIRCUIT**

1. Disconnect control unit connector.
2. Check continuity between control unit connector terminals and motor relay terminals.

Control unit	Motor relay
7	2
19	3
2	1

MTBL0087



SBR772DE

Does continuity exist?

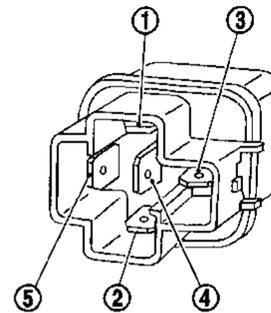
Yes	▶	GO TO 6.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>• Harness connectors E42, E85</li> <li>• Harness for open or short between motor relay terminal (relay box side) and control unit</li> </ul> If NG, repair harness or connectors.

**6 CHECK MOTOR RELAY**

Relay type	ABS motor relay	
Condition	Continuity existence between terminals 3 and 5	
Battery voltage not applied between each terminal	1 and 2	No
Battery voltage applied between each terminal	1 and 2	Yes

MTBL0088

While applying battery voltage to relay terminals, insert fuse into the circuit.



SBR776D

Is motor relay OK?

Yes	▶	GO TO 7.
No	▶	Replace motor relay.

**7 CHECK ACTUATOR MOTOR GROUND CIRCUIT**

Refer to ACTUATOR MOTOR GROUND in Ground Circuit Check, BR-52.

Is ground circuit OK?

Yes	▶	GO TO 8.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>• Harness connector E42</li> <li>• Harness for open or short between solenoid valve relay terminal (relay box side) and ground</li> </ul> If NG, repair harness or connectors.

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Motor Relay or Motor (Cont'd)

<b>8</b>	<b>CHECK ABS ACTUATOR CIRCUIT</b>
<p>Check continuity between ABS actuator 2-pin connector E23 (ABS actuator side) terminal 21 and actuator motor ground terminal.</p>	
<b>Does continuity exist?</b>	
Yes	▶ GO TO 9.
No	<p>▶ <b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E23</li> <li>● Harness for open or short between actuator connector and motor terminal</li> </ul> <p>If NG, repair harness or connectors.</p>

<b>11</b>	<b>CHECK MOTOR POWER SUPPLY CIRCUIT</b>
<p>1. Remove motor relay. 2. Check continuity between motor relay terminal 5 and ground.</p>	
<b>Does continuity exist?</b>	
Yes	▶ GO TO 12.
No	<p>▶ <b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E42</li> <li>● Harness for open or short between motor relay terminal (relay box side) and fusible link</li> </ul> <p>If NG, repair harness or connectors.</p>

<b>9</b>	<b>CHECK MOTOR</b>
<p>1. Remove motor relay. 2. Connect actuator connectors. 3. Connect suitable wire between motor relay connector terminals 3 and 5. <b>Do not connect wire for more than 5 seconds.</b></p>	
<b>Does motor operate?</b>	
Yes	▶ Go to "Low Voltage", BR-65.
No	▶ Replace ABS actuator.

<b>12</b>	<b>CHECK ABS MOTOR RELAY</b>
<p>1. Disconnect control unit connector. 2. Check continuity between motor relay terminal 3 and ground.</p>	
<b>Does continuity exist?</b>	
Yes	<p>▶ <b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E42</li> <li>● Harness for open or short between motor relay terminal (relay box side) and fusible link</li> </ul> <p>If NG, repair harness or connectors.</p>
No	▶ GO TO 13.

<b>10</b>	<b>REPLACE FUSIBLE LINK</b>
<p>Replace fusible link.</p> <p style="text-align: center;"><b>Does the fusible link blow out when ignition switch is turned "ON"?</b></p>	
Yes	▶ GO TO 11.
No	▶ INSPECTION END

<b>13</b>	<b>CHECK ABS MOTOR POWER SUPPLY CIRCUIT</b>
<p>1. Remove motor ground. 2. Check continuity between ABS actuator 2-pin connector E23 (ABS actuator side) terminal 21 and ground.</p>	
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>ABS actuator 2-pin connector (ABS actuator side)</p> </div> <div style="text-align: center;"> <p>Remove motor ground.</p> </div> </div> <p style="text-align: right; margin-right: 50px;">SBR489DF</p>	
<b>Does continuity exist?</b>	
Yes	▶ Replace ABS actuator.
No	▶ GO TO 14.

<b>14</b>	<b>CHECK MOTOR</b>
Go to "9 CHECK MOTOR" in "Motor Relay or Motor" (preceding page).	
<b>Does motor operate?</b>	
Yes	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.
No	▶ Replace ABS actuator.

**Low Voltage  
DIAGNOSTIC PROCEDURE  
Malfunction code No. 57**

NCBR0067

NCBR0067S01

<b>1</b>	<b>INSPECTION START</b>
ABS control unit power supply and ground circuit inspection	
<p style="text-align: right; margin-right: 50px;">SBR337E</p>	
▶ GO TO 2.	

<b>2</b>	<b>CHECK CONNECTOR</b>
<p>1. Disconnect control unit connectors. Check terminals for damage or loose connections. Then reconnect connectors. 2. Carry out self-diagnosis again.</p>	
<b>Does warning lamp activate again?</b>	
Yes	▶ GO TO 3.
No	▶ INSPECTION END

<b>3</b>	<b>CHECK ABS CONTROL UNIT POWER SUPPLY</b>
<p>1. Disconnect control unit connector. 2. Check voltage between control unit connector terminal 1 and ground.</p>	
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> </div> <div style="text-align: center;"> <p style="text-align: right; margin-right: 50px;">SBR726DD</p> </div> </div>	
<b>Does battery voltage exist when ignition switch is turned ON?</b>	
Yes	▶ GO TO 4.
No	▶ GO TO 5.

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# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS

Low Voltage (Cont'd)

<b>4</b>	<b>CHECK CONTROL UNIT GROUND</b>
Refer to CONTROL UNIT GROUND in Ground Circuit Check, BR-53.	
<b>Is ground circuit OK?</b>	
OK	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.
NG	▶ <b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E85</li> <li>● Harness for open or short between control unit and ground</li> </ul> If NG, repair harness or connectors.

<b>6</b>	<b>CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT</b>
Check continuity between battery and control unit connector terminal 1.	
<b>Does continuity exist?</b>	
Yes	▶ Check battery. Refer to BATTERY in EL section.
No	▶ <b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E85</li> <li>● Harness for open or short between control unit and fuse</li> </ul> If NG, repair harness or connectors.

<b>5</b>	<b>CHECK FUSE</b>
Check 7.5A fuse 3 (Engine control) for control unit. Refer to POWER SUPPLY ROUTING in EL section.	
<b>Is fuse OK?</b>	
Yes	▶ GO TO 6.
No	▶ Replace fuse.

## Control Unit DIAGNOSTIC PROCEDURE Malfunction code No. 71

NCBR0068

NCBR0068S01

<b>1</b>	<b>INSPECTION START</b>
ABS control unit power supply and ground circuit inspection	
SBR337E	
▶ GO TO 2.	

<b>2</b>	<b>CHECK CONNECTOR</b>
1. Disconnect control unit connector. Check terminals for damage or loose connections. Then reconnect connectors. 2. Carry out self-diagnosis again.	
<b>Does warning lamp activate again?</b>	
Yes	▶ GO TO 3.
No	▶ <b>INSPECTION END</b>

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

**ABS**

*Control Unit (Cont'd)*

<b>3</b>	<b>CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT</b>	
Check voltage. Refer to "3. CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT" in "Low Voltage", BR-65.		
<b>Does battery voltage exist when ignition switch is turned ON?</b>		
Yes	▶	GO TO 4.
No	▶	Repair.

<b>4</b>	<b>CHECK WARNING LAMP INDICATION</b>	
Does warning lamp indicate code No. 71 again?		
Yes	▶	Replace control unit.
No	▶	Inspect the system according to the code No.

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1. ABS Works Frequently

## 1. ABS Works Frequently

NCBR0073

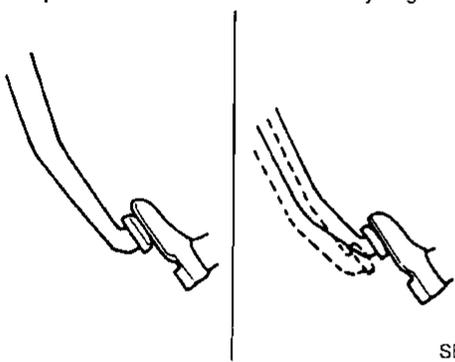
<b>1</b>	<b>CHECK BRAKE FLUID PRESSURE</b>	
Check brake fluid pressure distribution. Refer to dual proportioning valve inspection in "DUAL PROPORTIONING VALVE", BR-10.		
<b>Is brake fluid pressure distribution normal?</b>		
Yes	▶	GO TO 2.
No	▶	Perform Preliminary Check. Refer to BR-51.

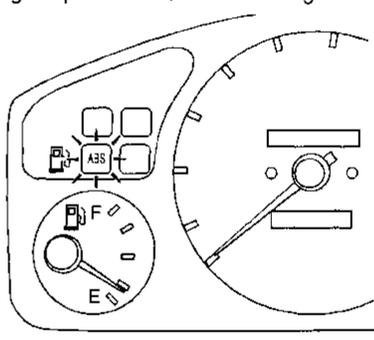
<b>3</b>	<b>CHECK FRONT AXLE</b>	
Check front and rear axles for excessive looseness. Refer to AX section, "Front Wheel Bearing", "ON-VEHICLE SERVICE" and "Rear Wheel Bearing", "ON-VEHICLE SERVICE".		
<b>Is front axle installed properly?</b>		
Yes	▶	Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-68.
No	▶	Repair.

<b>2</b>	<b>CHECK WHEEL SENSOR</b>	
1. Check wheel sensor connector for terminal damage or loose connections. 2. Perform wheel sensor mechanical check. Refer to "Wheel Sensor or Rotor", BR-55.		
<b>Are wheel sensors functioning properly?</b>		
Yes	▶	GO TO 3.
No	▶	Repair.

## 2. Unexpected Pedal Action

NCBR0071

<b>1</b>	<b>CHECK BRAKE PEDAL STROKE</b>	
Check brake pedal stroke. Is stroke excessively large?		
		
SBR540A		
Yes	▶	Perform Preliminary Check. Refer to BR-51.
No	▶	GO TO 2.

<b>3</b>	<b>CHECK WARNING LAMP INDICATION</b>	
Ensure warning lamp remains off while driving.		
		
SBR326E		
<b>Is warning lamp turned off?</b>		
Yes	▶	GO TO 4.
No	▶	Carry out self-diagnosis. Refer to BR-41, BR-43.

<b>2</b>	<b>CHECK CONNECTOR AND PERFORMANCE</b>	
Disconnect ABS solenoid valve relay and check whether brake is effective.		
<b>Does connector function properly when brake pedal is depressed?</b>		
Yes	▶	GO TO 3.
No	▶	Perform Preliminary Check. Refer to BR-51.

<b>4</b>	<b>CHECK WHEEL SENSOR</b>	
1. Check wheel sensor connector for terminal damage or loose connection. 2. Perform wheel sensor mechanical check. Refer to "Wheel Sensor Rotor", BR-55.		
<b>Is wheel sensor mechanism OK?</b>		
Yes	▶	Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.
No	▶	Repair.

3. Long Stopping Distance

NCBR0070

<b>1</b>	<b>CHECK CONNECTOR AND PERFORMANCE</b>	
Disconnect ABS solenoid valve relay and check whether stopping distance is still long.		
<b>Does connector function properly when brake pedal is depressed?</b>		
Yes	▶	Perform Preliminary Check and air bleeding.
No	▶	Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-68.

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**NOTE:**

Stopping distance may be larger than vehicles without ABS when road condition is slippery.

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4. ABS Does Not Work

NCBR0072

<b>1</b>	<b>CHECK WARNING LAMP INDICATION</b>	
Does the ABS warning lamp activate?		
Yes	▶	Carry out self-diagnosis. Refer to BR-41, 43.
No	▶	Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-68.

AT

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**BR**

**NOTE:**

ABS does not work when vehicle speed is under 10 km/h (6 MPH).

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## 5. Pedal Vibration and Noise

=NCBR0069

<b>1</b>	<b>INSPECTION START</b>
Pedal vibration and noise inspection	
Brake pedal 	
SAT797A	
▶ GO TO 2.	

<b>2</b>	<b>CHECK SYMPTOM</b>
1. Apply brake. 2. Start engine.	
<b>Does the symptom appear only when engine is started?</b>	
Yes	▶ Carry out self-diagnosis. Refer to BR-41, 43.
No	▶ GO TO 3.

<b>3</b>	<b>RECHECK SYMPTOM</b>
Does the symptom appear when electrical equipment switches (such as headlamp) are operated?	
Yes	▶ GO TO 4.
No	▶ Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-68.

<b>4</b>	<b>CHECK WHEEL SENSOR</b>
Check wheel sensor shield ground. For location of shield ground, refer to wiring diagram and "HARNESS LAYOUT" in EL section.	
<b>Is wheel sensor shield grounded properly?</b>	
Yes	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.
No	▶ Repair.

**NOTE:**

ABS may operate and cause vibration under any of the following conditions.

- Applying brake gradually when shifting or operating clutch.
- Low friction (slippery) road.
- High speed cornering.
- Driving over bumps and pot holes.
- Engine speed is over 5,000 rpm with vehicle stopped.

**6. Warning Lamp Does Not Come On When Ignition Switch Is Turned On**

-NCBR0074

<b>1</b>	<b>INSPECTION START</b>
Warning lamp circuit inspection	
SBR334E	
▶ GO TO 2.	

<b>2</b>	<b>CHECK FUSE</b>
Check 10A fuse No. 11 for warning lamp. For fuse layout, refer to "POWER SUPPLY ROUTING" in EL section.	
<b>Is fuse OK?</b>	
Yes	▶ GO TO 3.
No	▶ Replace fuse.

<b>3</b>	<b>CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT</b>
<ol style="list-style-type: none"> <li>1. Install 10A fuse.</li> <li>2. Remove solenoid valve relay.</li> <li>3. Disconnect connectors from control unit and actuator.</li> <li>4. Check voltage between control unit connector terminal 30 and ground after turning ignition switch "ON".</li> </ol>	
SBR715DC	
<b>Does battery voltage exist after turning ignition switch "ON"?</b>	
Yes	▶ GO TO 5.
No	▶ GO TO 4.

<b>4</b>	<b>CHECK WARNING LAMP</b>
Check warning lamp bulb.	
<b>Is warning lamp bulb OK?</b>	
Yes	▶ Repair harness and connectors between fuse and control unit connector terminal 30 (including combination meter).
No	▶ Replace bulb.

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# TROUBLE DIAGNOSES FOR SYMPTOMS

**ABS**

## 6. Warning Lamp Does Not Come On When Ignition Switch Is Turned On (Cont'd)

### 5 CHECK CIRCUIT

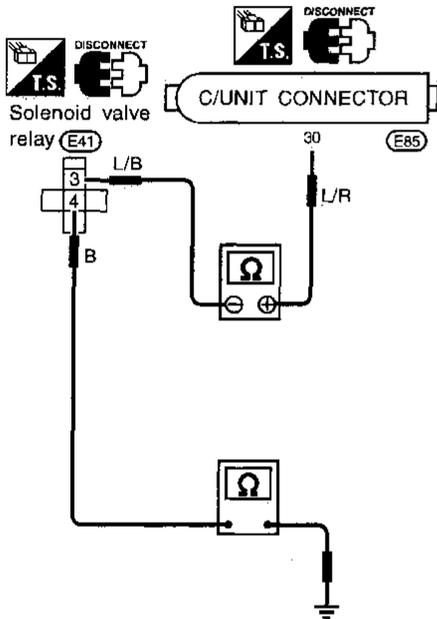
1. Remove solenoid valve relay.
2. Check continuity between control unit terminals and solenoid valve relay terminals.

ABS control unit	Solenoid valve relay
30 (+)	3 (-)
Ground	4

MTBL0091

**NOTE:**

Pay attention to tester polarity.  
 Specifications may vary depending on the type of tester.  
 Before performing this inspection, refer to the instruction manual of the tester.



SBR105ED

**Does continuity exist?**

Yes	▶	GO TO 6.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connectors E41, E85</li> <li>● Harness for open or short between solenoid valve relay terminal (relay box side) and control unit</li> </ul>

### 6 CHECK SOLENOID VALVE RELAY

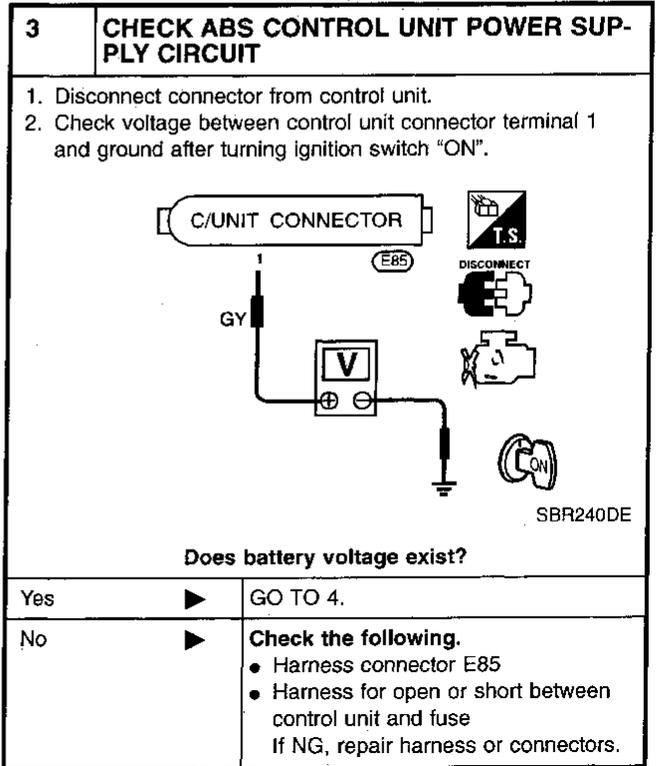
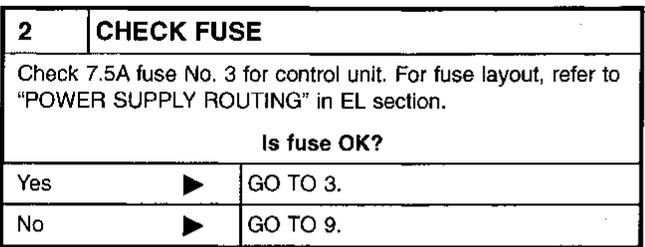
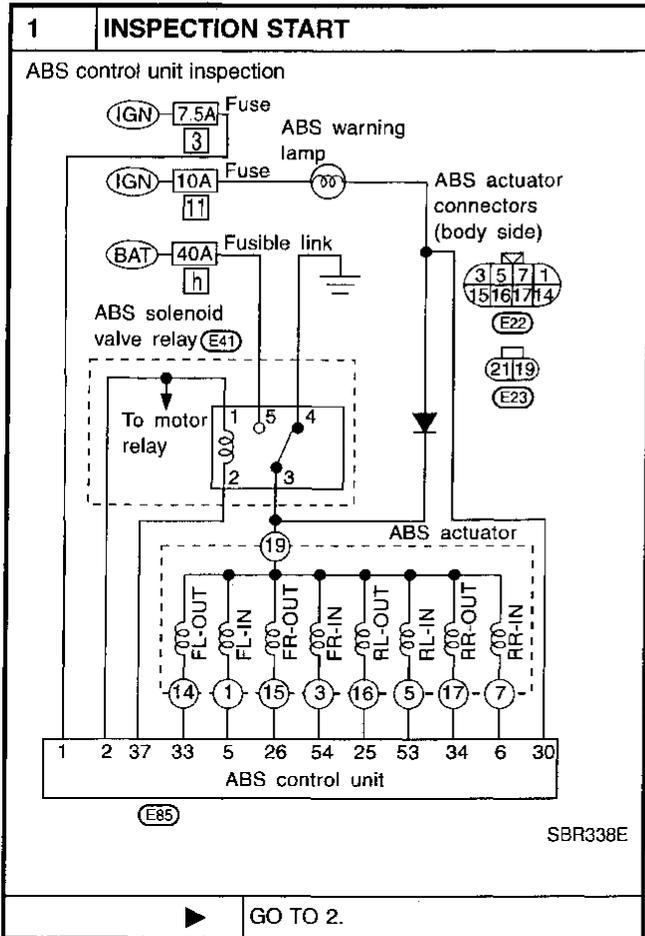
Refer to "8. CHECK SOLENOID VALVE RELAY", "Solenoid Valve Relay", BR-59.

**Is solenoid valve relay OK?**

Yes	▶	Go to "Low Voltage", BR-65.
No	▶	Replace solenoid valve relay.

7. Warning Lamp Stays On When Ignition Switch Is Turned On

-NCBR0075



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
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BR  
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RS  
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SC  
EL  
IDX

# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS

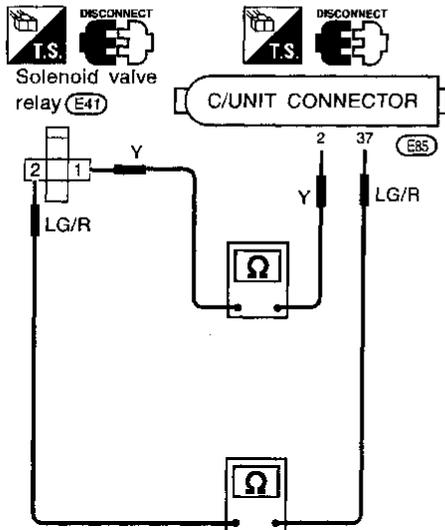
## 7. Warning Lamp Stays On When Ignition Switch Is Turned On (Cont'd)

### 4 CHECK ABS SOLENOID VALVE RELAY COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Remove solenoid valve relay.
3. Check continuity between control unit connector terminals and solenoid valve relay terminals.

Control unit	Solenoid valve relay
2	1
37	2

MTBL0092



SBR781DE

Does continuity exist?

Yes	▶	GO TO 5.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>• Harness connectors E41, E85</li> <li>• Harness for open or short between solenoid valve relay terminal (relay box side) and control unit</li> </ul> If NG, repair harness or connectors.

### 5 CHECK ABS SOLENOID VALVE RELAY

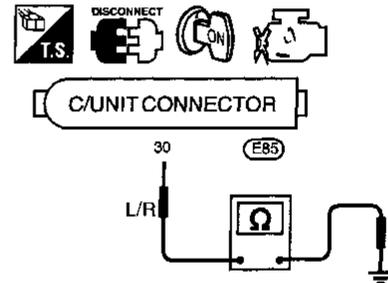
Go to "8. CHECK SOLENOID VALVE RELAY", "Solenoid Valve Relay", BR-59.

Does continuity exist?

Yes	▶	GO TO 6.
No	▶	Replace solenoid valve relay.

### 6 CHECK WARNING LAMP GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect connectors from control unit and remove solenoid valve relay.
3. Check continuity between control unit connector terminal 30 and body ground.



SBR106EB

Does continuity exist?

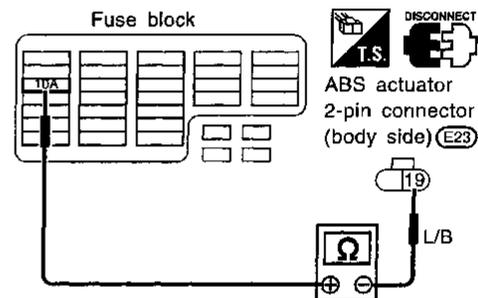
Yes	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>• Harness connector E85</li> <li>• Harness for open or short between control unit and fuse</li> </ul> If NG, repair harness or connectors.
No	▶	GO TO 7.

### 7 CHECK ABS SOLENOID VALVE RELAY CIRCUIT

1. Remove 10A fuse 11 (meter) for warning lamp. For fuse layout, refer to POWER SUPPLY ROUTING in EL section.
2. Disconnect ABS actuator 2-pin connector E23.
3. Check continuity between ABS actuator 2-pin connector (body side) terminal 19 (-) and 10A fuse 11 (fuse box side) terminal (+).

#### NOTE:

Pay attention to tester polarity. Specifications may vary depending on the type of tester. Before performing this inspection, refer to the instruction manual of the tester.



SBR339E

Does continuity exist?

Yes	▶	Replace ABS relay unit.
No	▶	GO TO 8.

# TROUBLE DIAGNOSES FOR SYMPTOMS

**ABS**

7. Warning Lamp Stays On When Ignition Switch Is Turned On (Cont'd)

<b>8</b>	<b>CHECK ABS SOLENOID VALVE CIRCUIT</b>
<p>1. Disconnect ABS actuator 8-pin connector.                  2. Check continuity between each ABS actuator 8-pin connector (ABS actuator side) terminal and body ground.</p>	
<p style="text-align: right;">SBR783DD</p>	
<b>Does continuity exist?</b>	
Yes	▶ Replace ABS actuator.
No	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.

<b>9</b>	<b>REPLACE FUSE</b>
<p>Replace 7.5A fuse No. 3.</p> <p style="text-align: center;"><b>Does the fuse blow out when ignition switch is turned "ON"?</b></p>	
Yes	▶ GO TO 10.
No	▶ INSPECTION END

<b>10</b>	<b>CHECK ABS CONTROL UNIT POWER SUPPLY CIRCUIT</b>
<p>1. Disconnect control unit connector.                  2. Check continuity between control unit connector terminal 1 and body ground.</p>	
<p style="text-align: right;">SBR720DD</p>	
<b>Does continuity exist?</b>	
Yes	▶ <b>Check the following.</b> ● Harness connector E85 ● Harness for open or short between control unit and fuse If NG, repair harness or connectors.
No	▶ Check control unit pin terminals for damage or the connection of control unit harness connector. Reconnect control unit harness connector. Then retest.

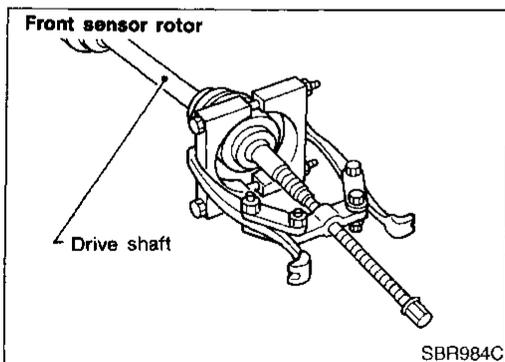
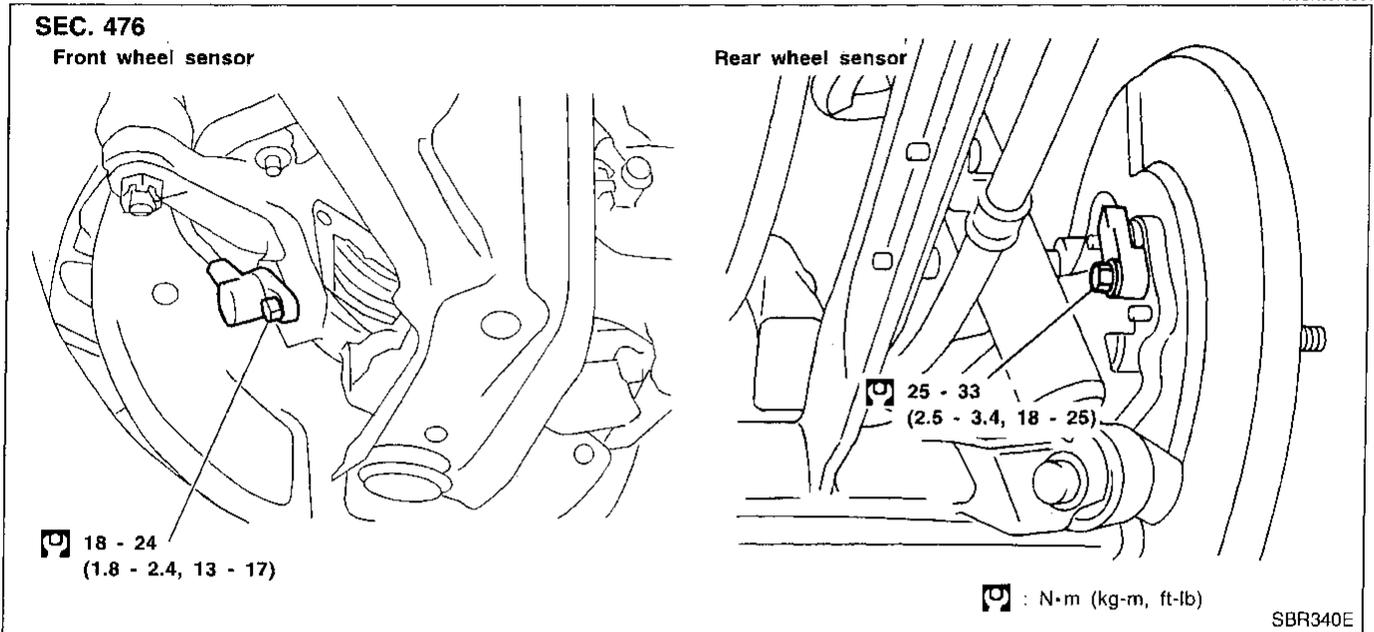
GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX

**CAUTION:**

Be careful not to damage sensor edge and sensor rotor teeth. When removing the front or rear wheel hub assembly, 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.

## Wheel Sensors

NCBR0076S01

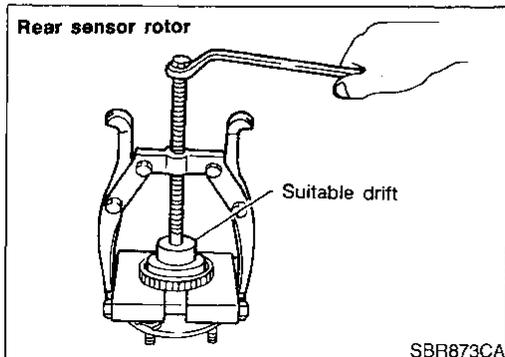


## Sensor Rotor REMOVAL

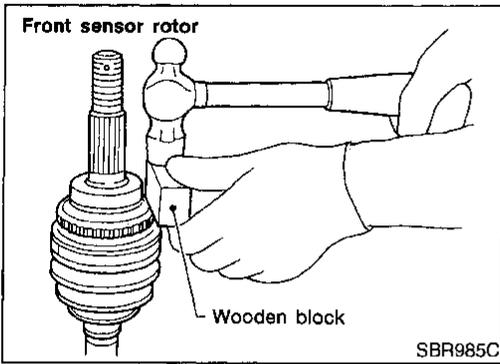
NCBR0076S02

NCBR0076S0201

1. Remove the drive shaft and rear wheel hub. Refer to "Drive Shaft" and "Wheel Hub" in AX section.
2. Remove the sensor rotor using suitable puller, drift and bearing replacer.



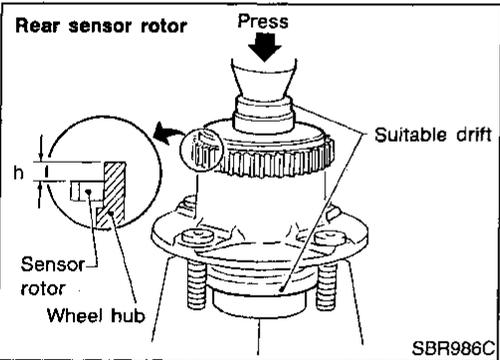
NCBR0076S0202



## INSTALLATION

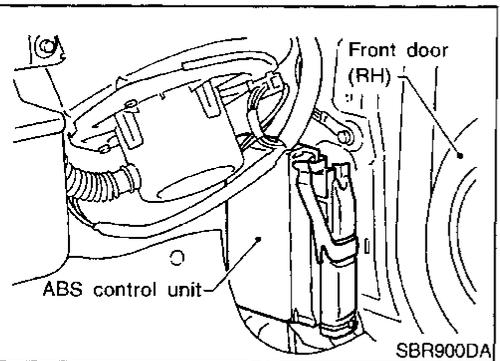
Install the sensor rotor. For front sensor rotor, use hammer and wooden block. For rear sensor rotor, use suitable drift and press.

- Always replace sensor rotor with new one.



- Pay attention to the dimension of rear sensor rotor as show in figure.

**h: 22.7 - 23.7 mm (0.894 - 0.933 in)**



## Control Unit

**Location: Driver side dash side lower.**

NCBR0076S03

- Make sure that the sensor shield ground cable is secured with lower mounting bolt.

GI

MA

EM

LC

EC

FE

CL

MT

AT

AX

SU

**BR**

ST

RS

BT

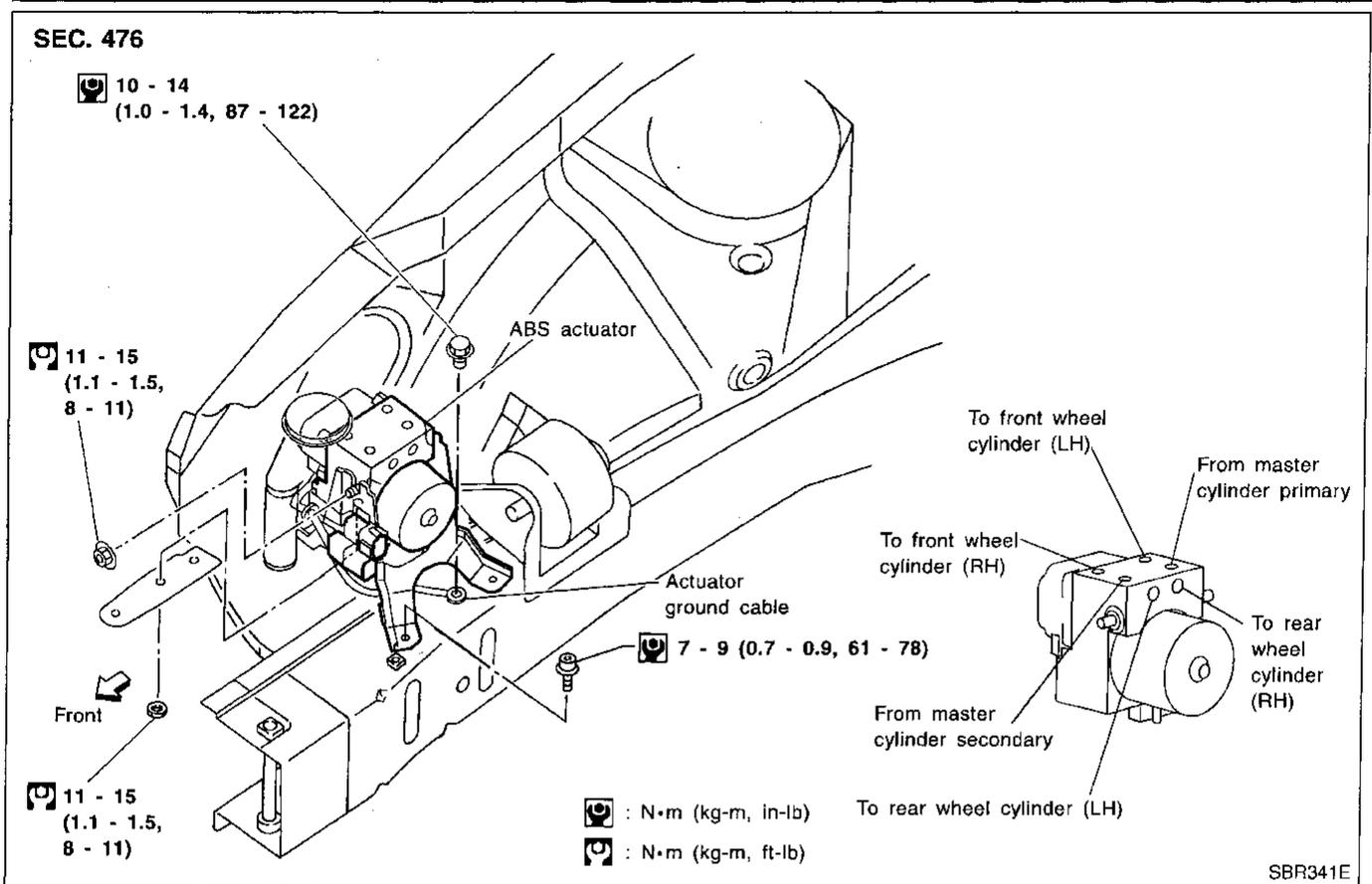
HA

SC

EL

IDX

Control Unit (Cont'd)



## Actuator REMOVAL

NCBR0076S04

NCBR0076S0401

1. Disconnect battery cable and harness connectors.
2. Drain brake fluid. Refer to "Changing Brake Fluid", BR-6.
3. Disconnect brake pipes.
4. Remove fender protector (RH) and remove fixing nuts for actuator.
5. Remove bolts securing actuator to bracket, then remove actuator and bracket as a single unit.
6. Remove bolts securing actuator assembly, then remove actuator assembly from bracket.

## INSTALLATION

NCBR0076S0402

### CAUTION:

- After installation, refill brake fluid. Then bleed air. Refer to "Bleeding Brake System", BR-7.

1. Temporarily install actuator on the bracket.
2. Tighten actuator ground cable.
3. Connect brake pipes temporarily.
4. Tighten fixing nuts, bolts and brake pipes.
5. Connect harness connectors and battery cable.
6. Install fender protector (RH).

**BR-78**

# SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

## General Specifications

NCBR0077  
Unit: mm (in)

Front brake	Brake model		CL25VB disc brake		GI
	Cylinder bore diameter		57.2 (2.252)		MA
	Pad Length × width × thickness		125.6 × 45.3 × 11 (4.94 × 1.783 × 0.43)		EM
	Rotor outer diameter × thickness		280 × 22 (11.02 × 0.87)		
Rear brake	Brake model		CL9HC disc brake		LC
	Cylinder bore diameter		33.96 (1.3370)		EC
	Pad Length × width × thickness		89.1 × 39.5 × 10 (3.508 × 1.555 × 0.39)		
Rotor outer diameter × thickness		258 × 9 (10.16 × 0.35)			
Master cylinder	Cylinder bore diameter		23.81 (15/16)		FE
Control valve	Valve model		Dual proportioning valve		CL
	Split point kPa (kg/cm <sup>2</sup> , psi) × reducing ratio		3,923 (40, 569) × 0.4		
Brake booster	Booster model		M/T	A/T	MT
			M195T	M210T	
	Diaphragm diameter	Primary	205 (8.07)	230 (9.06)	AT
		Secondary	180 (7.09)	180 (7.09)	
Recommended brake fluid		DOT 3		AX	

## Disc Brake

NCBR0078  
Unit: mm (in)

Brake model		CL25VB	CL9HC
Pad wear limit	Minimum thickness	2.0 (0.079)	1.5 (0.059)
	Maximum runout	0.07 (0.0028)	0.07 (0.0028)
Rotor repair limit	Minimum thickness	20.0 (0.787)	8 (0.31)

## Brake Pedal

NCBR0079  
Unit: mm (in)

Free height "H"	M/T	151 - 161 (5.94 - 6.34)
	A/T	159 - 169 (6.26 - 6.65)
Clearance "C" between pedal stopper and threaded end of stop lamp switch or ASCD switch		0.3 - 1.0 (0.012 - 0.039)

\*: Measured from surface of dash reinforcement panel to surface of pedal pad

## Parking Brake

NCBR0080

Type	Center lever	SC
Number of notches [under force of 196 N (20 kg, 44 lb)]	6 - 7	EL
Number of notches when warning lamp switch comes on	1	IDX