

# BRAKE SYSTEM

## SECTION **BR**

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

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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"

NCBR0081

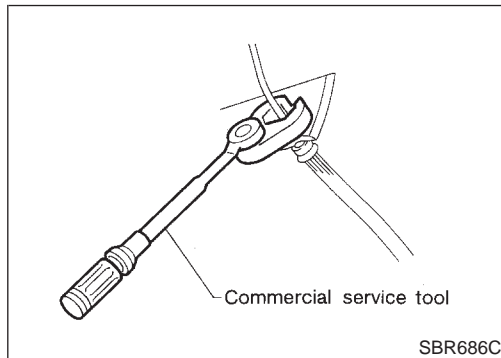
The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to INFINITI G20 is as follows:

- For a frontal collision  
The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision  
The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of 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. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses (except "SEAT BELT PRE-TENSIONER") covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.



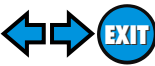
## Precautions for Brake System

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-7.

### WARNING:

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



## PRECAUTIONS

*Wiring Diagrams and Trouble Diagnosis*

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### Wiring Diagrams and Trouble Diagnosis

NCBR0003

When you read wiring diagrams, refer to the following:

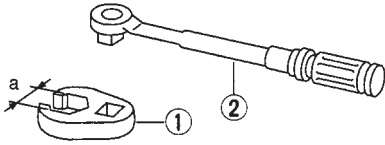
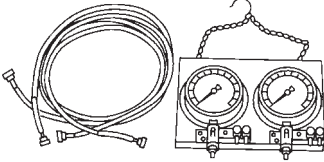
- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING"

When you perform trouble diagnosis, refer to the following:

- GI-36, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-25, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

## Commercial Service Tools

NCBR0004

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 <p>NT360</p>	GI MA EM
Brake fluid pressure gauge	 <p>NT151</p>	LC EC FE
		CL
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		AT
		AX
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# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

## NVH Troubleshooting Chart

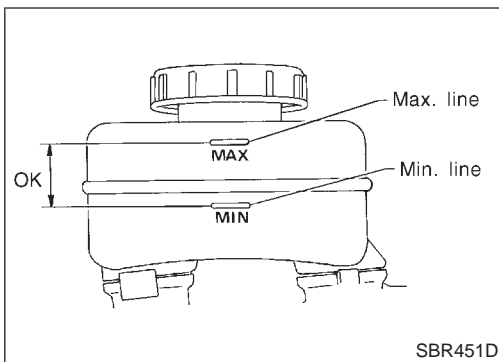
### NVH Troubleshooting Chart

NCSB0006S071

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
	Noise	Shimmy, Judder		
	X		Pads - damaged	BR-20, 24
	X		Pads - uneven wear	BR-20, 24
	X		Shims damaged	BR-20, 24
	X	X	Rotor imbalance	—
	X		Rotor damage	—
	X		Rotor runout	BR-22, 28
	X		Rotor deformation	—
	X		Rotor deflection	—
	X		Rotor rust	—
	X		Rotor thickness variation	BR-22, 28
	X	X	DRIVE SHAFT	NVH in AX section
	X	X	AXLE	NVH in AX section
	X	X	SUSPENSION	NVH in SU section
	X	X	TIRES	NVH in SU section
	X	X	ROAD WHEEL	NVH in SU section
	X	X	STEERING	NVH in ST section

X: Applicable



## Checking Brake Fluid Level

NCBR0006

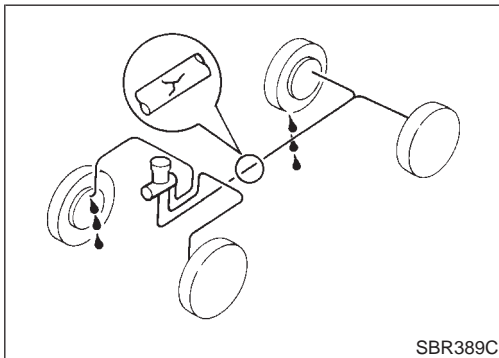
- Check fluid level in reservoir tank. It should be between Max and Min lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- Release parking brake lever and see if brake warning lamp goes off. If not, check brake system for leaks.

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## Checking Brake Line

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### CAUTION:

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

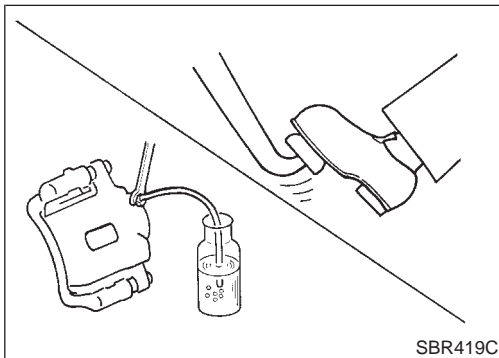
1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.

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## 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.

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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-8.

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## 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

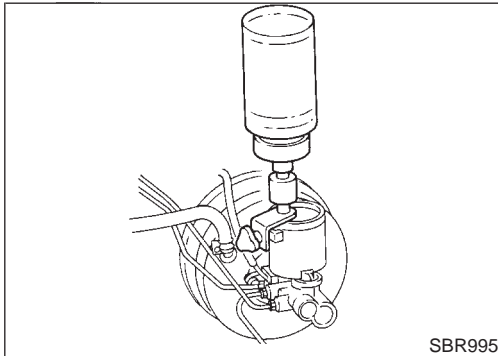
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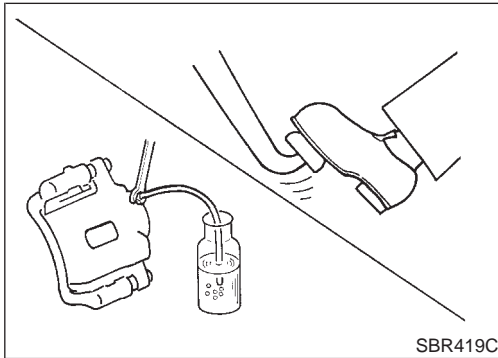
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pressure such that vehicle stopping time equals 3 to 5 seconds.

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.



SBR995



SBR419C

## Bleeding Brake System

NCBR0009

### CAUTION:

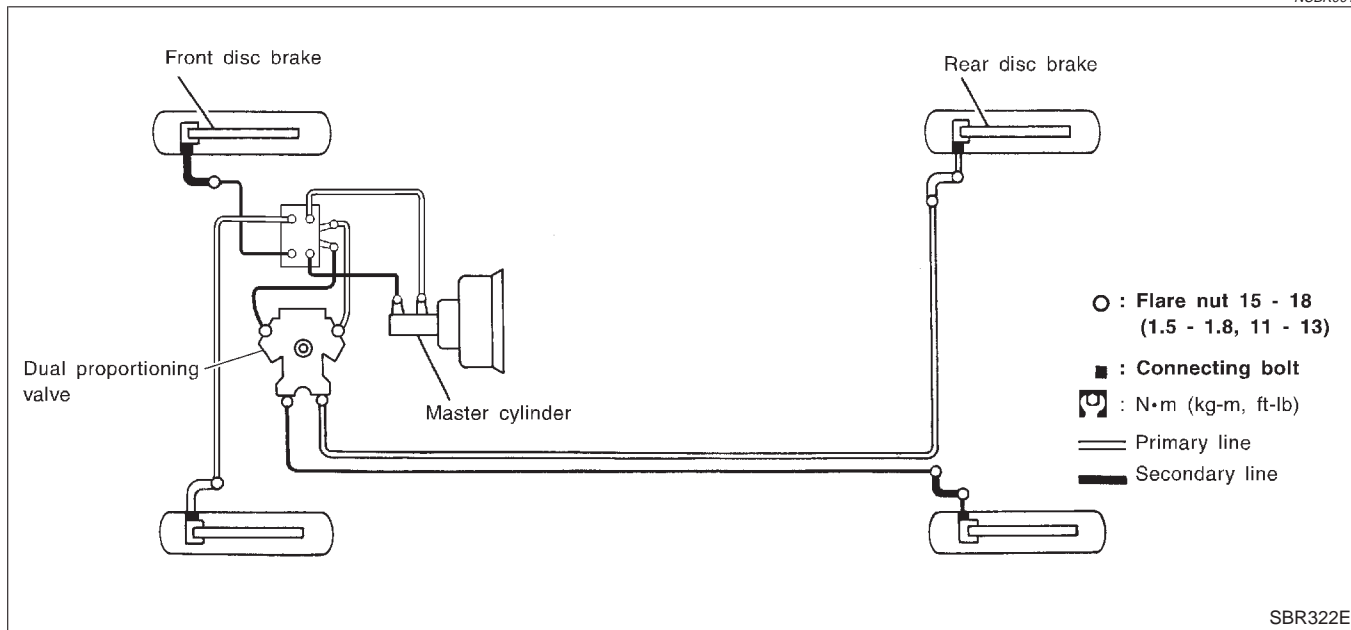
- Carefully monitor brake fluid level at master cylinder during bleeding operation.
- Fill reservoir with new brake fluid “DOT 3”. Make sure it is full at all times while bleeding air out of system.
- Place a container under master cylinder to avoid spillage of brake fluid.
- For models with ABS, turn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

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



## Hydraulic Circuit

NCBR0010



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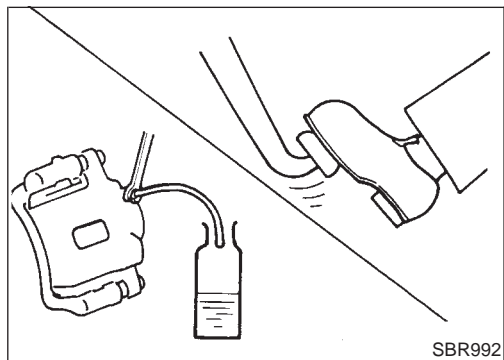
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## Removal

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.

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## Inspection

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

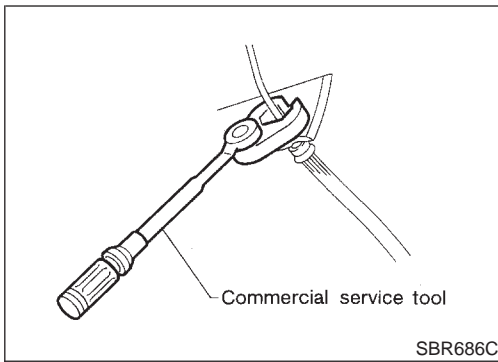
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# BRAKE HYDRAULIC LINE

## Installation

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## Installation

### 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

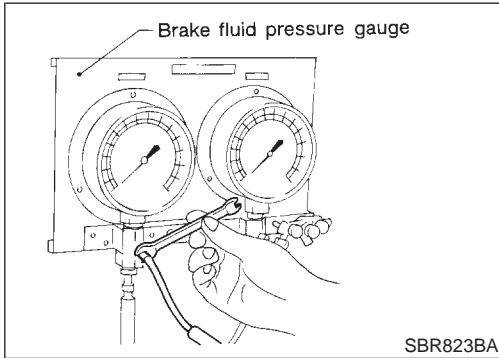
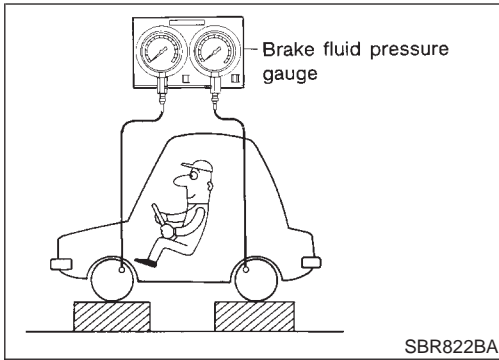
**17 - 20 N·m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)**

2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Brake System", BR-8.

# DUAL PROPORTIONING VALVE

Inspection

NCBR0014



## Inspection

### CAUTION:

- Carefully monitor brake fluid level at master cylinder.
- Use new brake fluid "DOT 3".
- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.

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-8.

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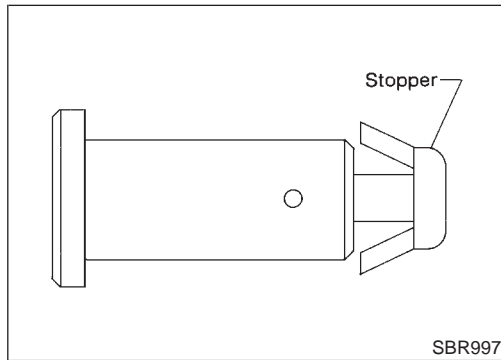
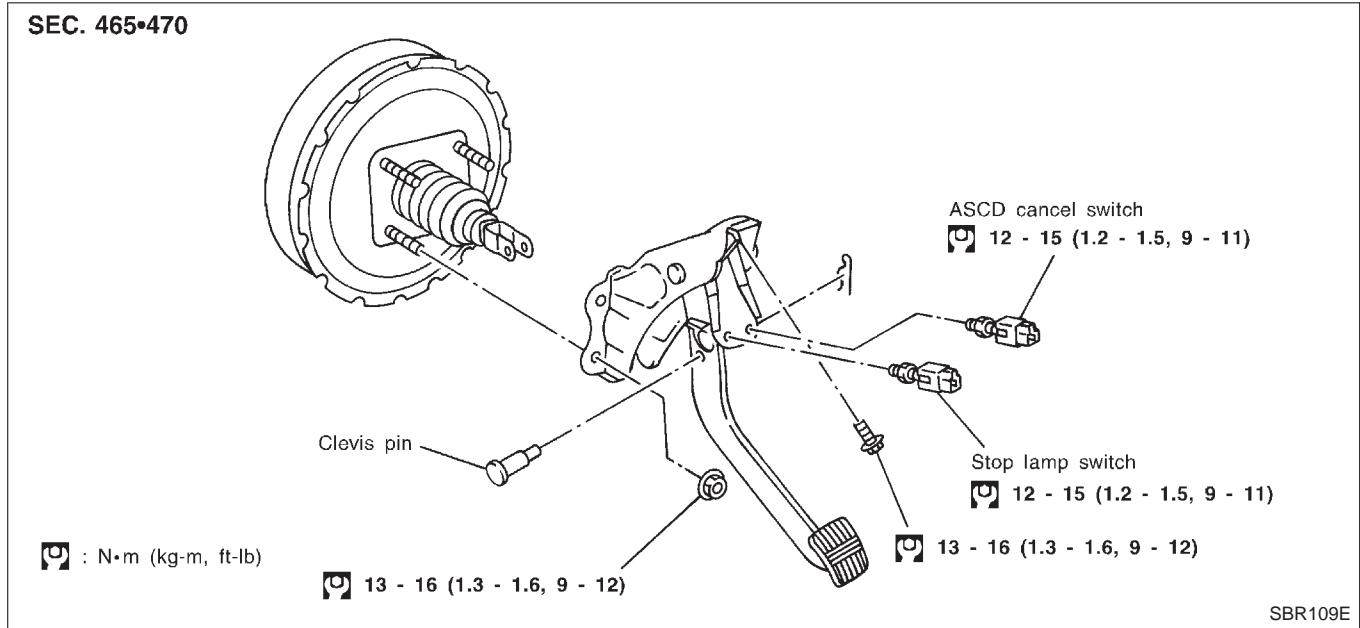
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# BRAKE PEDAL AND BRACKET

Removal and Installation

## Removal and Installation

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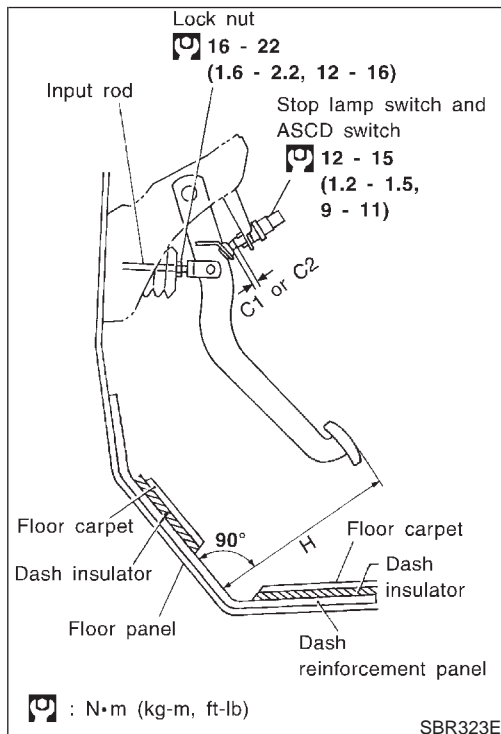


### Inspection

NCBR0016

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 metal panel. Adjust if necessary.

**H: Free height**

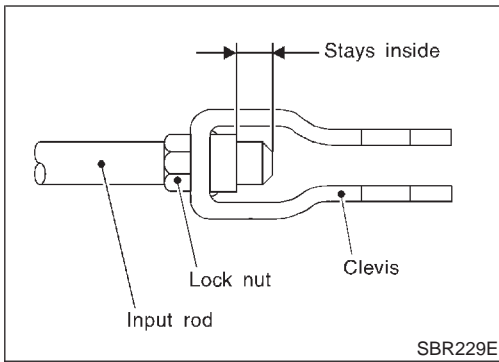
**Refer to SDS, BR-79.**

**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)**

# 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.

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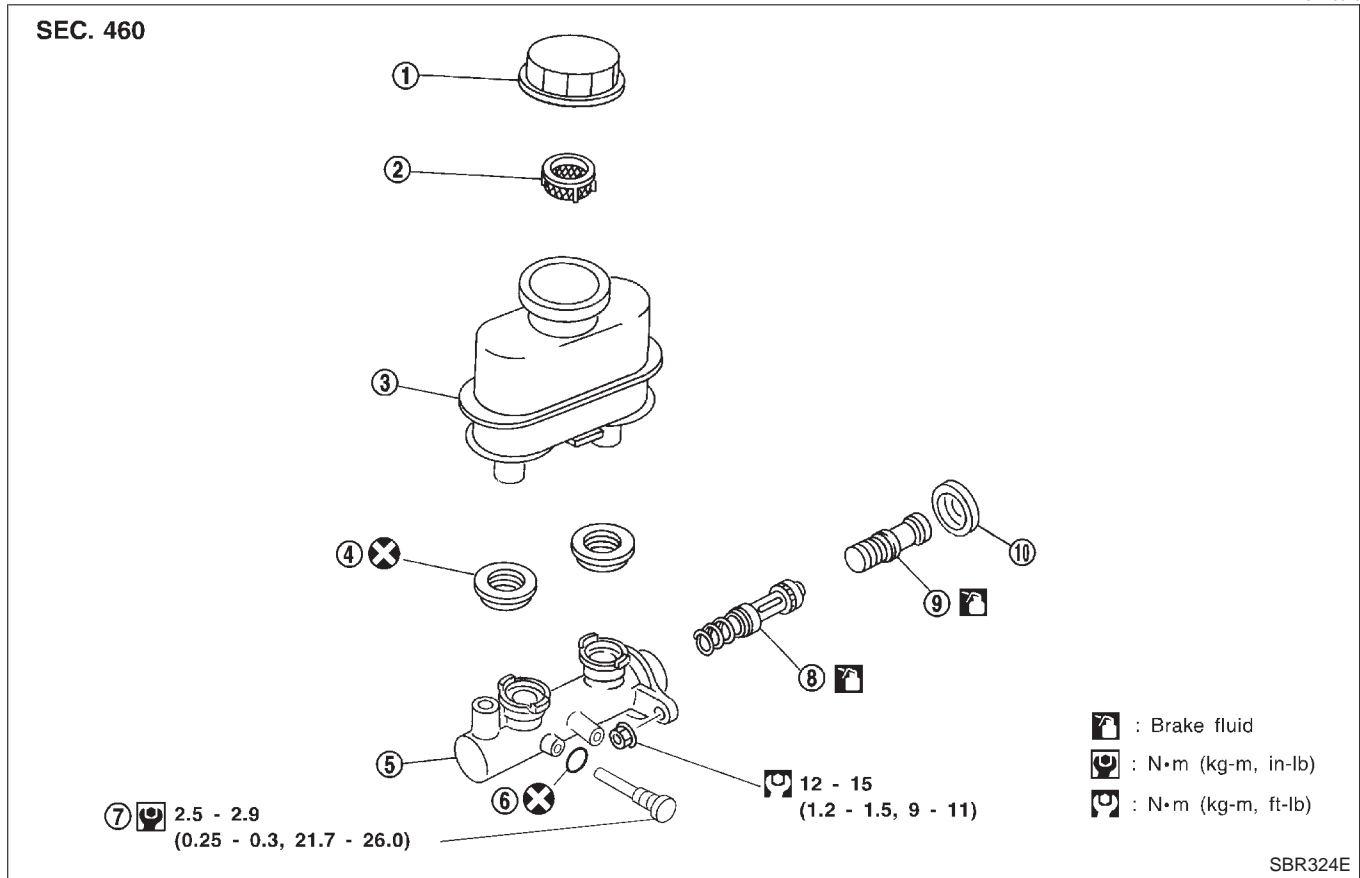
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# MASTER CYLINDER

Removal

## Removal

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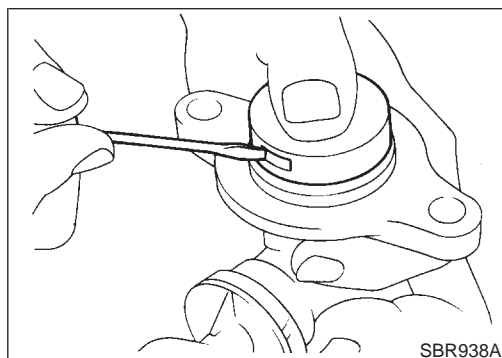


- |                   |                   |                              |
|-------------------|-------------------|------------------------------|
| 1. Reservoir cap  | 5. Cylinder body  | 8. Secondary piston assembly |
| 2. Oil filter     | 6. O-ring         | 9. Primary piston assembly   |
| 3. Reservoir 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.



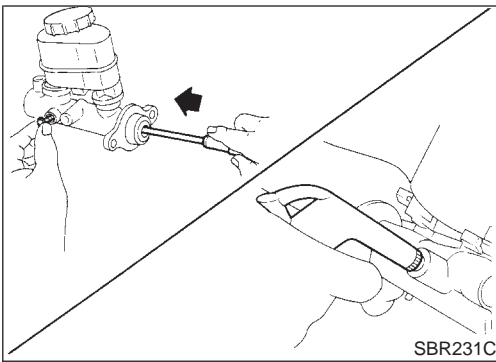
### Disassembly

1. Bend claws of stopper cap outward.

NCBR0019

# 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.

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## Inspection

Check for the following items.  
**Replace any part if damaged.**

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### Master cylinder:

- Pin holes or scratches on inner wall.

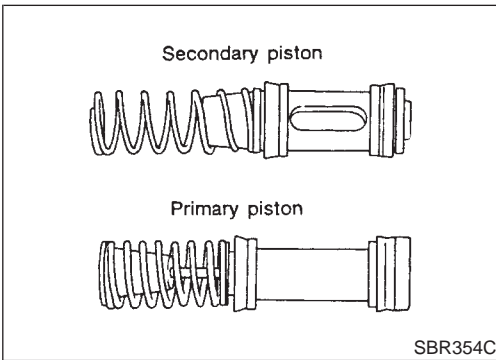
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### Piston:

- Deformation of or scratches on piston cups.

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## Assembly

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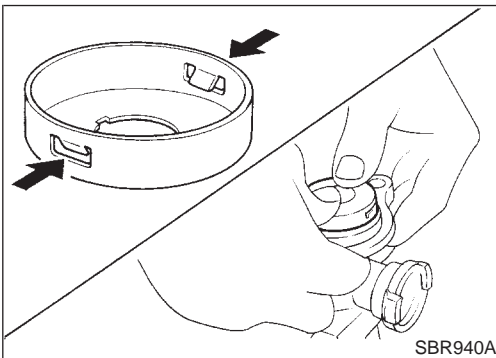
1. Insert secondary piston assembly. Then insert primary piston assembly.  
● Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.

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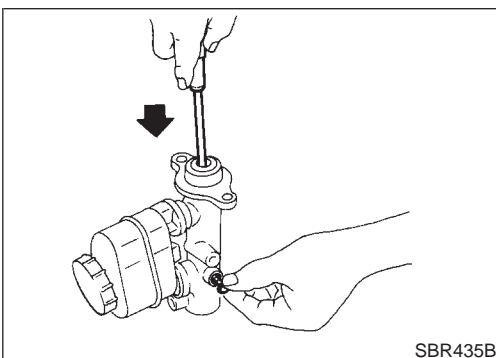
2. Install stopper cap.  
**Before installing stopper cap, ensure that claws are bent inward.**
3. Push reservoir tank seals into cylinder body.
4. Push reservoir tank into cylinder body.

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

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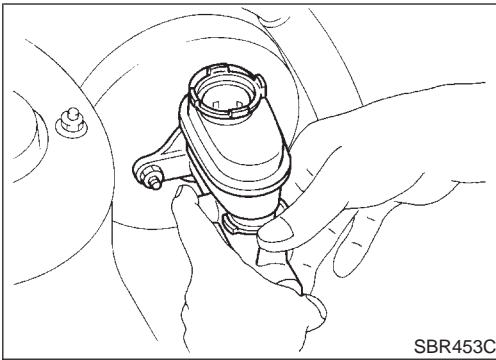
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# MASTER CYLINDER


## Installation

NCBR0022

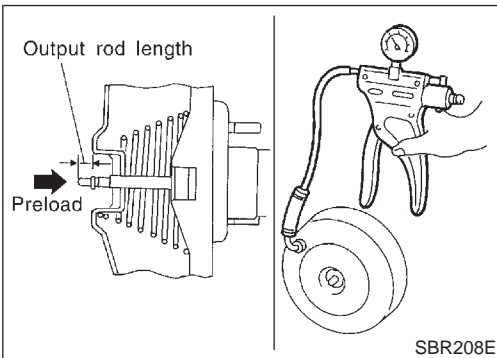
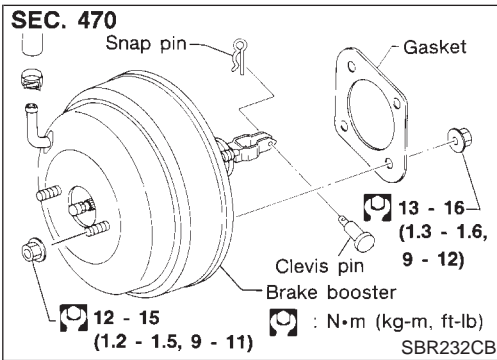
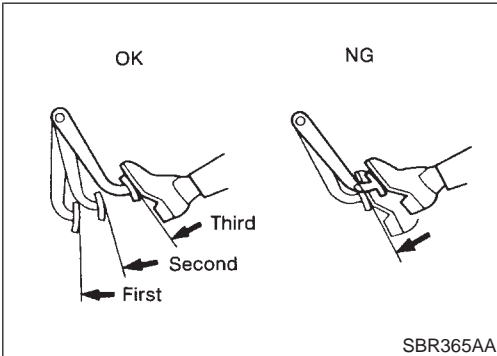
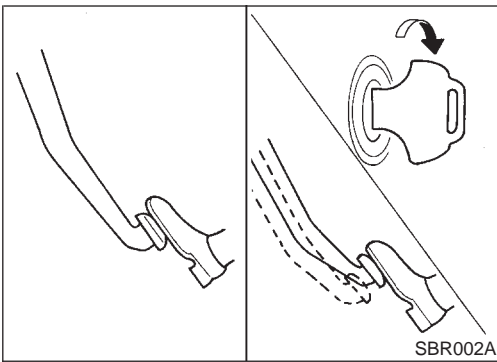


## Installation

### CAUTION:

- Refill with new brake fluid "DOT 3".
  - Never reuse drained brake fluid.
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
  2. Torque mounting nuts.  
 : 12 - 15 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)
  3. Fill up reservoir tank with new brake fluid.
  4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal.
  5. Have driver depress brake pedal slowly several times until no air comes out of master cylinder.
  6. Fit brake lines to master cylinder.
  7. Tighten flare nuts.  
 : 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-8.





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

**Specified length:**

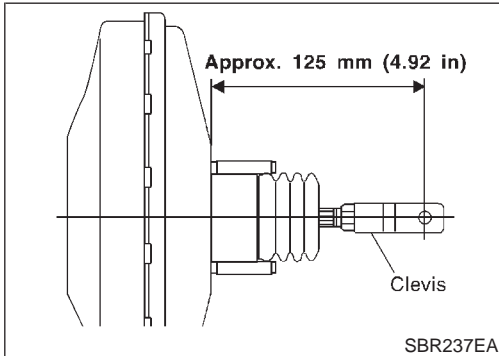
**10.275 - 10.525 mm (0.4045 - 0.4144 in)**

## 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.

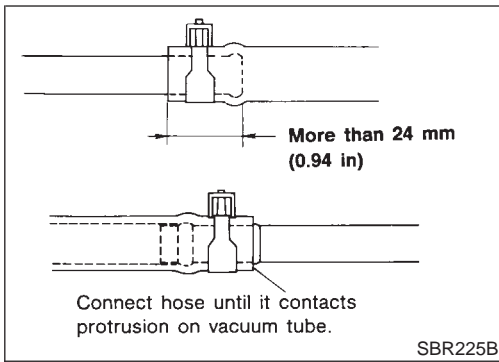


1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to master cylinder) lightly.
3. Connect brake pedal and booster input rod with clevis pin.
4. Secure mounting nuts.

### 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-16.
6. Bleed air. Refer to "Bleeding Brake System", BR-8.



## 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.

GI

MA

EM

LC

## Inspection

NCBR0028

### HOSES AND CONNECTORS

NCBR0028S01

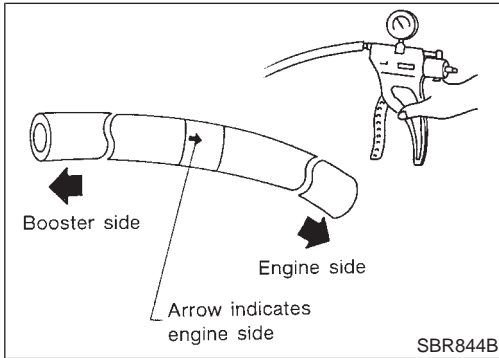
Check vacuum lines, connections and check valve for airtightness, improper attachment chafing and deterioration.

EC

FE

CL

MT



## CHECK VALVE

NCBR0028S02

Check vacuum with a vacuum pump.

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

AT

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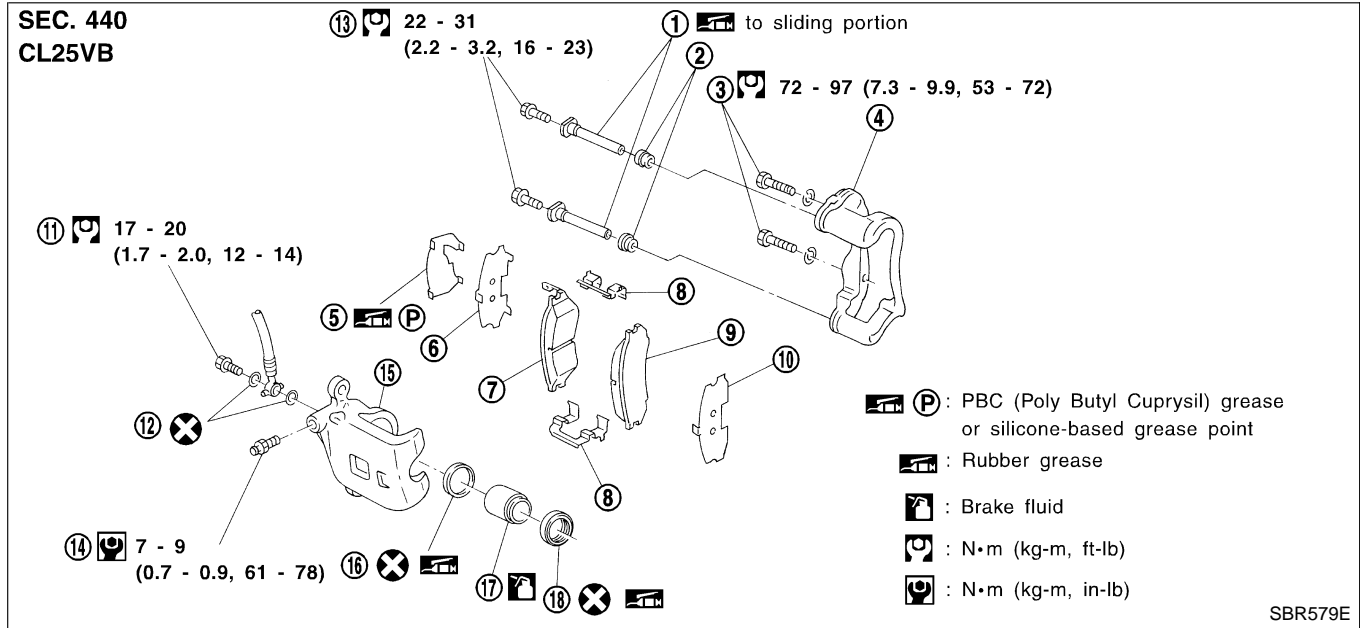
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# FRONT DISC BRAKE

Component

## Component

NCBR0030



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

## Pad Replacement

NCBR0029

### WARNING:

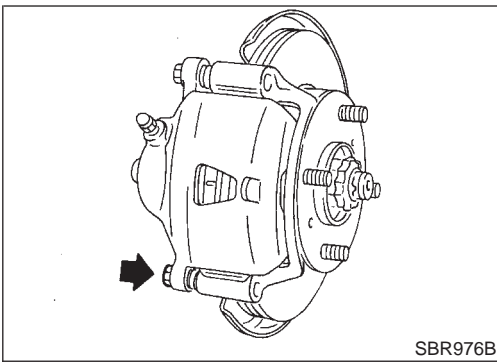
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

### 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-7.

# 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.

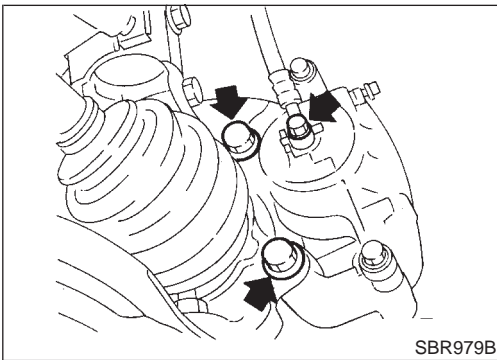
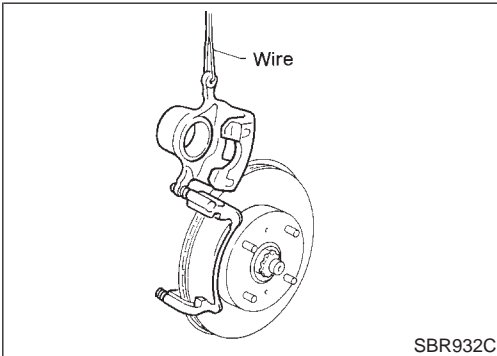
**Standard pad thickness:**

**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.**

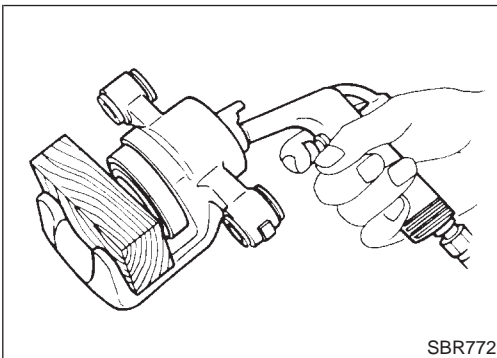


## Removal

**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

**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

### CALIPER

#### Cylinder Body

- 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.

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

# 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.

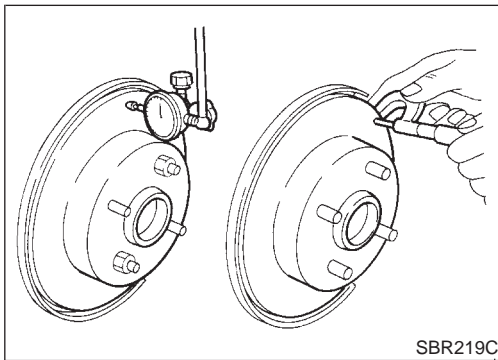
**ROTOR**

NCBR0033S02

**Rubbing Surface**

NCBR0033S0201

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

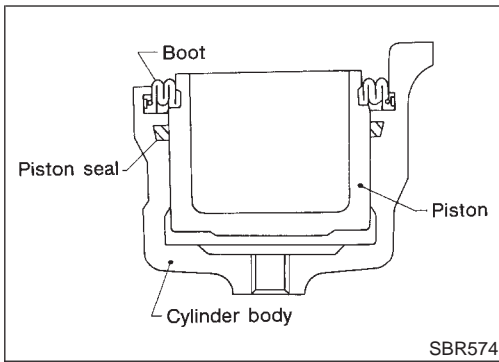
**Thickness variation (At least 8 positions):**

**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)**



## Assembly

NCBR0034

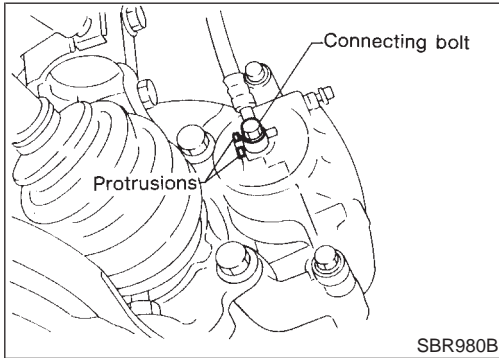
1. Insert piston seal into groove on cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot.

GI

MA

EM

LC



## 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-8.

EC

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MT

AT

AX

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**BR**

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RS

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SC

EL

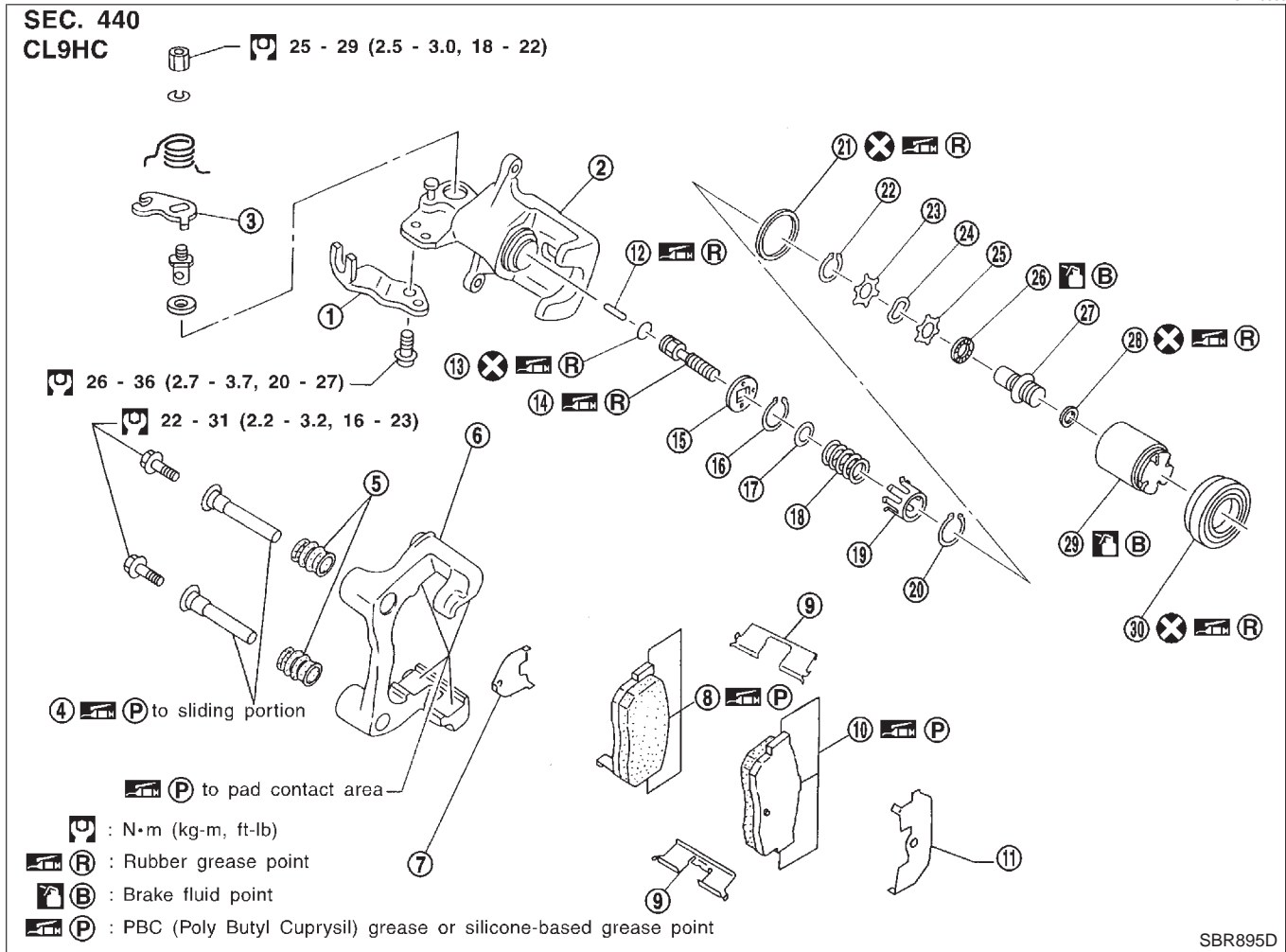
IDX

# REAR DISC BRAKE

Component

## Component

NCBR0038



- |                  |                  |                 |
|------------------|------------------|-----------------|
| 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

NCBR0037

### 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.



# REAR DISC BRAKE

Pad Replacement (Cont'd)

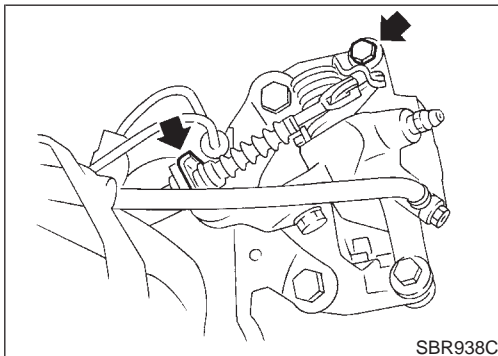
- It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.
- Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to "Brake Burnishing Procedure", "ON-VEHICLE SERVICE", BR-7.

GI

MA

EM

LC



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.

EC

FE

CL

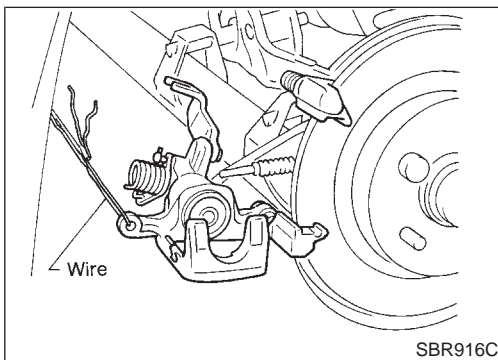
**Standard pad thickness:**

**10 mm (0.39 in)**

**Pad wear limit:**

**1.5 mm (0.059 in)**

MT

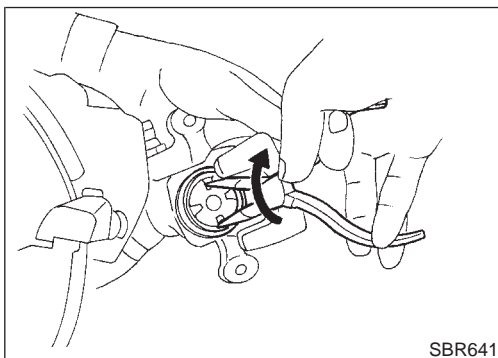


AT

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SU

**BR**



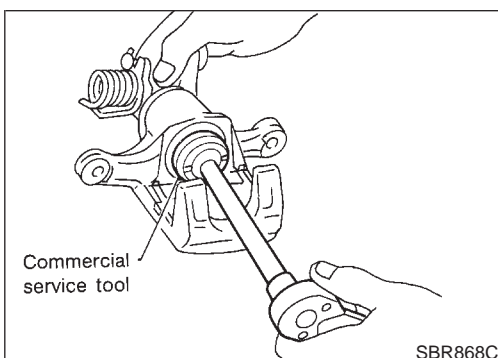
6. When installing new pads, push piston into cylinder body by gently turning piston clockwise, as shown. **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**

ST

RS

BT

HA



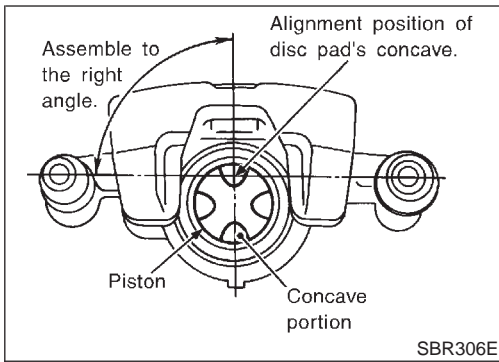
SC

EL

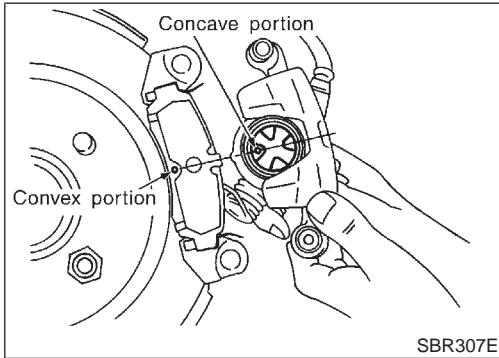
IDX

# REAR DISC BRAKE

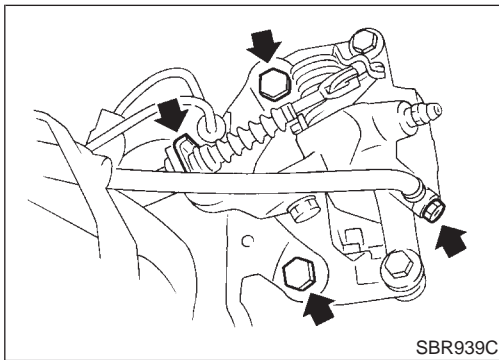
## Pad Replacement (Cont'd)



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

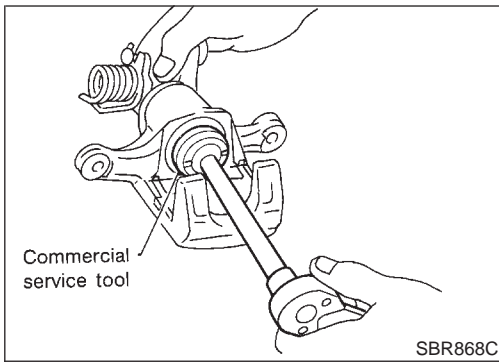
NCBR0039

### **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.**



## Disassembly

NCBR0040

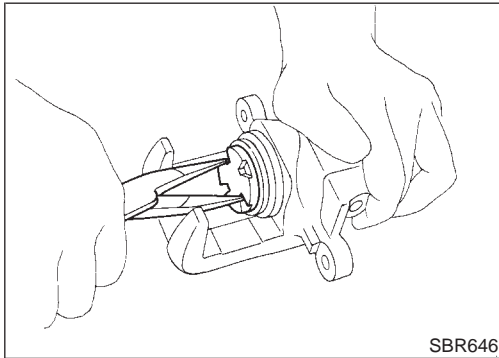
1. Remove piston by turning it counterclockwise with suitable commercial service tool or long nose pliers.

GI

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LC

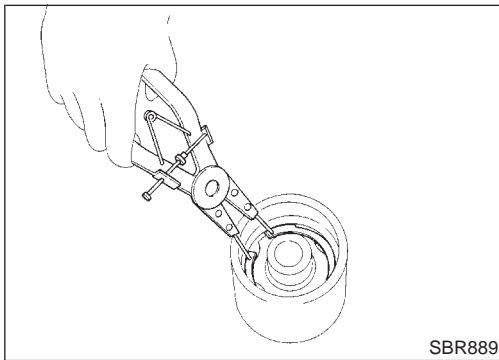


EC

FE

CL

MT



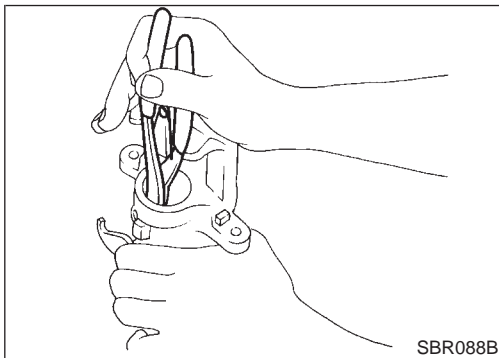
2. Pry off ring A from piston with suitable pliers and remove adjusting nut.

AT

AX

SU

**BR**



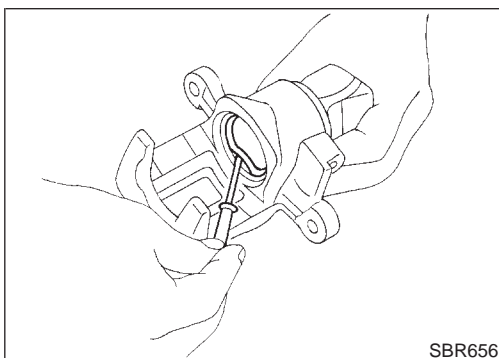
3. Disassemble cylinder body.
  - a. Pry off ring B with suitable pliers, then remove spring cover, spring and seat.
  - b. Pry off ring C, then remove key plate, push rod and rod.

ST

RS

BT

HA



- c. Remove piston seal.  
**Be careful not to damage cylinder body.**

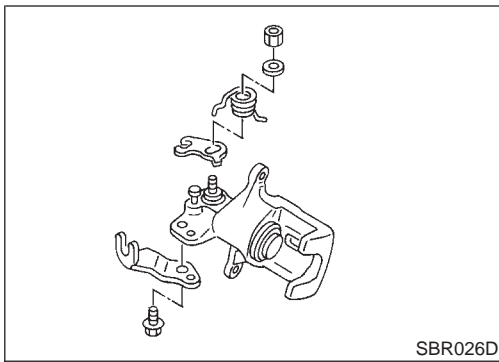
SC

EL

IDX

# REAR DISC BRAKE

Disassembly (Cont'd)



SBR026D

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.

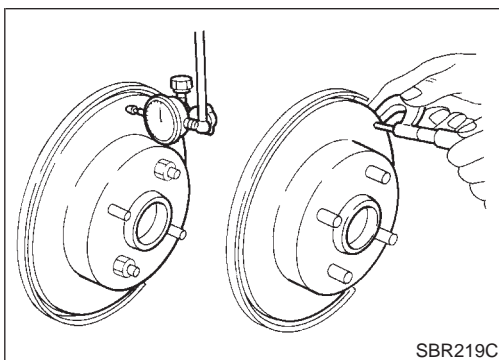
Replace if any of the above conditions are observed.

### Pin and Pin Boot

NCBR0041S0104

Check for wear, cracks or other damage.

Replace if any of the above conditions are observed.



SBR219C

## ROTOR

### Rubbing Surface

NCBR0041S02

Check rotor for roughness, cracks or chips.

NCBR0041S0201

### Runout

NCBR0041S0202

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").

# 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)**

GI

## Thickness

NCBR0041S0203

MA

**Rotor repair limit:**

**Standard thickness**

**9 mm (0.35 in)**

EM

**Minimum thickness**

**8 mm (0.31 in)**

LC

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

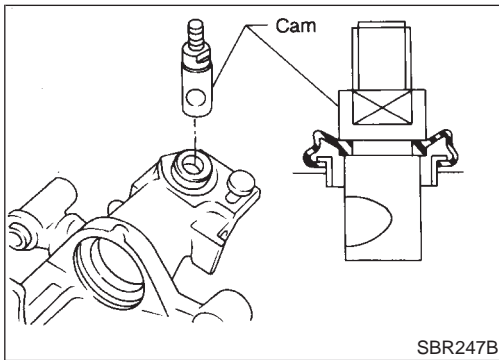
**Maximum 0.02 mm (0.0008 in)**

EC

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CL

MT



## Assembly

NCBR0042

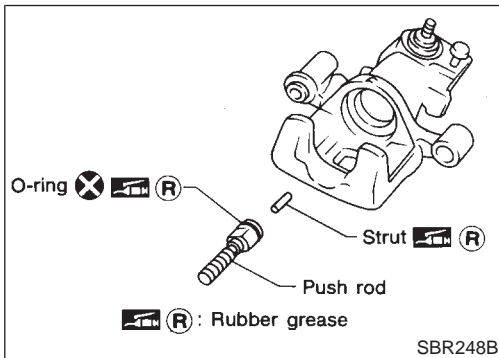
1. Insert cam with depression facing towards open end of cylinder.

AT

AX

SU

**BR**



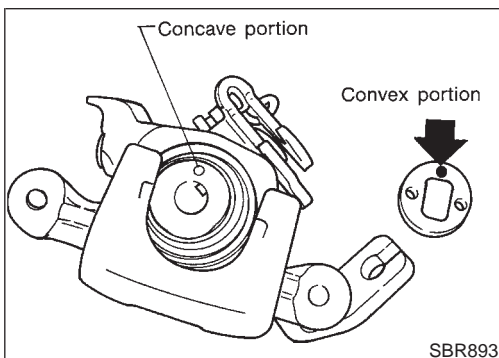
2. Generously apply rubber grease to strut and push rod to make insertion easy.

ST

RS

BT

HA



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

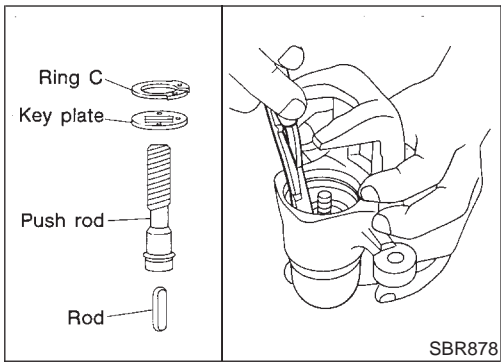
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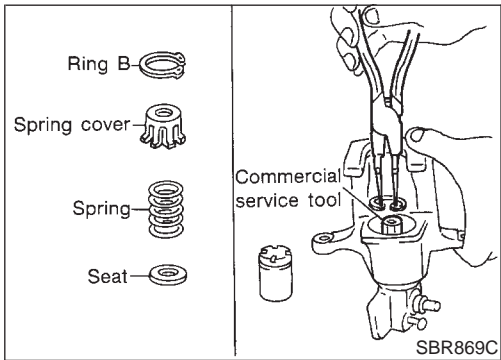
IDX

# REAR DISC BRAKE

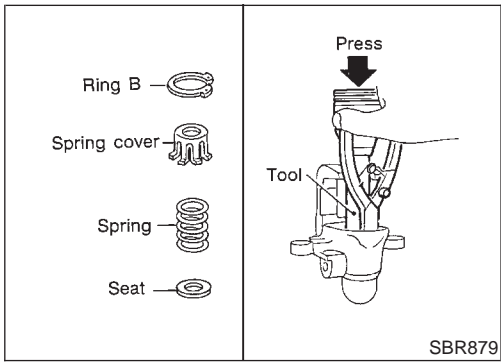
Assembly (Cont'd)



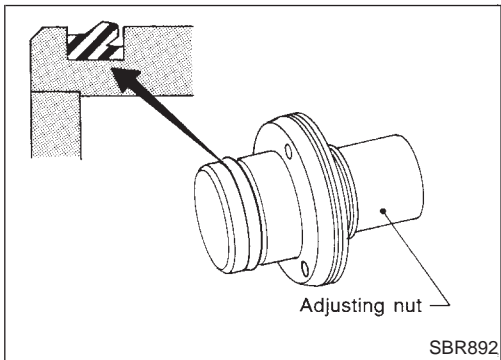
4. Install ring C with a suitable tool.



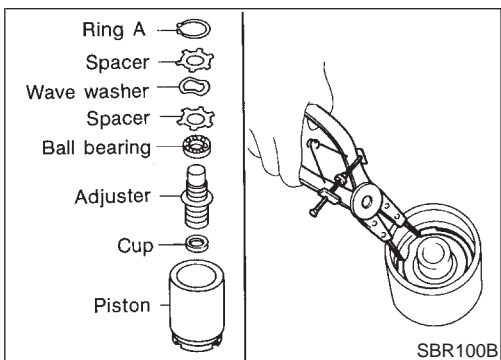
5. Install seat, spring, spring cover and ring B with suitable press and drift.



6. Install cup in the specified direction.

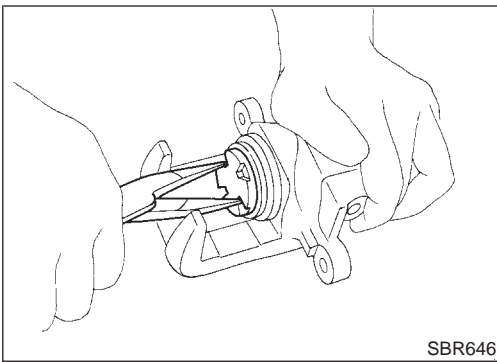


7. Install adjuster, bearing, spacers, washers and ring A with a suitable tool.



# 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.

GI

MA

EM

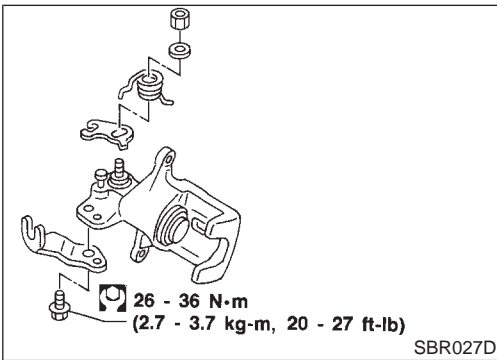
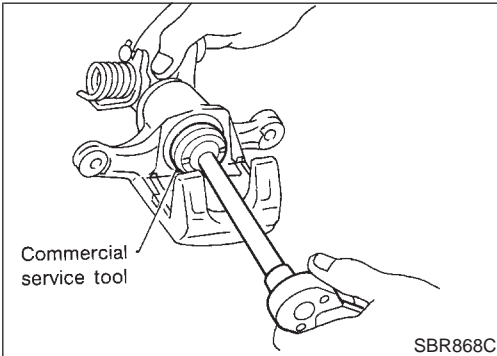
LC

EC

FE

CL

MT



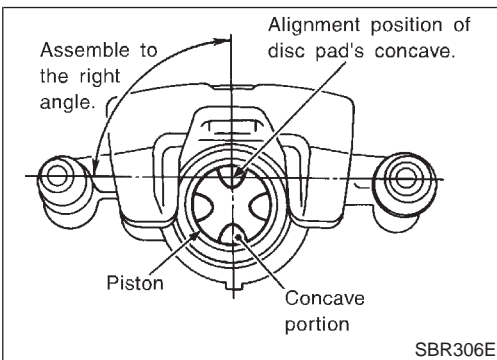
10. Fit toggle lever, return spring and cable guide.

AT

AX

SU

**BR**



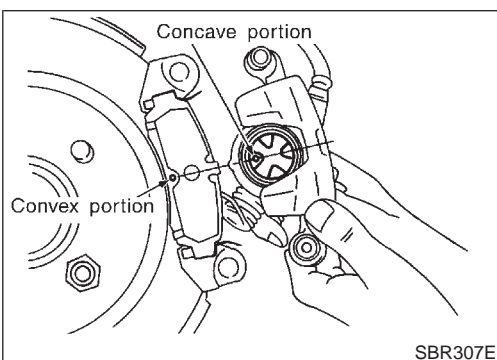
11. Adjust the piston to the right angle as shown in the figure.

ST

RS

BT

HA



## 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-8.

EL

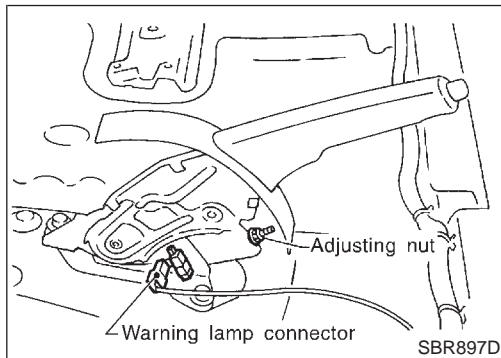
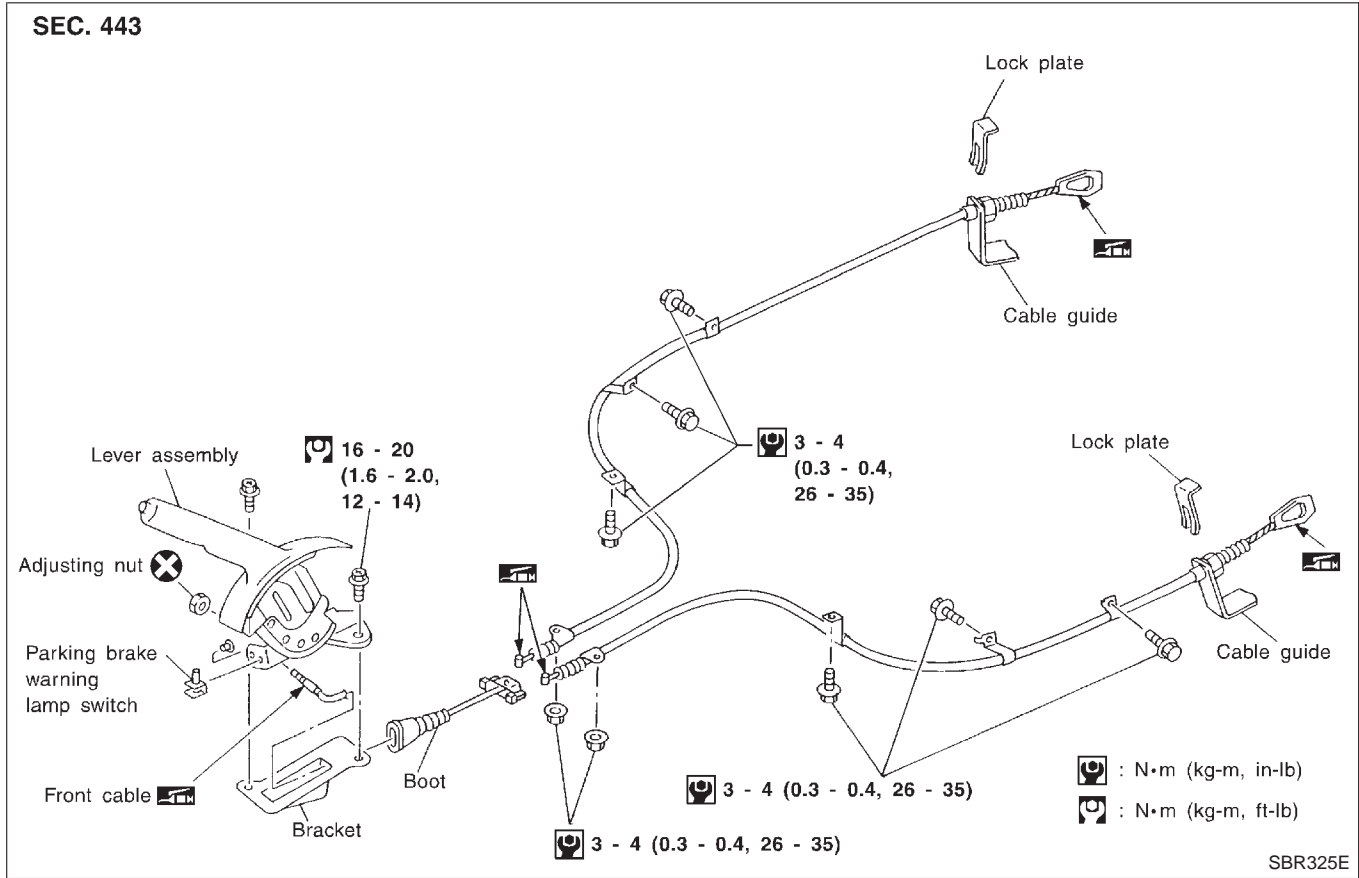
IDX

# PARKING BRAKE CONTROL

Components

## Components

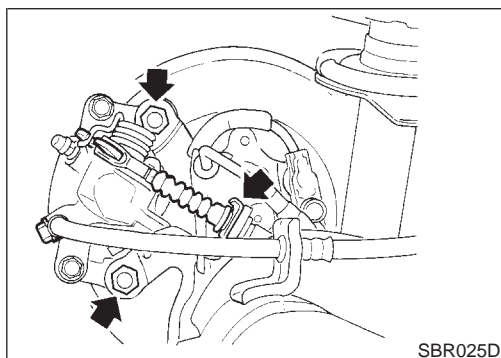
NCBR0044



## 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.
4. Remove lock plate and disconnect cable.





# PARKING BRAKE CONTROL

Inspection

## Inspection

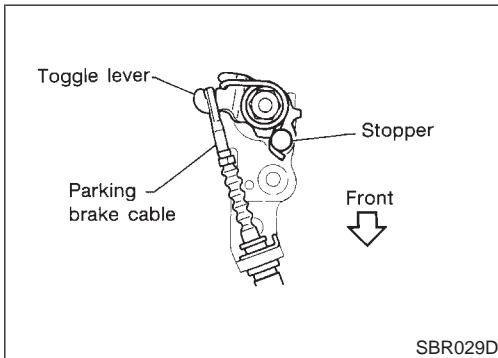
1. Check control lever for wear or other damage. Replace if necessary. NCBR0046
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.

GI

MA

EM

LC



## Adjustment

**Pay attention to the following points after adjustment.** NCBR0047

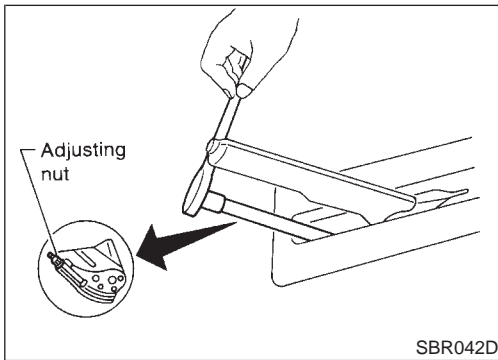
- 1) There is no drag when control lever is being released.
- 2) Be sure that toggle lever returns to stopper when parking brake lever is released.

EC

FE

CL

MT



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.

AT

AX

SU

**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.

**BR**

**Number of "A" notches: 1**

ST

RS

BT

HA

SC

EL

IDX

*Purpose*

## 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. NCBR0082

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.

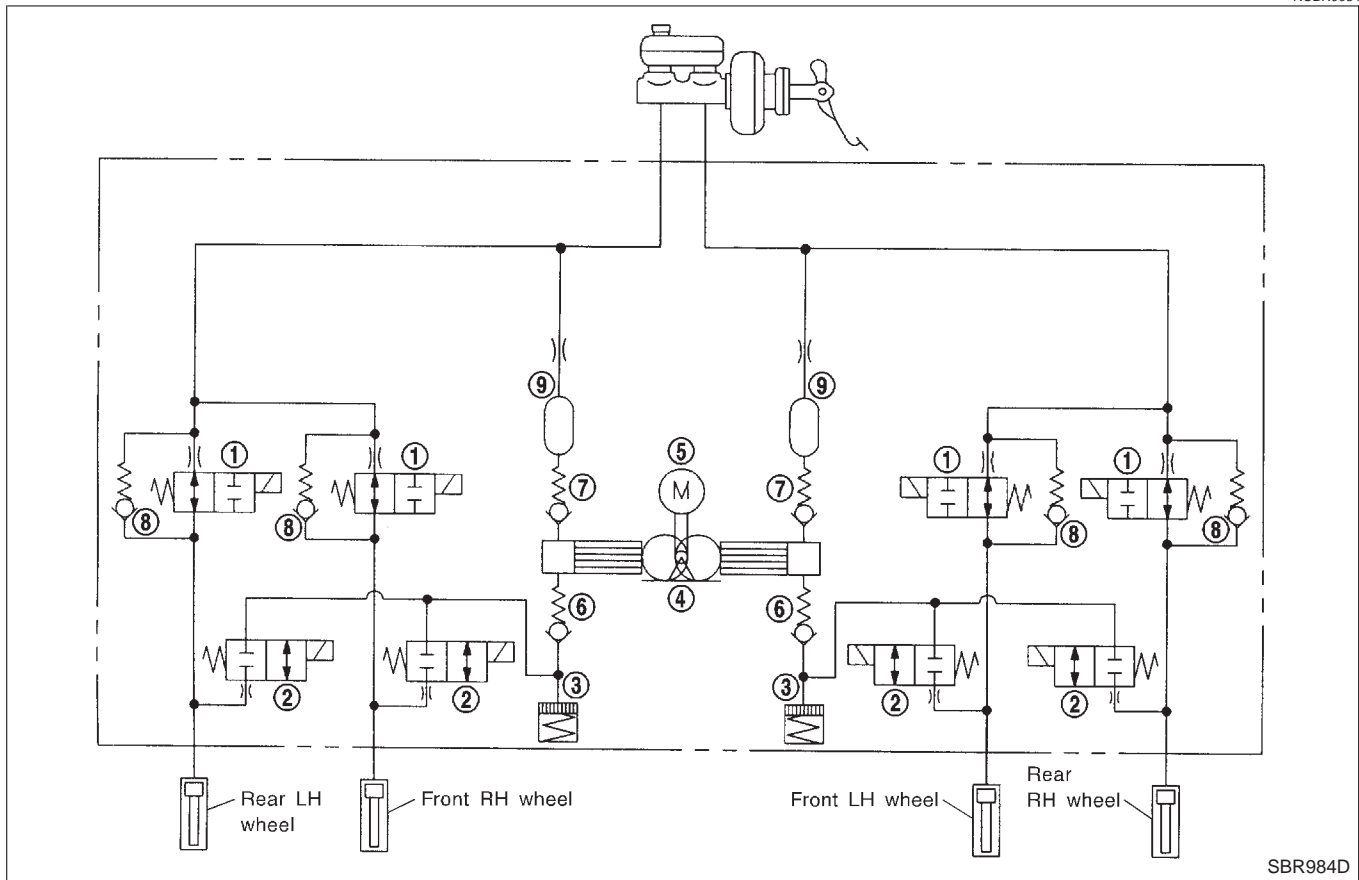
## ABS (Anti-Lock Brake System) Operation

NCBR0083

- 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

NCBR0084

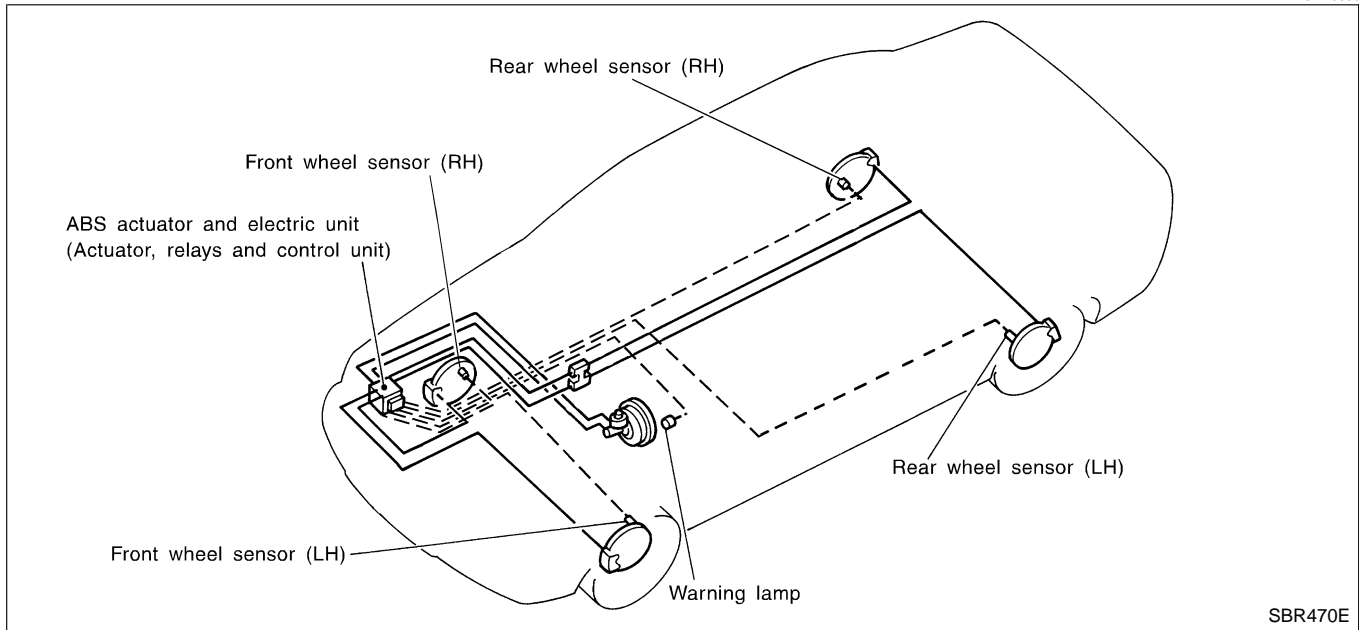


SBR984D

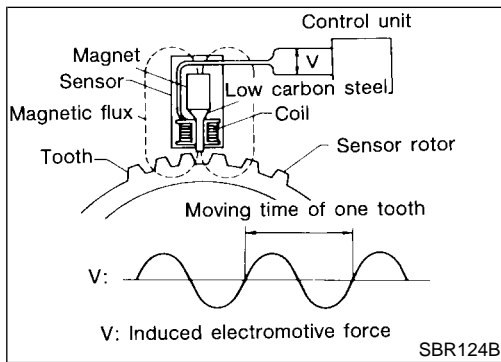
- |                          |                |                       |
|--------------------------|----------------|-----------------------|
| 1. Inlet solenoid valve  | 4. Pump        | 7. Outlet valve       |
| 2. Outlet solenoid valve | 5. Motor       | 8. Bypass check valve |
| 3. Reservoir    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

System Components

NCBR0086



GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT



System Description

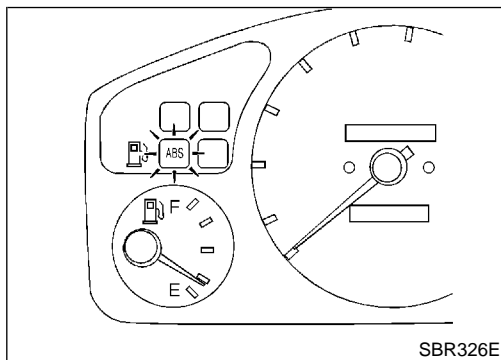
SENSOR

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.

NCBR0087

NCBR0087S01

AT  
AX  
SU

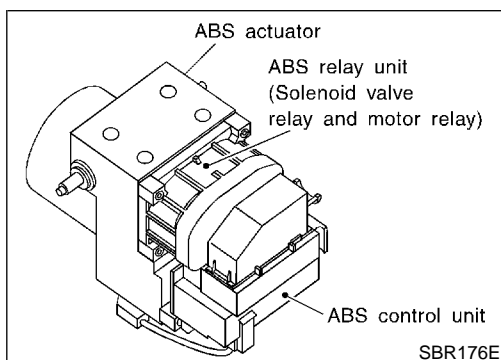


CONTROL UNIT

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 control unit causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control unit, and the vehicle's brake system reverts to normal operation.

NCBR0087S02

ST  
RS  
BT  
HA



ABS ACTUATOR AND ELECTRIC UNIT

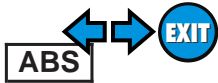
The ABS actuator and electric unit contains:

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

NCBR0087S03

SC  
EL  
IDX

# DESCRIPTION



System Description (Cont'd)

This components controls the hydraulic circuit and increases, holds or decreases hydraulic pressure to all or individual wheels. The ABS actuator and electric unit are not disassemble.

## ABS Actuator Operation

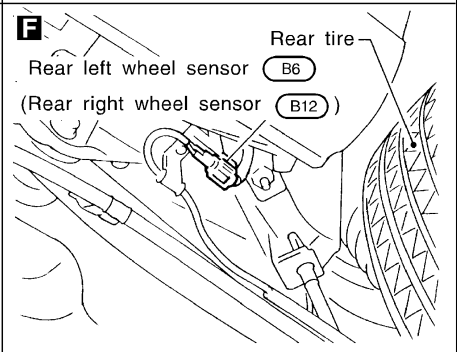
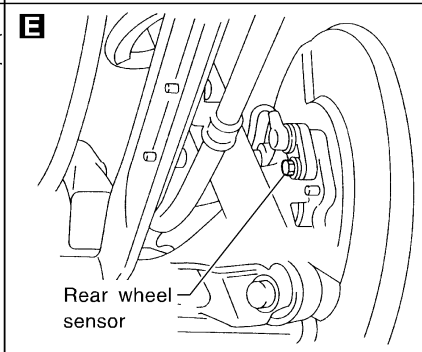
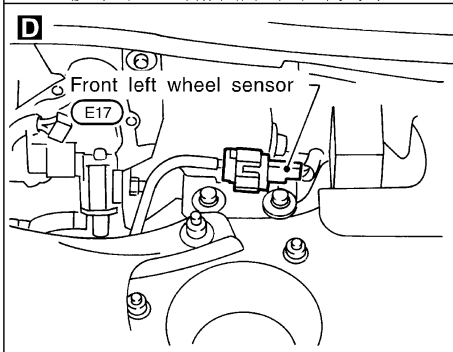
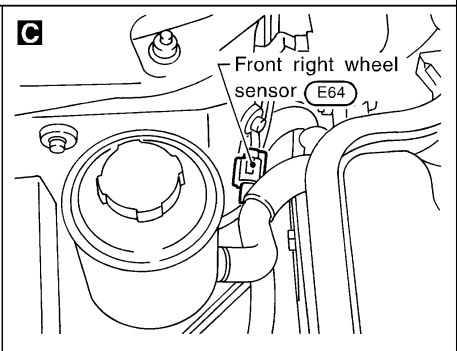
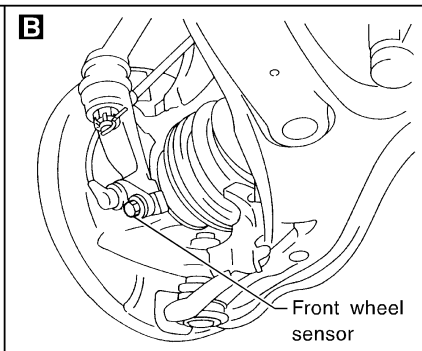
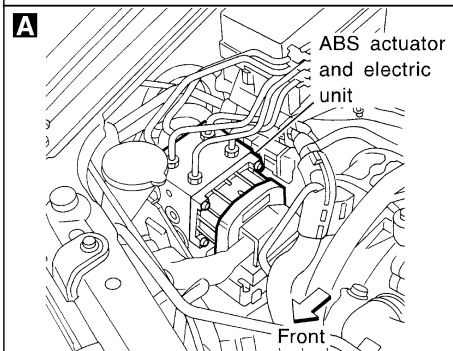
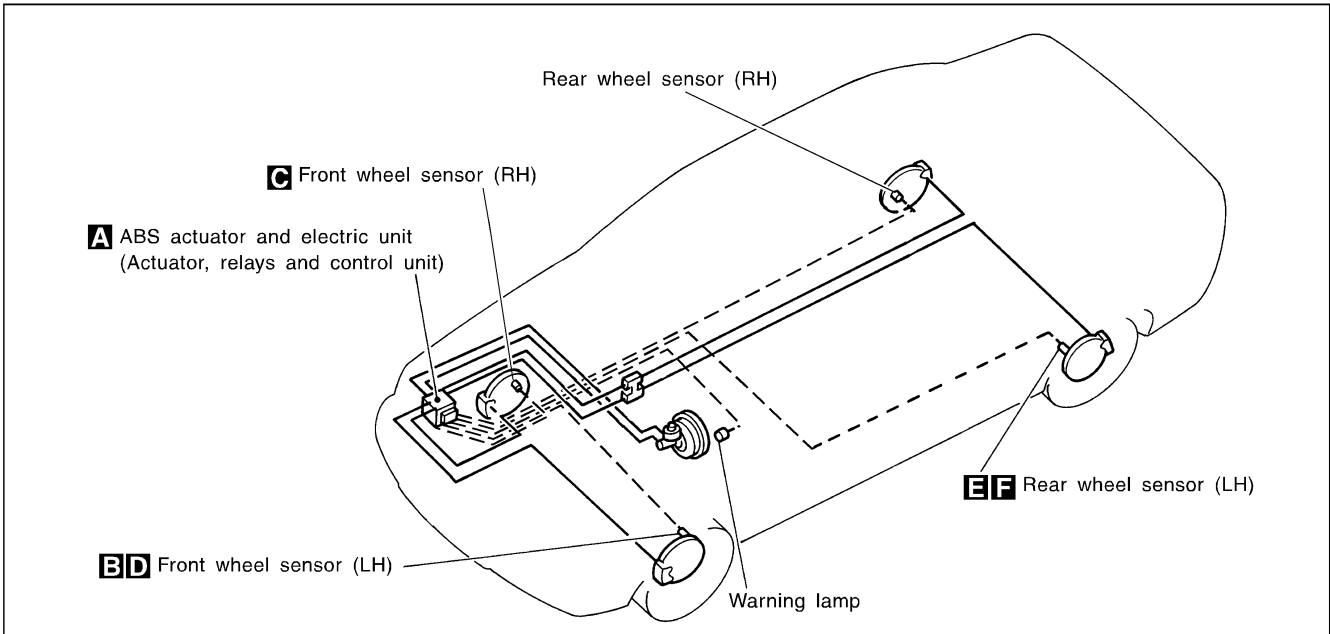
NCBR0087S0301

		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.

# Component Parts and Harness Connector Location

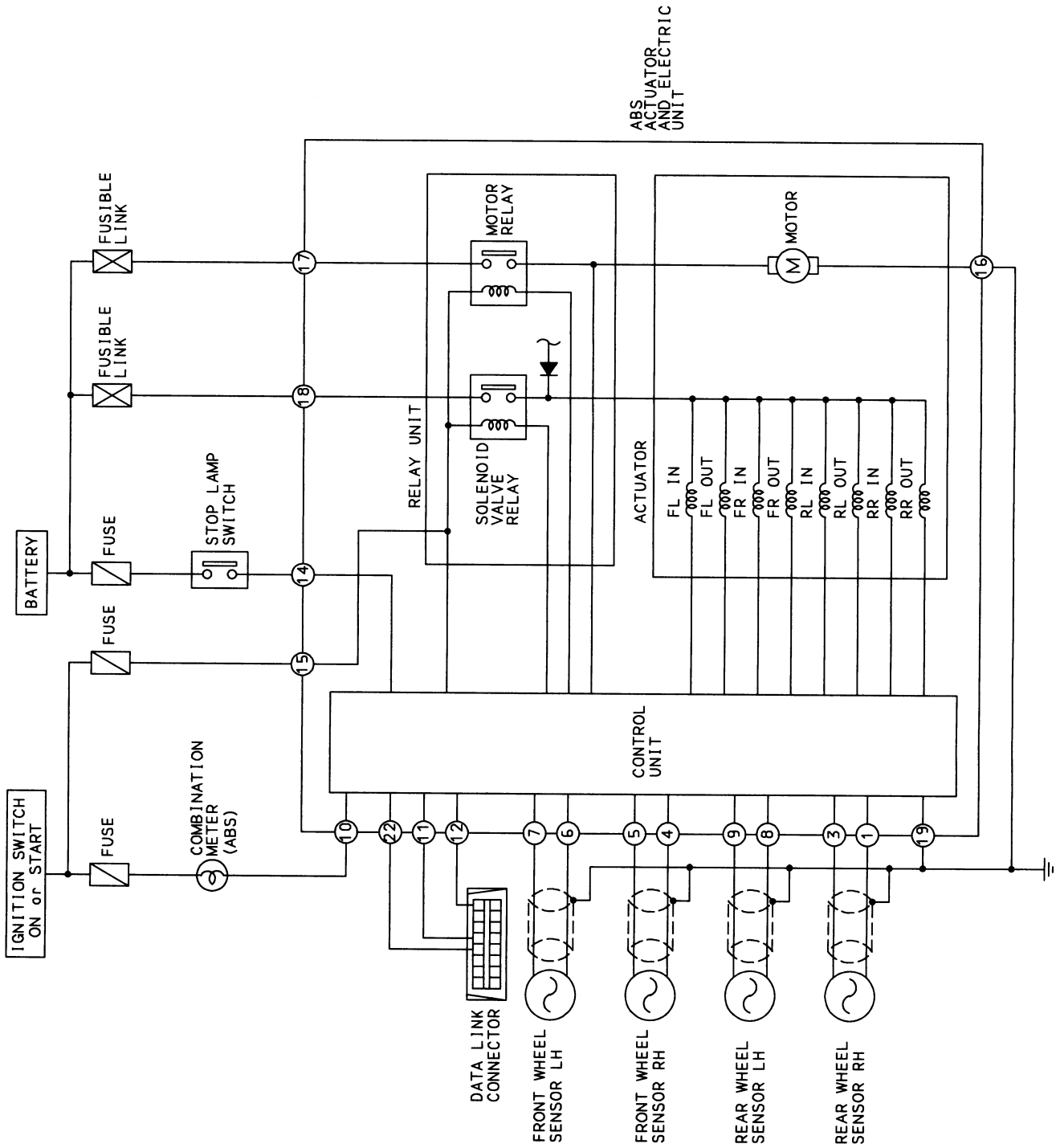
NCBR0088

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



Schematic

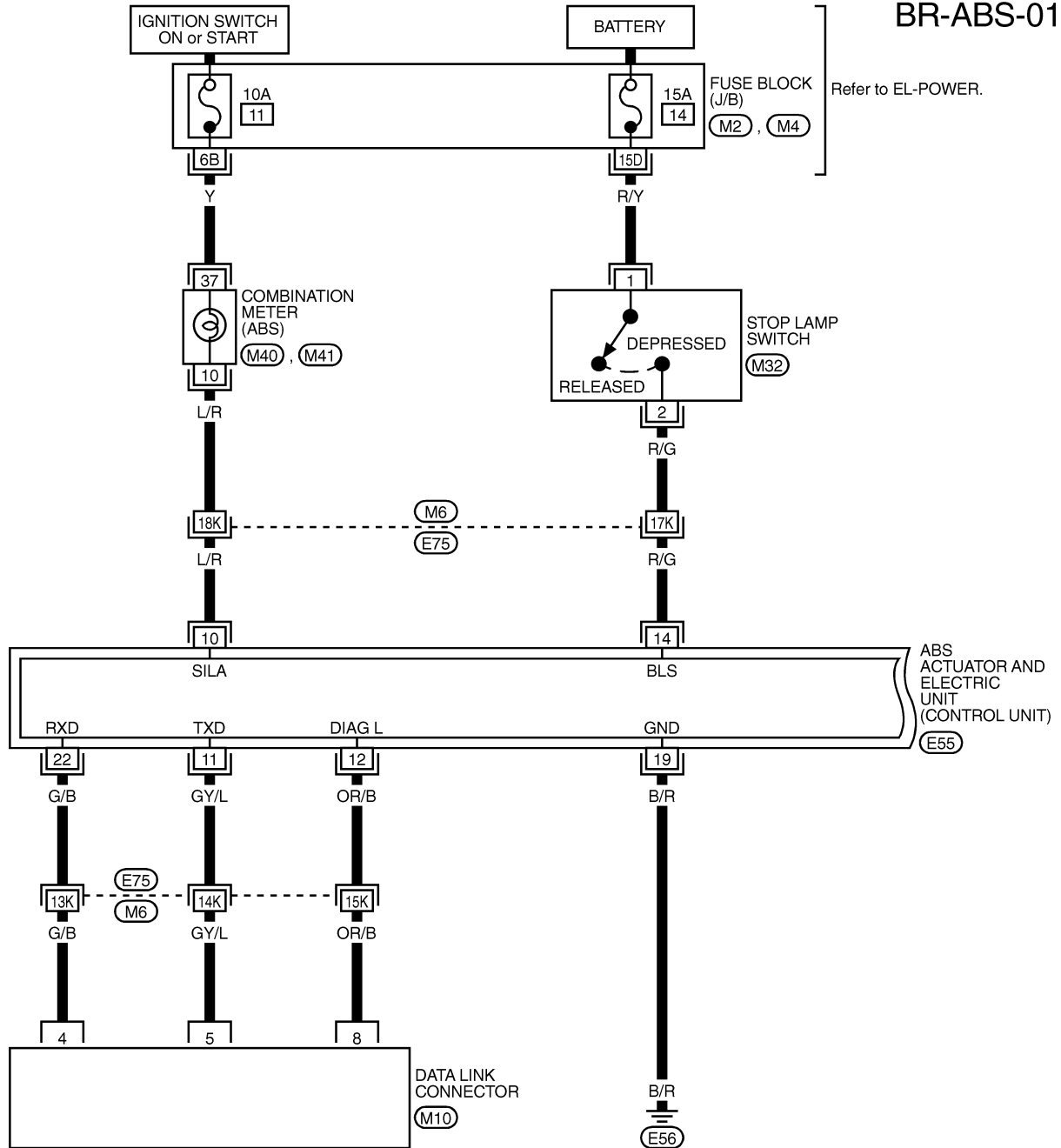
NCBR0089



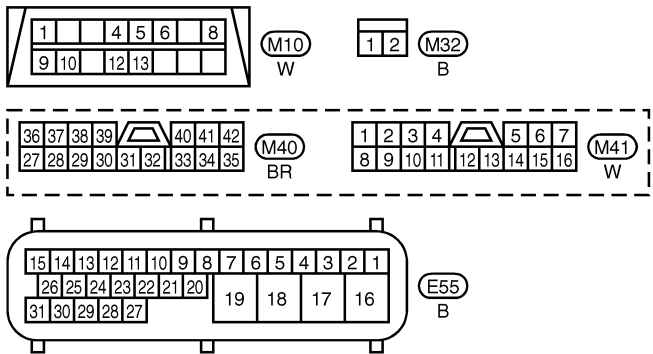
## Wiring Diagram — ABS —

NCBR0090

**BR-ABS-01** GI



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

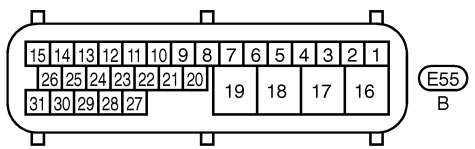
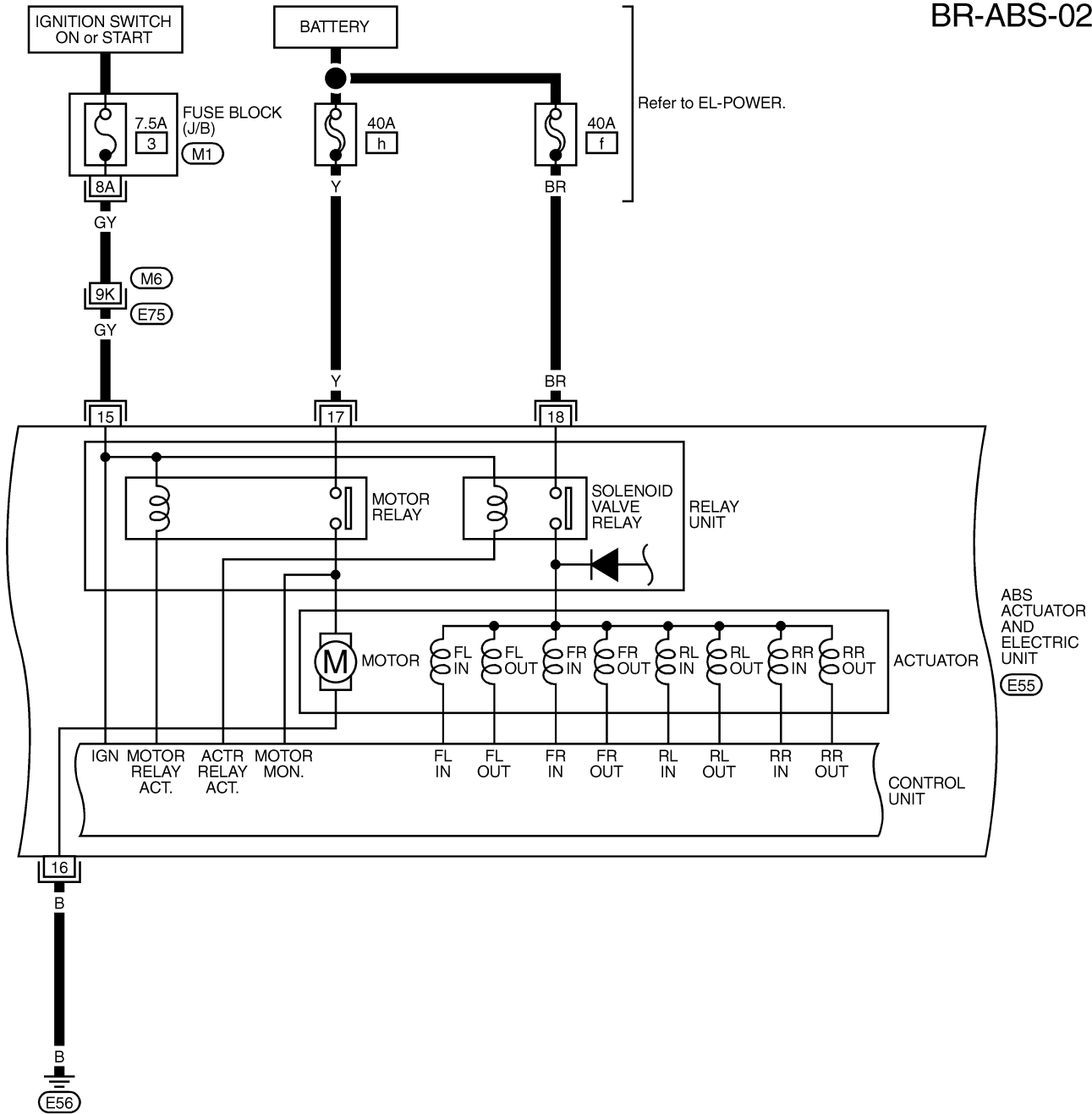


REFER TO THE FOLLOWING.  
 (E75) -SUPER MULTIPLE JUNCTION (SMJ)  
 (M2), (M4) -FUSE BLOCK-JUNCTION BOX (J/B)

# DESCRIPTION

Wiring Diagram — ABS — (Cont'd)

BR-ABS-02

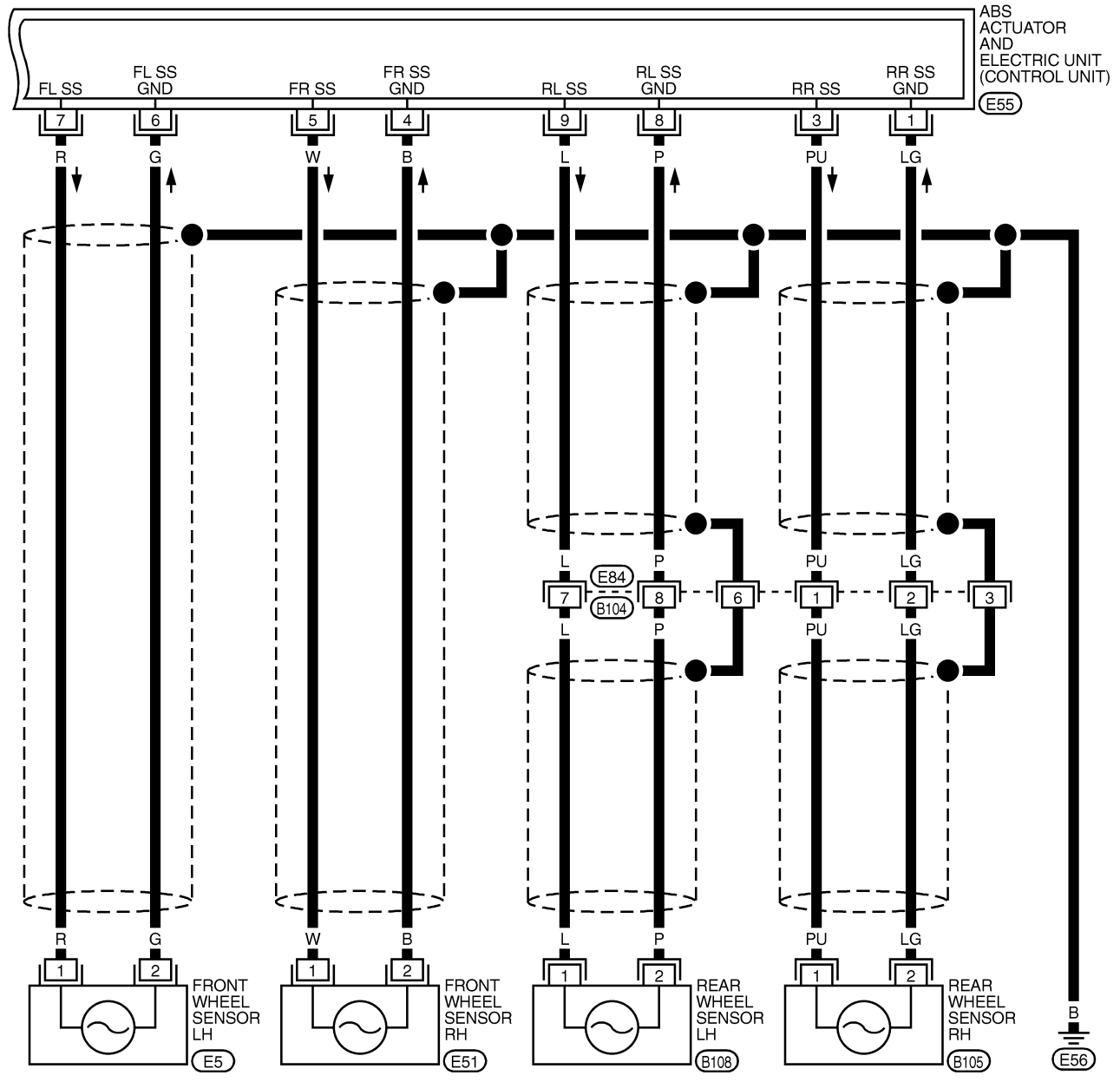


REFER TO THE FOLLOWING.  
 (E75) -SUPER MULTIPLE JUNCTION (SMJ)  
 (M1) -FUSE BLOCK-JUNCTION BOX (J/B)

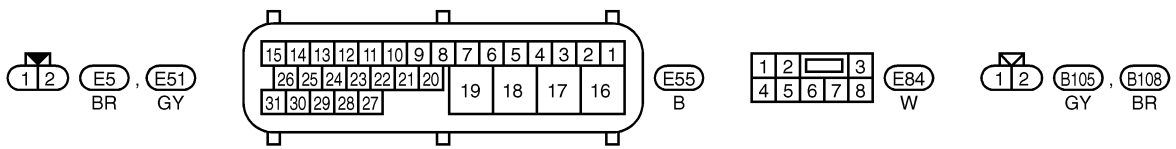


# DESCRIPTION

## BR-ABS-03



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



## Self-diagnosis

NCBR0091

### FUNCTION

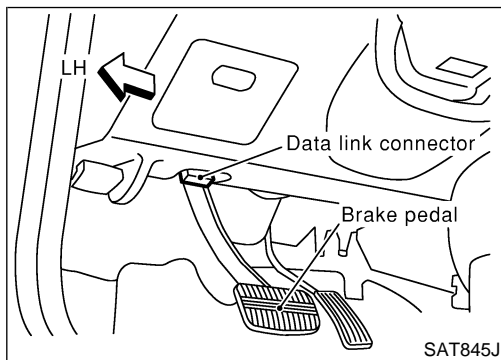
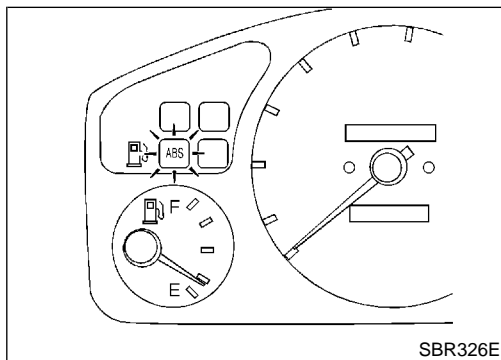
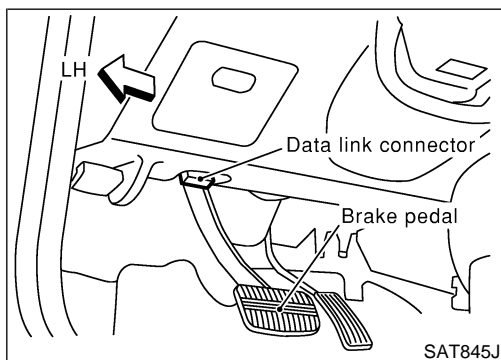
NCBR0091S01

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

### SELF-DIAGNOSIS PROCEDURE

NCBR0091S02

- Drive vehicle over 30 km/h (19 MPH) for at least one minute.
- Turn ignition switch "OFF".
- Ground terminal "8" of "Data link connector" with a suitable harness.
- Turn ignition switch "ON" while grounding terminal "8".  
**Do not depress brake pedal.**  
**Do not start engine.**



- After 3.0 seconds, the ABS 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-55. 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-43.
- 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 ABS warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
- After making certain that ABS warning lamp does not come on, test the ABS SELF-DIAGNOSIS in a safe area to verify that it functions properly.

#### NOTE:

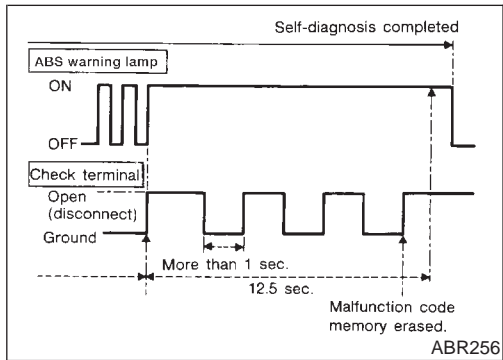
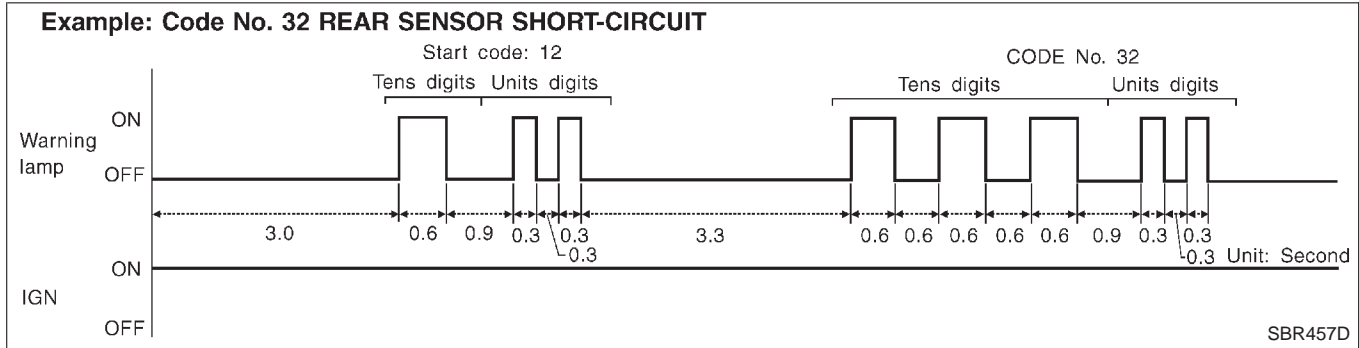
The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the indication starts flashing again.

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

NCBR0091S03

- Determine the code No. by counting the number of times the ABS 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).

4. The malfunction code chart is given on the BR-55 page.



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

NCBR0091S04

1. Disconnect the check terminal from ground (ABS warning lamp will stay lit).
2. Within 12.5 seconds, ground the check terminal 3 times. Each terminal ground must last more than 1 second. The ABS warning lamp goes out after the erase operation has been completed.
3. Perform self-diagnosis again. Refer to BR-42. Only the start code should appear, no malfunction codes.

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

## CONSULT-II

NCBR0092

### CONSULT-II APPLICATION TO ABS

NCBR0092S01

ITEM	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST
Front right wheel sensor	X	X	—
Front left wheel sensor	X	X	—
Rear right wheel sensor	X	X	—
Rear left wheel sensor	X	X	—
Stop lamp switch	—	X	—
Front right inlet solenoid valve	X	X	X
Front right outlet solenoid valve	X	X	X
Front left inlet solenoid valve	X	X	X
Front left outlet solenoid valve	X	X	X
Rear right inlet solenoid valve	X	X	X
Rear right outlet solenoid valve	X	X	X
Rear left inlet solenoid valve	X	X	X
Rear left outlet solenoid valve	X	X	X
Actuator solenoid valve relay	X	X	—
Actuator motor relay (ABS MOTOR is shown on the ACTIVE TEST screen.)	X	X	X
ABS warning lamp	—	X	—
Battery voltage	X	X	—
Control unit	X	—	—

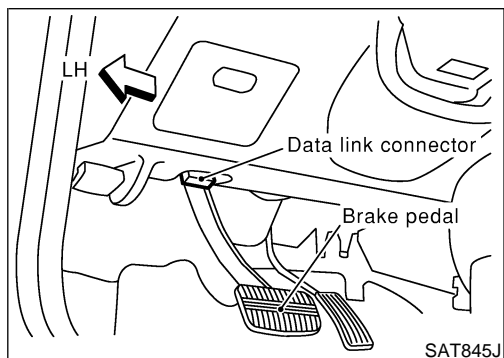
X: Applicable

—: Not applicable

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

NCBR0092S02

Ignore the ECU part number displayed in the ECU PART NUMBER MODE. Refer to parts catalog to order the ABS actuator and electric unit.



### CONSULT-II Inspection Procedure SELF-DIAGNOSIS PROCEDURE

NCBR0093

NCBR0093S01

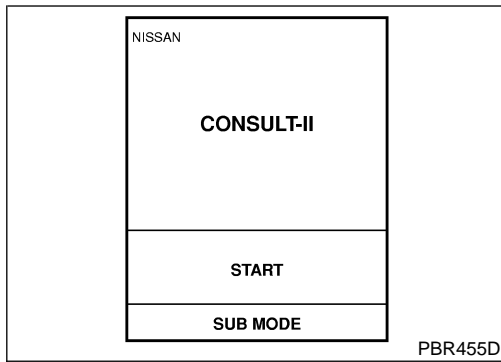
1. Turn ignition switch OFF.
2. Connect CONSULT-II to Data Link Connector.
3. Start engine.
4. Drive vehicle over 30 km/h (19 MPH) for at least one minute.

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

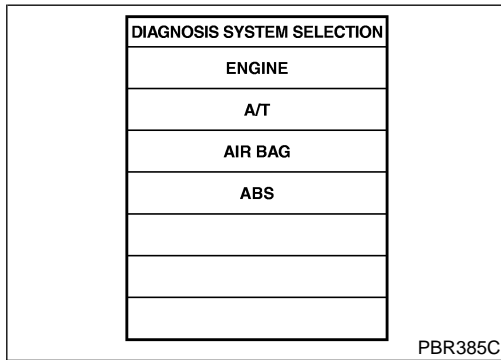
ABS

EXIT

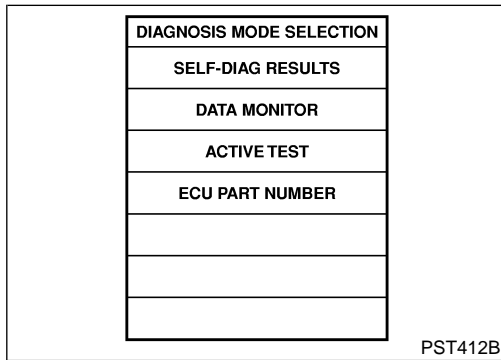
CONSULT-II Inspection Procedure (Cont'd)



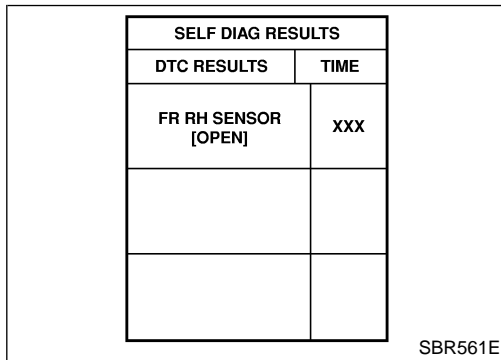
5. Stop vehicle with engine running and touch "START" on CONSULT-II screen.



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 ABS warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.

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

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

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION



CONSULT-II Inspection Procedure (Cont'd)

## SELF-DIAGNOSTIC RESULTS MODE

=NCBR0093S02

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-56
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-56
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-56
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-56
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-56
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-56
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-56
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-56
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-56
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59
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-59

# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

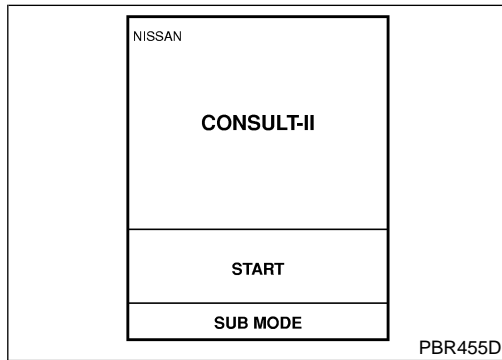
ABS

EXIT

CONSULT-II 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-59
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-59
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 RELAY [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 [ABNORMAL]	<ul style="list-style-type: none"> <li>● Power source voltage supplied to ABS control unit is abnormally low.</li> </ul>	BR-64
CONTROL UNIT	<ul style="list-style-type: none"> <li>● Function of calculation in ABS control unit has failed.</li> </ul>	BR-66

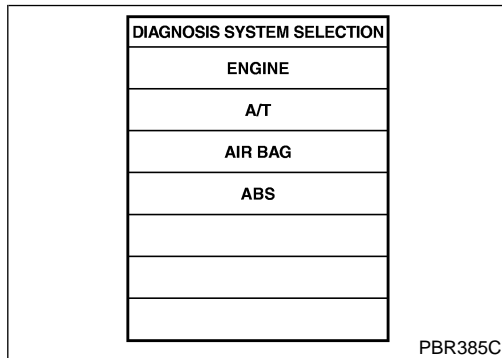
\*1: Be sure to confirm the ABS warning lamp illuminates when the ignition switch is turned ON after repairing the shorted sensor circuit, but the lamp goes out when driving the vehicle over 30 km/h (19 MPH) for one minute in accordance with SELF-DIAGNOSIS PROCEDURE.



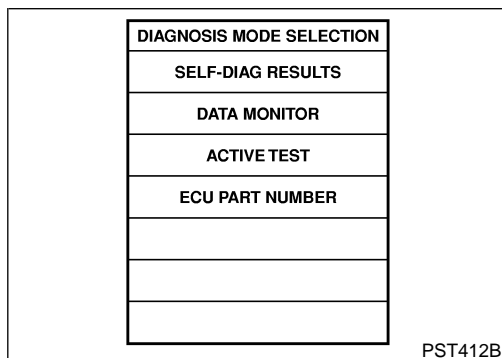
## DATA MONITOR PROCEDURE

NCBR0093S03

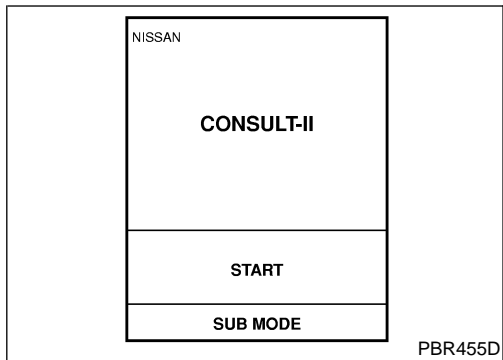
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector.
3. Turn ignition switch ON.
4. Touch "START" on CONSULT-II screen.



5. Touch "ABS".



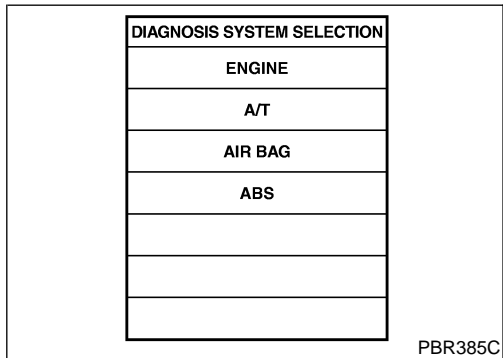
6. Touch "DATA MONITOR".
7. Touch "SETTING" on "SELECT MONITOR ITEM" screen.
8. Touch "LONG TIME" on "SET RECORDING COND" screen.
9. Touch "START" on "SELECT MONITOR ITEM".



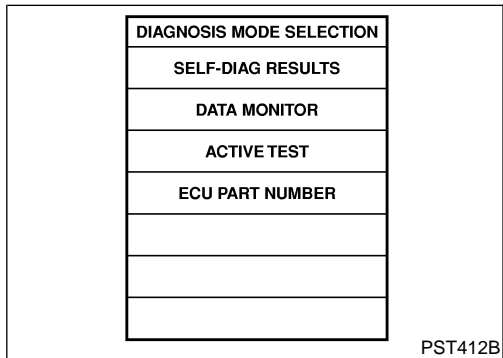
## ACTIVE TEST PROCEDURE

NCBR0093S04

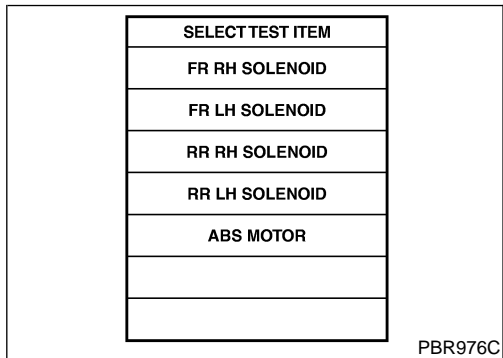
- When conducting Active test, vehicle must be stationary.
  - When ABS warning lamp stays on, never conduct Active test.
1. Turn ignition switch OFF.
  2. Connect CONSULT-II to Data Link Connector.
  3. Start engine.
  4. Touch "START" on CONSULT-II screen.



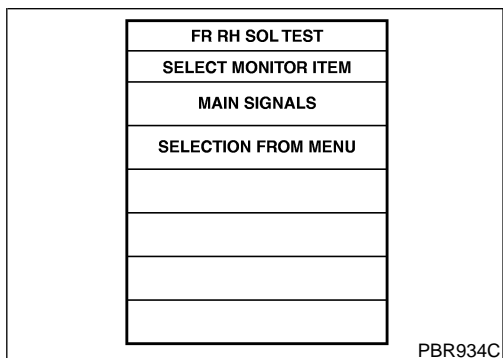
5. Touch "ABS".



6. Touch "ACTIVE TEST".



7. Select active test item by touching screen.



8. Touch "START".
9. Carry out the active test by touching screen key.



# ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

ABS

EXIT

CONSULT-II Inspection Procedure (Cont'd)

## DATA MONITOR MODE

NCBR0093S05

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.	GI MA
STOP LAMP SW	Turn ignition switch ON and depress brake pedal.	Depress the pedal: ON Release the pedal: OFF	EM
FR RH IN SOL FR RH OUT SOL FR LH IN SOL FR LH OUT SOL RR IN SOL RR OUT SOL RL IN SOL RL OUT SOL	Ignition switch is turned ON or engine is running.	Operating conditions for each solenoid valve are indicated. ABS is not operating: OFF	LC EC FE
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 oper- ated.	CL
MOTOR RELAY		ABS is not operating: OFF ABS is operating: ON	MT
WARNING LAMP		Warning lamp is turned on: ON Warning lamp is turned off: OFF	AT
BATTERY VOLT		Power supply voltage for control unit	

## ACTIVE TEST MODE

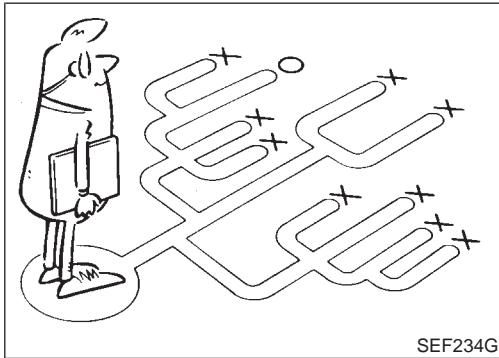
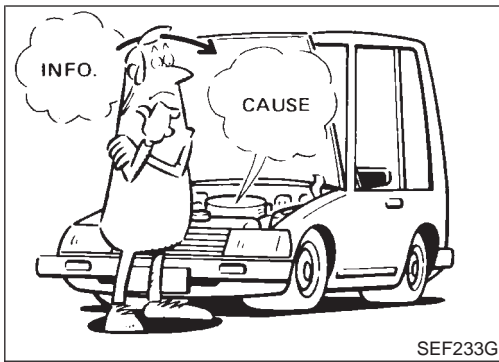
NCBR0093S06

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		
			IN SOL	OUT SOL
		UP (Increase):	OFF	OFF
		KEEP (Hold):	ON	OFF
		DOWN (Decrease):	ON	ON
ABS MOTOR		ABS actuator motor ON: Motor runs OFF: Motor stops		

**NOTE:**

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

How to Perform Trouble Diagnoses for Quick and Accurate Repair



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

### INTRODUCTION

NCBR0094

NCBR0094S01

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.

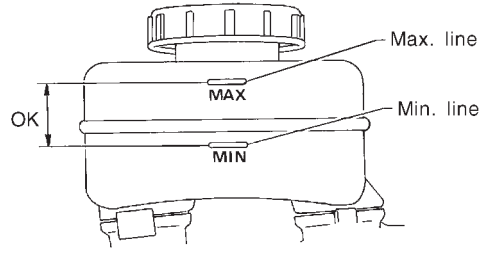
A visual check only may not find the cause of the problems, so a road test should be performed.

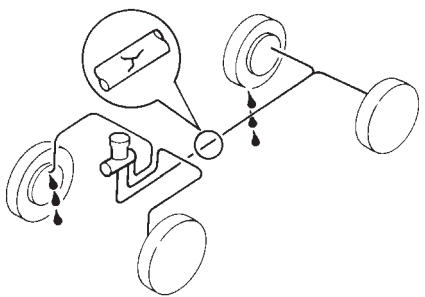
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. Through the talks with the customer, find out what symptoms are present and under what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

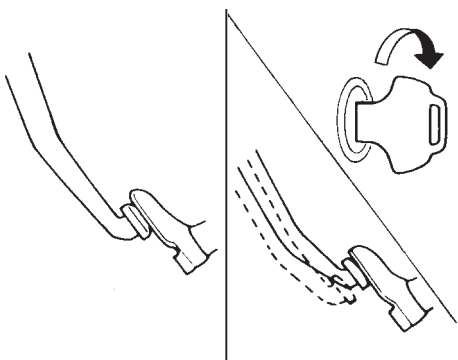
## Preliminary Check

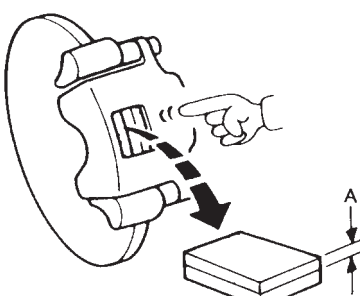
NCBR0095

<b>1</b>	<b>CHECK BRAKE FLUID LEVEL</b>		GI MA EM LC EC FE CL
		<p><b>Check brake fluid level in reservoir tank.</b> Low fluid level may indicate brake pad wear or leakage from brake line.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SBR451D</p>	
		<b>Is brake fluid filled between MAX and MIN lines on reservoir tank and/or has brake fluid been contaminated?</b>	
Yes		▶ GO TO 2.	
No		▶ Repair. GO TO 2.	

<b>2</b>	<b>CHECK BRAKE LINE</b>		MT AT AX SU <b>BR</b> ST RS BT HA SC EL IDX
		<p><b>Check brake line for leakage.</b></p> <div style="text-align: center;">  </div> <p style="text-align: right;">SBR389C</p>	
		<b>Is leakage present at or around brake lines, tubes or hoses or are any of these parts cracked or damaged?</b>	
Yes		▶ GO TO 3.	
No		▶ Repair. GO TO 3.	

Preliminary Check (Cont'd)

<b>3</b>	<b>CHECK BRAKE BOOSTER OPERATION</b>
<p>Check brake booster for operation and air tightness. Refer to BR-17.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SBR058C</p> <p style="text-align: center;"><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-20, 22, 24, 28.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SBR059C</p> <p style="text-align: center;"><b>Are brake pads and rotors functioning properly?</b></p>	
Yes	▶ GO TO 5.
No	▶ Replace.

<b>5</b>	<b>RECHECK BRAKE FLUID LEVEL</b>
<p>Check brake fluid level in reservoir tank again.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR451D</p>	
<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 6.
No	▶ Fill up brake fluid.

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
AX  
SU

<b>6</b>	<b>CHECK WARNING LAMP ACTIVATION</b>
<p>Check warning lamp activation.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR326E</p>	
<p><b>Does warning lamp turn on when ignition switch is turned "ON"?</b></p>	
Yes	▶ GO TO 7.
No	▶ Check fuse, warning lamp bulb and warning lamp circuit.

BR

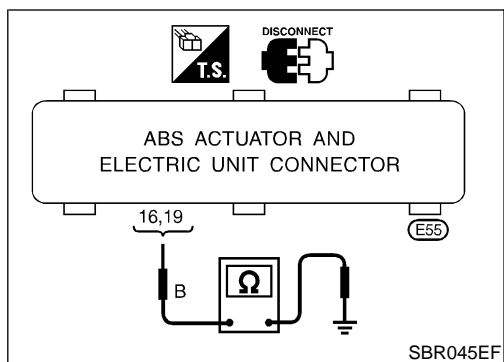
<b>7</b>	<b>CHECK WARNING LAMP DEACTIVATION</b>
<p>Check warning lamp for deactivation after engine is started.</p> <p style="text-align: center;"><b>Does warning lamp turn off when engine is started?</b></p>	
Yes	▶ GO TO 8.
No	▶ Go to Self-diagnosis. Refer to BR-42, 44.

RS  
BT  
HA

<b>8</b>	<b>DRIVE VEHICLE</b>
<p>Drive vehicle at speeds over 30 km/h (19 MPH) for at least one minute.</p> <p style="text-align: center;"><b>Does warning lamp remain off after vehicle has been driven at 30 km/h (19 MPH) for at least one minute?</b></p>	
Yes	▶ END
No	▶ Go to Self-diagnosis. Refer to BR-42, 44.

SC  
EL  
IDX

## Ground Circuit Check



## Ground Circuit Check

### ABS ACTUATOR AND ELECTRIC UNIT GROUND

NCBR0096

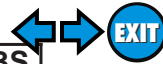
NCBR0096S04

- Check continuity between ABS actuator and electric unit connector terminals and ground.

**Continuity should exist.**

# TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

**ABS**



*Malfunction Code/Symptom Chart*

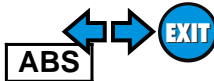
## Malfunction Code/Symptom Chart

NCBR0097

Code No. (No. of LED flashes)	Malfunctioning part	Reference page	
12	Self-diagnosis could not detect any malfunctions.	—	GI
18	Sensor rotor	BR-56	MA
21	Front right sensor (open-circuit)	BR-56	
22	Front right sensor (short-circuit)	BR-56	EM
25	Front left sensor (open-circuit)	BR-56	
26	Front left sensor (short-circuit)	BR-56	LG
31	Rear right sensor (open-circuit)	BR-56	
32	Rear right sensor (short-circuit)	BR-56	EC
35	Rear left sensor (open-circuit)	BR-56	
36	Rear left sensor (short-circuit)	BR-56	FE
41	Actuator front right outlet solenoid valve	BR-59	
42	Actuator front right inlet solenoid valve	BR-59	CL
45	Actuator front left outlet solenoid valve	BR-59	
46	Actuator front left inlet solenoid valve	BR-59	MT
51	Actuator rear right outlet solenoid valve	BR-59	
52	Actuator rear right inlet solenoid valve	BR-59	AT
55	Actuator rear left outlet solenoid valve	BR-59	
56	Actuator rear left inlet solenoid valve	BR-59	AX
57*	Power supply (Low voltage)	BR-64	SU
61	Actuator motor or motor relay	BR-62	
63	Solenoid valve relay	BR-59	<b>BR</b>
71	Control unit	BR-66	
ABS 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	ST RS
ABS warning lamp stays on, during self-diagnosis.	Control unit	—	BT
ABS warning lamp does not come on when ignition switch is turned on.	Fuse, warning lamp bulb or warning lamp circuit Control unit	BR-71	HA
ABS warning lamp does not come on during self-diagnosis.	Control unit	—	SC
Pedal vibration and noise	—	BR-70	
Long stopping distance	—	BR-68	EL
Unexpected pedal action	—	BR-67	
ABS does not work.	—	BR-69	IDX
ABS works frequently.	—	BR-67	

\*: Under voltage that is too low, the control unit disable the ABS. It does not set the ABS in fail-safe condition. Instead, the ABS becomes a conventional brake system. After the power supply has resumed, the warning lamp goes off, making it possible for the ABS to be re-engaged.

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS



Wheel Sensor or Rotor

## Wheel Sensor or Rotor DIAGNOSTIC PROCEDURE

NCBR0098

NCBR0098S01

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

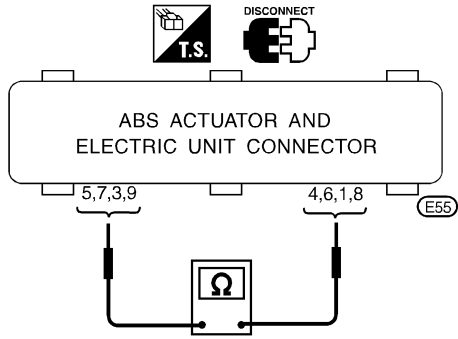
### NOTE:

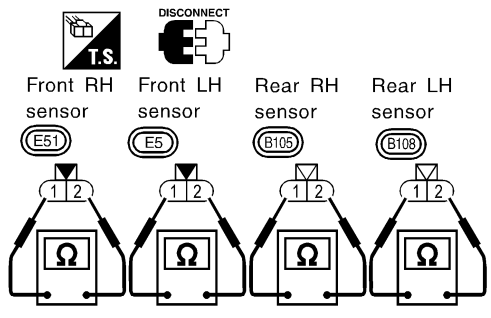
Wheel position should be identified by code No. except code No. 18 (sensor rotor).

<b>1</b>	<b>INSPECTION START</b>
<p>Wheel sensor inspection</p> <div style="text-align: center;"> <p style="text-align: center;">Wheel sensor connectors (sensor side)</p> <p style="text-align: center;">Front RH    Front LH    Rear RH    Rear LH</p> </div>	
SBR476EA	
<b>▶</b>	<b>GO TO 2.</b>

<b>2</b>	<b>CHECK CONNECTOR</b>
<ol style="list-style-type: none"> <li>1. Disconnect connectors from control unit and wheel sensor of malfunction code No. Check terminals for damage or loose connections. Then reconnect connectors.</li> <li>2. Carry out self-diagnosis again.</li> </ol> <p style="text-align: center;"><b>Does warning lamp activate again?</b></p>	
Yes	<b>▶</b> GO TO 3.
No	<b>▶</b> <b>INSPECTION END</b>



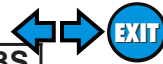
<b>3</b>	<b>CHECK WHEEL SENSOR CIRCUIT</b>	<p>1. Disconnect control unit connector.</p> <p>2. Check resistance between control unit connector terminals.</p> <p>Code No. 21 or 22 (Front RH wheel) Terminals 4 and 5</p> <p>Code No. 25 or 26 (Front LH wheel) Terminals 6 and 7</p> <p>Code No. 31 or 32 (Rear RH wheel) Terminals 1 and 3</p> <p>Code No. 35 or 36 (Rear LH wheel) Terminals 8 and 9</p> <p style="color: blue;"><b>Resistance: 1.44 - 1.76 kΩ</b></p> <div style="text-align: center; margin: 10px 0;">  <p style="font-size: small;">SBR477EA</p> </div> <p style="text-align: center;"><b>Is resistance 1.44 - 1.76 kΩ?</b></p>	GI MA EM LC EC FE CL MT						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	Yes	▶	GO TO 5.	No	▶	GO TO 4.	AT AX
Yes	▶	GO TO 5.							
No	▶	GO TO 4.							

<b>4</b>	<b>CHECK WHEEL SENSOR</b>	<p>Check resistance of each sensor. (See NOTE.)</p> <p style="color: blue;"><b>Resistance: 1.44 - 1.76 kΩ</b></p> <div style="text-align: center; margin: 10px 0;">  <p style="font-size: small;">SBR478EA</p> </div> <p style="text-align: center;"><b>Is resistance 1.44 - 1.76 kΩ?</b></p>	SU BR ST RS BT						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair harness and connectors between control unit connector and wheel sensor connector.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Replace wheel sensor.</td> </tr> </table>	Yes	▶	Repair harness and connectors between control unit connector and wheel sensor connector.	No	▶	Replace wheel sensor.	HA SC
Yes	▶	Repair harness and connectors between control unit connector and wheel sensor connector.							
No	▶	Replace wheel sensor.							

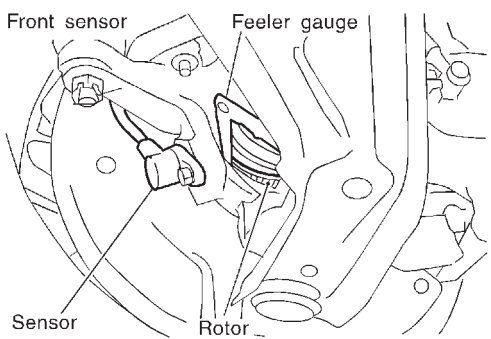
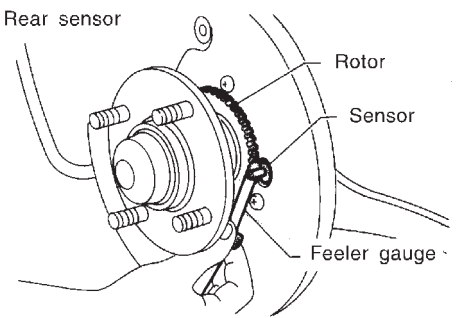
<b>5</b>	<b>CHECK TIRE</b>	<p>Check for inflation pressure, wear and size of each tire.</p> <p style="text-align: center;"><b>Are tire pressure and size correct and is tire wear within specifications?</b></p>	EL IDX						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Adjust tire pressure or replace tire(s).</td> </tr> </table>	Yes	▶	GO TO 6.	No	▶	Adjust tire pressure or replace tire(s).	
Yes	▶	GO TO 6.							
No	▶	Adjust tire pressure or replace tire(s).							

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS



Wheel Sensor or Rotor (Cont'd)

<b>6</b>	<b>CHECK WHEEL BEARING</b>
<p>Check wheel bearing axial end play. Check clearance between sensor and rotor.</p> <p><b>Clearance:</b>  <b>Front</b>  <b>0.7 - 1.5 mm (0.028 - 0.059 in)</b>  <b>Rear</b>  <b>0.58 - 1.20 mm (0.228 - 0.0472 in)</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Front sensor Feeler gauge Sensor Rotor</p> </div> <div style="text-align: right;">SBR333E</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p>Rear sensor Rotor Sensor Feeler gauge</p> </div> <div style="text-align: right;">SBR069CA</div> </div>	
<b>Is axial end play and clearance within specifications?</b>	
Yes	▶ GO TO 7.
No	▶ Clean sensor fixing portion, or replace sensor.

<b>7</b>	<b>CHECK SENSOR ROTOR</b>
Check sensor rotor for teeth damage.	
<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.

## ABS Actuator Solenoid Valve or Solenoid Valve Relay

### DIAGNOSTIC PROCEDURE

Malfunction code No. 41, 45, 55, 42, 46, 56, 63, 51, 52

=NCBR0100

NCBR0100S01

<b>1</b>	<b>INSPECTION START</b>	<p>Solenoid valve relay inspection</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td> </tr> <tr> <td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td></td><td></td><td></td><td>19</td><td>18</td><td>17</td><td>16</td><td></td><td></td><td></td> </tr> </table> <p style="text-align: right;">SBR580E</p>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	26	25	24	23	22	21	20									31	30	29	28	27				19	18	17	16			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																																	
26	25	24	23	22	21	20																																									
31	30	29	28	27				19	18	17	16																																				
▶		GO TO 2.																																													

<b>2</b>	<b>CHECK SOLENOID VALVE POWER SUPPLY CIRCUIT</b>	<p>Check 40A [f] fusible link (ABS ACTR) for ABS solenoid valve relay. For fusible link layout, refer to POWER SUPPLY ROUTING in EL section.</p> <p style="text-align: center;"><b>Is fusible link OK?</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 7.</td> </tr> </table>	Yes	▶	GO TO 3.	No	▶	GO TO 7.
Yes	▶	GO TO 3.						
No	▶	GO TO 7.						

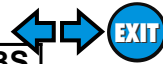
<b>3</b>	<b>CHECK FUSE</b>	<p>Check 7.5A fuse No. 3. For fuse layout, refer to "POWER SUPPLY ROUTING" in EL section.</p> <p style="text-align: center;"><b>Is fuse OK?</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 9.</td> </tr> </table>	Yes	▶	GO TO 4.	No	▶	GO TO 9.
Yes	▶	GO TO 4.						
No	▶	GO TO 9.						

<b>4</b>	<b>CHECK CONNECTOR</b>	<p>1. Disconnect connectors from control unit and ABS actuator. Check terminals for damage or loose connection. Then reconnect connectors.</p> <p>2. Carry out self-diagnosis again.</p> <p style="text-align: center;"><b>Does warning lamp activate again?</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td><b>INSPECTION END</b></td> </tr> </table>	Yes	▶	GO TO 5.	No	▶	<b>INSPECTION END</b>
Yes	▶	GO TO 5.						
No	▶	<b>INSPECTION END</b>						

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# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS



*ABS Actuator Solenoid Valve or Solenoid Valve Relay (Cont'd)*

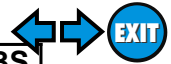
<b>5</b>	<b>CHECK GROUND CIRCUIT</b>	
Refer to ABS ACTUATOR AND ELECTRIC UNIT in Ground Circuit Check, BR-54.		
<b>Is ground circuit OK?</b>		
Yes	▶	GO TO 6.
No	▶	Repair harness and connectors.

<b>6</b>	<b>CHECK SOLENOID VALVE POWER SUPPLY CIRCUIT</b>	
1. Disconnect ABS actuator and electric unit connector. 2. Check voltage between ABS actuator and electric unit connector terminal 18 and ground.		
SBR052EE		
<b>Does battery voltage exist?</b>		
Yes	▶	Replace ABS actuator and electric unit.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fusible link</li> </ul> If NG, repair harness or connectors.

<b>7</b>	<b>REPLACE FUSIBLE LINK</b>	
Replace fusible link.		
<b>Does the fusible link blow out when ignition switch is turned "ON"?</b>		
Yes	▶	GO TO 8.
No	▶	<b>INSPECTION END</b>

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS



*ABS Actuator Solenoid Valve or Solenoid Valve Relay (Cont'd)*

<b>8</b>	<b>CHECK RELAY UNIT POWER SUPPLY CIRCUIT</b>	
<p>1. Disconnect ABS actuator and electric unit connector.                  2. Check continuity between ABS actuator and electric unit connector terminal 18 and ground.</p> <div style="text-align: center;"> <p style="text-align: center;">Does continuity exist?</p> </div> <p style="text-align: right; font-size: small;">SBR052EE</p>		
Yes	▶	Replace ABS actuator and electric unit.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fusible link</li> </ul> If NG, repair harness or connectors.

<b>9</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	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fuse</li> </ul> If NG, repair harness or connectors.
No	▶	<b>INSPECTION END</b>

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

=NCBR0101

NCBR0101S01

<b>1</b>	<b>INSPECTION START</b>
<p>ABS motor relay inspection</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR581E</p>	
▶ GO TO 2.	

<b>2</b>	<b>CHECK MOTOR POWER SUPPLY CIRCUIT</b>
<p>Check 40A [h] fusible link (ABS MTR) for ABS motor relay. For fusible link layout, refer to POWER SUPPLY ROUTING in EL section.</p> <p style="text-align: center;"><b>Is fusible link OK?</b></p>	
Yes	▶ GO TO 3.
No	▶ GO TO 6.

<b>3</b>	<b>CHECK CONNECTOR</b>
<p>1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connectors.</p> <p>2. Carry out self-diagnosis again.</p> <p style="text-align: center;"><b>Does warning lamp activate again?</b></p>	
Yes	▶ GO TO 4.
No	▶ <b>INSPECTION END</b>

<b>4</b>	<b>CHECK MOTOR RELAY POWER SUPPLY CIRCUIT</b>	
<p>1. Disconnect ABS actuator and electric unit connector.                  2. Check voltage between ABS actuator and electric unit connector terminal 17 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: center;"><b>Does battery voltage exist?</b></p>		
Yes	▶	GO TO 5.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fusible link</li> </ul> If NG, repair harness or connectors.

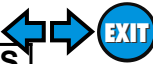
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<b>5</b>	<b>CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT</b>	
<p>Refer to ABS ACTUATOR AND ELECTRIC UNIT GROUND in Ground Circuit Check, BR-54.</p> <p style="text-align: center;"><b>Is ground circuit OK?</b></p>		
Yes	▶	Replace ABS actuator and electric unit.
No	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and ground</li> </ul> If NG, repair harness or connectors.

<b>6</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 7.
No	▶	<b>INSPECTION END</b>

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS



Motor Relay or Motor (Cont'd)

<b>7</b>	<b>CHECK ABS ACTUATOR MOTOR POWER SUPPLY CIRCUIT</b>	
<p>1. Disconnect battery cable and ABS actuator and electric unit connector.                  2. Check continuity between ABS actuator and electric unit connector terminal 17 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR055EE</p> <p style="text-align: center;"><b>Does continuity exist?</b></p>		
Yes	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
No	▶	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fusible link</li> </ul> <p>If NG, repair harness or connectors.</p>

## Low Voltage DIAGNOSTIC PROCEDURE Malfunction code No. 57

NCBR0102

NCBR0102S01

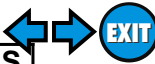
<b>1</b>	<b>INSPECTION START</b>	
<p>ABS actuator and electric unit power supply and ground circuit inspection</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR582E</p>		
▶		GO TO 2.



# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS

ABS

Low Voltage (Cont'd)



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

GI  
MA  
EM

<b>3</b>	<b>CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT</b>	
1. Disconnect ABS actuator and electric unit connector. 2. Check voltage between ABS actuator and electric unit connector terminal 15 and ground.		
<p style="text-align: center;">ABS ACTUATOR AND ELECTRIC UNIT CONNECTOR</p> <p style="text-align: right;">SBR058EG</p>		
<b>Does battery voltage exist when ignition switch is turned ON?</b>		
Yes	▶	GO TO 4.
No	▶	GO TO 5.

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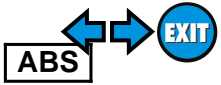
<b>4</b>	<b>CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND</b>	
Refer to ABS ACTUATOR AND ELECTRIC UNIT GROUND in Ground Circuit Check, BR-54.		
<b>Is ground circuit OK?</b>		
OK	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
NG	▶	<b>Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and ground</li> </ul> If NG, repair harness or connectors.

SU  
BR  
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RS

<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.

HA  
SC  
EL  
IDX

# TROUBLE DIAGNOSES FOR SELF-DIAGNOSTIC ITEMS



Low Voltage (Cont'd)

<b>6</b>	<b>CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT</b>	
Check continuity between battery and ABS actuator and electric unit connector terminal 15.		
<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 E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fuse</li> </ul> If NG, repair harness or connectors.

## Control Unit DIAGNOSTIC PROCEDURE Malfunction code No. 71

NCBR0103  
NCBR0103S01

<b>1</b>	<b>INSPECTION START</b>	
ABS actuator and electric unit power supply and ground circuit inspection		
SBR583E		
	▶	GO TO 2.

<b>2</b>	<b>CHECK CONNECTOR</b>	
1. Disconnect ABS actuator and electric 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>

<b>3</b>	<b>CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT</b>	
Check voltage. Refer to "3. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT" in "Low Voltage", BR-64.		
<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 ABS actuator and electric unit.
No	▶	Inspect the system according to the code No.

## 1. ABS Works Frequently

NCBR0104

<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-11.		
<b>Is brake fluid pressure distribution normal?</b>		
Yes	▶	GO TO 2.
No	▶	Perform Preliminary Check. Refer to BR-51.

GI

MA

EM

<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-56.		
<b>Are wheel sensors functioning properly?</b>		
Yes	▶	GO TO 3.
No	▶	Repair.

LC

EC

FE

CL

<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-67.
No	▶	Repair.

MT

AT

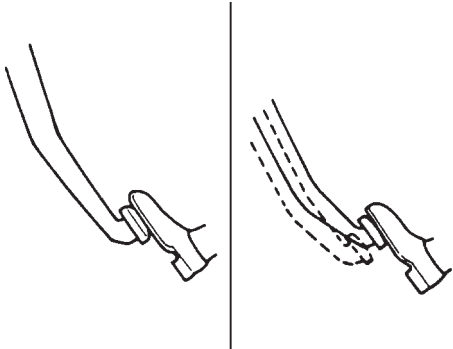
AX

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## 2. Unexpected Pedal Action

NCBR0105

<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.

ST

RS

BT

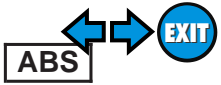
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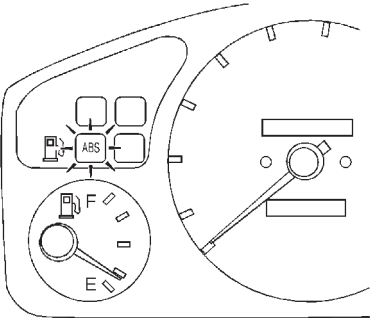
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# TROUBLE DIAGNOSES FOR SYMPTOMS



## 2. Unexpected Pedal Action (Cont'd)

<b>2</b>	<b>CHECK CONNECTOR AND PERFORMANCE</b>	
1. Disconnect ABS actuator and electric unit connector. 2. Check whether brake is effective.		
<b>OK or NG</b>		
Yes	▶	GO TO 3.
No	▶	Perform Preliminary Check. Refer to BR-51.

<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-42, BR-44.

<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.		
<b>Is wheel sensor mechanism OK?</b>		
Yes	▶	Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
No	▶	Repair.

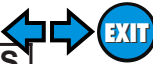
## 3. Long Stopping Distance

NCBR0106

<b>1</b>	<b>CHECK CONNECTOR AND PERFORMANCE</b>	
1. Cancel ABS by disconnecting ABS actuator and electric unit connector. 2. Check whether stopping distance is still long.		
<b>OK or NG</b>		
OK	▶	Perform Preliminary Check and air bleeding.
NG	▶	Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-67.

# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS



3. Long Stopping Distance (Cont'd)

## NOTE:

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

GI

MA

EM

LC

## 4. ABS Does Not Work

NCBR0107

1	<b>CHECK WARNING LAMP INDICATION</b>	
Does the ABS warning lamp activate?		
Yes	▶	Carry out self-diagnosis. Refer to BR-42, BR-44.
No	▶	Go to "3. CHECK WARNING LAMP INDICATION" in "2. Unexpected Pedal Action", BR-67.

EC

FE

CL

## NOTE:

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

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## 5. Pedal Vibration and Noise

=NCBR0108

<b>1</b>	<b>INSPECTION START</b>		
Pedal vibration and noise inspection			
<p>Brake pedal</p> 			
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-42, BR-44.	
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-67.	

<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 ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.	
No	▶	Repair.	

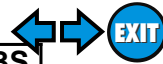
**NOTE:**

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.

# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS



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

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

=NCBR0109

<b>1</b>	<b>INSPECTION START</b>		
		Warning lamp circuit inspection	
		SBR205EB	
▶		GO TO 2.	

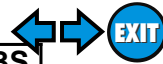
<b>2</b>	<b>CHECK FUSE</b>		
		Check 10A fuse No. 11 for warning lamp. For fuse layout, refer to "POWER SUPPLY ROUTING" in EL section.	
		<b>Is fuse OK?</b>	
Yes ▶		GO TO 3.	
No ▶		Replace fuse.	

<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>	
		SBR715DD	
		<b>Does battery voltage exist after turning ignition switch "ON"?</b>	
Yes ▶		GO TO 5.	
No ▶		GO TO 4.	

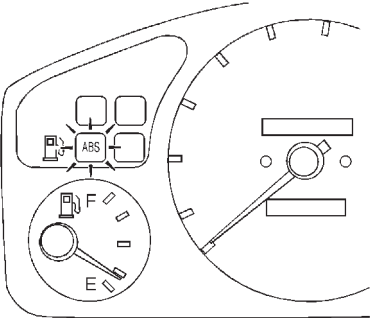
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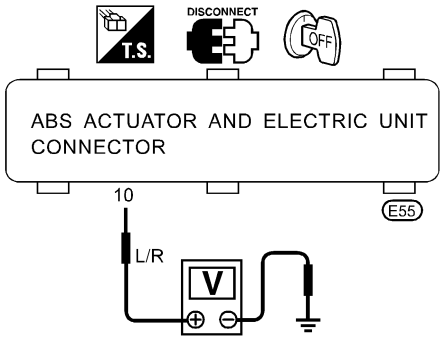
# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS



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

<b>4</b>	<b>CHECK WARNING LAMP INDICATION</b>	
Disconnect ABS actuator and electric unit connector.		
		
SBR326E		
<b>Does the ABS warning lamp activate?</b>		
Yes	▶	GO TO 6.
No	▶	GO TO 5.

<b>5</b>	<b>CHECK HARNESS FOR SHORT</b>	
1. Disconnect ABS actuator and electric unit connector. 2. Check voltage between ABS actuator and electric unit connector terminal 10 and ground.		
		
SBR144EE		
<b>Does battery voltage exist?</b>		
Yes	▶	Check combination meter. Refer to WARNING LAMPS in EL section.
No	▶	Repair harness and connectors between fuse and ABS actuator and electric unit connector terminal 10.

<b>6</b>	<b>CHECK HARNESS CONNECTOR</b>	
Check ABS actuator and electric unit pin terminals for damage or connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then reset.		
OK	▶	<b>INSPECTION END</b>
NG	▶	Replace ABS actuator and electric unit.



# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS

EXIT

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

=NCBR0110

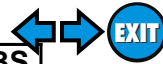
<b>1</b>	<b>INSPECTION START</b>		
ABS control unit inspection			<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p>
▶		GO TO 2.	SBR206EB

<b>2</b>	<b>CHECK WARNING LAMP</b>		
<ol style="list-style-type: none"> <li>1. Disconnect ABS actuator and electric unit connector.</li> <li>2. Connect suitable wire between ABS actuator and electric unit connector terminal 10 and ground.</li> </ol>			<p>MT</p> <p>AT</p> <p>AX</p> <p>SU</p> <p><b>BR</b></p>
▶		Does warning lamp activate?	SBR146ED
Yes	▶	GO TO 3.	ST
No	▶	<b>Repair combination meter. Check the following.</b> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and fuse</li> </ul> If NG, repair harness or connector.	RS

<b>3</b>	<b>CHECK HARNESS CONNECTOR</b>		
Check ABS actuator and electric unit pin terminals for damage or the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.			<p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	<b>INSPECTION END</b>	
NG	▶	GO TO 4.	

# TROUBLE DIAGNOSES FOR SYMPTOMS

ABS



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

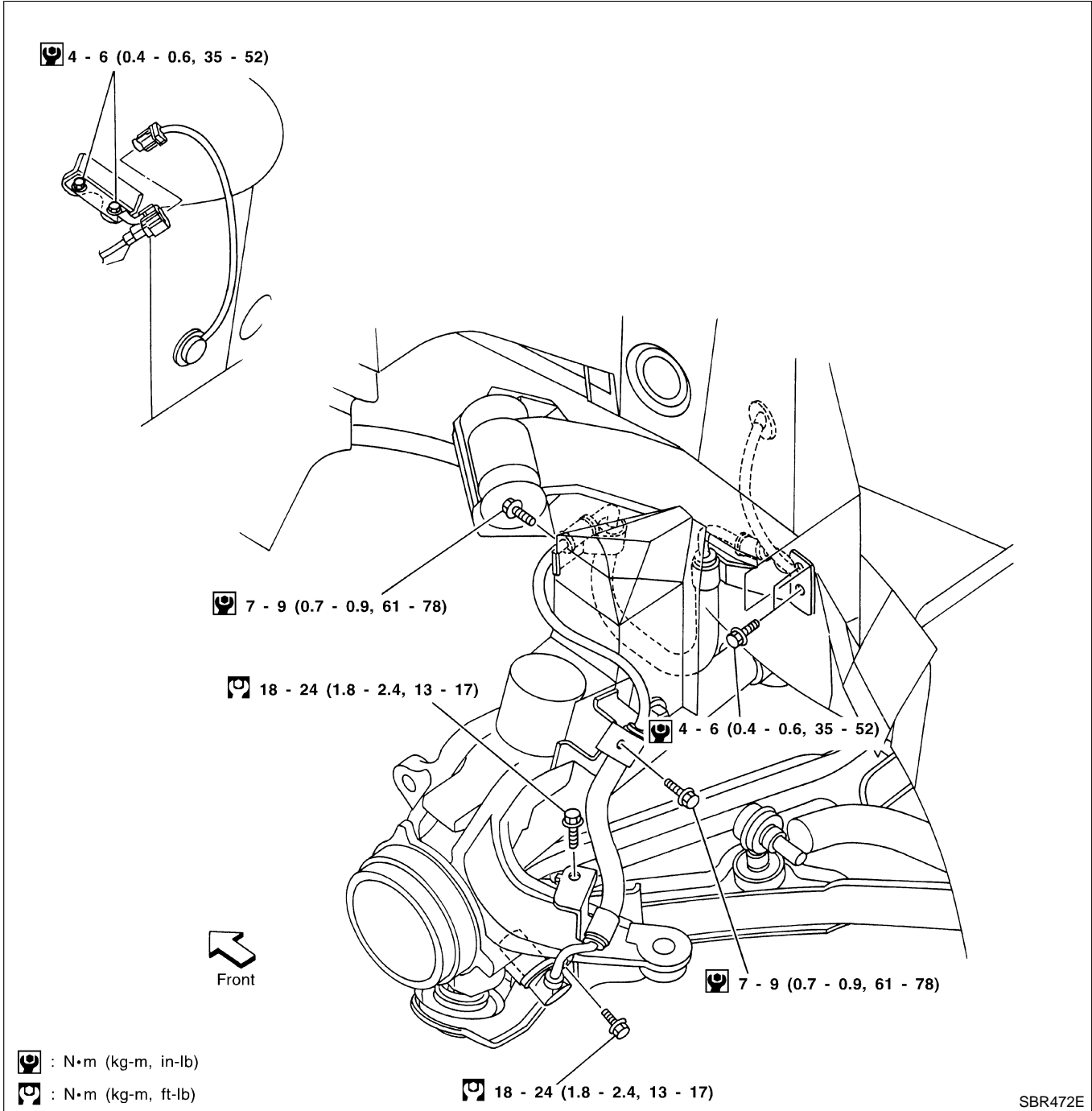
<b>4</b>	<b>CHECK ABS MOTOR GROUND</b>	
<p>1. Turn ignition switch "OFF".                  2. Disconnect ABS actuator and electric unit connector.                  3. Check continuity between ABS actuator and electric unit connector terminal 16 and ground.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SBR147EB</p>		
<b>Does continuity exist?</b>		
Yes	▶	Replace ABS actuator and electric unit.
No	▶	<p><b>Check the following.</b></p> <ul style="list-style-type: none"> <li>● Harness connector E55</li> <li>● Harness for open or short between ABS actuator and electric unit and ground</li> </ul> <p>If NG, repair harness or connector.</p>

## 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.

## Front Wheel Sensors

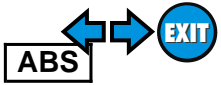
NCBR0111S01



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

SBR472E

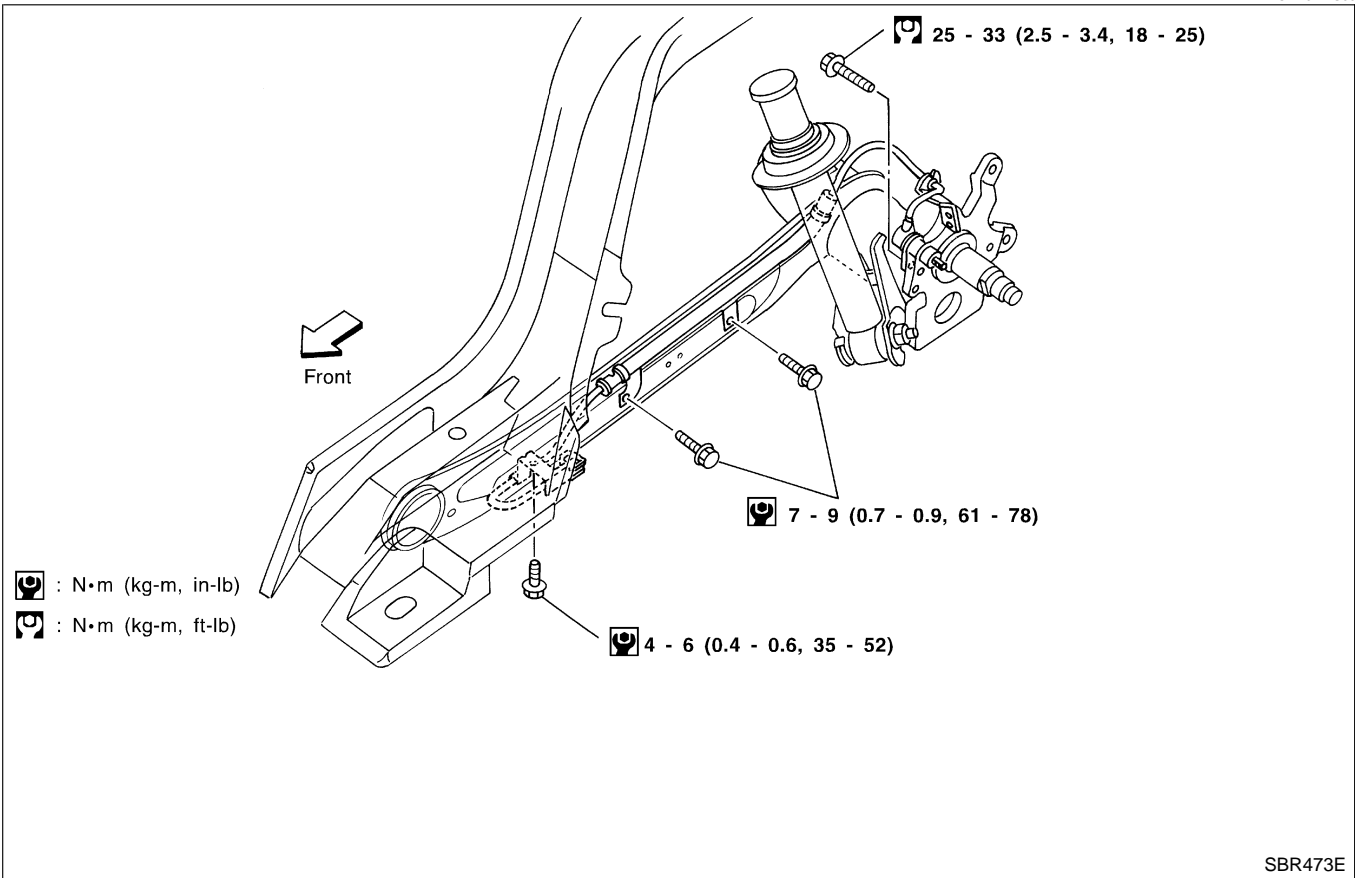
# REMOVAL AND INSTALLATION



Rear Wheel Sensors

## Rear Wheel Sensors

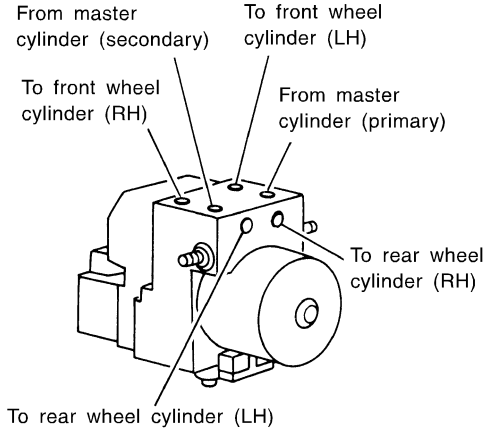
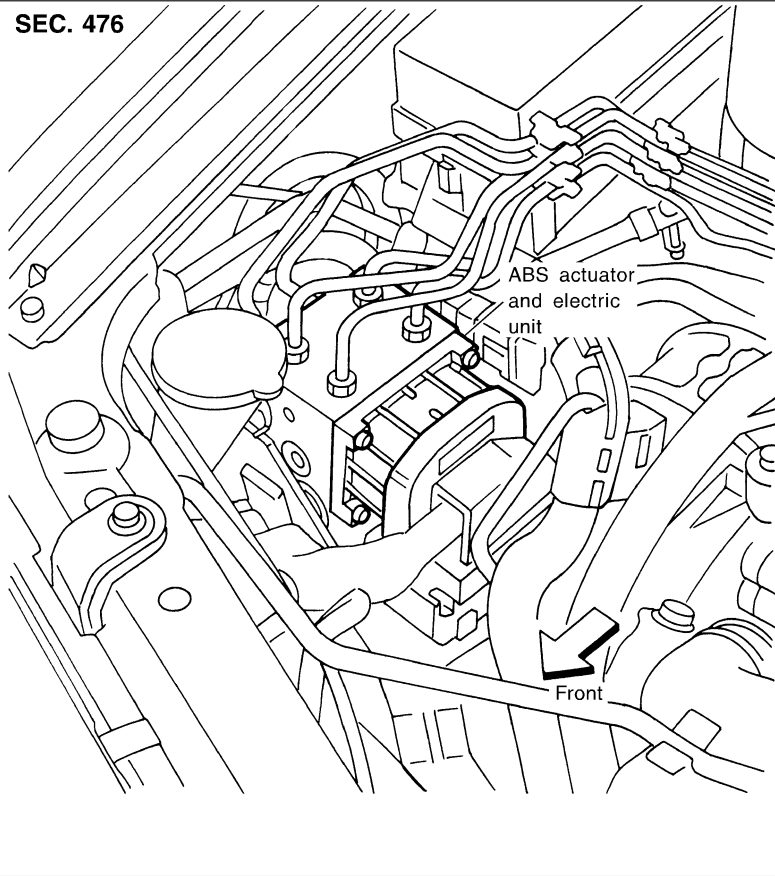
NCBR0111S09



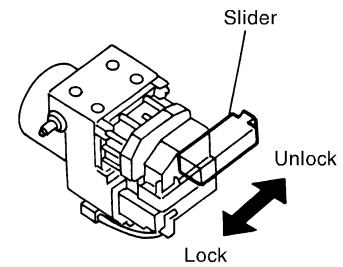
## ABS Actuator and Electric Unit

NCBR0111S10

SEC. 476



The way of connector lock



SBR474E

### REMOVAL

NCBR0111S1001

1. Disconnect battery cable.
2. Drain brake fluid.
3. Remove mounting bracket fixing bolts and nuts.
4. Disconnect connector, brake pipes and remove fixing nuts.

### INSTALLATION

NCBR0111S1002

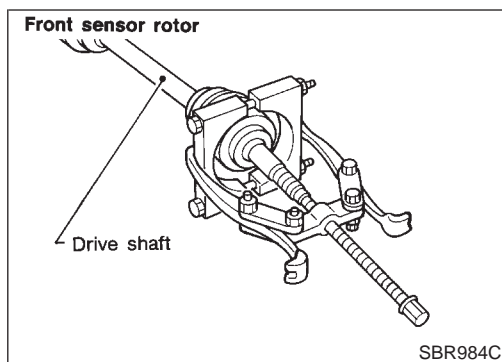
#### CAUTION:

**After installation, refill brake fluid. Then bleed air.**

1. Connect brake pipes temporarily.
2. Tighten fixing bolts and nuts.
3. Tighten brake pipes.
4. Connect connector and battery cable.

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

## Sensor Rotor



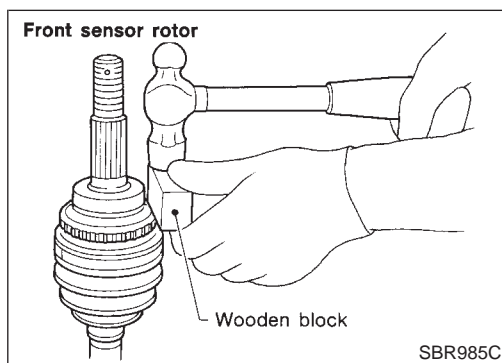
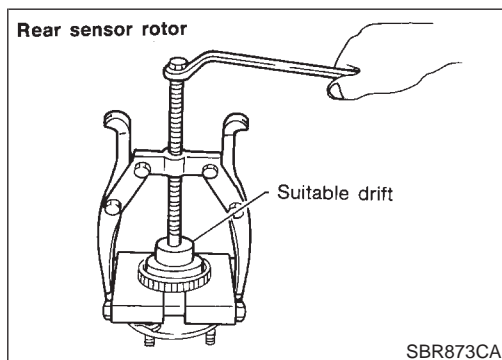
## Sensor Rotor

NCBR0111S02

### REMOVAL

NCBR0111S0201

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.



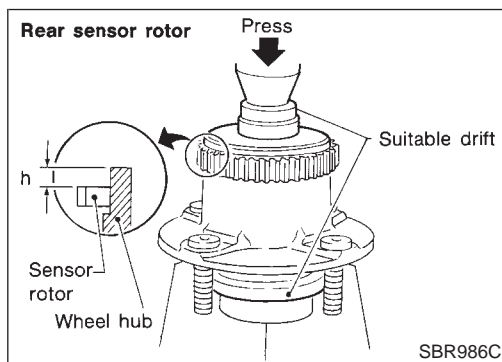
### INSTALLATION

NCBR0111S0202

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)**



## 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)		EM
Rear brake	Brake model		CL9HC disc brake		LC
	Cylinder bore diameter		33.96 (1.3370)		LC
	Pad Length × width × thickness		89.1 × 39.5 × 10 (3.508 × 1.555 × 0.39)		EC
	Rotor outer diameter × thickness		258 × 9 (10.16 × 0.35)		EC
Master cylinder	Cylinder bore diameter		23.81 (15/16)		FE
Control valve	Valve model		Dual proportioning valve		FE
	Split point kPa (kg/cm <sup>2</sup> , psi) × reducing ratio		3,923 (40, 569) × 0.4		CL
Brake booster	Booster model		M/T	A/T	MT
			M195T	M210T	MT
	Diaphragm diameter	Primary	205 (8.07)	230 (9.06)	AT
		Secondary	180 (7.09)	180 (7.09)	AT
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

## NOTES