

BRAKE SYSTEM

SECTION **BR**

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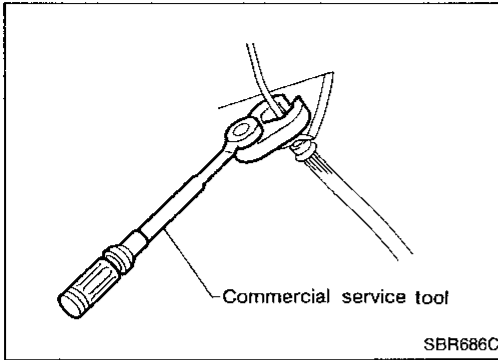
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PRECAUTIONS AND PREPARATION



Precautions

- CL28VD type front disc brake uses plastic pistons. Handle them carefully comparing with the former steel pistons.
- 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.

WARNING:

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

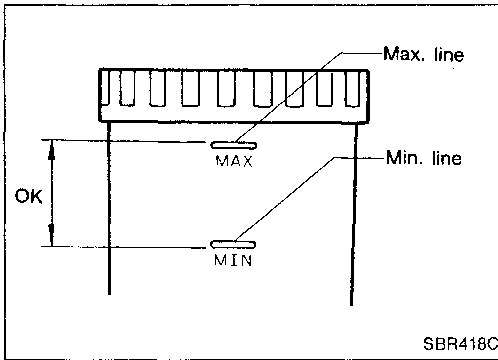
Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
KV991V0010 (—) Brake fluid pressure gauge		Measuring brake fluid pressure
	NT151	

Commercial Service Tools

Tool name	Description	
① Flare nut crows foot ② Torque wrench		NT223

CHECK AND ADJUSTMENT



Checking Brake Fluid Level

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

Checking Brake System

- Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any damaged parts.
If leakage occurs around joints, retighten or, if necessary, replace damaged parts.
- Be sure to check for oil leakage by fully depressing brake pedal.

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Changing Brake Fluid

1. Drain brake fluid in each air bleeder valve.
2. Refill until new brake fluid comes out of each air bleeder valve.
Use same procedure as in bleeding hydraulic system to refill brake fluid.
Refer to Bleeding Procedure below.

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- Refill with recommended brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.

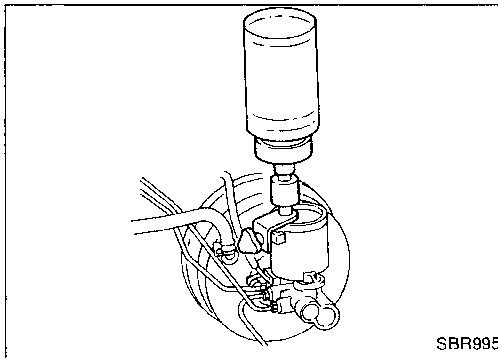
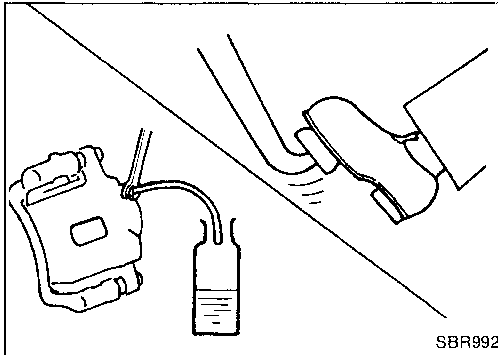
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Bleeding Brake System

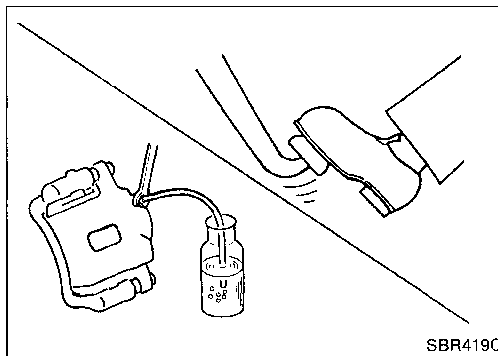
CAUTION:

- Carefully monitor brake fluid level at master cylinder during bleeding operation.
- If master cylinder is suspected to have air inside, bleed air from master cylinder first. Refer to "Installation" in "MASTER CYLINDER" (BR-9).
- 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.
- Models equipped with Rear Wheel Anti-Lock Brake system: Before bleeding air, be sure to turn OFF ignition switch, and disconnect battery ground cable and actuator connector.
- Bleed air in the following order.
 1. LSV air bleeder (Models equipped with LSV)
 2. Left rear brake
 3. Right rear brake
 4. Left front brake
 5. Right front brake
 6. R-ABS actuator (Models equipped with R-ABS)

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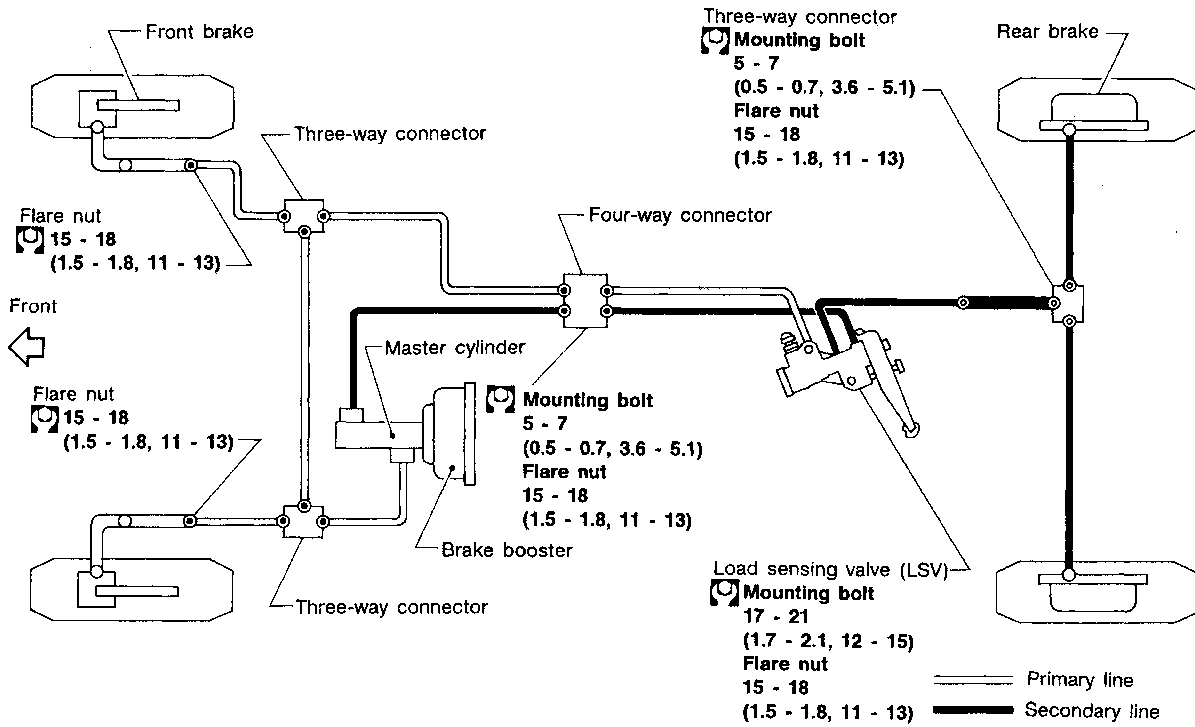
1. Connect a transparent vinyl tube to air bleeder valve.
2. Fully depress brake pedal several times.
3. With brake pedal depressed, open air bleeder valve to release air.
4. Close air bleeder valve.
5. Release brake pedal slowly.
6. Repeat steps 2. through 5. until clear brake fluid comes out of air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

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BRAKE HYDRAULIC LINE

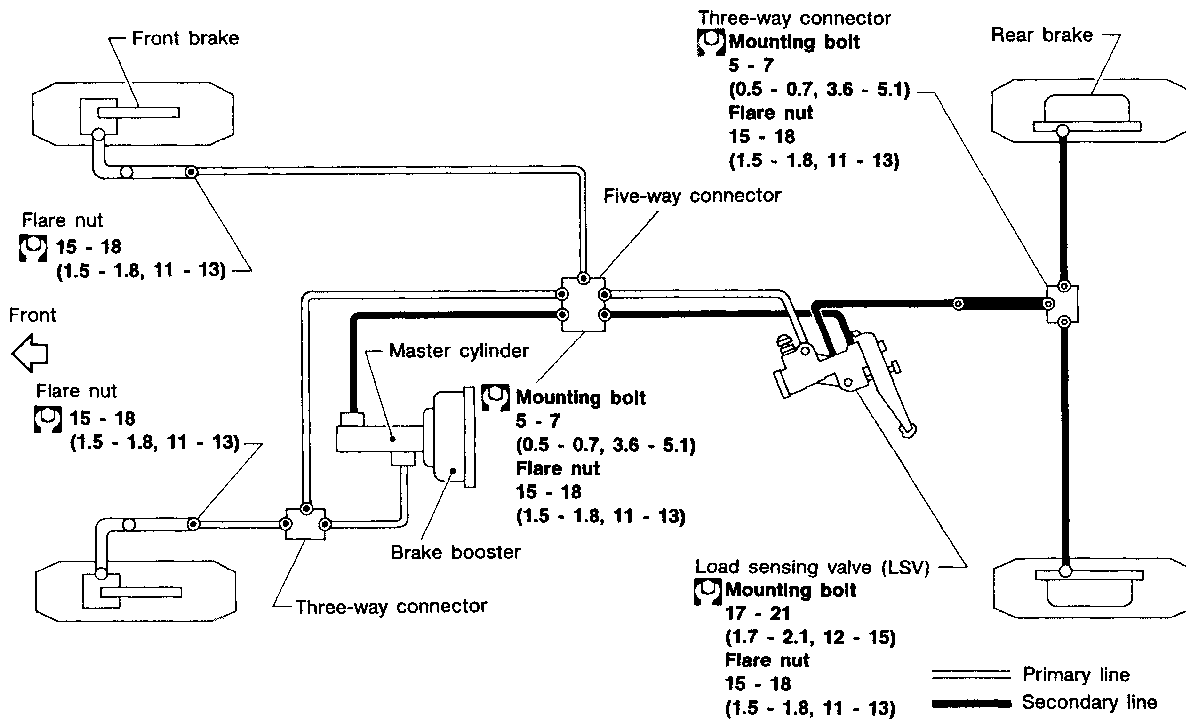
2WD Truck with VG30 engine



☐ : N·m (kg·m, ft·lb)

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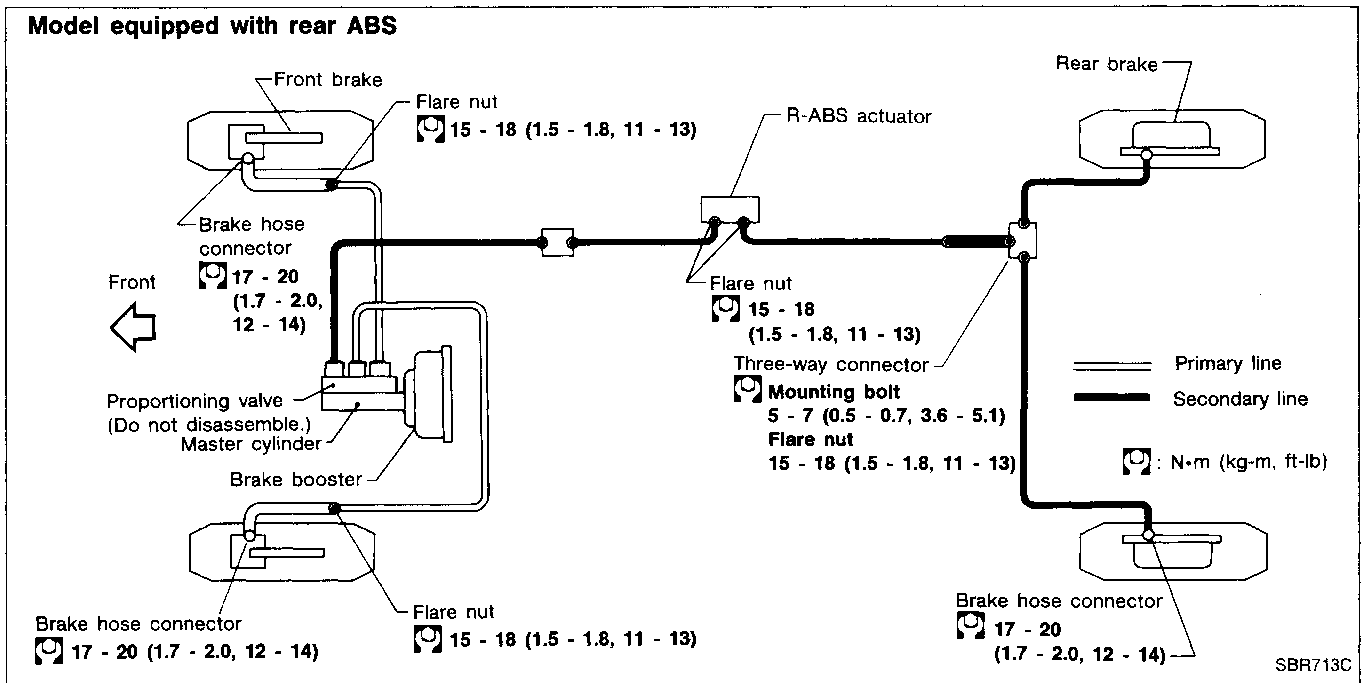
2WD Truck with KA24 engine



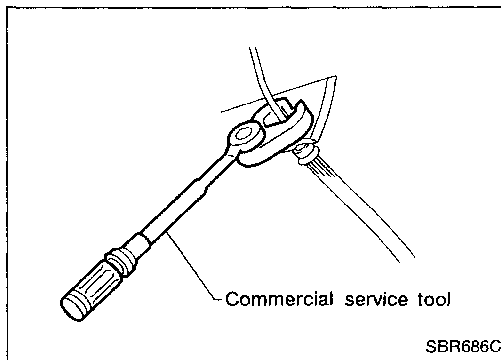
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BRAKE HYDRAULIC LINE



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Removal and Installation

CAUTION:

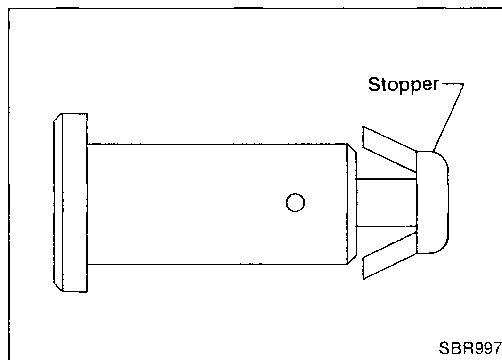
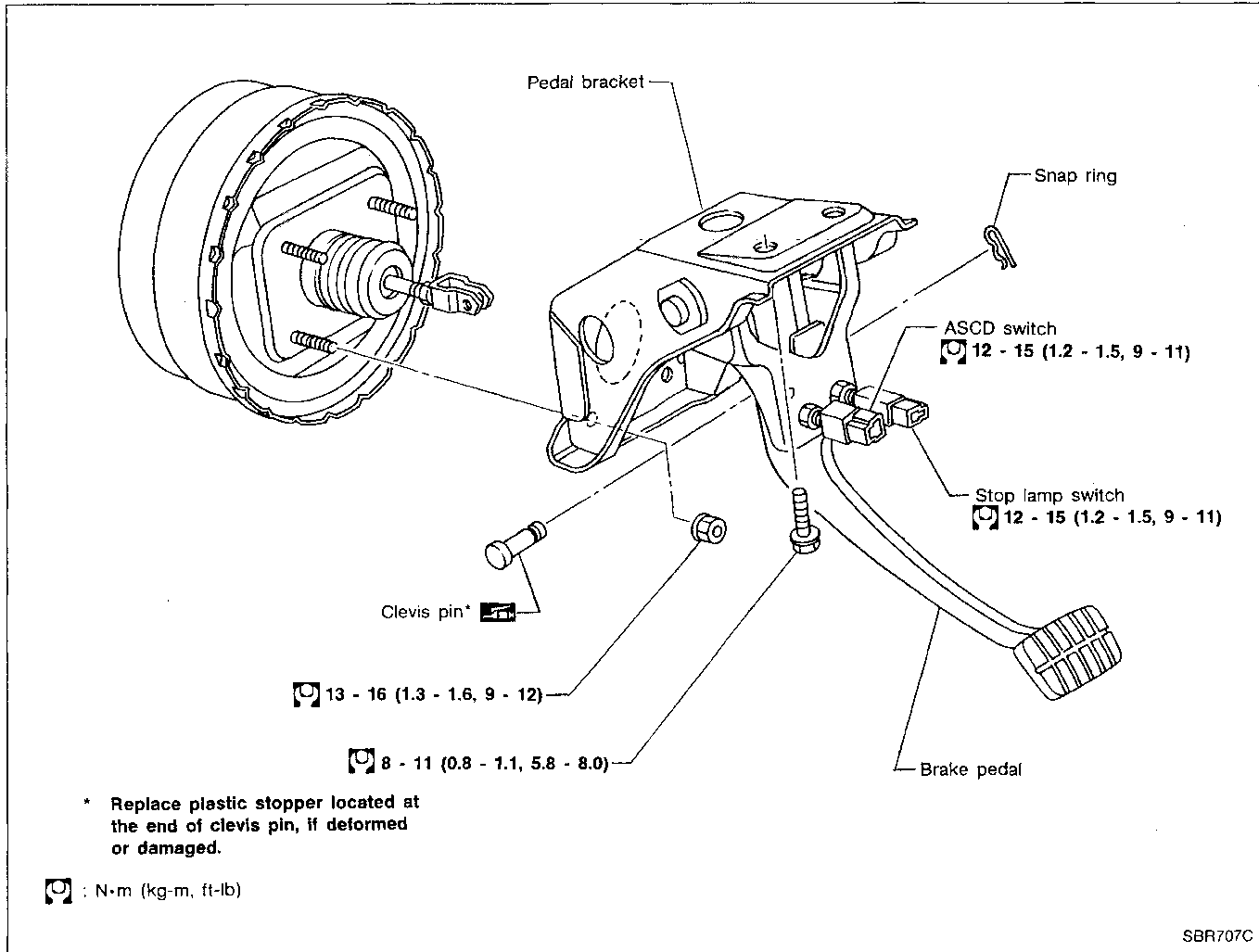
- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
- All hoses must be free from excessive bending, twisting and pulling.
- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Use Tool when removing and installing brake tube.
- Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.
- To remove brake hose, first remove flare nut securing brake tube to hose, then withdraw lock spring. Next disconnect the other side.
- All hoses must be free from excessive bending, twisting and pulling.
- After installing brake lines, be sure to check for oil leakage by fully depressing brake pedal.

Inspection

Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any damaged parts. If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

BRAKE PEDAL AND BRACKET

Removal and Installation

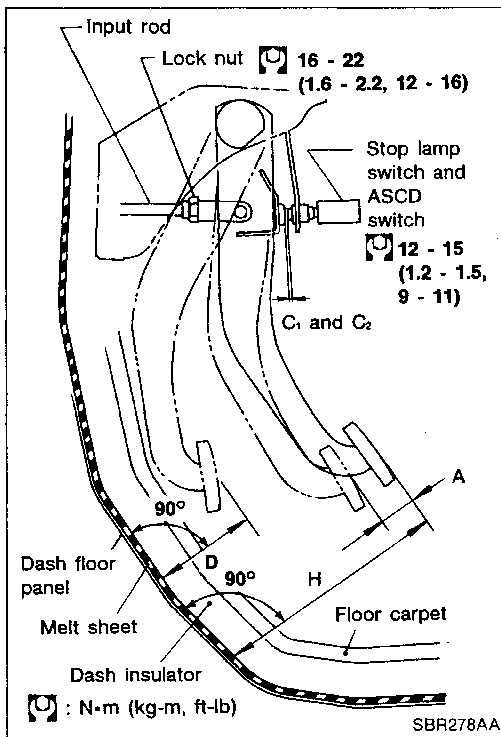


Inspection

Check brake pedal for following items:

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

BRAKE PEDAL AND BRACKET



Adjustment

Check brake pedal free height from melt sheet. Adjust if necessary.

H: Free height

Refer to SDS.

D: Depressed height

Refer to SDS.

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

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

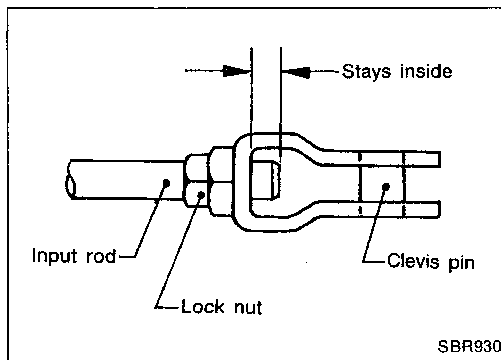
0.3 - 1.0 mm (0.012 - 0.039 in)

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

0.3 - 1.0 mm (0.012 - 0.039 in)

A: Pedal free play

1 - 3 mm (0.04 - 0.12 in)



1. Adjust pedal free height with brake booster input rod. Then tighten lock nut.

Make sure that the tip of input rod stays inside.

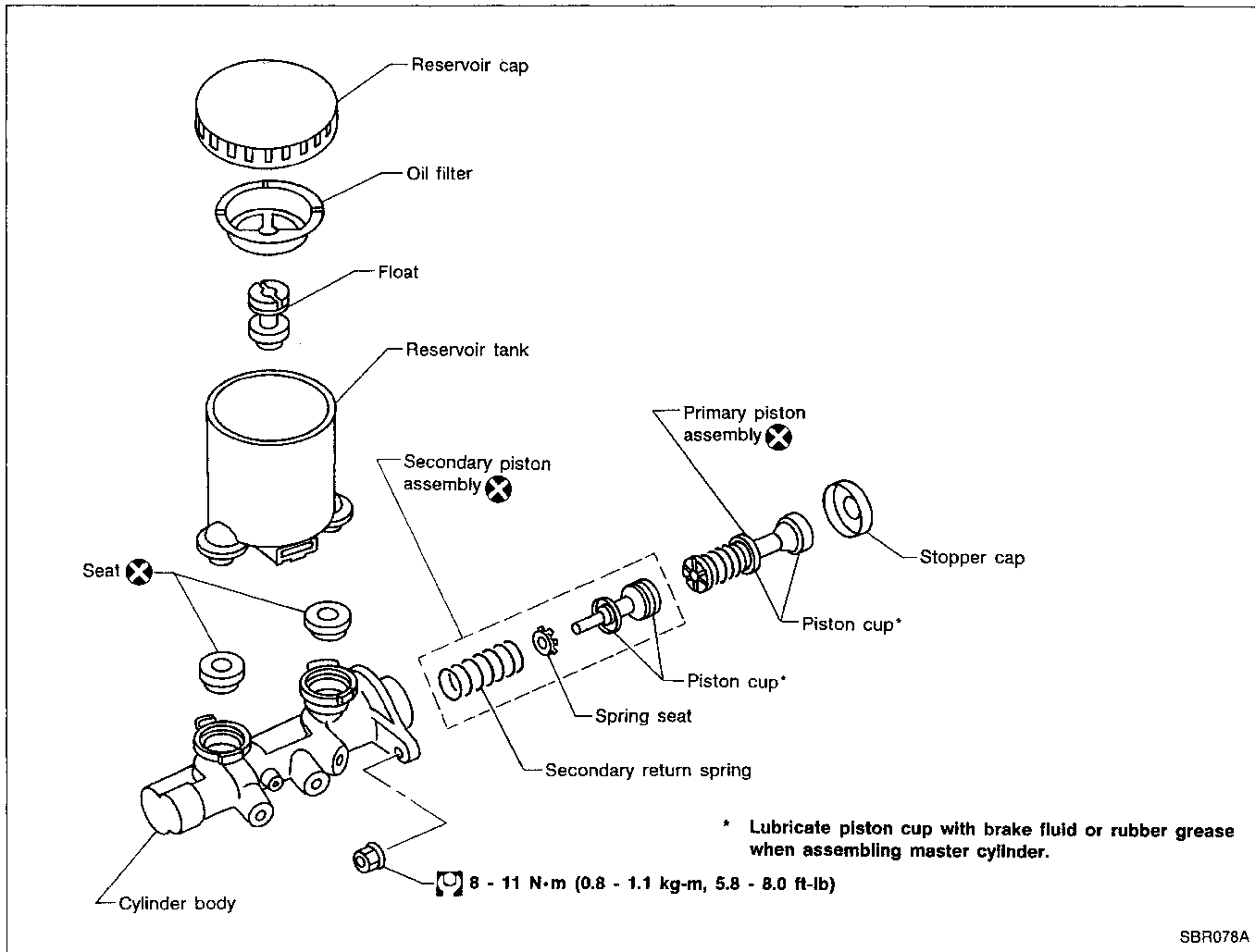
2. Adjust clearance "C₁" and "C₂" with stop lamp switch and ASCD switch respectively. Then tighten lock nuts.

3. Check pedal free play.

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

4. Check brake pedal depressed height with engine running. If depressed height is below the specified value, check brake system for leaks, accumulation of air or any damage components such as master cylinder, wheel cylinder, etc. Make the necessary repairs, if necessary.

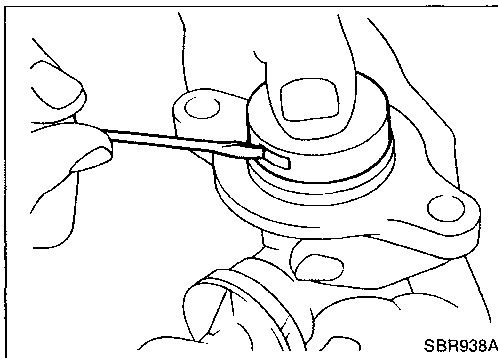
MASTER CYLINDER



Removal

CAUTION:

- Be careful not to splash brake fluid on painted areas; it may cause of 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.

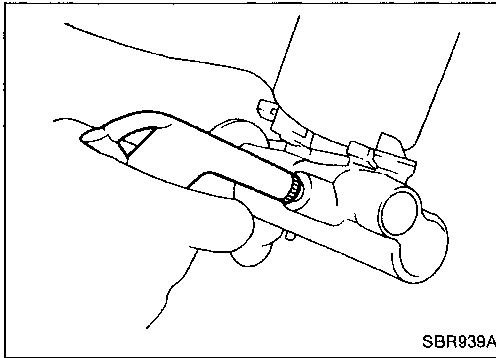


Disassembly

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

MASTER CYLINDER

Disassembly (Cont'd)



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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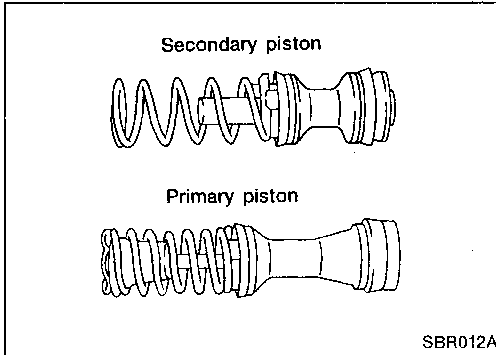
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Inspection

Check for the following items.

Replace any part if damaged.

Master cylinder:

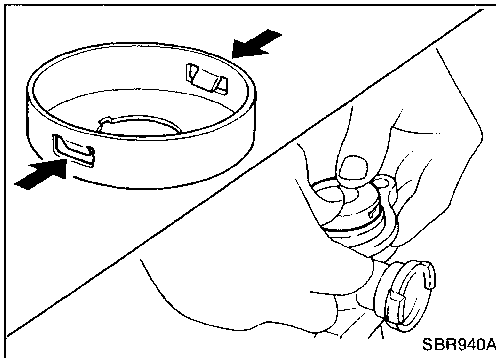
- Pin holes or scratches on inner wall.

Piston:

- Deformation of or scratches on piston cups.

Assembly

Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.



1. Bend claws inward.

2. Install stopper cap.

3. Install reservoir tank oil seals.

4. Push reservoir tank into master cylinder.

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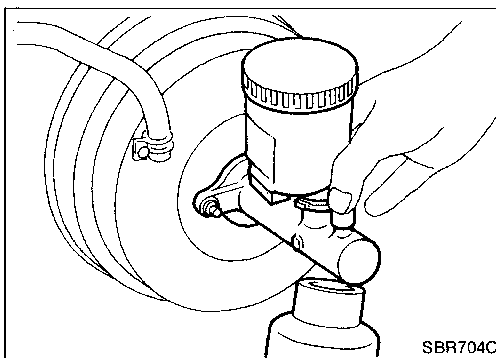
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Installation

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.

8 - 11 N·m (0.8 - 1.1 kg·m, 5.8 - 8.0 ft·lb)

3. Fill up reservoir tank with new brake fluid.

4. Plug all ports on master cylinder with fingers in order not to have air sucked 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)

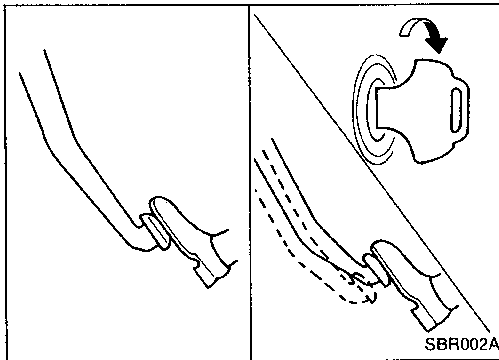
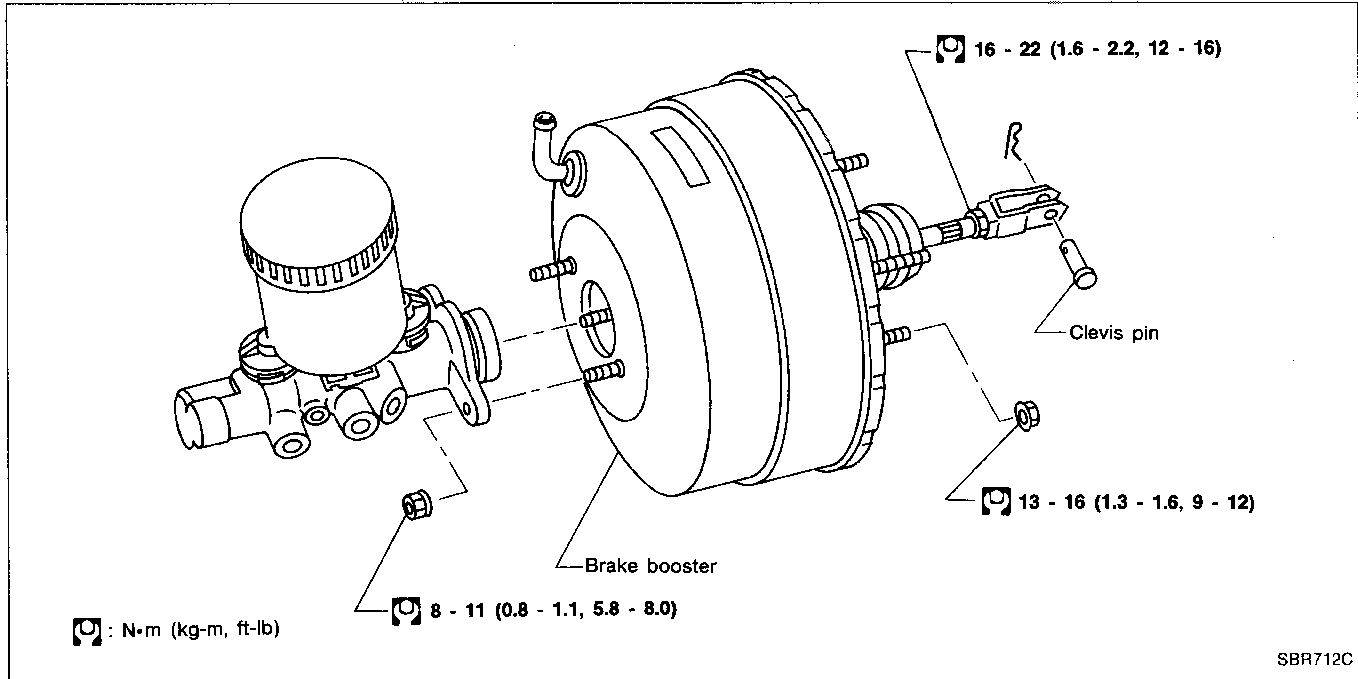
8. Bleed air from brake system. Refer to "Bleeding Brake System" (BR-3).

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BRAKE BOOSTER

Removal and Installation



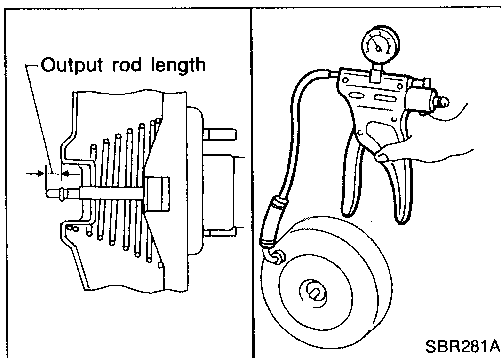
On-vehicle Service

OPERATING CHECK

- Depress brake pedal several times with engine off, then check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.

AIRTIGHT CHECK

- Start engine, then stop it in one or two minutes. Depress brake pedal several times slowly. If pedal goes further down the first time and gradually rises after second or third time, the booster is airtight.
- Depress brake pedal while engine is running, then stop engine with pedal depressed. If there is no change in pedal stroke after holding pedal down **30 seconds**, brake booster is airtight.



Inspection

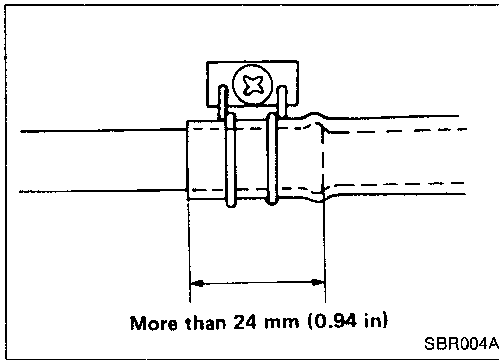
OUTPUT ROD LENGTH CHECK

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

Specified length:

10.275 - 10.525 mm (0.4045 - 0.4144 in)

VACUUM PIPING



Removal and Installation

CAUTION:

Do not apply any oil or lubricants to vacuum hose and check valve.

- Insert vacuum tube into vacuum hose more than 24 mm (0.94 in).

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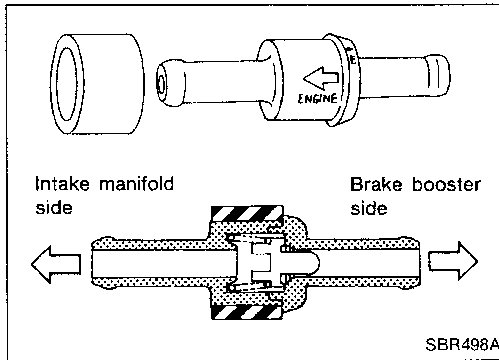
- Install check valve properly paying attention to its direction.

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Inspection

HOSES AND CONNECTORS

- Check condition of vacuum hoses and connectors.
- Check vacuum hoses for air tightness.

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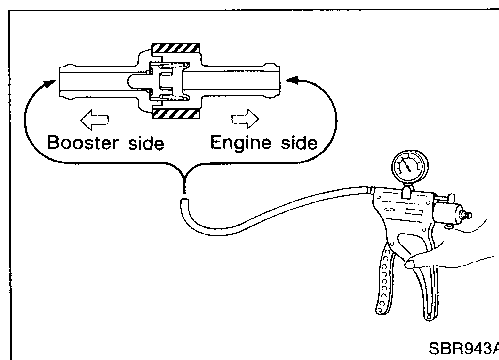
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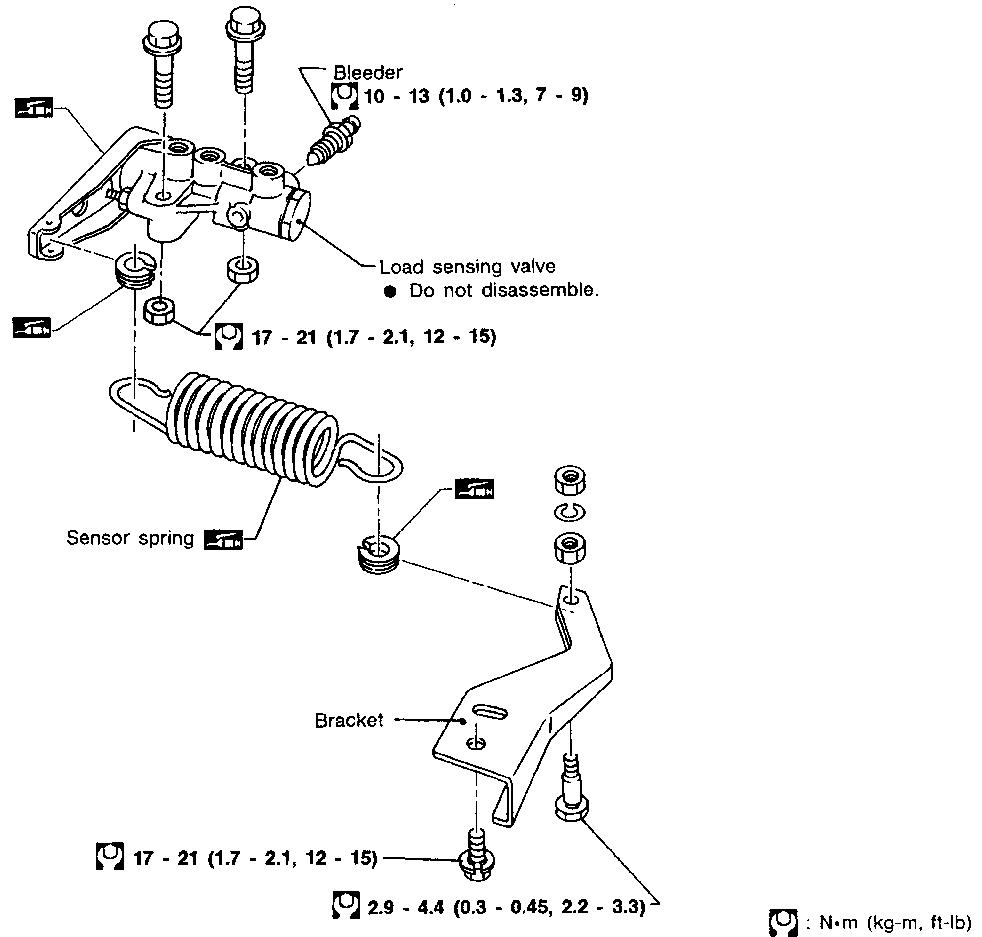
CHECK VALVE

Check vacuum with a vacuum pump.

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

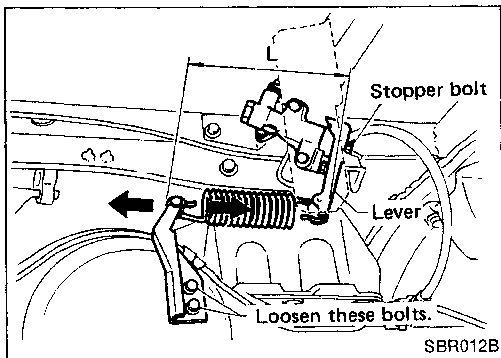
LOAD SENSING VALVE

Load Sensing Valve



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- Do not reuse Load Sensing Valve once it is disassembled.
- Replace damaged Load Sensing Valve as an assembly.
- When disassembling, apply multi-purpose grease to all rubbing areas.



Inspection (LSV)

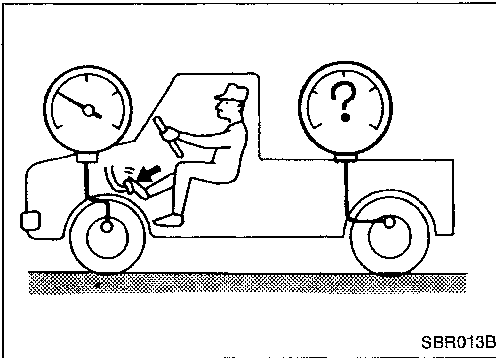
1. Ensure vehicle is unladen condition*.
* Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
2. Have a driver sit in the driver's seat and one person sit on the rear end. Then have the person on the rear end slowly get off the vehicle. This is necessary to stabilize suspension deflection.
3. Attach a lever to the stopper bolt, and adjust length "L" as follows:

Length "L":
Approx. 189 mm (7.44 in)

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LOAD SENSING VALVE

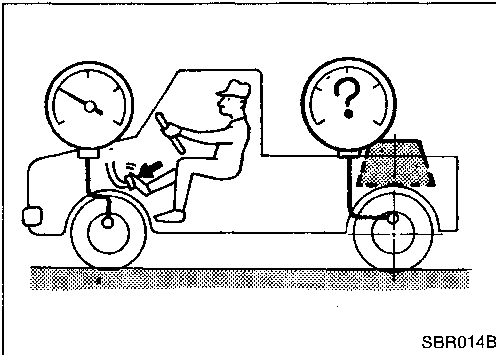
Inspection (LSV) (Cont'd)



4. Install pressure gauge to front and rear brake.
Tool number: KV991V0010 (—)
5. Raise front brake pressure to 9,807 kPa (100 kg/cm², 1,422 psi) and check rear brake pressure.

Rear brake pressure:
Refer to table below.

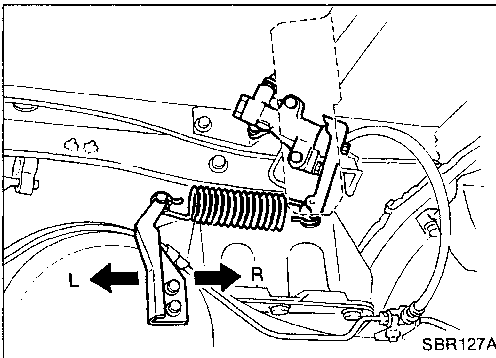
If rear brake pressure is not within specification, adjust bracket.
(Refer to step 3.)



6. Set weight slowly on axle center.
Weight: 100 kg (221 lb)
7. Raise front brake pressure to 9,807 kPa (100 kg/cm², 1,422 psi) and check rear brake pressure.

Rear brake pressure:
Refer to table below.

If rear brake pressure is not within specification, adjust bracket as follows:



8. Adjust bracket to direction of L when rear brake pressure is above specification.
 9. Adjust bracket to direction of R when rear brake pressure is below specification.
- Repeat step 7. until rear brake pressure is within specification.

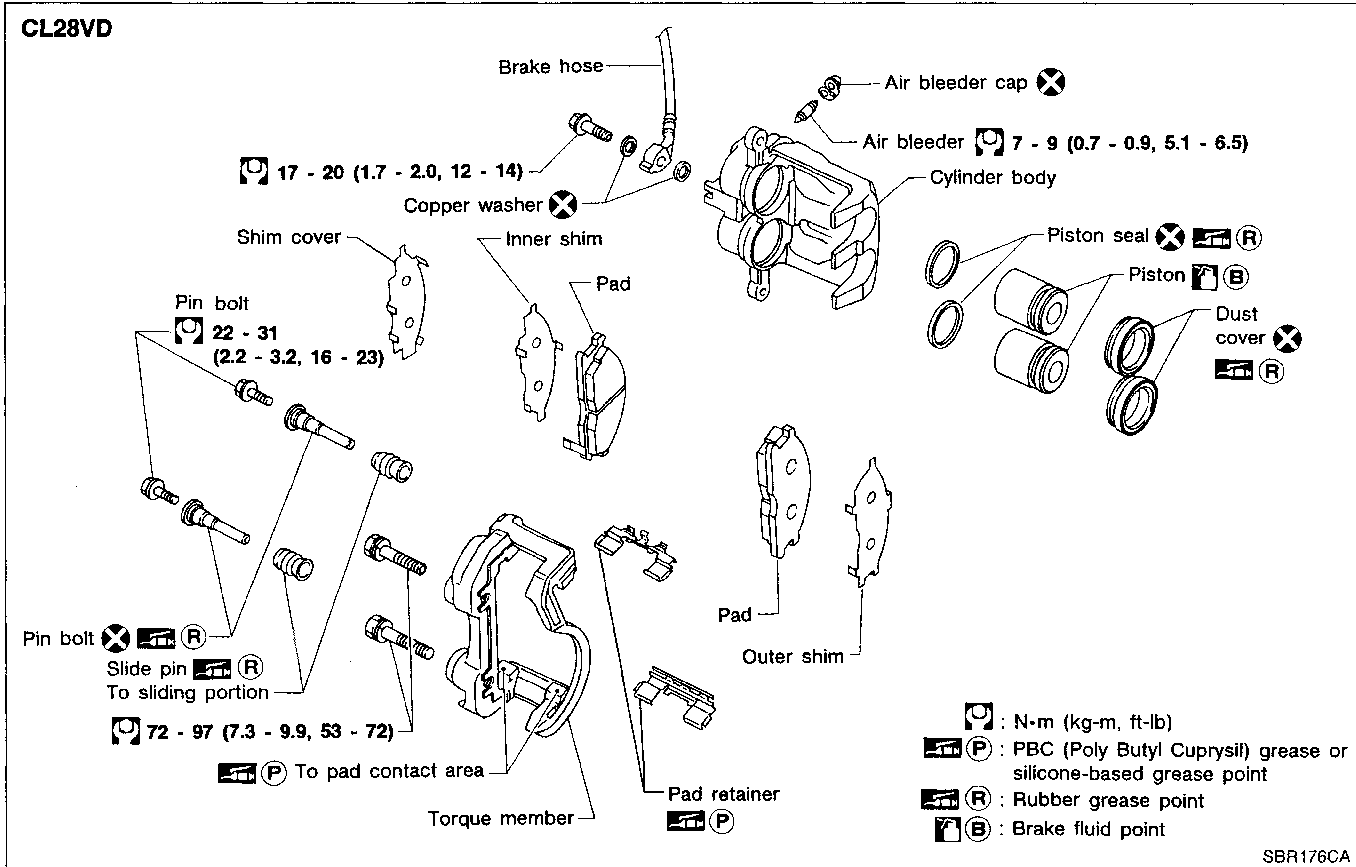
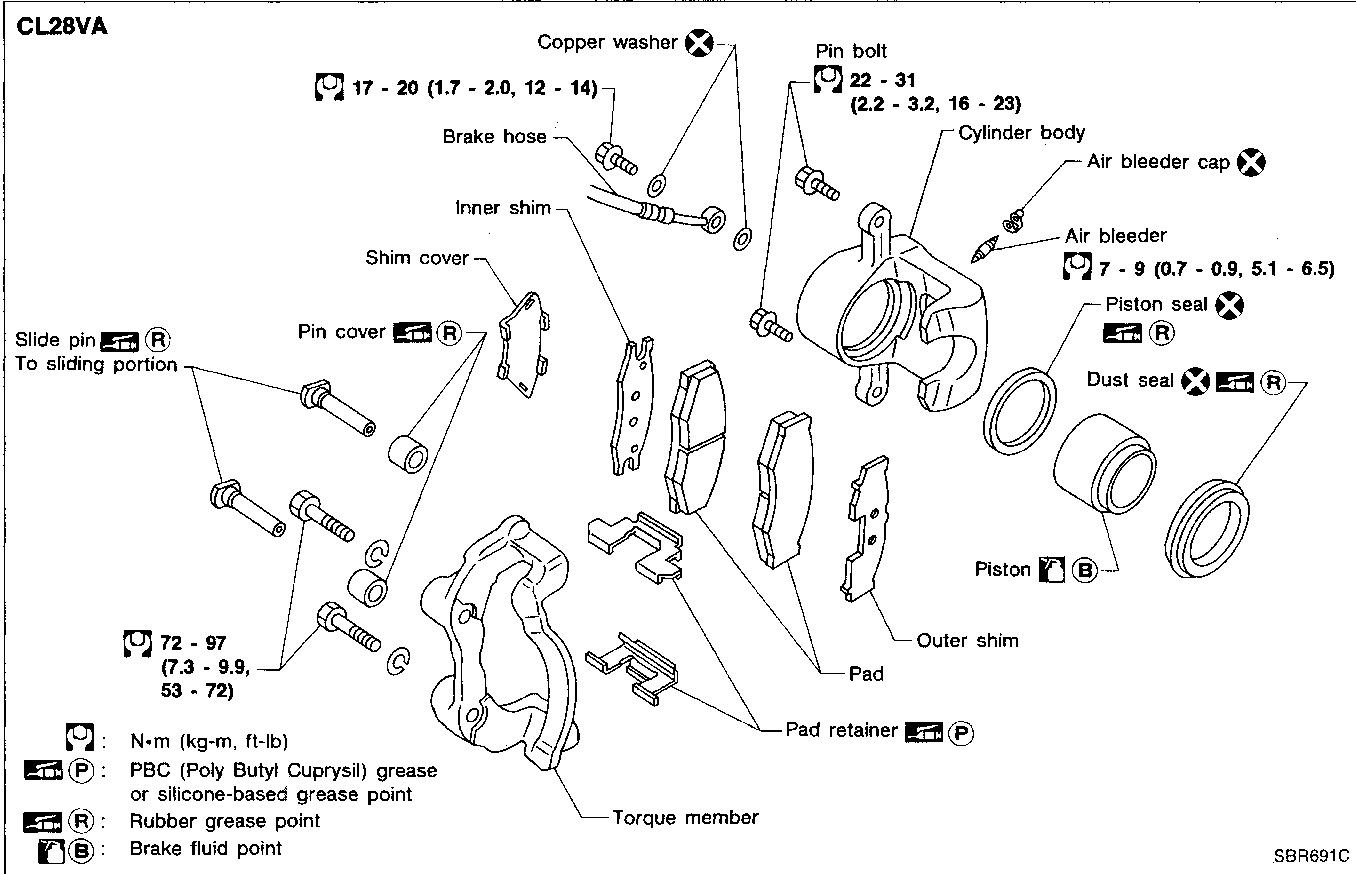
Unit: kPa (kg/cm², psi)

	U.S.A.			Canada		
	KA24E	VG30E		KA24E	VG30E	
		Except HD *	HD *		Except HD *	HD *
Without weight	2,942 - 3,727 (30 - 38, 427 - 540)	3,040 - 3,825 (31 - 39, 441 - 555)	3,040 - 3,825 (31 - 39, 441 - 555)	2,942 - 3,727 (30 - 38, 427 - 540)	3,040 - 3,825 (31 - 39, 441 - 555)	3,040 - 3,825 (31 - 39, 441 - 555)
With weight	3,432 - 4,805 (35 - 49, 498 - 697)	4,119 - 5,492 (42 - 56, 597 - 796)	3,923 - 5,296 (40 - 54, 569 - 768)	3,334 - 4,707 (34 - 48, 483 - 683)	4,119 - 5,492 (42 - 56, 597 - 796)	3,923 - 5,296 (40 - 54, 569 - 768)

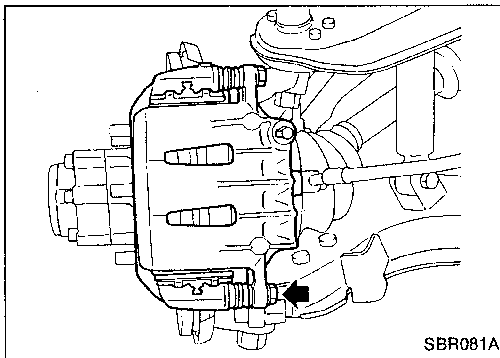
*HD: Heavy duty models.

FRONT DISC BRAKE

CL28VA and CL28VD

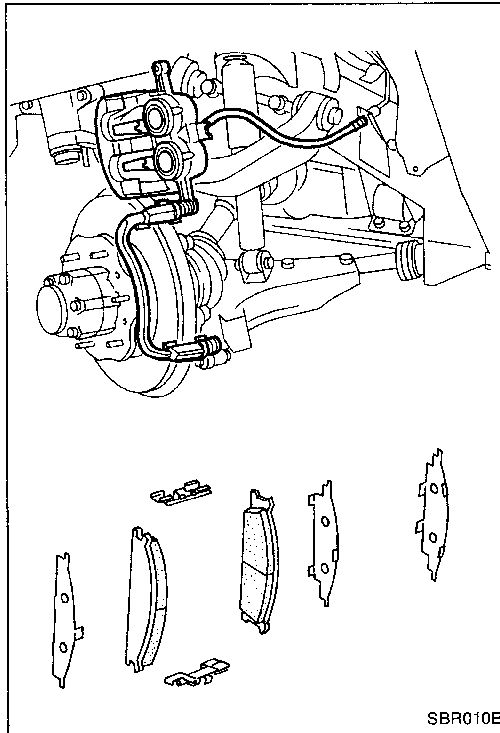


FRONT DISC BRAKE



Pad Replacement

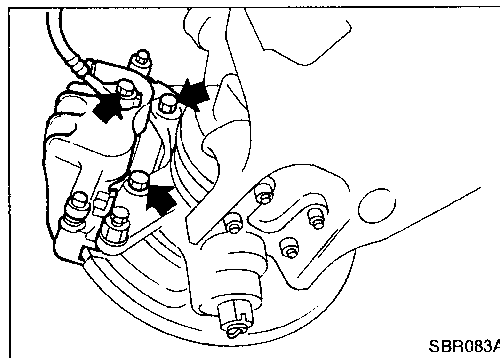
1. Remove pin bolt.



2. Swing cylinder body upward. Then remove pad retainers, and inner and outer shims.

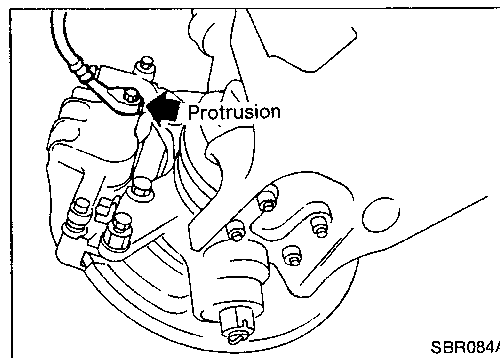
CAUTION:

- When cylinder body is swung up, do not depress brake pedal because piston will pop out.
- Be careful not to damage dust cover or get oil on rotor. Always replace shims when replacing pads.



Removal and Installation

- Remove torque member fixing bolts and union bolt.



- Install brake hose to caliper securely.

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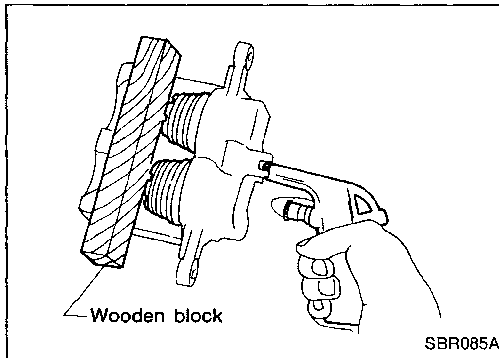
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FRONT DISC BRAKE

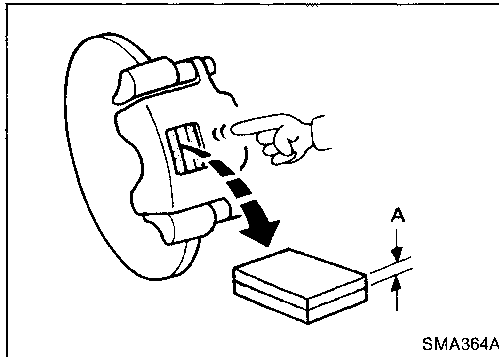


Disassembly

Push out piston with dust cover with compressed air.
For CL28VD (2-piston type), use a wooden block so that the 2 pistons come out evenly.

CAUTION:

CL28VD type front disc brake uses plastic pistons. Handle them carefully comparing with the former steel pistons.



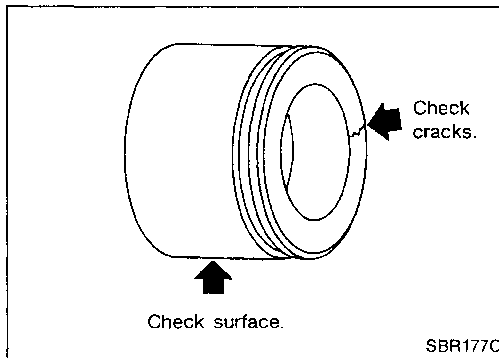
Inspection

DISC PAD

Check disc pad for wear or damage.

Pad wear limit (A):

2.0 mm (0.079 in)



PISTON

— for steel piston (CL28VA only) —

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

CAUTION:

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

— for plastic piston (CL28VD) —

Check piston for uneven surface, small chips or cracks. Replace if any of the above conditions are observed.

CYLINDER BODY

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

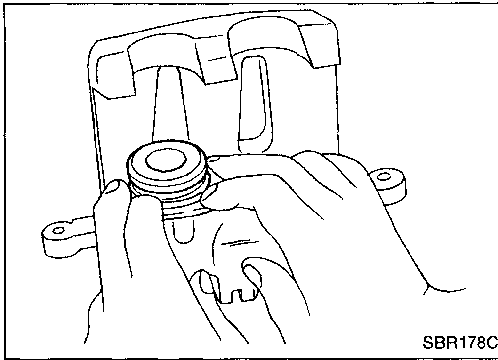
CAUTION:

Use brake fluid to clean. Never use mineral oil.

PIN, PIN BOLT AND PIN BOOT

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

FRONT DISC BRAKE



Assembly

- Insert piston seal into groove on cylinder body.
- With dust seal fitted to piston, install piston into cylinder body.

CAUTION:

- **Secure dust seal properly.**
- **Lubricate with brake fluid before installing plastic piston (CL28VD) into cylinder body.**

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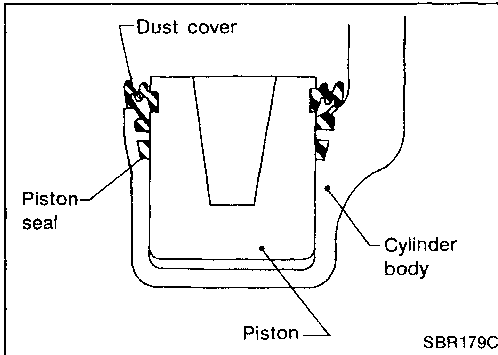
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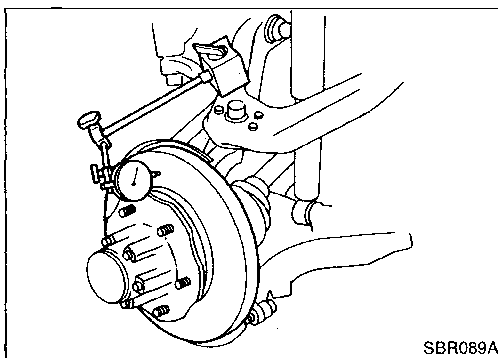
IDX



Rotor Inspection

RUBBING SURFACE

Check rotor roughness, cracks or chips.



RUNOUT

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

Rotor repair limit:

Maximum runout

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

0.07 mm (0.0028 in)

FA

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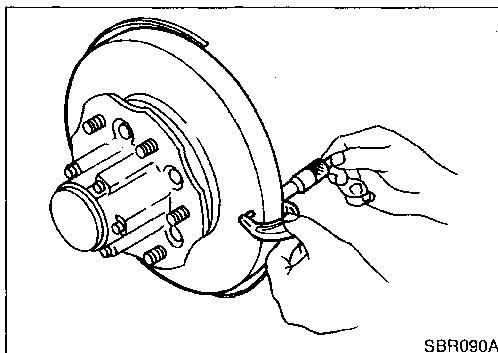
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THICKNESS

Rotor repair limit:

Minimum thickness

CL28VA 20.0 mm (0.787 in)

CL28VD 24.0 mm (0.945 in)

BF

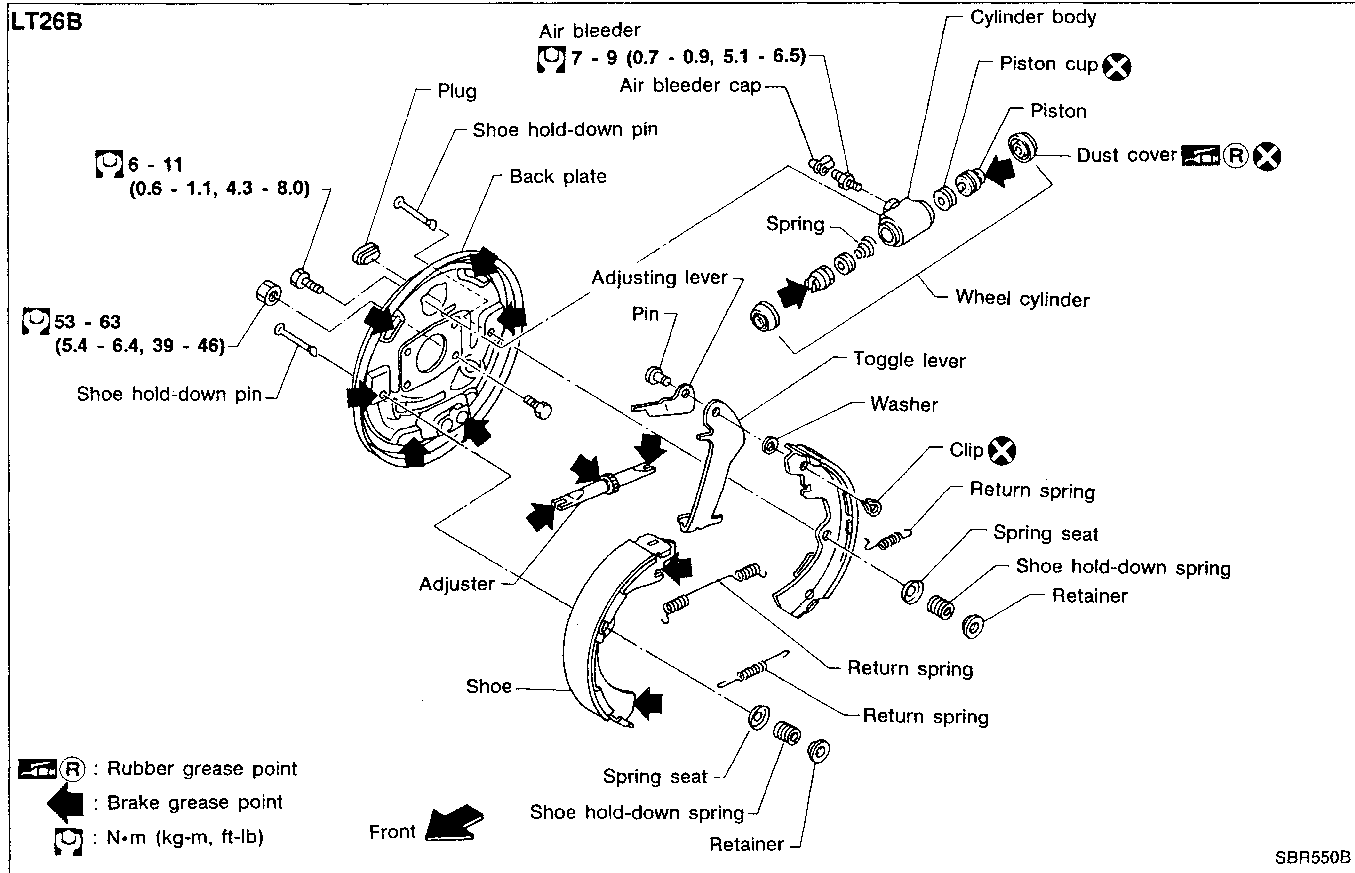
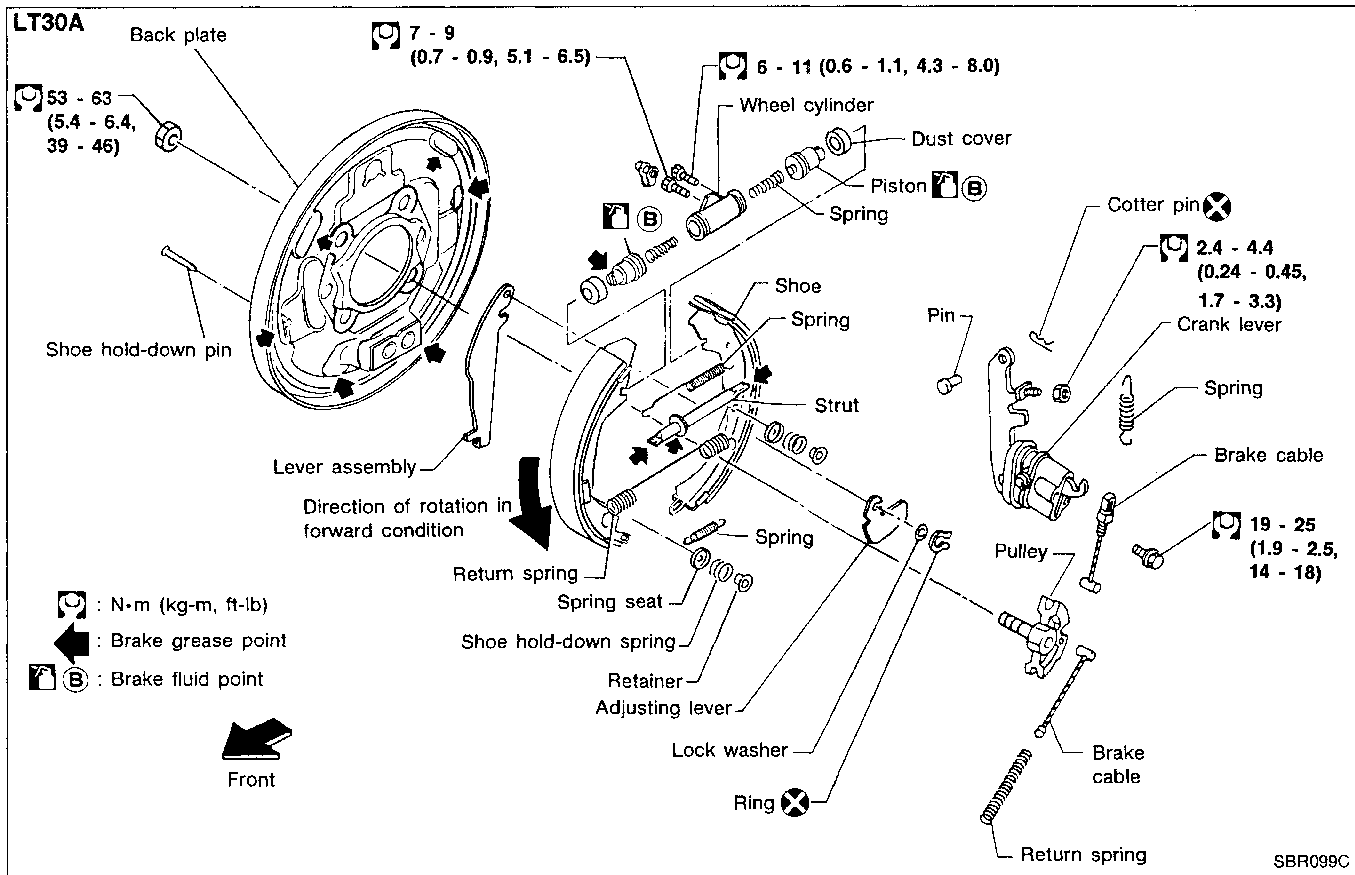
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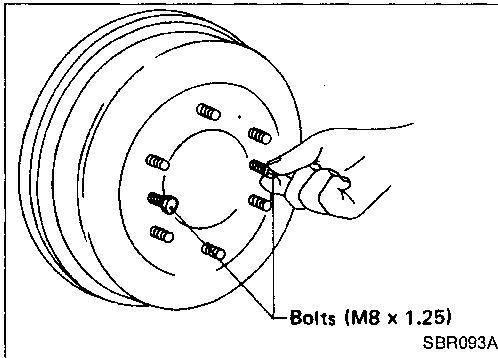
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REAR DRUM BRAKE

LT30A and LT26B



REAR DRUM BRAKE



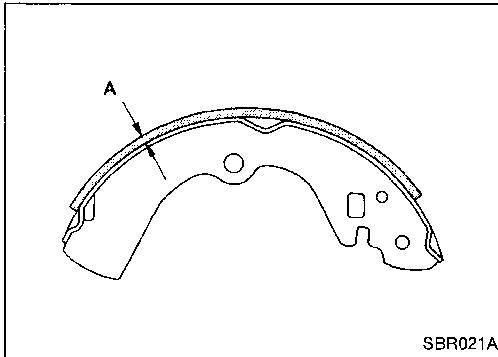
Brake Drum Removal

- Release parking brake control lever fully.
- Tighten two bolts gradually if brake drum is hard to remove.

GI

MA

EM



Shoe Replacement

- Measure lining thickness.

Lining wear limit (A):

1.5 mm (0.059 in)

Before installing new shoes, rotate nut until adjuster rod is at its shortest point.

After installation is completed, adjust shoe-to-drum clearance.

LC

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Wheel Cylinder Inspection

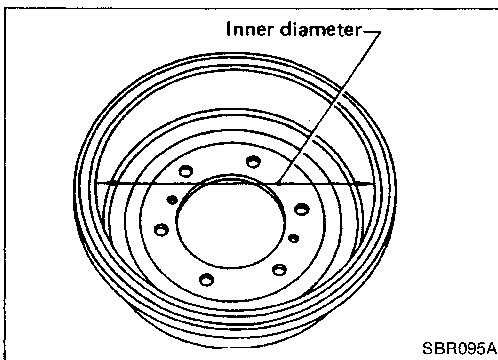
Check parts for score, wear or damage. Replace if any of the above conditions are observed.

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Drum Inspection

Maximum inner diameter (Repair limit):

LT26B 261.5 mm (10.30 in)

LT30A 296.5 mm (11.67 in)

- Contact surface should be finefinished with No. 120 to 150 emery paper.
- Using a drum racer, lathe brake drum if it shows score marks, partial wear or stepped wear.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.

FA

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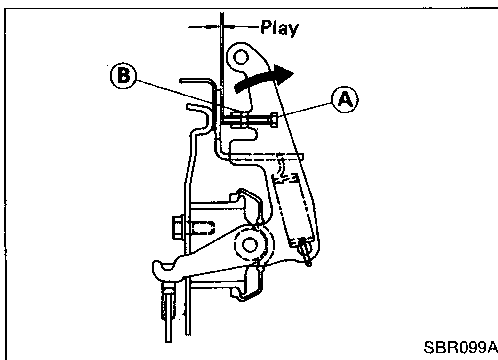
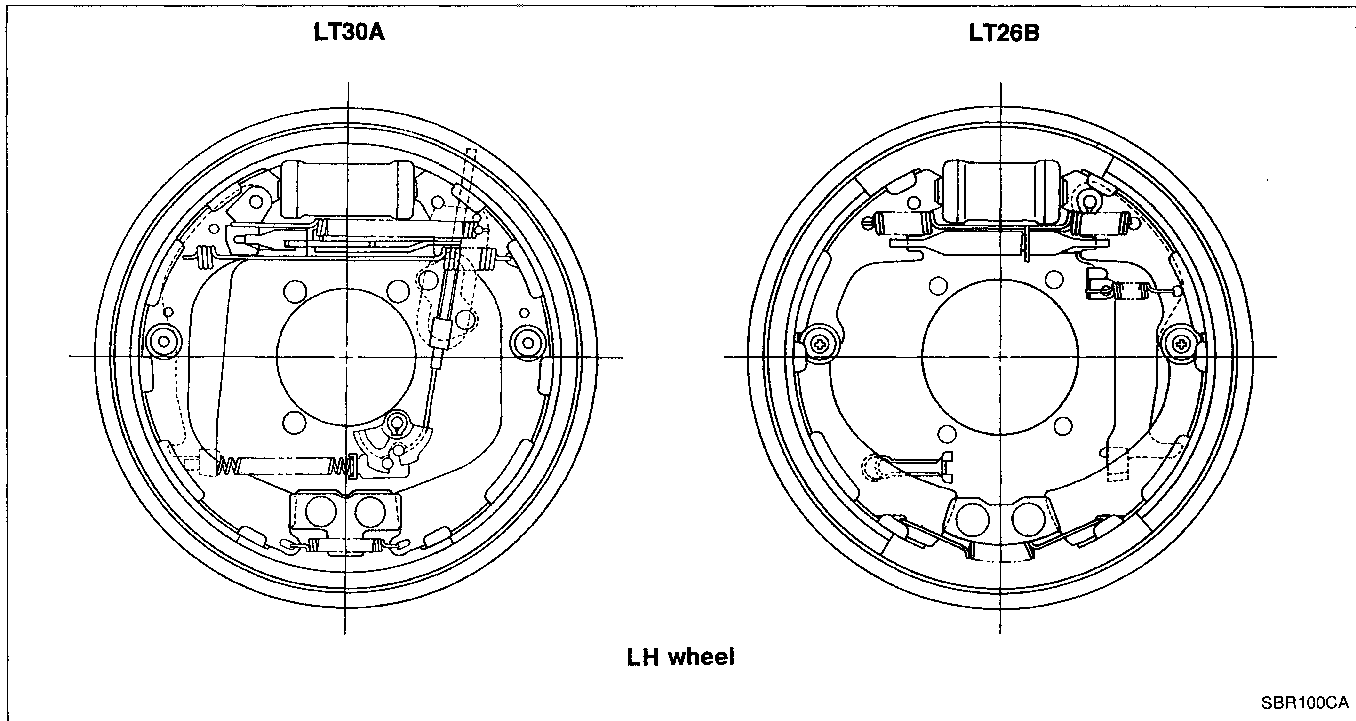
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REAR DRUM BRAKE

Shoe Installation

- Install all the parts by referring to the figure below.
- Shorten adjuster by rotating it.

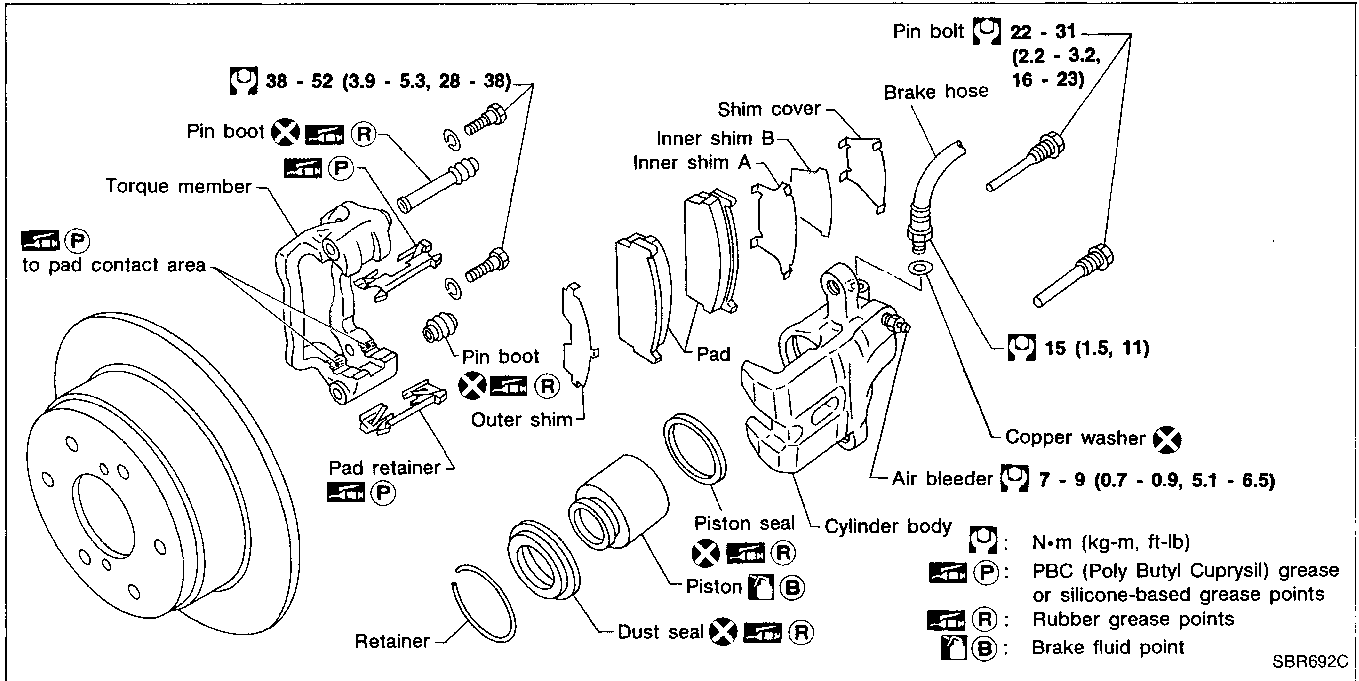


LT30A model

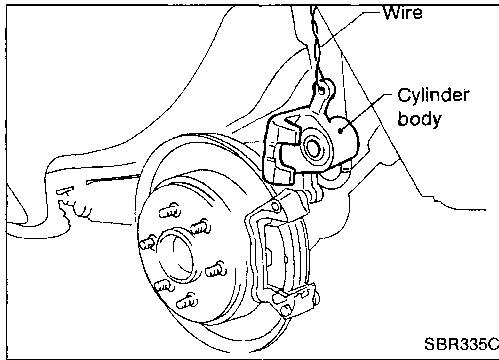
- After installing crank lever on back plate, make sure that there is no play between crank lever and back plate. If play exists, adjust bolt (A) and lock nut (B).

REAR DISC BRAKE

AD14VB



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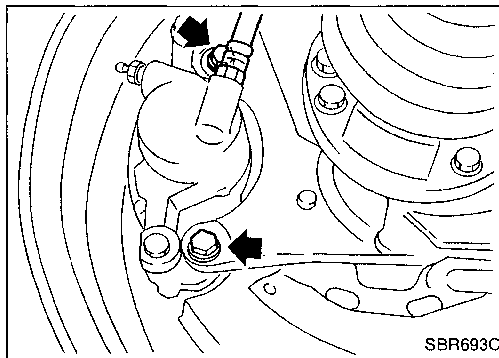
Pad Replacement

1. Remove guide pin.
2. Swing cylinder body upward. Then remove pad retainer and inner and outer shims.

CAUTION:

- When cylinder body is swung up, do not depress brake pedal because piston will pop out.
- Be careful not to damage dust seal or get oil on rotor. Always replace shims when replacing pads.

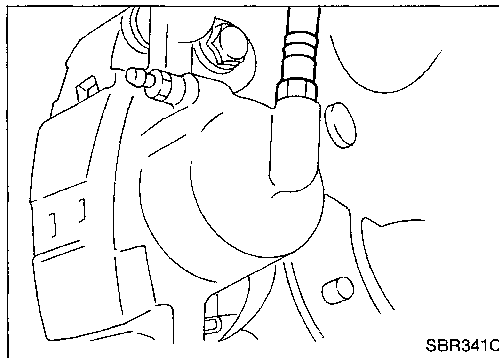
MT
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Removal and Installation

- Remove flare nut securing brake tube and brake hose. Then remove brake hose from caliper.
- Remove torque member fixing bolts.

FA
RA



CAUTION:

- When installing brake hose to caliper, disconnect brake hose from brake tube.

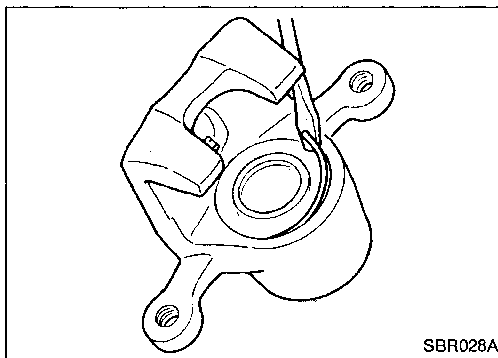
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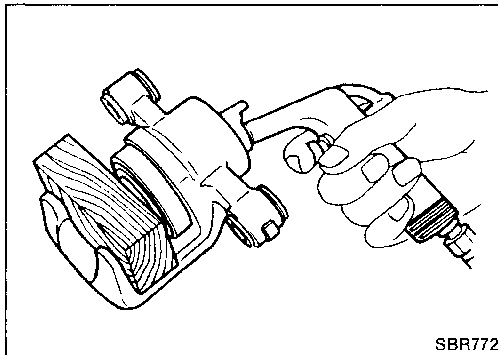
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REAR DISC BRAKE

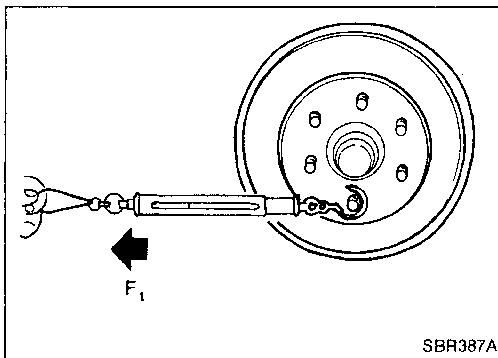
Removal and Installation (Cont'd)



- Remove retainer with a screwdriver.



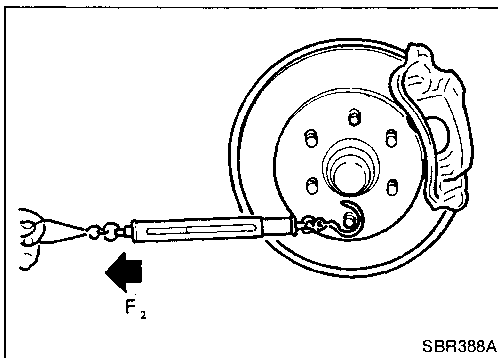
- Push out piston with dust seal with compressed air.



Inspection

Inspection of brake drag force

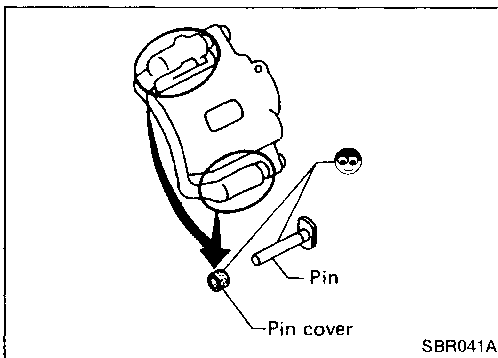
- (1) Swing cylinder body upward.
- (2) Make sure that wheel bearing is adjusted properly. Refer to "Rear Wheel Bearing" in RA section.
- (3) Measure rotating force (F_1).



- (4) Install caliper with pads to the original position.
- (5) Depress brake pedal for 5 seconds.
- (6) Release brake pedal, rotate disc rotor 10 revolutions.
- (7) Measure rotating force (F_2).
- (8) Calculate brake drag force by subtracting F_1 from F_2 .

Maximum brake drag force ($F_2 - F_1$):

103.0 N (10.5 kg, 23.2 lb)



If it is not within specification, check pins and pin boots in caliper.

- Make sure that wheel bearing is adjusted properly.
- Disc pads and disc rotor must be dried.

Disc pad

Check disc pad for wear or damage.

Pad wear limit (A):

2.0 mm (0.079 in)

REAR DISC BRAKE

Inspection (Cont'd)

Cylinder body

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

CAUTION:

Use brake fluid to clean. Never use mineral oil.

Piston

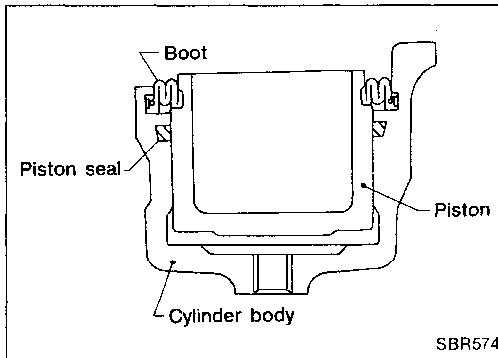
Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

CAUTION:

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

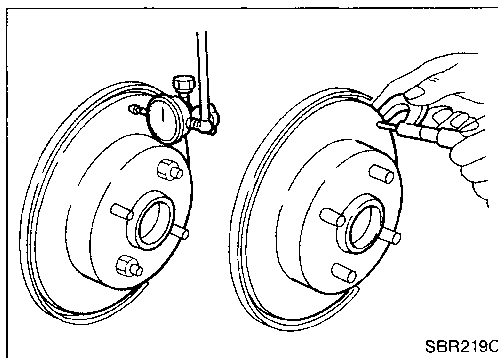
Pin, pin bolt, retainer, piston seal, dust seal and pin boot

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



Assembly

- With dust seal fitted to piston, insert dust seal into groove on cylinder body and install piston.
- Properly secure dust seal.



Rotor Inspection

Rubbing surface

Check rotor for roughness, cracks or chips. Repair or replace if necessary.

Runout

Make sure that axial end play is within the specifications before measuring. Refer to "Rear Wheel Bearing" in RA section. Then check maximum runout with a dial gauge.

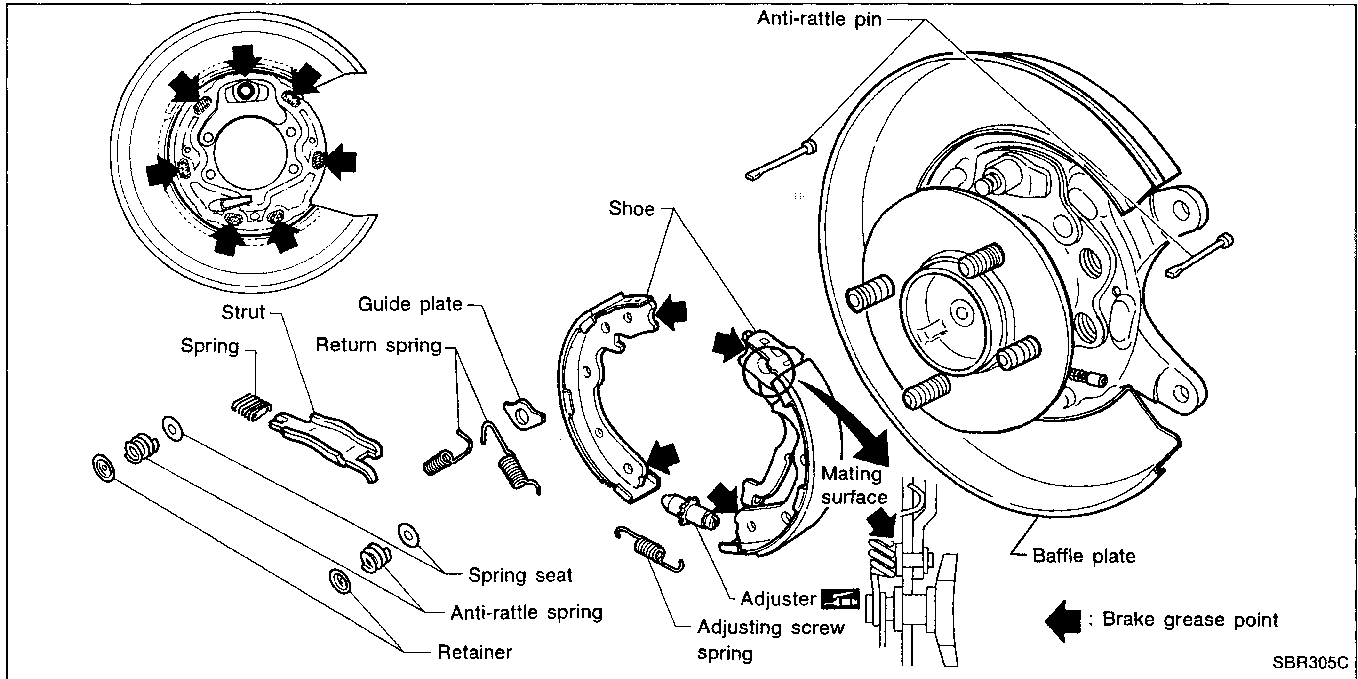
Rotor repair limit: 0.07 mm (0.0028 in)
(Total indicator reading at center of rotor pad contact surface)

Thickness

Rotor repair limit: 16.0 mm (0.630 in)
Minimum thickness

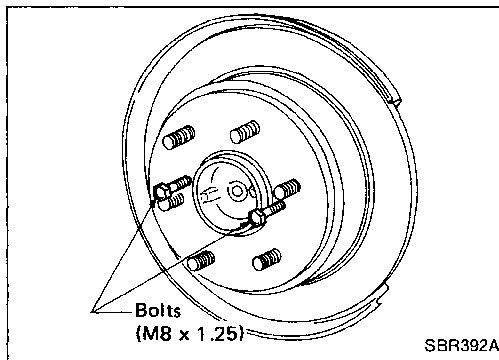
PARKING DRUM BRAKE

DS19HB — AD14VB Model

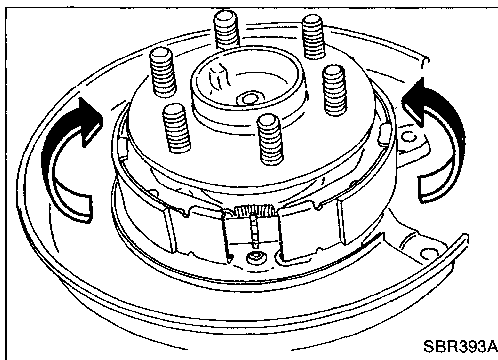


Shoe Replacement

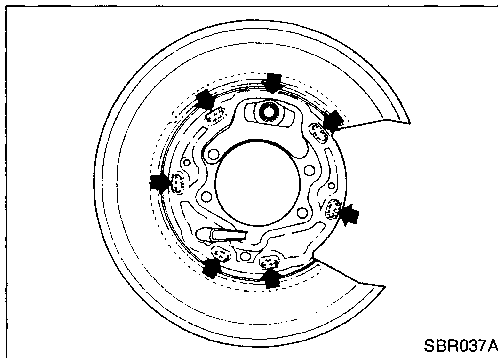
1. Remove disc rotor (With parking brake drum).
Tighten two bolts gradually if disc rotor is hard to remove.



2. After removing retainer, remove spring.
Be careful not to damage parking brake cable when separating it.



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



PARKING DRUM BRAKE

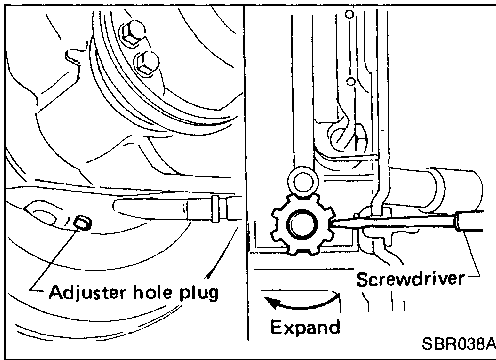
Shoe Replacement (Cont'd)

SHOE CLEARANCE ADJUSTMENT

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

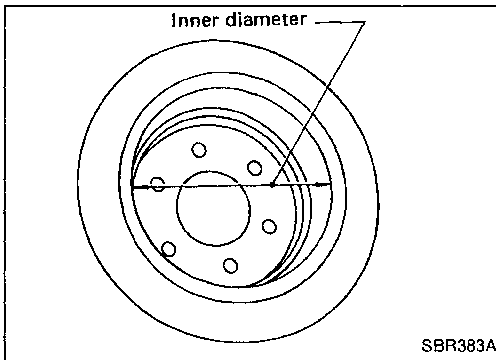
Make sure that parking control lever is released completely.

2. Return adjuster wheel 7 to 8 latches.
3. Install adjuster hole plug, and make sure that there is no drag between shoes and brake drum when rotating disc rotor.



BREAKING IN DRUM AND LINING

1. Set transfer lever in the "2H" position. Using either low or 2nd transmission speed, drive the unloaded vehicle at approximately 30 km/h (19 MPH) on a safe, level and dry road.
2. Depress the release button of parking brake lever, then pull the lever with a force of 98 N (10 kg, 22 lb).
3. While holding the lever back, continue to drive the vehicle 100 m (328 ft).
4. Repeat steps 1 through 3 two or three times.



Drum Inspection

**Maximum inner diameter (Repair limit):
191.0 mm (7.52 in)**

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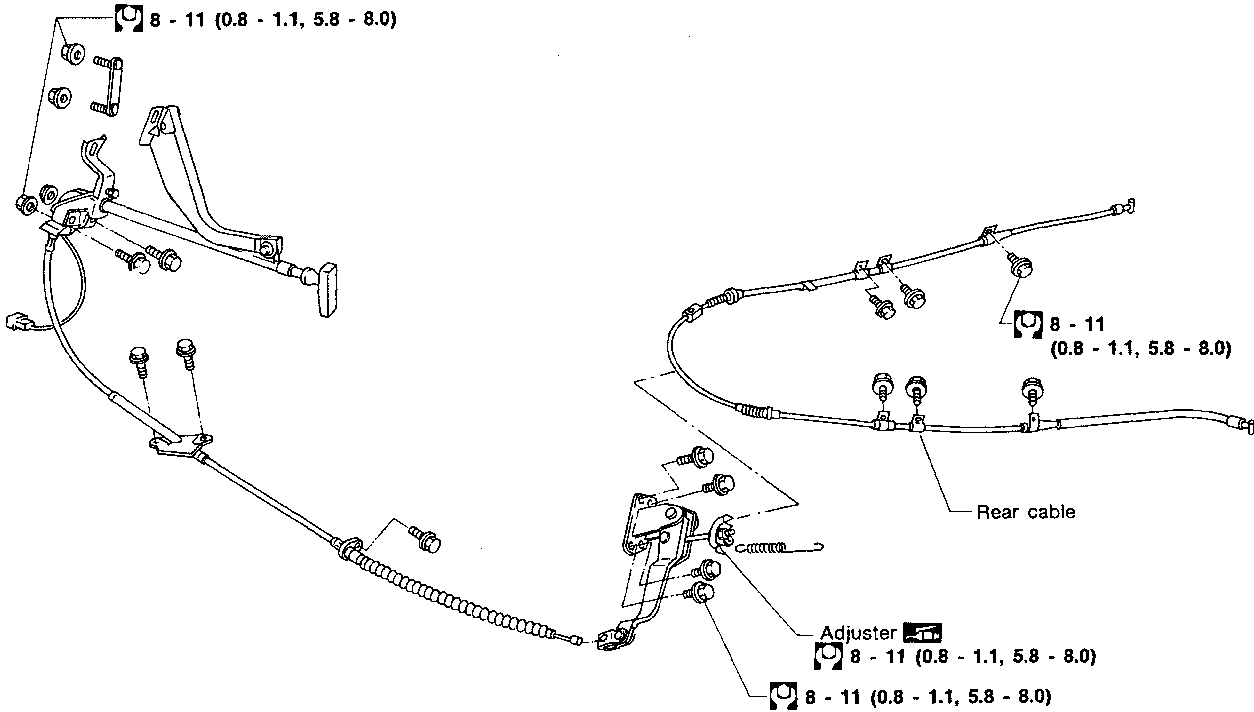
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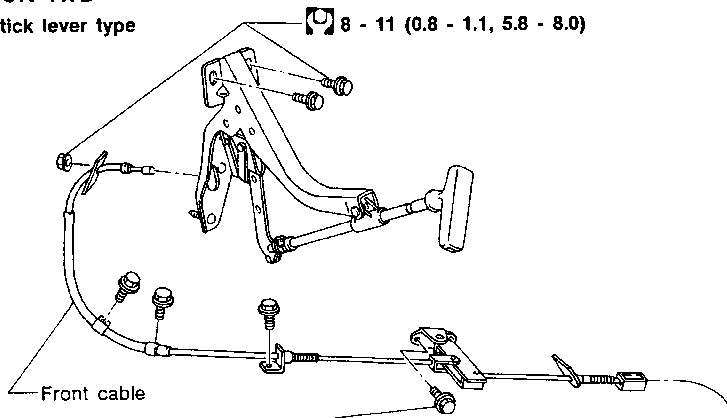
PARKING BRAKE CONTROL

TRUCK-2WD

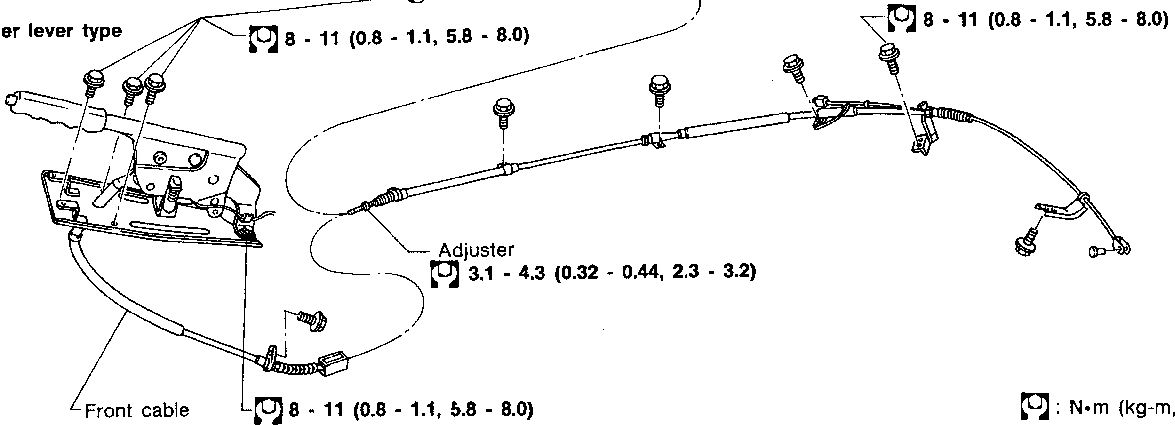


TRUCK-4WD

Stick lever type

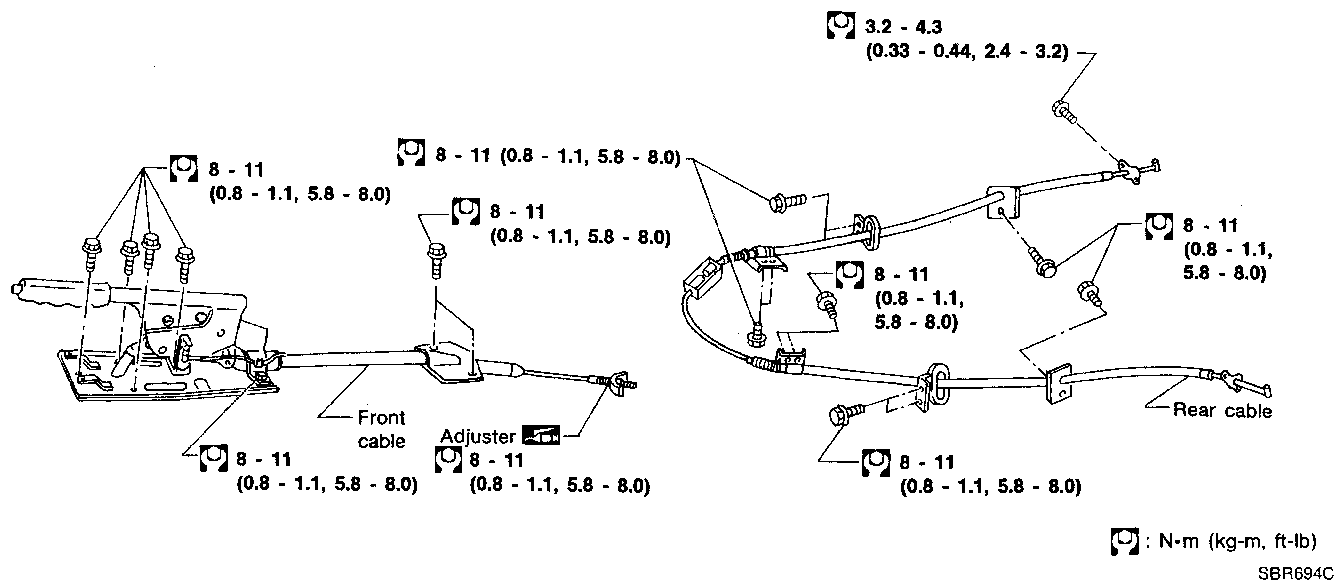


Center lever type



PARKING BRAKE CONTROL

PATHFINDER



Removal and Installation

- Be careful not to damage cable.
- Make sure there is no free play after installation.

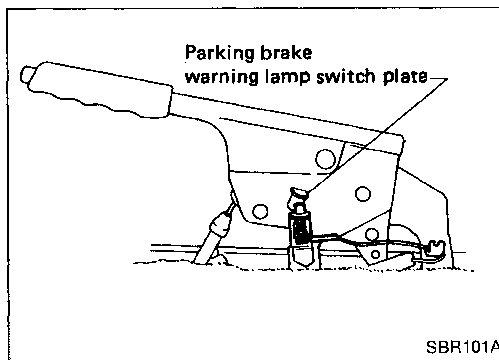
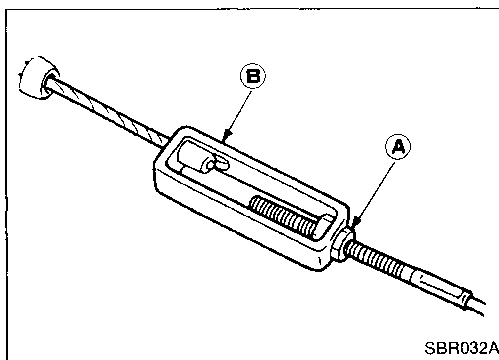
Inspection

- Check control lever for wear or other damage. Replace if necessary.
- Check wires for discontinuity or deterioration. Replace if necessary.
- Check warning lamp and switch. Correct if necessary.
- Check part at each connecting portion and, if found deformed or damaged, replace.

Adjustment

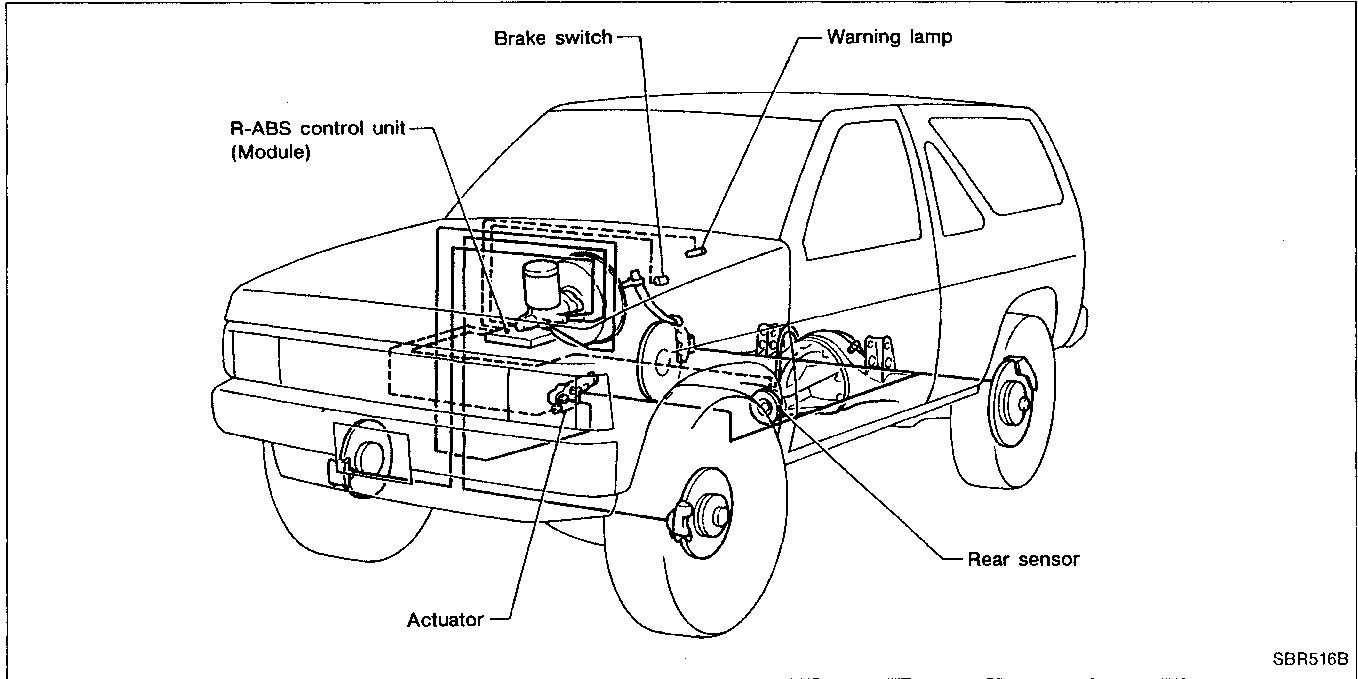
- Adjust clearance between shoe and drum as follows:
 - **LT26B** —
 - Pull parking brake lever several times until clicking sound does not occur from rear brake.
 - **LT30A** —
 - Release parking brake lever and loosen adjusting nut.
 - Depress brake pedal fully at least 10 times.
 - Loosen lock nut (A), rotate adjuster (B).
 - Tighten lock nut (A).
 - Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.
- Number of notches: Refer to SDS (BR-48).
- Bend parking brake warning lamp switch plate so that brake warning light comes on when ratchet at parking brake lever is pulled "A" notches and goes out when fully released.

Number of notches "A":
 Center lever type 1
 Stick lever type 1

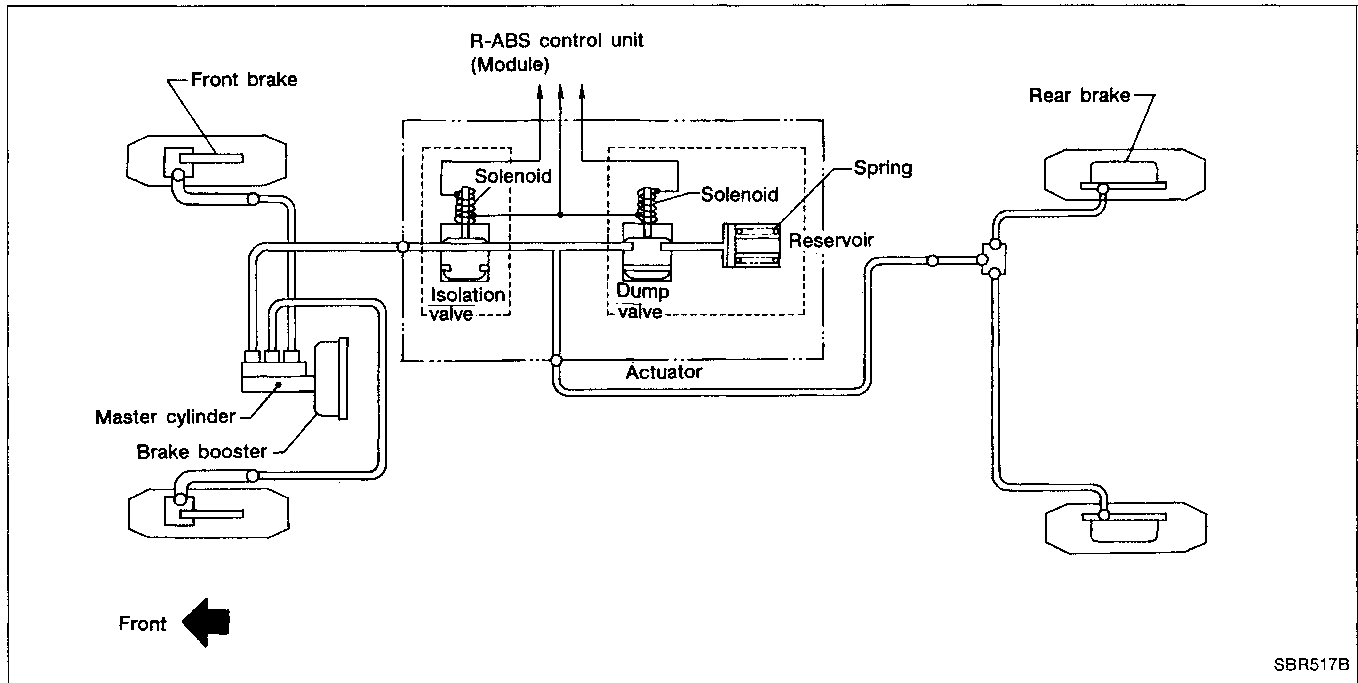


REAR WHEEL ANTI-LOCK BRAKE SYSTEM

System Components

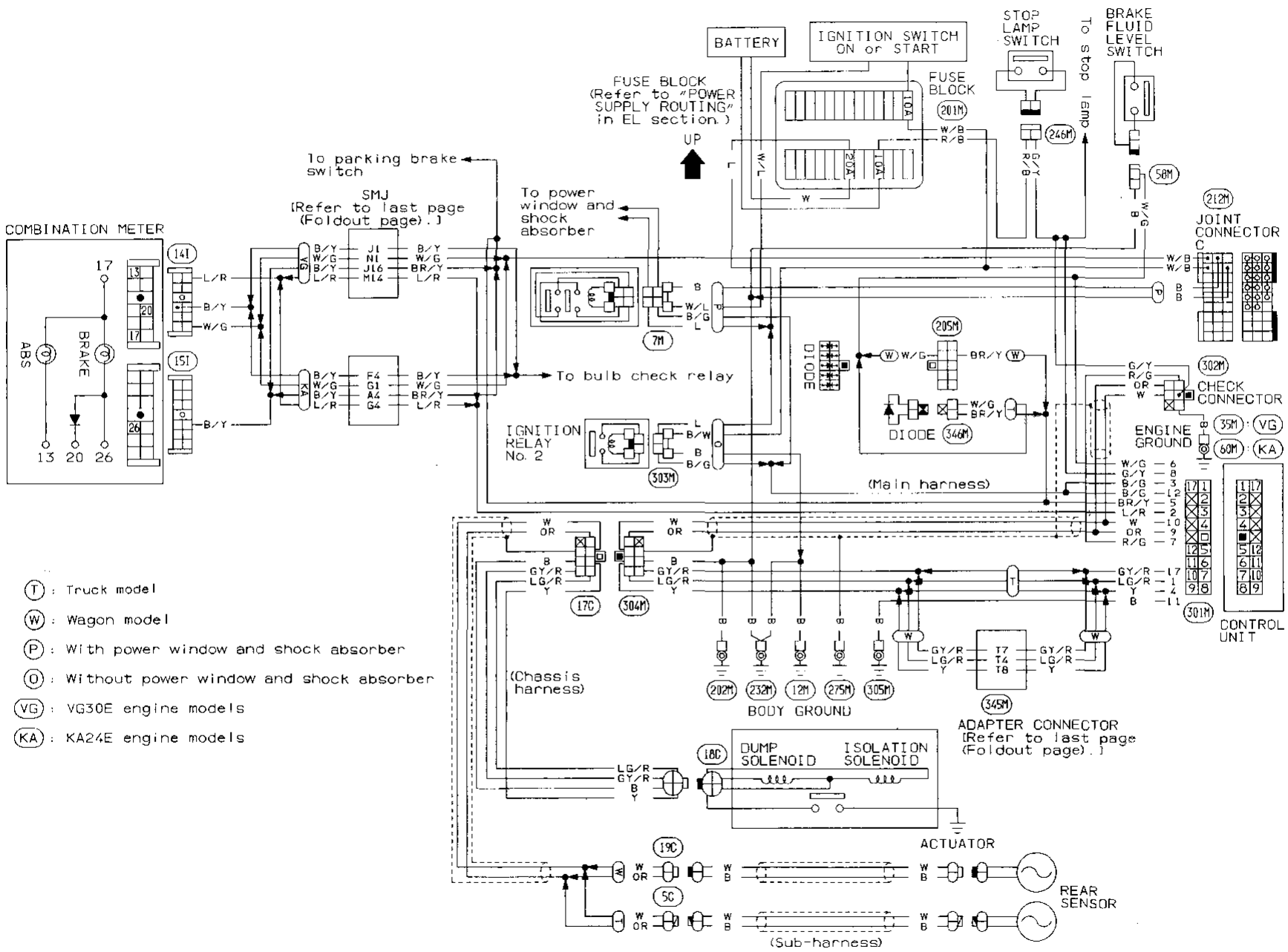


Hydraulic Circuit



REAR WHEEL ANTI-LOCK BRAKE SYSTEM

Wiring Diagram



- (T) : Truck model
- (W) : Wagon model
- (P) : With power window and shock absorber
- (O) : Without power window and shock absorber
- (VG) : VG30E engine models
- (KA) : KA24E engine models

BR-29

SBR763C IDX

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EL HA BF SJ BR RA FA PD TF AT MT CL FE EC EF & LC EM MA GI

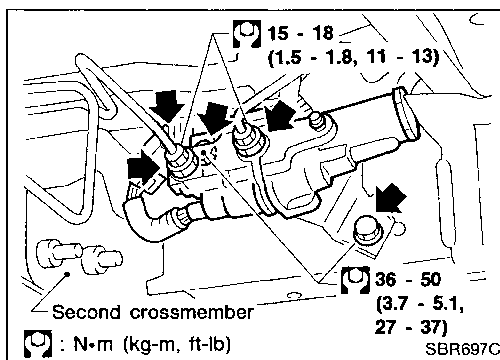
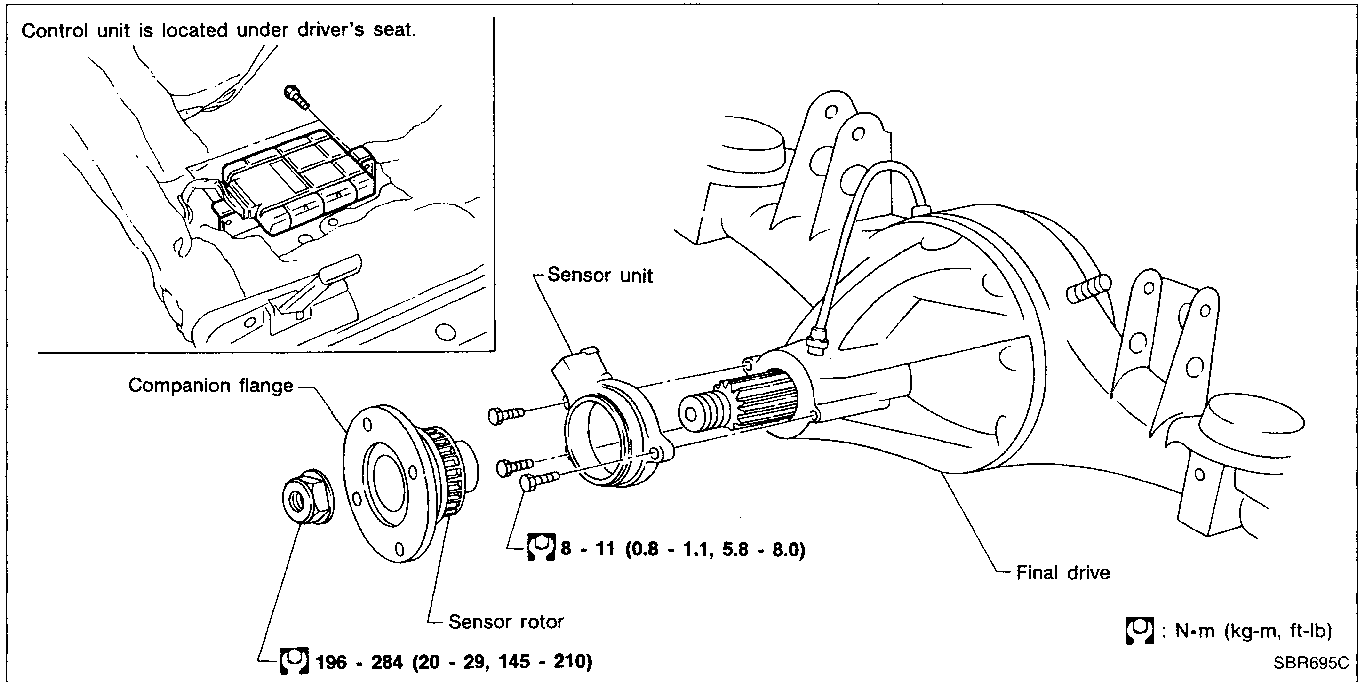
REAR WHEEL ANTI-LOCK BRAKE SYSTEM

Removal and Installation

CAUTION:

Be careful not to damage sensor edge and sensor rotor teeth. In case the final drive assembly needs to be removed, disconnect the ABS sensor from the assembly and move it away. Failure to do so may result in damage to the sensor wires making the sensor inoperative.

REAR SENSOR AND CONTROL UNIT



ACTUATOR

Removal

1. Disconnect battery cable.
2. Drain brake fluid.
Refer to "Changing Brake Fluid" in "CHECK AND ADJUSTMENT" (BR-3).
3. Disconnect connectors, brake pipes and remove fixing nuts.

Installation

CAUTION:

After installation, refill brake fluid. Then bleed air. Refer to "Bleeding Brake System" (BR-3).

1. Connect brake pipes temporarily.
2. Secure fixing nuts.
3. Torque brake pipes.
4. Connect connectors and battery cable.

TROUBLE DIAGNOSES

Contents

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Symptom Chart	BR-33	
Preliminary Check 1	BR-34	
Preliminary Check 2	BR-34	GI
Self-diagnosis	BR-35	
Component Parts and Harness Connector Location	BR-36	
Circuit Diagram for Quick Pinpoint Check	BR-37	MA
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Diagnostic Procedure 2 — Long stopping distance	BR-38	
Diagnostic Procedure 3 — Brake pedal stroke is large	BR-38	EM
Diagnostic Procedure 4 — R-ABS doesn't work	BR-39	
Diagnostic Procedure 5 — R-ABS works frequently	BR-40	
Diagnostic Procedure 6 — MAIN POWER SUPPLY AND GROUND CIRCUIT	BR-41	LC
Diagnostic Procedure 7 — ACTUATOR ISO SOLENOID SHORT CIRCUIT OR OPEN (Warning lamp flashing number 2 or 7)	BR-42	EF & EC
Diagnostic Procedure 8 — ACTUATOR ISO SOLENOID BLOCKED (Warning lamp flashing number 4)	BR-42	
Diagnostic Procedure 9 — ACTUATOR DUMP SOLENOID SHORT CIRCUIT OR OPEN (Warning lamp flashing number 3 or 8)	BR-43	FE
Diagnostic Procedure 10 — SENSOR OPEN OR SHORT CIRCUIT (Warning lamp flashing number 9 or 10)	BR-44	
Diagnostic Procedure 11 — SENSOR SIGNAL ERRATIC (Warning lamp flashing number 6)	BR-44	CL
Diagnostic Procedure 12 — CONTROL UNIT (Warning lamp flashing number 13, 14 or 15)	BR-44	
Diagnostic Procedure 13 — Other (Warning lamp flashing number 5)	BR-45	
Electrical Components Inspection	BR-46	MT

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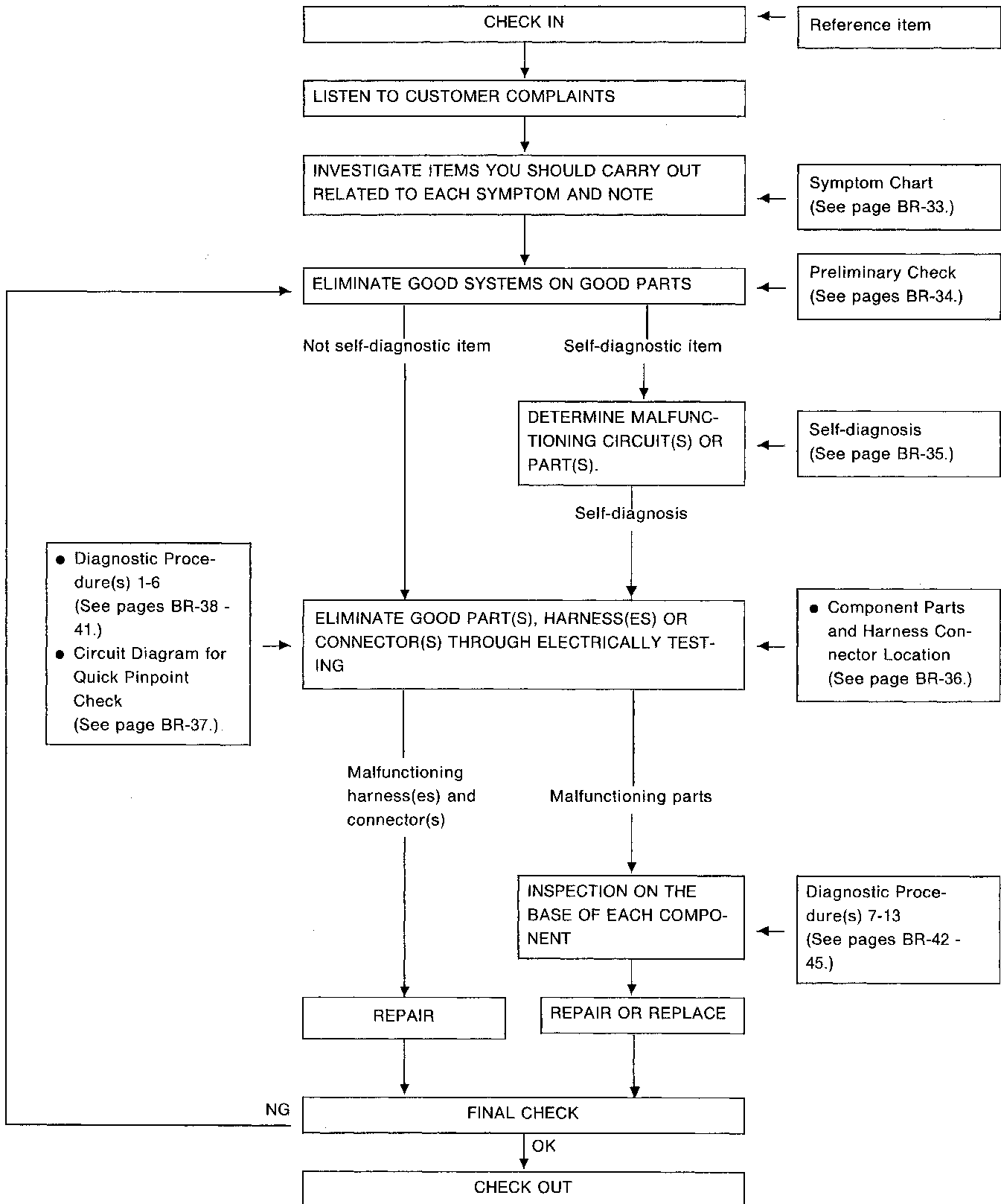
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TROUBLE DIAGNOSES

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



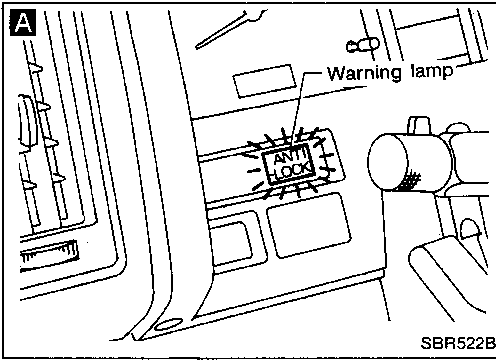
TROUBLE DIAGNOSES

Symptom Chart

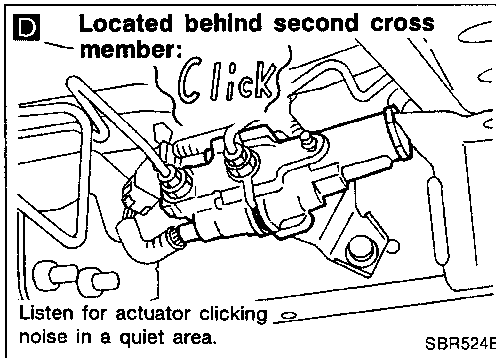
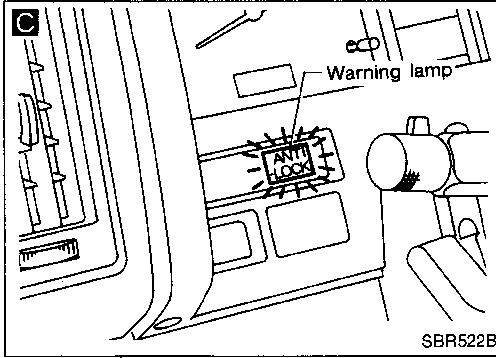
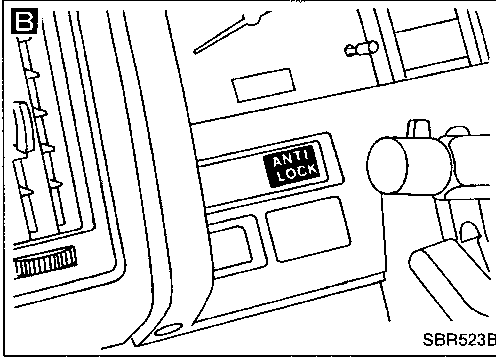
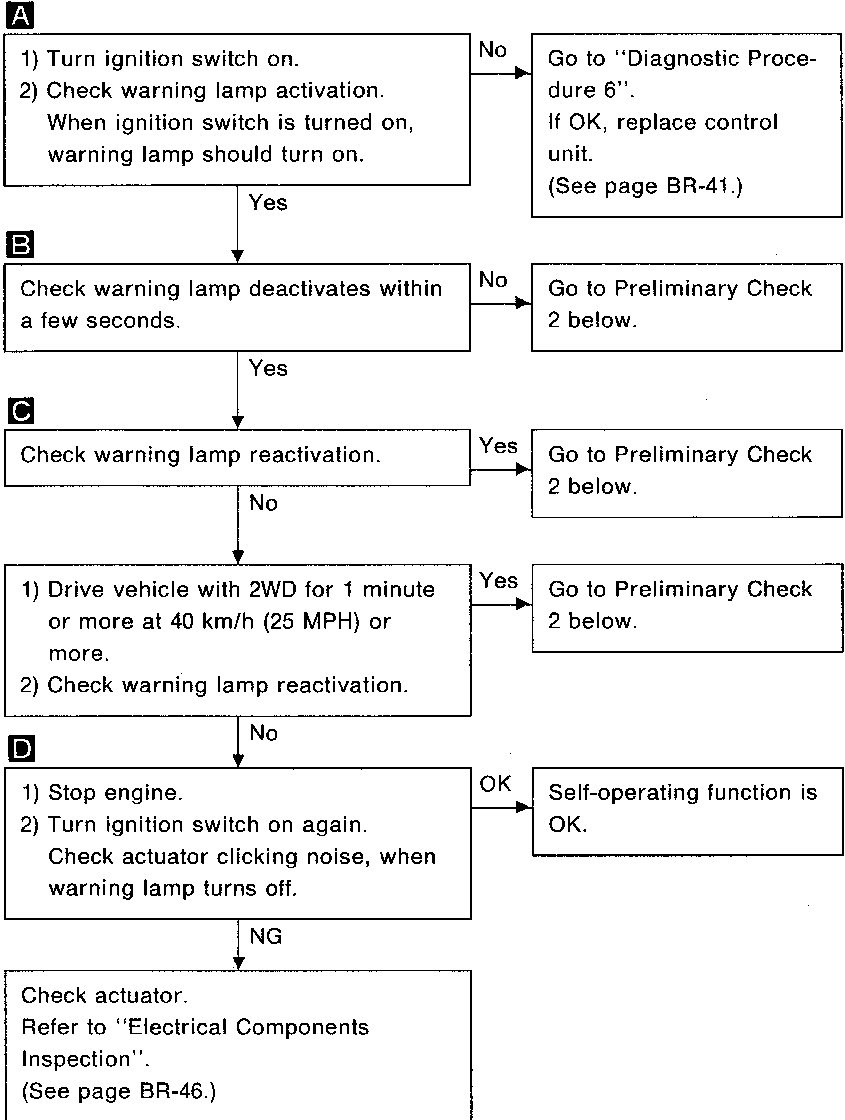
PROCEDURE	REFERENCE PAGE	SYMPTOM					
Electrical Components Inspection	BR-46	Sensor Unit and Actuator				○	
Diagnostic Procedure (Select inspection with LED flashing No.)	BR-45	Warning flashing 5	○	○	○	○	○
	BR-44	Warning flashing 13,14 or 15	○	○	○	○	
	BR-44	Warning flashing 6	○	○	○	○	
	BR-44	Warning flashing 9 or 10	○	○	○	○	
	BR-43	Warning flashing 3 or 8	○	○	○	○	
	BR-42	Warning flashing 4	○	○	○	○	
	BR-42	Warning flashing 2 or 7	○	○	○	○	
Diagnostic Procedure	BR-41	Diagnostic Procedure 6					○
	BR-40	Diagnostic Procedure 5					
	BR-39	Diagnostic Procedure 4				○	
	BR-38	Diagnostic Procedure 3			○		
	BR-38	Diagnostic Procedure 2		○			
	BR-38	Diagnostic Procedure 1	○				
Preliminary Check	BR-34	Preliminary Check 2				○	
	BR-34	Preliminary Check 1				○	
		Pedal vibration & noise					
		Long stopping distance					
		Brake pedal stroke					
		R-ABS doesn't work				○	
		R-ABS works frequently					○

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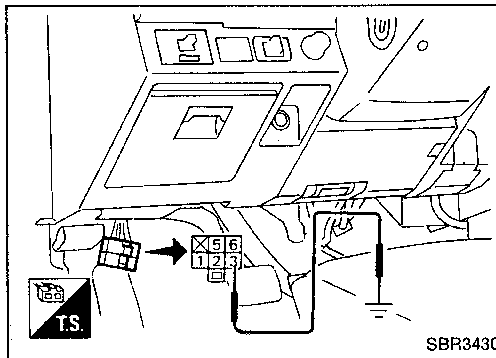
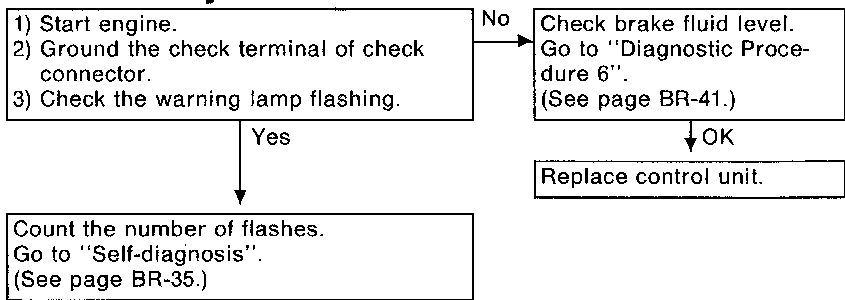
TROUBLE DIAGNOSES



Preliminary Check 1



Preliminary Check 2



TROUBLE DIAGNOSES

Self-diagnosis

CHECKING THE NUMBER OF WARNING LAMP FLASHES

When a problem occurs in the R-ABS, the warning lamp on the instrument panel comes on. As shown in the table, the control unit performs self-diagnosis.

To obtain satisfactory self-diagnosing results, the vehicle must be driven in 2WD above 40 km/h (25 MPH) for at least one minute before the self-diagnosis is performed. After the vehicle has been stopped, the number of warning flashes is counted by grounding the check terminal, with the engine running, there be identifying a malfunctioning part or unit by the number of flashes.

If more than two parts or units malfunction at the same time, the warning lamp will flash to indicate one of the malfunctioning parts or units. After the part or unit has been repaired, the warning lamp will then flash to indicate that the other part or unit is malfunctioning.

No. of warning flashes	Detected items	Malfunctioning cause or part	Diagnostic Procedure	
2	Actuator	ISO solenoid	Open	Diagnostic Procedure 7
7			Shorted	Diagnostic Procedure 7
4			Blocked	Diagnostic Procedure 8
3		DUMP solenoid	Open	Diagnostic Procedure 9
8			Short circuit	Diagnostic Procedure 9
9	Sensor	Open	Diagnostic Procedure 10	
10		Short circuit	Diagnostic Procedure 10	
6		Erratic	Diagnostic Procedure 11	
13, 14 or 15	Control Unit	—	Diagnostic Procedure 12	
5	Other		Diagnostic Procedure 13	

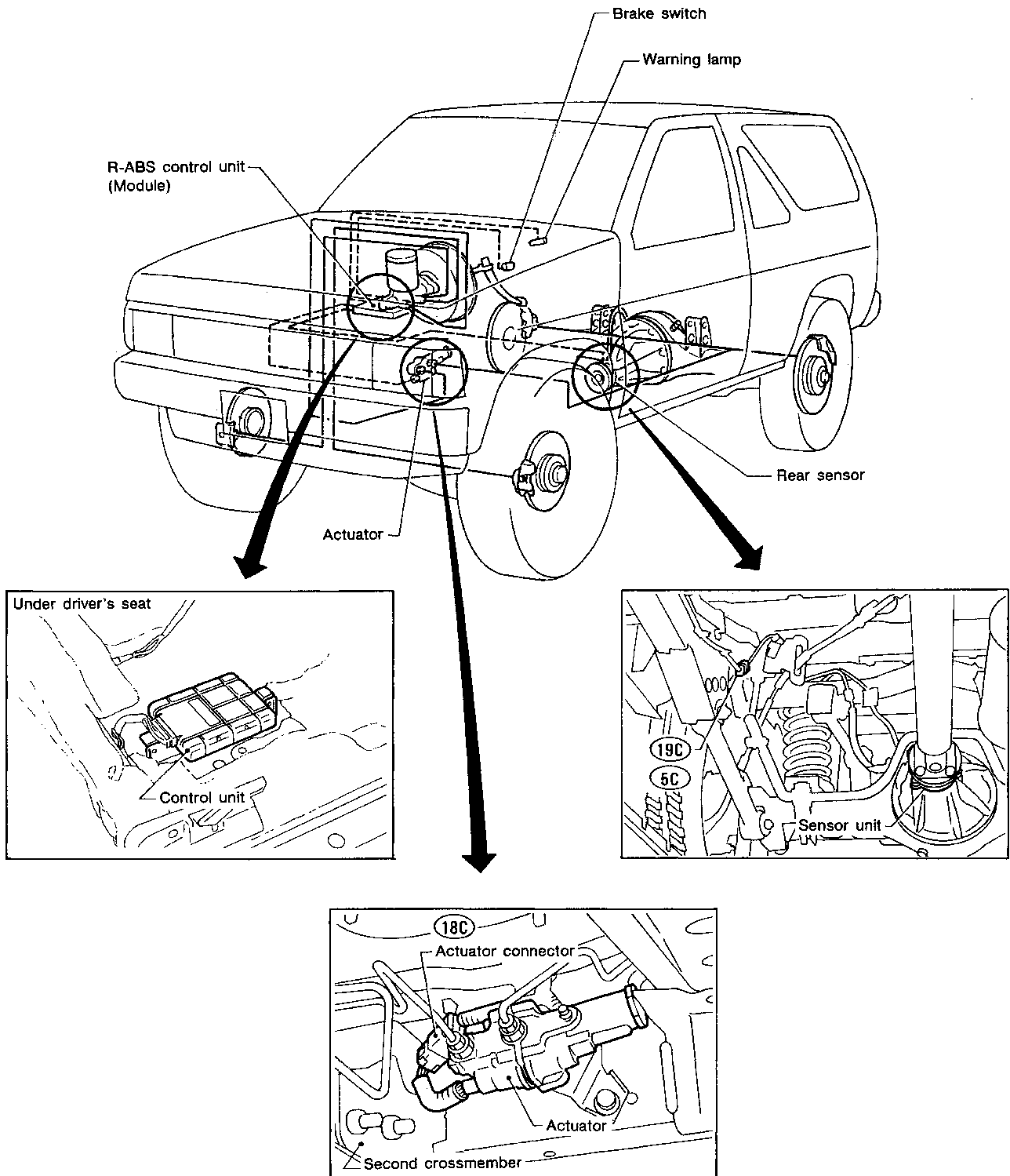
CAUTION:

When driving in 4WD, the rear anti-lock brake system is not effective in most cases. The rear wheels will lock if the front wheels lock as the transfer mechanically couples the front and rear axles together. If this happens, the rear anti-lock brake system may not function but the ordinary brakes will operate normally. The "ANTI-LOCK" brake warning light will then come on. The above condition is not a malfunction and the rear anti-lock brake system can be re-activated by starting the engine again. The "Anti-Lock" brake warning light will then go off.

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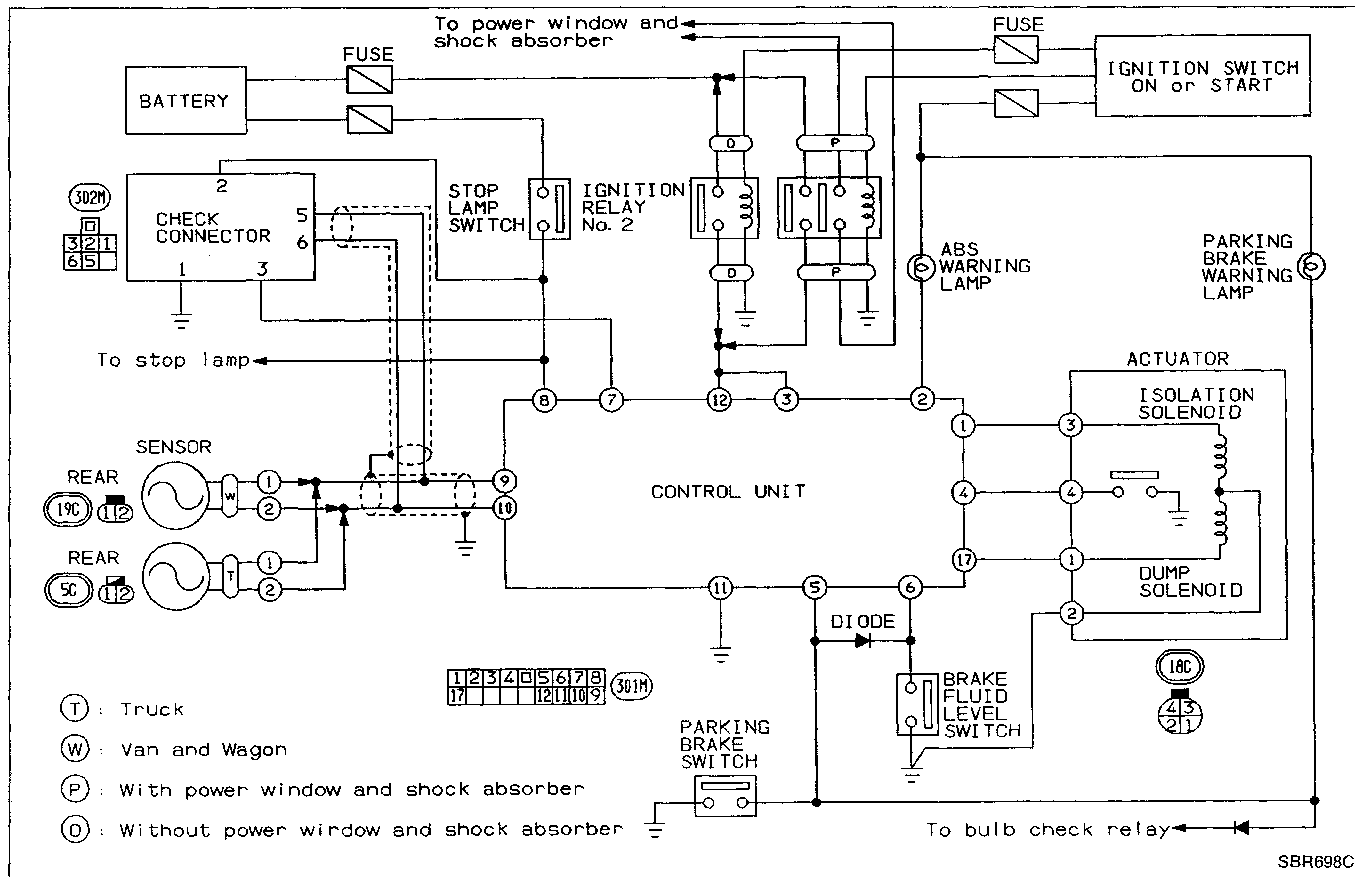
TROUBLE DIAGNOSES

Component Parts and Harness Connector Location



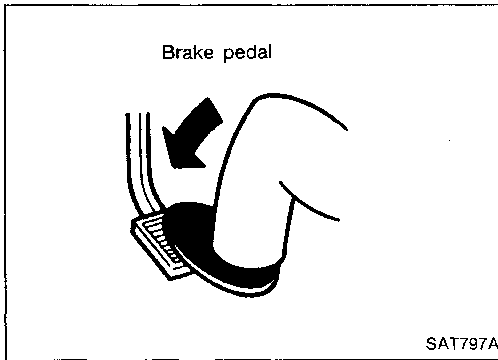
TROUBLE DIAGNOSES

Circuit Diagram for Quick Pinpoint Check



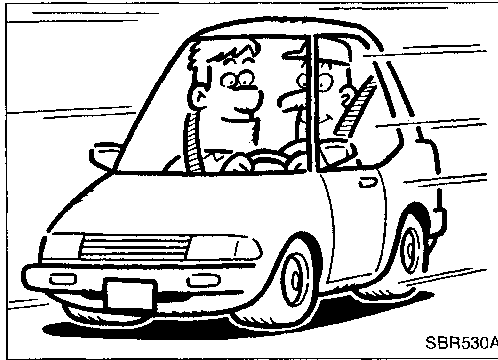
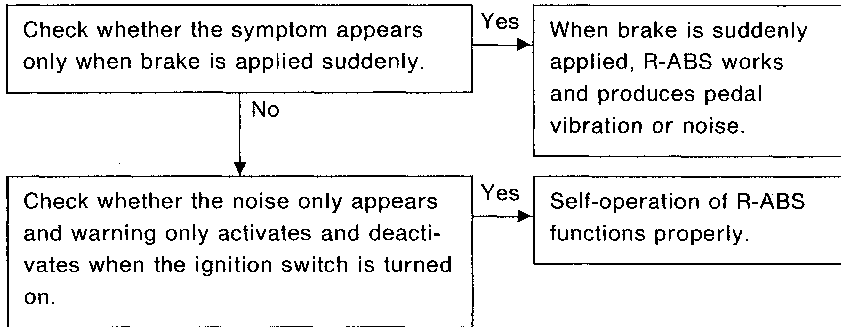
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TROUBLE DIAGNOSES



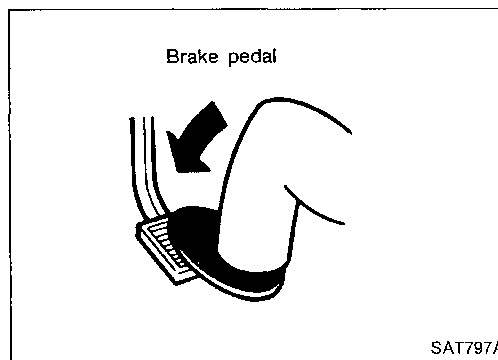
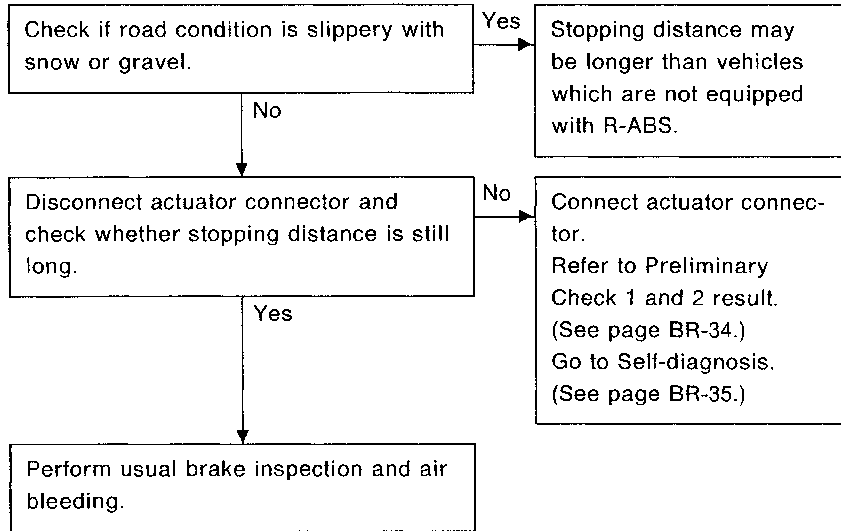
Diagnostic Procedure 1

SYMPTOM: Pedal vibration or noise



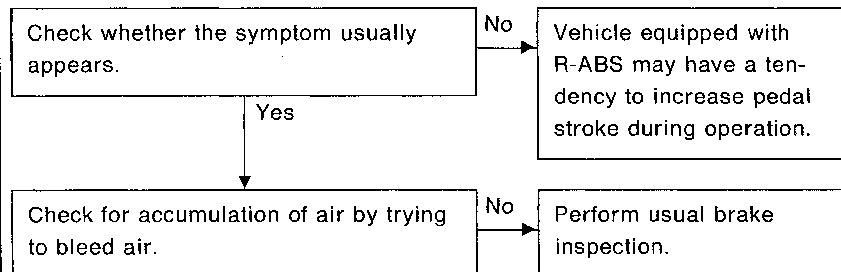
Diagnostic Procedure 2

SYMPTOM: Long stopping distance
Refer to worksheet results.



Diagnostic Procedure 3

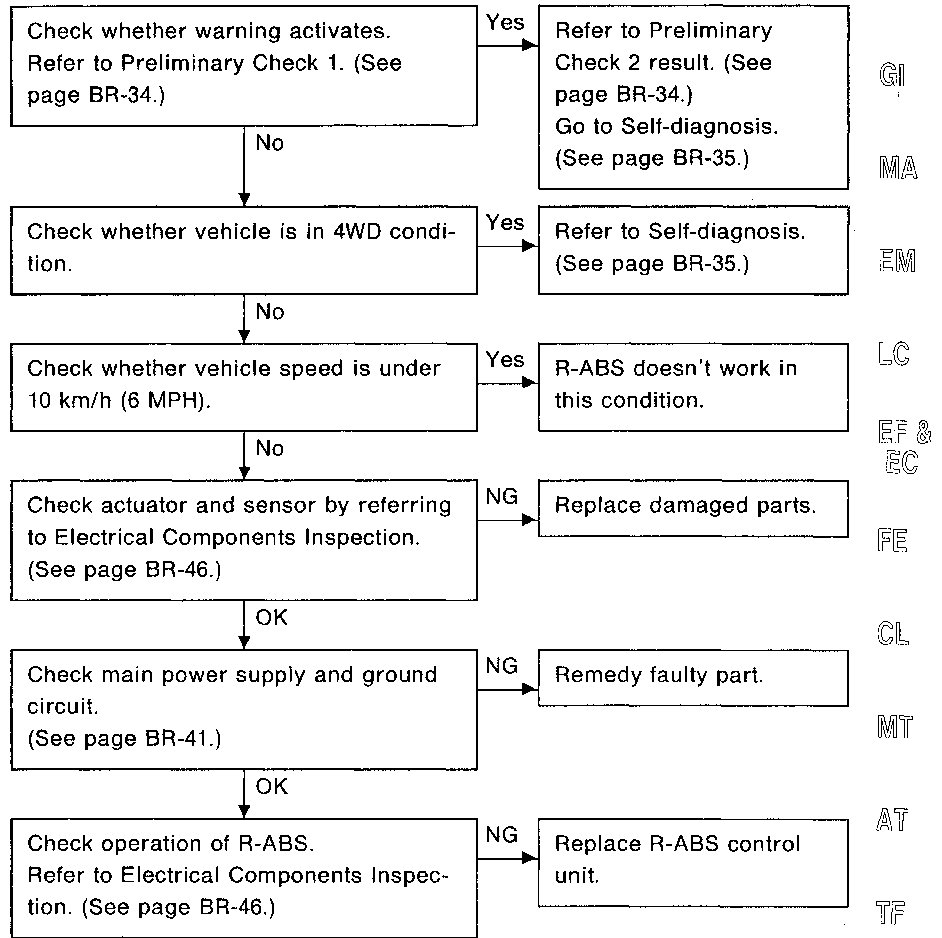
SYMPTOM: Brake pedal stroke is large.



TROUBLE DIAGNOSES

Diagnostic Procedure 4

SYMPTOM: R-ABS doesn't work.



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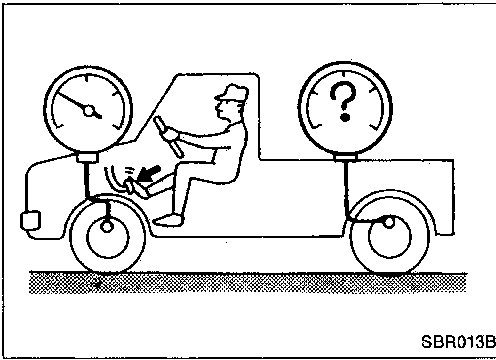
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TROUBLE DIAGNOSES



Diagnostic Procedure 5

SYMPTOM: R-ABS works frequently.

A

CHECK BRAKE FLUID PRESSURE.
Check whether brake fluid pressure distribution is normal.

D_2/D_1 : kPa (kg/cm², psi)

4WD TRUCK

2,256 - 3,040

(23 - 31, 327 - 441)/

6,865 (70, 995)

Standard Van & Wagon

4,021 - 4,805

(41 - 49, 583 - 697)/

6,865 (70, 995)

Van & Wagon Option for

SE grade

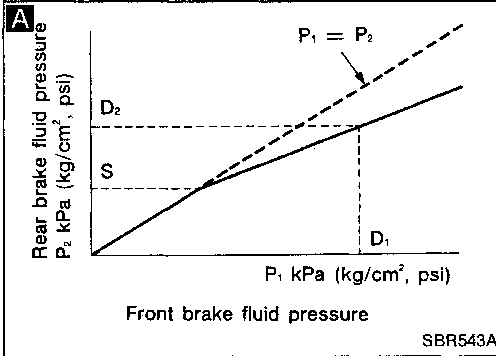
4,904 - 5,688

(50 - 58, 711 - 825)/

6,865 (70, 995)

NG

Replace master cylinder.



OK

Perform usual brake inspection.

NG

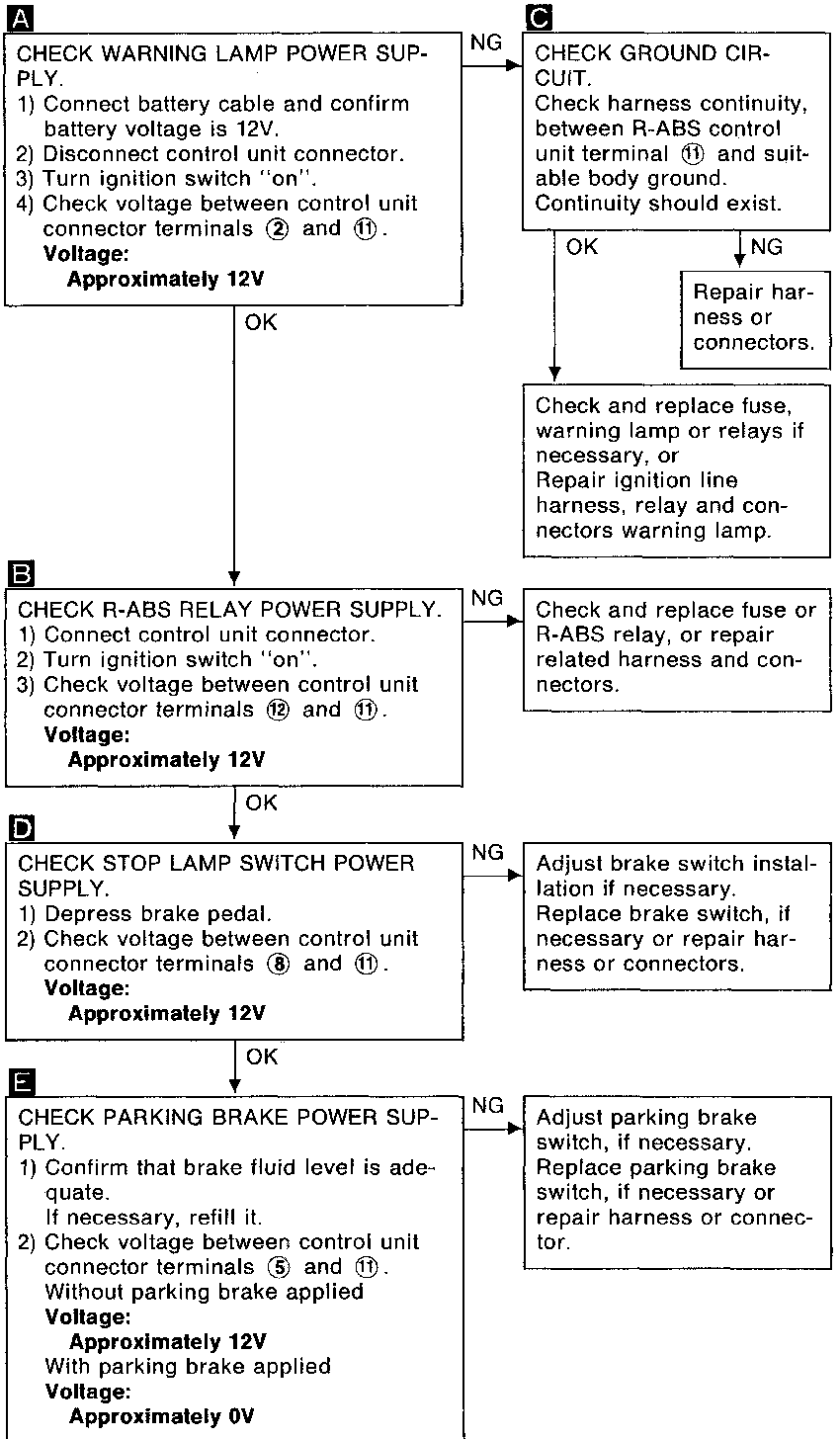
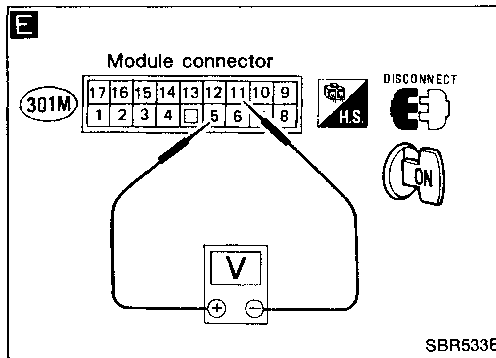
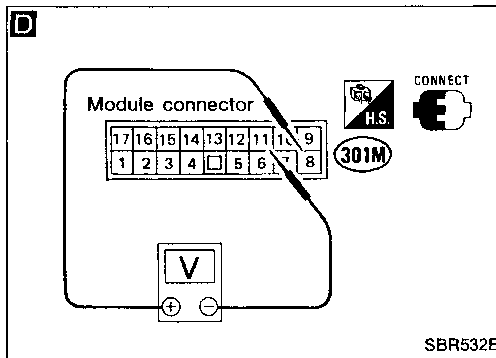
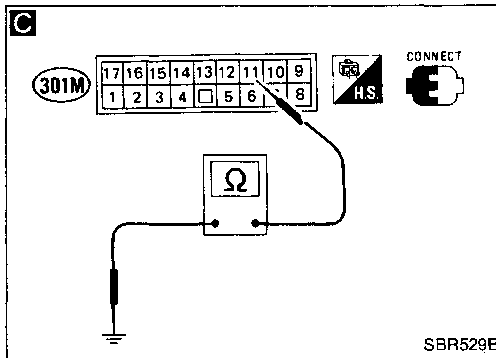
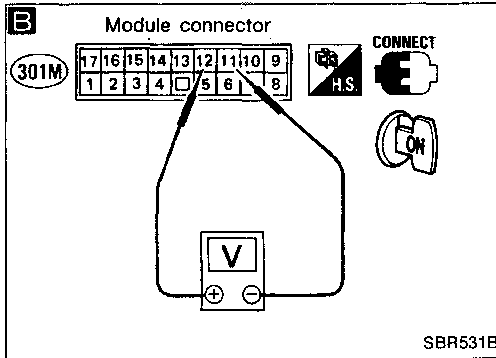
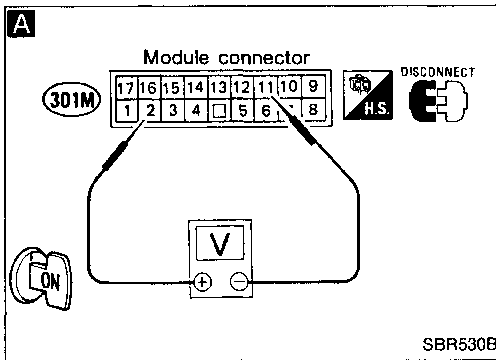
Remedy.

OK

When wheel lock occurs frequently due to hard braking operation, the R-ABS operates at each occurrence of wheel lock. Accordingly, frequent R-ABS operation is normal under severe braking conditions where wheel lock would occur frequently due to braking.

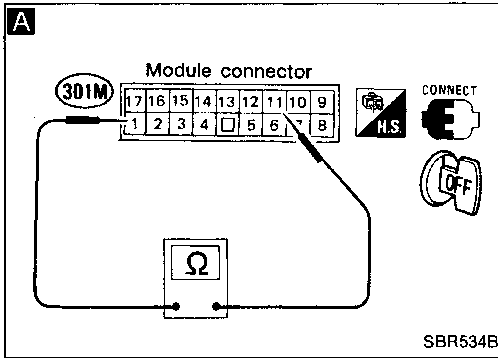
Diagnostic Procedure 6

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



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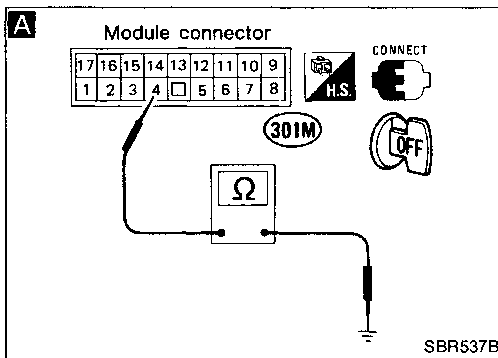
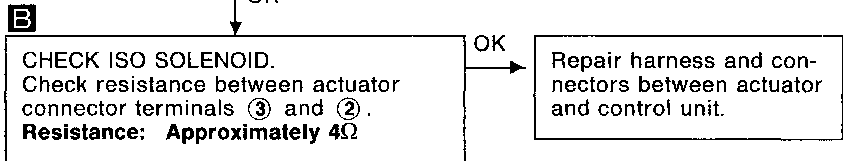
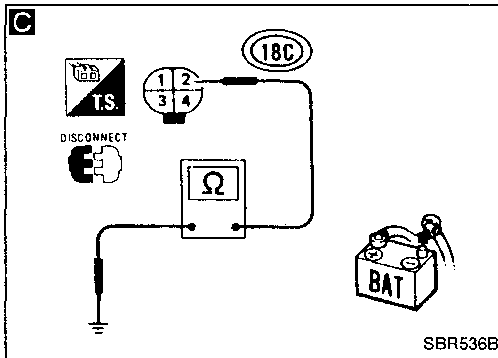
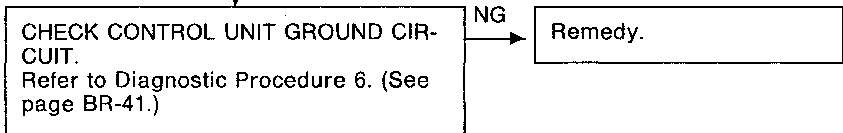
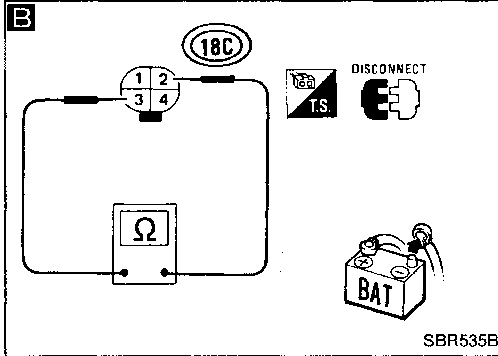
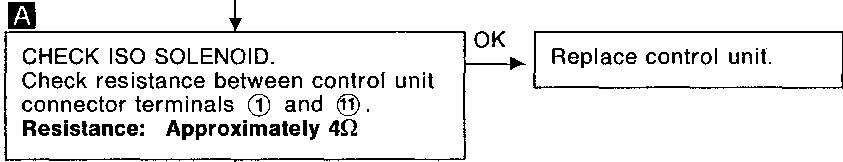
TROUBLE DIAGNOSES



Diagnostic Procedure 7

ACTUATOR ISO SOLENOID SHORT CIRCUIT OR OPEN (Warning lamp flashing number 2 or 7)

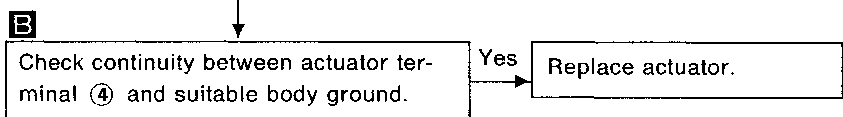
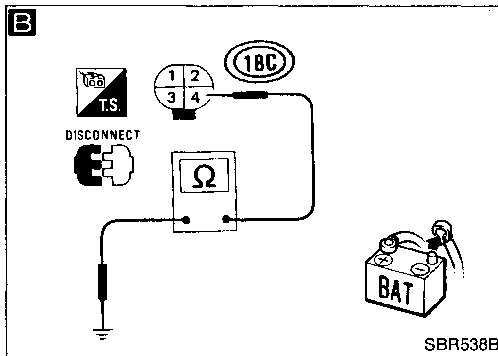
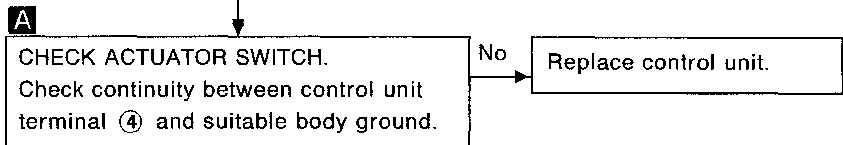
Remove battery negative terminal connector.



Diagnostic Procedure 8

ACTUATOR ISO SOLENOID BLOCKED (Warning lamp flashing number 4)

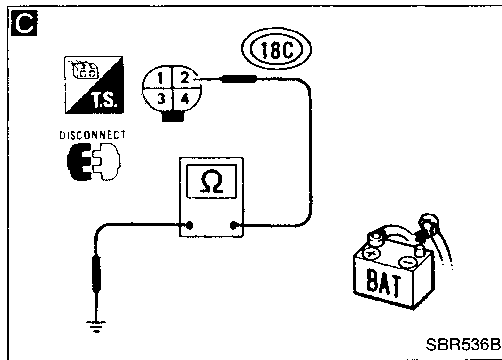
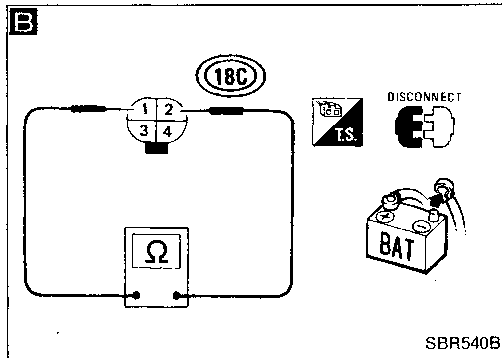
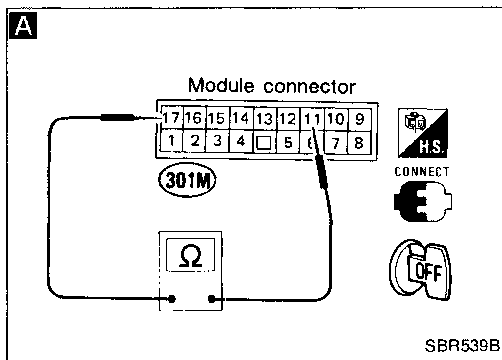
Remove battery negative terminal connector.



Repair short circuit of harness connectors between actuator and control unit.

Diagnostic Procedure 9

**ACTUATOR DUMP SOLENOID SHORT CIRCUIT OR OPEN
(Warning lamp flashing number 3 or 8)**

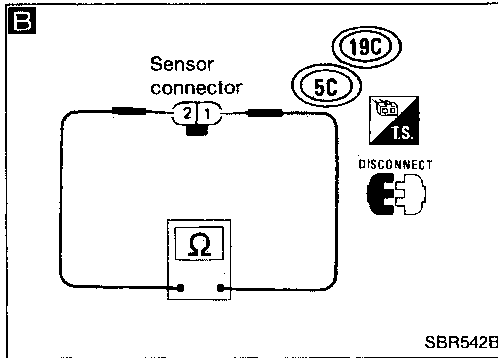
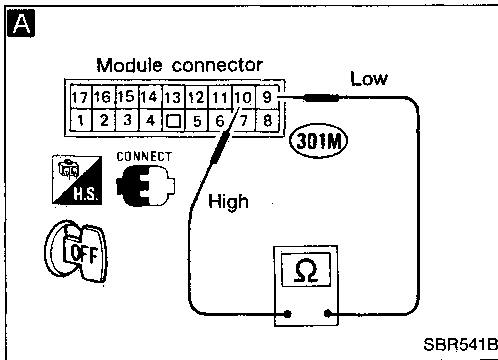


```

    graph TD
      Start[Remove battery negative terminal connector.] --> A[A]
      A["A  
CHECK DUMP SOLENOID.  
Check resistance between control unit connector terminals ⑰ and ⑪.  
Resistance:  
Approximately 1.5Ω"] -- OK --> A_OK[Replace control unit.]
      A -- NG --> B[B]
      B["B  
CHECK CONTROL UNIT GROUND CIRCUIT.  
Refer to Diagnostic Procedure 6. (See page BR-41.)"] -- NG --> B_NG[Remedy.]
      B -- OK --> C[C]
      C["C  
CHECK DUMP SOLENOID.  
Check resistance between actuator connector terminals ① and ②.  
Resistance:  
Approximately 1.5Ω"] -- OK --> C_OK[Repair harness and connectors between actuator and control unit.]
      C -- NG --> D[D]
      D["C  
CHECK ACTUATOR GROUND CIRCUIT.  
Check harness continuity between actuator terminal ② and suitable body ground."] -- OK --> D_OK[Replace actuator.]
      D -- NG --> D_NG[Repair harness or connectors.]
  
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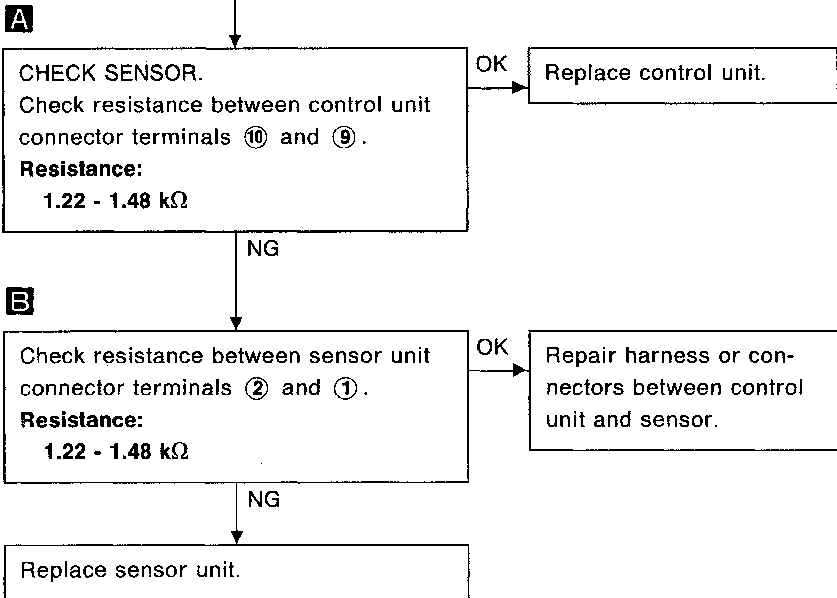
TROUBLE DIAGNOSES



Diagnostic Procedure 10

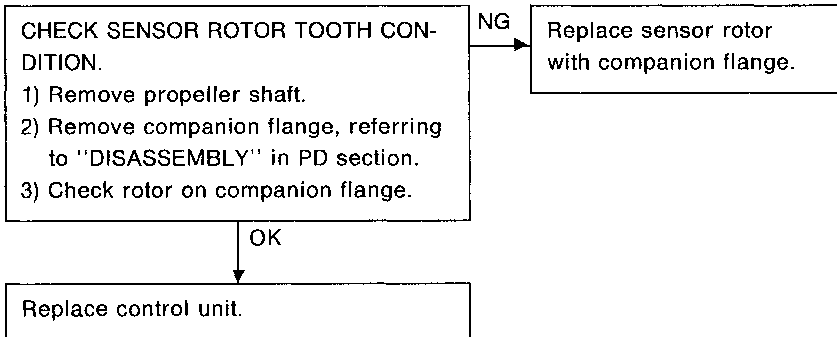
SENSOR OPEN OR SHORT CIRCUIT (Warning lamp flashing number 9 or 10)

Remove battery negative terminal connector.



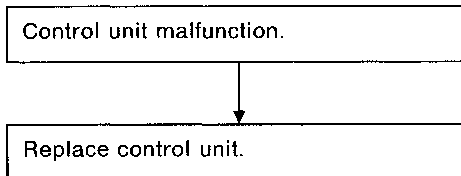
Diagnostic Procedure 11

SENSOR SIGNAL ERRATIC (Warning lamp flashing number 6)



Diagnostic Procedure 12

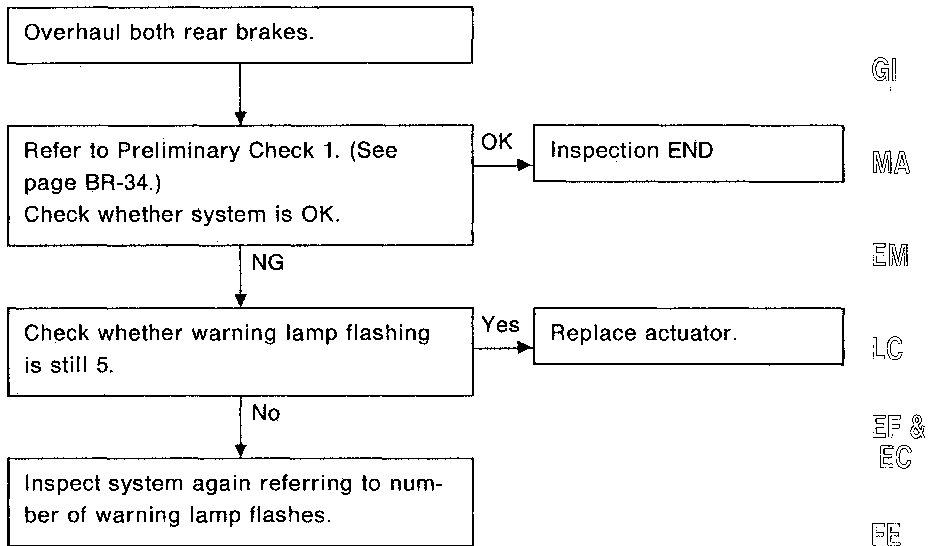
CONTROL UNIT (Warning lamp flashing 13, 14 or 15)



TROUBLE DIAGNOSES

Diagnostic Procedure 13

Other (Warning lamp flashing 5)



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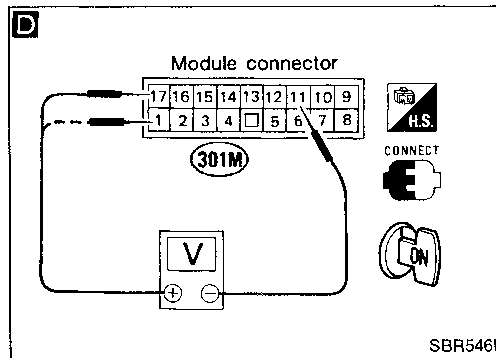
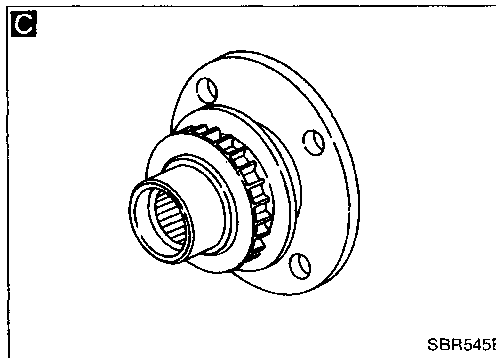
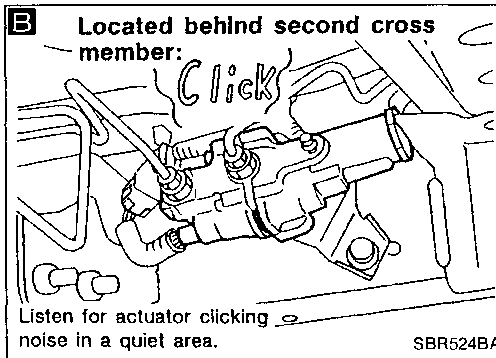
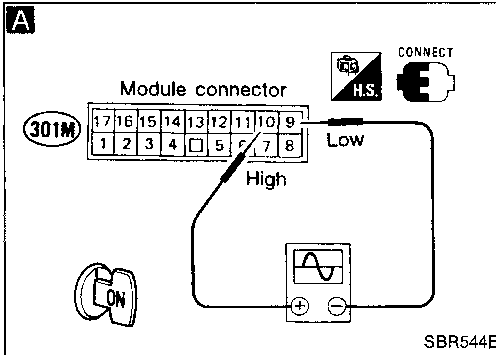
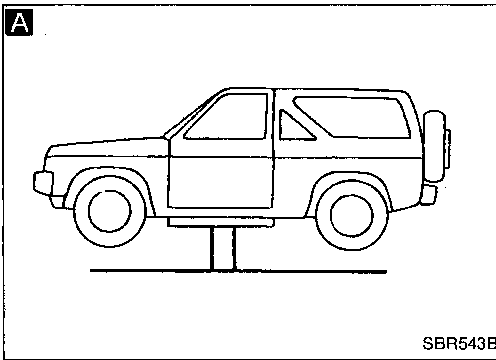
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TROUBLE DIAGNOSES

Electrical Components Inspection

SENSOR UNIT AND ACTUATOR



A
CHECK SENSOR SIGNAL.
 1) Raise vehicle. Confirm it is safe to rotate rear wheels.
 2) Start engine and rotate rear wheels with transmission in D position or first gear position.
 3) Check sensor signal voltage between control unit terminals ⑩ and ⑨ with AC voltmeter.
Voltage: 0.4V or more
M/T at 700 rpm
A/T at 850 rpm

B
CHECK ACTUATOR OPERATION. Refer to Preliminary Check 2 result. Clicking noise sounds from actuator, when the ignition switch is turned on with battery cable connected.

CHECK R-ABS OPERATION as follows:
 1) Perform R-ABS check in a safe place without obstacles in the vicinity.
 2) Drive the vehicle for more than one minute at speeds over 40 km/h (25 MPH) in the 2WD mode, then check that the warning lamp does not light on the instrument panel. After this, check for operation.
 3) Check if ordinary braking effect occurs, and check also that the rear wheels will not be locked when such abrupt braking is applied that the front wheels lock.

C
CHECK SENSOR ROTOR for following points:
 ● Tooth condition
 ● Installation on companion flange
 ● Deformation
 ● Wear
 ● Looseness

D
CHECK PULSING VOLTAGE FROM CONTROL UNIT.
 Check pulsing voltage for ISO and DUMP solenoid between control unit terminals ⑰ and ⑱, and terminals ① and ②.
Voltage: 0.3 - 3.5V for approx. 13 msec.
 Use suitable digital voltmeter. Pulsing voltage appears when R-ABS warning turns off after ignition is turned on.

OK → R-ABS is good condition.
 NG → Replace actuator.

NG → Replace sensor rotor with companion flange.
 OK → Replace sensor unit.

NG → Replace control unit.
 OK → Replace actuator.

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Applied model	Without rear ABS		With rear ABS			
	Truck			Pathfinder		
	2WD		4WD		Standard	Option for SE grade
	KA24E	VG30E	Standard	Long		
Front brake						
Brake model	CL28VA		CL28VD			
Cylinder bore diameter x number of pistons mm (in)	60.6 (2.386) x 1		42.8 (1.685) x 2			
Pad length x width x thickness mm (in)	IN: 126.5 x 43 x 11 (4.98 x 1.69 x 0.43) OUT: 129 x 43 x 11 (5.08 x 1.69 x 0.43)		146.6 x 48.5 x 10 (5.77 x 1.909 x 0.39)			
Rotor outer diameter x thickness mm (in)	250 x 22 (9.84 x 0.87)	260 x 26 (10.24 x 1.02)	277 x 26 (10.91 x 1.02)			
Rear brake						
Brake model	LT26B		LT30A	LT26B	AD14VB	
Cylinder bore diameter x number of pistons mm (in)	22.22 (7/8)		20.64 (13/16)		42.83 (1.6862)	
Lining or pad length x width x thickness mm (in)	249.6 x 50.5 x 5.5 (9.83 x 1.99 x 0.217)		296 x 50 x 6.1 (11.65 x 1.97 x 0.240)	249.6 x 50 x 5.5 (9.83 x 1.97 x 0.217)	99.8 x 33.5 x 10.0 (3.929 x 1.319 x 0.394)	
Drum inner diameter or rotor outer diameter x thickness mm (in)	260.0 (10.24)		295.0 (11.61)	260.0 (10.24)	286 x 18 (11.26 x 0.71)	
Parking brake						
Brake model	—		—		DS19HB	
Lining length x width x thickness mm (in)	—		—		182.3 x 30 x 3 (7.18 x 1.18 x 0.12)	
Drum inner diameter mm (in)	—		—		190.0 (7.48)	
Master cylinder						
Bore diameter mm (in)	25.40 (1)					
Control valve						
Valve model	Linkage type load sensing valve		Proportioning valve within master cylinder			
Split point [kPa (kg/cm ² , psi)] x reducing ratio	(Variable) x 0.23		2,452 (25, 356) x 0.2	2,942 (30, 427) x 0.2	2,452 (25, 356) x 0.2	3,923 (40, 569) x 0.4
Brake booster						
Booster model	M195T		M215T			
Diaphragm diameter mm (in)	Pri.: 205 (8.07) Sec.: 180 (7.09)		Pri.: 230 (9.06) Sec.: 205 (8.07)			
Recommended brake fluid	DOT 3					

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SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment

DISC BRAKE

Unit: mm (in)

Brake model	CL28VA	CL28VD	AD14VB
Pad wear limit			
Minimum thickness	2.0 (0.079)		
Rotor repair limit			
Minimum thickness	20.0 (0.787)	24.0 (0.945)	16.0 (0.630)

DRUM BRAKE

Unit: mm (in)

Brake model	LT26B	LT30A
Lining wear limit		
Minimum thickness	1.5 (0.059)	
Drum repair limit		
Maximum inner diameter	261.5 (10.30)	296.5 (11.67)
Out-of-round limit	0.03 (0.0012)	

PARKING DRUM BRAKE

Unit: mm (in)

Brake model	DS19HB
Lining wear limit	
Minimum thickness	1.5 (0.059)
Drum repair limit	
Maximum inner diameter	191.0 (7.52)
Brake shoe adjustment	
Returning notches	7 - 8

BRAKE PEDAL

Unit: mm (in)

Free height "H"	
M/T	209 - 219 (8.23 - 8.62)
A/T	212 - 222 (8.35 - 8.74)
Depressed height "D" [under force of 490 N (50 kg, 110 lb) with engine running]	120.0 (4.72)
Clearance "C" between pedal stopper and threaded end of stop lamp switch or ASCD switch	0.3 - 1.0 (0.012 - 0.039)
Pedal free play	
At clevis	1.0 - 3.0 (0.039 - 0.118)
At pedal pad	4 - 12 (0.16 - 0.47)

PARKING BRAKE CONTROL

Control type	Center lever	Stick lever
Lever stroke [under force of 196 N (20 kg, 44 lb)]	9 - 11*1 7 - 9*2	10 - 12*1
Lever stroke when warning switch comes on	1	1

*1: Truck models.

*2: Van and Wagon models.