BRAKE SYSTEM

SECTION BR

CONTENTS

CONTENTS (Cont'd)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

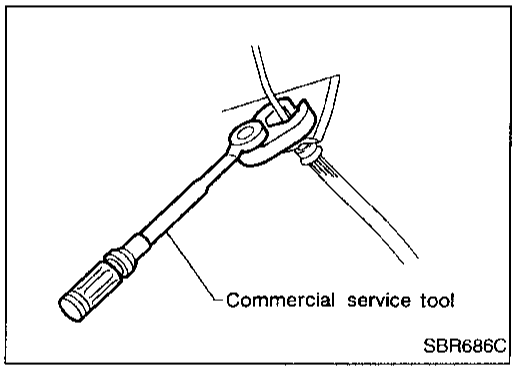
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

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

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt help to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental air bags for a frontal collision). Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses (except "SEAT BELT PRE-TENSIONER" connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).**



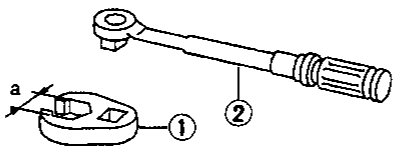
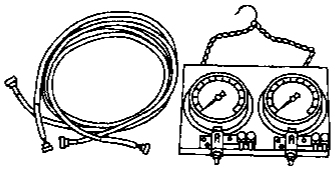
Precautions for Brake System

- **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-5.**

WARNING:

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

Commercial Service Tools

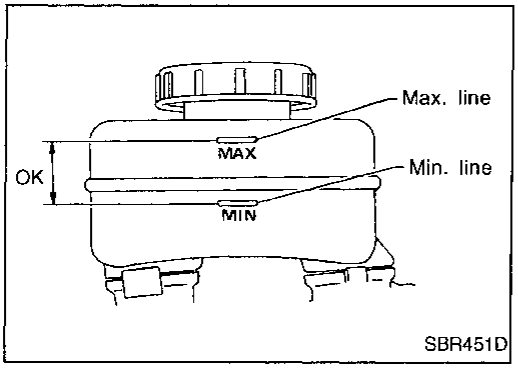
Tool name	Description	
① Flare nut crowfoot ② Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Brake fluid pressure gauge	 NT151	Measuring brake fluid pressure

NVH Troubleshooting Chart

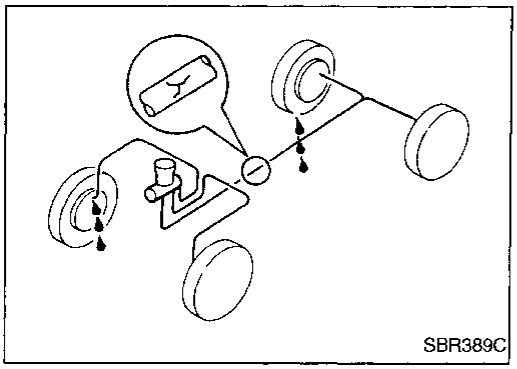
Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

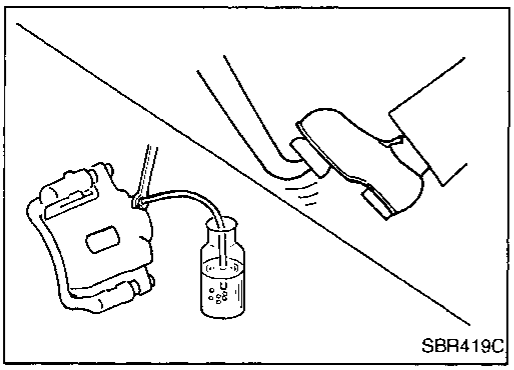
Reference page			BR-14, 18	BR-14, 18	BR-15, 20	—	—	BR-16, 23	—	—	—	BR-17, 23	NVH in FA section	NVH in FA, RA section	NVH in FA section	NVH in FA section	NVH in ST section
Possible cause and SUSPECTED PARTS			Pads - damaged	Pads - uneven wear	Shims damaged	Rotor imbalance	Rotor damage	Rotor runout	Rotor deformation	Rotor deflection	Rotor rust	Rotor thickness variation	DRIVE SHAFT	AXLE AND SUSPENSION	TIRES	ROAD WHEEL	STEERING
Symptom	BRAKE	Noise	X	X	X								X	X	X	X	X
		Shake				X							X	X	X	X	X
		Shimmy, Judder				X	X	X	X	X	X	X		X	X	X	X

X: Applicable



SBR451D


SBR389C


SBR419C

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

Checking Brake Line

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

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

Changing Brake Fluid

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Always keep fluid level higher than minimum line on reservoir tank.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

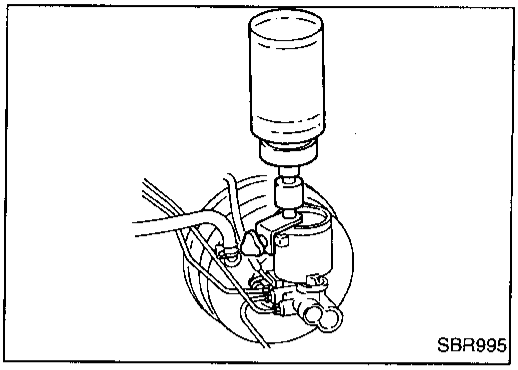
1. Clean inside of reservoir tank, and refill with new brake fluid.
2. Connect a vinyl tube to each air bleeder valve.
3. Drain brake fluid from each air bleeder valve by depressing brake pedal.
4. Refill until brake fluid comes out of each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to "Bleeding Brake System" (BR-6).

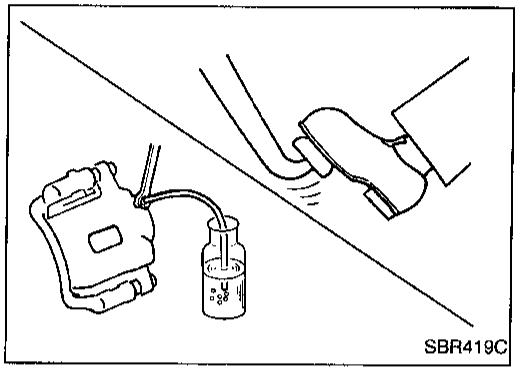
Brake Burnishing Procedure

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

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

1. Drive the vehicle on a straight smooth road at 50 km/h (31 MPH).
2. Use medium brake pedal/foot effort to bring the vehicle to a complete stop from 50 km/h (31 MPH). Adjust brake pedal/foot pressure such that vehicle stopping time equals 3 to 5 seconds.
3. To cool the brake system, drive the vehicle at 50 km/h (31 MPH) for 1 minute without stopping.
4. Repeat steps 1 to 3 10 times or more to complete the burnishing procedure.


SBR995


SBR419C

Bleeding Brake System

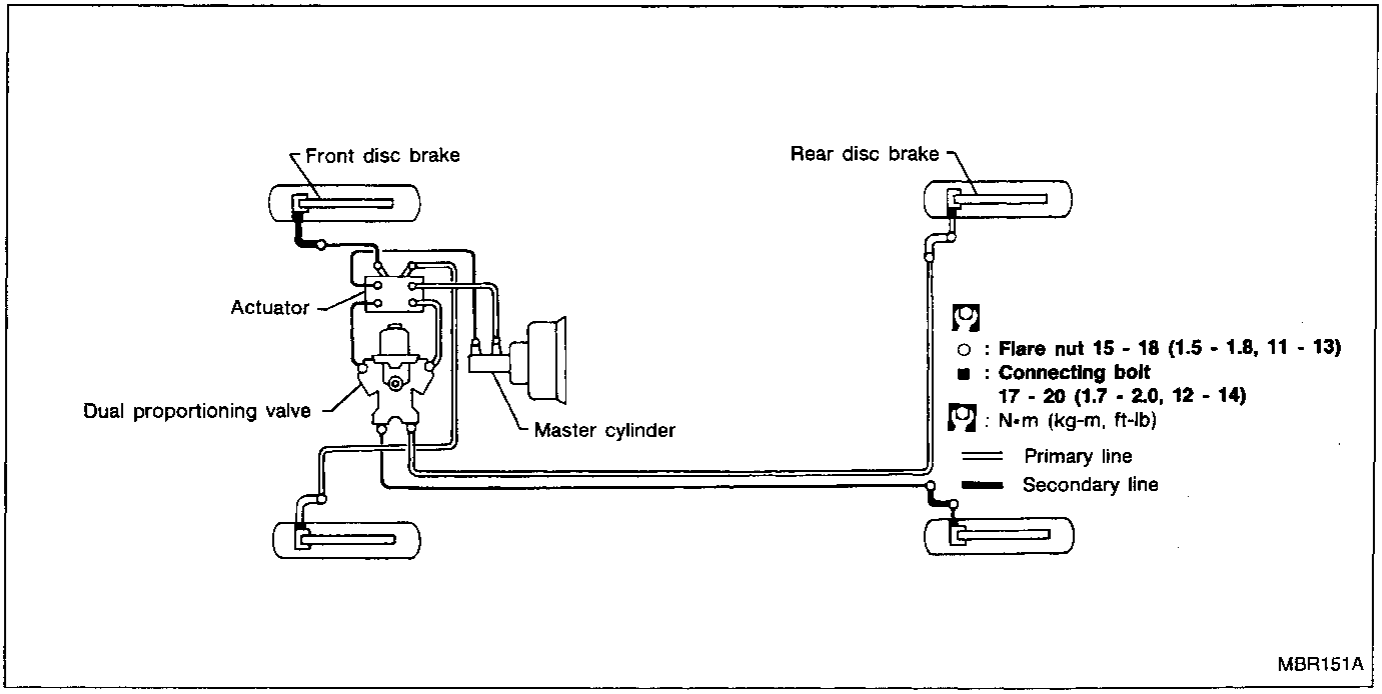
CAUTION:

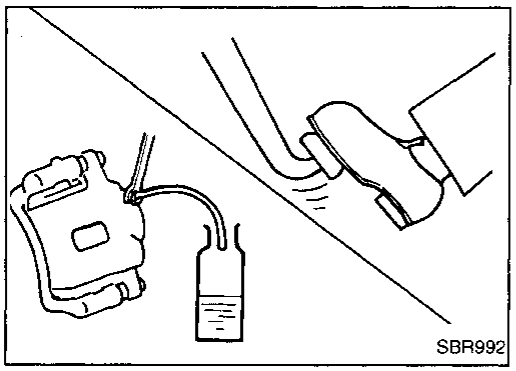
- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**
- **For models 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.

Brake Hydraulic Line





REMOVAL

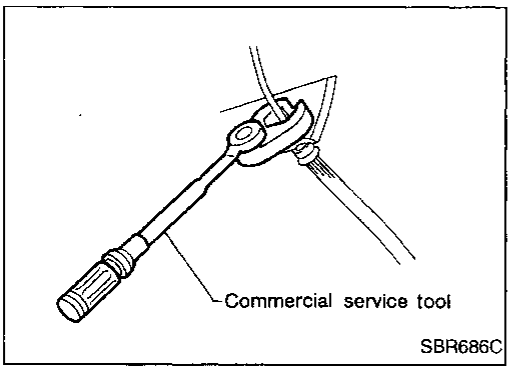
CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **All hoses must be free from excessive bending, twisting and pulling.**

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

INSPECTION

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



INSTALLATION

CAUTION:

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

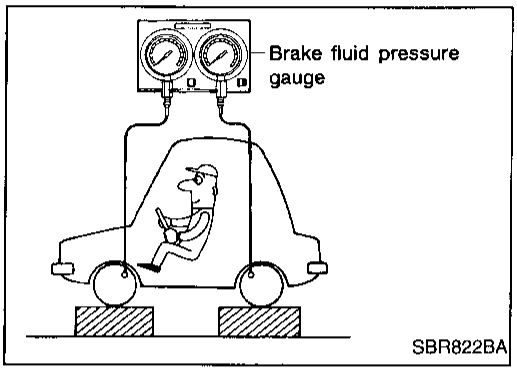
1. Tighten all flare nuts and connecting bolts.

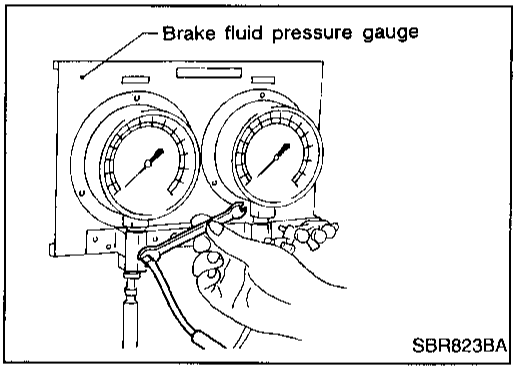
Specification:

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)

Brake Hydraulic Line (Cont'd)

2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Brake System" (BR-6).





Dual Proportioning Valve

INSPECTION

CAUTION:

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

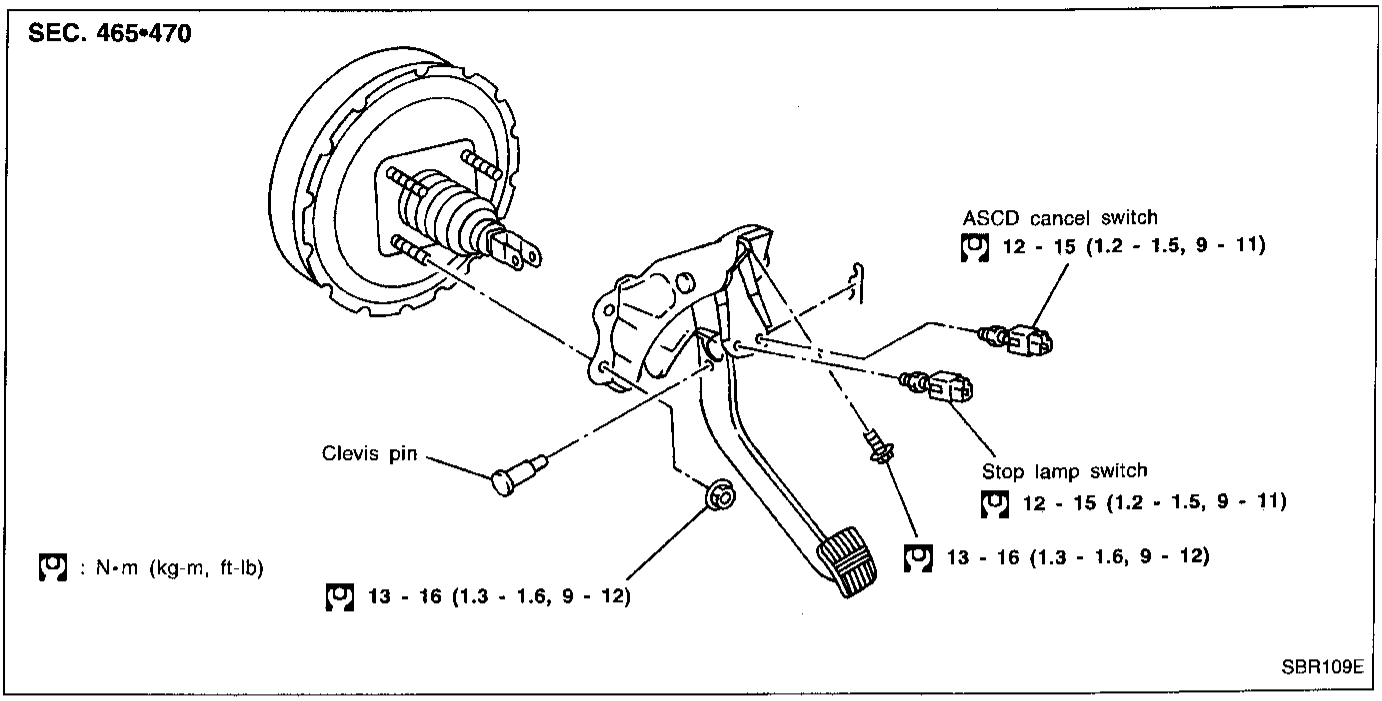
1. Connect Tool to air bleeders of front and rear brakes on either LH and RH side.
2. Bleed air from the Tool.
3. Check fluid pressure by depressing brake pedal.

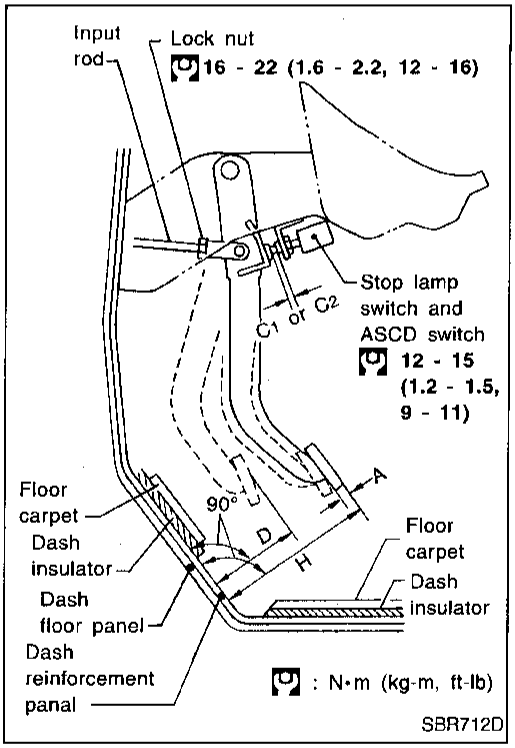
Unit: kPa (kg/cm^2, psi)

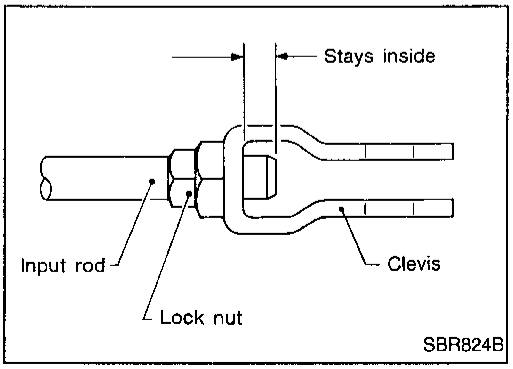
Applied pressure (Front brake)	5,394 (55, 782)
Output pressure (Rear brake)	2,452 - 2,844 (25 - 29, 356 - 412)

4. Bleed air after disconnecting the Tool. Refer to "Bleeding Brake System" (BR-6).

Removal and Installation







Inspection

Check brake pedal for following items.

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

Adjustment

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

H: Free height
Refer to SDS (BR-80).

D: Depressed height
Refer to SDS (BR-80).
Under force of 490 N (50 kg, 110 lb) with engine running

C_1, C_2: Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch
0.3 - 1.0 mm (0.012 - 0.039 in)

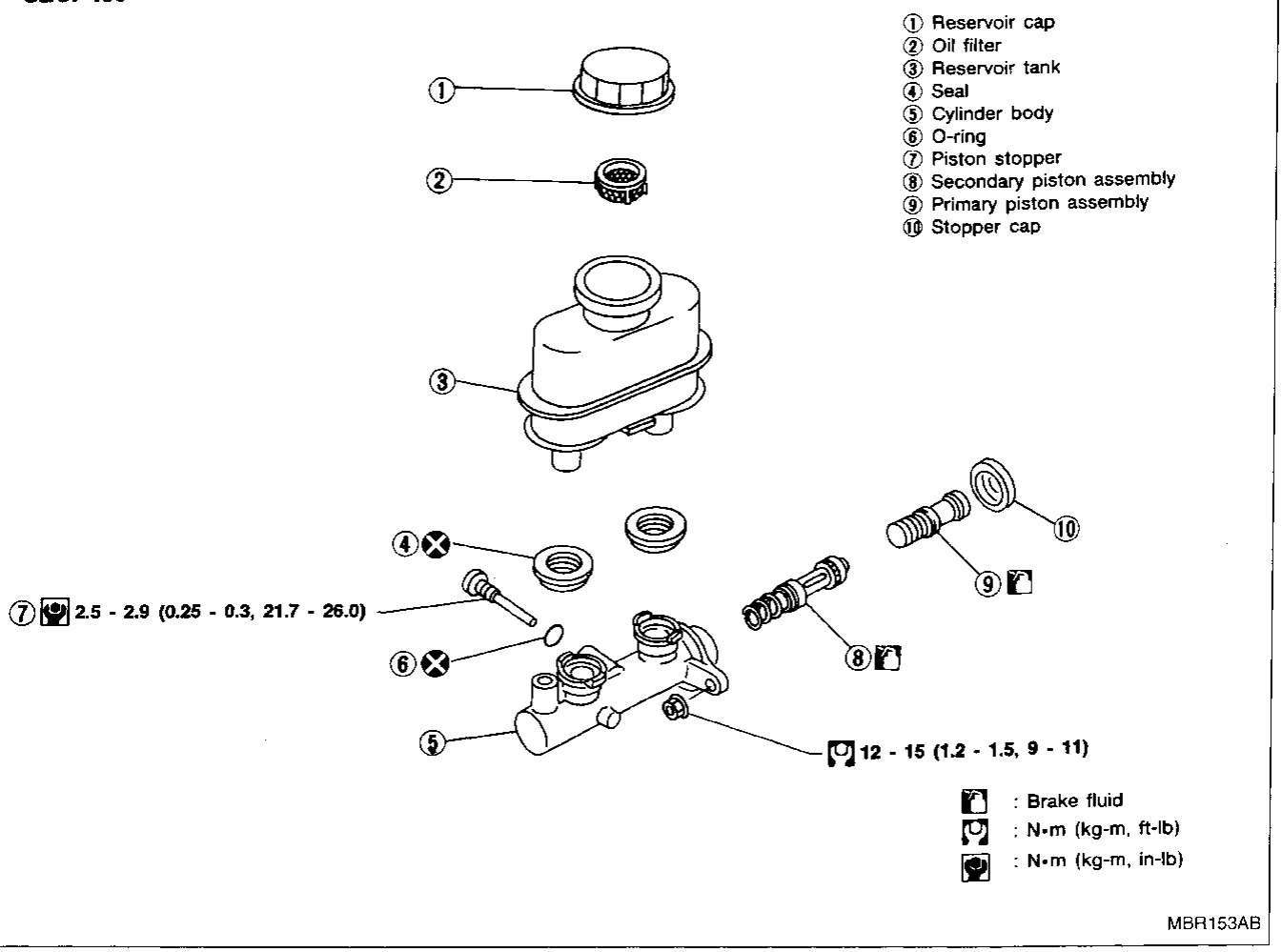
A: Pedal free play
1 - 3 mm (0.04 - 0.12 in)

1. 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.

SEC. 460

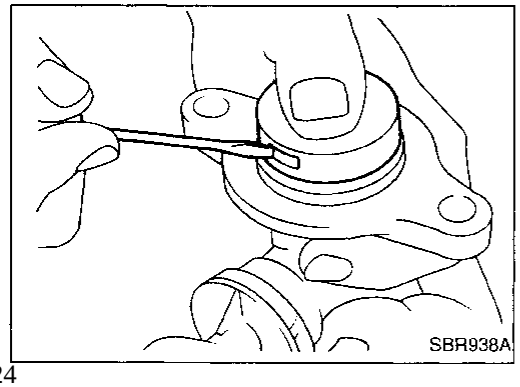


Removal

CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

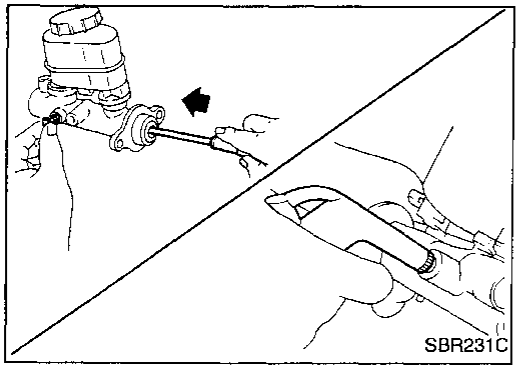
1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake pipe flare nuts.
4. Remove master cylinder mounting nuts.



Disassembly

1. Bend claws of stopper cap outward.

Disassembly (Cont'd)


SBR231C

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

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

4. Draw out reservoir tank.

Inspection

Check for the following items.

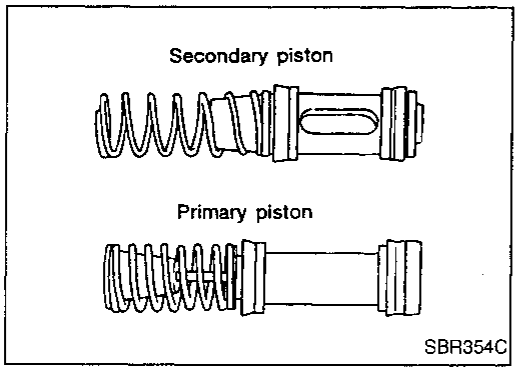
Replace any part if damaged.

Master cylinder:

- Pin holes or scratches on inner wall.

Piston:

- Deformation of or scratches on piston cups.

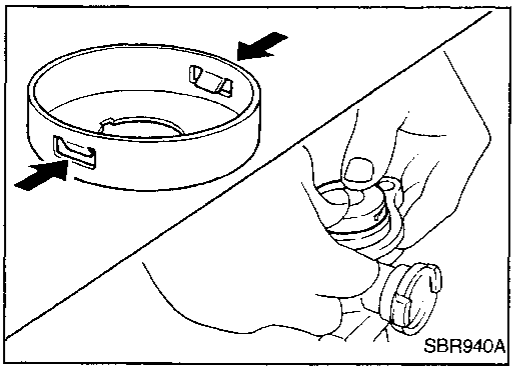


SBR354C

Assembly

1. Insert secondary piston assembly. Then insert primary piston assembly.

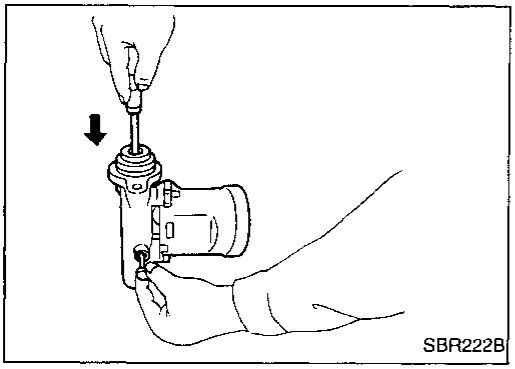
- **Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body.**


SBR940A

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.


SBR222B

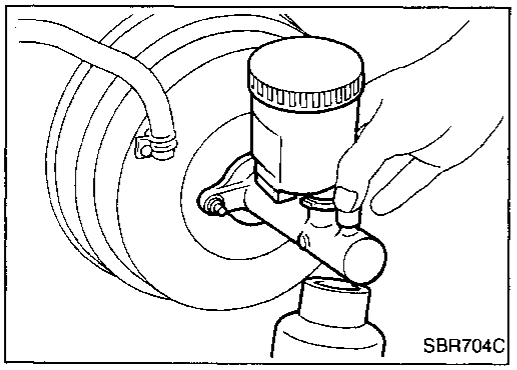
5. Install valve stopper while piston is pushed into cylinder.

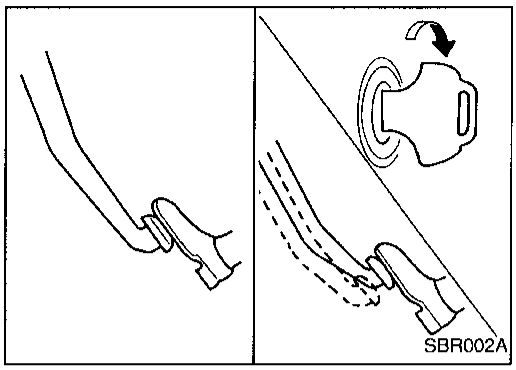
Installation

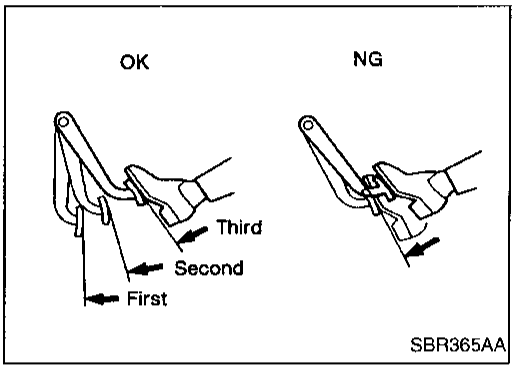
CAUTION:

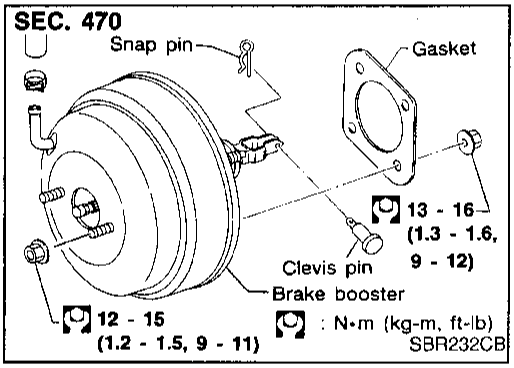
- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

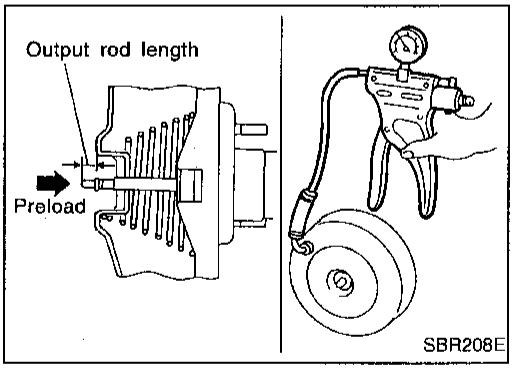
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Torque mounting nuts.
   : 12 - 15 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)
3. Fill up reservoir tank with new brake fluid.
4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal.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


SBR704C









Brake Booster

ON-VEHICLE SERVICE

Operating check

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

Airtight check

- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. The pedal should go further down the first time, and then it should gradually rise thereafter.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for **30 seconds**.

REMOVAL

CAUTION:

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

INSPECTION

Output rod length check

1. Apply vacuum of −66.7 kPa (−500 mmHg, −19.69 inHg) to brake booster with a handy vacuum pump.
2. Add preload of 19.6 N (2.0 kg, 4.4 lb) to output rod.
3. Check output rod length.

   Specified length:

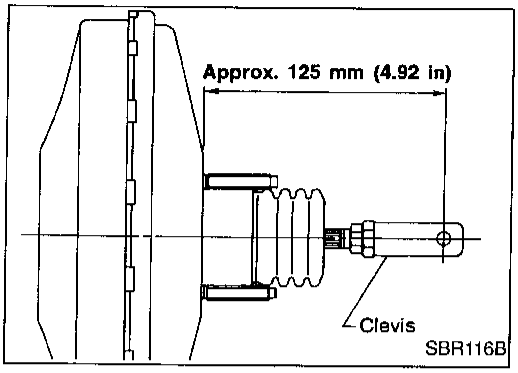
   10.275 - 10.525 mm (0.4045 - 0.4144 in)

INSTALLATION

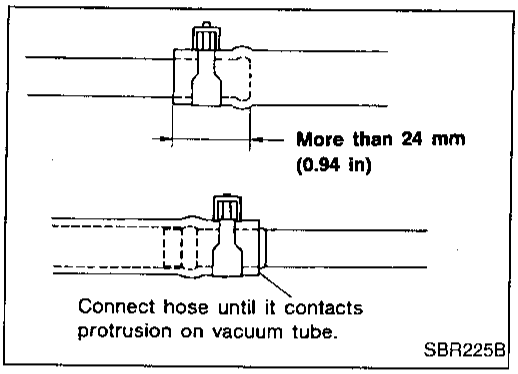
CAUTION:

- **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.**

Brake Booster (Cont'd)



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-11).
6. Bleed air. Refer to "Bleeding Brake System" (BR-6).

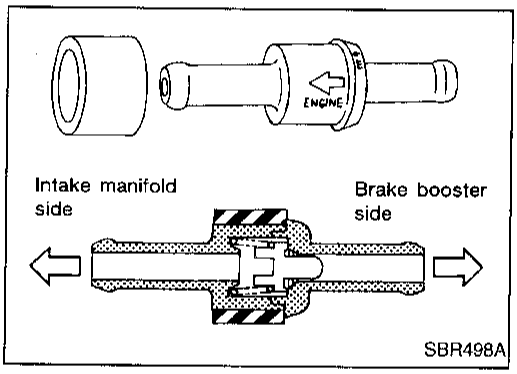


Vacuum Hose

REMOVAL AND INSTALLATION

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

- **Do not apply any oil or lubricants to vacuum hose and check valve.**
- **Insert vacuum tube into vacuum hose as shown.**

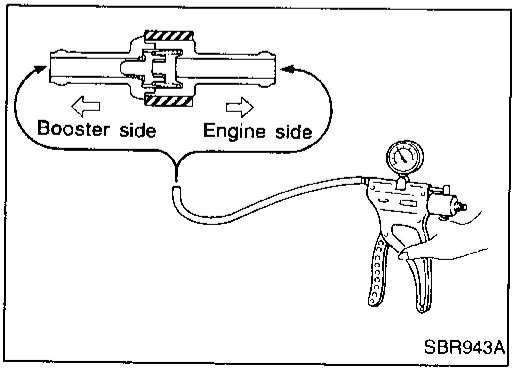


- **Install check valve, paying attention to its direction.**

INSPECTION

Hoses and connectors

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



Check valve

Check vacuum with a vacuum pump.

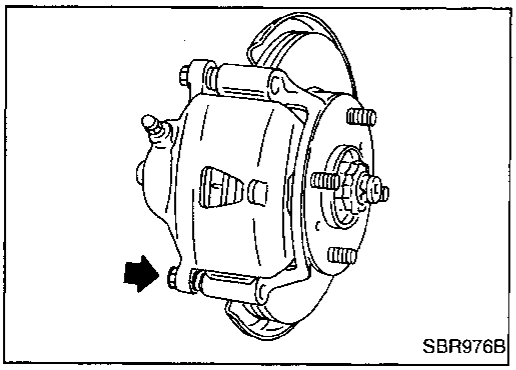
Connect to booster side	Vacuum should exist.
Connect to engine side	Vacuum should not exist.

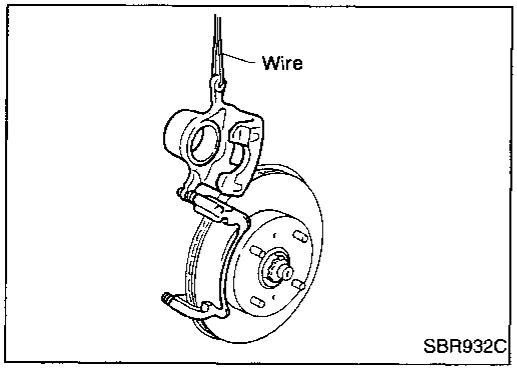
Pad Replacement

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

CAUTION:

- **When cylinder body is open, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of the rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**
- **Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to "Brake Burnishing Procedure", "ON-VEHICLE SERVICE", BR-5.**


SBR976B

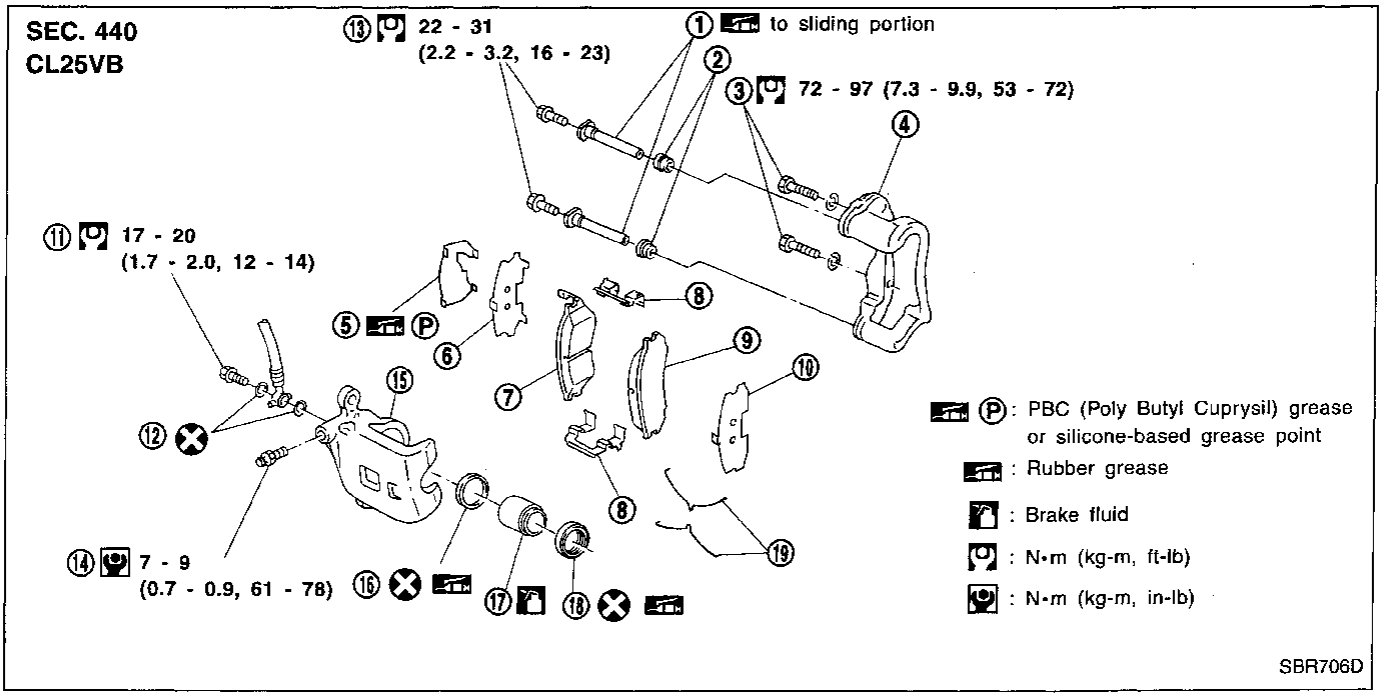


SBR932C

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.

Component



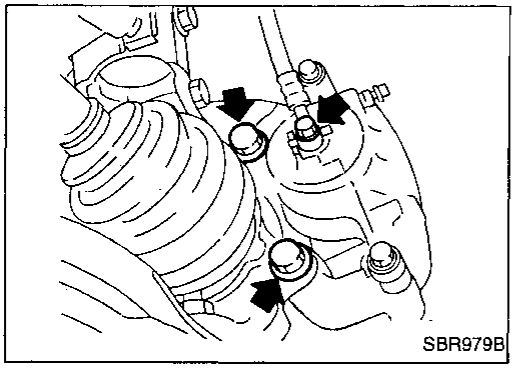
① Main pin
② Pin boot
③ Torque member fixing bolt
④ Torque member
⑤ Shim cover
⑥ Inner shim
⑦ Inner pad
⑧ Pad retainer
⑨ Outer pad
⑩ Outer shim
⑪ Connecting bolt
⑫ Copper washer
⑬ Main pin bolt
⑭ Bleed valve
⑮ Cylinder body
⑯ Piston seal
⑰ Piston
⑱ Piston boot
⑲ Pad return spring

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.

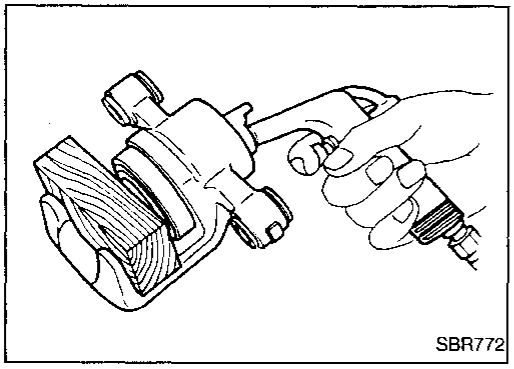
It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.


SBR979B

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.


SBR772

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.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

PISTON

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.

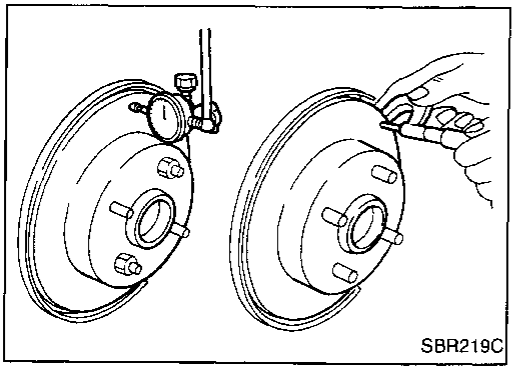
SLIDE PIN, PIN BOLT AND PIN BOOT

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

Inspection — Rotor

RUBBING SURFACE

Check rotor for roughness, cracks or chips.


SBR219C

RUNOUT

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

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

Maximum runout:
0.07 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).

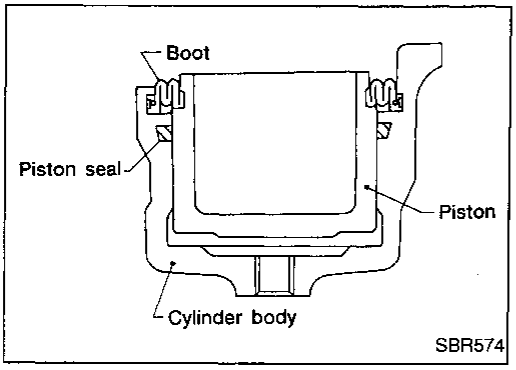
Inspection — Rotor (Cont'd)

THICKNESS

Thickness variation (At least 8 positions):
Maximum 0.01 mm (0.0004 in)

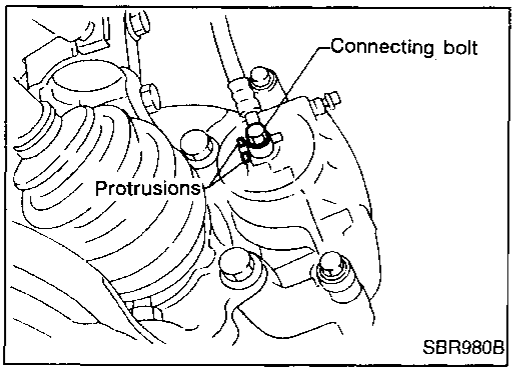
If thickness variation exceeds the specification, turn rotor with on-car brake lathe.

Rotor repair limit:
20.0 mm (0.787 in)



Assembly

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



Installation

CAUTION:

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

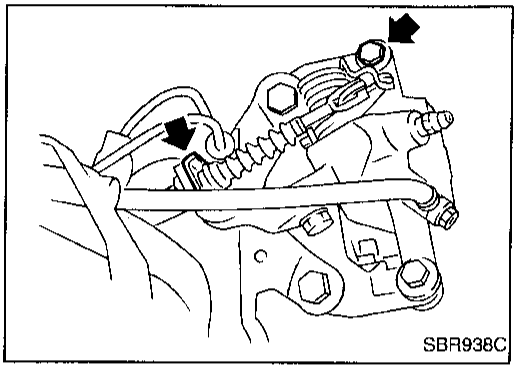
1. Install brake hose to caliper securely.
2. Install all parts and secure all bolts.
3. Bleed air. Refer to "Bleeding Brake System" (BR-6).

Pad Replacement

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

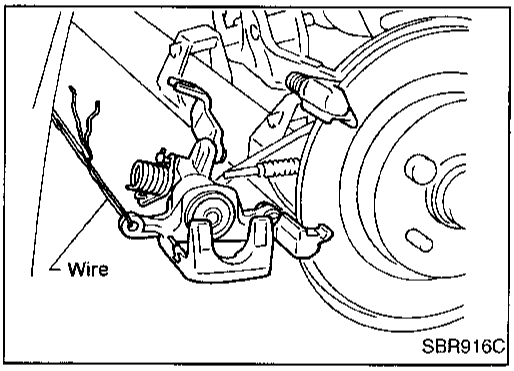
CAUTION:

- **When cylinder body is open, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims in replacing pads.**
- **If shims are rusted or show peeling of rubber coat, replace them with new shims.**

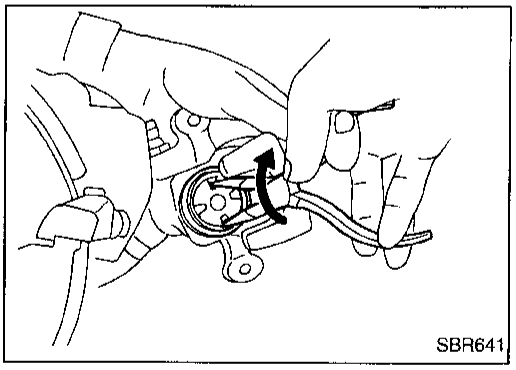

SBR938C

- **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-5.**

1. Remove master cylinder reservoir cap.
2. Remove brake cable mounting bolt and lock spring.
3. Release parking brake control lever, then disconnect cable from the caliper.
4. Remove upper pin bolt.
5. Open cylinder body downward. Then remove pad retainers, and inner and outer shims.
   Standard pad thickness:
   10 mm (0.39 in)
   Pad wear limit:
   1.5 mm (0.059 in)

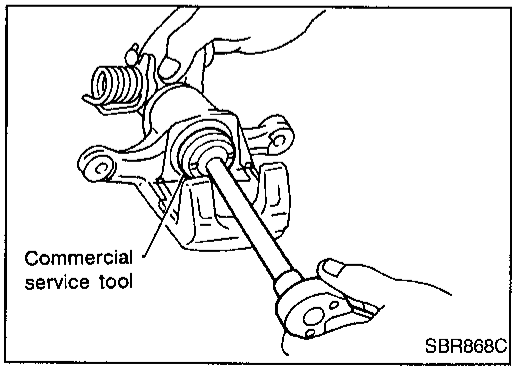


SBR916C


SBR641

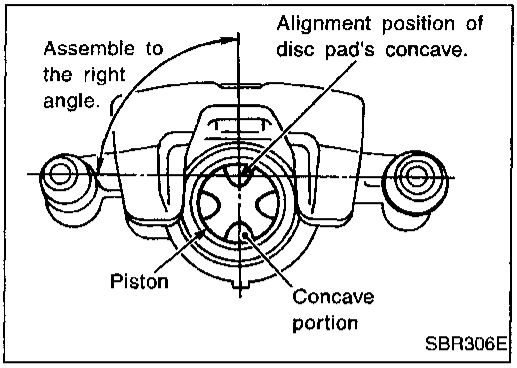
6. When installing new pads, push piston into cylinder body by gently turning piston clockwise, as shown.

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

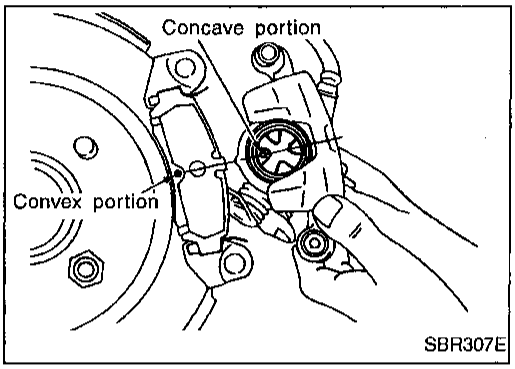


SBR868C

Pad Replacement (Cont'd)

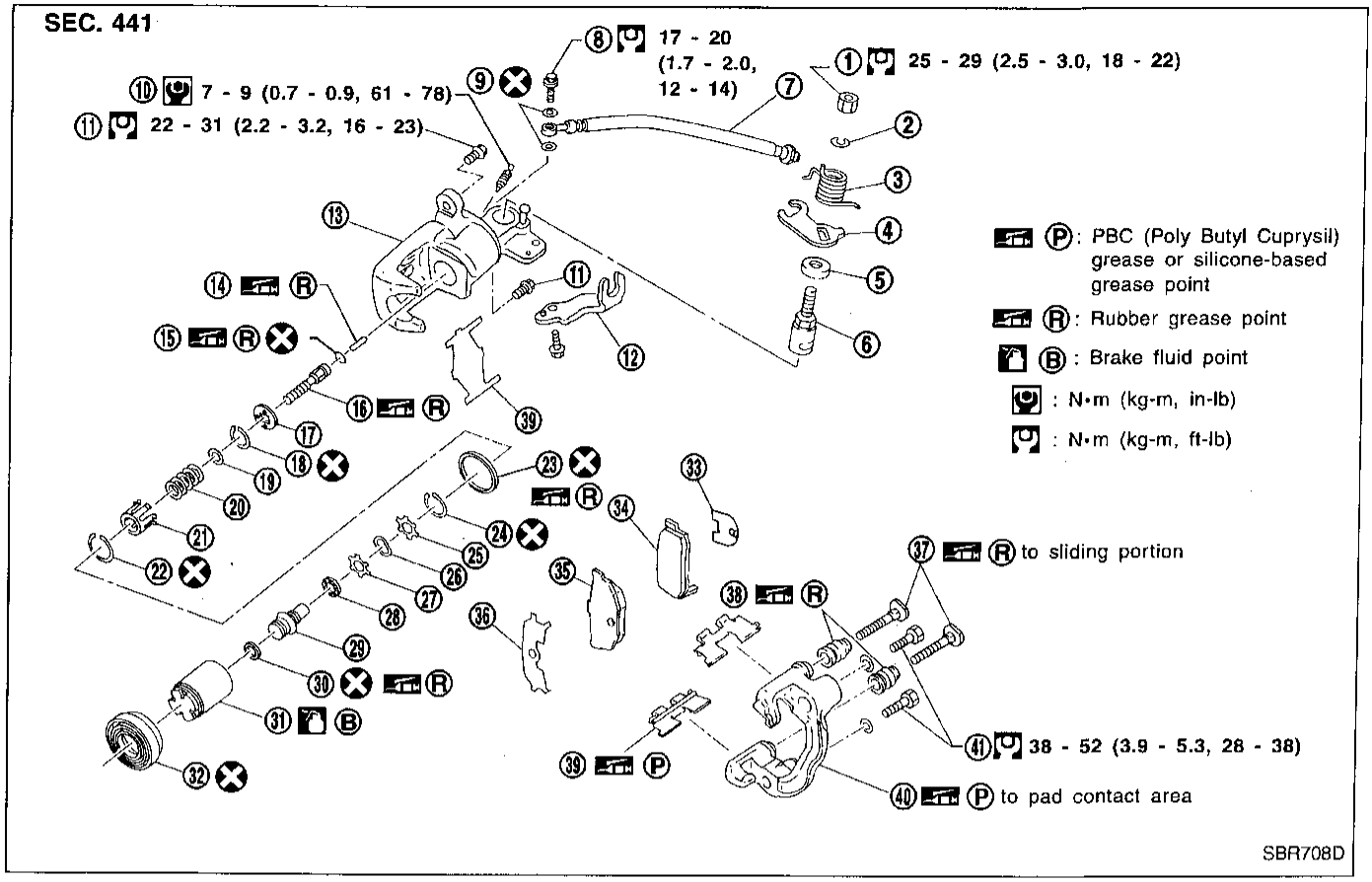


7. When disassembling the rear disc brake or replacing the pads, adjust the piston to the right angle as shown in the figure.

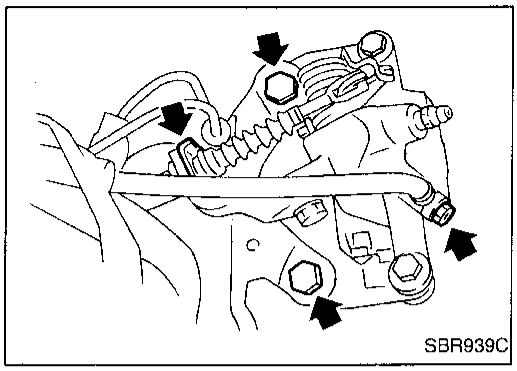


8. As shown in the figure, align the piston's concave to the pad's convex, then install the cylinder body to the torque member.

Component



① Nut
② Washer
③ Return spring
④ Parking brake lever
⑤ Cam boot
⑥ Cam
⑦ Brake hose
⑧ Connecting bolt
⑨ Copper washer
⑩ Bleed screw
⑪ Pin bolt
⑫ Cable mounting bracket
⑬ Cylinder
⑭ Strut
⑮ O-ring
⑯ Push rod
⑰ Key plate
⑱ Ring C
⑲ Seat
⑳ Spring
㉑ Spring cover
㉒ Ring B
㉓ Piston seal
㉔ Ring A
㉕ Spacer
㉖ Wave washer
㉗ Spacer
㉘ Ball bearing
㉙ Adjusting nut
㉚ Cup
㉛ Piston
㉜ Dust seal
㉝ Inner shim
㉞ Inner pad
㉟ Outer pad
㊱ Outer shim
㊲ Pin
㊳ Pin boot
㊴ Pad retainer
㊵ Torque member
㊶ Torque member fixing bolt

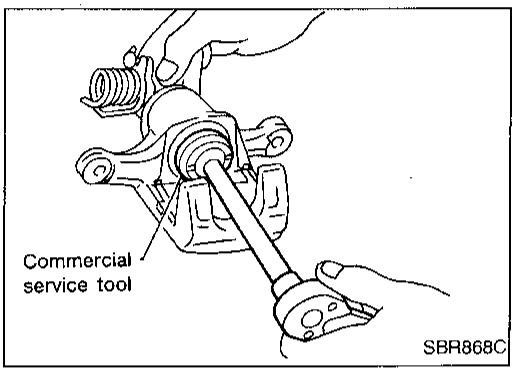

SBR939C

Removal

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

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

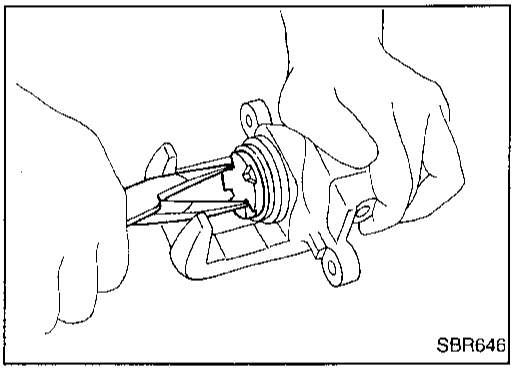
It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.



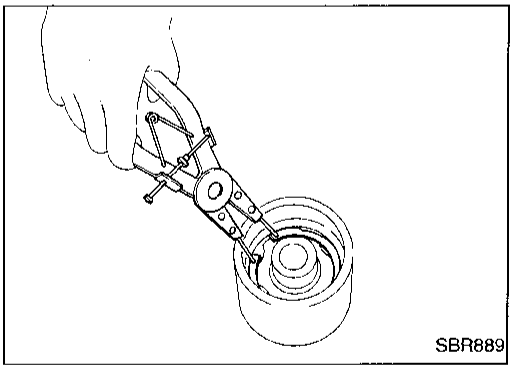
SBR868C

Disassembly

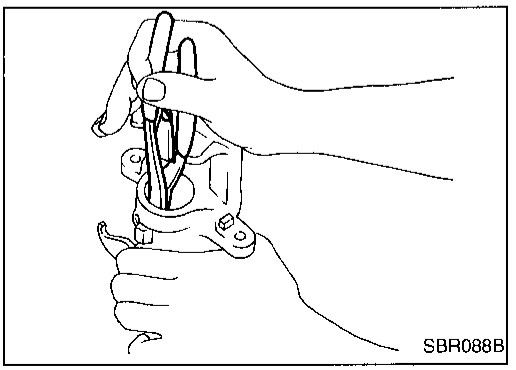
1. Remove piston by turning it counterclockwise with suitable commercial service tool or long nose pliers.


SBR646

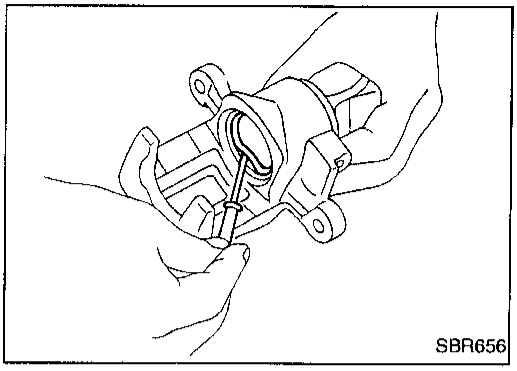
2. Pry off ring A from piston with suitable pliers and remove adjusting nut.


SBR889

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.

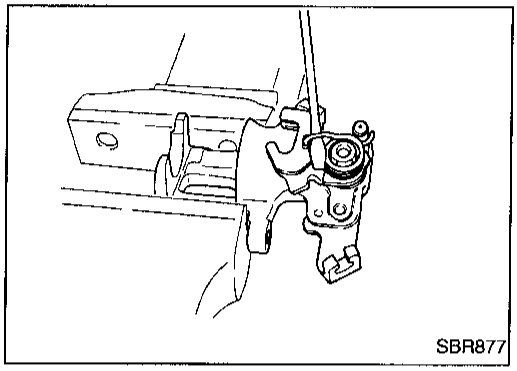

SBR088B

Disassembly (Cont'd)


SBR656

c. Remove piston seal.

Be careful not to damage cylinder body.


SBR877

4. Remove return spring, nut and lever.

Inspection — Caliper

CAUTION:

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

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.

TORQUE MEMBER

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

PISTON

CAUTION:

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

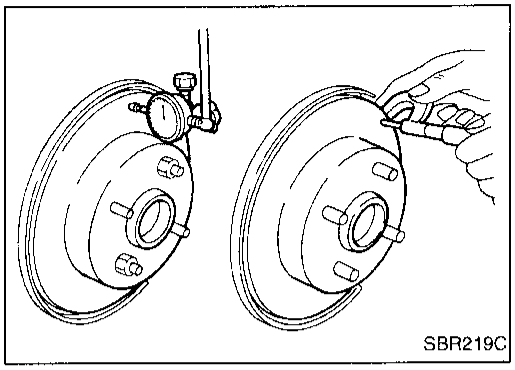
Check piston for score, rust, wear, damage or presence of foreign materials.

Replace if any of the above conditions are observed.

PIN AND PIN BOOT

Check for wear, cracks or other damage.

Replace if any of the above conditions are observed.


SBR219C

Inspection — Rotor

RUBBING SURFACE

Check rotor for roughness, cracks or chips.

RUNOUT

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 "Rear Wheel Bearing" in RA section.

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

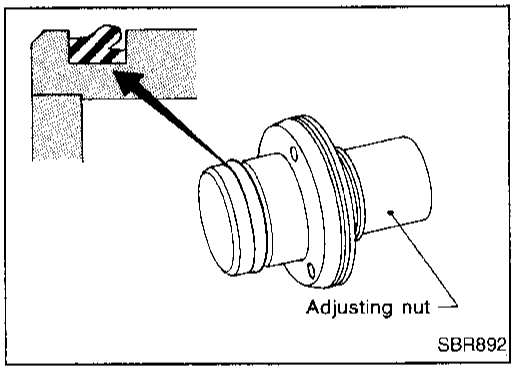
Maximum runout:
0.15 mm (0.0059 in)

THICKNESS

Rotor repair limit:
Standard thickness
9 mm (0.35 in)
Minimum thickness
8 mm (0.31 in)
Thickness variation (At least 8 portions)
Maximum 0.02 mm (0.0008 in)

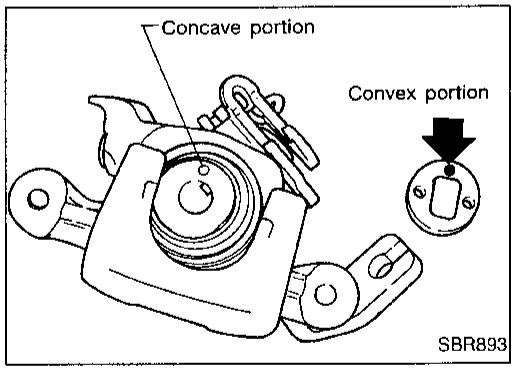
Assembly

1. Install cup in the specified direction.



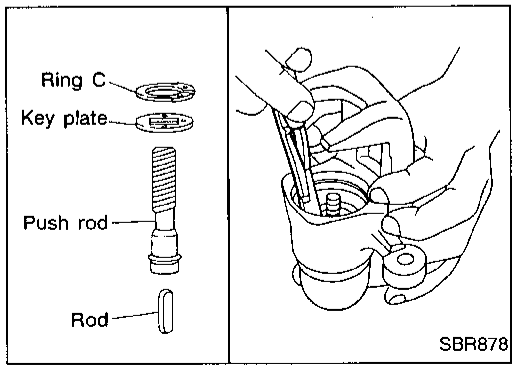
SBR892

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



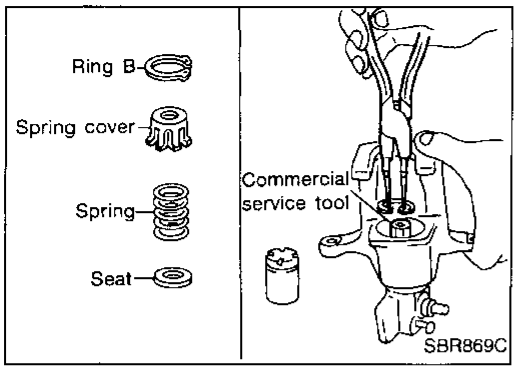
SBR893

3. Install ring C with a suitable tool.

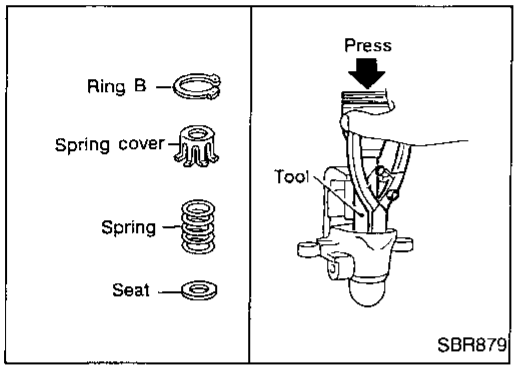


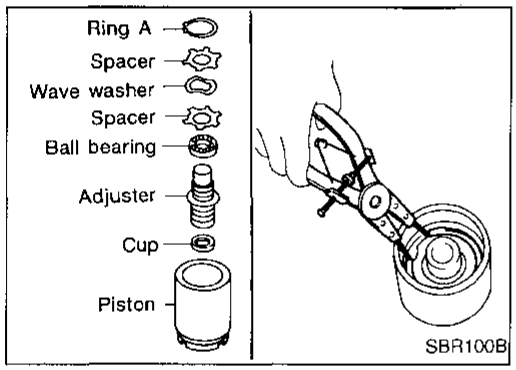
SBR878

Assembly (Cont'd)

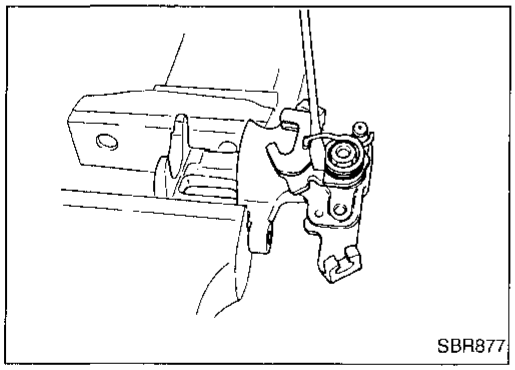


4. Install seat, spring, spring cover and ring B with suitable press and drift.





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



6. Fit lever and tighten nut.
7. Fit return spring in the order shown.

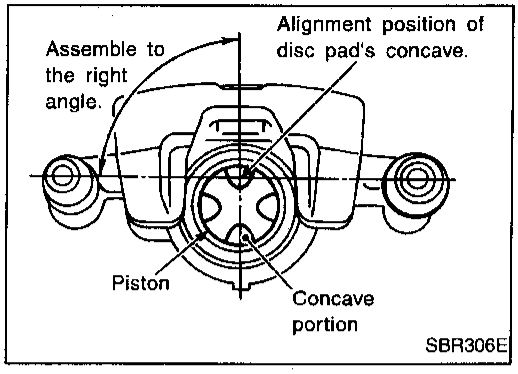
Installation

CAUTION:

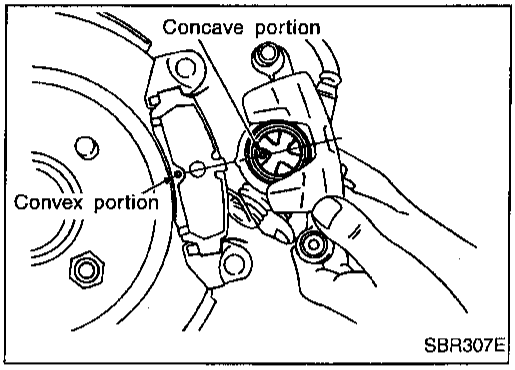
- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install brake hose to caliper securely.

Installation (Cont'd)

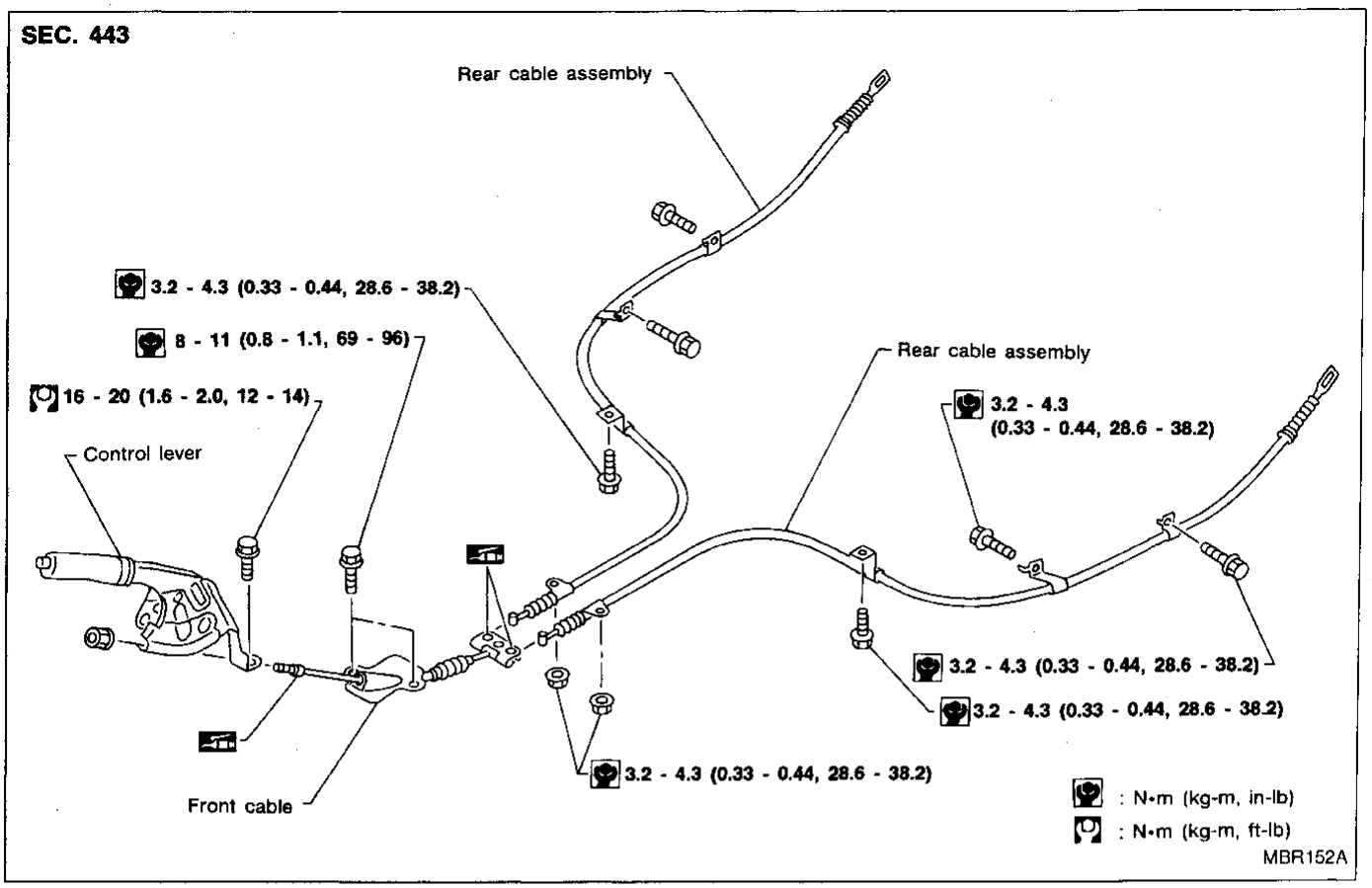


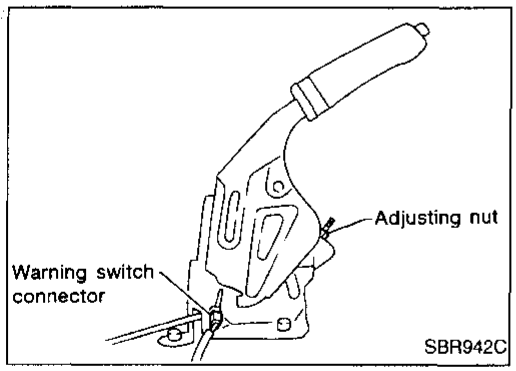
2. When disassembling the rear disc brake or replacing the pads, adjust the piston to the right angle as shown in the figure.



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

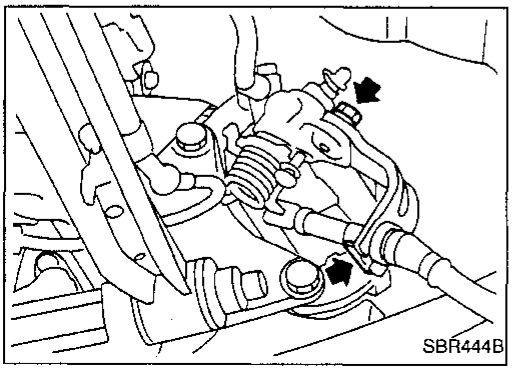
4. Install all parts and secure all bolts.
5. Bleed air. Refer to "Bleeding Brake System" (BR-6).





Removal and Installation

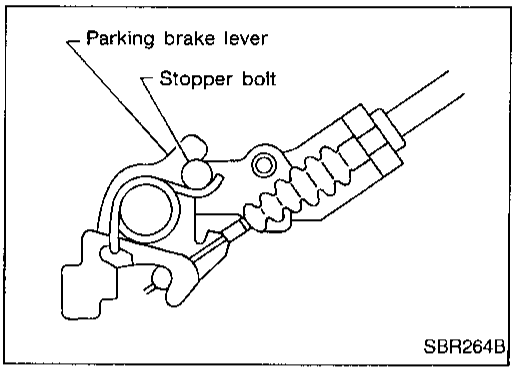
1. To remove parking brake cable, first remove center console.
2. Disconnect warning switch connector.
3. Remove bolts, slacken off and remove adjusting nut.



4. Remove parking brake cable lock plate.

Inspection

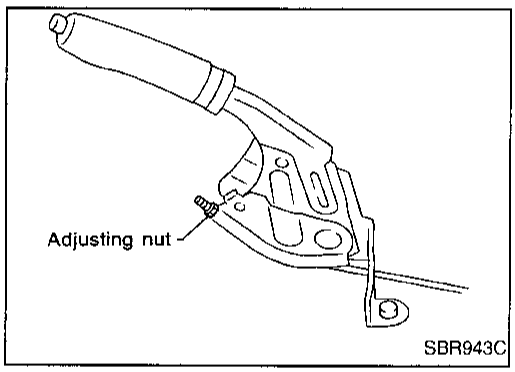
1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.



Adjustment

Pay attention to the following points after adjustment.

a. There is no drag when control lever is being released.
b. Parking brake lever returns to stopper bolt when control lever for rear disc brake models is released.



1. Loosen parking brake cable.
2. Depress brake pedal fully more than 5 times.
3. Operate control lever 10 times or more with a full stroke [213 mm (8.39 in)].
4. Adjust control lever by turning adjusting nut.
5. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.
   Number of notches: 10 - 11 [196 N (20 kg, 44 lb)]
6. Bend warning lamp switchplate. Warning lamp should come on when lever is pulled "A" notches. It should go off when the lever is fully released.
   Number of "A" notches: 1

Purpose

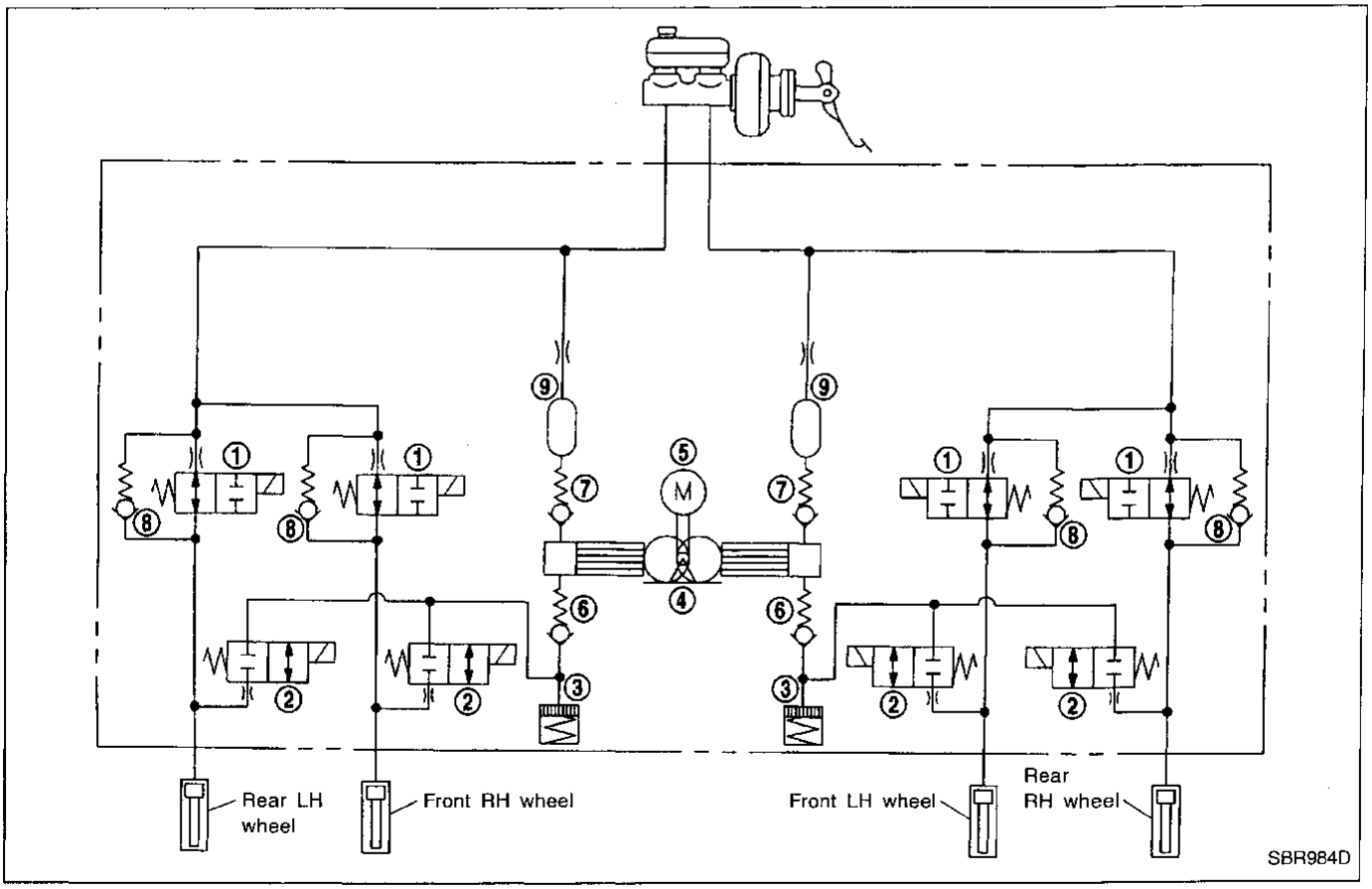
The ABS (Anti-Lock Brake System)/TCS (Traction Control System) allows for two-way communication between the following two systems.

1. The ABS consists of electronic and hydraulic components. It allows for control of braking force so that locking of the wheels can be avoided.
   The ABS:
1) Ensures proper tracking performance through steering wheel operation.
2) Enables obstacles to be avoided through steering wheel operation.
3) Ensures vehicle stability by preventing flat spins.
2. The TCS (Traction Control System) is mainly effective for vehicle starting or acceleration on slippery road surfaces. It minimizes drive wheel slipping and enhances vehicle stability. The system helps to reduce the mental stress on the driver during delicate accelerator pedal control.

ABS (Anti-Lock Brake System) Operation

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

ABS Hydraulic Circuit

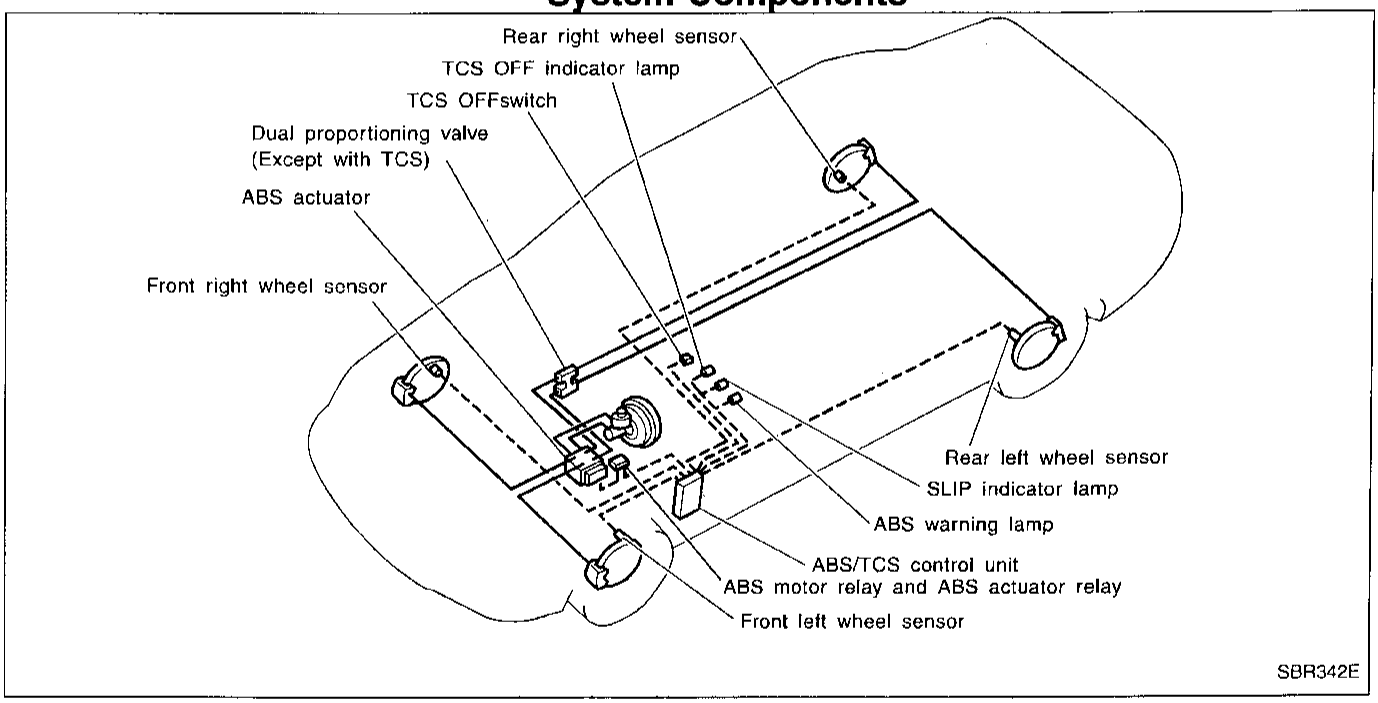


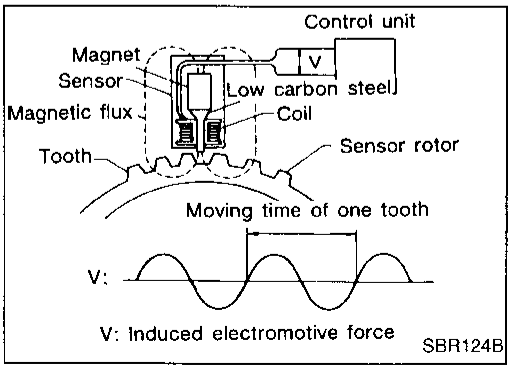
① Inlet solenoid valve
② Outlet solenoid valve
③ Reservoir
④ Pump
⑤ Motor
⑥ Inlet valve
⑦ Outlet valve
⑧ Bypass check valve
⑨ Damper

TCS (Traction Control System) Operation

- This system is designed to limit wheel slip during acceleration by cutting fuel to selected cylinders and changing transmission shift schedule.
  The ABS/TCS control unit monitors wheel speed slips through the ABS wheel sensors and determines the desired torque reduction needed to minimize wheel spin.
  The torque reduction by the ABS/TCS control unit may result in a combination of fuel cutoff and change shift timing of the transmission.
  The torque reduction is sent from the ABS/TCS control unit through the data link to the ECM and TCM.
  The ECM will cut off fuel and/or TCM change shift schedule to achieve torque reduction.
  The TCS will be enabled when the TCS switch is in the ON position (TCS OFF indicator not illuminated), and if the catalytic converter temperature is within normal operating range.
- This system has a self-diagnostic function. When the ignition switch is initially turned "ON", the SLIP indicator lamp and TCS OFF indicator lamp light. If there is no problem with the ABS and TCS, both indicator lamps will go out as soon as the engine starts.
- The TCS OFF switch cancels the TCS function. The TCS OFF indicator lamp then lights to indicate that the TCS is not operating.
- This system utilizes a fuel-cut function to control drive torque. If fuel cut continues for an extended period of time during high-speed operations, the catalyst may melt and deteriorate. During continued TCS operations, the system will sometimes suspend the drive torque control function, preventing catalyst melting and deterioration.

System Components



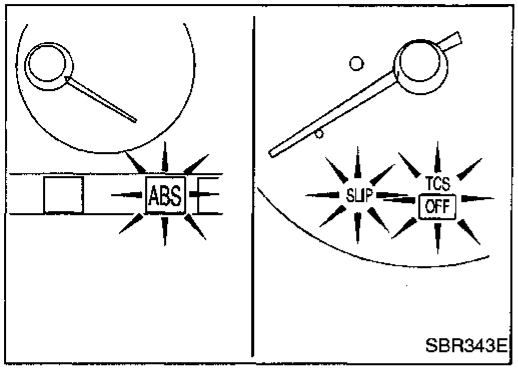


System Description

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.

System Description (Cont'd)



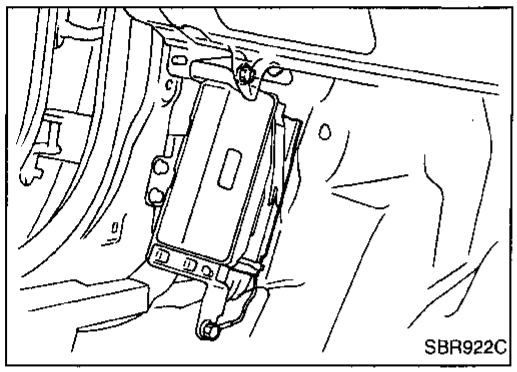
CONTROL UNIT

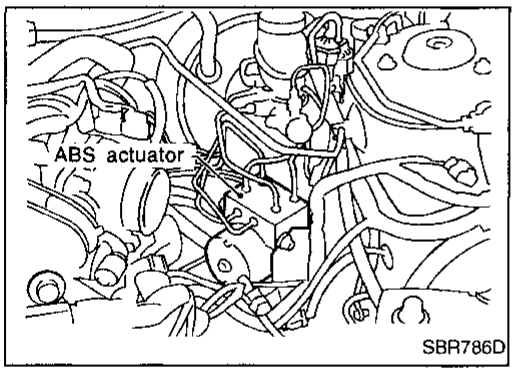
ABS function

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 ABS warning lamp is turned on. In this condition, the ABS will be deactivated, and the vehicle's brake system reverts to normal operation.

TCS function

Drive wheel slippage is detected by the 4-wheel rotating speed signal. When the wheel slip becomes excessive, the TCS operates, causing the SLIP indicator lamp to flash. And, at the same time, a fuel-cut signal to be sent to the ECM and a signal requiring a change in the shift schedule is sent to the TCM. When the TCS OFF switch is used to cancel TCS function, the TCS OFF indicator lamp will light. (TCS does not activate.) In case of a malfunction in the TCS, both the SLIP indicator lamp and the TCS OFF indicator lamp will light, while shutting down the TCS system operation. The vehicle will operate in the same way as a vehicle not equipped with the TCS.





ACTUATOR

The actuator contains:

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

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

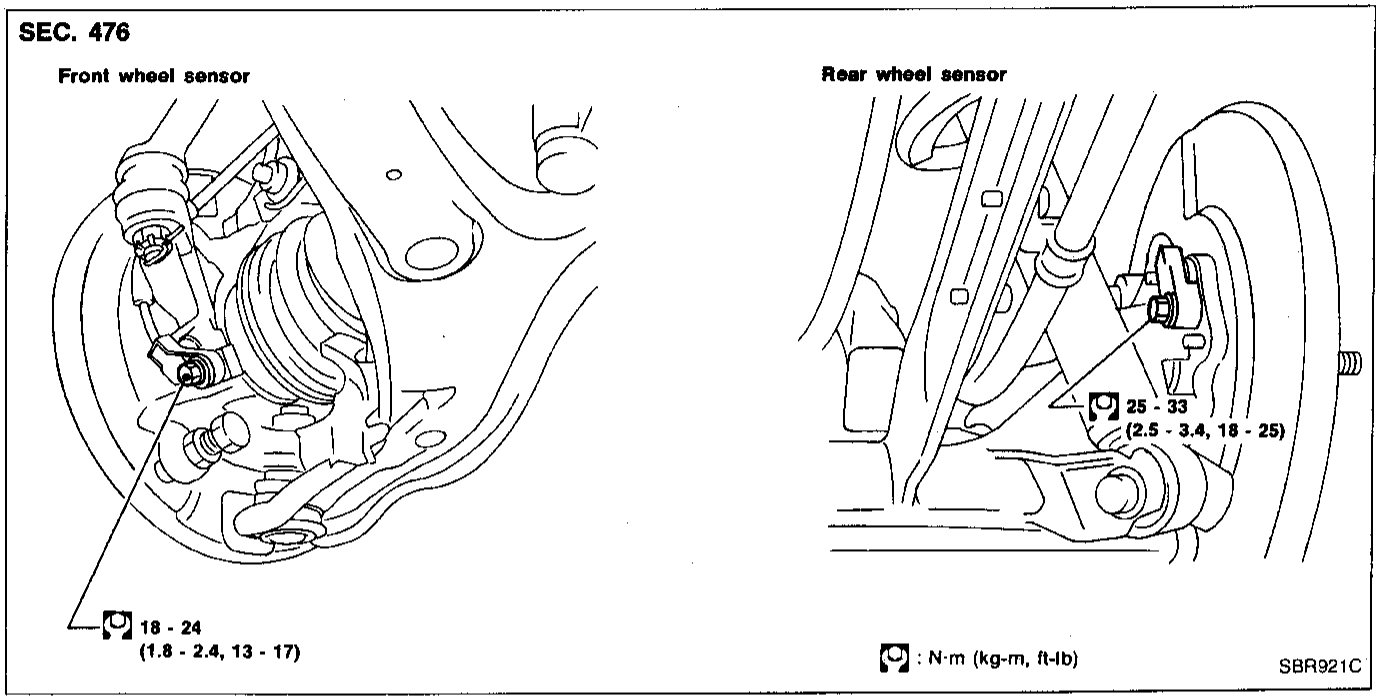
ABS actuator operation

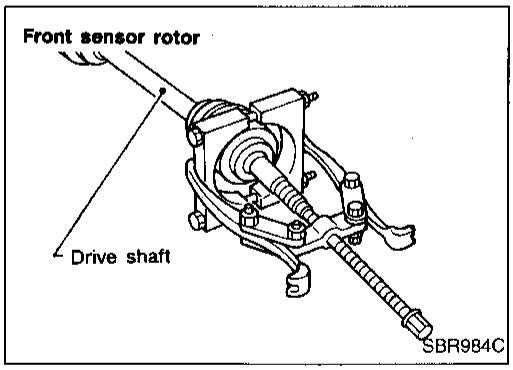
		Inlet solenoid valve	Outlet solenoid valve	
Normal brake operation		OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is directly transmitted to caliper via the inlet solenoid valve.
ABS operation	Pressure hold	ON (Closed)	OFF (Closed)	Hydraulic circuit is shut off to hold the caliper brake 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.

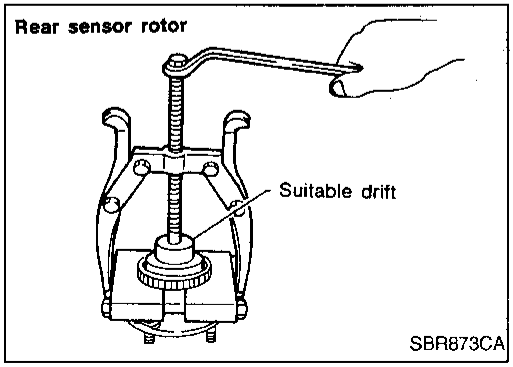
Removal and Installation

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

WHEEL SENSORS





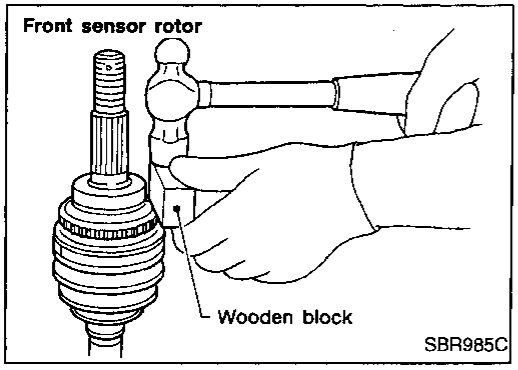


SENSOR ROTOR

Removal

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

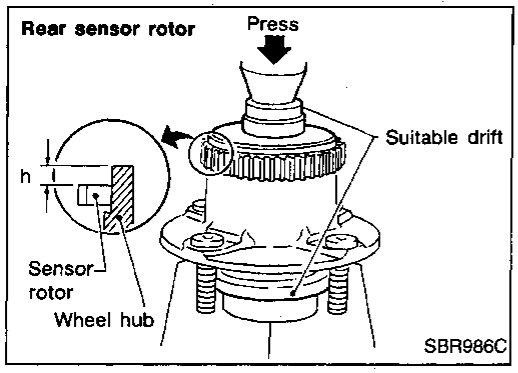
Removal and Installation (Cont'd)



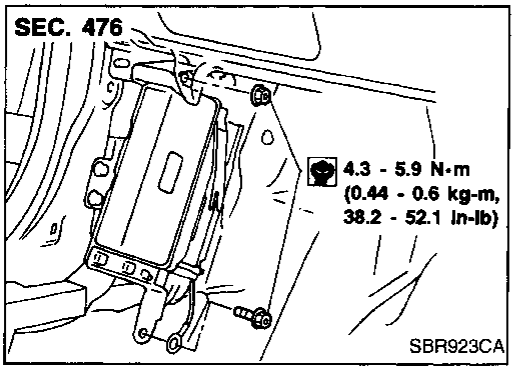
Installation

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

- Always replace sensor rotor with new one.



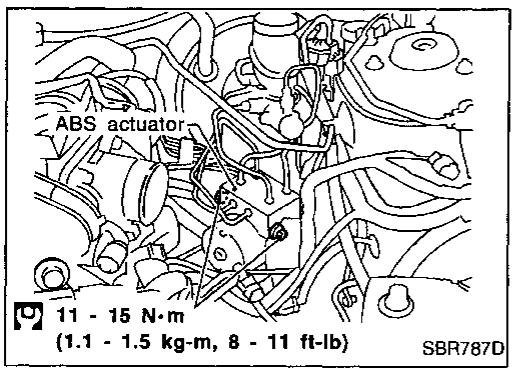
- Pay attention to the dimension of rear sensor rotor as show in figure.
  h: 12.5 - 13.5 mm (0.492 - 0.531 in)



CONTROL UNIT

Location: Driver side dash side lower.

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



ACTUATOR

Removal

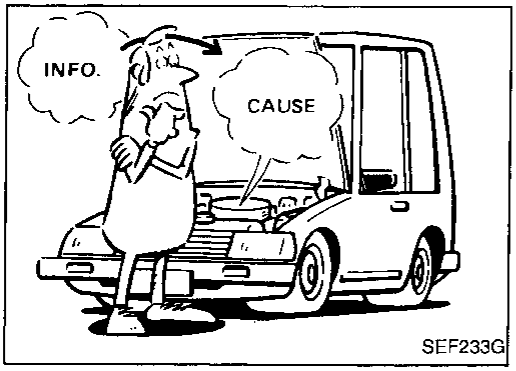
1. Disconnect battery cable.
2. Drain brake fluid. Refer to "Changing Brake Fluid" (BR-5).
3. Remove air cleaner and duct.
4. Apply different colored paint to each pipe connector and actuator to prevent incorrect connection.
5. Disconnect harness connectors, brake pipes and remove fixing nuts and actuator ground cable.

Installation

CAUTION:

- **After installation, refill brake fluid. Then bleed air. Refer to "Bleeding Brake System" (BR-6).**

1. Temporarily install actuator on the bracket.
2. Tighten actuator ground cable.
3. Connect brake pipes temporarily.
4. Tighten fixing nuts.
5. Tighten brake pipes.
6. Connect harness connectors and battery cable.
7. Install air cleaner and duct.



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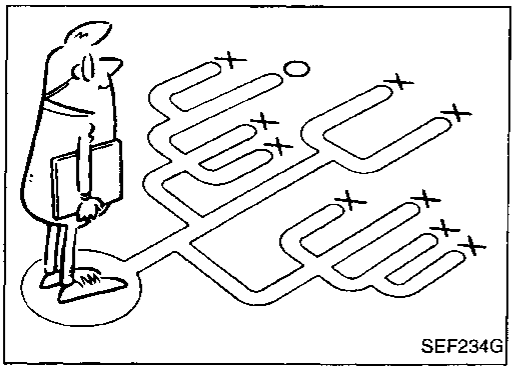
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The ABS/TCS 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/TCS 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/TCS controlled vehicle. Also check related Service Bulletins for information.

Preliminary Check

BASIC INSPECTION 1: BRAKE FLUID LEVEL AND LEAKAGE

1. Check brake fluid level in reservoir tank. Replenish brake fluid if necessary.
2. Check for leakage at or around brake piping and ABS actuators. If leakage or seepage is noted, proceed as follows:

- If ABS actuator connectors are loose, tighten to specified torque. Recheck to ensure that leakage is no longer present.
- If flare nut threads at piping connectors or actuator threads are damaged, replace faulty parts with new ones. Recheck to ensure that leakage is no longer present.
- If brake fluid leaks through areas other than actuator connectors, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace faulty parts with new ones.
- If brake fluid leaks at or seeps through actuators, wipe off using a clean cloth. Recheck for leakage or seepage. If necessary, replace with new actuators.

CAUTION:
ABS actuators cannot be disassembled. Relay units can be replaced alone.

3. Check brake booster for proper operation.
4. Check brake disc rotor and pad condition.

BASIC INSPECTION 2: LOOSE POWER LINE TERMINAL AND POWER VOLTAGE

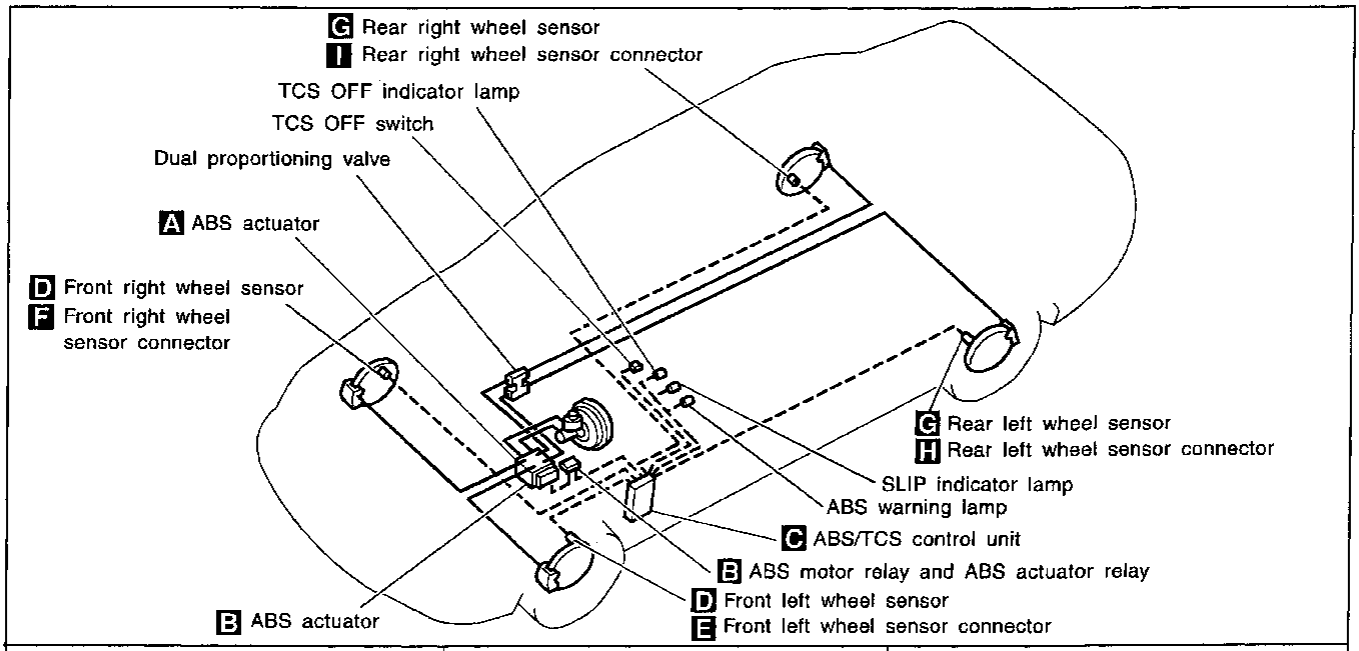
Check battery terminals (positive and negative) and battery mounting (ground) for looseness. If necessary, tighten to specified torque. Also check for low battery voltage.

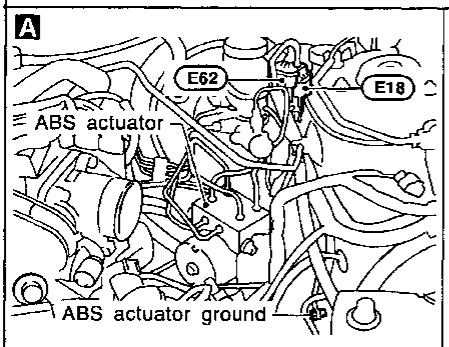
BASIC INSPECTION 3: SLIP, TCS OFF INDICATOR AND ABS WARNING LAMP

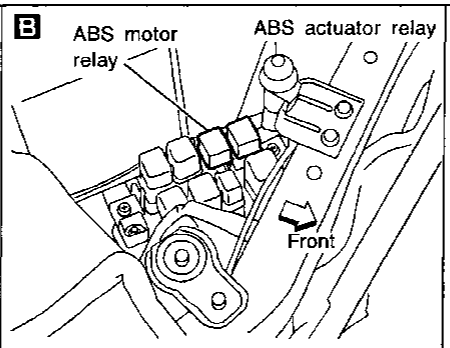
1. Turn ignition switch "ON" to ensure that TCS OFF indicator lights. If TCS OFF indicator lamp does not light, check TCS OFF circuit.
   (Refer to diagnostic procedure 19 "TCS OFF indicator lamp does not come on when ignition switch is turned on" under "TROUBLE DIAGNOSES FOR SYMPTOMS".)
2. Turn ignition switch "ON" to ensure that SLIP indicator lights. If SLIP indicator lamp does not light, check SLIP indicator lamp circuit.
   (Refer to diagnostic procedure 18 "SLIP indicator lamp does not come on when ignition switch is turned on" under "TROUBLE DIAGNOSES FOR SYMPTOM".)
3. Turn ignition switch "ON" to ensure that ABS warning lamp lights. If ABS warning lamp does not light, check ABS warning lamp circuit.
   (Refer to diagnostic procedure 20 "ABS warning lamp does not come on when ignition switch is turned on" under "TROUBLE DIAGNOSES FOR SYMPTOM".)
4. Check to ensure that SLIP indicator lamp, TCS OFF indicator lamp and ABS warning lamp go out approximately 1 second after engine starts. If SLIP indicator lamp, TCS OFF indicator lamp and ABS warning lamp do not go out, perform self-diagnostic procedures.
   (Refer to BR-41, BR-45.)
5. After driving vehicle at 30 km/h (19 MPH) for more than 1 minute, check to ensure that SLIP indicator lamp, TCS OFF indicator lamp and ABS warning lamp remain off. If SLIP indicator lamp, TCS OFF indicator lamp and ABS warning lamp light, perform self-diagnostic procedures.
   (Refer to BR-41, BR-45.)
6. While running engine, turn TCS OFF switch "ON" and "OFF" to ensure that TCS OFF indicator lights and goes out correspondingly. If TCS OFF indicator lamp does not correspond with switch operation, check TCS OFF switch circuit.
   (Refer to Diagnostic Procedure 22 "INOPERATIVE TCS OFF SWITCH" under "TROUBLE DIAGNOSES FOR SYMPTOM".)
7. Start engine to ensure that TCS OFF indicator lamp goes out. If TCS OFF indicator lamp remains on for more than 10 seconds after engine starts, perform self-diagnostic procedures.
   (Refer to BR-41, BR-45.)
8. Drive vehicle at 30 km/h (19 MPH) for more than 1 minute to ensure that TCS OFF indicator lamp remains off. If TCS OFF indicator lights, perform self-diagnostic procedures.*1
   (Refer to BR-41, BR-45.)
9. After performing self-diagnostic procedures, be sure to erase trouble stored in memory.

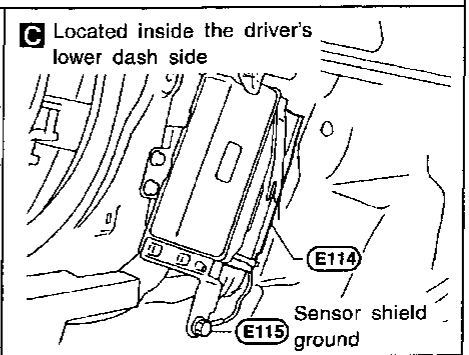
*1: If a wheel sensor should send a signal (shorts), drive the vehicle at about 30 km (19 MPH) for about 1 minute until the ABS warning lamp goes out.

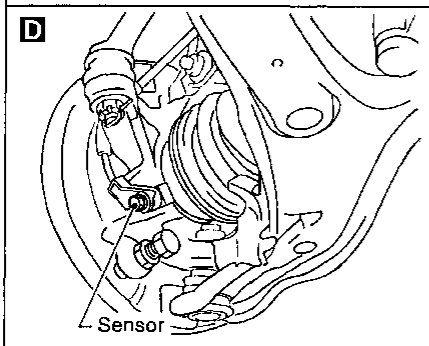
Component Parts and Harness Connector Location

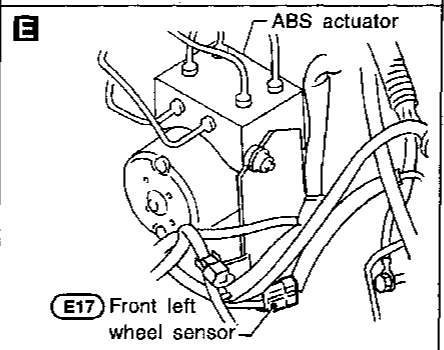


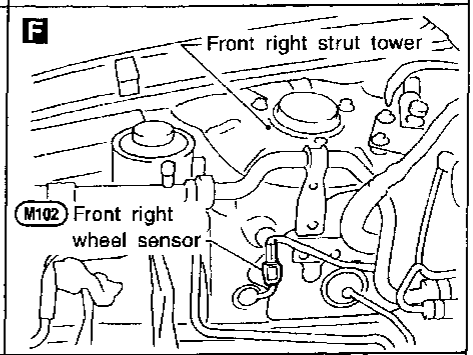


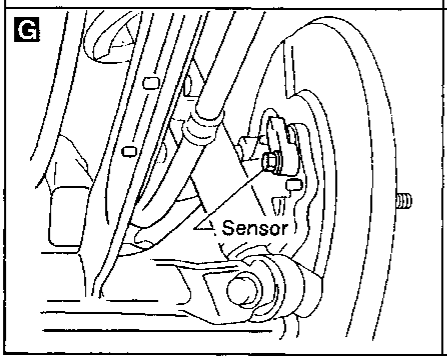


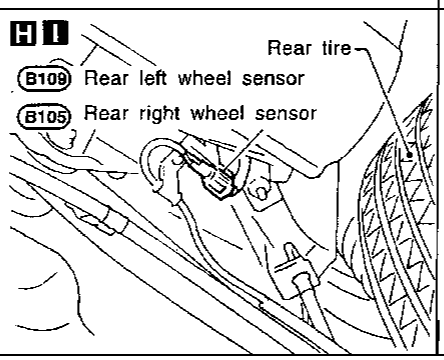












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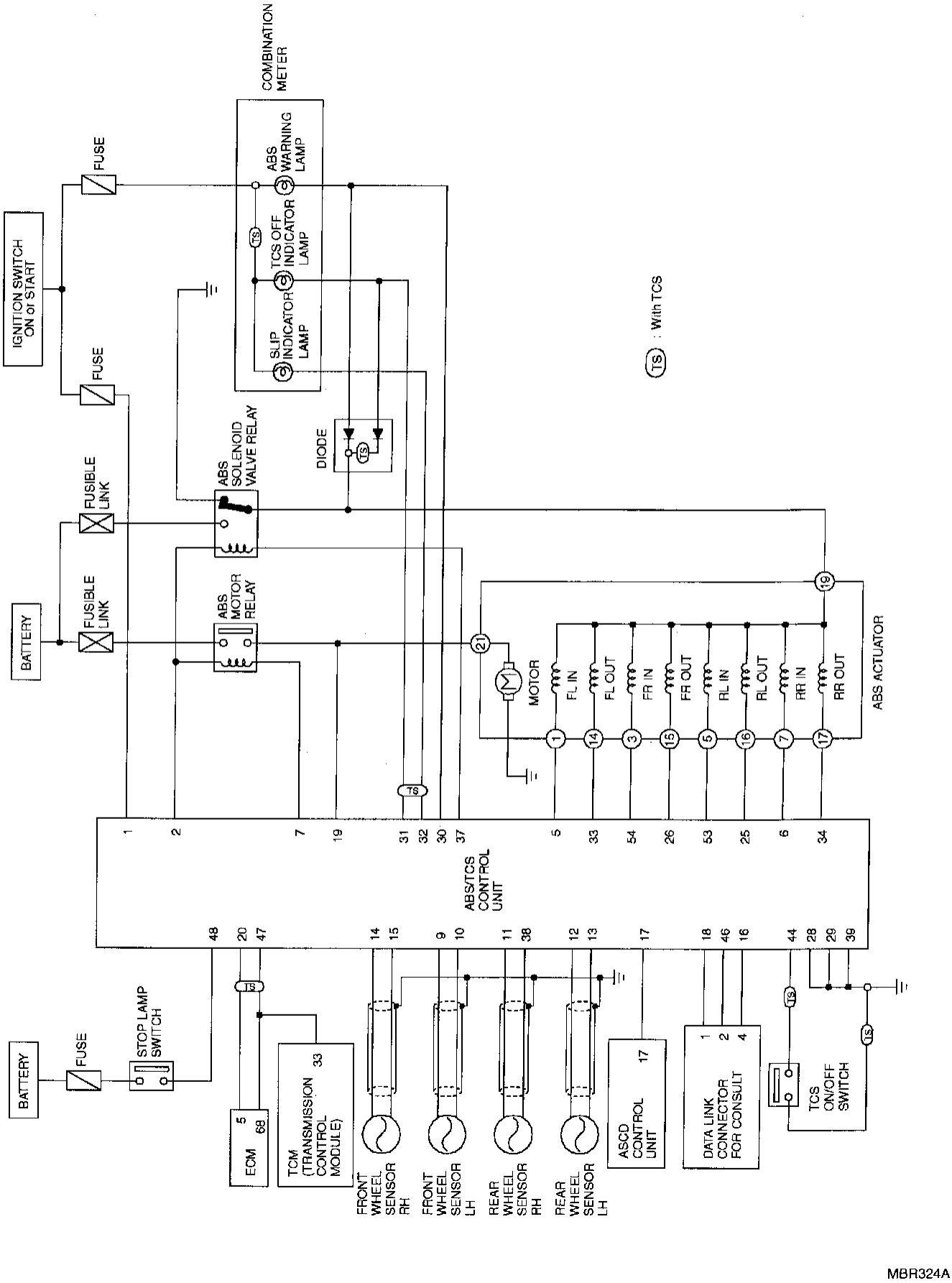
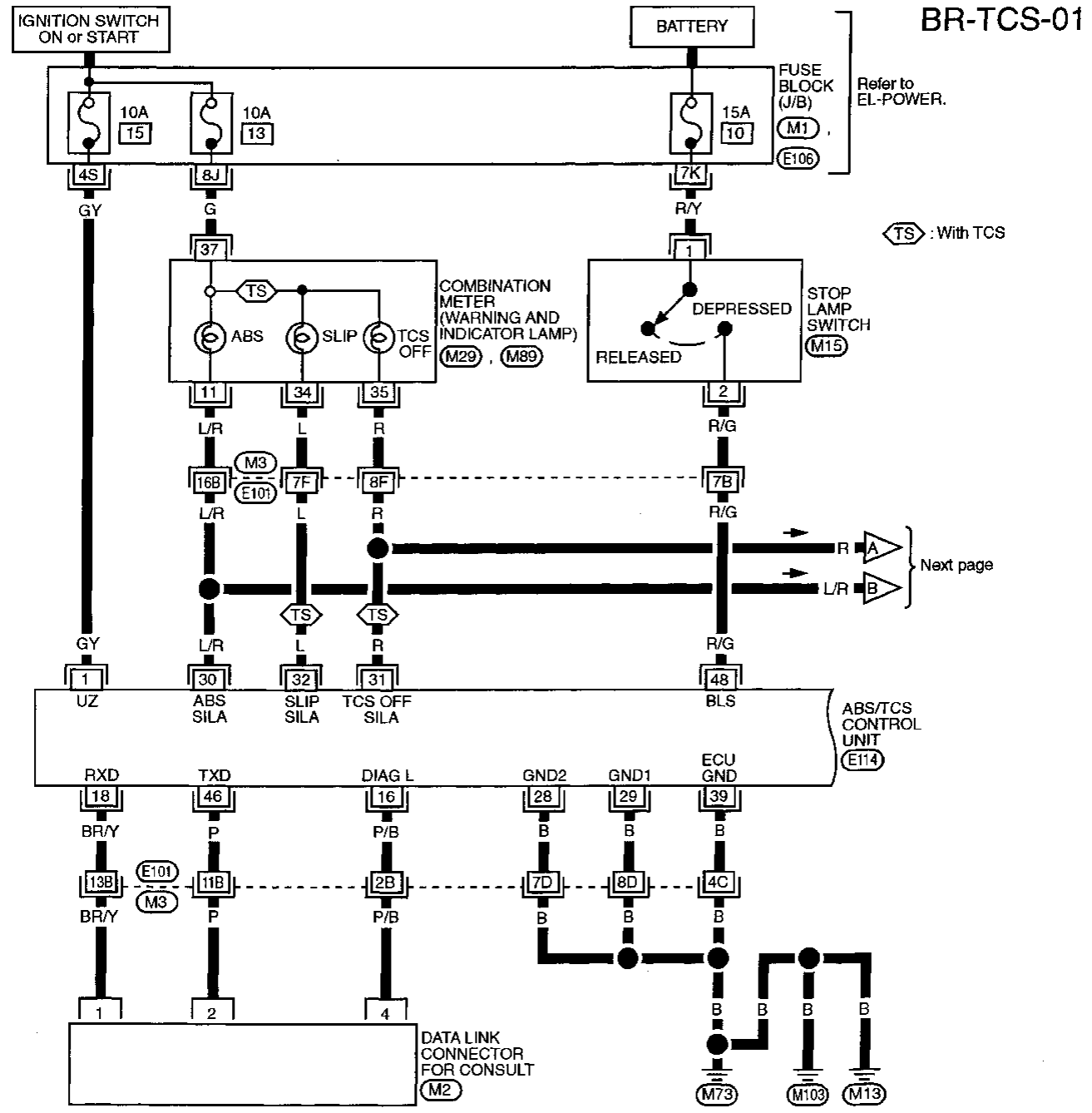
Schematic



MBR324A

Wiring Diagram — ABS/TCS —



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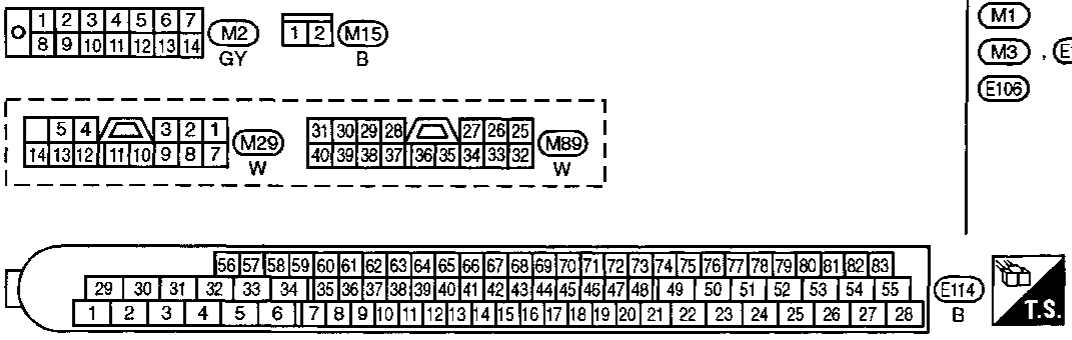
M1

M3, E101

E106

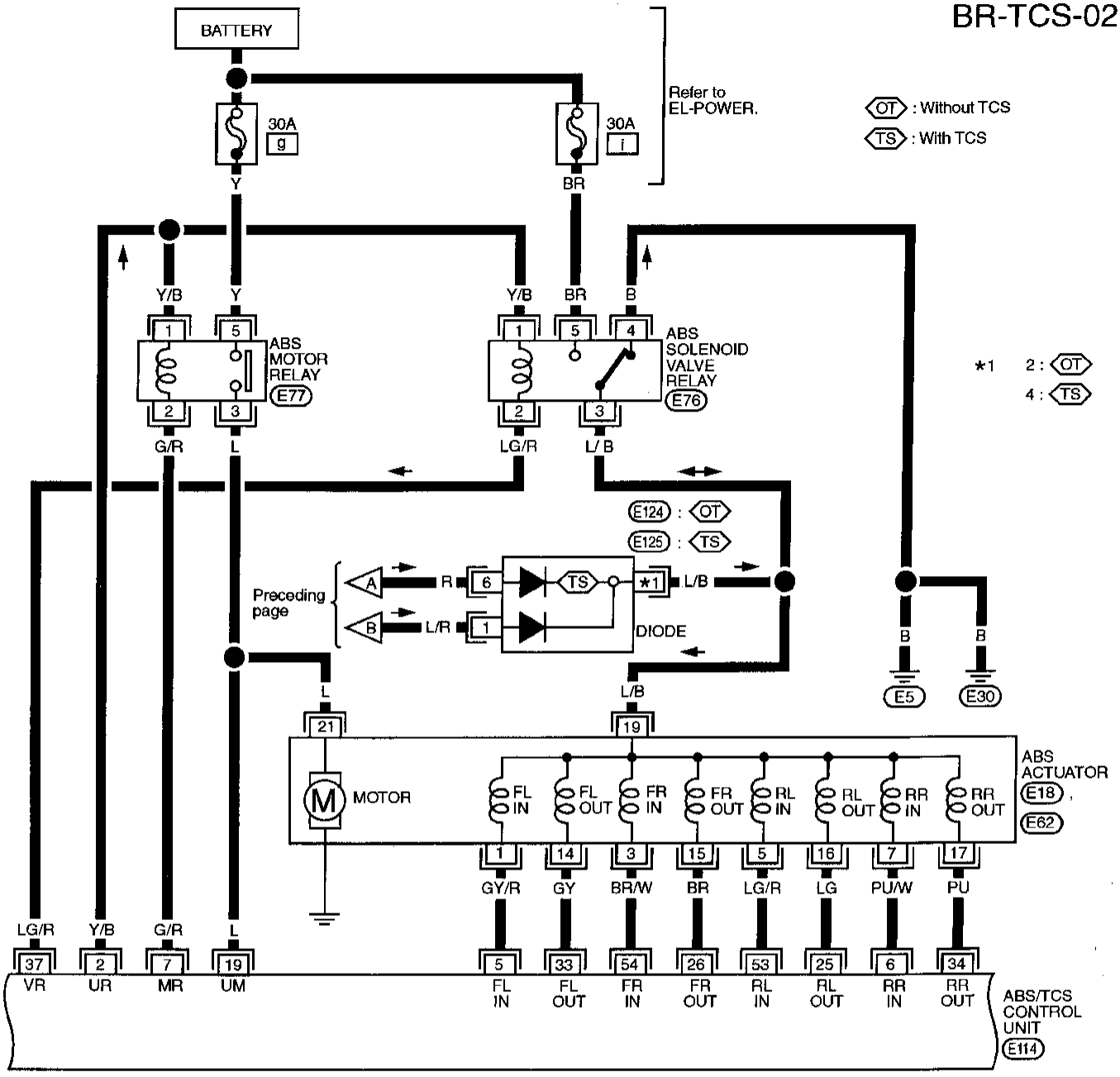


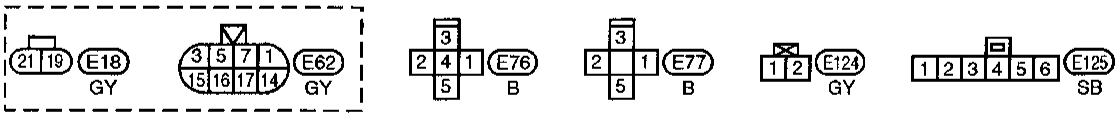
MBR325A

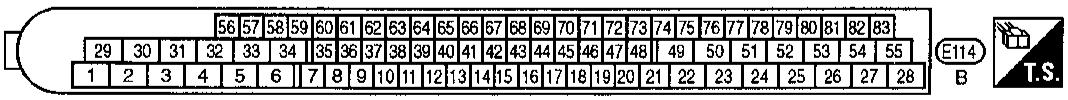
1151

Wiring Diagram — ABS/TCS — (Cont'd)

BR-TCS-02



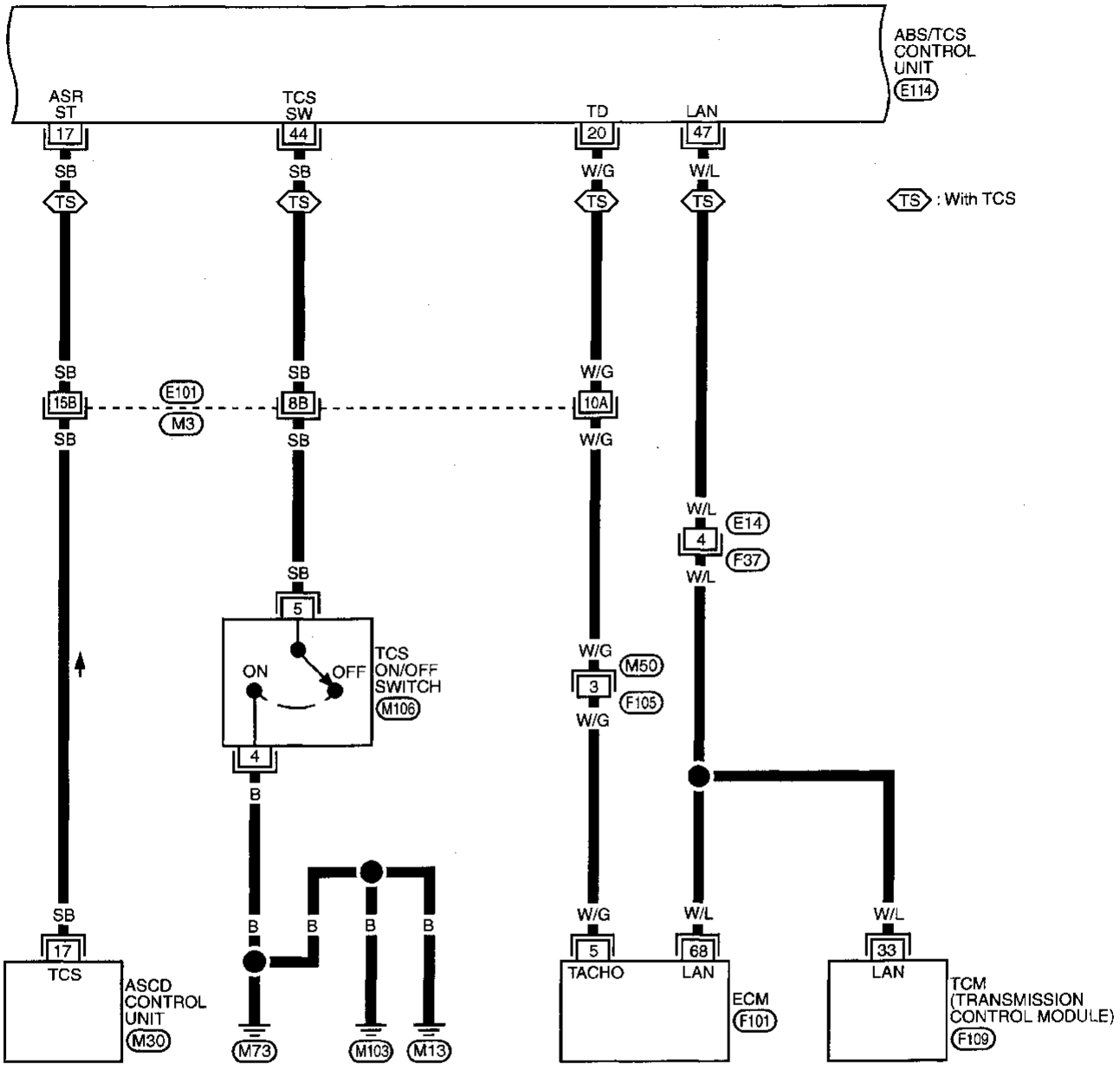




MBR326A

Wiring Diagram — ABS/TCS — (Cont'd)

BR-TCS-03



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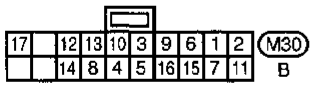
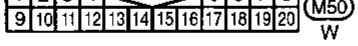
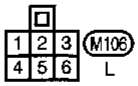
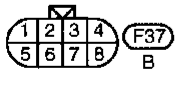
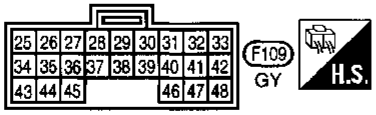
M3 , E101
F101

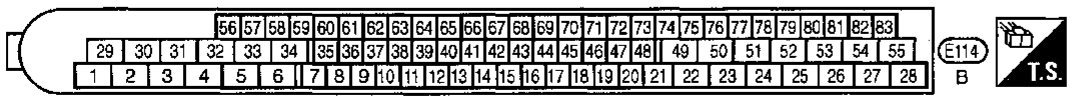








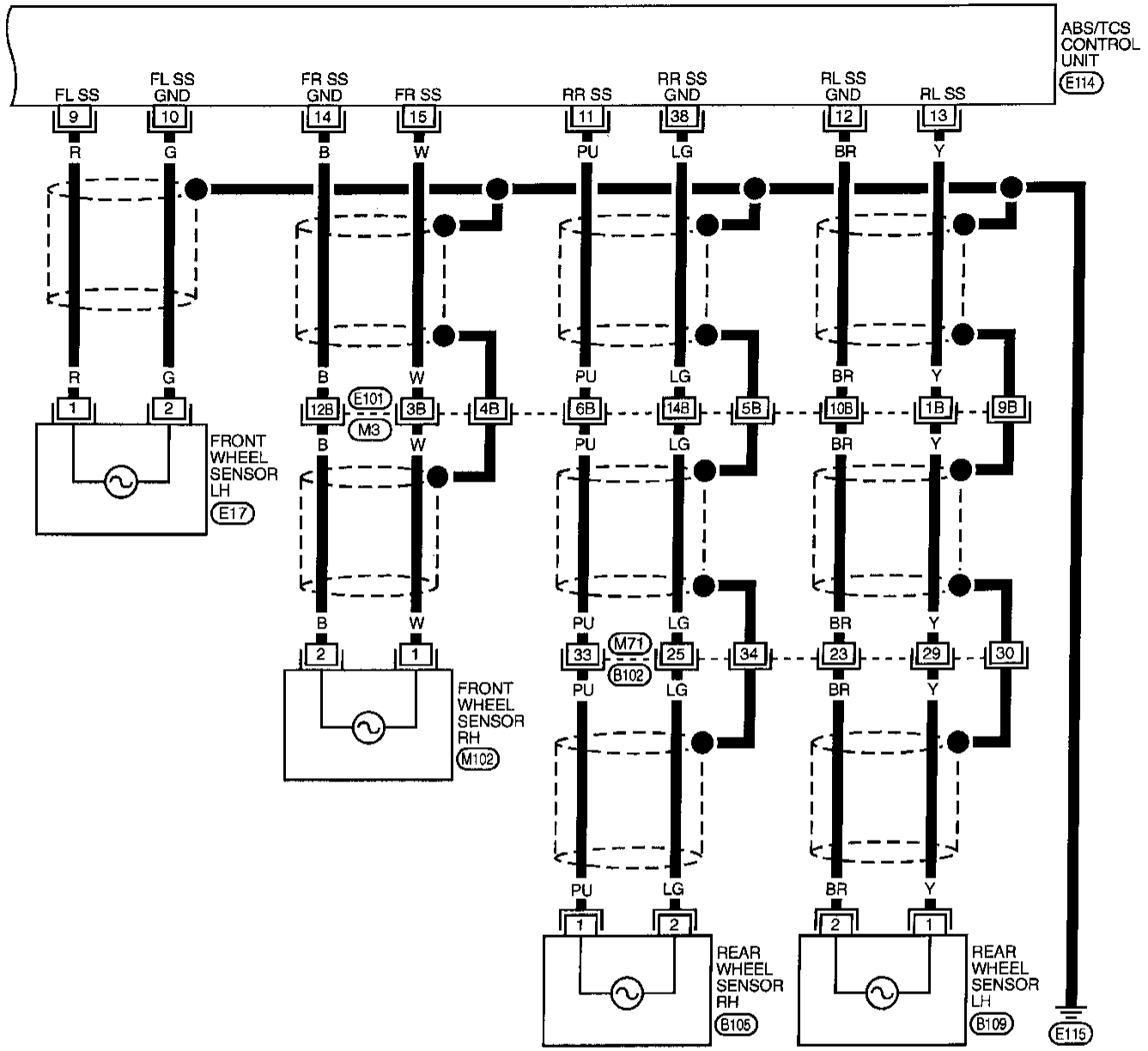




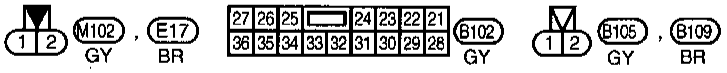
MBR327A

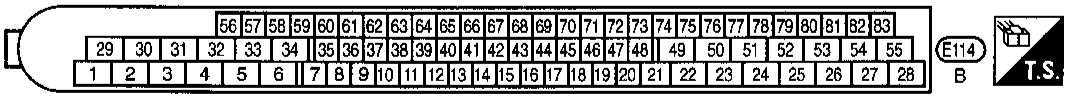
Wiring Diagram — ABS/TCS — (Cont'd)

BR-TCS-04



Refer to last page (Foldout page).
M3 , E101





MBR328A

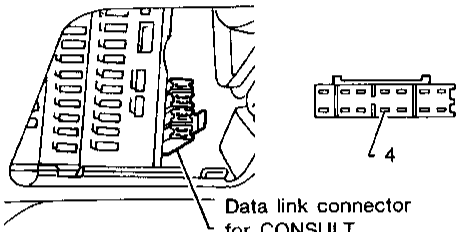
Self-diagnosis

FUNCTION

- When a problem occurs in the ABS, the ABS warning lamp on the instrument panel comes on. When a problem occurs in the TCS, the TCS OFF indicator lamp and SLIP indicator lamp on the instrument panel comes on. To actuate the self-diagnostic results mode, ground the self-diagnostic (check) terminal located on "Data link connector for CONSULT". The location of the malfunction is indicated by the ABS warning lamp or SLIP indicator lamp flashing.
- **Without TCS ..... A self-diagnostic result is indicated by means of the ABS warning lamp.**
- **With TCS ..... A self-diagnostic result is indicated by means of the SLIP indicator lamp.**

SELF-DIAGNOSIS PROCEDURE

A



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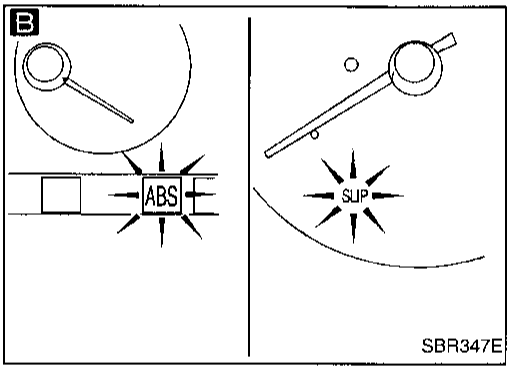

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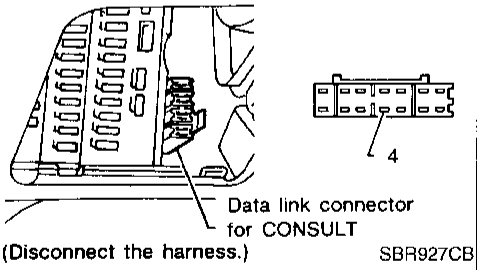


Drive vehicle over 30 km/h (19 MPH) for at least one minute.

↓

Turn ignition switch "OFF".

↓

A

Ground terminal "4" of "Data link connector for CONSULT" with a suitable harness.

↓

Turn ignition switch "ON" while grounding terminal "4".
Do not depress brake pedal.

↓

B

After 3.0 seconds, the ABS warning lamp or SLIP indicator lamp starts flashing to indicate the malfunction code No. (See NOTE.)

↓

Verify the location of the malfunction with the malfunction code chart (BR-43). 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 "HOW TO ERASE SELF-DIAGNOSTIC RESULTS" (BR-42).

↓

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

↓

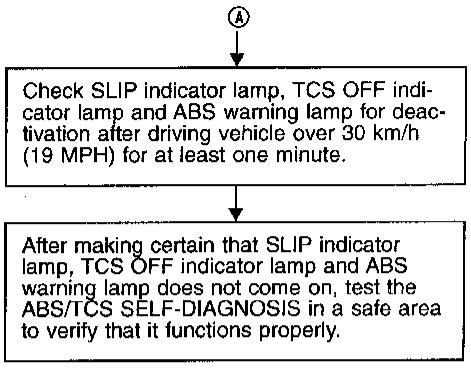
C

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

↓

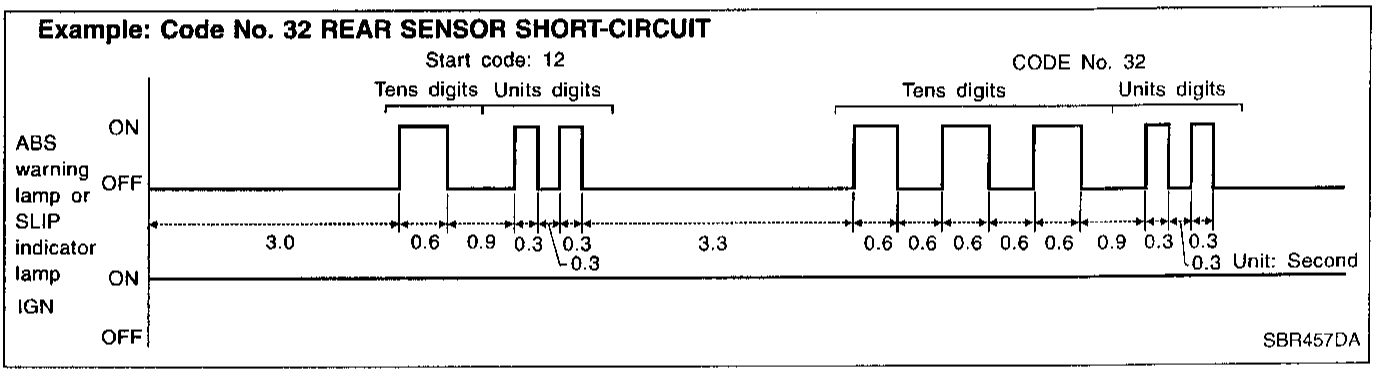
Ⓐ

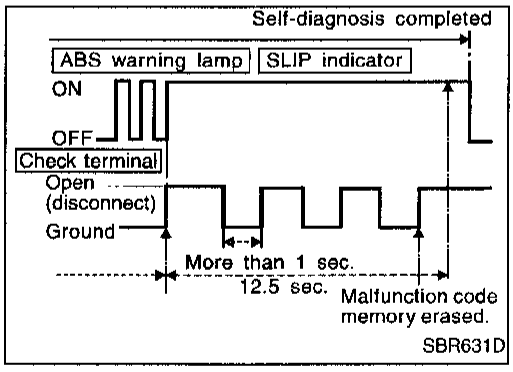
NOTE: The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the SLIP indication starts flashing again. The TCS OFF indicator lamp and ABS warning lamp remain lighted.



HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

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





HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

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

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

NOTE: The TCS OFF indicator lamp and ABS warning lamp remain lighted.

Self-diagnosis (Cont'd)

MALFUNCTION CODE/SYMPTOM CHART

Code No. (No. of SLIP indicator flashes)	Malfunctioning part	Warning lamp	Indicator		Fail-safe	Diag-nostic proce-dure
		ABS	TCS OFF	SLIP		
12	Self-diagnosis could not detect any malfunctions	OFF	OFF	OFF	—	—
21	Front right sensor (open-circuit)	ON	ON	ON	X	8
22	Front right sensor (short-circuit)*2	ON	ON	ON	X	8
25	Front left sensor (open-circuit)	ON	ON	ON	X	8
26	Front left sensor (short-circuit)*2	ON	ON	ON	X	8
31	Rear right sensor (open-circuit)	ON	ON	ON	X	8
32	Rear right sensor (short-circuit)*2	ON	ON	ON	X	8
35	Rear left sensor (open-circuit)	ON	ON	ON	X	8
36	Rear left sensor (short-circuit)*2	ON	ON	ON	X	8
41	Actuator front right outlet solenoid valve	ON	ON	ON	X	7
42	Actuator front right inlet solenoid valve	ON	ON	ON	X	7
45	Actuator front left outlet solenoid valve	ON	ON	ON	X	7
46	Actuator front left inlet solenoid valve	ON	ON	ON	X	7
51	Actuator rear right outlet solenoid valve	ON	ON	ON	X	7
52	Actuator rear right inlet solenoid valve	ON	ON	ON	X	7
55	Actuator rear left outlet solenoid valve	ON	ON	ON	X	7
56	Actuator rear left inlet solenoid valve	ON	ON	ON	X	7
57	Power supply (Low or high voltage)*3	ON	ON	OFF	—*1	11
61	Actuator motor or motor relay*4	ON	ON	ON	X	9
63	Solenoid valve relay	ON	ON	ON	X	10
71	Control unit	ON	ON	ON*5	X	12
98	LAN communication system failure	OFF	ON	ON	X	5
81	Engine speed signal	OFF	ON	ON	X	2
96	LAN is monitoring	OFF	ON	ON	X	3
87	Engine parts are under fail-safe condition	OFF	ON	ON	X	1
92	LAN communication start procedures are incomplete	OFF	ON	ON	X	4
94	Continued reception after LAN communication starts	OFF	ON	ON	X	6
85	ECM determines the ABS/TCS control unit is malfunctioning.	OFF	ON	ON	X	3
ABS works frequently	—	—	—	—	—	17
Unexpected pedal action	—	—	—	—	—	15
Long stopping distance	—	—	—	—	—	14
ABS does not work	—	—	—	—	—	16
Pedal vibration and noise	—	—	—	—	—	13
SLIP indicator stays on when engine is running	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	ON	ON	ON	X*6	—
SLIP indicator does not come on when engine is running	Fuse, warning lamp bulb or warning lamp circuit Control unit	ON	ON	ON	X	—
Poor acceleration	TCM is the cause of the symptom.	OFF	OFF	OFF	—	23

X: Available —: Not available

*1: Fail-safe operation does not activate. A signal from control unit suspends TCS and ABS control operation. Brakes operate conventionally.
After specified power supply voltage resumes, TCS OFF indicator and ABS warning lamp go out, allowing for TCS and ABS control operation.

*2: If a wheel or wheels spin on bad or slippery road surfaces for a period of approximately 10 to 80 seconds, the ABS warning lamp and the TCS OFF indicator lamp light. But this is not a malfunction. When the ignition switch is turned "ON" after a shorted wheel sensor circuit has been repaired, the ABS warning lamp and the TCS OFF indicator lamp light. Drive the vehicle at about 30 km/h (19 MPH) to ensure these lamps go out within 1 minute.

*3: When the BATTERY VOLTAGE [ABNORMAL] code No. appears on the display, it does not indicate a malfunction related to the ABS/TCS control unit. Do not replace the ABS/TCS control unit even if the code No. appears.

*4: The BATTERY VOLTAGE [ABNORMAL] code No. can sometimes appear when the ABS motor ground circuit is loose or disconnected. When it does, always check the ground circuit for improper installation.

*5: Only the SLIP indicator lamp goes out depending on the type of ECM malfunction.

*6: If failure occurs in self-diagnostic check terminal (terminal No. 4 of data link connector for CONSULT) circuit and/or TCS operation (SLIP indicator) circuit, fail-safe operation will not activate.

CONSULT

CONSULT APPLICATION TO ABS/TCS

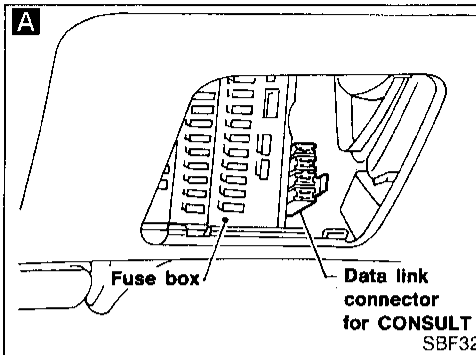
ITEM	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST
Front right wheel sensor	X	X	—
Front left wheel sensor	X	X	—
Rear right wheel sensor	X	X	—
Rear left wheel sensor	X	X	—
Stop lamp switch	—	X	—
Engine speed signal	X	X	—
Battery voltage	X	X	—
Front right inlet solenoid valve	X	X	X
Front right outlet 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	—
Control unit	X	—	—
ABS motor	X	—	X
A/T gear position signal	—	X	—
TCS OFF indicator lamp	—	X	—
SLIP indicator lamp	—	X	—
ECM	X	—	—
LAN signal	X	—	—

X: Applicable
—: Not applicable

ECU (ABS/TCS control unit) part number mode

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

A



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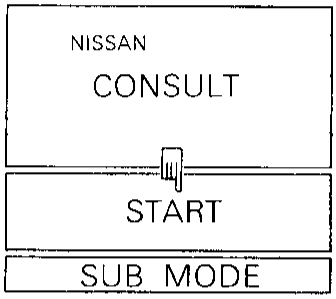

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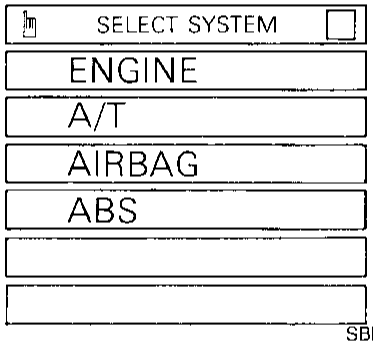

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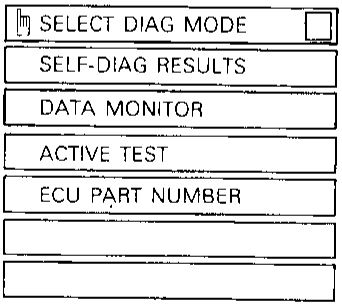

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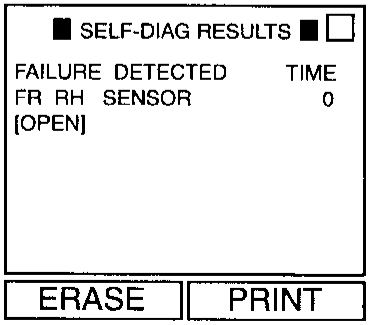

SBR950C

CONSULT Inspection Procedure

SELF-DIAGNOSIS PROCEDURE

A

1) Turn ignition switch OFF.
2) Connect CONSULT to Data Link Connector for CONSULT.

1) Start engine.
2) Drive vehicle over 30 km/h (19 MPH) for at least one minute.

B 1) Stop vehicle with engine running and touch "START" on CONSULT screen.
C 2) Touch "ABS".
D E 3) Touch "SELF-DIAG RESULTS".
- **The screen shows maximum three malfunctions.**
- **Does the screen show the detected malfunction?**

No →
SLIP INDICATOR LAMP, TCS OFF INDICATOR AND ABS WARNING LAMP INSPECTION

Check SLIP indicator lamp, TCS OFF indicator lamp, ABS warning lamp and the circuit and repair if necessary.

Yes ↓

MALFUNCTION REPAIR

Make the necessary repairs following the diagnostic procedures.

E

After repairing the malfunctions, start engine. Then erase the self-diagnostic results stored in the control unit by touching "ERASE".
Are the self-diagnostic results erased?

No →

Yes ↓

Check SLIP indicator lamp, TCS OFF indicator, ABS warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
Do not touch the TCS OFF switch. Do the SLIP indicator lamp, TCS OFF indicator lamp, and ABS warning lamp activate?

Yes → Go to B above.

No ↓

End

Note: "SELF-DIAG RESULTS" screen shows the detected malfunction and the times of ignition switch ON and OFF after it occurred.

SELF-DIAGNOSTIC RESULTS MODE

Diagnostic item	Diagnostic item is detected when ...	Diagnostic procedure
FR RH SENSOR [OPEN]*1	• Circuit for front right wheel sensor is open. (An abnormally high input voltage is entered.)	8
FR LH SENSOR [OPEN]*1	• Circuit for front left wheel sensor is open. (An abnormally high input voltage is entered.)	8
RR RH SENSOR [OPEN]*1	• Circuit for rear right sensor is open. (An abnormally high input voltage is entered.)	8
RR LH SENSOR [OPEN]*1	• Circuit for rear left sensor is open. (An abnormally high input voltage is entered.)	8
FR RH SENSOR [SHORT]*1	• Circuit for front right wheel sensor is shorted. (An abnormally low input voltage is entered.)	8
FR LH SENSOR [SHORT]*1	• Circuit for front left wheel sensor is shorted. (An abnormally low input voltage is entered.)	8
RR RH SENSOR [SHORT]*1	• Circuit for rear right sensor is shorted. (An abnormally low input voltage is entered.)	8
RR LH SENSOR [SHORT]*1	• Circuit for rear left sensor is shorted. (An abnormally low input voltage is entered.)	8
ABS SENSOR [ABNORMAL SIGNAL]	• Teeth damage on sensor rotor or improper installation of wheel sensor. (Abnormal wheel sensor signal is entered.)	8
FR RH IN ABS SOL [OPEN]	• Circuit for front right inlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
FR LH IN ABS SOL [OPEN]	• Circuit for front left inlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
RR RH IN ABS SOL [OPEN]	• Circuit for rear right inlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
RR LH IN ABS SOL [OPEN]	• Circuit for rear left inlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
FR RH IN ABS SOL [SHORT]	• Circuit for front right inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
FR LH IN ABS SOL [SHORT]	• Circuit for front left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
RR RH IN ABS SOL [SHORT]	• Circuit for rear right inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
RR LH IN ABS SOL [SHORT]	• Circuit for rear left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
FR RH OUT ABS SOL [OPEN]	• Circuit for front right outlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
FR LH OUT ABS SOL [OPEN]	• Circuit for front left outlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
RR RH OUT ABS SOL [OPEN]	• Circuit for rear right outlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
RR LH OUT ABS SOL [OPEN]	• Circuit for rear left outlet solenoid valve is open. (An abnormally low output voltage is entered.)	7
FR RH OUT ABS SOL [SHORT]	• Circuit for front right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
FR LH OUT ABS SOL [SHORT]	• Circuit for front left outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
RR RH OUT ABS SOL [SHORT]	• Circuit for rear right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
RR LH OUT ABS SOL [SHORT]	• Circuit for rear left outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	7
ABS ACTUATOR RELAY [ABNORMAL]	• Actuator solenoid valve relay is ON, even control unit sends off signal. • Actuator solenoid valve relay is OFF, even control unit sends on signal.	10
ABS MOTOR [ABNORMAL]	• Circuit for actuator motor is open or shorted. • Actuator motor relay is stuck.	9
BATTERY VOLTAGE [ABNORMAL]	• Power source voltage supplied to ABS control unit is abnormally low.	11
CONTROL UNIT	• Function of calculation in ABS control unit has failed.	12

*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.

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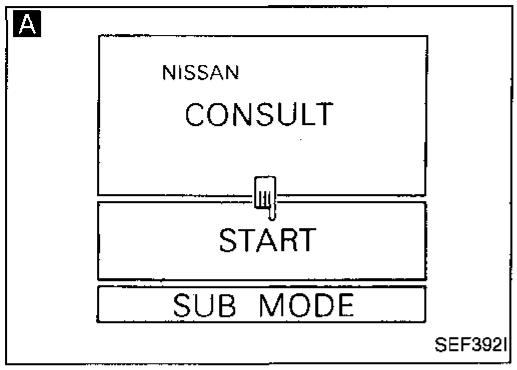
CONSULT Inspection Procedure (Cont'd)

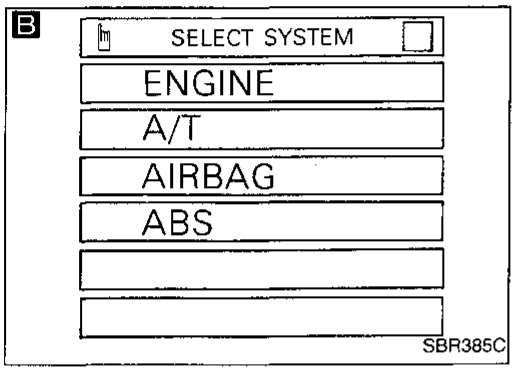
Diagnostic item	Diagnostic item is detected when ...	Diagnostic procedure
LAN SIGNAL 1 [ABNORMAL]	• ECM judges that communication signal between ABS/TCS control unit and ECM is abnormal.	3
LAN SIGNAL 2 [ABNORMAL]	• On the Local Area Network (LAN) between ABS/TCS control unit and ECM, ECM does not transmit the LAN start signal to ABS/TCS control unit.	4
LAN SIGNAL 3 [ABNORMAL]	• The communication start signal output is not terminated and the ordinary signals are not entered to ABS/TCS control unit.	6
ENGINE SPEED SIG [ABNORMAL]	• Engine speed signal from ECM is not entered.	2
ENGINE CHECK SIGNAL	• Based on the signal from ECM, the ABS/TCS control unit judges that the engine control system is malfunctioning.	1
LAN CIRCUIT 1 [ABNORMAL]	• The communication line between ABS/TCS control unit and ECM is open or shorted.	5
LAN CIRCUIT 2 [ABNORMAL]	• An instantaneous signal interruption occurs repeatedly on the communication line between ABS/TCS control unit and ECM.	5

CONSULT Inspection Procedure (Cont'd)

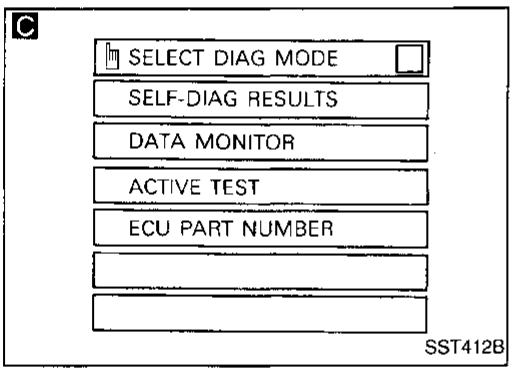
DATA MONITOR PROCEDURE



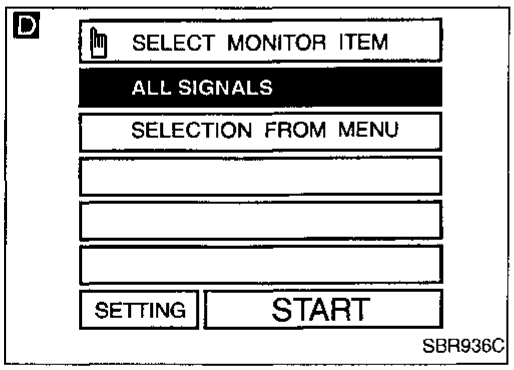
1) Turn ignition switch OFF.
2) Connect CONSULT to Data link connector for CONSULT.
3) Turn ignition switch ON.

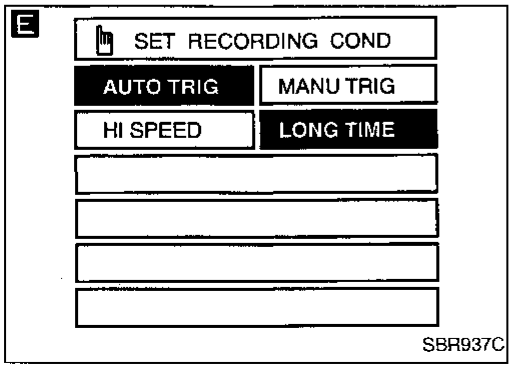


A 1) Touch "START" on CONSULT screen.
B 2) Touch "ABS".
C 3) Touch "DATA MONITOR".



D 1) Touch "SETTING" on "SELECT MONITOR ITEM" screen.
E 2) Touch "LONG TIME" on "SET RECORDING COND" screen.
D 3) Touch "START" on "SELECT MONITOR ITEM".





CONSULT Inspection Procedure (Cont'd)

ACTIVE TEST PROCEDURE

- When conducting Active test, vehicle must be stationary.
- When ABS warning lamp stays on, never conduct Active test.

1) Turn ignition switch OFF.
2) Connect CONSULT to Data link connector for CONSULT.
3) Turn ignition switch ON.

↓

A 1) Touch "START" on CONSULT screen.
B 2) Touch "ABS".
C 3) Touch "ACTIVE TEST".

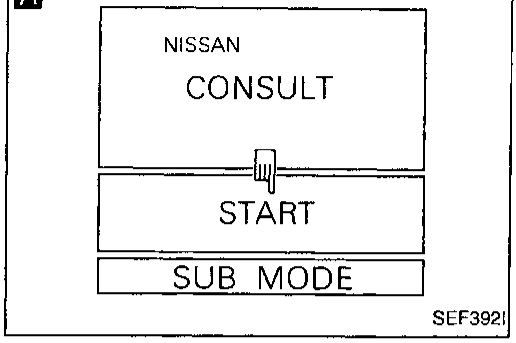
↓

D 1) Select active test item by touching screen.
E 2) Touch "START".

↓

Carry out the active test by touching screen key.

A



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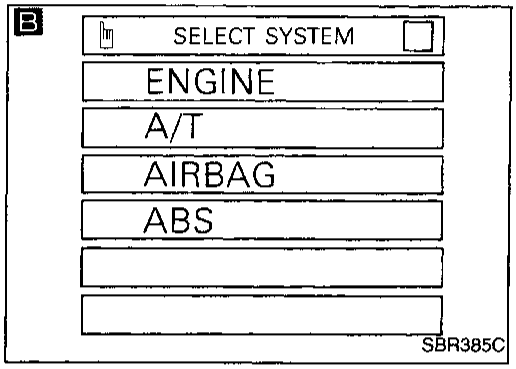

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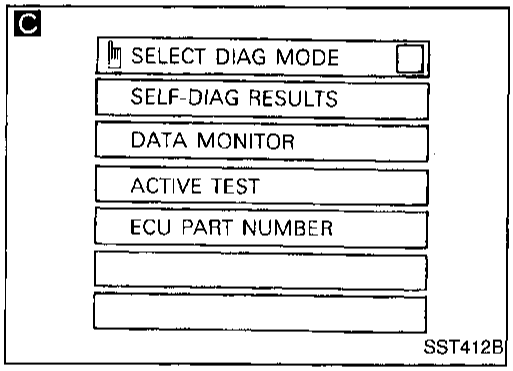

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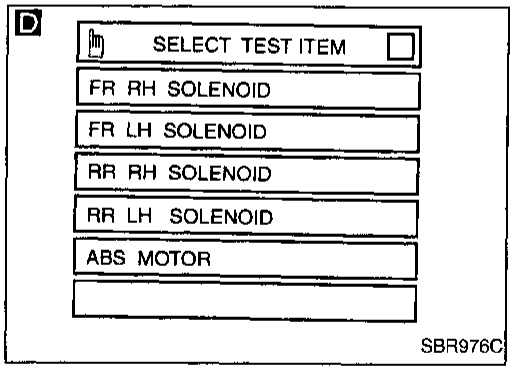
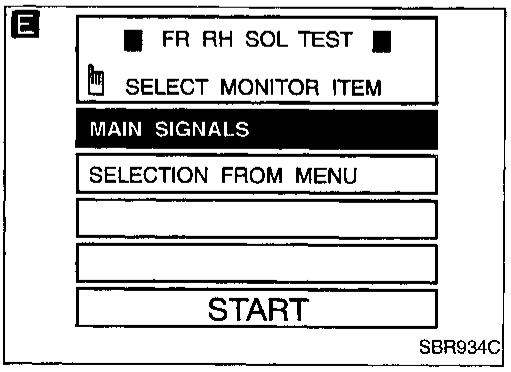
D



SBR976C

E



SBR934C

DATA MONITOR MODE

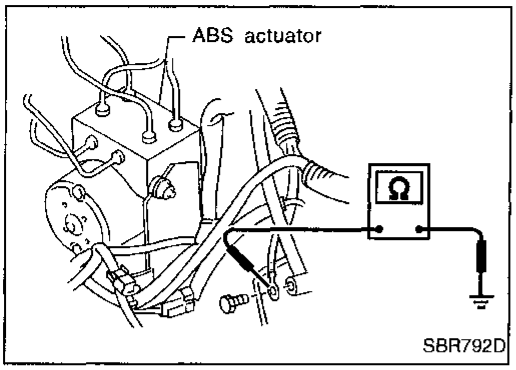
MONITOR ITEM	CONDITION	SPECIFICATION
FR RH SENSOR FR LH SENSOR RR RH SENSOR RR LH SENSOR	Drive vehicle. (Each wheel is rotating.)	Displays computed vehicle speed from wheel sensor signal. Almost the same speed as speedometer.
STOP LAMP SW	Turn ignition switch ON and depress brake pedal.	Depress the pedal: ON Release the pedal: OFF
ENGINE SPEED	Engine is running. (rpm)	Engine speed: 0 - 8,000 (rpm)
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
ACTUATOR RLY	Ignition switch is turned ON or engine is running.	Displays ON/OFF condition of ABS actuator relay. When turning ignition switch ON, ABS actuator relay is operated.
MOTOR RELAY		ABS is not operating: OFF ABS is operating: ON
WARNING LAMP		Warning lamp is turned on: ON Warning lamp is turned off: OFF
BATTERY VOLT		Power supply voltage for control unit
THRTL OPENING	The throttle valve opening rate (%)	Opening rate: 0 - 100 %
TRQ RDUC SIG	The operating cylinder ratio to fuel injected, calculated and sent by ABS/TCS control unit to ECM, is displayed.	TCS is not operating: 0 TCS is operating: 0 - 6* * Displays the number of cylinders to which fuel supply is cut.
GEAR	A/T gear position signal detected by TCM via ECM is displayed.	Gear position: P, N: N.P 1st: 1 2nd: 2 3rd: 3 4th: 4
TCS SW	ON/OFF condition of signal from TCS switch is displayed.	TCS OFF S/W (all the time switch is pressed): ON TCS OFF S/W (released): OFF
TCS OFF LAMP	• TCS OFF condition is displayed. • The condition of malfunctioning TCS is displayed.	TCS OFF indicator "OFF": OFF TCS OFF indicator "ON": ON
SLIP LAMP	The TCS functioning state is displayed by detecting rear wheel slip.	SLIP indicator "ON": ON SLIP indicator "OFF": OFF
TCS OPR SIG	TCS operating condition	TCS is not operating: OFF TCS is operating: ON

CONSULT Inspection Procedure (Cont'd)

ACTIVE TEST MODE

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.)

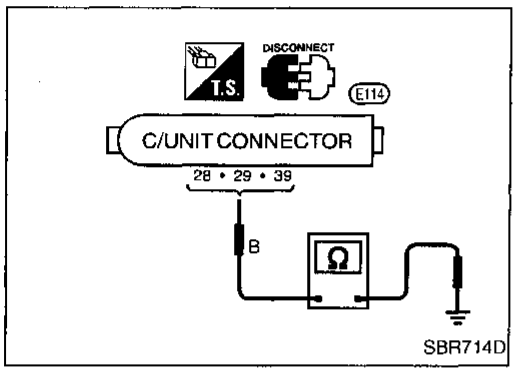


Ground Circuit Check

ABS ACTUATOR MOTOR GROUND

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

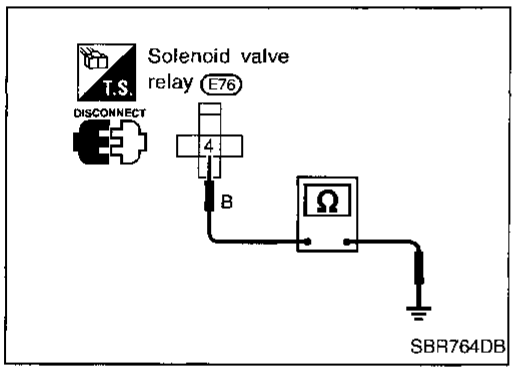
Resistance: 0Ω



ABS/TCS CONTROL UNIT GROUND

- Check resistance between the terminals and ground.

Resistance: 0Ω



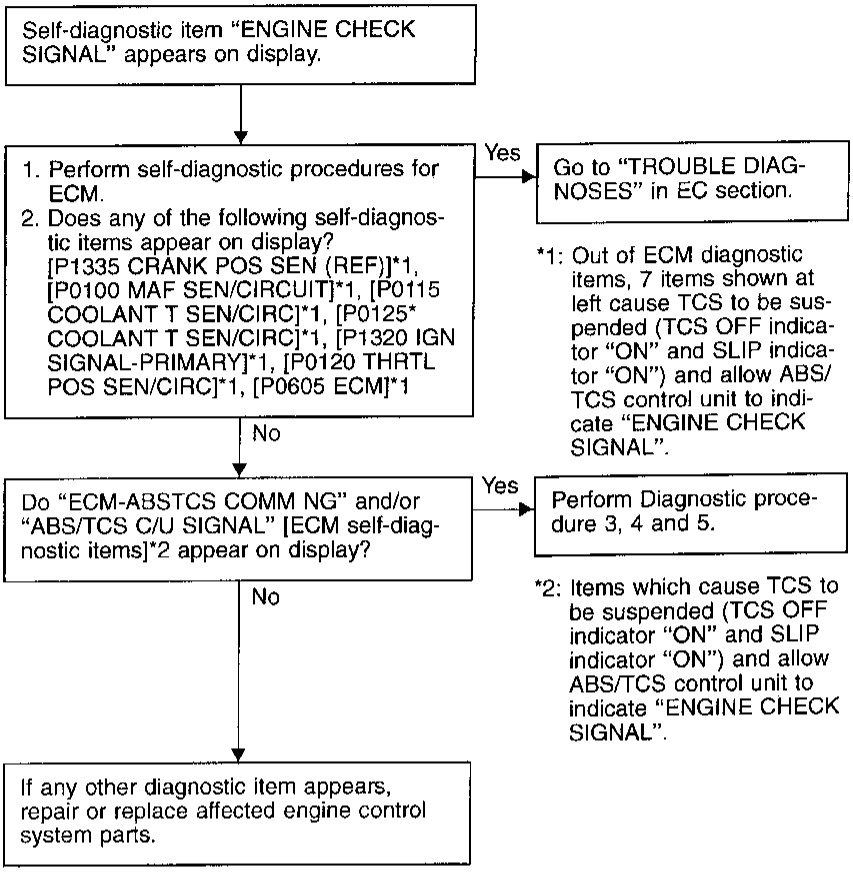
ABS SOLENOID VALVE RELAY GROUND

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

Resistance: 0Ω

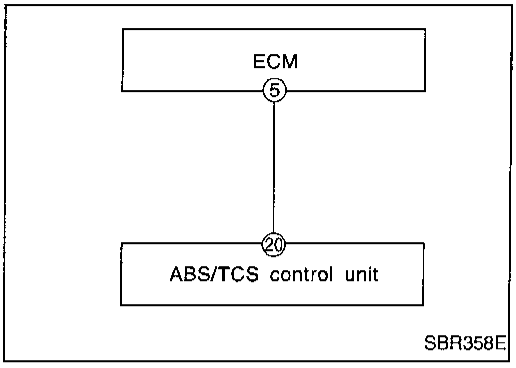
Diagnostic Procedure 1 (ENGINE CHECK SIGNAL — Engine system)

Malfunction code No. 87



*1: Out of ECM diagnostic items, 7 items shown at left cause TCS to be suspended (TCS OFF indicator "ON" and SLIP indicator "ON") and allow ABS/TCS control unit to indicate "ENGINE CHECK SIGNAL".

*2: Items which cause TCS to be suspended (TCS OFF indicator "ON" and SLIP indicator "ON") and allow ABS/TCS control unit to indicate "ENGINE CHECK SIGNAL".



Diagnostic Procedure 2 (ENGINE SPEED SIG — Engine speed signal)

Malfunction code No. 81

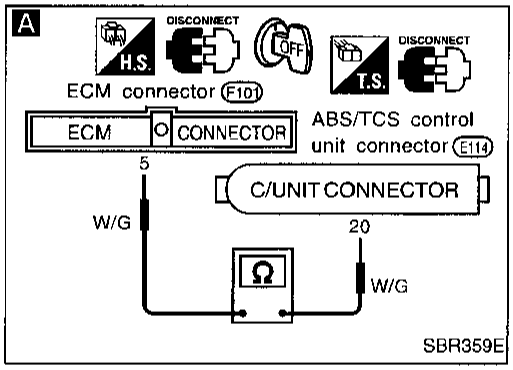
Self-diagnostic item "ENGINE SPEED SIG" appears on display.

1. Perform self-diagnostic procedures for ECM.
2. Does [P1335 CRANK POS SEN (REF)]*1 (Self-diagnostic item) appear on display?

Yes → Check ECM.
Refer to "TROUBLE DIAGNOSES" in EC section.

No ↓

*1: Out of ECM diagnostic item, only [P1335 CRANK POS SEN (REF)] causes TCS to be suspended (SLIP indicator lamp "ON" and TCS OFF indicator lamp "ON") and allows ABS/TCS control unit to indicate "ENGINE SPEED SIG".



Perform self-diagnostic procedures for ECM.
Does [ECM-ABSTCS COMM NG] and [ABS-TCS C/U SIGNAL]*1 (self-diagnostic items) appear on display?

Yes → Perform Diagnostic procedure 3, 4 and 5.

No ↓

Disconnect*2 ABS/TCS control unit and ECM connectors, then reconnect them securely. Repeat self-diagnostic procedures.

OK → Poor connector contact.

*2: Check for terminal separation, looseness or bending, etc., at connector housing. If necessary, repair faulty terminals.

NG ↓

A

CHECK ABS/TCS CONTROL UNIT-TO-ECM HARNESS CONNECTORS.

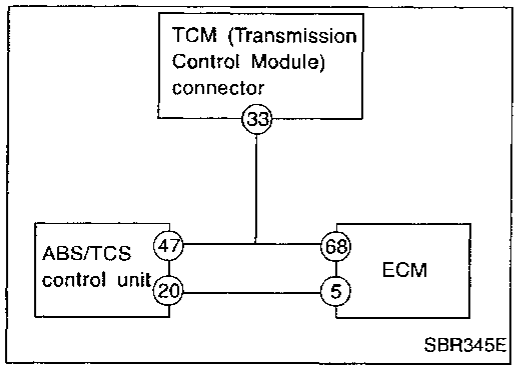
1. Disconnect ABS/TCS control unit and ECM connectors.
2. Check continuity between terminal ⑳ for ABS/TCS control unit and terminal ⑤ for ECM.
   Continuity should exist.

NG → Check the following.
- Harness connectors E114, F101
- Harness for open or short between ECM connectors and ABS/TCS control unit

If NG, repair harness or connectors.

OK ↓

Connect connectors, then repeat self-diagnostic procedures.



Diagnostic Procedure 3 (LAN SIGNAL 1 — LAN monitoring)

Malfuncton code No. 85

Self-diagnostic item "LAN SIGNAL 1" appears on display.

↓

Perform self-diagnostic procedures for ECM.
Does self-diagnostic item [ECM-ABSTCS COMM NG] appear on display?

Yes → Ⓐ

No ↓

Does "ABS-TCS C/U SIGNAL" appear on display?

No → Faulty ABS/TCS control unit.

Yes ↓

Do any other ABS/TCS control unit self-diagnostic items appear on display?

Yes → Repair or replace affected items shown on display.

No ↓

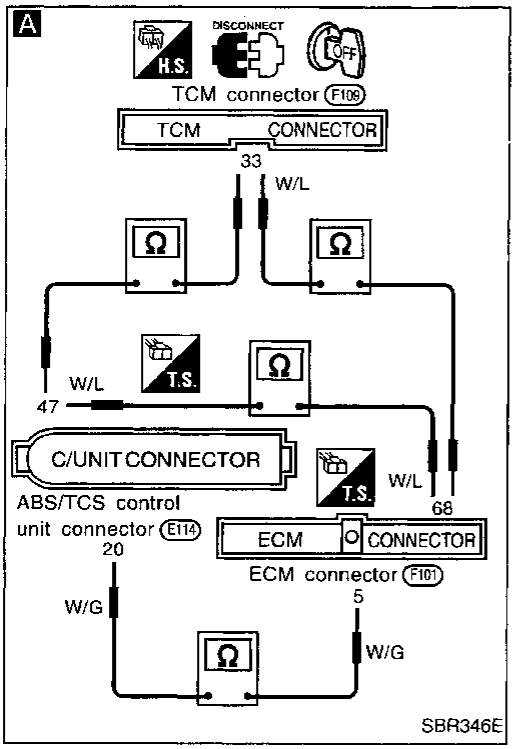
Check if battery voltage is too low (less than 9V) or battery terminals are loose.

NG → Repair or replace battery and power source parts.

OK ↓

Repeat self-diagnostic procedures.

NG → Faulty ABS/TCS control unit.



Ⓐ ↓

A

LAN CIRCUIT CHECK

Check continuity between connector terminals.

ABS/TCS control unit	ECM	TCM
⑳	⑤	
㊼	㊽	
㊼		㉝
	㊽	㉝

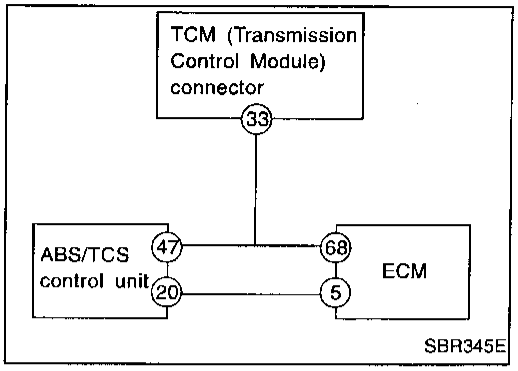
Continuity should exist.

NG → Check the following.
- Harness connectors E114, F101, F109
- Harness for open or short between ECM connector and ABS/TCS control unit
- Harness for open or short between ABS/TCS control unit connector and TCM connector
- Harness for open or short between ECM connector and TCM connector

If NG, repair harness or connectors.

OK ↓

Repeat self-diagnostic procedures.



Diagnostic Procedure 4 (LAN SIGNAL 2 — LAN communication start procedures incomplete)

Malfunction code No. 92

Self-diagnostic item "LAN SIGNAL 2" appears on display.

↓

Is self-diagnosis for ECM able to start? — No → • Repair or replace data link connector for CONSULT-to-ECM harness and connector. • Faulty ECM. (Malfunction indicator lamp remains "ON" during operation)

↓ Yes

Does [ECM-ABSTCS COMM NG] (self-diagnostic item) appear on display? — Yes → Check LAN circuit. Refer to "LAN CIRCUIT CHECK", BR-55.

↓ No

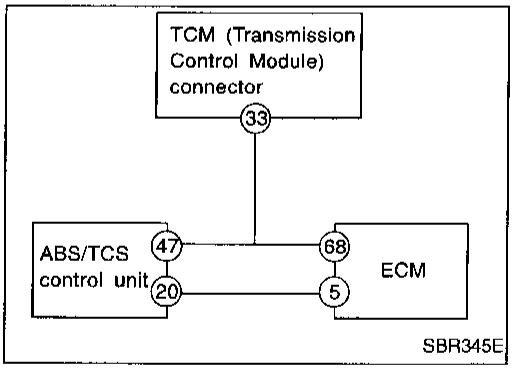
Is starter signal input to ECM? — No → Repair or replace starter switch system.

↓ Yes

If other items appear on display, repair or replace affected areas.

↓

Repeat self-diagnostic procedures for ABS/TCS control unit.



Diagnostic Procedure 5 (LAN CIRCUITS 1, LAN CIRCUITS 2 — LAN communication system failure)

Malfunction code No. 96, 98

Self-diagnostic items "LAN CIRCUITS 1" or "LAN CIRCUITS 2" appear on display.

↓

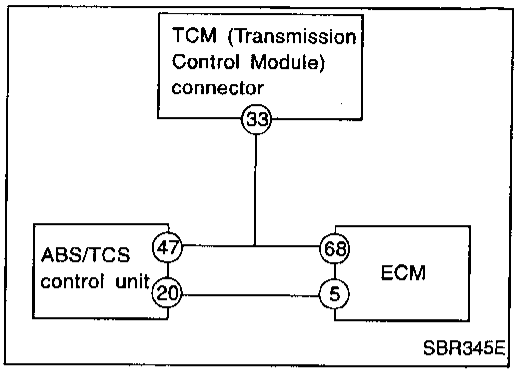
• Perform self-diagnostic procedures for ECM. • Does "ABS-TCS communication" (self-diagnostic item) appear on display? — Yes → Check LAN circuit. Refer to LAN CIRCUIT CHECK, BR-55.

↓ No

Check ECM to-battery power circuits, harnesses and connectors. — NG → Repair or replace affected parts.

↓ OK

Repeat self-diagnostic procedures for ABS/TCS control unit. — NG → Faulty ABS/TCS control unit.



Diagnostic Procedure 6 (LAN SIGNAL 3 — Continued reception after LAN communication starts)

Malfunction code No. 94

Self-diagnostic item "LAN SIGNAL 3" appears on display.

↓

Perform self-diagnostic procedures for ECM.
Does self-diagnostic item [ECM-ABSTCS COMM NG] appear on display?

Yes → Check ECM. Refer to "TROUBLE DIAGNOSES" in EC section.

↓ No

Does self-diagnostic item [ABS-TCS C/U SIGNAL] appear on display?

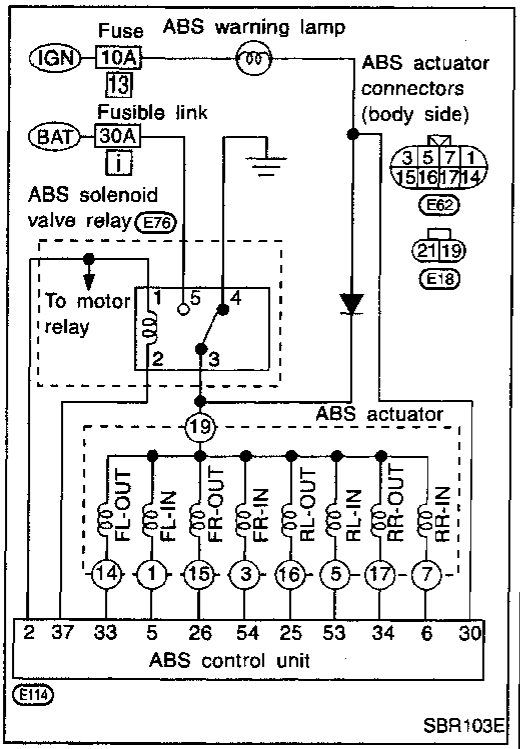
No → If other items appear on display, repair or replace affected areas.

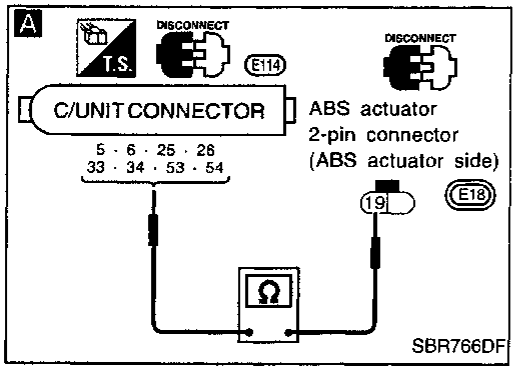
↓ Yes

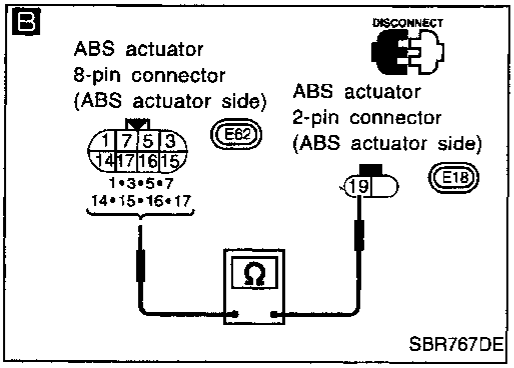
Replace ABS/TCS control unit.

↓

Repeat self-diagnostic procedures for ABS/TCS control unit.







Diagnostic Procedure 7 (ABS actuator solenoid valve)

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

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

No → Inspection end

Yes ↓

A

ABS ACTUATOR SOLENOID VALVE CHECK

OK → Ⓐ (Go to next page.)

1. Disconnect connectors from ABS/TCS control unit and ABS actuator.
2. Check resistance between ABS/TCS control unit connector terminals and ABS actuator 2-pin connector (E18) (ABS actuator side) terminals.

Code No.	Control unit	ABS actuator	Resistance
41	26	19	4.4 - 6.0Ω
45	30	19	
51	34	19	
55	25	19	
42	54	19	8.5 - 9.5Ω
46	5	19	
52	6	19	
56	53	19	

NG ↓

B

OK → Check the following.
- Harness connectors (E62), (E18)
- Harness for open or short between actuator connector and ABS/TCS control unit
- Harness for open or short between actuator 8-pin connector and actuator 2-pin connector

If NG, repair harness or connectors.

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

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

NG ↓

Ⓑ

Diagnostic Procedure 7 (ABS actuator solenoid valve) (Cont'd)

Ⓑ

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

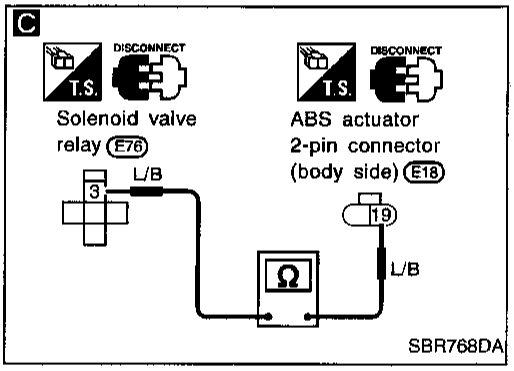
ABS actuator				Resistance
OUT solenoid valve		⑭	⑮, ⑯, ⑰	8.8 - 12.0Ω
		⑮	⑯, ⑰	
		⑯	⑰	
Solenoid valve	IN	①, ③, ⑤, ⑦	—	12.9 - 15.5Ω
	OUT	—	⑭, ⑮, ⑯, ⑰	
IN solenoid valve		①	③, ⑤, ⑦	17.0 - 19.0Ω
		③	⑤, ⑦	
		⑤	⑦	

OK → Check the following.
- Harness connectors (E62), (E18)
- Harness for open or short between actuator connector and ABS/TCS control unit
- Harness for open or short between actuator 8-pin connector and actuator 2-pin connector

If NG, repair harness or connectors.

NG → Replace ABS actuator.

C



Ⓐ

C

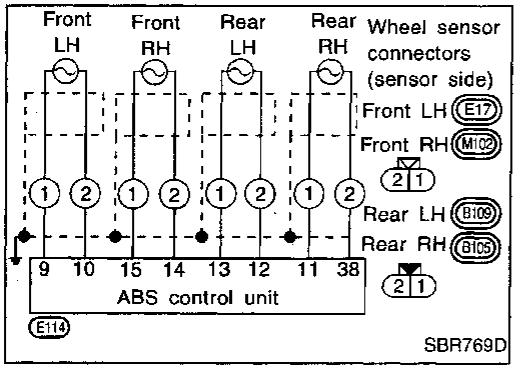
1. Remove solenoid valve relay.
2. Check continuity between ABS actuator 2-pin connector (E18) (body side) terminal ⑲ and solenoid valve relay terminal ③.

Continuity should exist.

NG → Check the following.
- Harness connectors (E18), (E76)
- Harness for open or short between actuator connector and solenoid valve relay terminal (relay box side)

If NG, repair harness or connectors.

OK → Go to Diagnostic Procedure 10, BR-65.



Diagnostic Procedure 8 (Wheel sensor or rotor)

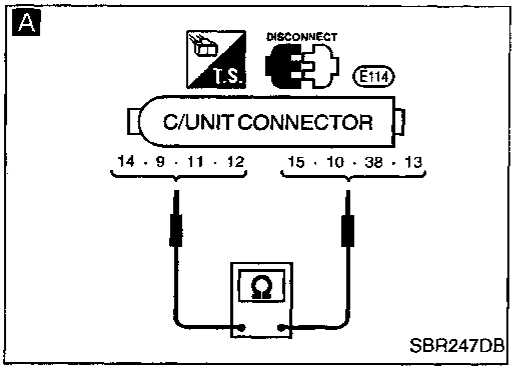
Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18

1. Disconnect connectors from ABS/TCS control unit and wheel sensor of malfunction code No. Check terminals for damage or loose connections. Then reconnect connectors.
2. Carry out self-diagnosis again.
   Does warning lamp activate again?

No → Inspection end

Yes ↓

A

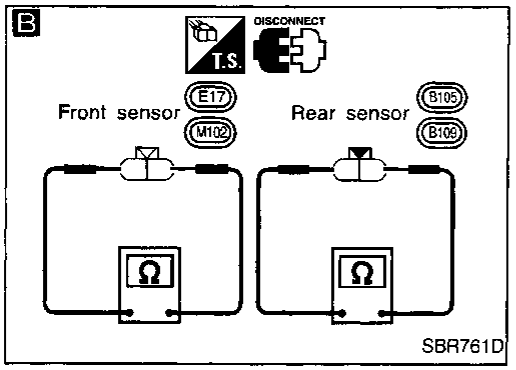


WHEEL SENSOR ELECTRICAL CHECK

OK → Ⓐ (See next page.)

1. Disconnect ABS/TCS control unit connector.
2. Check resistance between ABS/TCS control unit connector terminals.
   Code No. 21 or 22 (Front RH wheel)
   Terminals ⑭ and ⑮
   Code No. 25 or 26 (Front LH wheel)
   Terminals ⑨ and ⑩
   Code No. 31 or 32 (Rear RH wheel)
   Terminals ⑪ and ㊳
   Code No. 35 or 36 (Rear LH wheel)
   Terminals ⑫ and ⑬
   Resistance: 0.8 - 1.2 kΩ

NG ↓



B Note

CHECK WHEEL SENSOR.

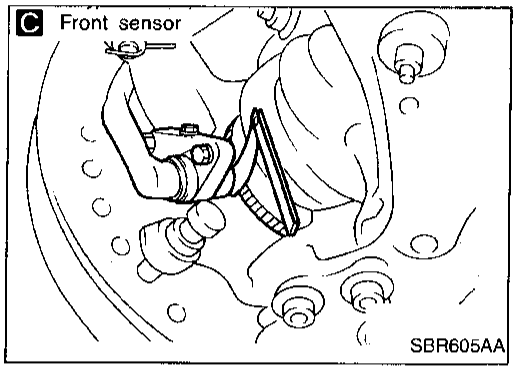
Check resistance of each sensor.
Resistance: 0.8 - 1.2 kΩ

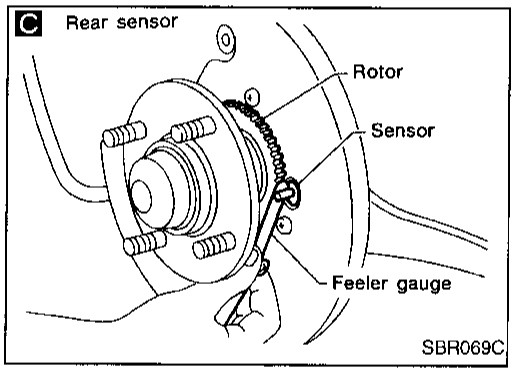
NG → Note: Replace wheel sensor.

OK ↓

Note: Repair harness and connectors between ABS/TCS control unit connector and wheel sensor connector.

Diagnostic Procedure 8 (Wheel sensor or rotor) (Cont'd)





Ⓐ

Note
WHEEL SENSOR MECHANICAL CHECK
Check for inflation pressure, wear and size of each tire.

NG → Note: Adjust tire pressure or replace tire(s).

OK ↓

Note
Check wheel bearing axial end play.

OK ↓

C Note
Check clearance between sensor and rotor.
Clearance:
Front
0.18 - 0.87 mm
(0.0071 - 0.0343 in)
Rear
0.23 - 0.72 mm
(0.0091 - 0.0283 in)

NG → Note: Clean sensor fixing portion, or replace sensor.

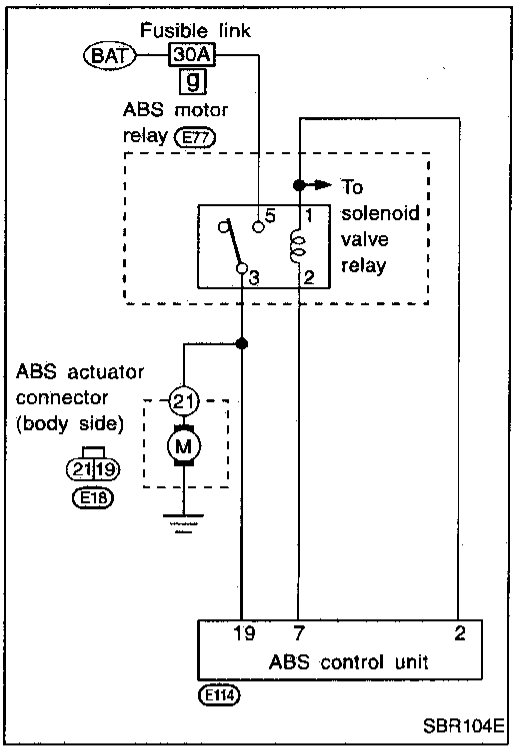
OK ↓

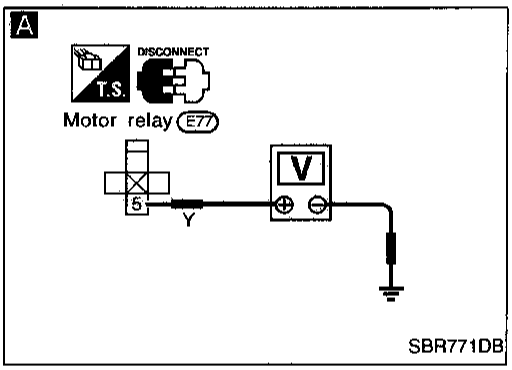
Note
Check sensor rotor for teeth damage.

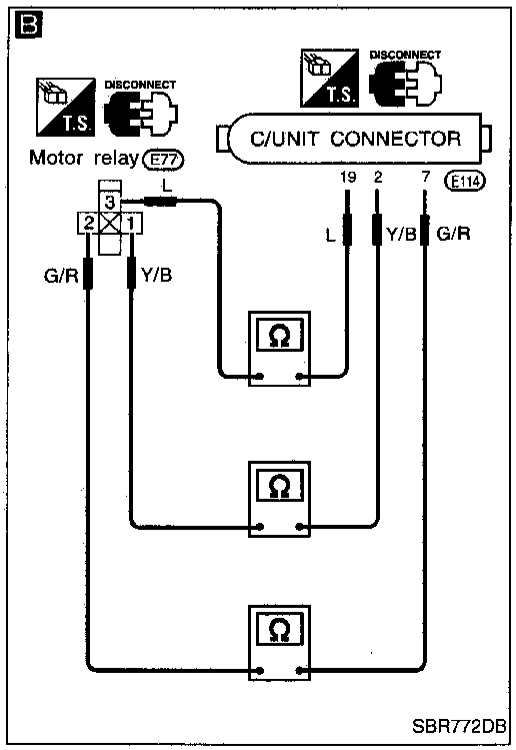
NG → Note: Replace sensor rotor.

OK ↓

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







Diagnostic Procedure 9 (ABS MOTOR — Motor relay or motor)

Malfunction code No. 61

MOTOR POWER SUPPLY CIRCUIT

Check 30A 9 fusible link (ABS MTR) for ABS motor relay. For fusible link layout, refer to POWER SUPPLY ROUTING in EL section.

NG → Ⓑ (Skip page.)

OK ↓

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

No → Inspection end

Yes ↓

A

1. Remove motor relay.
2. Check voltage between motor relay terminal ⑤ and ground.
Battery voltage should exist.

NG → Check the following.
- Harness connector E77
- Harness for open or short between motor relay terminal (relay box side) and fusible link

If NG, repair harness or connectors.

OK ↓

B

CIRCUIT CHECK

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

Control unit	Motor relay
⑦	②
⑲	③
②	①

Continuity should exist.

NG → Check the following.
- Harness connectors E77, E114
- Harness for open or short between motor relay terminal (relay box side) and ABS/TCS control unit

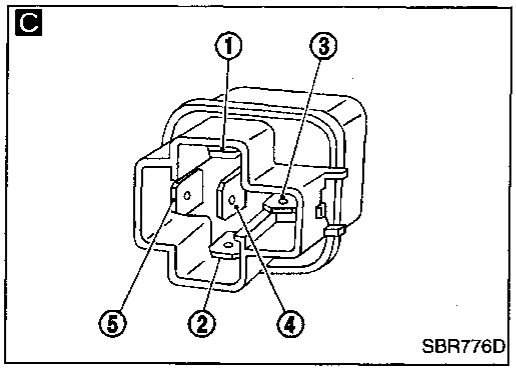
If NG, repair harness or connectors.

OK ↓

Ⓐ
(Go to next page.)

Diagnostic Procedure 9 (ABS MOTOR — Motor relay or motor) (Cont'd)

C



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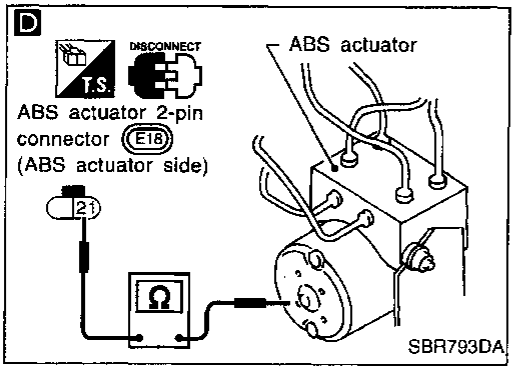

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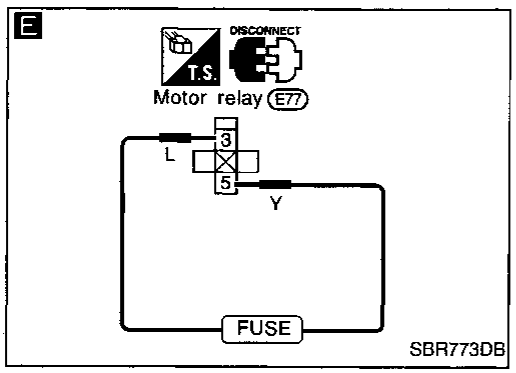
E



SBR773DB

Ⓐ

C

MOTOR RELAY CHECK — NG → Replace motor relay.

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

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

OK ↓

ACTUATOR MOTOR GROUND CHECK — NG →

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

Check the following.
- Harness connector E77
- Harness for open or short between solenoid valve relay terminal (relay box side) and ground

If NG, repair harness or connectors.

OK ↓

D

Check continuity between ABS actuator 2-pin connector E16 (ABS actuator side) terminal ㉑ and actuator motor positive terminal.
Continuity should exist. — NG →

Check the following.
- Harness connector E18
- Harness for open or short between actuator connector and motor terminal

If NG, repair harness or connectors.

OK ↓

E

MOTOR CHECK — NG → Replace ABS actuator.

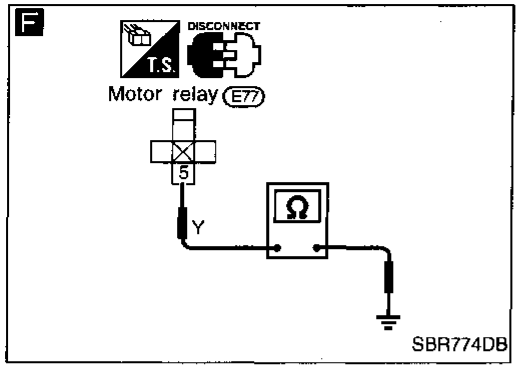
1. Remove motor relay.
2. Connect actuator connectors.
3. Connect suitable wire between motor relay connector terminals ③ and ⑤.
   Motor should operate.
   Do not connect wire for more than 5 seconds.

OK ↓

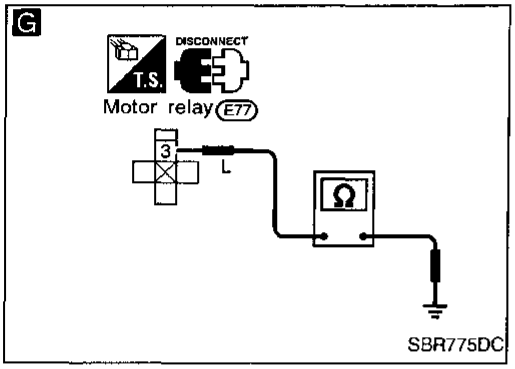
Go to Diagnostic Procedure 11, BR-67.

Diagnostic Procedure 9 (ABS MOTOR — Motor relay or motor) (Cont'd)

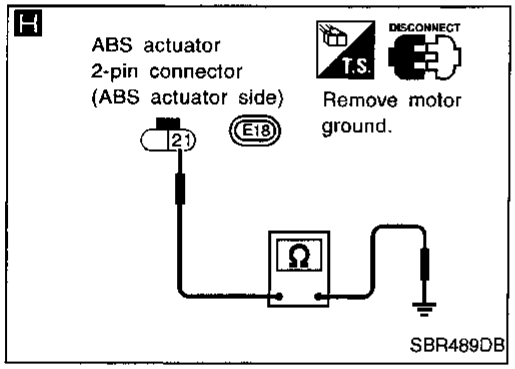
F



G



H



Ⓑ

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

No → Inspection end

Yes

F

MOTOR POWER SUPPLY CIRCUIT

1. Remove motor relay.
2. Check continuity between motor relay terminal ⑤ and ground.
   Continuity should not exist.

NG → Check the following.
- Harness connector E77
- Harness for open or short between motor relay terminal (relay box side) and fusible link

If NG, repair harness or connectors.

OK

G

1. Disconnect ABS/TCS control unit connector.
2. Check continuity between motor relay terminal ③ and ground.
   Continuity should not exist.

NG → Check the following.
- Harness connector E77
- Harness for open or short between motor relay terminal (relay box side) and fusible link

If NG, repair harness or connectors.

OK

H

1. Remove motor ground.
2. Check continuity between ABS actuator 2-pin connector E18 (ABS actuator side) terminal ㉑ and ground.
   Continuity should not exist.

NG → Replace ABS actuator.

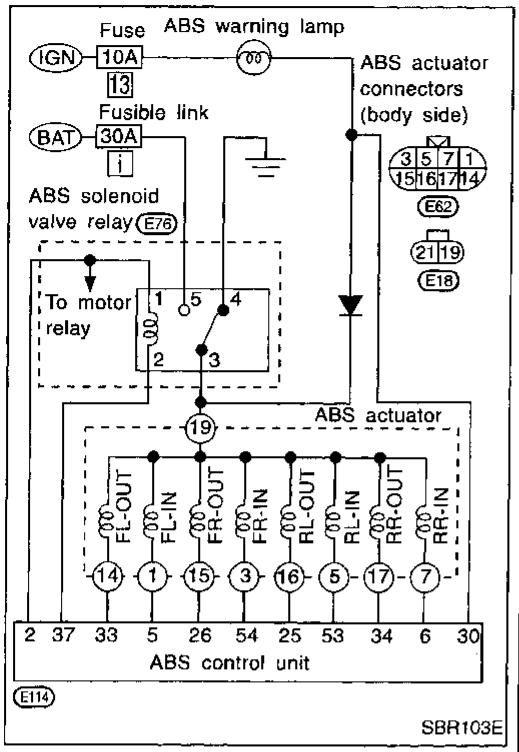
OK

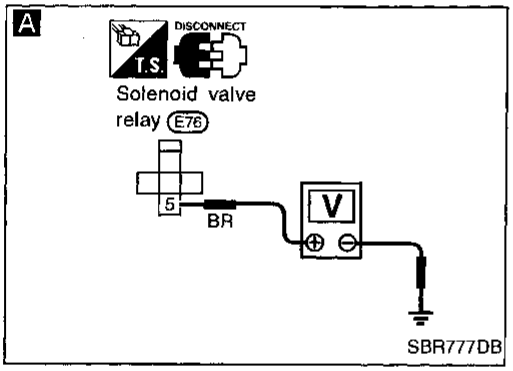
MOTOR CHECK

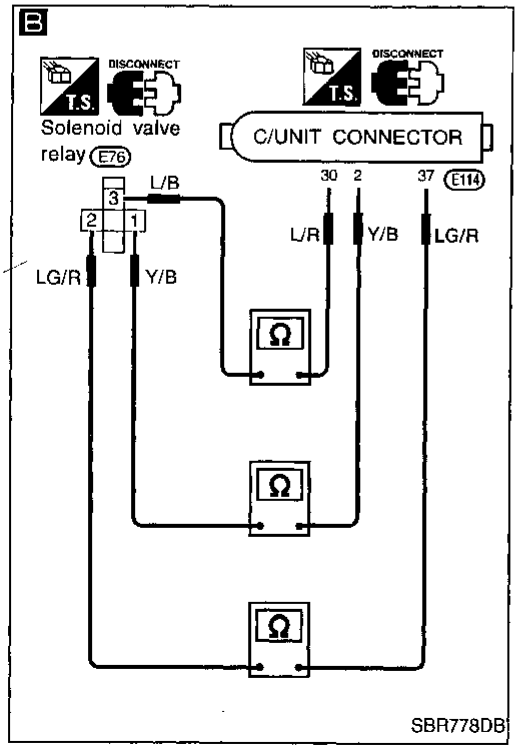
Go to E in Diagnostic Procedure 9 (preceding page).

OK

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







Diagnostic Procedure 10 (ABS ACTUATOR RELAY — Solenoid valve relay)

Malfunction code No. 63

SOLENOID VALVE POWER SUPPLY CHECK

Check 30A [i] fusible link (ABS ACTR) for ABS solenoid valve relay. For fusible link layout, refer to POWER SUPPLY ROUTING in EL section.

NG → Ⓐ (See next page.)

OK ↓

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

No → Inspection end

Yes ↓

GROUND CIRCUIT CHECK

Refer to ABS/TCS CONTROL UNIT GROUND and ABS ACTUATOR MOTOR GROUND in Ground Circuit Check, BR-52.

NG → Repair harness and connectors.

OK ↓

A

SOLENOID VALVE POWER SUPPLY CHECK

1. Remove solenoid valve relay.
2. Check voltage between solenoid valve relay terminal ⑤ and ground.
   Battery voltage should exist.

NG → Check the following.
- Harness connector (E76)
- Harness for open or short between solenoid valve terminal (relay box side) and fusible link

If NG, repair harness or connectors.

OK ↓

B

CIRCUIT CHECK

1. Disconnect ABS/TCS control unit connector.
2. Check continuity between ABS/TCS control unit connector terminals and solenoid valve relay terminals.

Control unit	Solenoid valve relay
㊲	②
②	①
㉚	③

Continuity should exist.

NG → Check the following.
- Harness connector (E114)
- Harness for open or short between solenoid valve relay terminal (relay box side) and ABS/TCS control unit

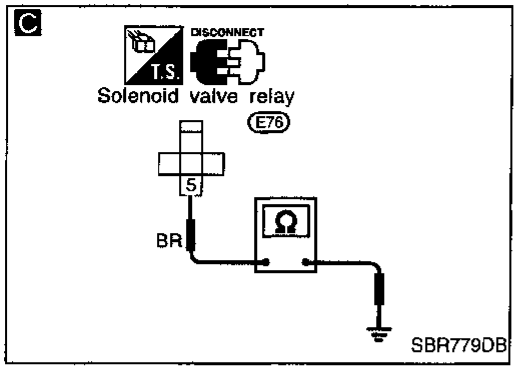
If NG, repair harness or connectors.

OK ↓

Ⓑ
(Go to next page.)

Diagnostic Procedure 10 (ABS ACTUATOR RELAY — Solenoid valve relay) (Cont'd)

C



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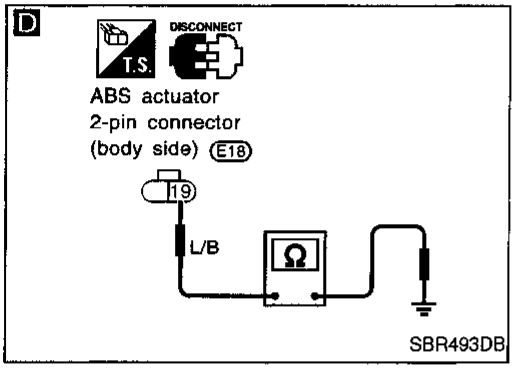
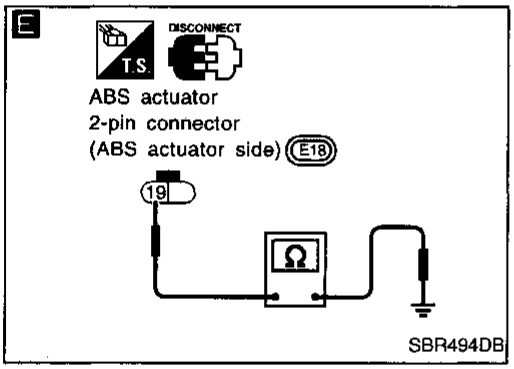


E



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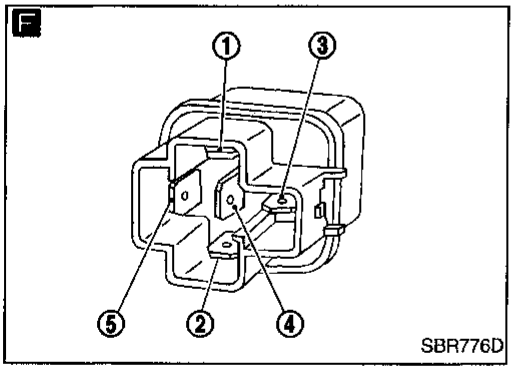


Ⓐ

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

No → Inspection end

Yes

C

RELAY UNIT POWER SUPPLY CIRCUIT

1. Remove solenoid valve relay.
2. Check continuity between solenoid valve relay terminal ⑤ and ground.
   Continuity should not exist.

NG → Check the following.
- Harness connector E76
- Harness for open or short between solenoid valve terminal (relay box side) and fusible link

If NG, repair harness or connectors.

OK

D

1. Disconnect ABS actuator 2-pin connectors and ABS/TCS control unit connector.
2. Check continuity between ABS actuator 2-pin connector E18 (body side) terminal ⑲ and ground.
   Continuity should not exist.

NG → Replace ABS relay box.

OK

E

Check continuity between ABS actuator 2-pin connector E18 (ABS actuator side) terminal ⑲ and ground.
Continuity should not exist.

NG → Replace ABS actuator.

OK

Go to Diagnostic Procedure 7, BR-58.

Ⓑ

F

SOLENOID VALVE RELAY CHECK

NG → Replace solenoid valve relay.

Relay type		Solenoid valve relay	
Condition		Continuity existence between terminals	
		③ and ④	③ and ⑤
Battery voltage not applied between each terminal	① and ②	Yes	No
Battery voltage applied between each terminal	① and ②	No	Yes

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

OK

Go to Diagnostic Procedure 7, BR-58.

Diagnostic Procedure 11 (BATTERY VOLTAGE — Low or high voltage)

Malfunction code No. 57

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

No → Inspection end

Yes

A

CONTROL UNIT POWER SUPPLY CHECK

1. Disconnect ABS/TCS control unit connector.
2. Check voltage between ABS/TCS control unit connector terminal ① and ground.
   Battery voltage should exist when ignition switch is turned ON.

NG → Ⓐ (See below.)

OK

CONTROL UNIT GROUND CHECK

Refer to ABS/TCS CONTROL UNIT GROUND in Ground Circuit Check, BR-52.

NG → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and ground

If NG, repair harness or connectors.

OK

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

Ⓐ

Check 10A fuse 15 (Engine control) for control unit. Refer to POWER SUPPLY ROUTING in EL section.

NG → Replace fuse.

OK

Check continuity between battery and ABS/TCS control unit connector terminal ①.

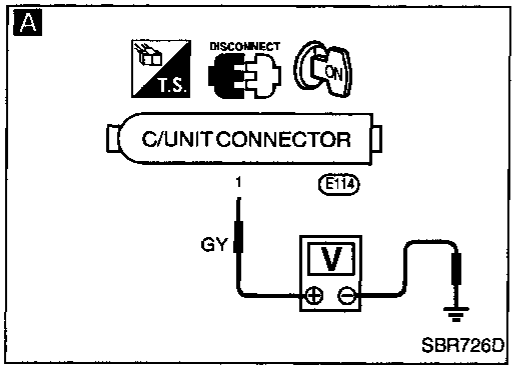
NG → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK

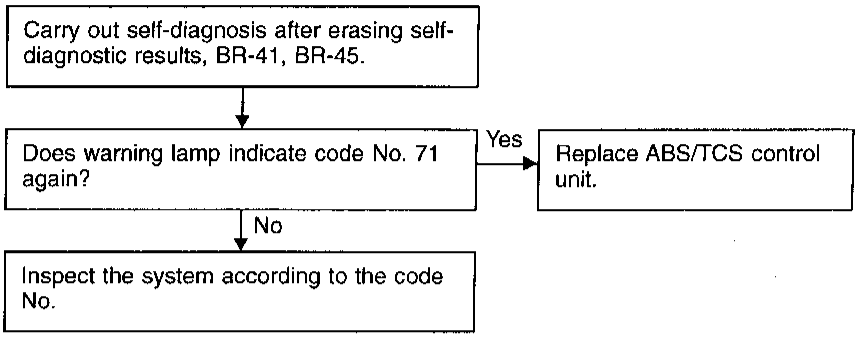
Check battery. Refer to BATTERY in EL section.

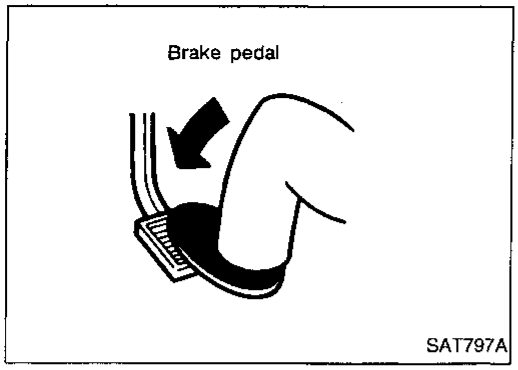
A



Diagnostic Procedure 12 (Control unit)

Malfunction code No. 71





Diagnostic Procedure 13 (Pedal vibration and noise)

1. Apply brake.
2. Start engine.
3. Does the symptom appear only when engine is started?

Yes → Carry out self-diagnosis. Refer to BR-41, BR-45.

No ↓

Does the symptom appear when electrical equipment switches (such as headlamp) are operated?

No → Go to B in Diagnostic Procedure 15, BR-70.

Yes ↓

Check wheel sensor shield ground secured with ABS/TCS control unit mounting bolt.

NG → Repair.

OK → Check ABS/TCS control unit pin terminals for damage or the connection of ABS/TCS control unit harness connector. Reconnect ABS/TCS control unit harness connector. Then retest.

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.**

Diagnostic Procedure 14 (Long stopping distance)

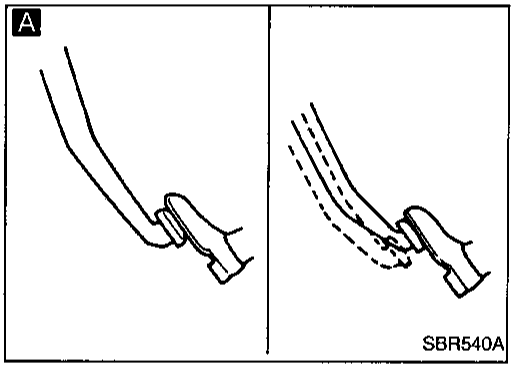
Disconnect ABS solenoid valve relay and check whether stopping distance is still long.

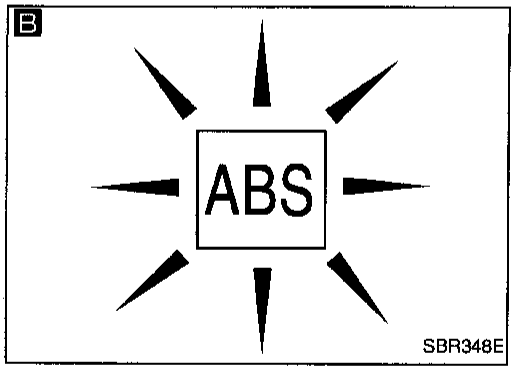
No → Go to B in Diagnostic Procedure 15, BR-70.

Yes ↓

Perform Preliminary Check and air bleeding.

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





Diagnostic Procedure 15 (Unexpected pedal action)

A

Check brake pedal stroke. Is stroke excessively large?

Yes → Perform Preliminary Check, refer to BR-34.

No ↓

Disconnect ABS solenoid valve relay and check whether brake is effective.

No → Perform Preliminary Check, refer to BR-34.

Yes ↓

B

Ensure warning lamp remains off while driving.

NG → Carry out self-diagnosis. Refer to BR-41, BR-45.

OK ↓

CHECK WHEEL SENSOR.

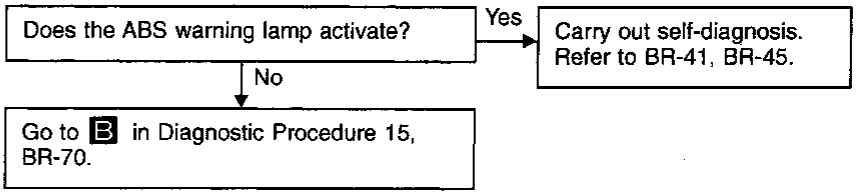
NG → Repair.

1. Check wheel sensor connector for terminal damage or loose connection.
2. Perform wheel sensor mechanical check.
   Refer to "WHEEL SENSOR MECHANICAL CHECK", BR-61.

OK ↓

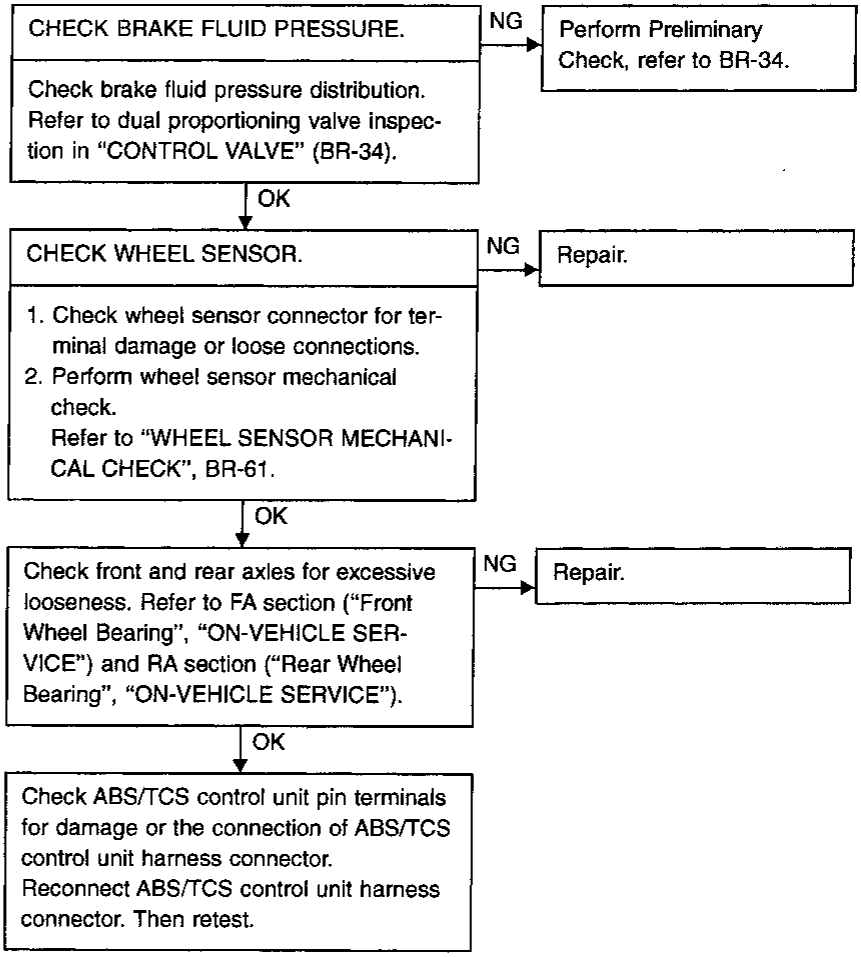
Check ABS/TCS control unit pin terminals for damage or the connection of ABS/TCS control unit harness connector.
Reconnect ABS/TCS control unit harness connector. Then retest.

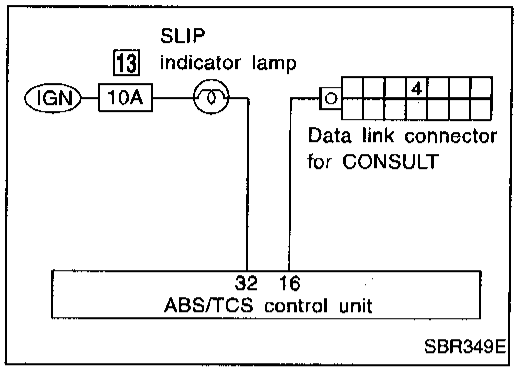
Diagnostic Procedure 16 (ABS does not work.)

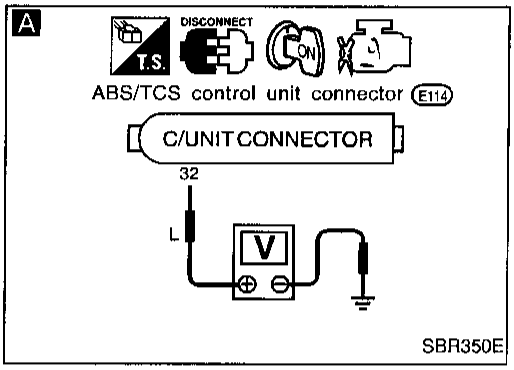


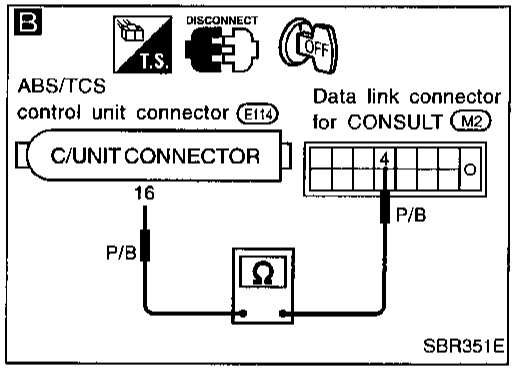
Note: ABS does not work when vehicle speed is under 10 km/h (6 MPH).

Diagnostic Procedure 17 (ABS works frequently.)









Diagnostic Procedure 18 (SLIP indicator lamp does not come on when ignition switch is turned on.)

CONTROL UNIT POWER SUPPLY CIRCUIT

Check 10A fuse 13 for control unit.
For fuse layout, refer to POWER SUPPLY ROUTING in EL section.

NG → Replace fuse.

OK ↓

A

1. Disconnect connector from ABS/TCS control unit.
2. Check voltage between ABS/TCS control unit connector terminal 32 and ground after turning ignition switch "ON".
Battery voltage should exist.

NG → Check warning lamp bulb.

NG → Replace bulb.

OK → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK ↓

B

CIRCUIT CHECK

1. Disconnect ABS/TCS control unit connector.
2. Check continuity between ABS/TCS control unit connector terminal 16 and terminal 4 of data link connector for CONSULT.
Continuity should exist.

NG → Check the following.
- Harness connectors E114, M2
- Harness for open or short between data link connector for CONSULT terminal and ABS/TCS control unit

If NG, repair harness or connectors.

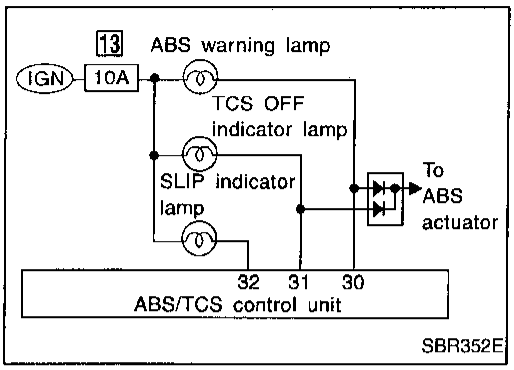
OK ↓

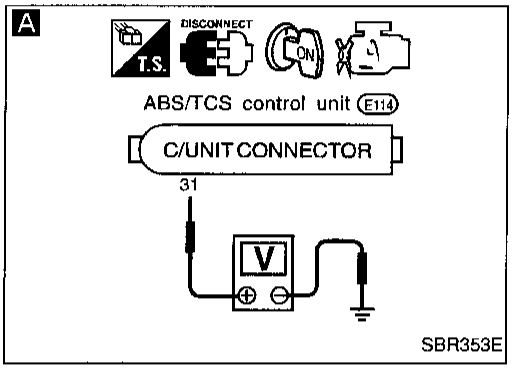
1. Disconnect connectors from ABS/TCS control unit. Check terminals for damage or loose connection. Then reconnect connectors.
2. Carry out self-diagnosis again.
Does warning lamp activate again?

No → Inspection end

Yes ↓

Check items the self-diagnosis detected as faulty.





Diagnostic Procedure 19 (TCS OFF indicator lamp does not come on when ignition switch is turned on.)

WARNING LAMP CIRCUIT CHECK

Check 10A fuse 13 for warning lamp. For fuse layout, refer to POWER SUPPLY ROUTING in EL section.

NG → Replace fuse.

OK ↓

A

1. Install 10A fuse.
2. Disconnect connector from ABS/TCS control unit.
3. Check voltage between ABS/TCS control unit connector terminal 31 and ground after turning ignition switch "ON".
   Battery voltage should exist after turning ignition switch "ON".

NG → Check warning lamp bulb.

NG → Replace bulb.

OK → Repair harness and connectors between fuse box and ABS/TCS control unit connector terminal 31 (including combination meter).

OK ↓

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

No → Inspection end

Yes ↓

Check items the self-diagnosis detected as faulty.

Diagnostic Procedure 20 (ABS warning lamp does not come on when ignition switch is turned on)

WARNING LIGHT CIRCUIT CHECK

Check 10A fuse [13] (meter) for warning lamp. For fuse layout, refer to POWER SUPPLY ROUTING in EL section.

NG → Replace fuse.

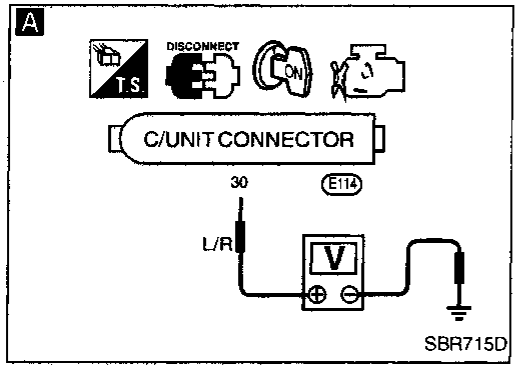
OK ↓

Check ABS warning lamp bulb.

NG → Replace bulb.

OK ↓

A



1. Install 10A fuse and bulb.
2. Remove solenoid valve relay.
3. Disconnect connectors from control unit.
4. Check voltage between ABS/TCS control unit connector terminal ㉚ and ground after turning ignition switch "ON".

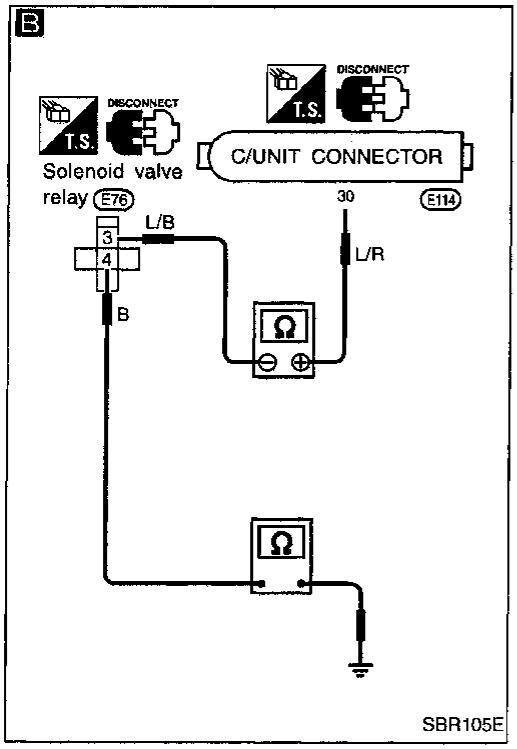
Battery voltage should exist after turning ignition switch "ON".

NG → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK ↓

B



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

ABS control unit	Solenoid valve relay
㉚ ⊕	③ ⊖
Ground	④

Continuity should exist.
Note: Pay attention to tester polarity*.

NG → Check the following.
- Harness connectors E114, E76
- Harness for open or short between solenoid valve relay terminal (relay box side) and ABS/TCS control unit

If NG, repair harness or connectors.

OK ↓

SOLENOID VALVE RELAY CHECK

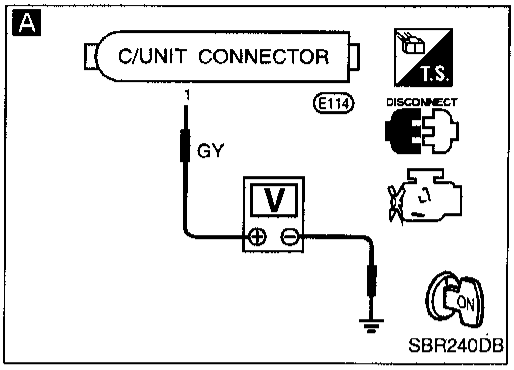
Refer to F in Diagnostic Procedure 10, BR-66.

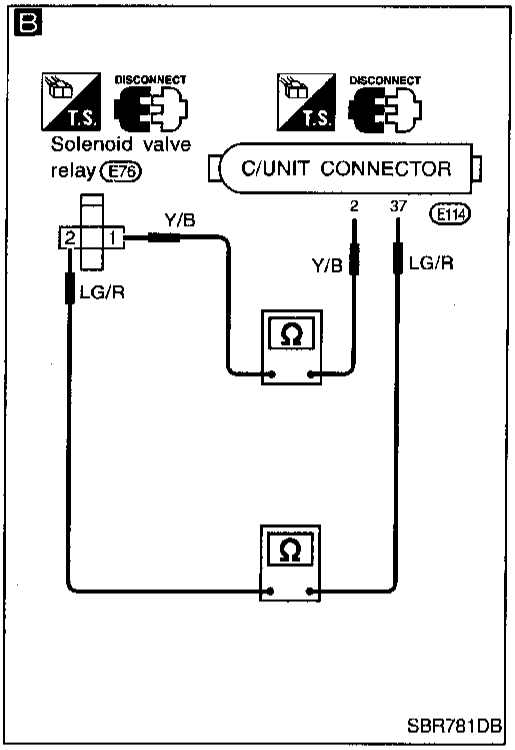
NG → Replace solenoid valve relay.

OK ↓

Go to Diagnostic Procedure 11, BR-67.

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





Diagnostic Procedure 21 (ABS warning lamp stays on continuously.)

CONTROL UNIT POWER SUPPLY CIRCUIT

Check 10A fuse 15 (engine control) for control unit.
For fuse layout, refer to POWER SUPPLY ROUTING in EL section.

NG → (Go to ⑧ on BR-77.)

OK ↓

A

1. Disconnect connector from ABS/TCS control unit.
2. Check voltage between ABS/TCS control unit connector terminal ① and ground after turning ignition switch "ON".

Battery voltage should exist.

NG → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK ↓

B

SOLENOID VALVE RELAY COIL POWER SUPPLY CIRCUIT

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

Control unit	Solenoid valve relay
②	①
㊲	②

Continuity should exist.

NG → Check the following.
- Harness connectors E114, E76
- Harness for open or short between solenoid valve relay terminal (relay box side) ABS/TCS and control unit

If NG, repair harness or connectors.

OK ↓

SOLENOID VALVE RELAY CHECK

Refer to F in Diagnostic Procedure 10, BR-66.

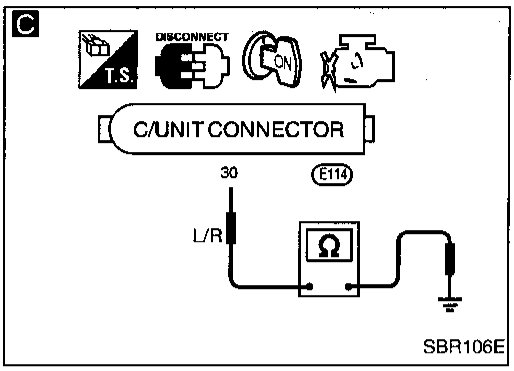
NG → Replace solenoid valve relay.

OK ↓

Ⓐ
(Go to next page.)

Diagnostic Procedure 21 (ABS warning lamp stays on continuously.) (Cont'd)

C



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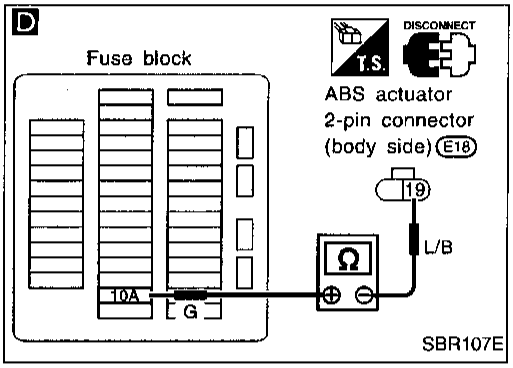
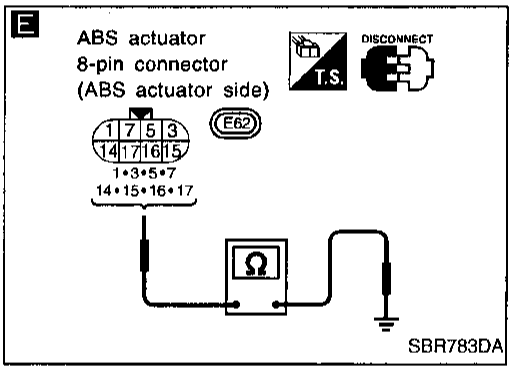


E



Ⓐ

C

GROUND-SHORT CHECK FOR WARNING LAMP CIRCUIT.

1. Turn ignition switch "OFF".
2. Remove solenoid valve relay. Disconnect connectors from ABS/TCS control unit.
3. Check continuity between ABS/TCS control unit connector terminal ㉚ and body ground.
   Continuity should not exist.

NG → Check the following.
- Harness connector E114
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK ↓

D

1. Remove 10A fuse 13 (meter) for warning lamp. For fuse layout, refer to POWER SUPPLY ROUTING in EL section.
2. Disconnect ABS actuator 2-pin connector E18.
3. Check continuity between ABS actuator 2-pin connector (body side) terminal ⑲ ⊖ and 10A fuse 13 (fuse box side) terminal ⊕.
   Continuity should not exist.

Note: Pay attention to tester polarity*.

NG → Check the following.
- Harness connector E18
- Harness for open or short between actuator connector and fuse

If NG, repair harness or connectors.

OK ↓

E

SOLENOID VALVE CIRCUIT

1. Disconnect ABS actuator 8-pin connector E62.
2. Check continuity between each ABS actuator 8-pin connector (ABS actuator side) terminals and body ground.
   Continuity should not exist.

NG → Replace ABS actuator.

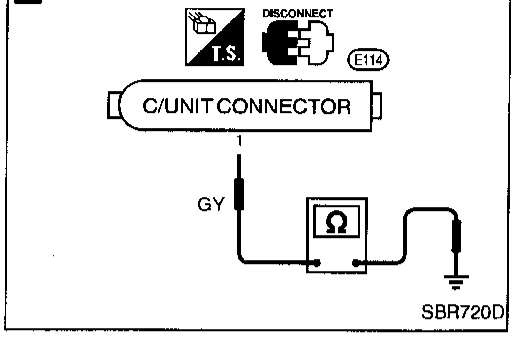
OK ↓

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

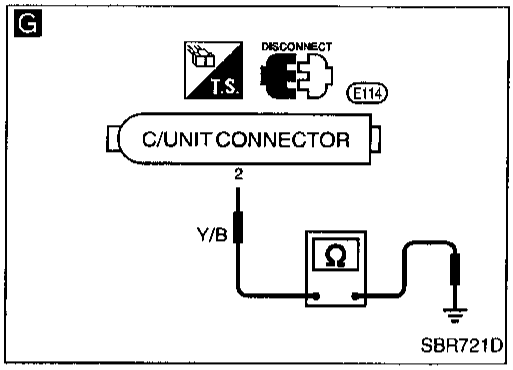
***: Specifications may vary depending on the type of tester. Before performing this inspection, refer to the instruction manual of the tester.**

Diagnostic Procedure 21 (ABS warning lamp stays on continuously.) (Cont'd)

F



G



Ⓑ

Replace 10A fuse [15].
Does the fuse blow out when ignition switch is turned "ON"?

No → Inspection end

Yes

F

ABS/TCS CONTROL UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS/TCS control unit connector.
2. Check continuity between ABS/TCS control unit connector terminal ① and body ground.
   Continuity should not exist.

NG → Check the following.
- Harness connector (E114)
- Harness for open or short between ABS/TCS control unit and fuse

If NG, repair harness or connectors.

OK

G

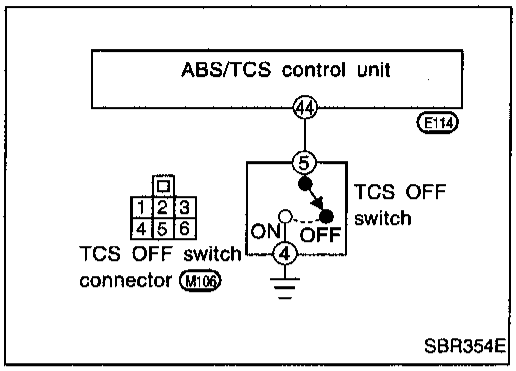
Check continuity between ABS/TCS control unit connector terminal ② and body ground.
Continuity should not exist.

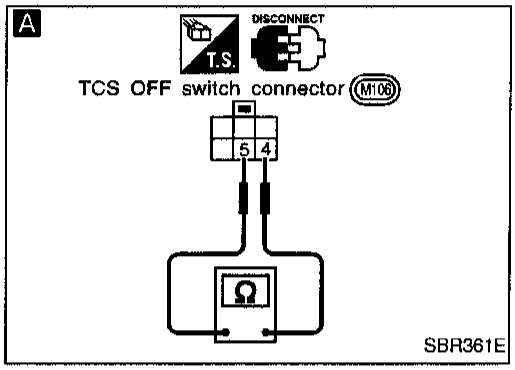
NG → Check the following.
- Harness connectors (E114), (E76), (E77)
- Harness for open or short between actuator connector and solenoid valve relay terminal (relay box side)

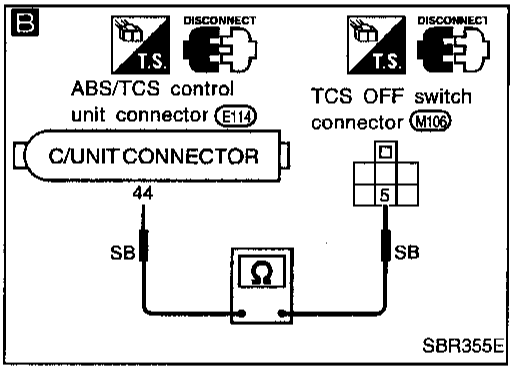
If NG, repair harness or connectors.

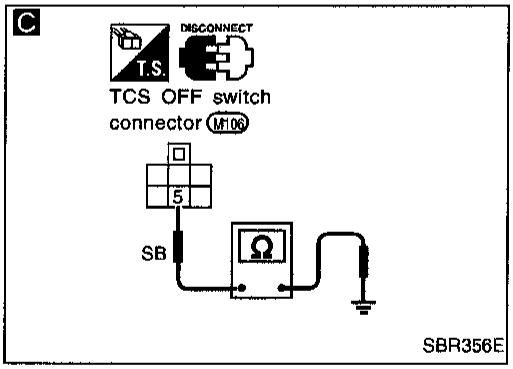
OK

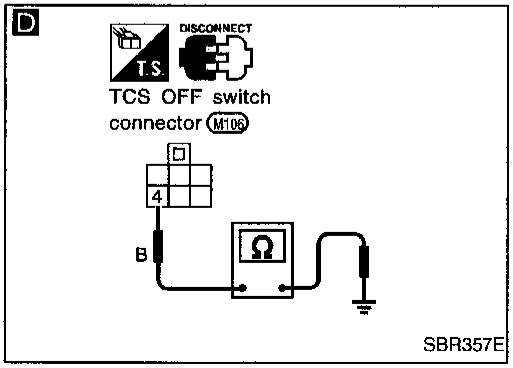
Check ABS/TCS control unit pin terminals for damage or the connection of ABS/TCS control unit harness connector.
Reconnect ABS/TCS control unit harness connector. Then retest.











Diagnostic Procedure 22 (TCS OFF switch is inoperative.)

A

CHECK TCS OFF SWITCH.

1. Remove TCS OFF switch and disconnect TCS OFF switch connector.
2. Check continuity between terminal ⑤ and ④ for TCS OFF switch connector.

When TCS OFF switch is pressed:
Continuity should exist.
When TCS OFF switch is released:
Continuity should not exist.

NG → Replace TCS OFF switch.

OK ↓

B

- Disconnect connector from ABS/TCS control unit.
- Check continuity between terminal ㊹ for ABS/TCS control unit connector and terminal ⑤ for TCS OFF switch connector.

Continuity should exist.

NG → Check the following.
- Harness connectors E114, M106
- Harness for open or short between TCS OFF switch terminal (body side) and ABS/TCS control unit

If NG, repair harness or connectors.

OK ↓

C

- Check continuity between terminal ⑤ for TCS OFF switch connector and ground.

Continuity should not exist.

NG → Repair harness and connectors.

OK ↓

D

- Check continuity between terminal ④ for TCS OFF switch connector and ground.

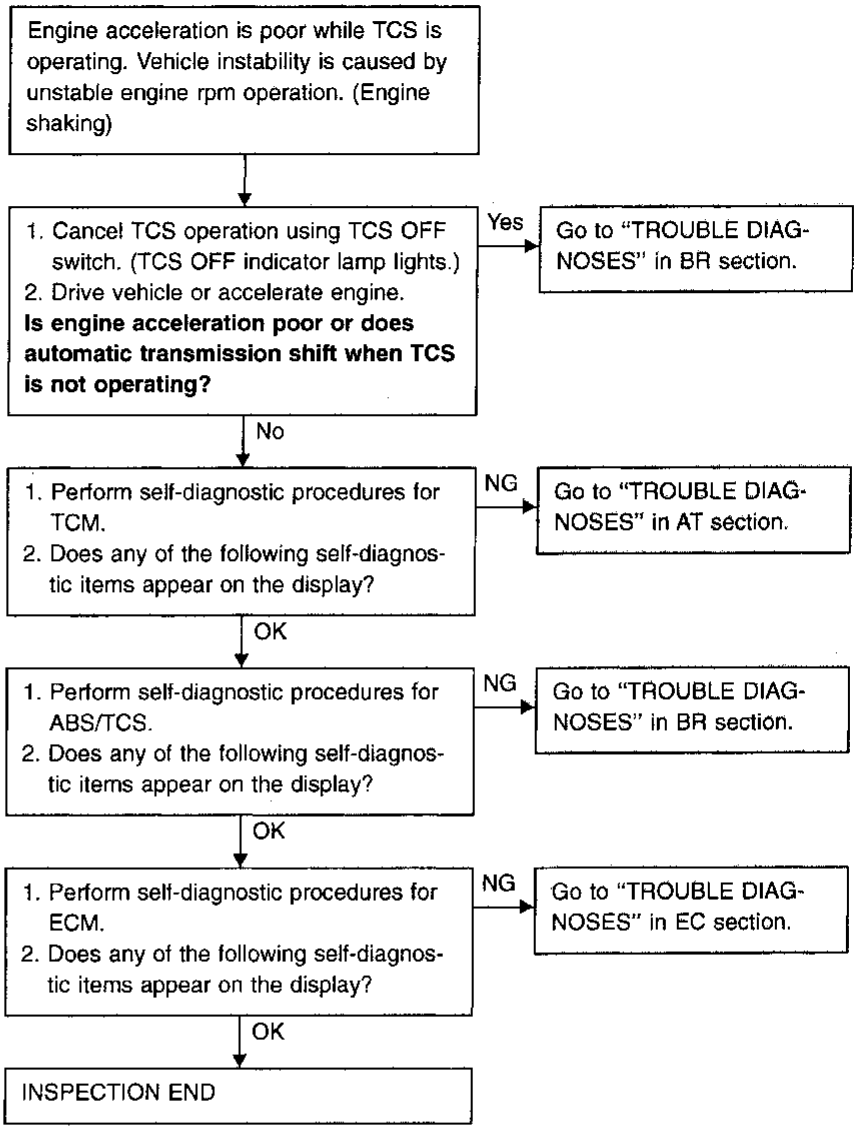
Continuity should exist.

NG → Repair harness and connectors.

OK ↓

Final check

Diagnostic Procedure 23 (Poor acceleration)



General Specifications

Front brake	
Brake model	CL25VB disc brake
Cylinder bore diameter mm (in)	57.2 (2.252)
Pad Length x width x thickness mm (in)	125.6 x 45.3 x 11 (4.94 x 1.783 x 0.43)
Rotor outer diameter x thickness mm (in)	280 x 22 (11.02 x 0.87)
Rear brake	
Brake model	CL9HB disc brake
Cylinder bore diameter mm (in)	33.96 (1.3370)
Pad Length x width x thickness mm (in)	89.1 x 39.5 x 10 (3.508 x 1.555 x 0.39)
Rotor outer diameter x thickness mm (in)	278 x 9 (10.94 x 0.35)

Master cylinder	
Cylinder bore diameter mm (in)	23.81 (15/16)
Control valve	
Valve model	Dual proportioning valve
Split point kPa (kg/cm^2, psi) x reducing ratio	1,961 (20, 284) x 0.2
Brake booster	
Booster model	M215T
Diaphragm diameter mm (in)	Primary: 230 (9.06) Secondary: 205 (8.07)
Recommended brake fluid	DOT 3

Inspection and Adjustment

DISC BRAKE

Brake model	CL25VB	CL9HB
Pad wear limit mm (in)		
Minimum thickness	2.0 (0.079)	1.5 (0.059)
Rotor repair limit mm (in)		
Maximum runout	0.07 (0.0028)	0.15 (0.0059)
Minimum thickness	20.0 (0.787)	8 (0.31)

PARKING BRAKE

Type	Center lever
Number of notches [under force of 196 N (20 kg, 44 lb)]	10 - 11
Number of notches when warning lamp switch comes on	1

BRAKE PEDAL

Free height "H"* mm (in)	
M/T	158 - 165 (6.22 - 6.50)
A/T	167 - 174 (6.57 - 6.85)
Depressed height "D" mm (in) [under force of 490 N (50 kg, 110 lb) with engine running]	M/T: 70 (2.76) A/T: 75 (2.95)
Pedal free play "A" mm (in)	1 - 3 (0.04 - 0.12)
Clearance "C" between pedal stopper and threaded end of stop lamp switch or ASCD switch mm (in)	0.3 - 1.0 (0.012 - 0.039)

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