

Brakes

Conventional Brake Components

Special Tools	19-2
Component Location Index	19-3
Brake System Inspection and Test	19-4
Symptom Troubleshooting	19-5
Brake Pedal and Brake Pedal Position Switch Adjustment	19-6
Parking Brake Inspection and Adjustment	19-7
Brake System Bleeding	19-9
Brake System Indicator Circuit Diagram	19-10
Parking Brake Switch Test	19-11
Brake Fluid Level Switch Test	19-11
Front Brake Pad Inspection and Replacement	19-12
Front Brake Disc Inspection	19-15
Front Brake Caliper Overhaul	19-16
Master Cylinder Replacement	19-17
Master Cylinder Inspection	19-19
Brake Booster Test	19-20
Brake Booster Pushrod Clearance Adjustment	19-21
Brake Booster Replacement	19-22
Rear Brake Pad Inspection and Replacement	19-24
Rear Brake Disc Inspection	19-27
Rear Brake Caliper Overhaul	19-28
Parking Brake Inspection	19-29
Parking Brake Shoe Replacement	19-31
Parking Brake Shoe Lining Break-in	19-34
Brake Pedal Replacement	19-35
Brake Hose and Line Inspection	19-36
Brake Hose Replacement	19-37
Parking Brake Cable Replacement	19-39

Electric Vacuum Pump System 19-41

VSA (Vehicle Stability Assist)

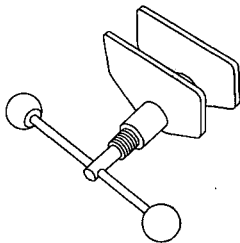
System Components	19-81
-------------------------	-------



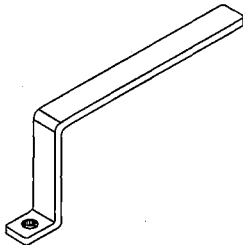
Conventional Brake Components

Special Tools

Ref. No.	Tool Number	Description	Qty
①	07AAE-SEPA101	Brake Caliper Piston Compressor	1
②	070AB-SJA0100	Booster Piston Holder	1



①

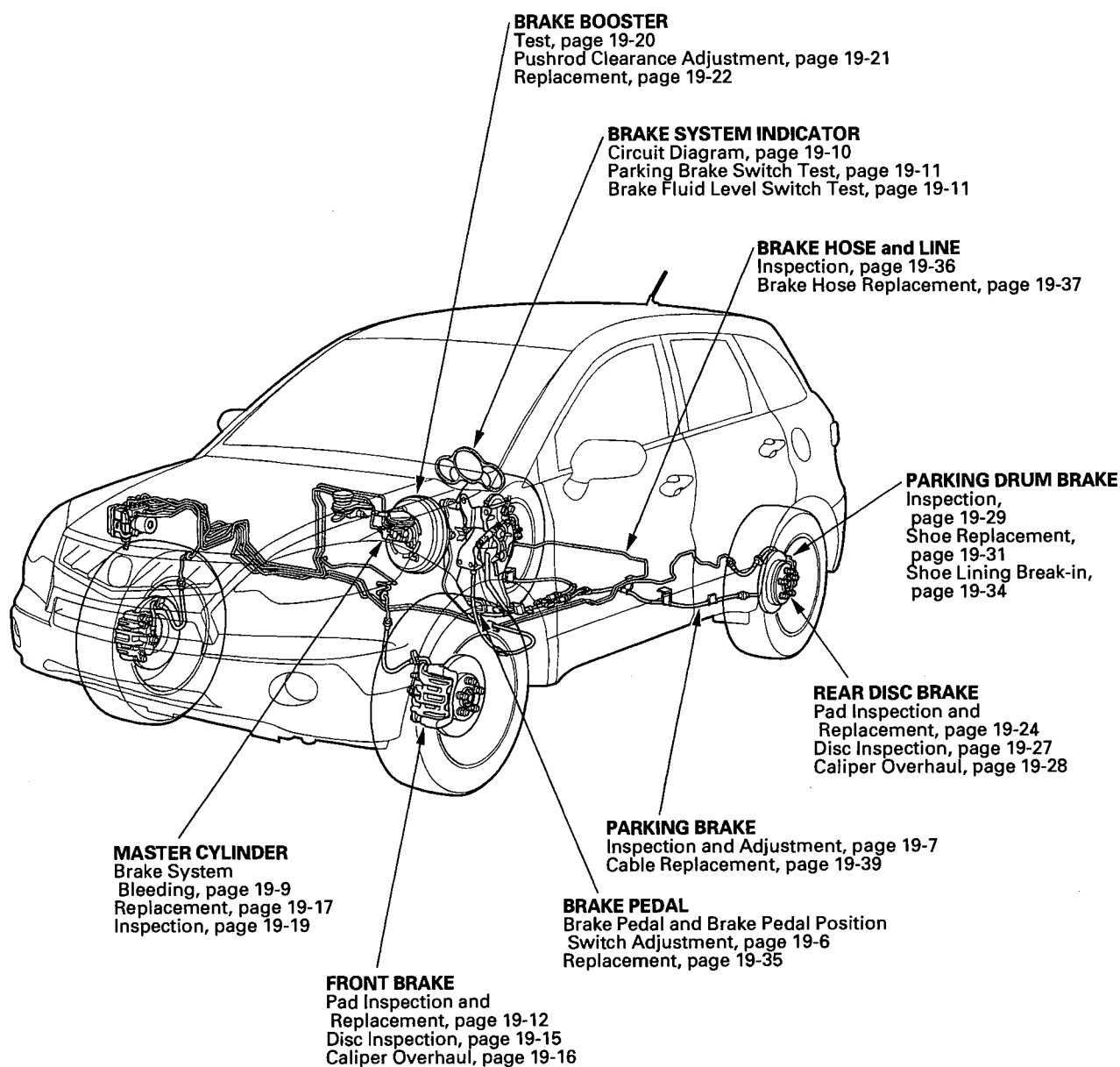


②

cardiagn.com



Component Location Index



Conventional Brake Components

Brake System Inspection and Test

Inspect the brake system components listed. Repair or replace any parts that are leaking or damaged.

Component Inspections:

Component	Procedure	Also check for
Master Cylinder	Look for damage or signs of fluid leakage at: • Reservoir, subreservoir, or master cylinder body. • Lines, reservoir hose and grommets, and their joints. • Between master cylinder and booster.	Bulging seat at reservoir cap. This is a sign of fluid contamination.
Brake Hoses	Look for damage or signs of fluid leakage at: • Line joints and banjo bolt connections. • Hoses and lines, also inspect for twisting or damage.	Bulging, twisted, or bent lines.
Caliper	Look for damage or signs of fluid leakage at: • Piston seal. • Banjo bolt connections. • Bleed screw.	Seized or sticking caliper pins.
VSA Modulator-control Unit	Look for damage or signs of fluid leakage at: • Line joints. • Modulator-control unit.	

Brake System Test

Brake pedal sinks/fades when braking

1. Set the parking brake, and start the engine, then turn off the A/C switch. Allow the engine to warm up to normal operating temperature (radiator fan comes on twice).
2. Attach a 50 mm (2 in.) piece of masking tape along the bottom of the steering wheel, and draw a horizontal reference mark across it.
3. With the transmission in P or N position, press and hold the brake pedal lightly (about the same pressure needed to keep an A/T-equipped vehicle from creeping), then release the parking brake.
4. While still holding the brake pedal, hook the end of the tape measure behind the brake pedal, then pull the tape up to the steering wheel. Note the measurement between the brake pedal and the reference mark on the steering wheel.
5. Apply steady pressure to the brake pedal for 3 minutes.
6. Watch the tape measure.
 - If the measurement increases 10 mm (3/8 in.) or less, the master cylinder is OK.
 - If the measurement increases more than 10 mm (3/8 in.), replace the master cylinder.

NOTE: When the electric vacuum pump motor operates, the brake pedal pressing force will be changed. In this case, the master cylinder is not faulty.



Symptom Troubleshooting

Rapid brake pad wear, vehicle vibration (after a long drive), or high, hard brake pedal

NOTE: Make sure that the caliper pins are installed correctly.

The upper caliper pin B and lower caliper pin A are different. If the pins are installed in the wrong location, it will cause, vibration, uneven or rapid brake pad wear, and possibly uneven tire wear. For proper caliper pin location (see page 19-16).

1. Check the electric vacuum pump system (see page 19-43). Make sure the indicator is not turned on.
2. Drive the vehicle until the brakes drag or until the pedal is high and hard. This can take 20 or more brake pedal applications during an extended test-drive.
3. With the engine running, raise the vehicle on a lift, and spin all four wheels by hand.

Is there brake drag at any of the wheels?

YES—Go to step 4.

NO—Look for other causes of the pad wear, high pedal, or vehicle vibration. ■

4. Turn the engine off, pump the brake pedal to deplete the vacuum in the brake booster, and then spin the wheels again to check for brake drag.

Is there brake drag at any of the wheels?

YES—Go to step 5.

NO—Replace the brake booster (see page 19-22). ■

5. Without removing the brake lines, unbolt and separate the master cylinder from the booster, then spin the wheels to check for brake drag.

Is there brake drag at any of the wheels?

YES—Go to step 6.

NO—Check the brake pedal position switch adjustment and pedal free play (see page 19-6). ■

6. Loosen the hydraulic lines at the master cylinder, then spin the wheels to check for brake drag.

Is there brake drag at any of the wheels?

YES—Go to step 7.

NO—Replace the master cylinder (see page 19-17). ■

7. Loosen the bleed screws at each caliper, then spin the wheels to check for brake drag.

Is there brake drag at any of the wheels?

YES—Disassemble and repair the caliper on the wheel(s) with brake drag. ■

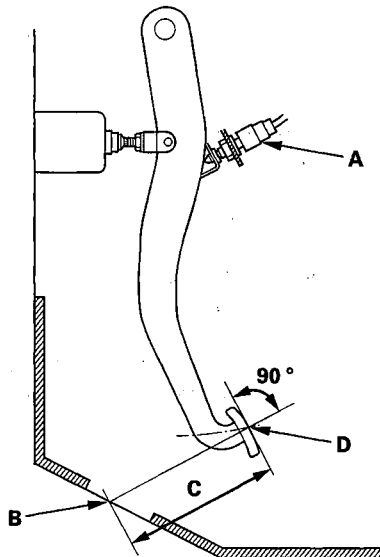
NO—Look for and replace any damaged brake lines. If all brake lines are OK, replace the VSA modulator-control unit (see page 19-137). ■

Conventional Brake Components

Brake Pedal and Brake Pedal Position Switch Adjustment

Pedal Height

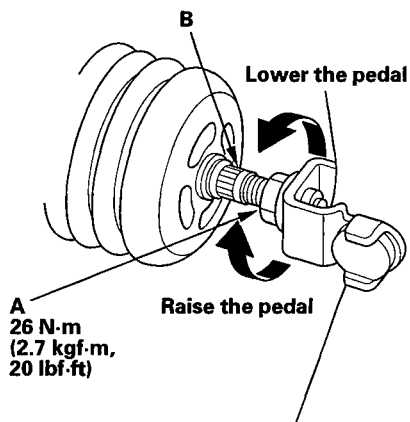
1. Turn the brake pedal position switch (A) counterclockwise, and pull it back until it is no longer touching the brake pedal.



2. Pull back the carpet and find the cutout (B) in the insulator. Lift up the insulator cutout and measure the pedal height (C) at the center of the pedal pad (D) to the floor without the insulator.

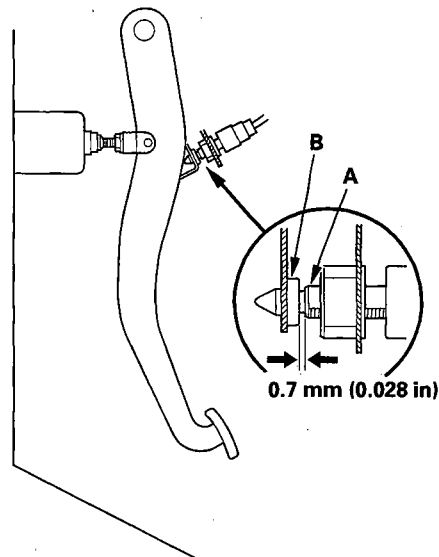
Standard pedal height (with carpet removed):
165 mm (6 1/2 in.)

3. Loosen the pushrod locknut (A), and screw the pushrod (B) in or out with pliers until the standard pedal height from the floor is reached. After adjustment, tighten the locknut firmly. Do not adjust the pedal height with the pushrod pressed.



Brake Pedal Position Switch Clearance

4. Using one hand, lift up on the brake pedal, while doing step 4. Push in the brake pedal position switch until its plunger is fully pressed (threaded end (A) touching the pad (B) on the pedal arm). Then, turn the switch 45 ° clockwise to lock it. The gap between the brake pedal position switch and the pad is automatically adjusted to 0.7 mm (0.028 in.) by locking the switch. Make sure the brake lights go off when the pedal is released.



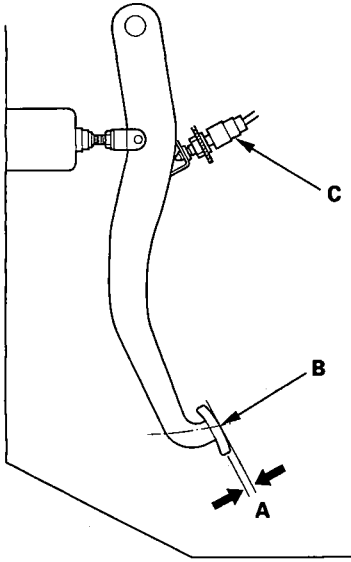
5. Check the brake pedal free play.



Pedal Free Play

1. With the engine off, inspect the pedal free play (A) on the pedal pad (B) by pushing the pedal by hand. If the brake pedal free play is out of specification, adjust the brake pedal position switch (C). If the brake pedal free play is insufficient, it may result in brake drag.

Free play: 1–5 mm (1/16–3/16 in.)

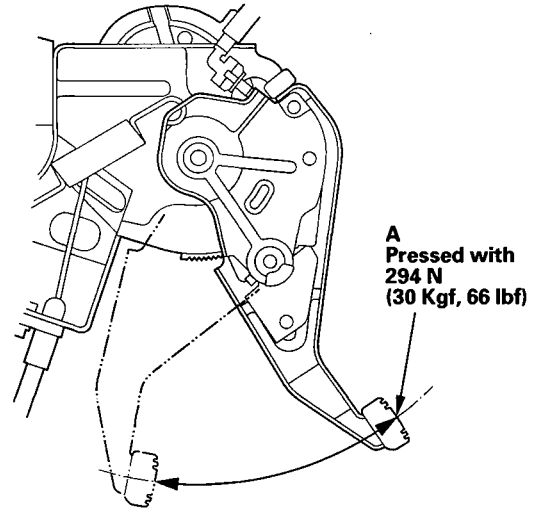


Parking Brake Inspection and Adjustment

Inspection

1. Press the parking brake pedal (A) with 294 N (30 kgf, 66 lbf) of force to fully apply the parking brake. The parking brake pedal should be locked within the specified number of clicks.

Pedal locked clicks: 6 to 7



2. Adjust the parking brake if the pedal clicks are not within the specification.

NOTE: Minor parking brake pedal adjustments (1 to 2 clicks) can be made with the adjusting nut. If a larger adjustment is required, follow the major adjustment procedure using the adjuster at the parking brake drum.

After installing new parking brake shoes and/or new brake disc/drum, make sure you drive the vehicle for "break-in" (see page 19-34).

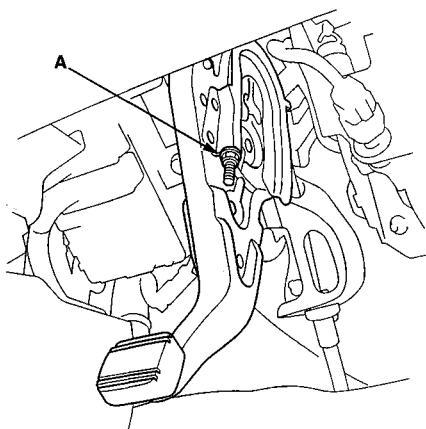
(cont'd)

Conventional Brake Components

Parking Brake Inspection and Adjustment (cont'd)

Minor Adjustment

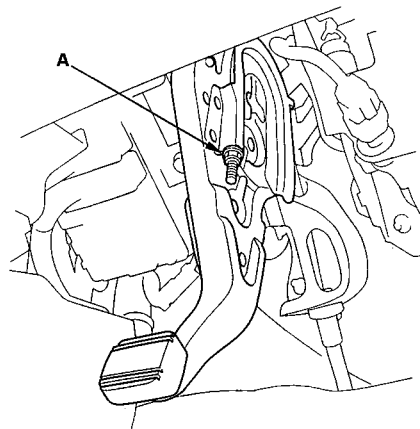
1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Release the parking brake pedal fully.
3. Press the parking brake pedal 1 click.
4. Tighten the parking brake adjusting nut (A) until the parking brakes drag slightly when the rear wheels are turned.



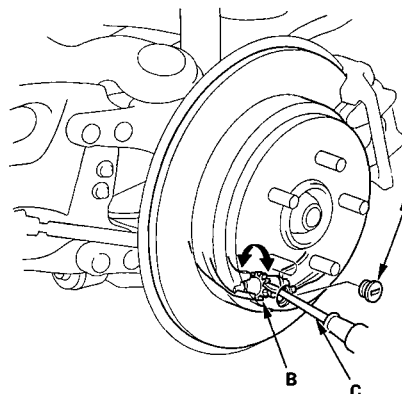
5. Release the parking brake pedal fully, and check that the parking brakes do not drag when the rear wheels are turned. Readjust if necessary.
6. Make sure the parking brakes are fully applied when the parking brake pedal is pressed all the way.

Major Adjustment (to be done when replacing parking brake shoes)

1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Release the parking brake pedal fully.
3. Back off the parking brake adjusting nut (A) in the parking brake pedal.



4. Remove the rear wheels.
5. Remove the access plug (A).



6. Turn the ratchet teeth on the adjuster nut (B) with a flat-tip screwdriver (C) until the shoes lock against the parking brake drum. Then back off the adjuster 8 clicks, and install the access plug.
7. Install the rear wheels.
8. Do the minor adjustment procedure.

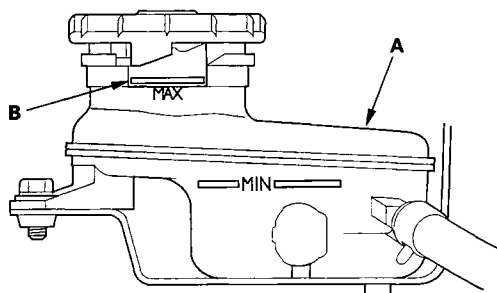


Brake System Bleeding

NOTE:

- Do not reuse the drained fluid. Use only clean Acura DOT 3 Brake Fluid from an unopened container. Using a non-Acura brake fluid can cause corrosion and shorten the life of the system.
- Do not mix different brands of brake fluid; they may not be compatible.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not spill brake fluid on the vehicle, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- The reservoir connected to the master cylinder must be at the MAX (upper) level mark at the start of the bleeding procedure and checked after bleeding each brake line. Add fluid as required.

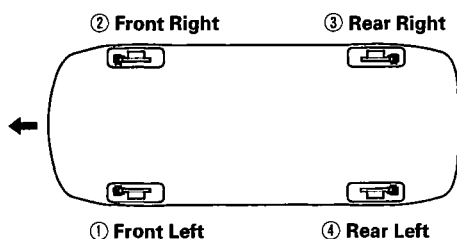
1. Make sure the brake fluid level in the reservoir (A) is at the MAX (upper) level line (B).



2. Have someone slowly pump the brake pedal several times, then apply steady pressure.
3. Start the bleeding at the driver's side of the front brake system.

NOTE: Bleed the calipers or the wheel cylinders in the sequence shown.

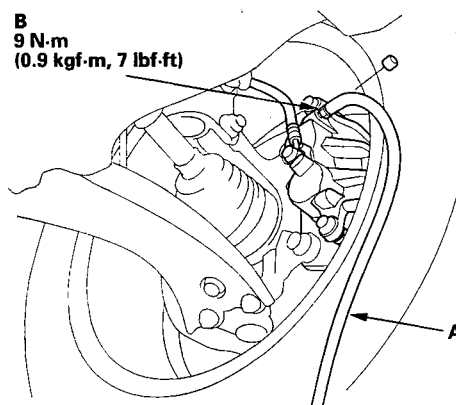
BLEEDING SEQUENCE:



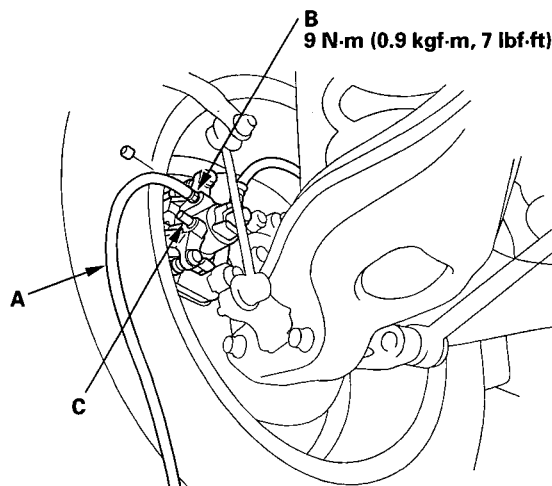
4. Attach a length of clear drain tube (A) to the bleed screw (B), then, loosen the bleed screw to allow air to escape from the system. Then tighten the bleed screw securely.

NOTE: Do not loosen the special bolt (C) on the rear caliper.

Front



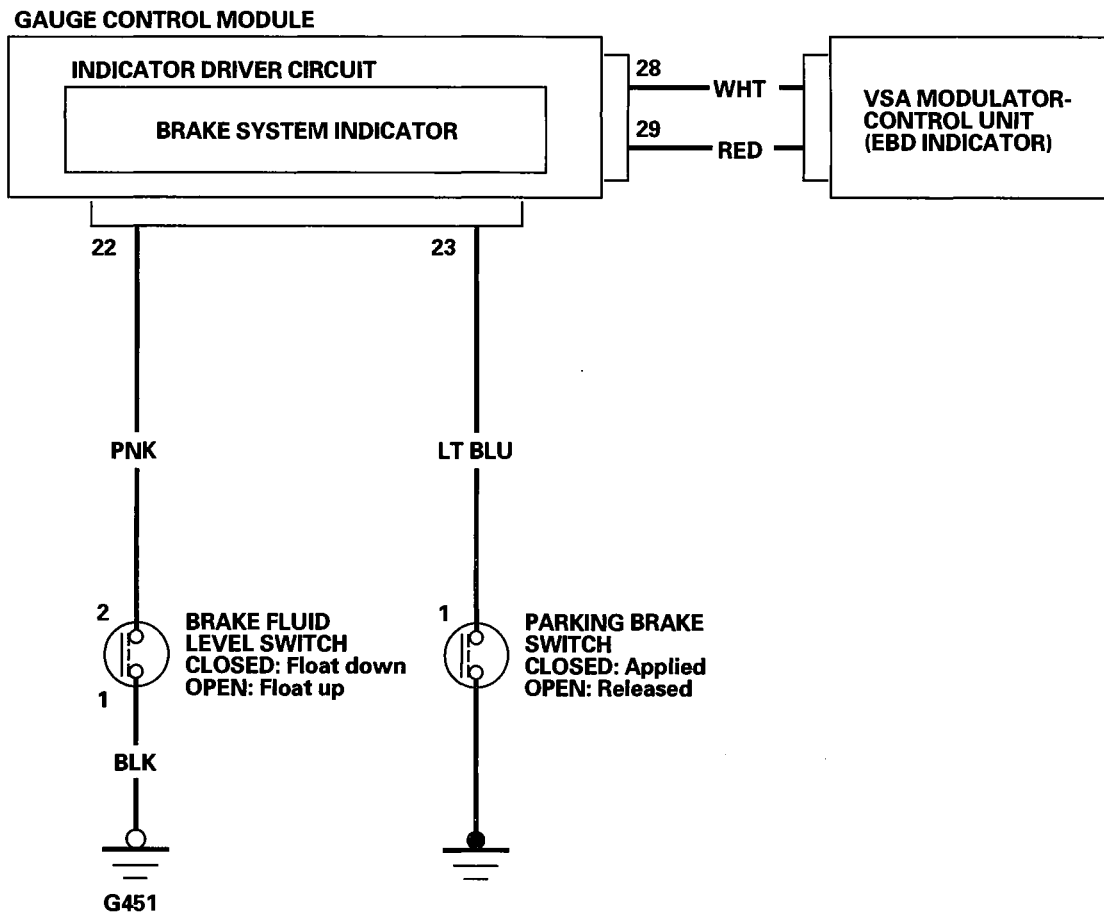
Rear



5. Refill the master cylinder reservoir to the MAX (upper) level line.
6. Repeat the procedure for each brake line until no air bubbles are in the fluid.

Conventional Brake Components

Brake System Indicator Circuit Diagram

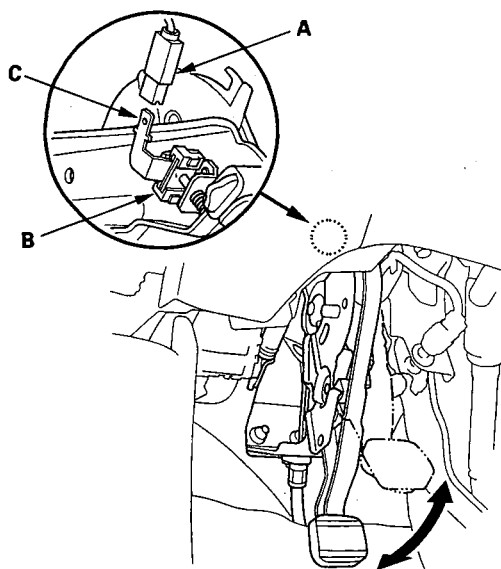




Parking Brake Switch Test

NOTE: If both the ABS/VSA indicator and the brake system indicator come on at the same time, check the VSA system first (see page 19-83).

1. Disconnect the parking brake switch connector (A) from the parking brake switch (B).



2. Check for continuity between the positive terminal (C) and body ground.

- With the parking brake pedal pressed, there should be continuity.
- With the parking brake pedal released, there should be no continuity.

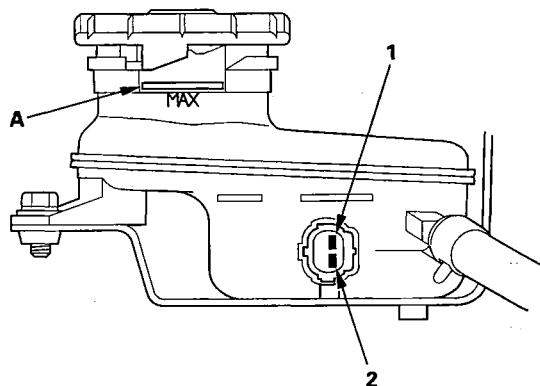
NOTE: If the parking brake switch and fluid level switch are OK, but the brake system indicator does not function, check the VSA system (see page 19-83).

Brake Fluid Level Switch Test

Check for continuity between the terminals (1) and (2) with the float in the down position and in the up position.

NOTE:

- Remove the brake fluid completely from the reservoir. With the float down, there should be continuity.
- Fill the reservoir with brake fluid to the MAX (upper) level (A). With the float up, there should be no continuity.
- If both the ABS/VSA indicator and the brake system indicator come on at the same time, check the VSA system first (see page 19-83).
- If the parking brake switch and fluid level switch are OK, but brake system indicator does not function, check the VSA system (see page 19-83).



Conventional Brake Components

Front Brake Pad Inspection and Replacement

Special Tools Required

Brake caliper piston compressor 07AAE-SEPA101

CAUTION

Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

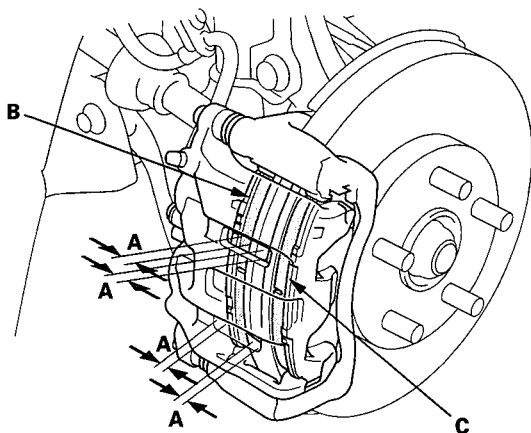
Inspection

1. Raise the front of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the front wheels.
3. Check the thickness (A) of the inner pad (B) and outer pad (C). Do not include the thickness of the backing plate.

Brake pad thickness:

Standard: 11.5—12.2 mm (0.45—0.48 in.)

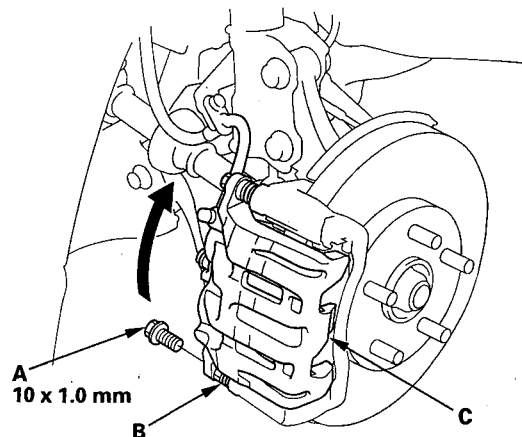
Service limit: 1.6 mm (0.06 in.)



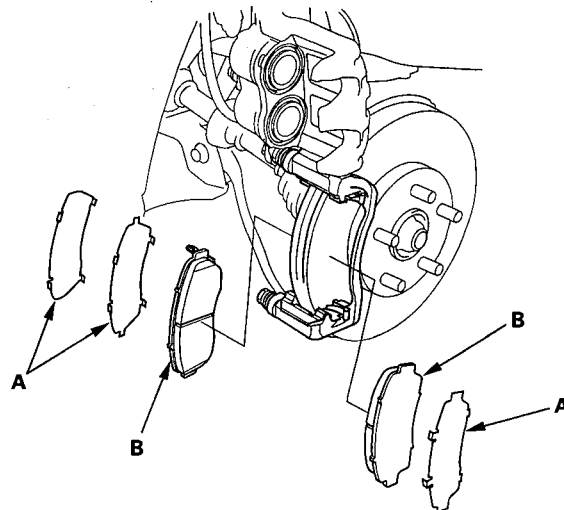
4. If the brake pad thickness is less than the service limit, replace the front brake pads as a set.

Replacement

1. Remove some brake fluid from the master cylinder.
2. Raise the front of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
3. Remove the front wheels.
4. Remove the flange bolt (A) while holding the caliper pin (B) with a wrench. Be careful not to damage the pin boot, and pivot the caliper (C) up out of the way. Check the hose and pin boots for damage and deterioration.

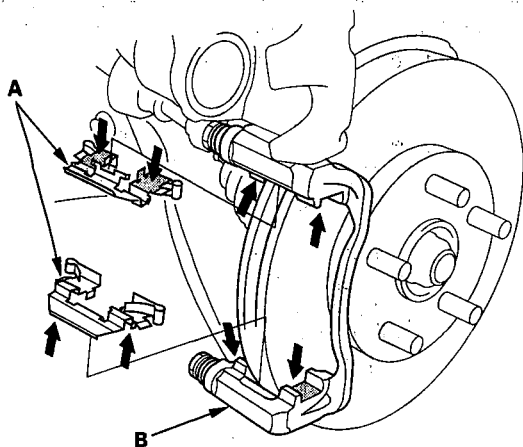


5. Remove the pad shims (A) and brake pads (B).



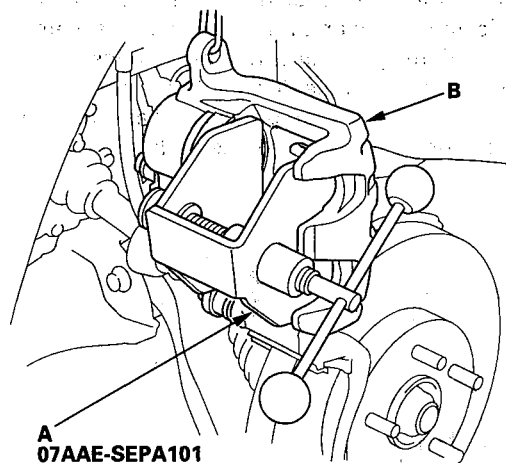


6. Remove the pad retainers (A).



7. Clean the caliper bracket (B) thoroughly; remove any rust, and check for grooves and cracks.
8. Check the brake disc for damage and cracks.
9. Apply a thin coat of M-77 assembly paste (P/N 08798-9010) to the retainers on their mating surfaces (indicated by the arrows) against the caliper bracket.
10. Install the pad retainers. Wipe excess assembly paste off the retainers. Keep any assembly paste off the discs and pads.

11. Mount the brake caliper piston compressor (A) on the caliper body (B).



12. Press in the piston with the brake caliper piston compressor so the caliper will fit over the brake pads. Make sure the piston boot is in position to prevent damaging it when pivoting the caliper down.

NOTE: Be careful when pressing in the piston; brake fluid might overflow from the master cylinder's reservoir.

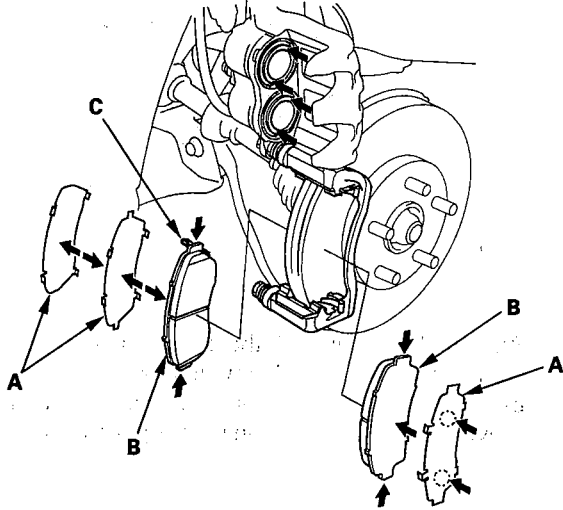
13. Remove the brake caliper piston compressor.

(cont'd)

Conventional Brake Components

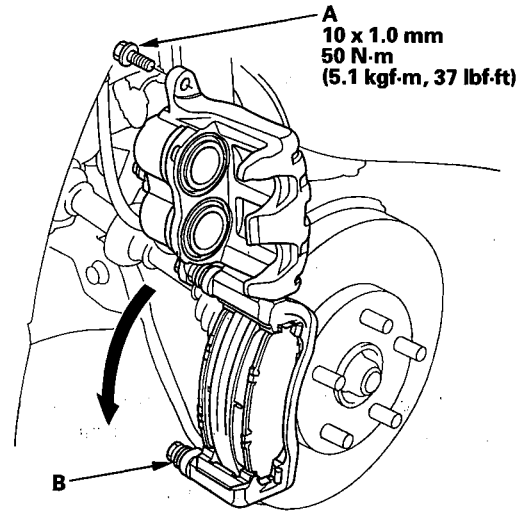
Front Brake Pad Inspection and Replacement (cont'd)

14. Apply a thin coat of M-77 assembly paste (P/N 08798-9010) to the pad side of the shims (A), the back of the brake pads (B) and the other areas indicated by the arrows. Wipe excess assembly paste off the pad shims and brake pads. Contaminated brake discs or brake pads reduce stopping ability. Keep grease and assembly paste off the brake discs and brake pads.



15. Install the brake pads and pad shims correctly. Install the brake pad with the wear indicator (C) on the upper inside. If you are reusing the brake pads, always reinstall the brake pads in their original positions to prevent a momentary loss of braking efficiency.

16. Pivot the caliper down into position. Install the flange bolt (A), and tighten it to the specified torque while holding the caliper pin (B) with a wrench. Be careful not to damage the pin boot.



17. Press the brake pedal several times to make sure the brakes work.

NOTE: Engagement may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.

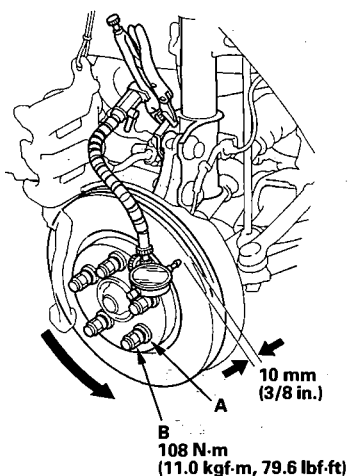
18. Add brake fluid as needed.
19. After installation, check for leaks at hose and line joints or connections, and retighten if necessary. Test-drive the vehicle, then check for leaks (see page 19-36).



Front Brake Disc Inspection

Runout

1. Raise the front of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the front wheels.
3. Remove the brake pads (see page 19-12).
4. Inspect the brake disc surface for damage and cracks. Clean the brake disc thoroughly, and remove all rust.
5. Install suitable flat washers (A) and wheel nuts (B), and tighten the wheel nuts to the specified torque to hold the brake disc securely against the hub.



6. Set up the dial gauge against the brake disc as shown, and measure the runout at 10 mm (3/8 in.) from the outer edge of the brake disc.

Brake disc runout:

Service limit: 0.04 mm (0.0016 in.)

7. If the brake disc is beyond the service limit, refinish the brake disc with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

Max. refinishing limit: 26.0 mm (1.02 in.)

NOTE:

- If the brake disc is beyond the service limit for refinishing, replace it (see page 18-13).
- A new brake disc should be refinished if its runout is greater than 0.04 mm (0.0016 in.).

Thickness and Parallelism

1. Raise the front of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the front wheels.
3. Remove the brake pads (see page 19-12).
4. Using a micrometer, measure the brake disc thickness at eight points, about 45 ° apart and 10 mm (3/8 in.) in from the outer edge of the brake disc. Replace the brake disc if the smallest measurement is less than the max. refinishing limit.

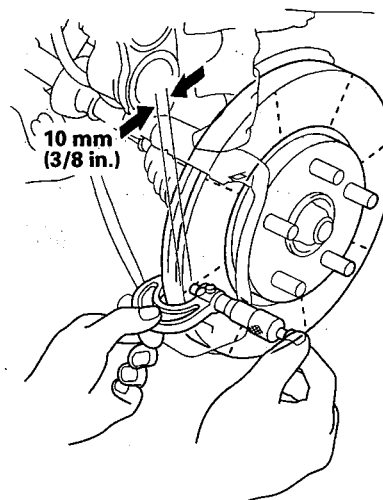
Brake disc thickness:

Standard: 27.8—28.1 mm (1.09—1.11 in.)

Max. refinishing limit: 26.0 mm (1.02 in.)

Brake disc parallelism: 0.015 mm (0.0006 in.) max.

NOTE: This is the maximum allowable difference between the thickness measurements.



5. If the brake disc is beyond the service limit for parallelism, refinish the brake disc with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

NOTE: If the brake disc is beyond the service limit for refinishing, replace it (see page 18-13).

Conventional Brake Components

Front Brake Caliper Overhaul

⚠ CAUTION

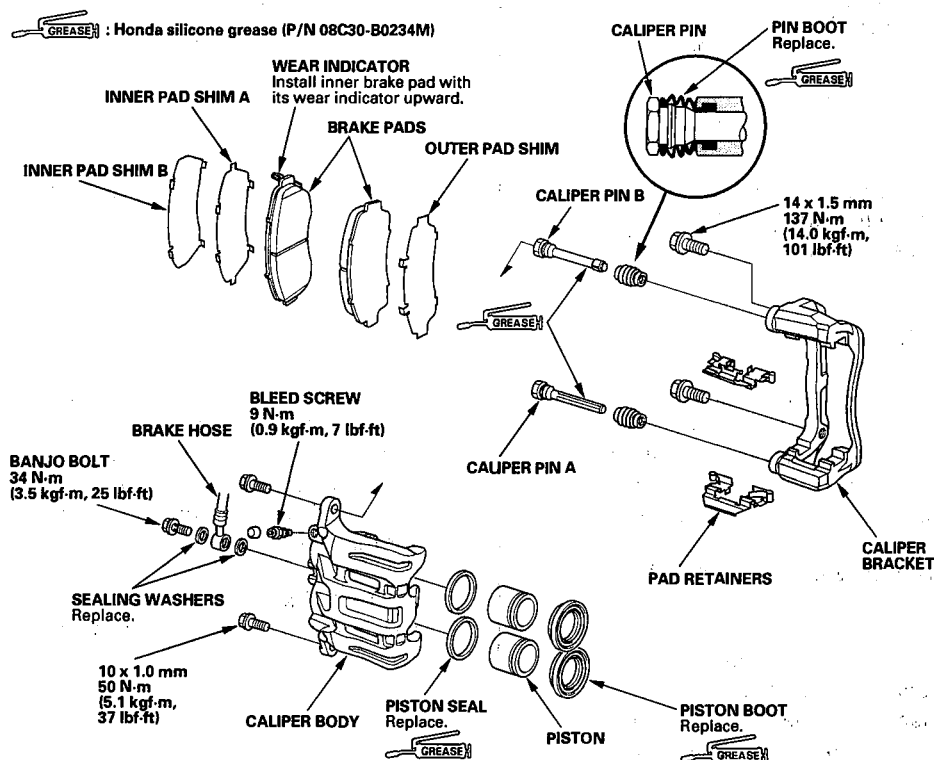
Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

Remove, disassemble, inspect, reassemble, and install the caliper, and note these items:

NOTE: Make sure that the caliper pins are installed correctly. Upper caliper pin B and lower caliper pin A are different. If these caliper pins are installed in the wrong location, it will cause vibration, uneven or rapid pad wear, and possibly uneven tire wear.

- Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid gets on the paint, wash it off immediately with water.
- To prevent dripping brake fluid, cover disconnected hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
- Before reassembling, check that all parts are free of dirt and other foreign particles.
- Replace parts with new ones as specified in the illustration.
- Make sure no dirt or other foreign matter gets in the brake fluid.
- Make sure no grease or oil gets on the brake discs or pads.
- When reusing brake pads, always reinstall them in their original positions to prevent loss of braking efficiency.
- Do not reuse drained brake fluid. Use only clean Acura DOT 3 Brake Fluid from an unopened container. Using a non-Acura brake fluid can cause corrosion and shorten the life of the system.
- Do not mix different brands of brake fluid as they may not be compatible.
- Coat the pistons, piston seal grooves, and caliper bores with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.
- After installing the caliper, check the brake hose and line for leaks, interference, and twisting.



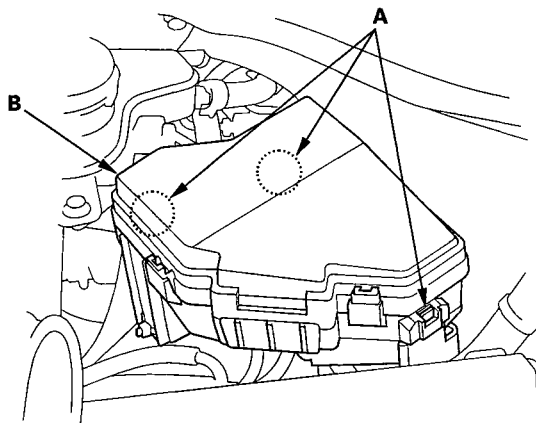


Master Cylinder Replacement

NOTICE

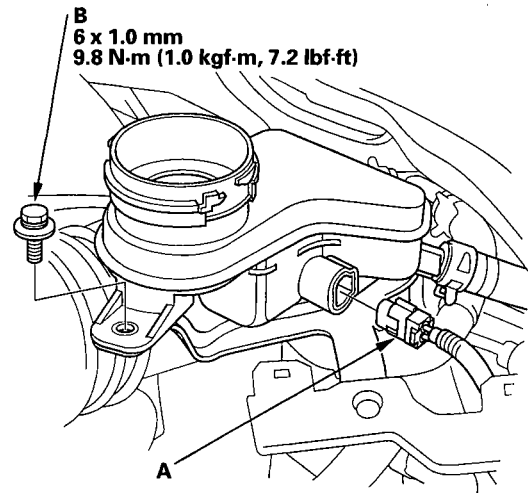
- Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid gets on the paint, wash it off immediately with water.
- Be careful not to damage or deform the brake lines during removal and inspection.
- To prevent the brake fluid from flowing, plug and cover the hose ends and joints with a shop towel or equivalent.

1. Open the air cleaner housing cover (see page 11-394).
2. Release the hooks (A), and move the under-hood fuse/relay box (B) aside. Do not disconnect the connectors.

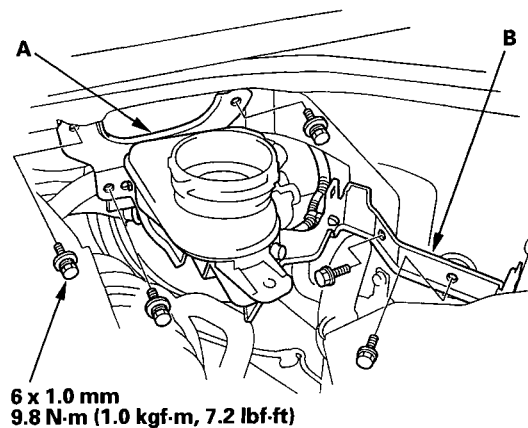


3. Remove the reservoir cap and brake fluid from the master cylinder reservoir with a syringe.

4. Disconnect the brake fluid level switch connector (A).



5. Remove the reservoir mounting bolt (B).
6. Remove the reservoir stay (A) with the under-hood fuse/relay box stay (B).

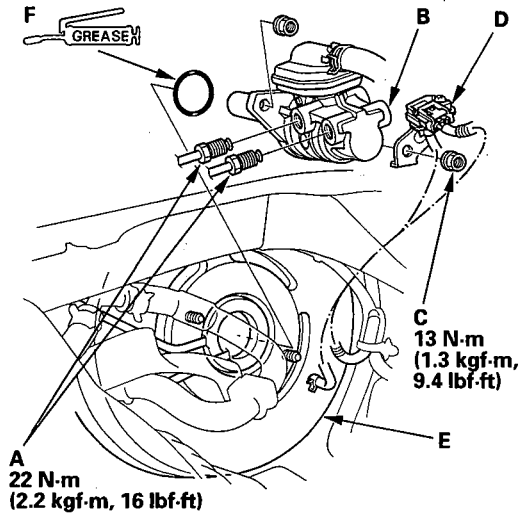


(cont'd)

Conventional Brake Components

Master Cylinder Replacement (cont'd)

7. Disconnect the brake lines (A) from the master cylinder (B). To prevent spills, cover the line joints with rags or shop towels.



8. Remove the master cylinder mounting nuts (C).
9. Remove the brake booster pressure sensor (D) with the stay, and move it aside. Do not damage the sensor and the wire harness.
10. Remove the master cylinder from the brake booster (E). Be careful not to bend or damage the brake lines when removing the master cylinder.
11. Remove the O-ring (F) from the master cylinder.

NOTE: Replace the O-ring whenever the master cylinder is removed.

12. Install the master cylinder in the reverse order of removal, and note these items:

- Check the brake booster pushrod clearance (see page 19-21).
- Coat the new O-ring with the silicone oil (Shin-Etsu KF54).
- Check the brake pedal height and free play after installing the master cylinder, and adjust it if necessary (see page 19-6).

13. Bleed the brake system (see page 19-9).

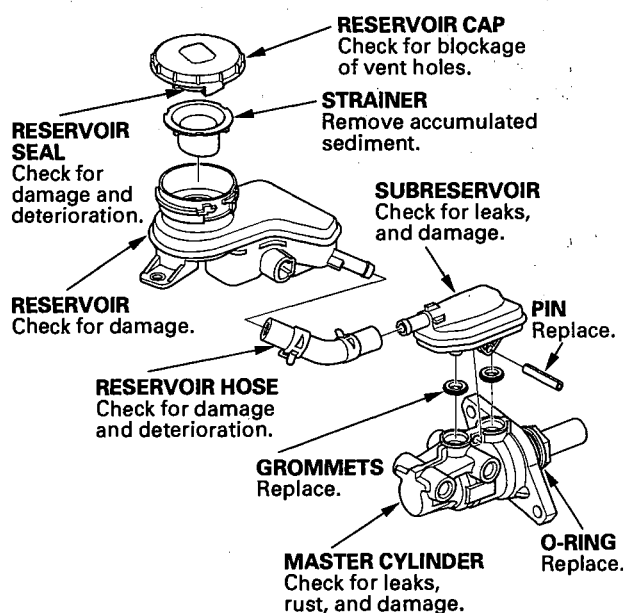
14. Spin the wheels to check for brake drag.



Master Cylinder Inspection

1. Inspect and note these items:

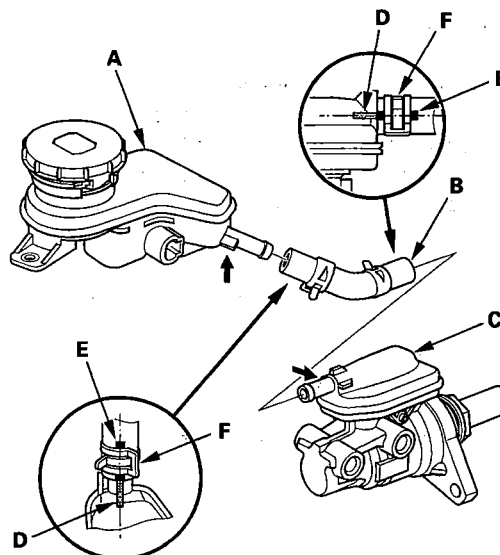
- Before reassembling, check that all parts are free of dirt and other foreign particles.
- Do not try to disassemble the master cylinder assembly. Replace the master cylinder assembly with a new part if necessary.
- Do not allow dirt or foreign matter to contaminate the brake fluid.



- ### 2. If the reservoir hose was disconnected, install the reservoir (A) and the reservoir hose (B) to the subreservoir (C).

NOTE:

- Align the rib plates (D) on the reservoir and subreservoir with the paint marks (E) on the hose.
- Position the direction of the clamp (F).



Conventional Brake Components

Brake Booster Test

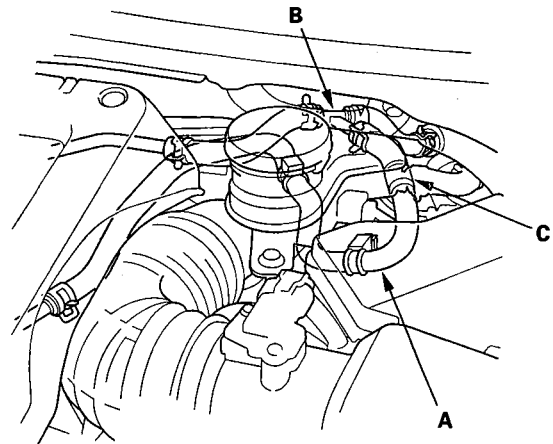
NOTE: The brake boost system on this vehicle is assisted by a electric vacuum pump. When electric vacuum pump system indicator comes on, check the electric vacuum pump system (see page 19-43) first. But the indicator may come on when testing the brake booster. In this case, it is not a fail of electric vacuum pump system. Check for DTC with the HDS, and clear the DTCs (see page 19-46).

Functional Test

1. With the engine off, press the brake pedal several times to deplete the vacuum reservoir, then press the brake pedal hard, and hold it for 15 seconds. If the brake pedal sinks, either the master cylinder is leaking internally, or the brake system is leaking. Inspect the brake hoses and lines (see page 19-36).
2. Start the engine with the brake pedal pressed. If the brake pedal sinks slightly, the vacuum booster is operating normally. If the brake pedal height does not vary, do the leak test.
3. Do the brake system test (see page 19-4).

Leak Test

1. Press the brake pedal with the engine running, then stop the engine. The brake pedal height should not vary while pressed for 30 seconds. If the pedal height rises go to step 6. If it does not rise go to step 2.
2. Start the engine and let it idle for 30 seconds. Turn the ignition switch off, and wait 30 seconds. Press the brake pedal several times using normal pressure. When the pedal is first pressed, it should be low. On consecutive applications, the pedal height should gradually rise. Does the pedal rise on each consecutive application? If it rises the booster is OK. If it does not go to step 3.
3. Disconnect the brake booster vacuum hose (A) from the 3-way joint (B). The check valve (intake manifold) (C) is built into the hose.



4. Start the engine, and let it idle. There should be vacuum available. If no vacuum is available, the check valve (intake manifold) is not working properly. Replace the brake booster vacuum hose and check valve (intake manifold), and retest. If vacuum is found, go to step 5.



5. With the engine off, reconnect the vacuum hose to the 3-way joint.
6. Start the engine, and then pinch the brake booster vacuum hose between the 3-way joint and the booster.
7. Turn the ignition switch off, and wait 30 seconds. Press the brake pedal several times using normal pressure. When the pedal is first pressed, it should be low. On consecutive applications, the pedal height should gradually rise.
 - If the pedal position does not vary go to step 8.
 - If the pedal position varies, replace the brake booster vacuum hose/check valve (intake manifold) assembly.
8. Start the engine, and pinch off the booster vacuum hose between the 3-way joint and electric vacuum pump.
9. Turn the ignition switch off, and wait 30 seconds. Press the brake pedal several times using normal pressure. When the pedal is first pressed, it should be low. On consecutive applications, the pedal height should gradually rise.
 - If the pedal position does not vary inspect the seal between the master cylinder and booster. If the seal is OK, replace the brake booster.
 - If the pedal positions varies, inspect the vacuum hose between the 3-way joint and the electric vacuum pump check valve. If the hose is OK, replace the vacuum hose/check valve (vacuum pump).

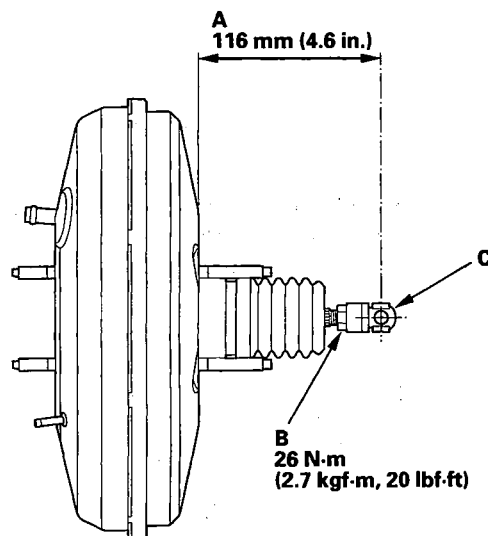
Brake Booster Pushrod Clearance Adjustment

Special Tools Required

Booster piston holder 070AB-SJA0100

NOTE:

- Brake booster pushrod to piston clearance must be checked and readjusted before installing a new master cylinder.
- The master cylinder assembly comes with a tool that must be used to adjust the clearance between the brake booster pushrod and the master cylinder piston.
- Use only the tool that comes with the new master cylinder to check the pushrod clearance. Do not use any other tool.
- Make sure to discard the tool supplied with the master cylinder after its use.
- The brake booster must be installed on the vehicle before doing the pushrod clearance adjustment.
- If the booster is removed, check the pushrod length (A) as shown. If the length is incorrect, loosen the pushrod locknut (B), and turn the yoke (C) in or out to adjust, then install the master cylinder.

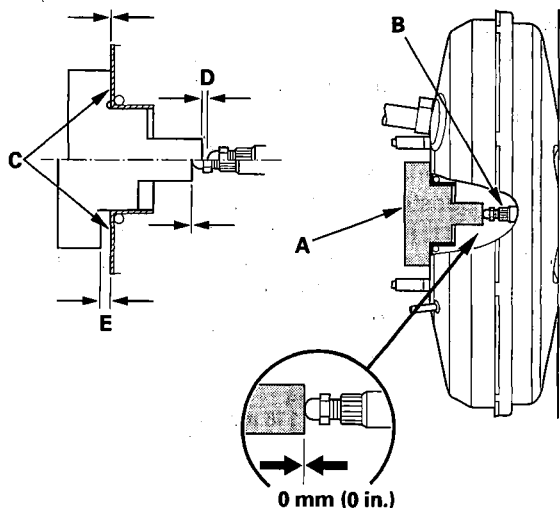


(cont'd)

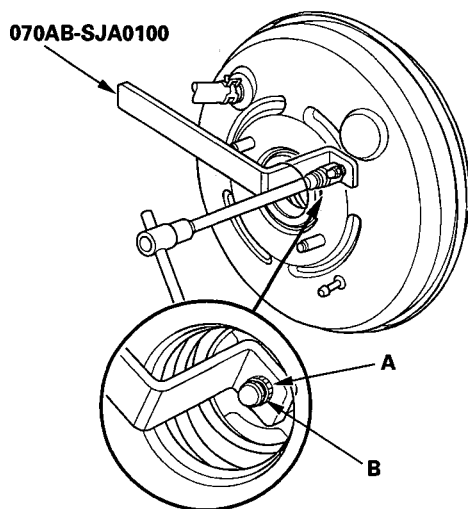
Conventional Brake Components

Brake Booster Pushrod Clearance Adjustment (cont'd)

1. Measure the clearance between the plate (A) supplied with master cylinder and brake booster pushrod (B). Make sure that the tool is lying flat against the surface (C) of the brake booster, and that the tip of the tool contacts the pushrod. If the tool will not lie flat (D) or there is a gap (E) between the tool and the pushrod, go to step 2 to adjust the pushrod in or out.



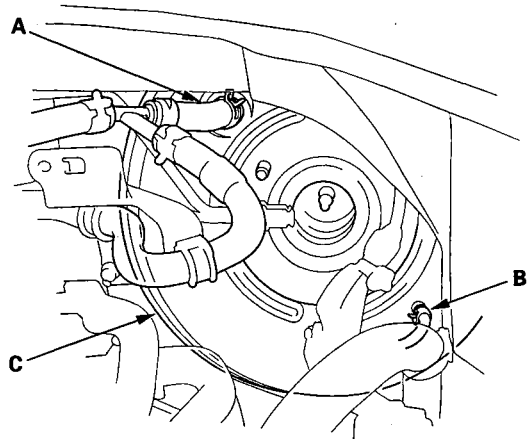
2. If the clearance is incorrect, use the booster piston holder to hold the pushrod (A), and turn the adjusting screw (B) clockwise to increase clearance or counterclockwise to decrease clearance.



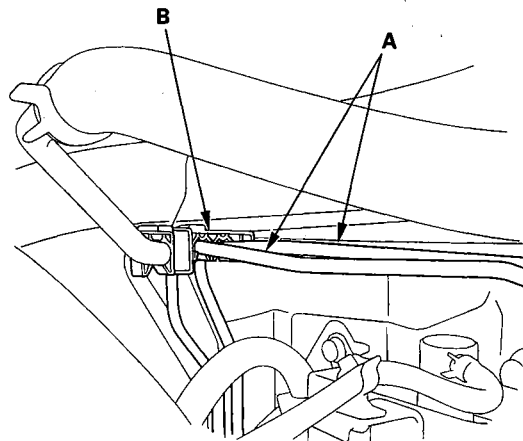
3. Install the master cylinder (see page 19-17).

Brake Booster Replacement

1. Remove the air cleaner (see page 11-394).
2. Remove the master cylinder (see page 19-17).
3. Disconnect the vacuum hose (A) and the brake booster pressure sensor hose (B) from the brake booster (C).

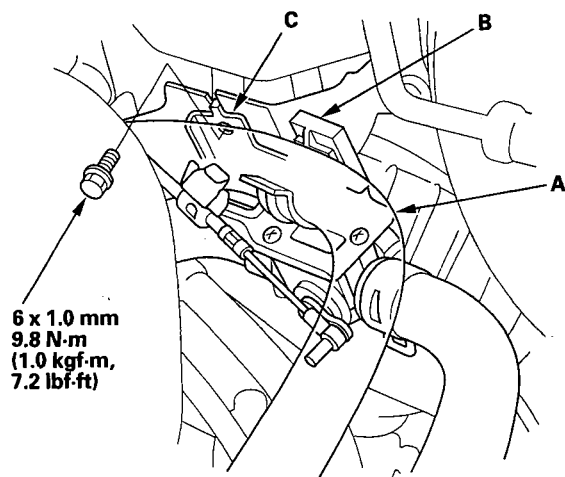


4. Remove the brake lines (A) from the clamp (B).

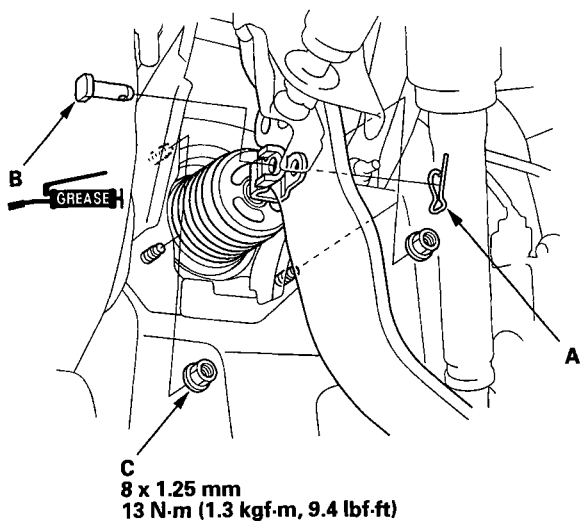




5. Remove the heater hose (A) from the clamp (B).

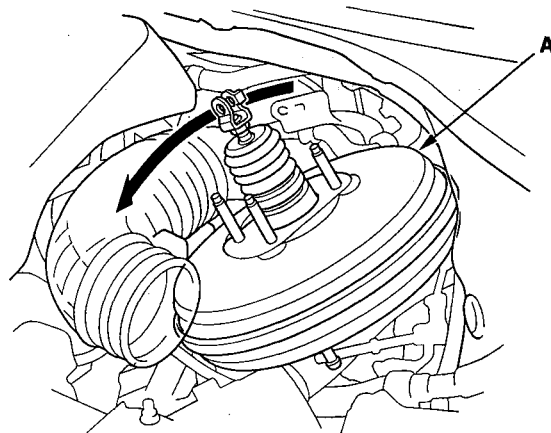


6. Remove the water valve mounting bracket (C). Do not disconnect the heater hoses.
7. Remove the driver's dashboard undercover (see page 20-98).
8. Remove the lock pin (A) and the joint pin (B), then disconnect the yoke from the brake pedal.



9. Remove the brake booster mounting nuts (C).

10. Pull the brake booster (A) forward, then move the brake booster to the front side while turning it.



11. Remove the brake booster upward from the engine compartment.

NOTICE

- Be careful not to damage the booster surfaces and threads of the booster stud bolts.
- Be careful not to bend or damage the brake lines.

12. Install the brake booster in the reverse order of removal, and note these items:

- Adjust the pushrod length before installing the brake booster.
- Always use a new lock pin.
- Install the master cylinder after installing the brake booster (see page 19-17).
- Check the brake pedal height and free play after installing the master cylinder, and adjust it (see page 19-6).
- Bleed the brake system (see page 19-9).

Conventional Brake Components

Rear Brake Pad Inspection and Replacement

Special Tools Required

Brake caliper piston compressor 07AAE-SEPA101

⚠ CAUTION

Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

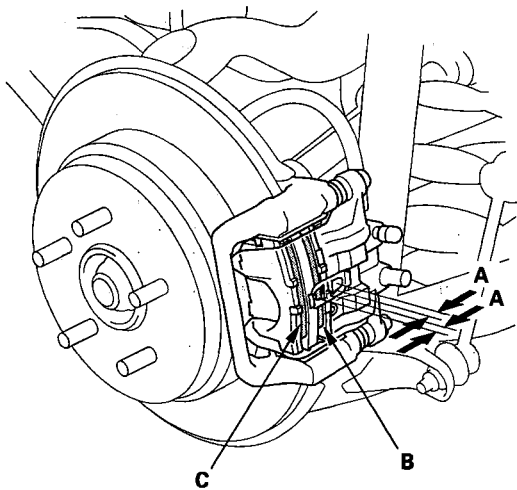
Inspection

1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the rear wheels.
3. Check the thickness (A) of the inner pad (B) and outer pad (C). Do not include the thickness of the backing plate.

Brake pad thickness:

Standard: 8.3—9.0 mm (0.33—0.35 in.)

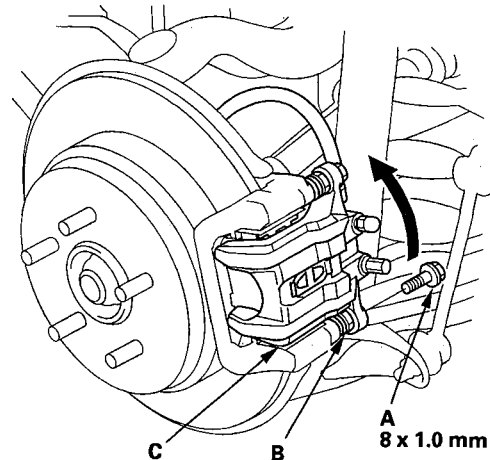
Service limit: 1.6 mm (0.06 in.)



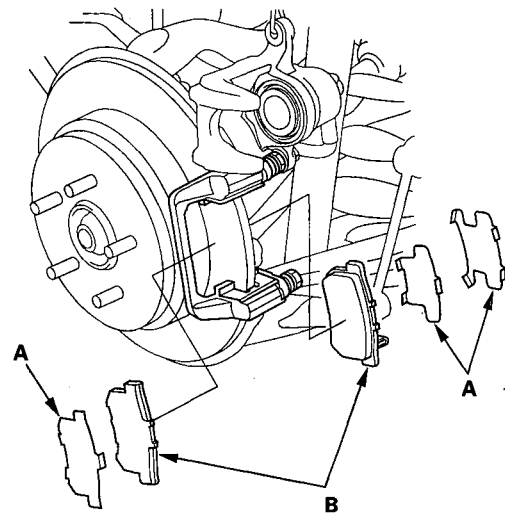
4. If the brake pad thickness is less than the service limit, replace the rear brake pads as a set.

Replacement

1. Remove some brake fluid from the master cylinder.
2. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
3. Remove the rear wheels.
4. Remove the flange bolt (A) while holding the caliper pin (B) with a wrench. Be careful not to damage the pin boot, and pivot the caliper (C) up out of the way. Check the hose and pin boots for damage and deterioration.



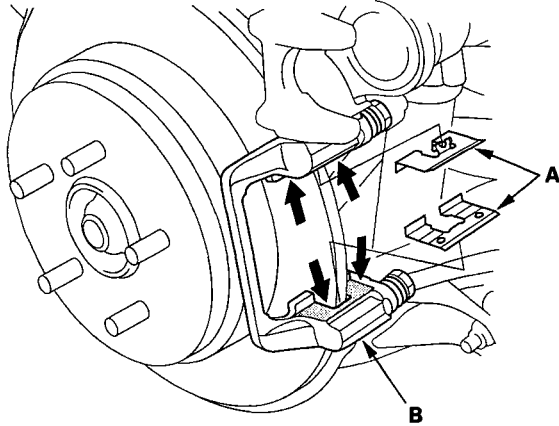
5. Remove the pad shims (A) and brake pads (B).





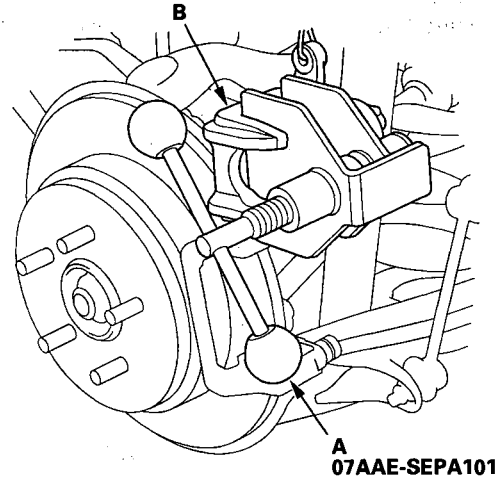
6. Remove the pad retainers (A).

NOTE: The upper and lower pad retainers are different. During installation, make sure the pad retainers are in proper positions.



7. Clean the caliper bracket (B) thoroughly; remove any rust, and check for grooves and cracks.
8. Check the brake disc/drum for damage and cracks.
9. Apply a thin coat of M-77 assembly paste (P/N 08798-9010) to the retainers on their mating surfaces (indicated by the arrows) against the caliper bracket.
10. Install the pad retainers. Wipe excess assembly paste off the retainers. Keep any assembly paste off the discs and pads.

11. Mount the brake caliper piston compressor (A) on the caliper body (B).



12. Press in the piston with the brake caliper piston compressor so the caliper will fit over the brake pads. Make sure the piston boot is in position to prevent damaging it when pivoting the caliper down.

NOTE: Be careful when pressing in the piston; brake fluid might overflow from the master cylinder's reservoir.

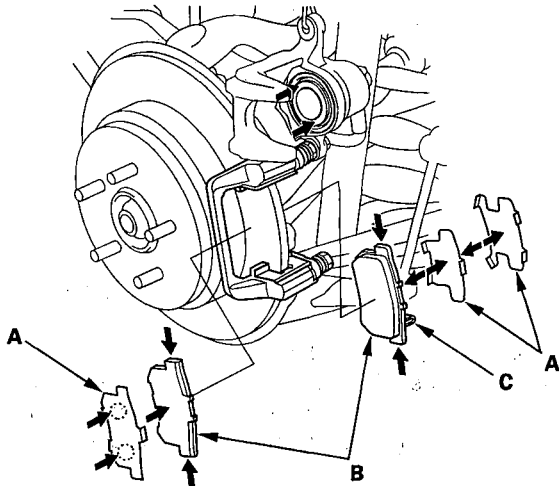
13. Remove the brake caliper piston compressor.

(cont'd)

Conventional Brake Components

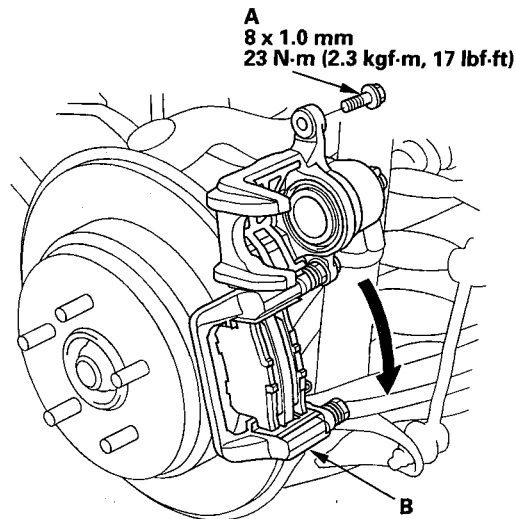
Rear Brake Pad Inspection and Replacement (cont'd)

14. Apply a thin coat of M-77 assembly paste (P/N 08798-9010) to the pad side of the shims (A), the back of the brake pads (B) and the other areas indicated by the arrows. Wipe excess assembly paste off the pad shims and brake pads. Contaminated brake discs or brake pads reduce stopping ability. Keep grease and assembly paste off the brake discs and brake pads.



15. Install the brake pads and pad shims correctly. Install the brake pad with the wear indicator (C) on the bottom inside. If you are reusing the brake pads, always reinstall the brake pads in their original positions to prevent a momentary loss of braking efficiency.

16. Pivot the caliper down into position. Install the flange bolt (A), and tighten it to the specified torque while holding the caliper pin (B) with a wrench. Be careful not to damage the pin boots.



17. Press the brake pedal several times to make sure the brakes work.

NOTE: Engagement may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.

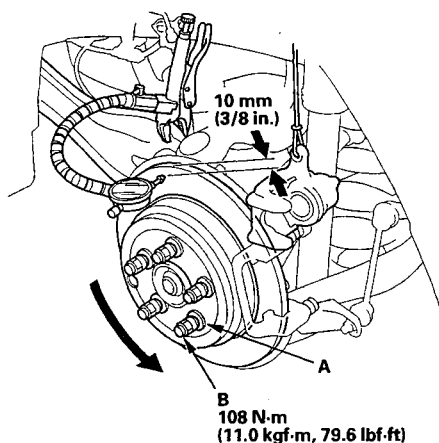
18. Add brake fluid as needed.
19. After installation, check for leaks at hose and line joints or connections, and retighten if necessary. Test-drive the vehicle, then check for leaks (see page 19-36).



Rear Brake Disc Inspection

Runout

1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the rear wheels.
3. Remove the brake pads (see page 19-24).
4. Inspect the brake disc/drum surface for damage and cracks. Clean the brake disc/drum thoroughly, and remove all rust.
5. Install suitable flat washers (A) and wheel nuts (B), and tighten the wheel nuts to the specified torque to hold the brake disc/drum securely against the hub.



6. Set up the dial gauge against the brake disc/drum as shown, and measure the runout at 10 mm (3/8 in.) from the outer edge of the brake disc/drum.

Brake disc/drum runout:

Service limit: 0.04 mm (0.0016 in.)

7. If the brake disc/drum is beyond the service limit, refinish the brake disc/drum with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

Max. refinishing limit: 7.5 mm (0.30 in.)

NOTE:

- If the brake disc/drum is beyond the service limit for refinishing, replace it (see page 18-32).
- A new brake disc/drum should be refinished if its runout is greater than 0.04 mm (0.0016 in.).

Thickness and Parallelism

1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the rear wheels.
3. Remove the brake pads (see page 19-24).
4. Using a micrometer, measure the brake disc/drum thickness at eight points, about 45° apart and 10 mm (3/8 in.) in from the outer edge of the brake disc/drum. Replace the brake disc/drum if the smallest measurement is less than the max. refinishing limit.

Brake disc/drum thickness:

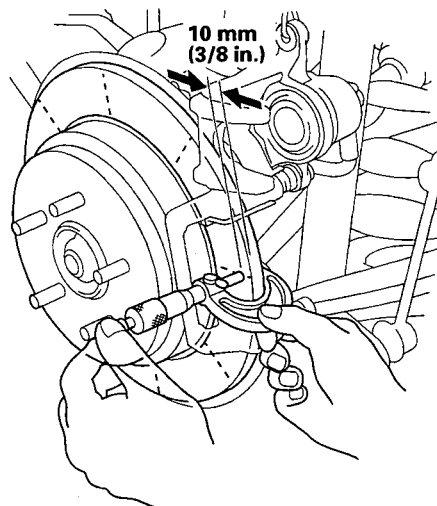
Standard: 8.9—9.1 mm (0.35—0.36 in.)

Max. refinishing limit: 7.5 mm (0.30 in.)

Brake disc/drum parallelism:

0.015 mm (0.0006 in.) max.

NOTE: This is the maximum allowable difference between the thickness measurements.



5. If the brake disc/drum is beyond the service limit for parallelism, refinish the brake disc/drum with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

NOTE: If the brake disc/drum is beyond the service limit for refinishing, replace it (see page 18-32).

Conventional Brake Components

Rear Brake Caliper Overhaul

⚠ CAUTION

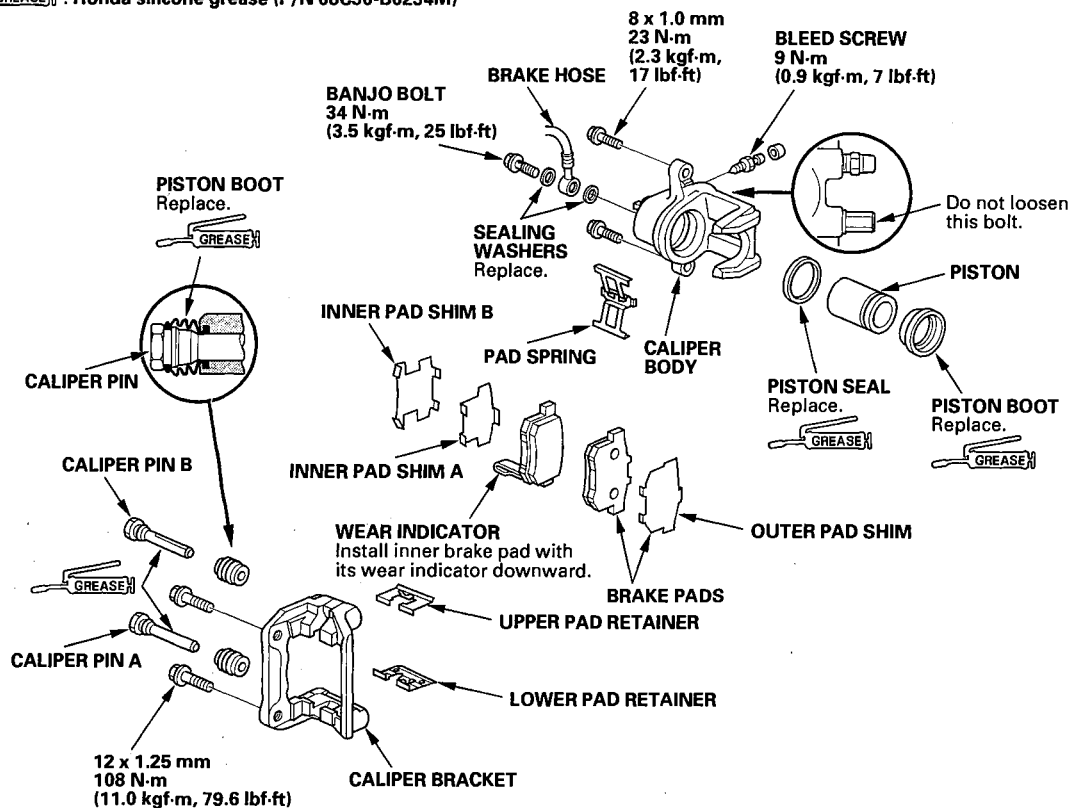
Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

Remove, disassemble, inspect, reassemble, and install the caliper, and note these items:

- Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid gets on the paint, wash it off immediately with water.
- To prevent dripping brake fluid, cover disconnected hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
- Before reassembling, check that all parts are free of dirt and other foreign particles.
- Replace parts with new ones as specified in the illustration.
- Make sure no dirt or other foreign matter gets in the brake fluid.
- Make sure no grease or oil gets on the brake discs or pads.
- When reusing brake pads, always reinstall them in their original positions to prevent loss of braking efficiency.
- Do not reuse drained brake fluid. Use only clean Acura DOT 3 Brake Fluid from an unopened container. Using a non-Acura brake fluid can cause corrosion and shorten the life of the system.
- Do not mix different brands of brake fluid as they may not be compatible.
- Coat the pistons, piston seal grooves, and caliper bores with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.
- After installing the caliper, check the brake hose and line for leaks, interference, and twisting.

 : Honda silicone grease (P/N 08C30-B0234M)





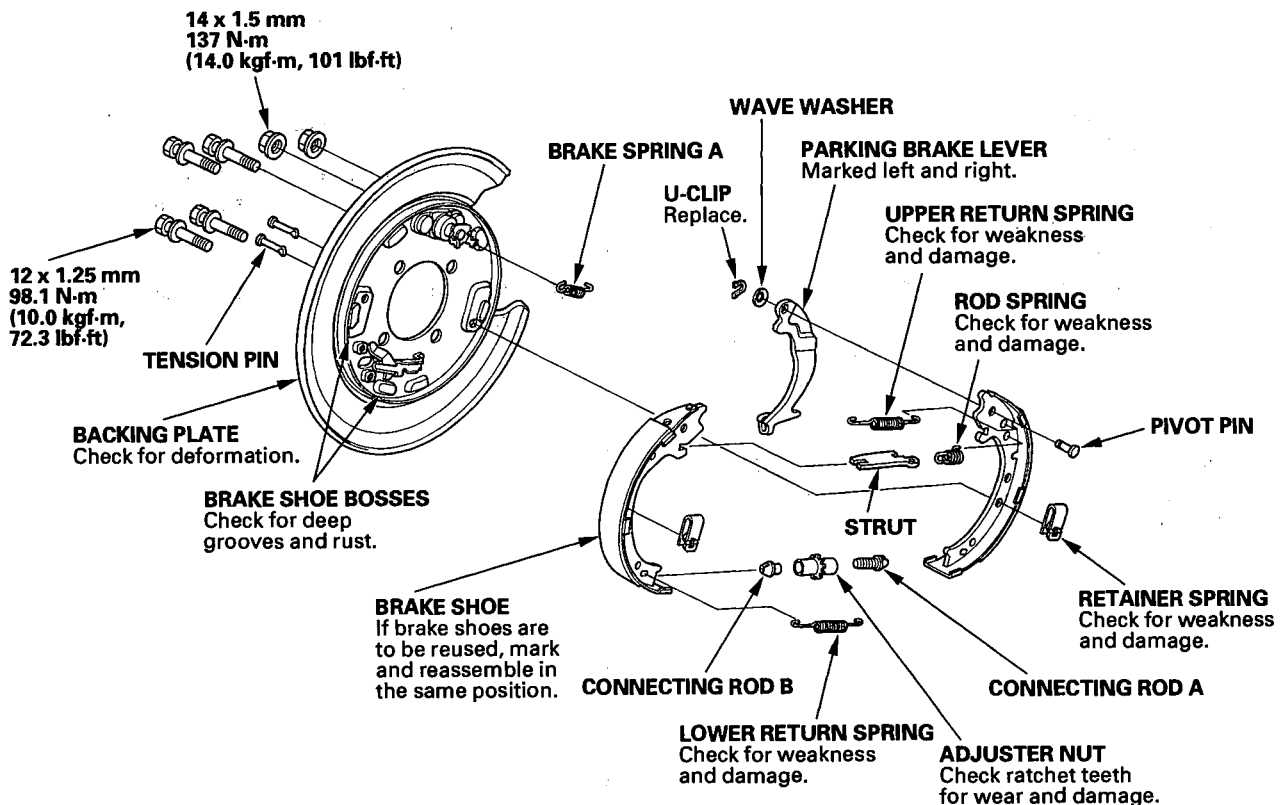
Parking Brake Inspection

⚠ CAUTION

Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the rear wheels.
3. Release the parking brake, and remove the rear brake caliper and brake disc/drum (see page 18-32).

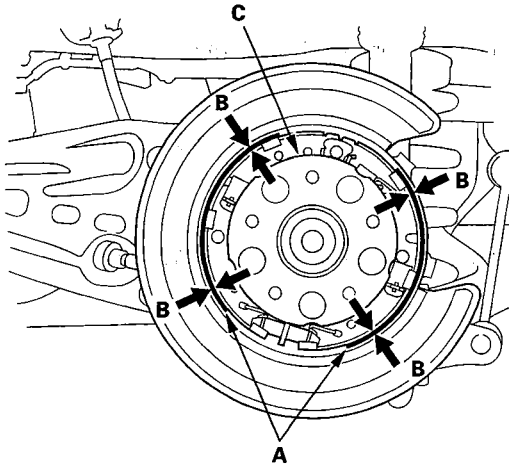


(cont'd)

Conventional Brake Components

Parking Brake Inspection (cont'd)

4. Check the parking brake linings (A) for cracking, glazing, wear, and contamination.



5. Measure the parking brake lining thickness (B). Measurement does not include brake shoe thickness.

Parking brake lining thickness:

Standard: 3.2 mm (0.126 in.)

Service limit: 1.0 mm (0.04 in.)

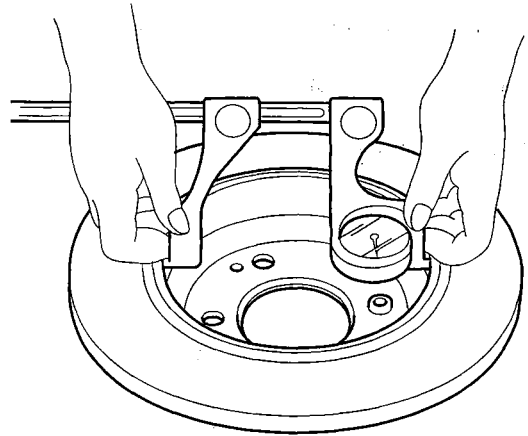
6. If the parking brake lining thickness is less than the service limit, replace all the parking brake shoes as a set.
7. Check the hub (C) for smooth operation. If it requires servicing, replace the hub bearing unit (see page 18-32).

8. Measure the inside diameter of the parking brake drum with inside vernier calipers.

Parking brake drum inside diameter:

Standard: 199.9–200.0 mm (7.870–7.874 in.)

Service limit: 201.0 mm (7.913 in.)



9. If the inside diameter of the parking brake drum is more than service limit, replace the brake disc/drum.
10. Check the parking brake disc/drum for scoring, grooves, and cracks.



Parking Brake Shoe Replacement

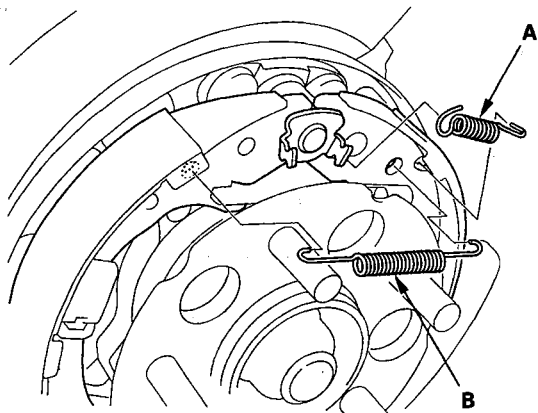
⚠ CAUTION

Frequent inhalation of brake pad dust, regardless of material composition, could be hazardous to your health.

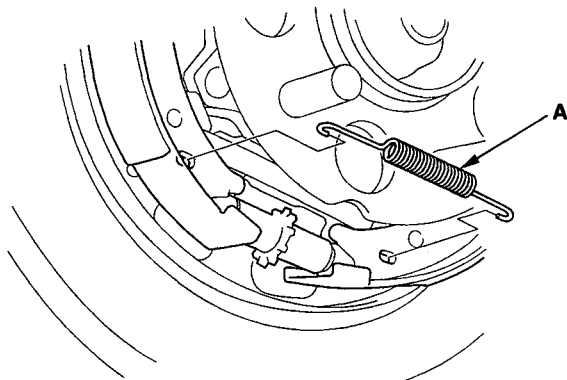
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

Disassembly

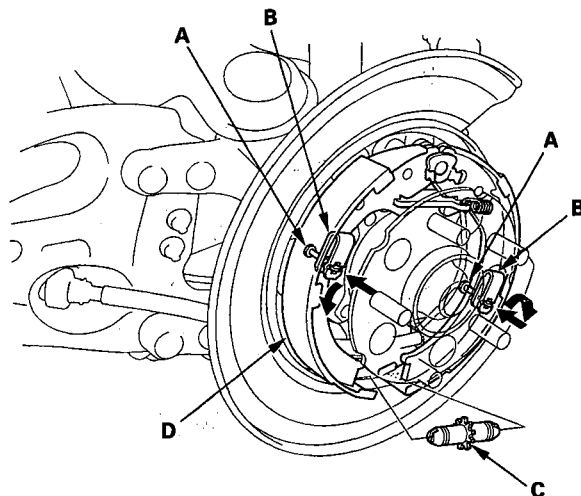
1. Raise the rear of the vehicle, and support it with safety stands in the proper locations (see page 1-7).
2. Remove the rear wheels.
3. Release the parking brake, and remove the rear brake caliper and brake disc/drum (see page 18-32).
4. Disconnect and remove the brake spring A and the upper return spring (B).



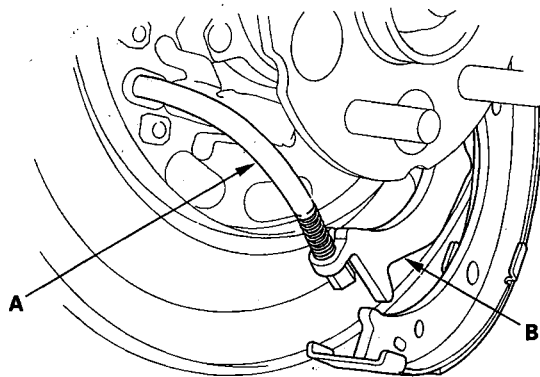
5. Disconnect and remove the lower return spring (A).



6. Remove the tension pins (A) by pushing the respective retainer spring (B) and turning the pin.



7. Remove the adjuster assembly (C) by moving forward brake shoe (D).
8. Remove the rearward brake shoe by disconnecting the parking brake cable (A) from the parking brake lever (B).

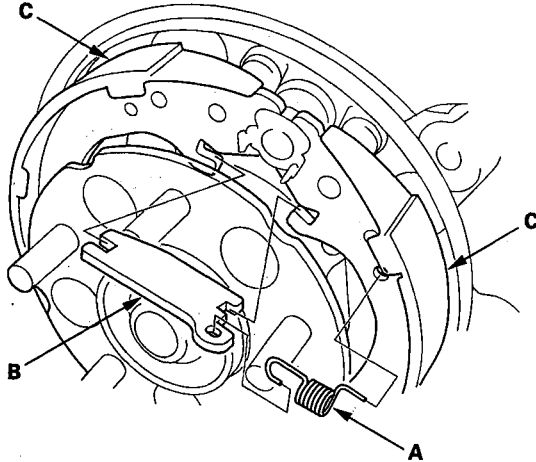


(cont'd)

Conventional Brake Components

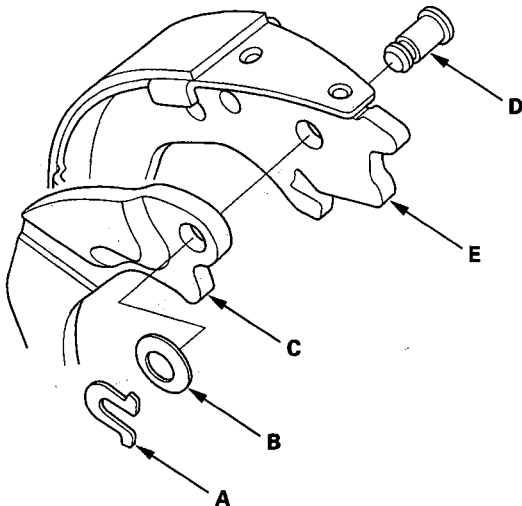
Parking Brake Shoe Replacement (cont'd)

9. Disconnect the rod spring (A), and remove the strut (B).



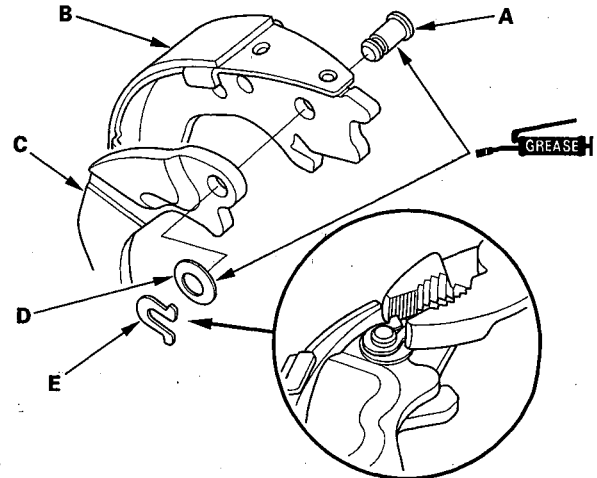
10. Remove the parking brake shoes (C).

11. Remove the U-clip (A), wave washer (B), parking brake lever (C), and pivot pin (D) from the brake shoe (E).



Reassembly

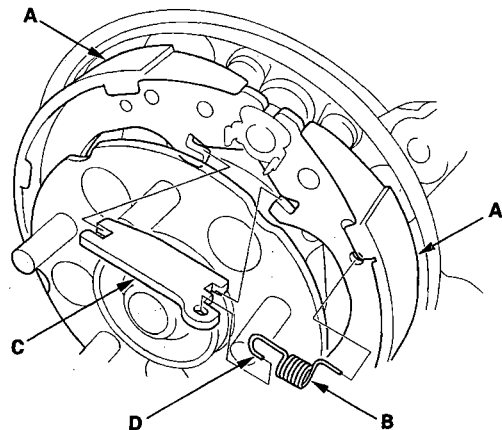
1. Apply Molykote 44MA grease to the sliding surface of the pivot pin (A), and insert the pin into the rearward brake shoe (B) from the outside.



2. Install the parking brake lever (C) and wave washer (D) on the pivot pin, and secure with a new U-clip (E).

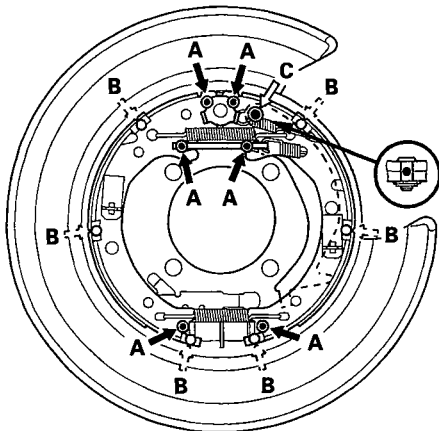
- Install the wave washer with its convex side facing out.
- Pinch the U-clip securely to prevent the parking brake lever coming out from the brake shoe.

3. Position the parking brake shoes (A), then hook the rod spring (B) on the strut (C) first with the spring end (D) pointing downward. Then hook the rod spring to the parking brake shoe, and install the strut on the parking brake shoes.





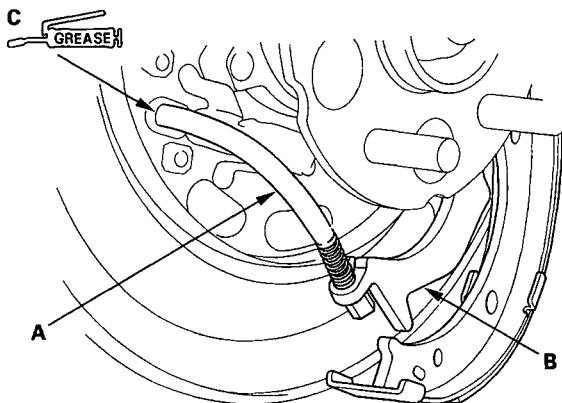
4. Apply a thin coat of Molykote 44MA grease to the brake shoe ends and strut ends (A), the sliding surfaces of the parking brake shoe (B), and the pivot of the parking brake lever (C) as shown. Wipe off any excess. Keep grease off the brake linings.



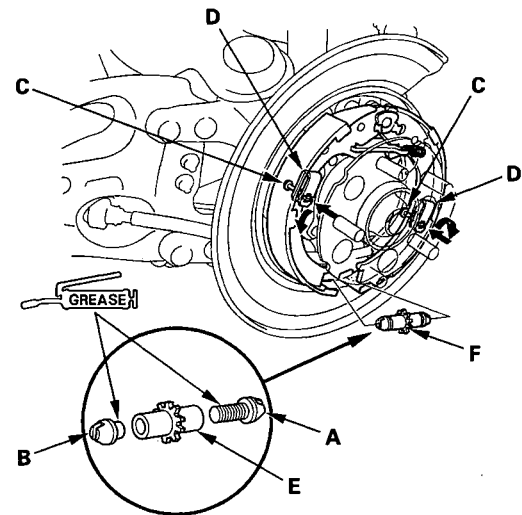
Greasing symbols:

- ➡● Brake shoe ends and strut ends
- - - - -○ Sliding surfaces of the shoe
- ➡● Pivot of parking brake lever

5. Connect the parking brake cable (A) to the parking brake lever (B). Apply silicone grease to the cable contact surface (C) on the backing plate.



6. Install the tension pins (C) and retainer springs (D). Make sure the tension pin does not contact to the parking brake lever.



7. Install connecting rods A and B on the adjuster nut (E).

NOTE:

- Clean the threaded portions of connecting rod A and the sliding surface of connecting rod B, then coat them with rubber grease.
- Shorten connecting rod A by fully turning the adjuster nut.

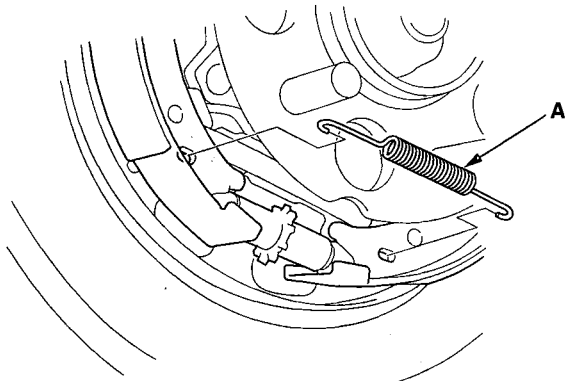
8. Position the brake shoe adjuster assembly (F) on the parking brake shoes.

(cont'd)

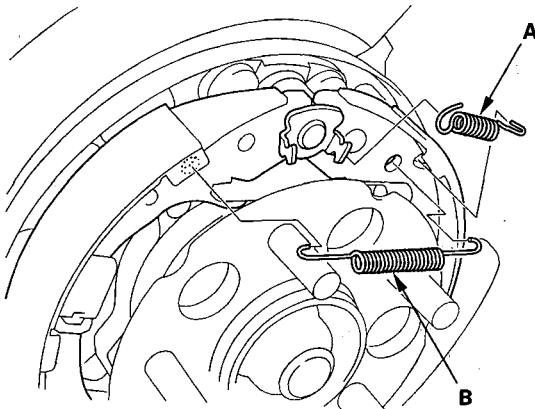
Conventional Brake Components

Parking Brake Shoe Replacement (cont'd)

9. Install the lower return spring (A).



10. Install the upper return spring (B) and the brake spring A.



11. Install the rear brake disc/drum and rear brake caliper (see page 18-32).
12. Do the major parking brake adjustment (see page 19-8).

Parking Brake Shoe Lining Break-in

⚠ WARNING

Do this operation in a safe area.

NOTE:

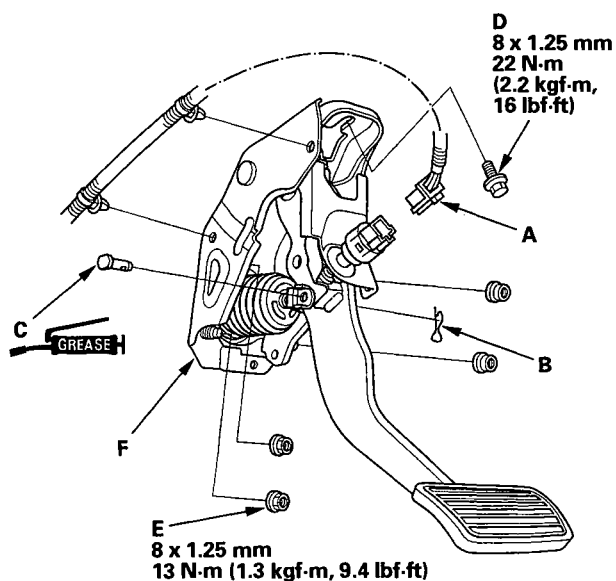
- Do brake lining surface break-in when replacing shoes with new brake linings and/or new rear brake disc/drum.
- Check the number of parking brake lever clicks. Adjust the parking brake before lining surface break-in (see page 19-8).

1. Park the vehicle on a firm, level surface.
2. Release the parking brake pedal.
3. Press the parking brake pedal 4 clicks.
4. Drive the vehicle for 1/4 mile (400 m) at about 31 mph (50 km/h).
5. Stop the vehicle, and release the parking brake for 5—10 minutes to allow the brake disc/drum to cool.
6. Repeat steps 3 through 5 again.
7. Check the parking brake pedal adjustment (see page 19-7).



Brake Pedal Replacement

1. Remove the driver's dashboard undercover (see page 20-102).
2. Disconnect the brake pedal position switch connector (A).



3. Remove the lock pin (B) and joint pin (C).

NOTE: Use a new lock pin whenever installing.

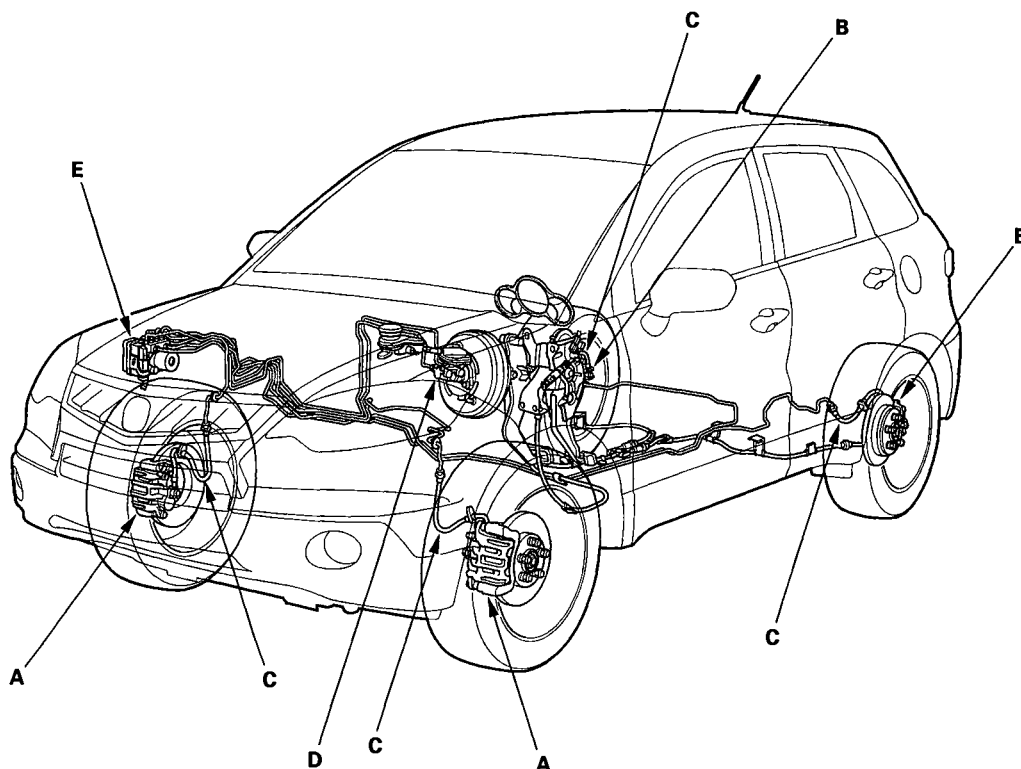
4. Remove the brake pedal bracket mounting bolt (D) and nuts (E).
5. Remove the brake pedal with bracket (F).
6. Install in the reverse order of removal.
7. Do the brake pedal and brake pedal position switch adjustment (see page 19-6).

Conventional Brake Components

Brake Hose and Line Inspection

1. Inspect the brake hoses for damage, deterioration, leaks, interference, and twisting.
2. Check the brake lines for damage, rusting, and leaks. Also check for bent brake lines.
3. Check for leaks at hose and line joints and connections, and retighten if necessary.
4. Check the master cylinder and the VSA modulator-control unit for damage and leaks.

Connection Point	Component	Connected to	Specified Torque Value	Note
A	Front brake caliper	Brake hose	34 N·m (3.5 kgf·m, 25 lbf·ft)	Banjo bolt
		Bleed screw	9 N·m (0.9 kgf·m, 7 lbf·ft)	
B	Rear brake caliper	Brake hose	34 N·m (3.5 kgf·m, 25 lbf·ft)	Banjo bolt
		Bleed screw	9 N·m (0.9 kgf·m, 7 lbf·ft)	
C	Brake hose	Brake line	15 N·m (1.5 kgf·m, 11 lbf·ft)	Flare nut
D	Master cylinder	Brake line	22 N·m (2.2 kgf·m, 16 lbf·ft)	Flare nut
E	VSA modulator-control unit	Brake line (12 mm nut)	22 N·m (2.2 kgf·m, 16 lbf·ft)	Flare nut
		Brake line (10 mm nut)	15 N·m (1.5 kgf·m, 11 lbf·ft)	Flare nut





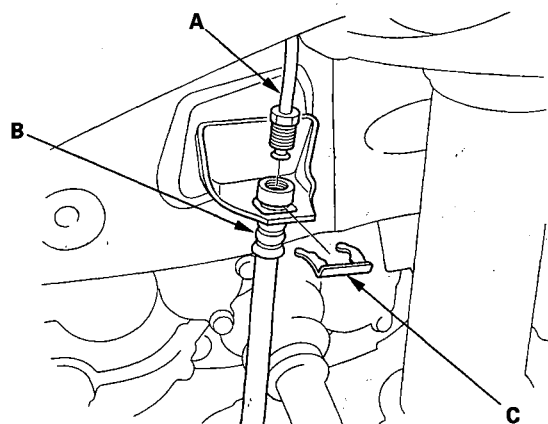
Brake Hose Replacement

NOTE:

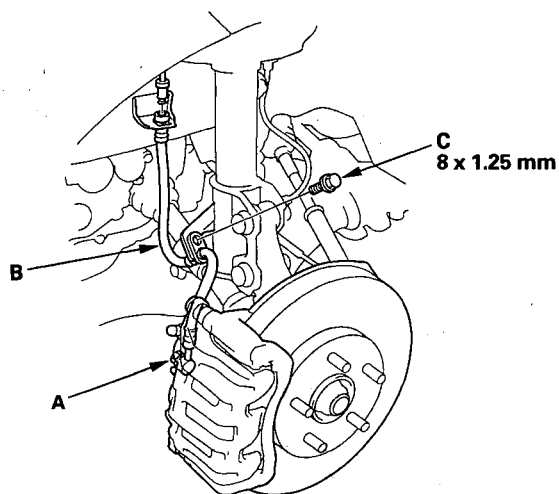
- Before reassembling, check that all parts are free of dirt and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid gets on the paint, wash it off immediately with water.
- To prevent the brake fluid from flowing, plug and cover the hose ends and joints with a shop towel or equivalent material.

Removal-Front

1. Disconnect the brake line (A) from the brake hose (B), then remove the brake hose clip (C).



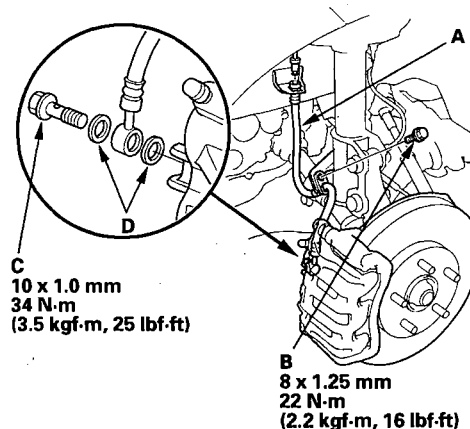
2. Remove the banjo bolt (A), and disconnect the brake hose (B) from the caliper.



3. Remove the brake hose mounting bolt (C), then remove the brake hose.

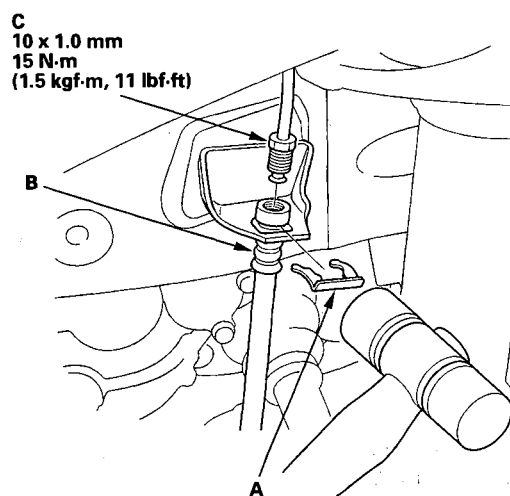
Installation-Front

1. Install the brake hose (A) with the mounting bolt (B).



2. Connect the brake hose to the caliper with the banjo bolt (C) and new sealing washers (D).

3. Install a new brake hose clip (A) to the brake hose (B) on the bracket, then connect the brake line (C). Do not twist the brake hose.



4. After installing the brake hose, bleed the brake system (see page 19-9).

5. Do the following checks:

- Check the brake hose and line joint for leaks, and tighten if necessary.
- Check the brake hoses for interference and twisting.

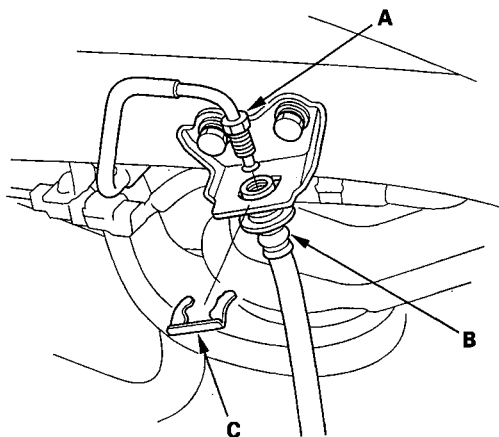
(cont'd)

Conventional Brake Components

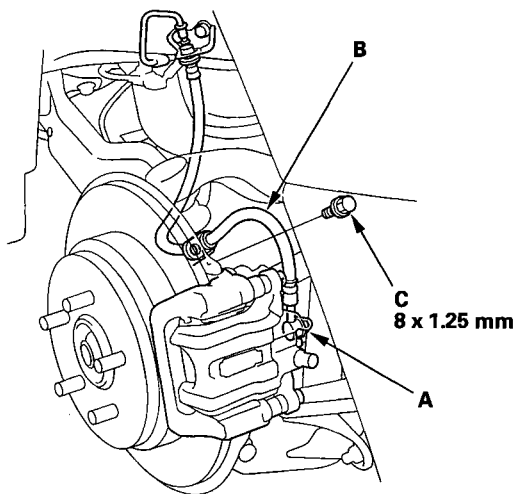
Brake Hose Replacement (cont'd)

Removal-Rear

1. Disconnect the brake line (A) from the brake hose (B), then remove the brake hose clip (C).



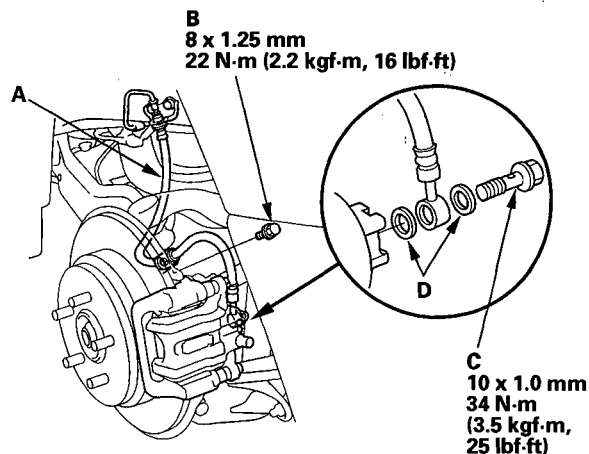
2. Remove the banjo bolt (A), and disconnect the brake hose (B) from the caliper.



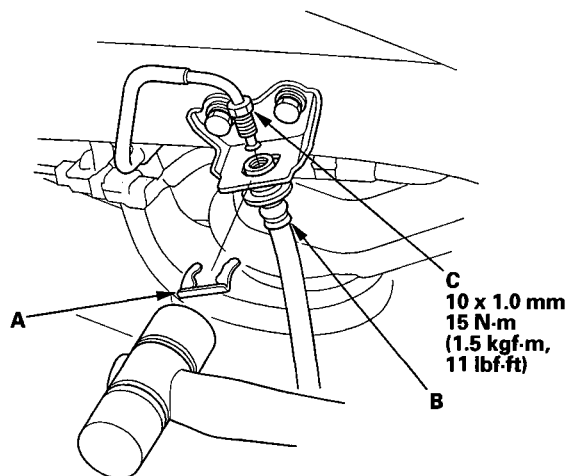
3. Remove the brake hose mounting bolt (C), then remove the brake hose.

Installation-Rear

1. Install the brake hose (A) with the mounting bolt (B).



2. Connect the brake hose to the caliper with the banjo bolt (C) and new sealing washers (D).
3. Install a new brake hose clip (A) to the brake hose (B) on the bracket, then connect the brake line (C). Do not twist the brake hose.



4. After installing the brake hose, bleed the brake system (see page 19-9).

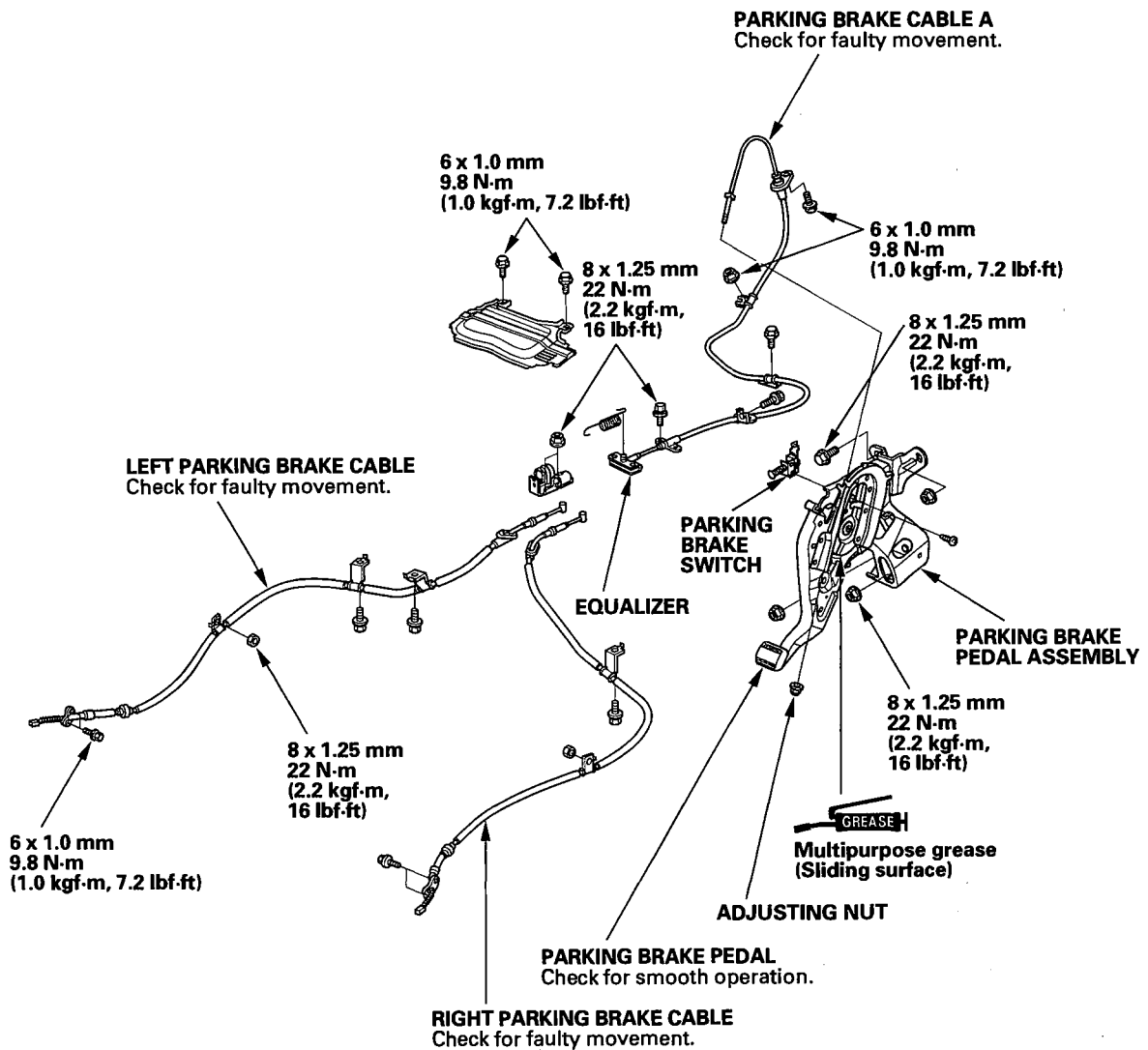
5. Do the following checks:

- Check the brake hose and line joint for leaks, and tighten if necessary.
- Check the brake hoses for interference and twisting.



Parking Brake Cable Replacement

Exploded View



(cont'd)

Conventional Brake Components

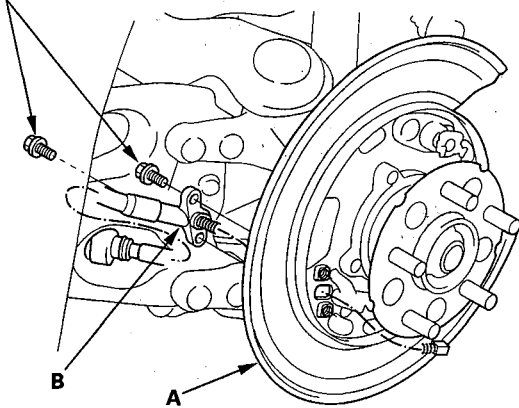
Parking Brake Cable Replacement (cont'd)

NOTE:

- The parking brake cable must not be bent or distorted. This will lead to stiff operation and premature cable failure.
- Refer to the Exploded View as needed during this procedure.

1. Loosen the parking brake cable adjusting nut (see page 19-8).
2. Remove the parking brake shoes, and disconnect the parking brake cable from the parking brake lever (see page 19-31).
3. Remove the parking brake cable mounting bolts from the backing plate (A).

6 x 1.0 mm
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)



4. Pull the parking brake cable (B) and remove it from the backing plate.
5. Reinstall the parking brake cable in the reverse order of removal, and note these items:
 - Be careful not to bend or distort the cable.
 - Connect the parking brake cable to the brake lever, and install the brake shoes and disc/drum (see page 19-31).
 - Do the parking brake adjustment (see page 19-7). Apply the parking brake firmly 10 times then adjust it again.

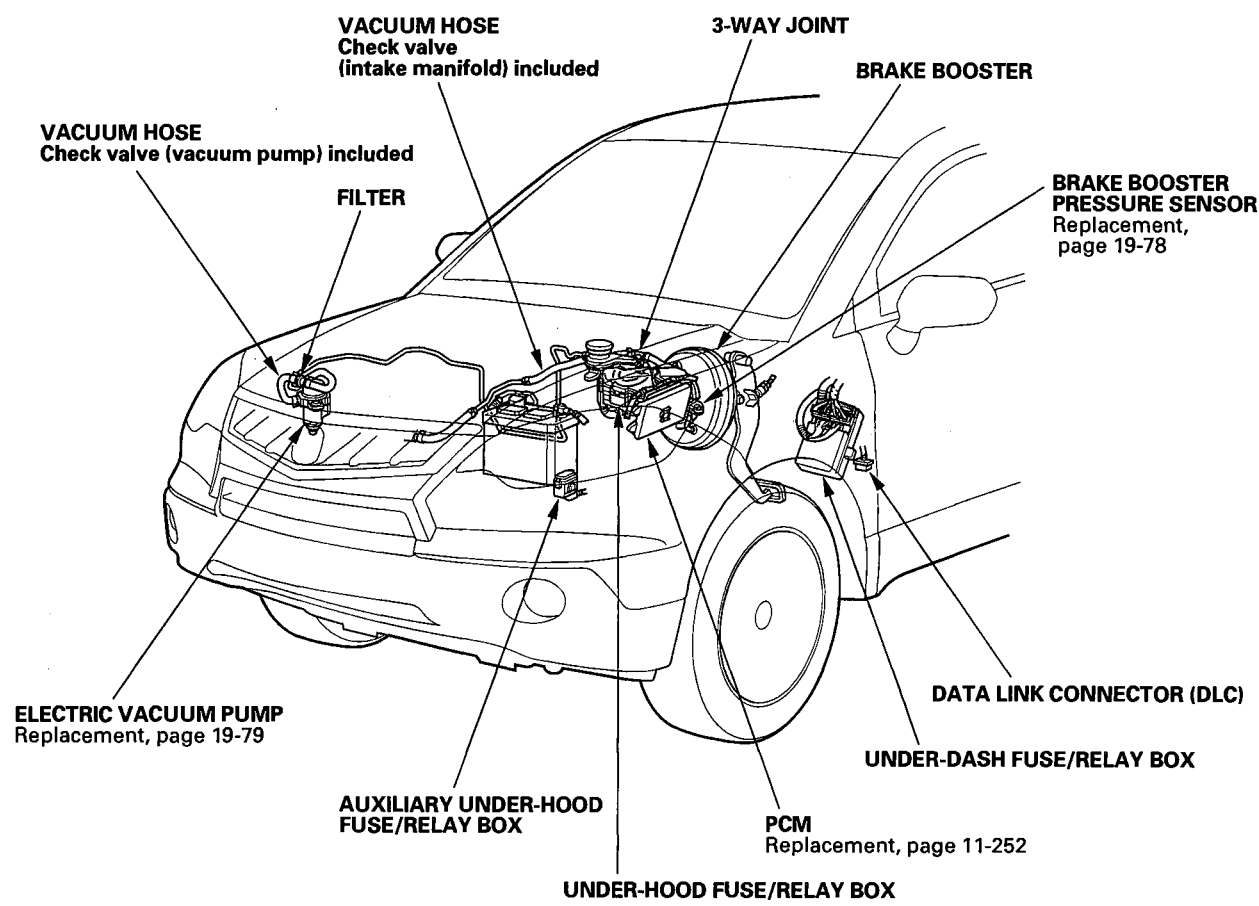
Brakes

Conventional Brake Components	19-1
Electric Vacuum Pump System	
Component Location Index	19-42
General Troubleshooting Information	19-43
DTC Troubleshooting Index	19-47
Symptom Troubleshooting Index	19-48
System Description	19-49
Circuit Diagram	19-54
DTC Troubleshooting	19-57
Brake Booster Pressure Sensor Replacement	19-78
Electric Vacuum Pump Replacement	19-79
VSA (Vehicle Stability Assist)	
System Components	19-81



Electric Vacuum Pump System

Component Location Index



cardiagn.com

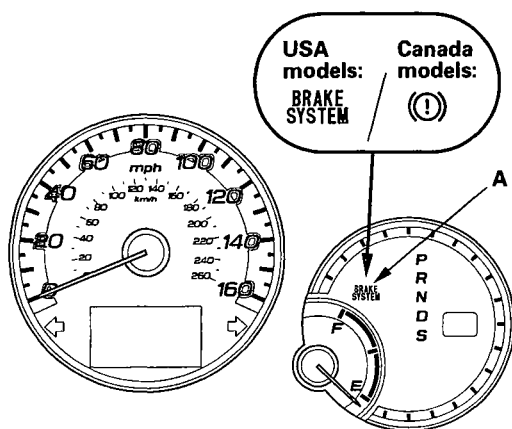


General Troubleshooting Information

System Indicator

This system has an electric vacuum pump system indicator (A).

- When the system detects a problem, the electric vacuum pump system indicator stays on.
- When the system is normal, the electric vacuum pump system indicator comes on after turning the ignition switch ON (II), then it goes off under these conditions:
 - Before starting the engine.
 - After starting the engine.
 - Pressing the brake pedal for the first time after starting the engine.



Diagnostic Trouble Code (DTC)

- The memory can hold any number of DTCs. However, when the same DTC is detected more than once, the more recent DTC is written over the earlier one. Therefore, when the same problem is detected repeatedly, it is memorized as a single DTC.
- The DTCs are indicated in the order they occur.
- The DTCs are memorized in the PCM.
- The electric vacuum pump system DTCs are shown independently, and are treated as additional internal data by the PCM. Therefore, the electrical vacuum pump system DTCs are canceled by disconnecting the battery.

Self-diagnosis

- Self-diagnosis can be classified into two categories:
 - Initial diagnosis: Done when the ignition switch is turned ON (II), and until the electric vacuum pump system indicator goes off.
 - Regular diagnosis: Done right after the initial diagnosis, until the ignition switch is turned OFF.
- When the system detects a problem, the system shifts to a fail-safe mode.

(cont'd)

Electric Vacuum Pump System

General Troubleshooting Information (cont'd)

Pump Motor

The electric vacuum pump operates as needed. You can hear the motor function at times, this is normal. The pump motor operates under these conditions:

- The system detects if the brake booster vacuum becomes low while the engine is running.
- After cold starting the engine, or the outside temperature is very cool.
- At high altitude.

The pump motor turns off when the system detects the brake booster vacuum is sufficient enough. If the system detects a fault, the system shifts to fail-safe mode, and turns on the electric vacuum pump system indicator.

Relationship of the Fuel and Emissions Systems

The electric vacuum pump system is a part of the brake systems. Operation relies on information from sensors in the Fuel and Emission systems. Review general troubleshooting in Fuel and Emissions systems (see page 11-3).



How to Troubleshoot DTCs

The troubleshooting procedures assume that the cause of the problem is still present and the electric vacuum pump system indicator is still on. Following the procedure when the electric vacuum pump system indicator does not come on can result in incorrect diagnosis.

When a client has driven the vehicle abnormally, these DTCs are might be stored:

- DTC P15BC: Drive the vehicle and apply/release the brake pedal repeatedly for 1 minute or more.
 - DTC P0571:
 - Both the brake pedal and the accelerator pedal are pressed at the same time for 5 minutes, and vehicle speed is 12 mph (20km/h) or more.
 - Stop the vehicle speed from 24 mph (40 km/h) without pressing brake pedal (using only parking brake etc.) continuously 3 times or more.
1. Ask the customer about the conditions when the problem occurred and the electric vacuum pump system indicator came on, such as during braking, acceleration when vehicle was travelling at a certain speed, etc.
 2. When the electric vacuum pump system indicator does not come on during the test-drive, but troubleshooting is done based on the DTC, check for loose connectors, poor contact of the terminals, etc.
 3. After troubleshooting or repairs are done, clear the DTCs, and test-drive the vehicle under the same conditions as when the DTC was originally set. Make sure the electric vacuum pump system indicator does not come on.
 4. Check for DTCs in other systems that are connected via the F-CAN. If there are DTCs that are related to the F-CAN, the most likely cause was that the ignition switch was turned ON (II) while the PCM connectors were disconnected.

Intermittent Failures

The term “intermittent failure” means a system may have had a failure, but it checks OK now. If the electric vacuum pump system indicator on the dash does not come on, check for poor connections or loose terminals at all connectors related to the circuit that you are troubleshooting. If the indicators were on but then went out, the original problem may have been intermittent.

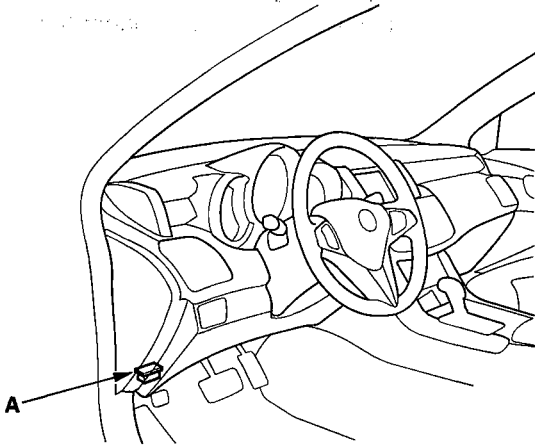
(cont'd)

Electric Vacuum Pump System

General Troubleshooting Information (cont'd)

How to Use the HDS (Honda Diagnostic System)

1. If the electric vacuum pump system indicator stays on, connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.



2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the PCM. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Check the diagnostic trouble code (DTC) and note it. Also check the on-board snapshot data, and download any data found. Then refer to the indicated DTC's troubleshooting, and begin the appropriate troubleshooting procedure.

NOTE:

- The HDS can read the DTC, freeze data, snapshot, current data, and other system data.
- For specific operations, refer to the Help menu that came with the HDS.

How to Retrieve DTCs

1. With the ignition switch OFF, connect the HDS to the data link connector (DLC) under the driver's side of the dashboard.
2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the PCM. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Follow the prompts on the HDS to display the DTC(s) on the screen. After determining the DTC, refer to the DTC troubleshooting.
5. Turn the ignition switch OFF.

How to Clear DTCs

NOTE: Check for fuel and emissions systems DTCs and write down the codes indicated.

1. With the ignition switch OFF, connect the HDS to the data link connector (DLC) under the driver's side of the dashboard.
2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the PCM. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Clear the DTC(s) by following the screen prompts on the HDS.
5. Turn the ignition switch OFF.



DTC Troubleshooting Index

DTC	Detection Item	Electric Vacuum Pump System Indicator	Note
P0555	Brake Booster Pressure Sensor Circuit Malfunction	ON	(see page 19-57)
P0556	Brake Booster Pressure Sensor Circuit Range/Performance Problem	ON	(see page 19-60)
P0571	Brake Pedal Position Switch Circuit	ON	(see page 19-63)
P1131	Electric Vacuum Pump System-Related PGM-FI Sensor Signal Malfunction	ON	(see page 19-64)
P15B9	Check Valve (Intake Manifold) Leak Detected	ON	(see page 19-64)
P15BA	Check Valve (Intake Manifold) Stuck Closed	ON	(see page 19-65)
P15BB	Brake Booster System Leak Detected	ON	(see page 19-66)
P15BC	Electric Vacuum Pump Operating Time Exceeded	ON	(see page 19-67)
P16D9	Powertrain Control Module (PCM) Internal Circuit Malfunction	ON	(see page 19-64)
P16DA	Electric Vacuum Pump Relay 1 Stuck OFF	ON	(see page 19-71)
P16DB	Electric Vacuum Pump Relay 1/2 Signal Circuit Malfunction	ON	(see page 19-74)
P16DC	Electric Vacuum Pump Relay 2 Stuck ON	ON	(see page 19-76)
P16DD	Electric Vacuum Pump Relay 1 Stuck ON	ON	(see page 19-77)

NOTE: If the electric vacuum pump system indicator and MIL come on at the same time, select the PGM-FI system with the HDS, and check the fuel and emissions system DTCs first (see page 11-3).

Electric Vacuum Pump System

Symptom Troubleshooting Index

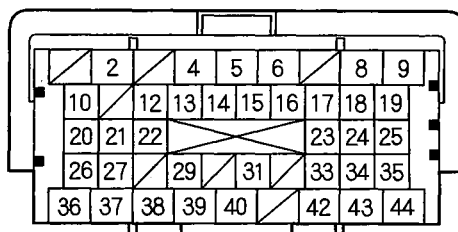
When the vehicle has one of these symptoms, check for a diagnostic trouble code (DTC) with the HDS. If there is no DTC, do the diagnostic procedure for the symptom, in the sequence listed, until you find the cause.

Symptom	Diagnostic procedure
HDS does not communicate with the PCM or the vehicle	Troubleshoot the DLC circuit (see page 11-229).
Electric vacuum pump system indicator does not come on	1. Do the gauge control module troubleshooting (see page 22-258). 2. Update the PCM (see page 11-7) or substitute a known-good PCM (see page 11-8), then recheck. If it is OK and substituted, replace the original PCM (see page 11-252).
Electric vacuum pump system indicator does not go off, and no DTCs are stored	1. Press the brake pedal several times. 2. Start the engine. 3. Check the F-CAN lines between the PCM and the gauge control module, and troubleshoot the gauge control module DTC (see page 22-3). 4. Check for fuel and emission systems DTCs with the HDS, and troubleshoot the system (see page 11-3). 5. Update the PCM (see page 11-7) or substitute a known-good PCM (see page 11-8), then recheck. If the system is OK with the substituted PCM, replace the original PCM (see page 11-252).
Brake assist is reduced, and no DTCs are stored	Check the conventional brake system.



System Description

PCM (Electric Vacuum Pump System) Inputs and Outputs at Connector A (□) (44P)



Terminal side of female terminals

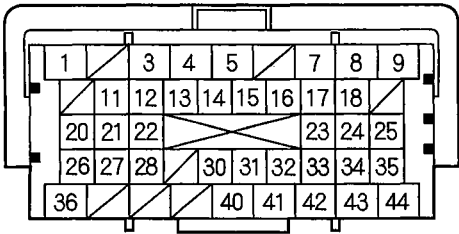
Terminal number	Wire color	Terminal name	Description	Signal
6	GRN	MRLY (PGM-FI MAIN RELAY 1) (C)	Drives PGM-FI main relay 1 (C) Power source for DTC memory	With ignition switch ON (II): about 0 V With ignition switch OFF: battery voltage
8	ORN	IGP (POWER SOURCE)	Power source for PCM circuit	With ignition switch ON (II): battery voltage
9	BLK	SG6 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
12	WHT	VPMPRLY (VACUUM PUMP RELAY)	Drives vacuum pump relay	With electric vacuum pump OFF: about 0 V With electric vacuum pump ON: about 14.0 V
13	PNK	VPMPRLYD	Detects vacuum pump signal load	At idle with electric vacuum pump OFF: about 2.3 V At idle with electric vacuum pump ON: about 14.0 V
17	YEL	APSA (ACCELERATOR PEDAL POSITION (APP) SENSOR A)	Detects APP sensor A signal	With ignition switch ON (II) and accelerator pedal pressed: about 4.7 V With ignition switch ON (II) and accelerator pedal released: about 1.0 V
18	PUR	APSB (ACCELERATOR PEDAL POSITION (APP) SENSOR B)	Detects APP sensor B signal	With ignition switch ON (II) and accelerator pedal pressed: about 2.3 V With ignition switch ON (II) and accelerator pedal released: about 0.5 V
19	RED	VCC6 (SENSOR VOLTAGE)	Provides sensor reference voltage	With ignition switch ON (II): about 5.0 V
24	GRY	VCC5 (SENSOR VOLTAGE)	Provides sensor reference voltage	With ignition switch ON (II): about 5.0 V
25	BRN	VCC4 (SENSOR VOLTAGE)	Provides sensor reference voltage	With ignition switch ON (II): about 5.0 V
34	LT BLU	SG5 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
35	BLU	SG4 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
36	WHT	CAN H (CAN COMMUNICATION SIGNAL HIGH)	Sends communication signal	With ignition switch ON (II): about 2.5 V (pulses)
37	RED	CAN L (CAN COMMUNICATION SIGNAL LOW)	Sends communication signal	With ignition switch ON (II): about 2.5 V (pulses)
40	LT GRN	BKSW (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With brake pedal released: about 0 V With brake pedal pressed: battery voltage

(cont'd)

Electric Vacuum Pump System

System Description (cont'd)

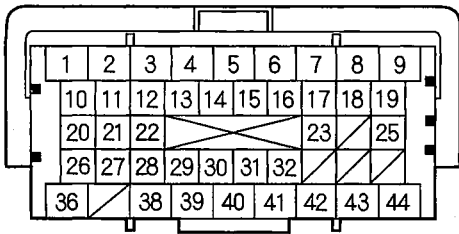
PCM (Electric Vacuum Pump System) Inputs and Outputs at Connector B (△) (44P)



Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
1	BLK	PG2 (POWER GROUND)	Ground circuit for PCM circuit	Less than 1.0 V at all times
5	GRN/BLK	PBMPA (BRAKE BOOSTER PRESSURE)	Detects brake booster pressure sensor signal	With ignition switch ON (II) and brake pedal released: about 2.0 V
36	BLK	PG1 (POWER GROUND)	Ground circuit for PCM circuit	Less than 1.0 V at all times

PCM (Electric Vacuum Pump System) Inputs and Outputs for Connector C (○) (44P)



Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
11	GRN/RED	MAP (MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR)	Detects MAP sensor signal	With ignition switch ON (II): about 2.0 V At idle: about 1.0 V (depending on engine speed)
13	YEL/RED	VCC1 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V
14	GRN/WHT	SG1 (SENSOR GROUND)	Sensor ground	Less than 1.0 V at all times
36	BLK/YEL	IG1 (IGNITION SIGNAL)	Detects ignition signal	With ignition switch ON (II): battery voltage



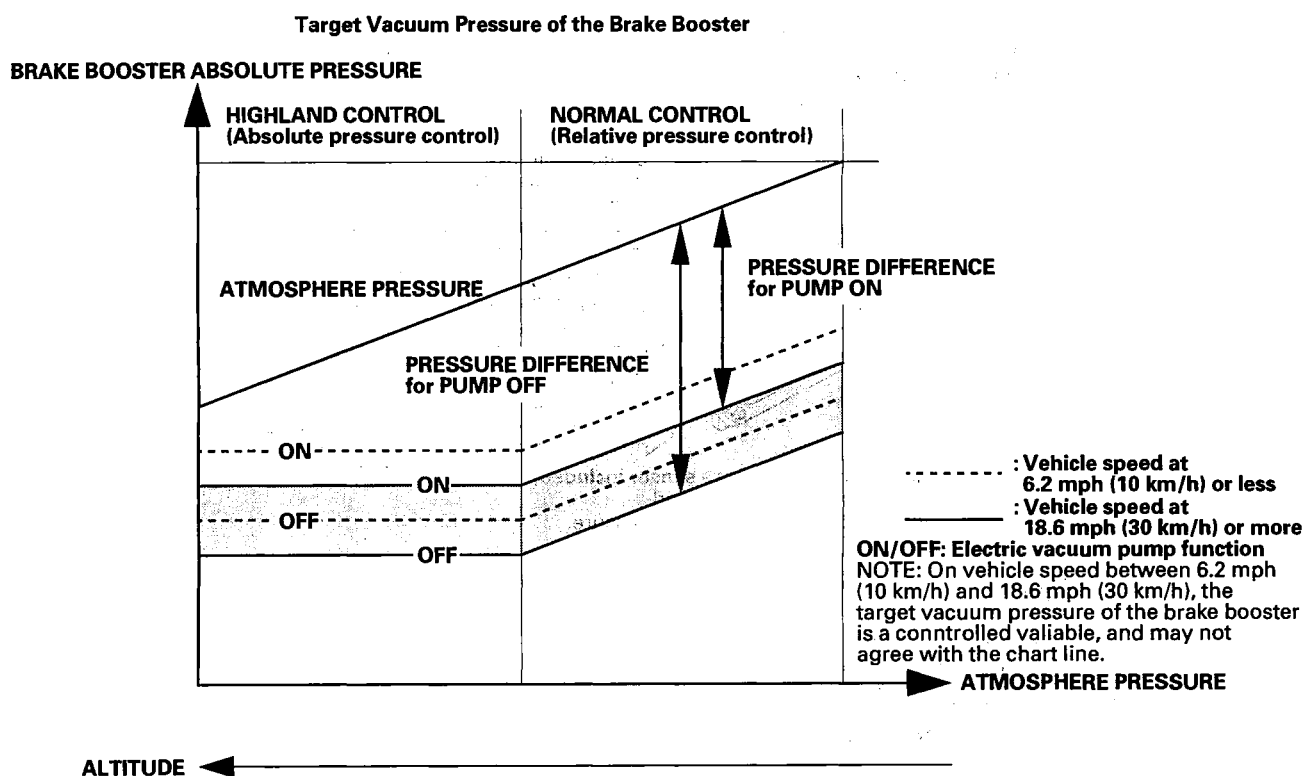
System Necessity

- Starting cold engine: The fuel and emissions systems will retard timing to help heat up the catalytic converter and turbocharger with high exhaust temperature. In this case, the vacuum pressure in the intake manifold is reduced.
- When the turbocharger system supercharges the intake air, the intake manifold vacuum pressure will be reduced.

To compensate for vacuum loss, the electric pump is required, especially in high altitude areas where low atmospheric density conditions create long warm up condition.

System Control

The electric vacuum pump controls the target vacuum of the brake booster compared to atmosphere pressure.



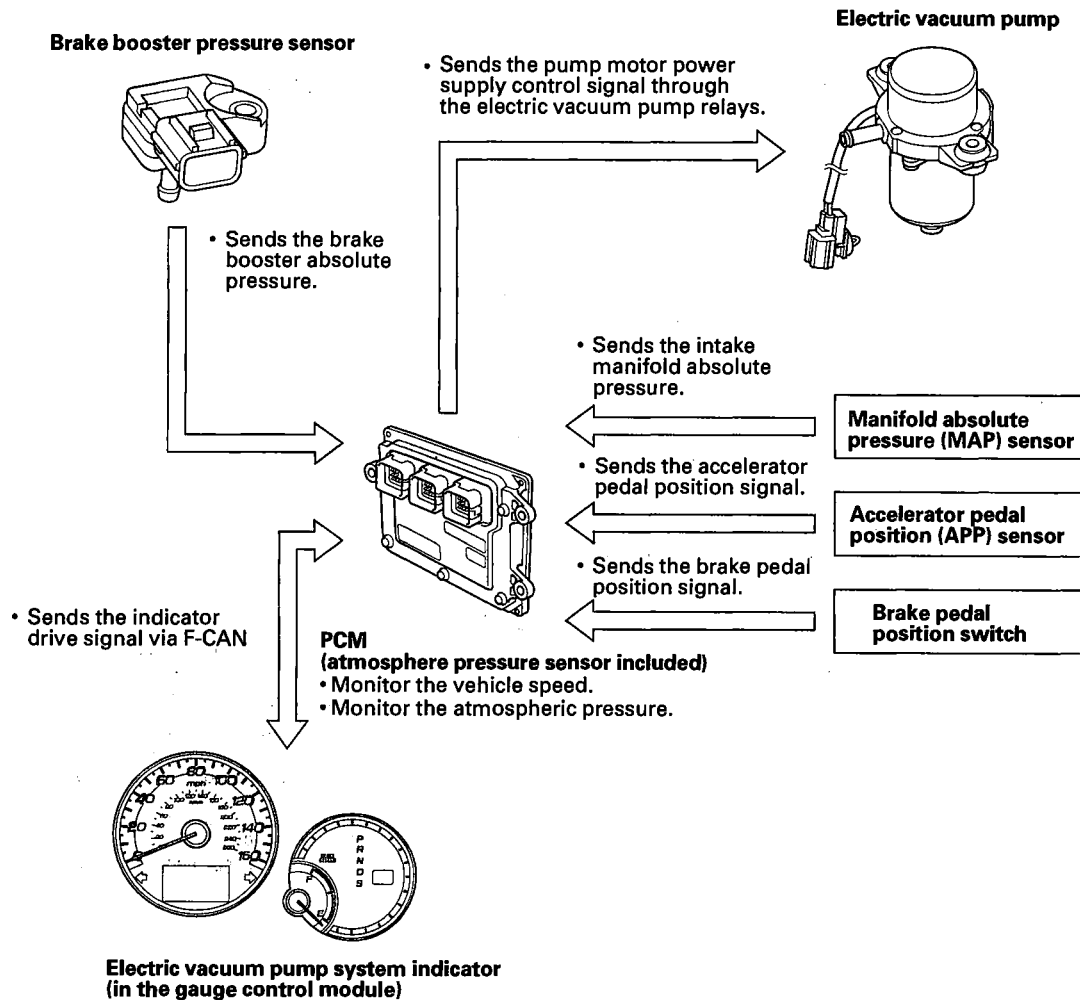
(cont'd)

Electric Vacuum Pump System

System Description (cont'd)

System Electrical Structure

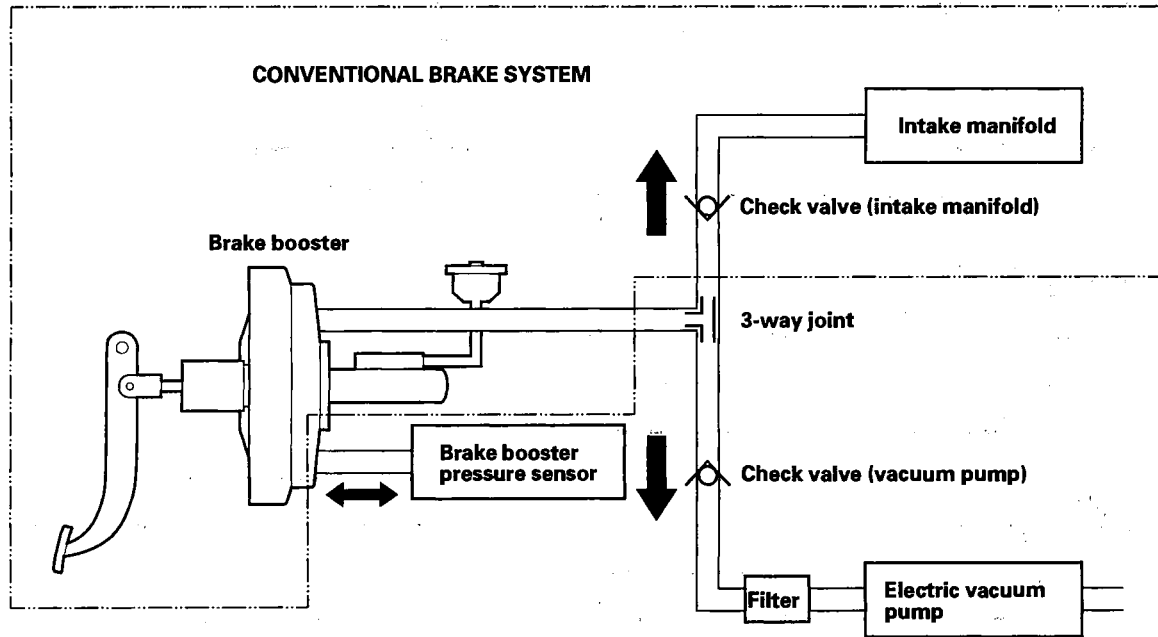
The system has a brake booster pressure sensor, a electric vacuum pump, a electric vacuum pump system indicator in the gauge control module, and the PCM with fuel and emissions systems sensors.





System Air Flow

The brake system includes: A brake booster pressure sensor, a electric vacuum pump with a filter, a check valve (vacuum pump), and a 3-way joint on the conventional brake system booster vacuum hoses.



Electric Vacuum Pump

The electric vacuum pump has a motor and a rotor with five sliding vanes. The motor rotates the rotor, and generates the vacuum.

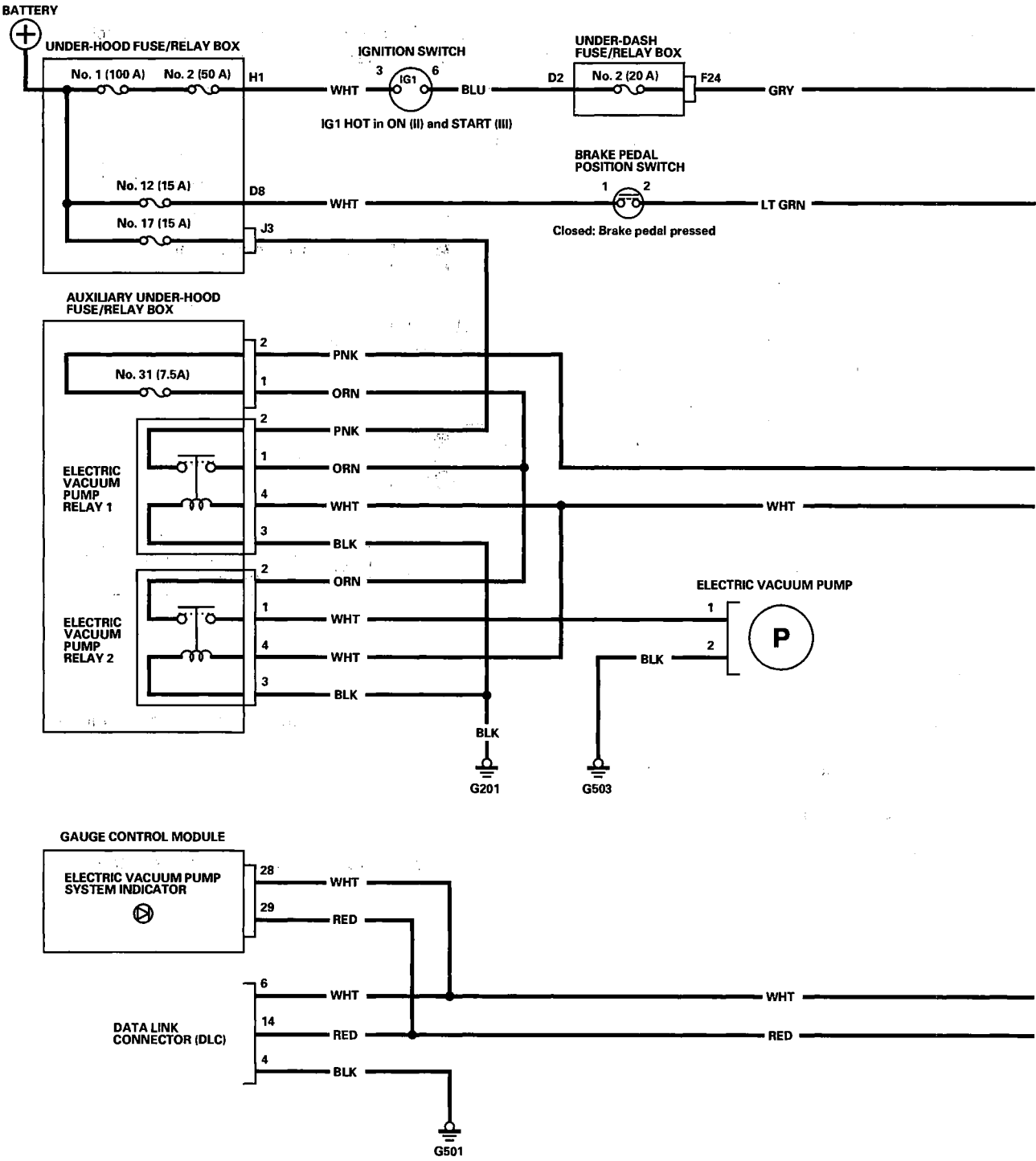
The motor function is controlled by the PCM.

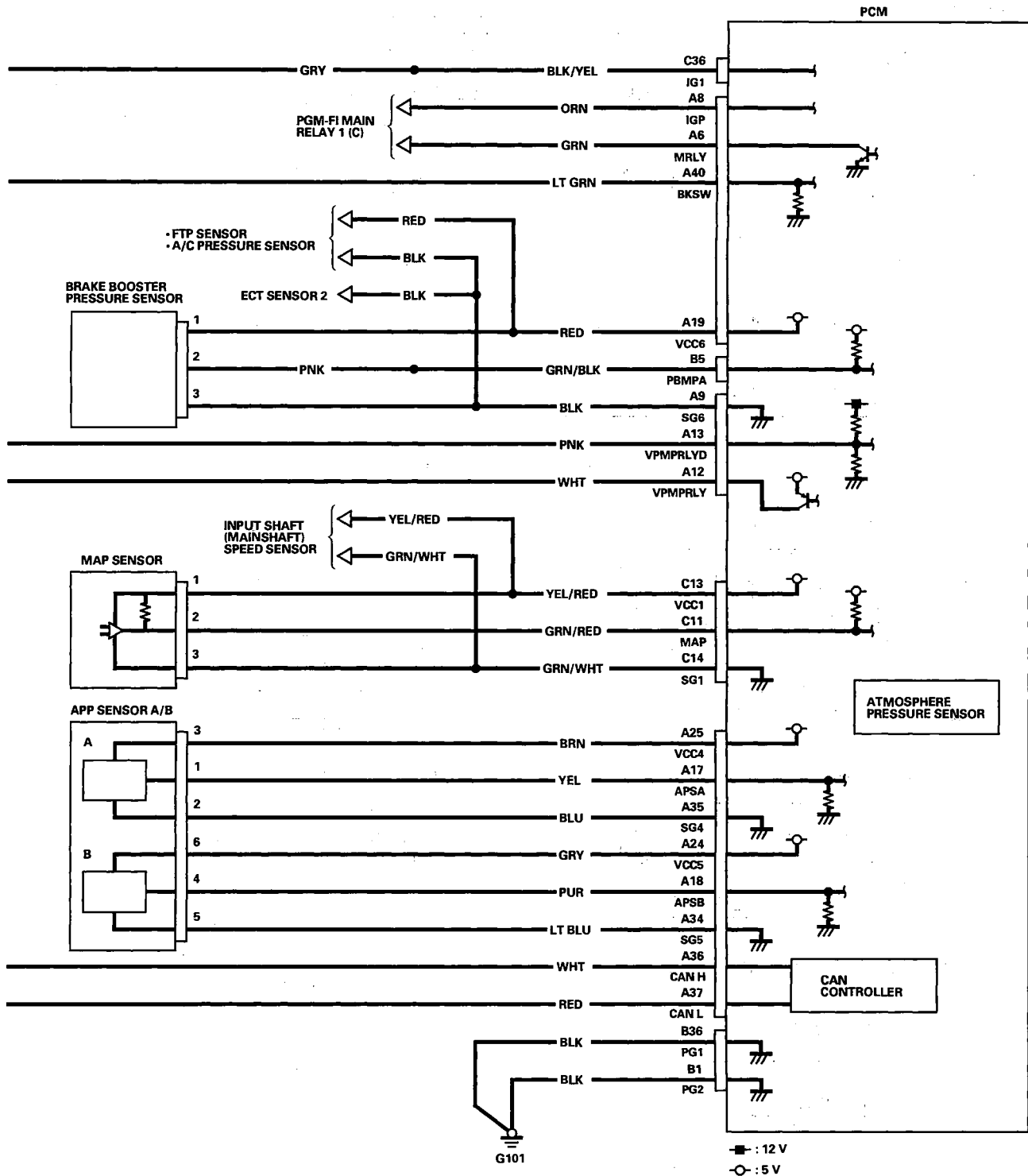
Brake Booster Pressure Sensor

The brake booster pressure sensor converts brake booster absolute pressure into electrical signals to the PCM.

Electric Vacuum Pump System

Circuit Diagram



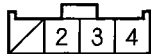


(cont'd)

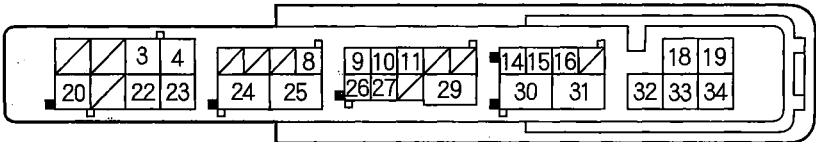
Electric Vacuum Pump System

Circuit Diagram (cont'd)

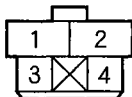
UNDER-HOOD FUSE/RELAY BOX
CONNECTOR J (4P)



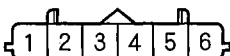
UNDER-DASH FUSE/RELAY BOX CONNECTOR F (34P)



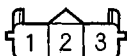
BRAKE PEDAL POSITION
SWITCH 4P CONNECTOR



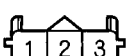
APP SENSOR A/B
6P CONNECTOR



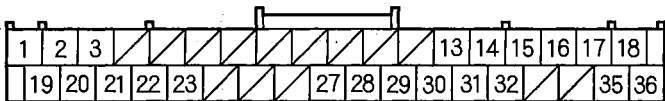
BRAKE BOOSTER PRESSURE
SENSOR 3P CONNECTOR



MAP SENSOR
3P CONNECTOR



GAUGE CONTROL MODULE 36P CONNECTOR

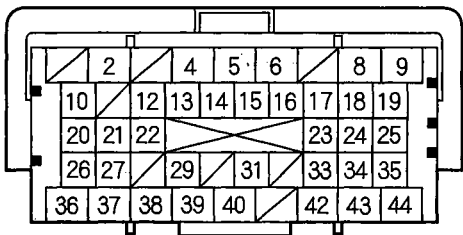


ELECTRIC VACUUM PUMP
2P CONNECTOR

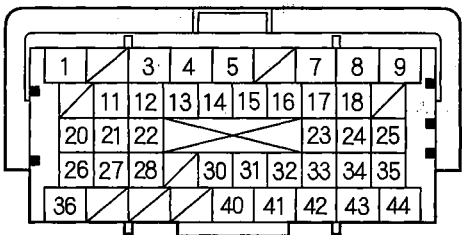


Wire side of female terminals

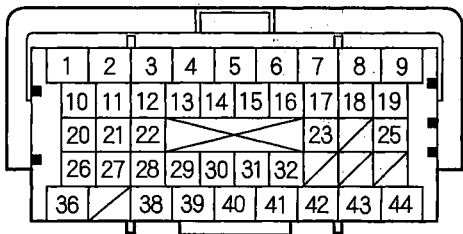
PCM CONNECTOR A (□) (44P)



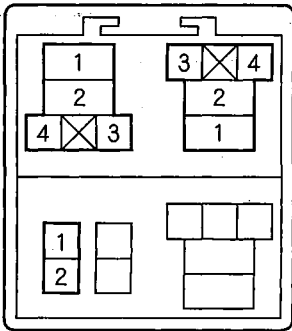
PCM CONNECTOR B (△) (44P)



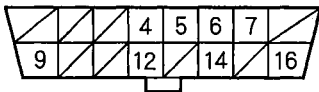
PCM CONNECTOR C (○) (44P)



AUXILIARY UNDER-HOOD FUSE/RELAY BOX



DATA LINK CONNECTOR (DLC)



Terminal side of female terminals



DTC Troubleshooting

DTC P0555: Brake Booster Pressure Sensor Circuit Malfunction

1. Turn the ignition switch ON (II).
2. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS.

Is it between 0.19 and 4.8 V?

YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the brake booster pressure sensor 3P connector, and PCM connector A (44P)/B (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■

NO—If 0.19 V or less is indicated, go to step 3. If 4.8 V or more is indicated, go to step 13.

3. Turn the ignition switch OFF.
4. Disconnect the brake booster pressure sensor 3P connector.
5. Turn the ignition switch ON (II).
6. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS.

Is 0.19 V or less indicated?

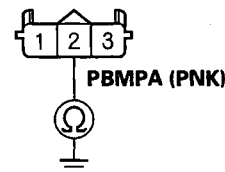
YES—Go to step 7.

NO—Go to step 11.

7. Turn the ignition switch OFF.
8. Short the SCS line with the HDS.

9. Disconnect PCM connector B (44P).
10. Check for continuity between body ground and brake booster pressure sensor 3P connector terminal No. 2.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Repair short to body ground in the wire between the brake booster pressure sensor and the PCM. ■

NO—Check for loose terminals in the brake booster pressure sensor 3P connector, and PCM connector A (44P)/B (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

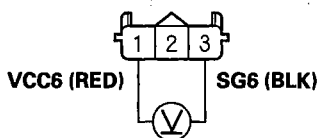
(cont'd)

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

11. Measure the voltage between brake booster pressure sensor 3P connector terminals No. 1 and No. 3.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR



Wire side of female terminals

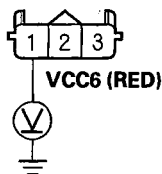
Is there about 5 V?

YES—Replace the brake booster pressure sensor (see page 19-78). ■

NO—Go to step 12.

12. Measure the voltage between body ground and brake booster pressure sensor 3P connector terminal No. 1.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR



Wire side of female terminals

Is there 0.1 V or less?

YES—Repair open in the wire between the brake booster pressure sensor and the PCM. ■

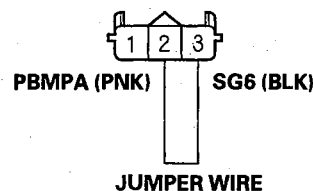
NO—Check for loose terminals in the brake booster pressure sensor 3P connector, and PCM connector A (44P)/B (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

13. Turn the ignition switch OFF.

14. Disconnect the brake booster pressure sensor 3P connector.

15. Connect brake booster pressure sensor 3P connector terminals No. 2 and No. 3 with a jumper wire.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR



Wire side of female terminals

16. Turn the ignition switch ON (II).

17. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS.

Is 4.8 V or more indicated?

YES—Go to step 18.

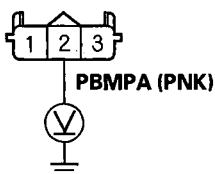
NO—Replace the brake booster pressure sensor (see page 19-78). ■

18. Disconnect the jumper wire from the brake booster pressure sensor.



19. Measure the voltage between body ground and brake booster pressure sensor 3P connector terminal No. 2.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR



Wire side of female terminals

Is there about 5 V?

YES—Repair open in the wire (SG6 line) between the brake booster pressure sensor and the PCM. ■

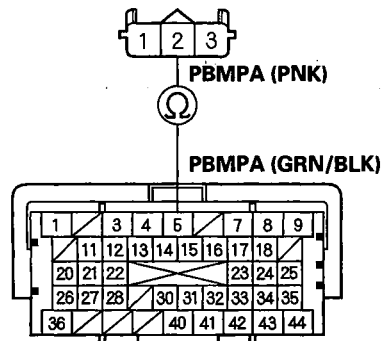
NO—Go to step 20.

20. Turn the ignition switch OFF.
21. Short the SCS line with the HDS.
22. Disconnect PCM connector B (44P).

23. Check for continuity between brake booster pressure sensor 3P connector terminal No. 2 and PCM connector B (44P) terminal No. 5.

BRAKE BOOSTER PRESSURE SENSOR 3P CONNECTOR

Wire side of female terminals



PCM CONNECTOR B (44P)

Terminal side of female terminals

Is there continuity?

YES—Check for loose terminals in the brake booster pressure sensor 3P connector, and PCM connector A (44P)/B (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

NO—Repair open in the wire between the brake booster pressure sensor and the PCM. ■

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

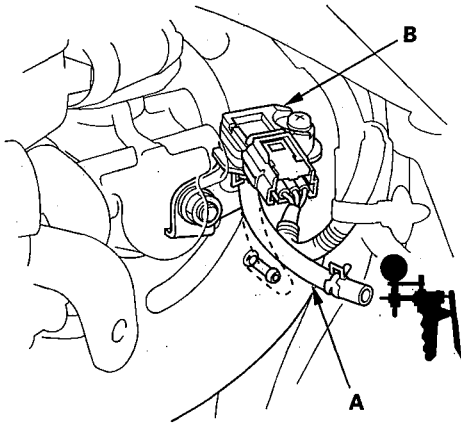
DTC P0556: Brake Booster Pressure Sensor Circuit Range/Performance Problem

Special Tools Required

Vacuum pump/gauge, 0—30 in. Hg, Snap-on YA4000A or equivalent, commercially available

NOTE: If DTC P0556 is stored at the same time as DTC P0571, troubleshoot DTC P0571 first, then recheck for DTC P0556.

1. Turn the ignition switch OFF.
2. Disconnect the vacuum hose (A) for the brake booster pressure sensor (B) from the brake booster, and connect a vacuum pump/gauge, 0—30 in.Hg, to the brake booster pressure sensor hose.



3. Turn the ignition switch ON (II).
4. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS before and after applying vacuum to the hose using the vacuum pump/gauge.

Does the indicated value change?

YES—Go to step 5.

NO—Replace the brake booster pressure sensor (see page 19-78). ■

5. Turn the ignition switch OFF.
6. Check for vacuum leaks or clogging up at these parts:
 - Brake booster pressure sensor hose.
 - Brake booster vacuum hoses and their joints.
 - Check valve (intake manifold).
 - Check valve (vacuum pump) and filter.
 - Brake booster.

Are the parts OK?

YES—Go to step 7.

NO—Repair or replace the leaking or clogged up part(s). ■

7. Check the brake pedal position switch signal circuit (see page 11-336).

Is the circuit OK?

YES—Go to step 8.

NO—Troubleshoot the brake pedal position switch signal circuit. ■

8. Reconnect the vacuum hose on the brake booster pressure sensor to the brake booster.
9. Turn the ignition switch ON (II).
10. Note the BRAKE BOOSTER PRESSURE in the DATA LIST with the HDS.
11. Turn the ignition switch OFF.
12. Make sure you have anti-theft codes for the audio and the navigation system (if equipped) then write down the audio presets. Disconnect the negative cable from the battery, and wait several seconds.
13. Reconnect the negative cable to the battery, then do this procedure after the troubleshooting:
 - Enter the anti-theft code for the audio and the navigation system (if equipped), then enter the audio presets.
 - Set the clock.



14. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS when the electric vacuum pump runs while you turn the ignition switch ON (II). Do not start the engine.

Does the indicated value change when the motor runs?

YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the electric vacuum pump relay 2 4P connector, the electric vacuum pump 2P connector, the brake pedal position switch 4P connector, and PCM connector A (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■

NO—If the pump does not run, go to step 15. If the pump runs, turn the ignition switch OFF, then repeat steps 12 to 14 again. If you still get the same brake booster pressure sensor value, replace the electric vacuum pump (see page 19-79). ■

15. Turn the ignition switch OFF.
16. Check the connection and terminal fits of the electric vacuum pump 2P connector.

Is the connector properly connected?

YES—Go to step 17.

NO—Connect the electric vacuum pump 2P connector properly. If necessary, repair or replace the connector. ■

17. Remove electric vacuum pump relay 2, and check it (see page 22-64).

Is the relay OK?

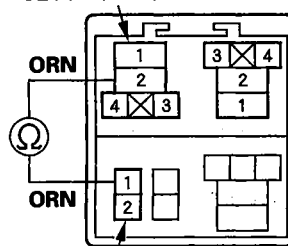
YES—Go to step 18.

NO—Replace electric vacuum pump relay 2. ■

18. Remove the No. 17 (15 A) fuse from the under-hood fuse/relay box.
19. Remove the No. 31 (7.5 A) fuse from the auxiliary under-hood fuse/relay box.
20. Check for continuity between electric vacuum pump relay 2 terminal No. 2 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box terminal No. 1.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 2



No. 31 (7.5 A) FUSE

Terminal side of female terminals

Is there continuity?

YES—Go to step 21.

NO—Repair open in the wire between electric vacuum pump relay 2 and the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box. ■

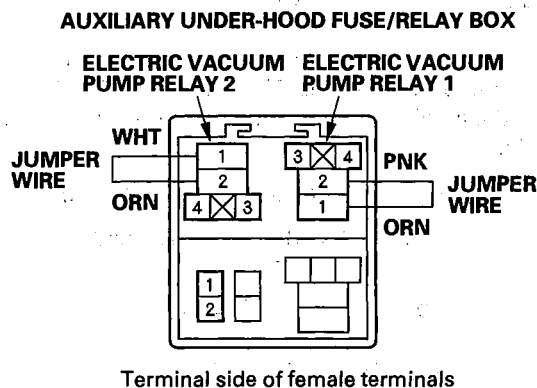
21. Remove electric vacuum pump relay 1.
22. Install the No. 17 (15 A) fuse in the under-hood fuse/relay box.

(cont'd)

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

23. Connect electric vacuum pump relay 2 connector terminals No. 1 and No. 2, and electric vacuum pump relay 1 connector terminals No. 1 and No. 2 with a jumper wire.



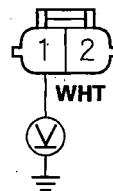
Does electric vacuum pump motor run?

YES—Check for loose terminals in the electric vacuum pump relay 2 4P connector, the electric vacuum pump 2P connector, the brake pedal position switch 4P connector, and PCM connector A (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

NO—Go to step 24.

24. Disconnect the electric vacuum pump 2P connector.
25. Measure the voltage between body ground and electric vacuum pump 2P connector terminal No. 1.

ELECTRIC VACUUM PUMP 2P CONNECTOR



Wire side of female terminals

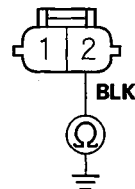
Is there battery voltage?

YES—Go to step 26.

NO—Repair open in the wire between the electric vacuum pump relay 2 and the electric vacuum pump.

26. Check for continuity between body ground and electric vacuum pump 2P connector terminal No. 2.

ELECTRIC VACUUM PUMP 2P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Replace the electric vacuum pump (see page 19-79). ■

NO—Repair open in the wire between the electric vacuum pump and body ground (G503). ■



DTC P0571: Brake Pedal Position Switch Circuit

NOTE: DTC P0571 may be stored when both the brake pedal and the accelerator pedal are pressed at the same time for 5 minutes, and vehicle speed is 12 mph (20 km/h) or more.

1. Turn the ignition switch OFF.
2. Check brake pedal position switch adjustment (see page 19-6).
Is the switch adjustment OK?
YES—Go to step 3.
NO—Adjust the brake pedal position switch (see page 19-6). ■
3. Turn the ignition switch ON (II).
4. Check the BRAKE PEDAL POSITION SWITCH in the DATA LIST with the HDS when the brake pedal is not pressed.
Is OFF indicated?
YES—Go to step 5.
NO—Go to step 9.
5. Check the BRAKE PEDAL POSITION SWITCH in the DATA LIST with the HDS when the brake pedal is pressed.
Is ON indicated?
YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the brake pedal position switch 4P connector, and PCM connector A (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■
NO—Go to step 6.
6. Turn the ignition switch OFF.

7. Disconnect the brake pedal position switch 4P connector.
8. Check the brake pedal position switch (see page 22-180).
Is the switch OK?
YES—Repair open in the wire between the brake pedal position switch and the PCM. ■
NO—Replace the brake pedal position switch (see page 19-6). ■
9. Turn the ignition switch OFF.
10. Disconnect the brake pedal position switch 4P connector.
11. Check the brake pedal position switch (see page 22-180).
Is the switch OK?
YES—Repair short in the wire between the brake pedal position switch and the PCM. ■
NO—Replace the brake pedal position switch (see page 19-6). ■

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

DTC P1131: Electric Vacuum Pump System Related PGM-FI Sensor Signal Malfunction

DTC P16D9: PCM Internal Circuit Malfunction

NOTE: This DTC is stored when there is a problem in the fuel and emission systems. Check for fuel and emission systems DTCs with the HDS, and go to the indicated DTC's troubleshooting (see page 11-3).

DTC P15B9: Check Valve (Intake Manifold) Leak Detected

1. Turn the ignition switch OFF.
2. Check for vacuum leaks at the check valve (intake manifold) between the brake booster and the intake manifold (see page 19-20).

Is the check valve OK?

YES—Go to step 3.

NO—Replace the brake booster vacuum hose. (The check valve is inside the hose). ■

3. Disconnect the vacuum hose from the brake booster.
4. Turn the ignition switch ON (II).
5. Check the BRAKE BOOSTER PRESSURE SENSOR, and BARO SENSOR in the DATA LIST with the HDS, then compare the two pressure values.

Is the BRAKE BOOSTER PRESSURE SENSOR 8.67 kPa (2.56 in.Hg, 65 mmHg), more than the BARO SENSOR?

YES—Replace the brake booster pressure sensor (see page 19-78). ■

NO—Intermittent failure, the system is OK at this time. ■



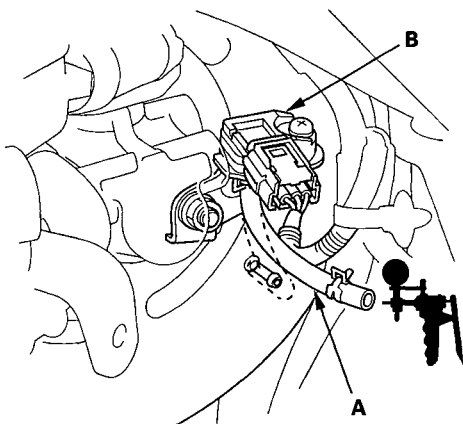
DTC P15BA: Check Valve (Intake Manifold) Stuck Closed

Special Tools Required

Vacuum pump/gauge, 0—30 in.Hg, Snap-on YA4000A or equivalent, commercially available

NOTE: If DTC P15BA is stored at the same time as DTC P0571, troubleshoot DTC P0571 first, then recheck for DTC P15BA.

1. Turn the ignition switch OFF.
2. Disconnect the vacuum hose (A) for the brake booster pressure sensor (B) from the brake booster, and connect a vacuum pump/gauge, 0—30 in.Hg, to the brake booster pressure sensor hose.



3. Turn the ignition switch ON (II).
4. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS before and after applying vacuum to the hose using the vacuum pump/gauge.

Does the indicated value change?

YES—Go to step 5.

NO—Replace the brake booster pressure sensor (see page 19-78). ■

5. Turn the ignition switch OFF.

6. Check for vacuum leaks or clogging up at these parts:

- Brake booster pressure sensor hose.
- Brake booster vacuum hoses and their joints.
- Check valve (intake manifold).
- Check valve (vacuum pump) and filter.
- Brake booster.

Are the parts OK?

YES—Go to step 7.

NO—Repair or replace the leaking or clogged up part(s).

7. Check the brake pedal position switch signal circuit (see page 11-336).

Is the circuit OK?

YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the brake pedal position switch 4P connector, and PCM connector A (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■

NO—Troubleshoot the brake pedal position switch signal circuit. ■

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

DTC P15BB: Brake Booster System Leak Detected

NOTE: If DTC P15BB is stored at the same time as DTC P0571, troubleshoot DTC P0571 first, then recheck for DTC P15BB.

1. Turn the ignition switch OFF.
2. Check for vacuum leaks or clogging at these parts:
 - Brake booster pressure sensor hose.
 - Brake booster vacuum hoses and their joints.
 - Check valve (intake manifold).
 - Check valve (vacuum pump) and filter.
 - Brake booster.

Are the parts OK?

YES—Go to step 3.

NO—Repair or replace the leaking or clogging up part(s).

3. Check the brake pedal position switch signal circuit (see page 11-336).

Is the circuit OK?

YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the brake pedal position switch 4P connector, and PCM connector A (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■

NO—Troubleshoot the brake pedal position switch signal circuit. ■



DTC P15BC: Electric Vacuum Pump Operating Time Exceeded

1. Turn the ignition switch OFF.
2. Make sure you have anti-theft codes for the audio and the navigation system (if equipped), then write down the audio presets. Disconnect the negative cable from the battery, and wait several seconds.
3. Reconnect the negative cable to the battery, then do this procedure after the troubleshooting:
 - Enter the anti-theft code for the audio and the navigation system (if equipped), then enter the audio presets.
 - Set the clock.
4. Turn the ignition switch ON (II). Do not start the engine.

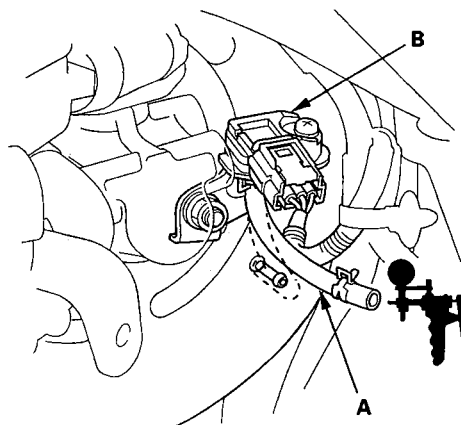
Does electric vacuum pump motor run?

YES—Go to step 5.

NO—Go to step 21.

5. Turn the ignition switch OFF.

6. Disconnect the vacuum hose (A) for the brake booster pressure sensor (B) from the brake booster, and connect a vacuum pump/gauge, 0—30 in. Hg, to the brake booster pressure sensor hose.



7. Turn the ignition switch ON (II).
8. Check the BRAKE BOOSTER PRESSURE SENSOR in the DATA LIST with the HDS before and after applying vacuum to the hose using the vacuum pump/gauge.

Does the indicated value change?

YES—Go to step 9.

NO—Replace the brake booster pressure sensor (see page 19-78). ■

9. Turn the ignition switch OFF.
10. Reconnect the vacuum hose to the brake booster.
11. Disconnect the brake booster vacuum hose from the intake manifold (see step 6 on page 9-3).

NOTE: Cap the brake booster vacuum hose connector on the intake manifold to prevent a vacuum leak, or dust entering the system.

12. Deplete the booster vacuum by pressing the brake pedal several times until the brake pedal becomes hard.
13. Turn the ignition switch ON (II).

(cont'd)

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

14. Check the ELECTRIC VACUUM PUMP RELAY in the DATA LIST with the HDS, and start the engine while pressing the brake pedal lightly.

NOTE: Do not press the brake pedal hard, press the pedal gently until the brake lights turn on.

Does the pump run and shut off within 8 seconds?

YES—Intermittent failure, the system is OK at this time. Check for loose terminals between the brake booster pressure sensor 3P connector, the electric vacuum pump relay 2 4P connector, the electric vacuum pump 2P connector, and PCM connector B (44P). Refer to intermittent failures troubleshooting (see page 19-45). ■

NO—Go to step 15.

15. Turn the ignition switch OFF.
16. Substitute the known-good or new vacuum hose between the electric vacuum pump and 3-way joint.
17. Deplete booster vacuum by pressing the brake pedal several times until the brake pedal becomes hard.
18. Turn the ignition switch ON (II).

19. Check the ELECTRIC VACUUM PUMP RELAY in the DATA LIST with the HDS, and start the engine while pressing the brake pedal lightly.

NOTE: Do not press the brake pedal hard, press the pedal gently until the brake lights turning on.

Does the pump function finish within 8 seconds?

YES—Replace the original vacuum hose between the electric vacuum pump and 3-way joint (see page 19-42). ■

NO—Go to step 20.

20. Check for vacuum leaks or clogging at these parts:

- Brake booster pressure sensor hose.
- Brake booster vacuum hoses and their joints.
- Check valve (intake manifold).
- Brake booster.

Are the parts OK?

YES—Replace the electric vacuum pump (see page 19-79). ■

NO—Repair or replace the leaking or clogging part (s). ■

21. Turn the ignition switch OFF.



22. Check the connection and pin fit of the electric vacuum pump 2P connector.

Is the connector properly connected?

YES—Go to step 23.

NO—Connect the electric vacuum pump 2P connector properly. If necessary, repair or replace the harness. ■

23. Remove electric vacuum pump relay 2, and check the relay (see page 22-64).

Is electric vacuum pump relay 2 OK?

YES—Go to step 24.

NO—Replace electric vacuum pump relay 2. ■

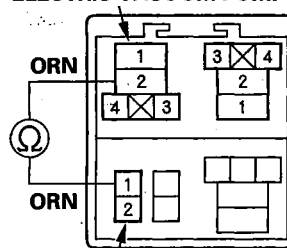
24. Remove the No. 17 (15 A) fuse in the under-hood fuse/relay box.

25. Remove the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box.

26. Check for continuity between electric vacuum pump relay 2 terminal No. 2 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box terminal No. 1.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 2



No. 31 (7.5 A) FUSE

Terminal side of female terminals

Is there continuity?

YES—Go to step 27.

NO—Repair open in the wire between the electric vacuum pump relay 2 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box. ■

27. Remove electric vacuum pump relay 1.

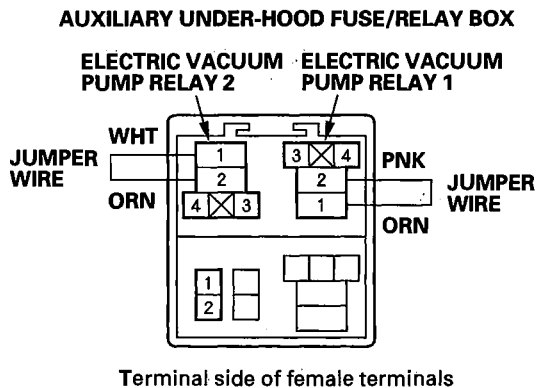
28. Install the No. 17 (15 A) fuse in the under-hood fuse/relay box.

(cont'd)

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

29. Connect electric vacuum pump relay 2 connector terminals No. 1 and No. 2, and electric vacuum pump relay 1 connector terminals No. 1 and No. 2 with a jumper wire.



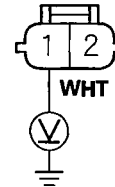
Does electric vacuum pump motor run?

YES—Check for loose terminals in the brake booster pressure sensor 3P connector, the electric vacuum pump relay 2 4P connector, the electric vacuum pump 2P connector, and PCM connector B (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

NO—Go to step 30.

30. Disconnect the electric vacuum pump 2P connector.
31. Measure the voltage between body ground and electric vacuum pump 2P connector terminal No. 1.

ELECTRIC VACUUM PUMP 2P CONNECTOR



Wire side of female terminals

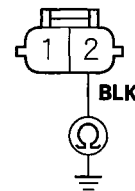
Is there battery voltage?

YES—Go to step 32.

NO—Repair open in the wire between the electric vacuum pump relay 2 and the electric vacuum pump. ■

32. Check for continuity between body ground and electric vacuum pump 2P connector terminal No. 2.

ELECTRIC VACUUM PUMP 2P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Replace the electric vacuum pump (see page 19-79). ■

NO—Repair open in the wire between the electric vacuum pump and body ground (G503). ■



DTC P16DA: Electric Vacuum Pump Relay 1 Stuck OFF

1. Turn the ignition switch OFF.
2. Check the No. 17 (15 A) fuse in the under-hood fuse/relay box.

Is the fuse blown?

YES—Repair short in the wire between the electric vacuum pump relay 1 and the No. 17 (15 A) fuse in the under-hood fuse/relay box. Replace the No. 17 (15 A) fuse, and recheck. ■

NO—Reinstall the fuse, then go to step 3.

3. Remove electric vacuum pump relay 1, and check the relay (see page 22-64).

Is electric vacuum pump relay 1 OK?

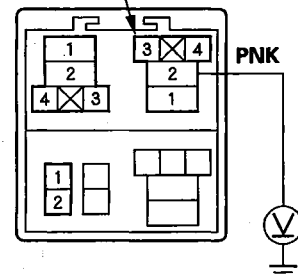
YES—Go to step 4.

NO—Replace electric vacuum pump relay 1. ■

4. Measure the voltage between body ground and electric vacuum pump relay 1 terminal No. 2.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 1



Terminal side of female terminals

Is there battery voltage?

YES—Go to step 5.

NO—Repair open in the wire between electric vacuum pump relay 1 and the No. 17 (15 A) fuse in the under-hood fuse/relay box. ■

5. Remove the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box.

(cont'd)

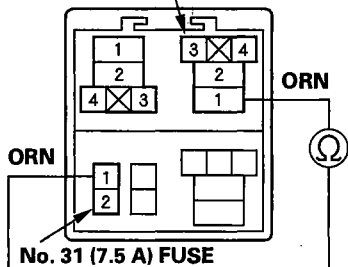
Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

6. Check for continuity between electric vacuum pump relay 1 terminal No. 1 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box terminal No. 1.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 1



Terminal side of female terminals

Is there continuity?

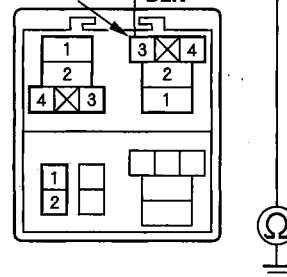
YES—Go to step 7.

NO—Repair open in the wire between electric vacuum pump relay 1 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box. ■

7. Check for continuity between body ground and electric vacuum pump relay 1 terminal No. 3.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 1



Terminal side of female terminals

Is there continuity?

YES—Go to step 8.

NO—Repair open in the wire between electric vacuum pump relay 1 and body ground (G201). ■

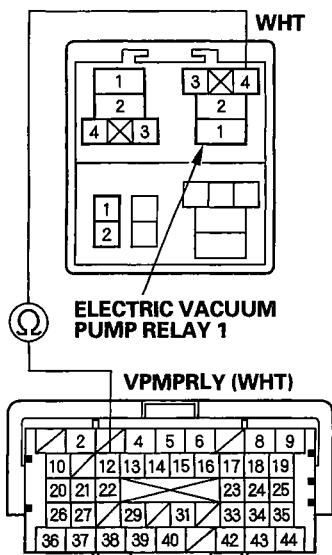
8. Short the SCS line with the HDS.
9. Disconnect PCM connector A (44P).



10. Check for continuity between electric vacuum pump relay 1 terminal No. 4 and PCM connector A (44P) terminal No. 12.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

Terminal side of female terminals



Terminal side of female terminals

Is there continuity?

YES—Check for loose terminals in the electric vacuum pump relay 1 4P connector, the electric vacuum pump 2P connector, and PCM connector A (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

NO—Repair open in the wire between electric vacuum pump relay 1 and the PCM. ■

Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

DTC P16DB: Electric Vacuum Pump Relay 1/2 Signal Circuit Malfunction

1. Turn the ignition switch OFF.
2. Check the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box.

Is the fuse blown?

YES—Repair short in the wire between the electric vacuum pump relay 1/2 and the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box. Replace the No. 31 (7.5 A) fuse and recheck. ■

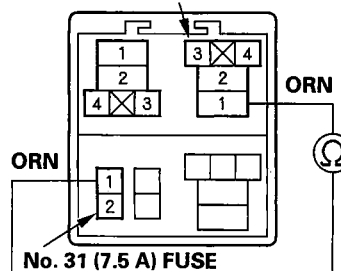
NO—Remove the fuse, then go to step 3.

3. Remove electric vacuum pump relay 1.

4. Check for continuity between electric vacuum pump relay 1 terminal No. 1 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box terminal No. 1.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 1



Terminal side of female terminals

Is there continuity?

YES—Go to step 5.

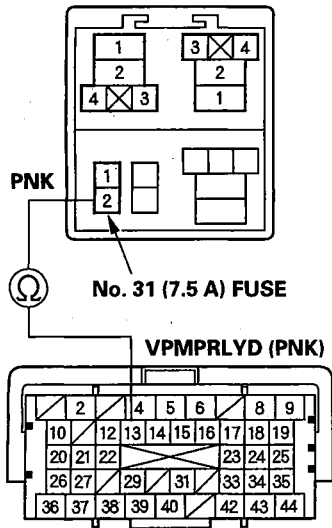
NO—Repair open in the wire between electric vacuum pump relay 1 and No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box. ■

5. Short the SCS line with the HDS.
6. Disconnect PCM connector A (44P).



7. Check for continuity between No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box terminal No. 2 and PCM connector A (44P) terminal No. 13.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX
Terminal side of female terminals



PCM CONNECTOR A (44P)
Terminal side of female terminals

Is there continuity?

YES—Check for loose terminals in PCM connector A (44P), then update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

NO—Repair open in the wire between the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box and the PCM. ■

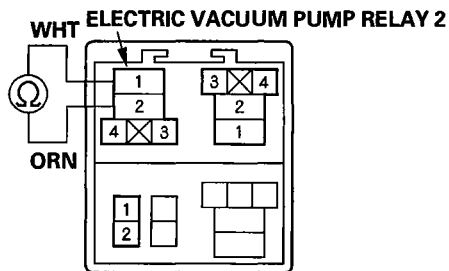
Electric Vacuum Pump System

DTC Troubleshooting (cont'd)

DTC P16DC: Electric Vacuum Pump Relay 2 Stuck ON

1. Turn the ignition switch OFF.
2. Remove electric vacuum pump relay 2, and check the relay (see page 22-64).
Is electric vacuum pump relay 2 OK?
YES—Go to step 3.
NO—Replace electric vacuum pump relay 2. ■
3. Remove the No. 17 (15 A) fuse in the under-hood fuse/relay box.
4. Disconnect the electric vacuum pump 2P connector.
5. Check for continuity between electric vacuum pump relay 2 terminals No. 1 and No. 2.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX



Terminal side of female terminals

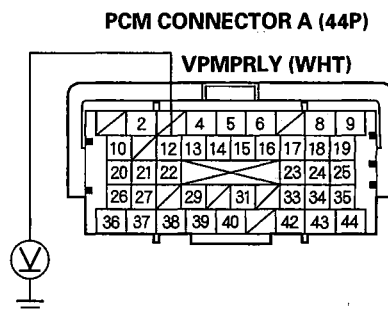
Is there continuity?

YES—Repair short in the wires between electric vacuum pump relay 2 (+B line) and (pump motor line). ■

NO—Go to step 6.

6. Short the SCS line with the HDS.
7. Disconnect PCM connector A (44P).

8. Turn the ignition switch ON (II).
9. Measure the voltage between body ground and PCM connector A (44P) terminal No. 12.



Terminal side of female terminals

Is there any voltage?

YES—Repair short to power in the wire between the electric vacuum pump relay 1/2 and the PCM. ■

NO—Update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■



DTC P16DD: Electric Vacuum Pump Relay 1 Stuck ON

1. Turn the ignition switch OFF.
2. Remove electric vacuum pump relay 1, and check the relay (see page 22-64).

Is electric vacuum pump relay 1 OK?

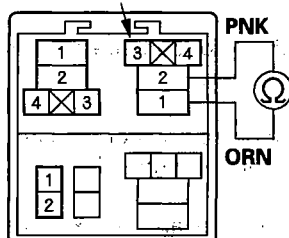
YES—Go to step 3.

NO—Replace electric vacuum pump relay 1. ■

3. Remove the No. 17 (15 A) fuse in the under-hood fuse/relay box, and the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box.
4. Check for continuity between electric vacuum pump relay 1 terminals No. 1 and No. 2.

AUXILIARY UNDER-HOOD FUSE/RELAY BOX

ELECTRIC VACUUM PUMP RELAY 1



Terminal side of female terminals

Is there continuity?

YES—Repair short in the wires between electric vacuum pump relay 1 (+B line) and (VPMRPLY line). ■

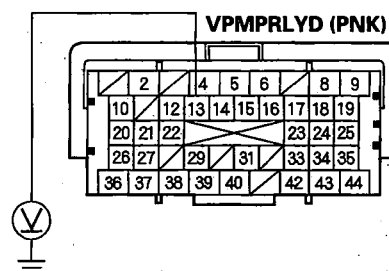
NO—Go to step 5.

5. Short the SCS line with the HDS.
6. Disconnect PCM connector A (44P).

7. Turn the ignition switch ON (II).

8. Measure the voltage between body ground and PCM connector A (44P) terminal No. 13.

PCM CONNECTOR A (44P)



Terminal side of female terminals

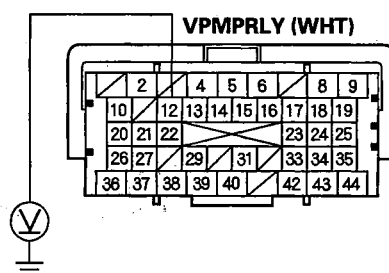
Is there 3.0 V or more?

YES—Repair short to power in the wire between the No. 31 (7.5 A) fuse in the auxiliary under-hood fuse/relay box and the PCM. ■

NO—Go to step 9.

9. Measure the voltage between body ground and PCM connector A (44P) terminal No. 12.

PCM CONNECTOR A (44P)



Terminal side of female terminals

Is there any voltage?

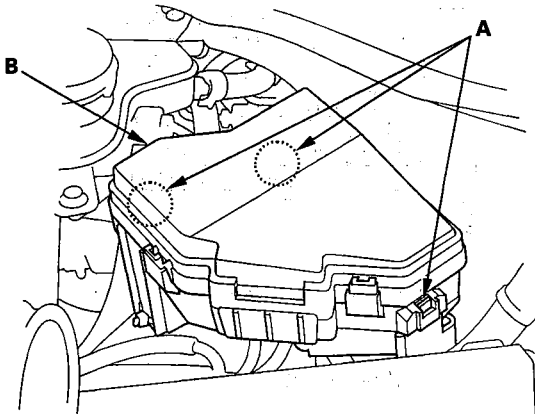
YES—Repair short to power in the wire between electric vacuum pump relay 1/2 and the PCM. ■

NO—Update the PCM if it does not have the latest software, or substitute a known-good PCM, then go to step 1 and recheck. If no DTCs are indicated, and the PCM was substituted, replace the original PCM (see page 11-252). ■

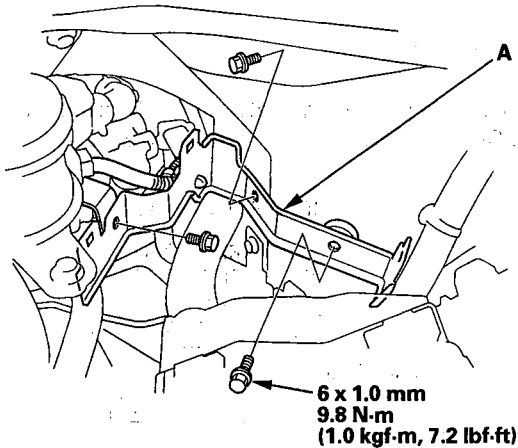
Electric Vacuum Pump System

Brake Booster Pressure Sensor Replacement

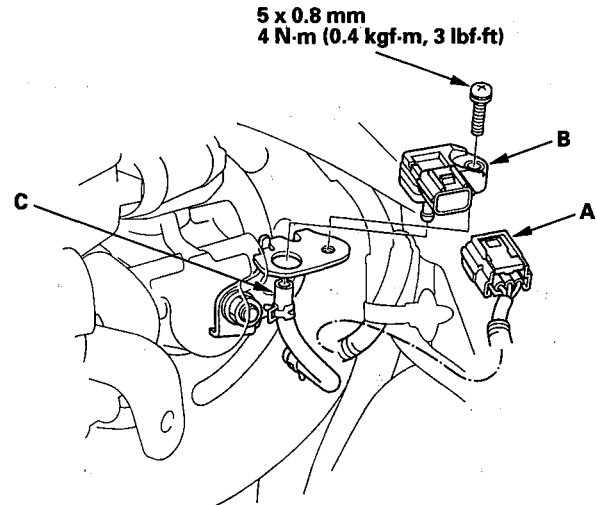
1. Open the air cleaner housing cover (see page 11-394).
2. Release the hooks (A), and move the under-hood fuse/relay box (B) aside. Do not disconnect the connectors.



3. Remove the under-hood fuse/relay box stay (A).



4. Disconnect the brake booster pressure sensor connector (A).



5. Remove the brake booster pressure sensor (B), then disconnect the sensor hose (C).

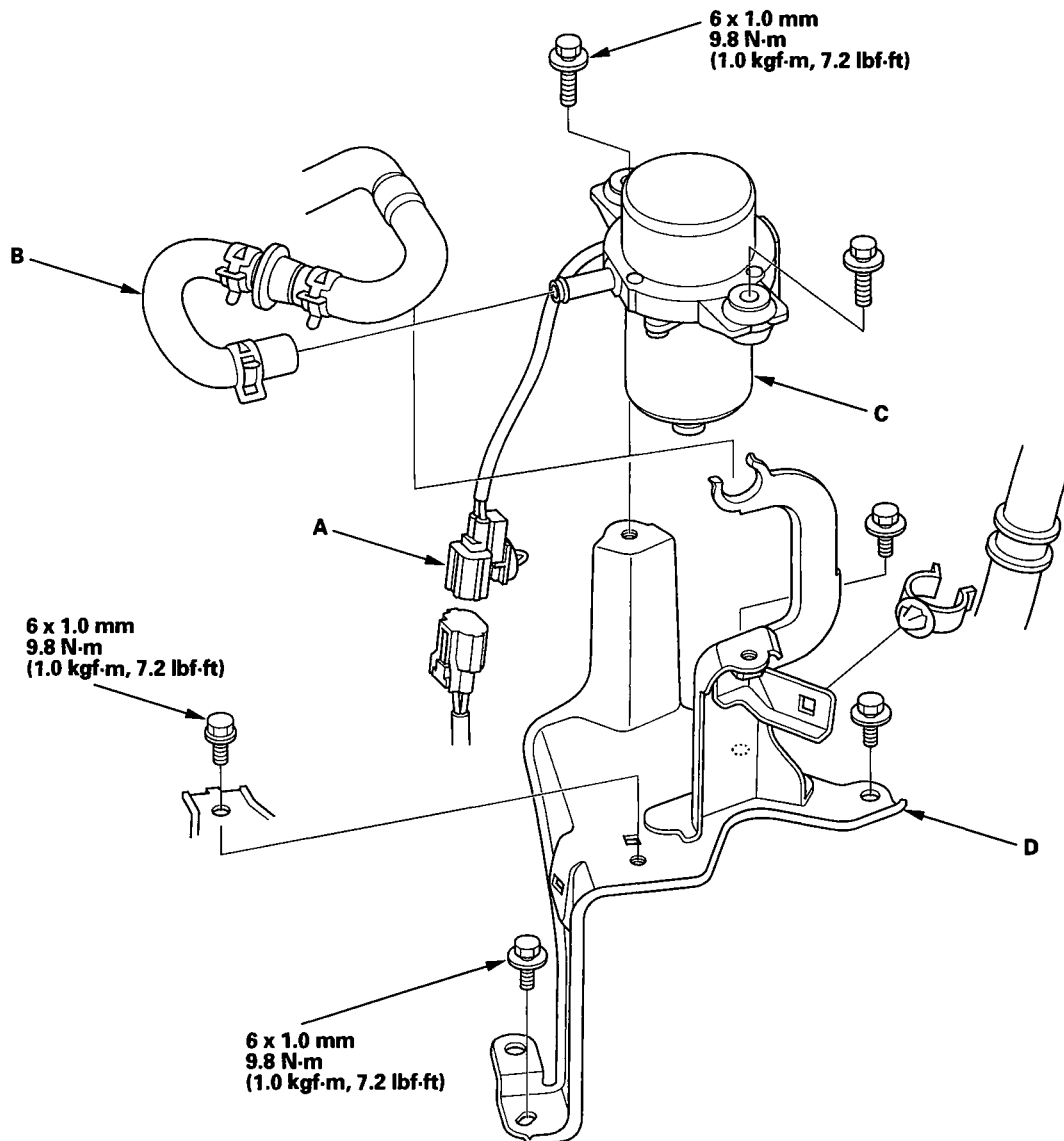
NOTE: Check for damage and deterioration of the the sensor hose.

6. Install the brake booster pressure sensor in the reverse order of removal.
7. Start the engine, and check that the electric vacuum pump system indicator goes off (see page 19-43).



Electric Vacuum Pump Replacement

1. Disconnect the electric vacuum pump connector (A).



2. Disconnect the vacuum pump hose (B) from the electric vacuum pump (C).
3. Remove the pump from the bracket (D).

NOTE: Do not disassemble the electric vacuum pump.

4. Replace the pump bracket if necessary.
5. Install the electric vacuum pump in the reverse order of removal.
6. Start the engine, and check that the electric vacuum pump system indicator goes off.

BACK

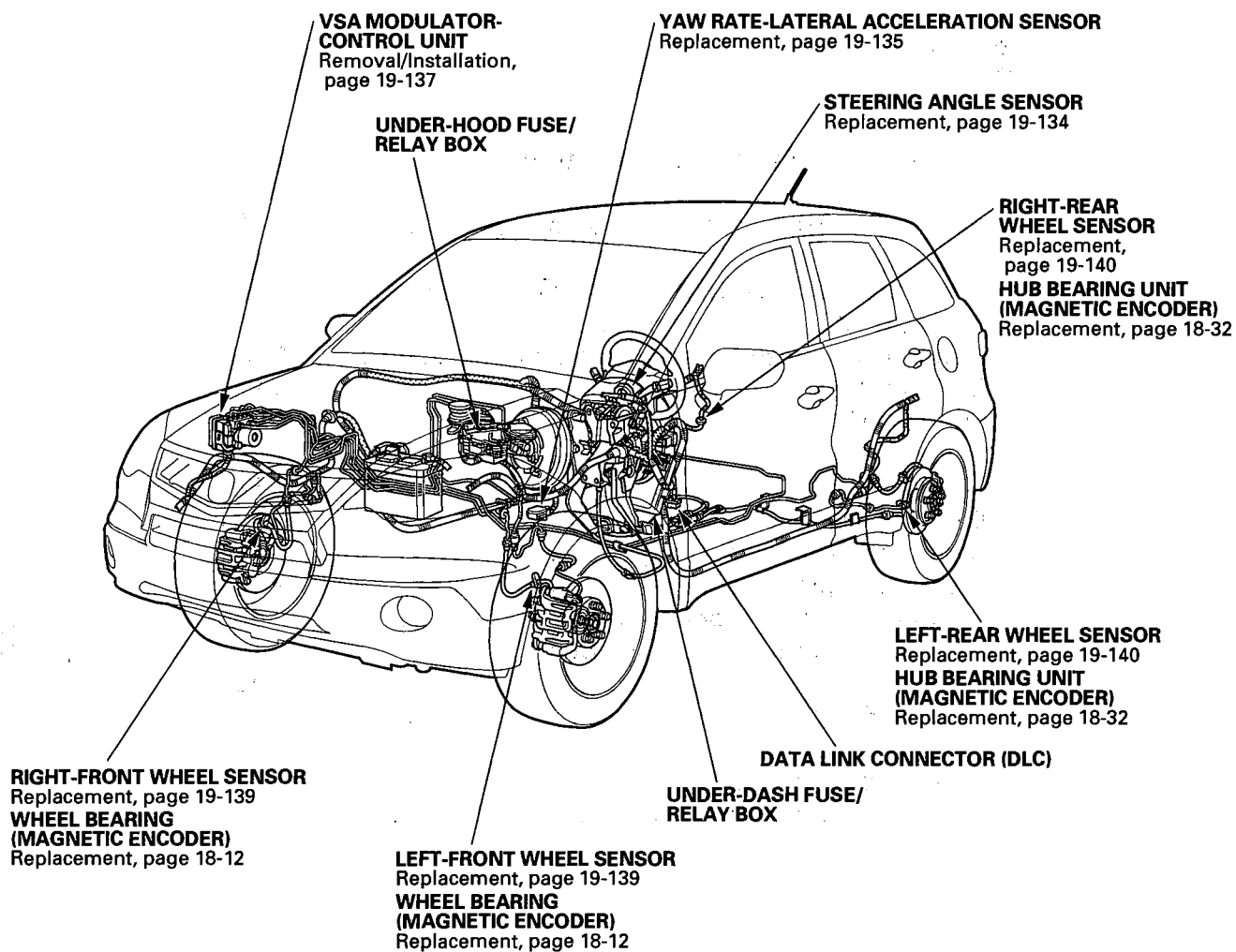
Brakes

Conventional Brake Components	19-1
Electric Vacuum Pump System	19-41
VSA (Vehicle Stability Assist) System Components	
Component Location Index	19-82
General Troubleshooting Information	19-83
DTC Troubleshooting Index	19-86
Symptom Troubleshooting Index	19-88
System Description	19-89
Circuit Diagram	19-98
DTC Troubleshooting	19-101
Symptom Troubleshooting	19-131
Steering Angle Sensor Replacement	19-134
Steering Angle Sensor Center Point Writing	19-135
Yaw Rate-Lateral Acceleration Sensor	
Replacement	19-135
VSA Off Switch Test	19-136
VSA Modulator-Control Unit	
Removal and Installation	19-137
Wheel Sensor Replacement	19-139



VSA System Components

Component Location Index

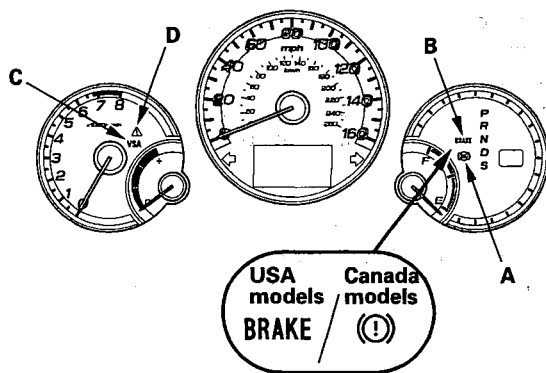


General Troubleshooting Information

System Indicator

This system has four indicators:

- ABS indicator (A)
- Brake system indicator (BRAKE) (B)
- VSA indicator (C)
- VSA activation indicator (D)



When the system detects a problem, it will turn the appropriate indicators on. Depending on the failure, the VSA modulator-control unit determines which indicators are turned on.

When the system is OK, each indicator comes on for about 2 seconds after turning the ignition switch ON (II), then goes off.

ABS indicator

The ABS indicator comes on when the ABS function is not working. The brakes still work like a conventional system.

Brake system indicator

The brake system indicator comes on when the EBD (electronic brake distribution) function is not working, when the parking brake is applied, and/or when the brake fluid level is low.

VSA indicator

The VSA indicator comes on when the VSA function is not working.

VSA activation indicator

The VSA activation indicator blinks when the VSA function is activating. The VSA activation indicator comes on when the VSA switch is turned off or when the VSA function is lost.

Each indicator will go off after a problem goes away, but the timing which the VSA modulator-control unit turns off the indicators varies between DTCs.

- DTC 61 or 62:
The indicators go off automatically when the system returns to normal.
- DTC 11, 13, 15, 17, 25, 26, 27*, 31, 32, 33, 34, 35, 36, 37, 38, 54, 66, 68, 81, 83, 84, 86, 87, 88, 91**, 113, 114, 121, 122, 123, 124, 131*, 132, 133, 134, 137, or 138
The indicators stay on until the ignition switch is turned OFF, whether or not the system returns to normal.
* : There are some cases that the indicators stay on until the vehicle is driven after the system returns to normal.
* * : There are some cases that the indicators go off automatically when the system returns to normal.
- DTC 12, 14, 16, 18, 21, 22, 23, 24, 51, 52, or 53:
The indicators stay on until the vehicle is driven after the system returns to normal.

(cont'd)

VSA System Components

General Troubleshooting Information (cont'd)

Diagnostic Trouble Code (DTC)

- The memory can hold 10 DTCs. However, when the same DTC is detected more than once, the more recent DTC is written over the earlier one. Therefore, when the same problem is detected repeatedly, it is memorized as a single DTC.
- The DTCs are indicated in the order they occur.
- The DTCs are memorized in the EEPROM. Therefore, the memorized DTCs cannot be canceled by disconnecting the battery. Do the specified procedures to clear the DTCs.

Self-diagnosis

- Self-diagnosis can be classified into two categories:
 - Initial diagnosis: Done right after the ignition switch is turned ON (II) and until the ABS and VSA indicators go off.
 - Regular diagnosis: Done right after the initial diagnosis until the ignition switch is turned OFF.
- When the system detects a problem, the VSA modulator-control unit shifts to fail-safe mode.

Kickback

The pump motor operates when the VSA modulator-control unit is functioning, and the fluid in the reservoir is forced out to the master cylinder, causing kickback at the brake pedal.

Pump Motor

- The pump motor operates when the VSA modulator-control unit is functioning.
- The VSA modulator-control unit checks the pump motor operation during regular diagnosis when the vehicle is driven over 10 mph (15 km/h) the first time after the ignition switch is turned ON (II). You may hear the motor operate at this time, but it is normal.

Brake Fluid Replacement/Air Bleeding

Brake fluid replacement and air bleeding procedures are identical to the procedures used on vehicles not equipped with the VSA system (see page 19-9).

How to Troubleshoot DTCs

The troubleshooting procedures assume that the cause of the problem is still present and the ABS and/or VSA indicator is still on. Following a troubleshooting procedure for a code that has been cleared and does not reset can result in incorrect diagnosis.

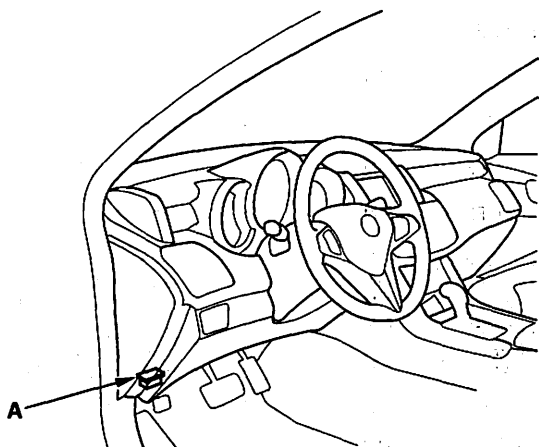
1. Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting. Find out when the ABS and/or VSA indicator came on, such as during control, after control, when the vehicle was traveling at a certain speed, etc.
2. When the ABS or VSA indicator does not come on during the test-drive, but troubleshooting is done based on the DTC, check for loose connectors, poor contact of the terminals, etc. before you start troubleshooting.
3. After troubleshooting, or repairs are done, clear the DTCs, and test-drive the vehicle under the same conditions that originally set the DTCs. Make sure the ABS and VSA indicators do not come on.
4. Check for other unit DTCs when connected via F-CAN, if there are DTCs that are related to F-CAN, the most likely cause was that the ignition switch was turned ON (II) with the VSA modulator-control unit connector disconnected. Clear the DTCs. Check for PGM-FI, SH-AWD, and VSA codes, and troubleshoot those first.

Intermittent Failures

The term "intermittent failure" means a system may have had a failure, but it checks OK now. If the indicator(s) of the system does not come on, check for loose connectors, poor contact of the terminals related to the circuit that you are troubleshooting. If the indicators were on but then went out, the original problem may have been intermittent.

How to Use the HDS (Honda Diagnostic System)

1. If the system indicators stays on, connect the HDS to the data link connector (DLC) (A) located under the driver's side of the dashboard.



2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the vehicle and the VSA modulator-control unit. If it doesn't, troubleshoot the DLC circuit: (see page 11-229).
4. Check the diagnostic trouble code (DTC) and note it. Also check the on-board snapshot data, and download any data found. Then refer to the indicated DTC's troubleshooting, and begin the appropriate troubleshooting procedure.

NOTE:

- The HDS can read the DTC, the current data, and other system data.
- For specific operations, refer to the Help menu that came with the HDS.

How to Retrieve DTCs

1. With the ignition switch OFF, connect the HDS to the data link connector (DLC) under the driver's side of the dashboard.
2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the vehicle and the VSA modulator-control unit. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Follow the prompts on the HDS to display the DTC(s) on the screen. After determining the DTC, refer to the DTC troubleshooting.
5. Turn the ignition switch OFF.

How to Clear DTCs

1. With the ignition switch OFF, connect the HDS to the data link connector (DLC) under the driver's side of the dashboard.
2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the vehicle and the VSA modulator-control unit. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Clear the DTC(s) by following the screen prompts on the HDS.
5. Turn the ignition switch OFF.

VSA System Components

DTC Troubleshooting Index

DTC	Detection Item	ABS Indicator	Brake System Indicator	VSA Indicator	VSA Activation Indicator	Note
11	Right-front wheel sensor (open/short to body ground/short to power)	ON	ON or OFF*	ON	ON	(see page 19-101)
12	Right-front wheel sensor (electrical noise/intermittent interruption)	ON	ON or OFF*	ON	ON	(see page 19-106)
13	Left-front wheel sensor (open/short to body ground/short to power)	ON	ON or OFF*	ON	ON	(see page 19-101)
14	Left-front wheel sensor (electrical noise/intermittent interruption)	ON	ON or OFF*	ON	ON	(see page 19-106)
15	Right-rear wheel sensor (open/short to body ground/short to power)	ON	ON or OFF*	ON	ON	(see page 19-101)
16	Right-rear wheel sensor (electrical noise/intermittent interruption)	ON	ON or OFF*	ON	ON	(see page 19-106)
17	Left-rear wheel sensor (open/short to body ground/short to power)	ON	ON or OFF*	ON	ON	(see page 19-101)
18	Left-rear wheel sensor (electrical noise/intermittent interruption)	ON	ON or OFF*	ON	ON	(see page 19-106)
21	Right-front magnetic encoder malfunction	ON	ON or OFF*	ON	ON	(see page 19-107)
22	Left-front magnetic encoder malfunction	ON	ON or OFF*	ON	ON	(see page 19-107)
23	Right rear magnetic encoder malfunction	ON	ON or OFF*	ON	ON	(see page 19-107)
24	Left-rear magnetic encoder malfunction	ON	ON or OFF*	ON	ON	(see page 19-107)
25	Yaw rate sensor (sensor unit)	OFF	OFF	ON	ON	(see page 19-107)
26	Lateral acceleration sensor (sensor unit)	OFF	OFF	ON	ON	(see page 19-107)
27	Steering angle sensor (hardware)	OFF	OFF	ON	ON	(see page 19-108)
31	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
32	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
33	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
34	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
35	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
36	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
37	ABS solenoid	ON	ON	ON	ON	(see page 19-108)
38	ABS solenoid	ON	ON	ON	ON	(see page 19-108)

*: Brake system indicator turns ON when 3 or more wheels fail.

DTC	Detection Item	ABS Indicator	Brake System Indicator	VSA Indicator	VSA Activation Indicator	Note
51	Motor locked	ON	ON	ON	ON	(see page 19-109)
52	Motor stuck OFF	ON	ON	ON	ON	(see page 19-109)
53	Motor stuck ON	ON	ON	ON	ON	(see page 19-111)
54	Valve relay	ON	ON or OFF	ON	ON	(see page 19-112)
61	IG1 voltage low	ON	ON or OFF	ON	ON	(see page 19-113)
62	IG1 voltage high	ON	ON	ON	ON	(see page 19-114)
66	VSA pressure sensor (hardware)	ON	OFF	ON	ON	(see page 19-114)
68	Brake pedal position switch stuck ON (hardware)	ON	OFF	ON	ON	(see page 19-115)
81	Central processing unit (CPU)	ON or OFF	ON or OFF	ON or OFF	ON or OFF	(see page 19-116)
83	PCM communication error	OFF	OFF	ON	ON	(see page 19-116)
84	Steering angle sensor No center point writing	OFF	OFF	OFF	ON	(see page 19-117)
86	F-CAN communication	ON or OFF	OFF	ON	ON	(see page 19-117)
87	Current flow into wheel sensor input amplifier	ON	OFF	ON	ON	(see page 19-122)
88	Difference in wheel speed	ON	ON or OFF	ON	ON	(see page 19-122)
91	VSA system	ON	OFF	ON	ON	(see page 19-123)
113	Yaw rate-lateral acceleration sensor (power supply)	OFF	OFF	ON	ON	(see page 19-123)
114	Yaw rate-lateral acceleration sensor installation problem	OFF	OFF	ON	ON	(see page 19-124)
121	VSA solenoid	ON	ON	ON	ON	(see page 19-124)
122	VSA solenoid	ON	ON	ON	ON	(see page 19-124)
123	VSA solenoid	ON	ON	ON	ON	(see page 19-124)
124	VSA solenoid	ON	ON	ON	ON	(see page 19-124)
131	Yaw rate sensor (software)	OFF	OFF	ON	ON	(see page 19-125)
132	Lateral acceleration sensor (software)	OFF	OFF	ON	ON	(see page 19-126)
133	Lateral acceleration sensor (joint failure)	OFF	OFF	ON	ON	(see page 19-126)
134	Steering angle sensor (software)	OFF	OFF	ON	ON	(see page 19-127)
137	VSA pressure sensor (software)	ON	OFF	ON	ON	(see page 19-128)
138	Brake pedal position switch stuck OFF (software)	ON	OFF	ON	ON	(see page 19-129)

*: Brake system indicator turns ON when 3 or more wheels fail.

VSA System Components

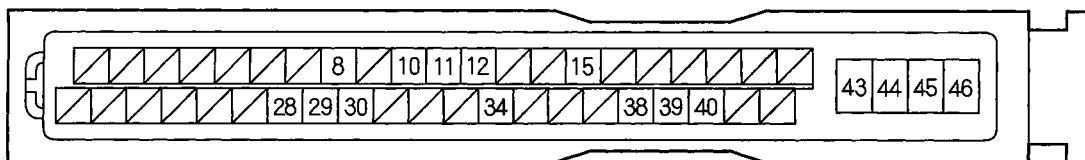
Symptom Troubleshooting Index

When the vehicle has one of these symptoms, check for a diagnostic trouble code (DTC) with the HDS. If there is no DTC, do the diagnostic procedure for the symptom, in the sequence listed, until you find the cause.

Symptom	Diagnostic procedure
HDS does not communicate with the VSA modulator-control unit or the vehicle	Troubleshoot the DLC circuit (see page 11-229).
VSA activation indicator does not come on at start-up (bulb check)	1. Do the gauge control module troubleshooting (see page 22-258). 2. Substitute a known-good VSA modulator-control unit, then recheck. If it is OK, replace the original VSA modulator-control unit (see page 19-137).
VSA activation indicator does not go off, and no DTCs are stored	1. Symptom troubleshooting (see page 19-131). 2. Do the gauge control module troubleshooting (see page 22-258). 3. Substitute a known-good VSA modulator-control unit, then recheck. If it is OK, replace the original VSA modulator-control unit (see page 19-137).
ABS indicator, brake system indicator, and VSA indicator do not come on at the same time	1. Do the gauge control module troubleshooting (see page 22-258). 2. Substitute a known-good VSA modulator-control unit, then recheck. If it is OK, replace the original VSA modulator-control unit (see page 19-137).
ABS indicator, brake system indicator, and VSA indicator do not go off at the same time	1. Symptom troubleshooting (see page 19-132). 2. Do the gauge control module troubleshooting (see page 22-258). 3. Substitute a known-good VSA modulator-control unit, then recheck. If it is OK, replace the original VSA modulator-control unit (see page 19-137).

System Description

VSA Modulator-control Unit Inputs and Outputs for 46P Connector



Wire side of female terminals

Terminal number	Wire color	Terminal sign	Description	Measurement (Disconnect the VSA modulator-control unit 46P connector)		
				Terminal	Conditions	Voltage
8	WHT	RR-GND	Detects right-rear wheel sensor signal	—	—	—
10	RED	RL-GND	Detects left-rear wheel sensor signal	—	—	—
11	YEL	RL +B	Detects left-rear wheel sensor signal	—	—	—
12	ORN	FL +B	Detects left-front wheel sensor signal	—	—	—
15	LT BLU	K-LINE	Communicates with HDS	—	—	—

(cont'd)

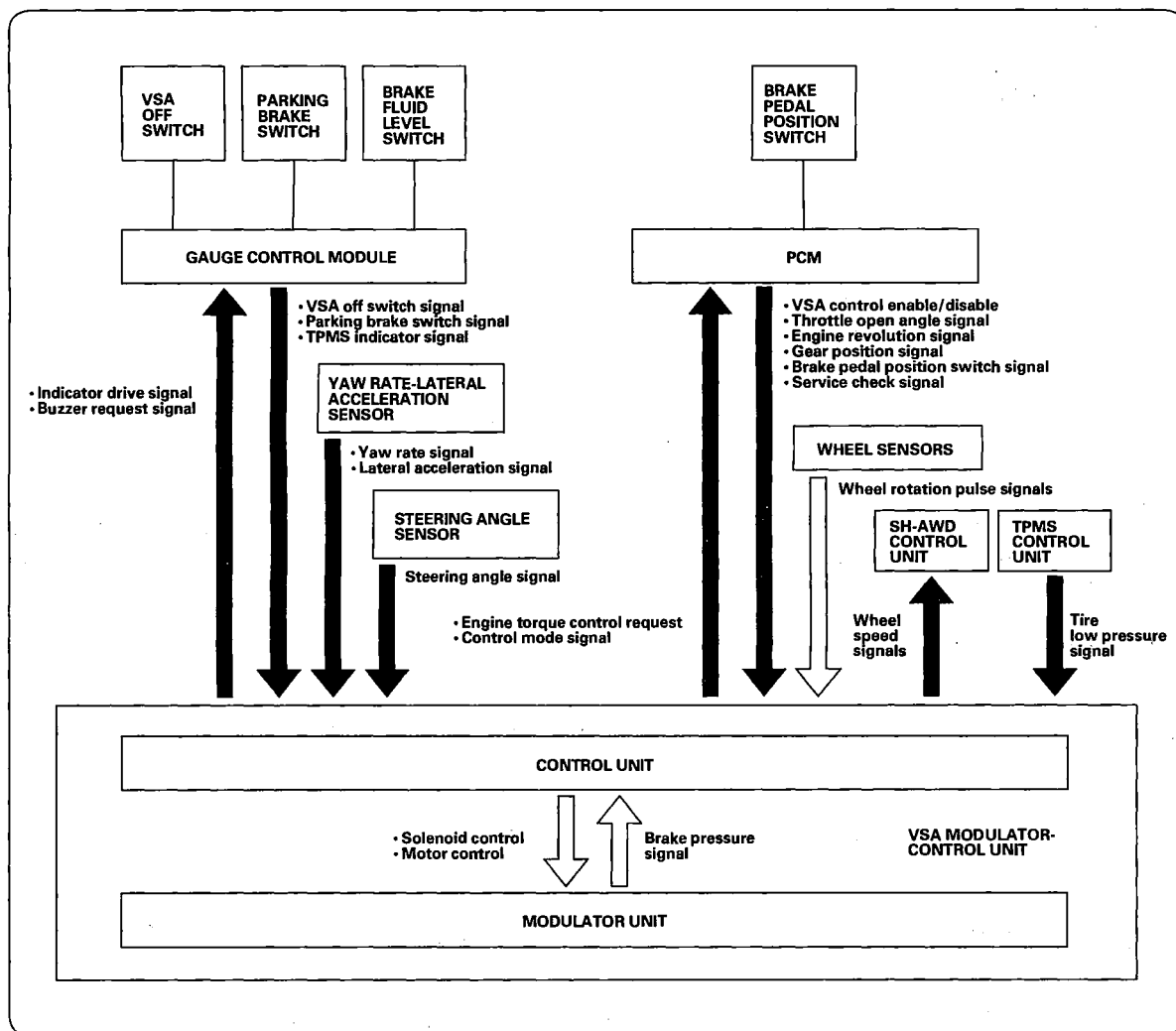
VSA System Components

System Description (cont'd)

Terminal number	Wire color	Terminal sign	Description	Measurement (Disconnect the VSA modulator-control unit 46P connector)		
				Terminal	Conditions	Voltage
28	PNK	FR-GND	Detects right-front wheel sensor signal	_____	_____	_____
29	GRN	FR +B	Detects right-front wheel sensor signal	_____	_____	_____
30	LT GRN	RR +B	Detects right-rear wheel sensor signal	_____	_____	_____
34	GRY	FL -GND	Detects left-front wheel sensor signal	_____	_____	_____
38	RED	CAN-L	F-CAN communication circuit	_____	_____	_____
39	WHT	CAN-H	F-CAN communication circuit	_____	_____	_____
40	GRN	IG1	Power source for activating the system	40—GND	Ignition switch ON (II)	Battery voltage
43	BLK	GND2	Ground for the VSA modulator-control unit	43—GND	At all time	Continuity to ground
44	WHT	+B SOL	Power source for the valve relay	44—GND	At all time	Battery voltage
45	RED	+B MOT	Power source for the motor relay	45—GND	At all time	Battery voltage
46	BLK	GND1	Ground for the pump motor	46—GND	At all time	Continuity to ground

System Outline

This system is composed of the VSA modulator-control unit, the wheel sensors, the steering angle sensor, and the yaw rate-lateral acceleration sensor, and the system indicators in the gauge control module. The VSA modulator-control unit controls the ABS, EBD, TCS, VSA, and brake assist with the brake pressure of each wheel and the engine torque.



← Communication via F-CAN

(cont'd)

VSA System Components

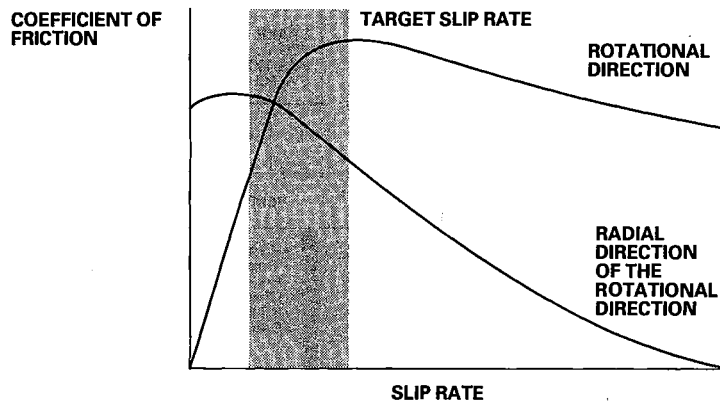
System Description (cont'd)

ABS Features

Anti-lock control

Without ABS, when the brake pedal is pressed while driving, the wheels sometimes lock before the vehicle comes to a stop. In such an event, the maneuverability of the vehicle is reduced if the front wheels are locked, and the stability of the vehicle is reduced if the rear wheels are locked, creating an extremely unstable condition. With ABS, the system precisely controls the slip rate of the wheels to ensure maximum grip force from the tires, and it thereby ensures maneuverability and stability of the vehicle. The ABS calculates the slip rate of the wheels based on the four wheel speeds, then it controls the brake fluid pressure to reach the target slip rate.

Grip force of tire and road surface

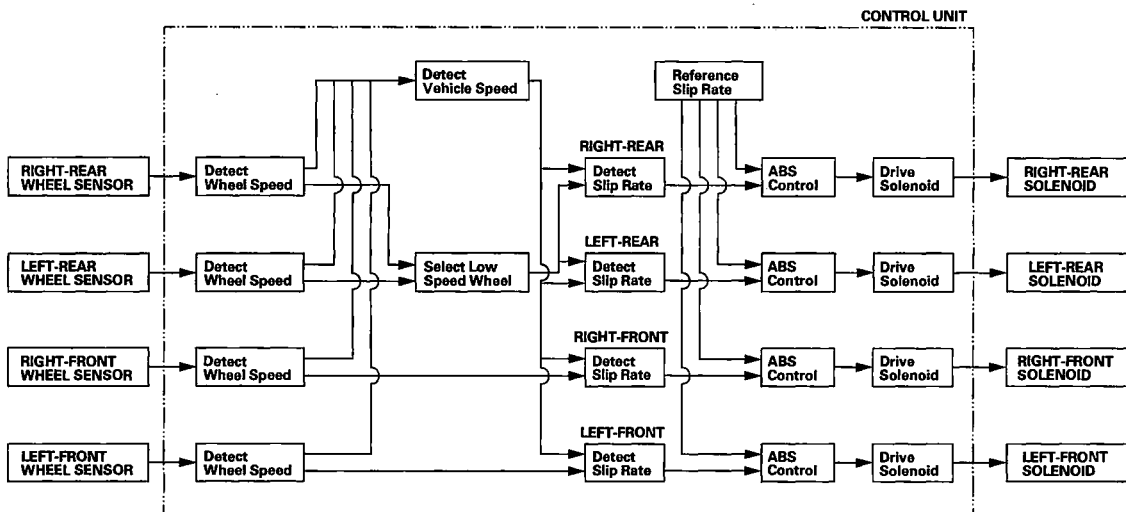


Main Control

The control unit detects the wheel speed based on the wheel sensor signals it received, then it calculates the vehicle speed based on the detected wheel speed. The control unit detects the vehicle speed during deceleration based on the rate of deceleration.

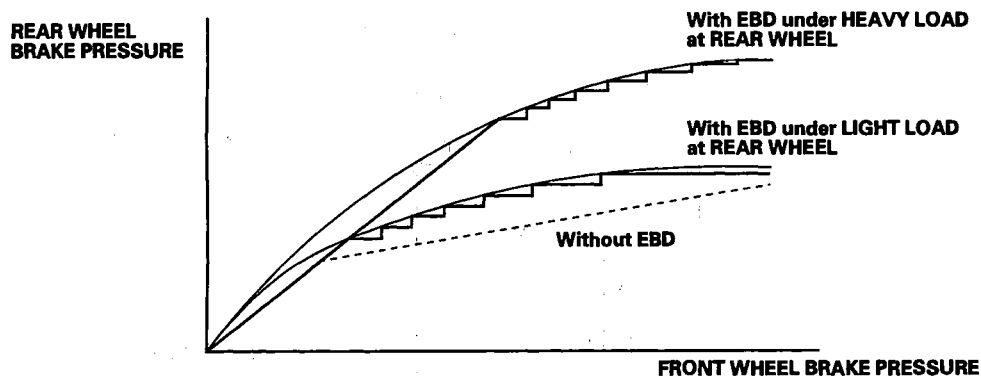
The control unit calculates the slip rate of each wheel, and transmits the control signal to the modulator unit solenoid valve when the slip rate is high.

The hydraulic control has three modes: Pressure intensifying, pressure reducing, and pressure retaining.



EBD Features

The electronic brake distribution (EBD) feature helps control vehicle braking by adjusting the rear brake force in accordance with the rear wheel load before the ABS operates. Based on the wheel sensor signals, the control unit uses the modulator to control the rear brakes individually. When the rear wheel speed is less than the front wheel speed, the VSA modulator-control unit retains the current rear brake fluid pressure by closing the inlet valve in the modulator. As the rear wheel speed increases and approaches the front wheel speed, the VSA modulator-control unit increases the rear brake fluid pressure by momentarily opening the inlet valve. This whole process is repeated very rapidly. While this is happening, kickback is felt at the brake pedal.



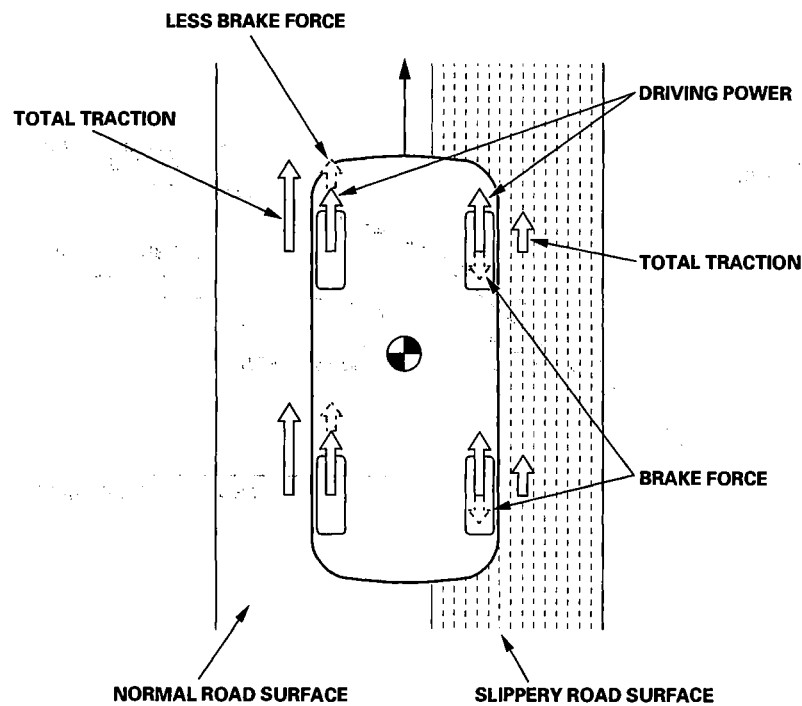
(cont'd)

VSA Sy

System Description (cont'd)

TCS Features

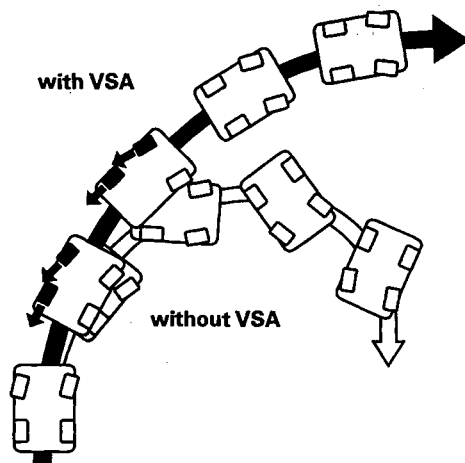
When a drive wheel loses traction on a slippery road surface and starts to spin, the VSA modulator-control unit applies brake pressure to the spinning wheel and sends engine torque control request to the PCM to slow the spinning wheel and keep traction.



VSA System Features

Oversteer control

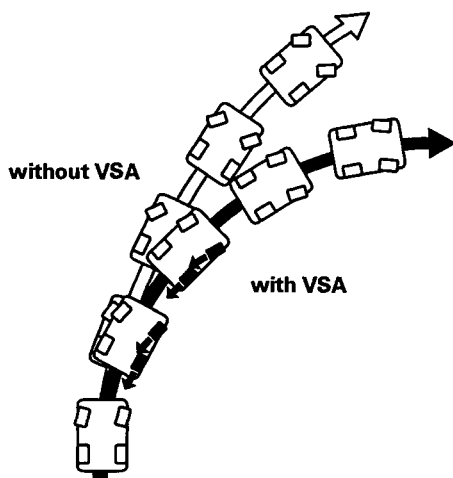
Applies the brake to the front and rear outside wheels



The brake makes the yaw rate opposite to the turning direction

Understeer control

- Applies the brake to the front and rear inside wheels
- Controls the engine torque when accelerating



The brake increases the yaw rate toward the turning direction

The throttle control effect;

- reduces vehicle speed
- increases cornering force

(cont'd)

VSA System Components

System Description (cont'd)

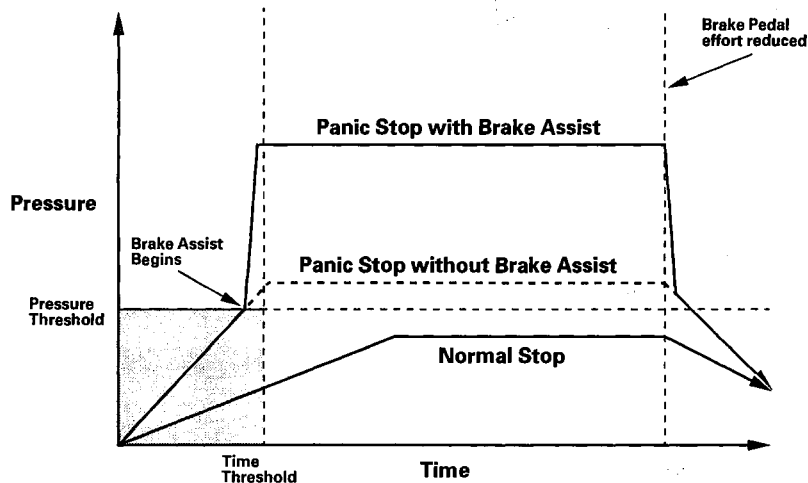
Brake Assist Features

Brake assist helps ensure that any driver can achieve the full braking potential of the vehicle by increasing brake system pressure in a panic situation, bringing the vehicle into a full ABS stop.

Each time the ignition switch is turned ON (II), the VSA modulator-control unit learns the current driver's normal braking characteristics by monitoring the brake pressure sensor and the brake pedal position switch at each stop.

Using these inputs and their values, the VSA modulator-control unit is able to learn the driver's normal braking habits, and then determine the difference between a normal stop and a panic stop for the individual driver of the vehicle. If during a panic stop the VSA modulator-control unit determines that the brake system pressure increases above a learned threshold in less than a learned amount of time, the VSA modulator-control unit engages brake assist.

Because the brake system pressure crossed the threshold before the time threshold had expired, the VSA modulator-control unit goes into brake assist mode.

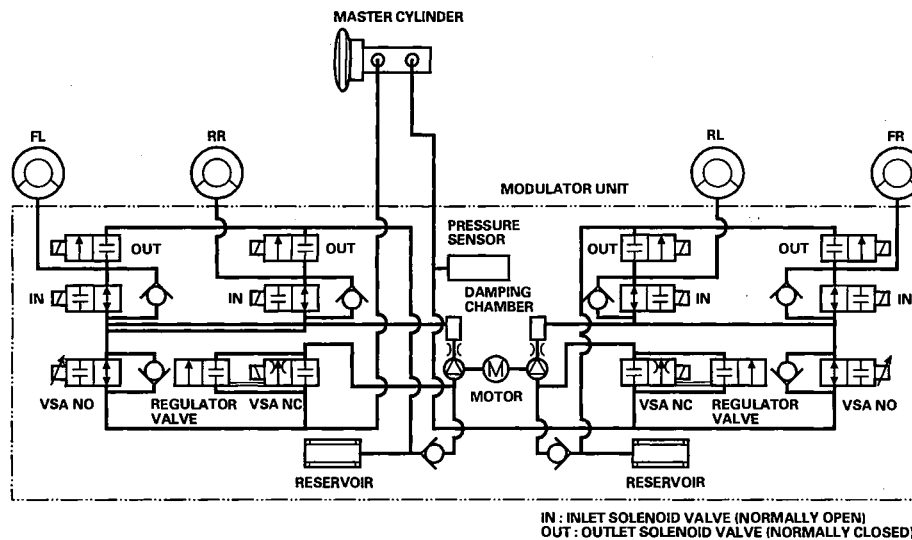


Modulator Unit

The modulator unit consists of the inlet solenoid valve, the outlet solenoid valve, the VSA NO (normally open) solenoid valve, the VSA NC (normally closed) solenoid valve, the reservoir, the pump, the pump motor, and the damping chamber.

The hydraulic control has three modes at ABS action; pressure intensifying, pressure retaining, and pressure reducing. And pressure adding mode is combined at TCS, VSA, and brake assist action.

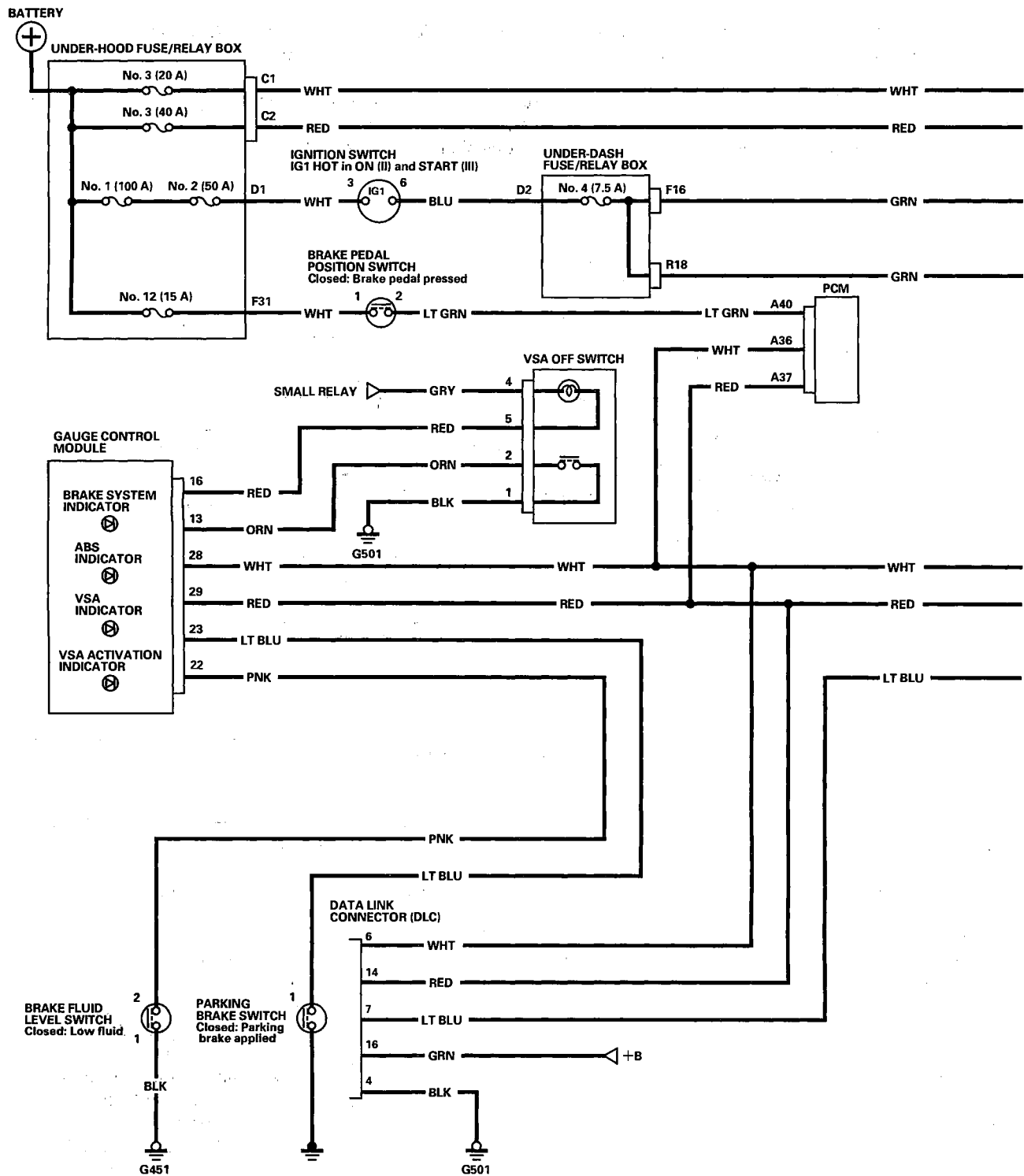
The hydraulic circuit is an independent four channel type; one channel for each wheel.

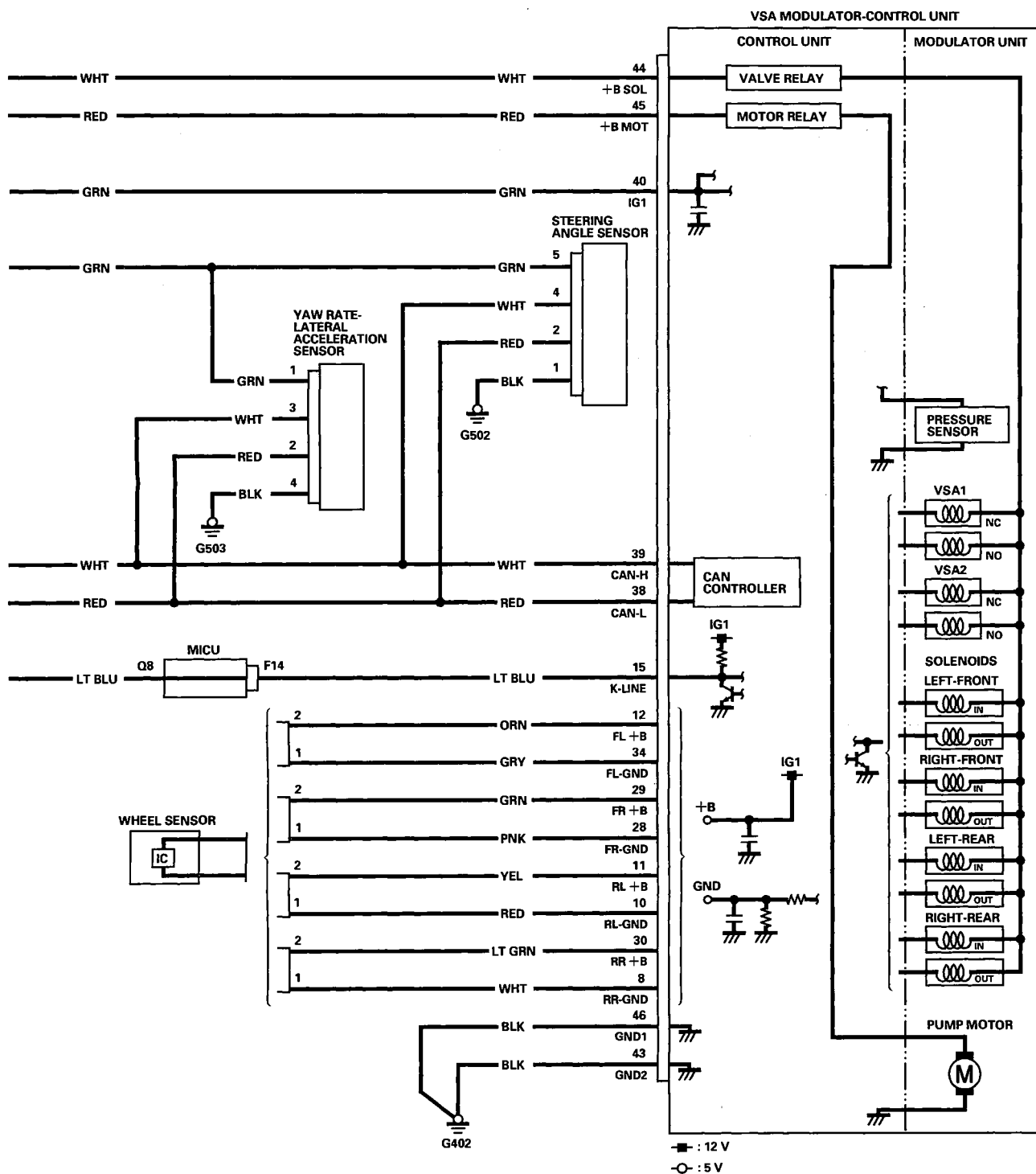


Mode	VSA NO Valve	VSA NC Valve	Inlet Solenoid Valve	Outlet Solenoid Valve	Brake Fluid
Pressure intensifying mode	open	closed	open	closed	Master cylinder fluid is pumped out to the caliper.
Pressure retaining mode	open	closed	closed	closed	Caliper fluid is retained by the inlet and outlet valves.
Pressure reducing mode	open	closed	closed	open	- Caliper fluid flows through the outlet valve to the reservoir. - The motor pumps the reservoir fluid through the damping chamber to the master cylinder.
Pressure adding mode	closed	open	open	closed	- Master cylinder fluid is pumped out by pump with motor through VSA NC valve to the caliper. - Caliper fluid pressure exceed master cylinder pressure.

VSA System Components

Circuit Diagram



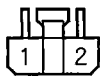


(cont'd)

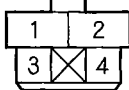
VSA System Components

Circuit Diagram (cont'd)

UNDER-HOOD FUSE/RELAY BOX
CONNECTOR C (2P)



BRAKE PEDAL POSITION
SWITCH 4P CONNECTOR



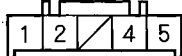
BRAKE FLUID LEVEL SWITCH
2P CONNECTOR



PARKING BRAKE SWITCH
1P CONNECTOR



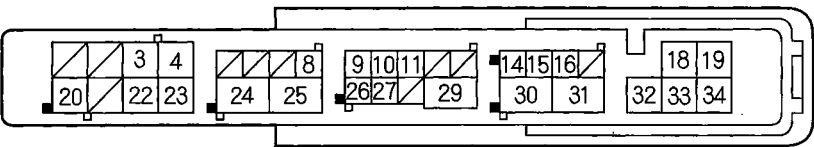
VSA OFF SWITCH
5P CONNECTOR



STEERING ANGLE SENSOR
5P CONNECTOR



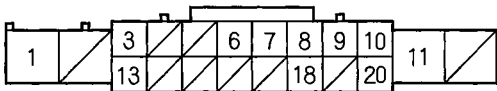
UNDER-DASH FUSE/RELAY BOX CONNECTOR F (34P)



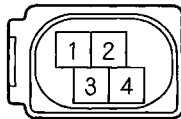
WHEEL SENSOR
2P CONNECTOR



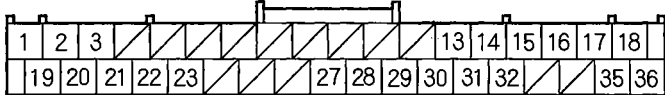
UNDER-DASH FUSE/RELAY BOX CONNECTOR R (20P)



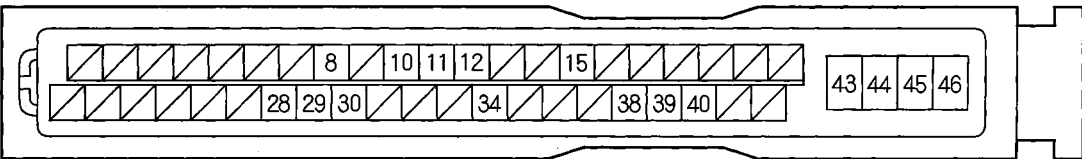
YAW RATE-LATERAL
ACCELERATION SENSOR
4P CONNECTOR



GAUGE CONTROL MODULE 36P CONNECTOR

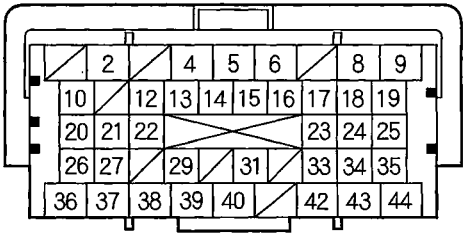


VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

PCM CONNECTOR A (44P)



DATA LINK CONNECTOR (DLC)



Terminal side of female terminals

DTC Troubleshooting

DTC 11, 13, 15, 17: Wheel Sensor (Open/Short to Body Ground/Short to Power)

1. Turn the ignition switch ON (II).
2. Check for DTCs with the HDS.

Is DTC 87 indicated with DTC 11, 13, 15, and/or 17 at the same time?

YES—Go to step 9.

NO—Go to step 3.

3. Clear the DTC with the HDS.
4. Turn the ignition switch OFF, then turn it ON (II) again.
5. Check for DTCs with the HDS.

Is DTC 11, 13, 15, and/or 17 indicated?

YES—Go to step 6.

NO—Intermittent failure, the system is OK at this time. Check for loose terminals between the wheel sensor 2P connector and the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

6. Turn the ignition switch OFF.

7. Check for loose terminals between the wheel sensor 2P connector and the VSA modulator-control unit 46P connector.

Are their connections OK?

YES—Go to step 8.

NO—Reconnect the connector and retest. ■

8. Check the appropriate wheel sensor is properly mounted (see page 19-139).

DTC	Appropriate Wheel Sensor
11	Right-front
13	Left-front
15	Right-rear
17	Left-rear

Is the wheel sensor installation OK?

YES—Go to step 10.

NO—Reinstall the wheel sensor, and check the mounting position (see page 19-139). ■

9. Turn the ignition switch OFF.
10. Disconnect the VSA modulator-control unit 46P connector.
11. Start the engine.

(cont'd)

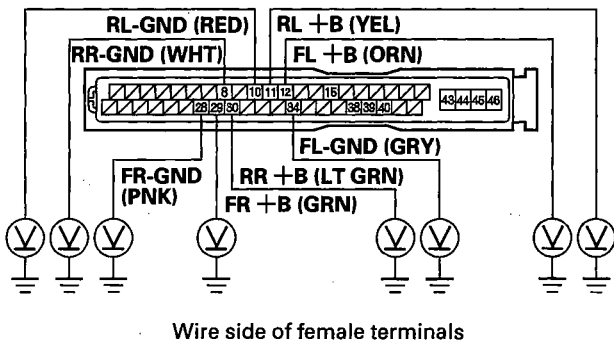
VSA System Components

DTC Troubleshooting (cont'd)

12. Measure the voltage between body ground and the appropriate wheel sensor +B and GND terminals of the VSA modulator-control unit 46P connector individually (see table).

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Is there 0.1 V or more?

YES—Repair short to power in the wire between the VSA modulator-control unit and the appropriate wheel sensor. ■

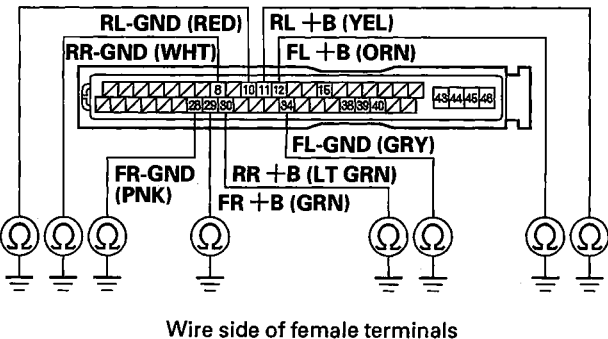
NO—Go to step 13.

13. Turn the ignition switch OFF.

14. Check for continuity between body ground and the appropriate wheel sensor +B and GND terminals of the VSA modulator-control unit 46P connector individually (see table).

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Is there continuity?

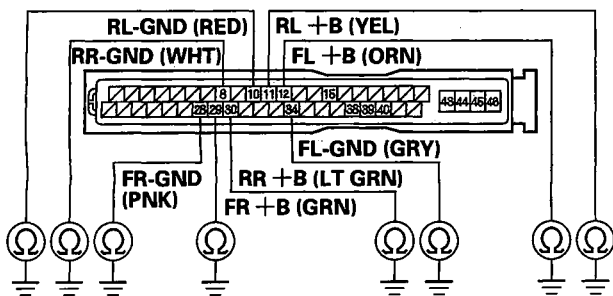
YES—Go to step 15.

NO—Go to step 17.

15. Disconnect the appropriate wheel sensor 2P connector.
16. Check for continuity between body ground and the appropriate wheel sensor +B and GND terminals of the VSA modulator-control unit 46P connector individually (see table).

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity?

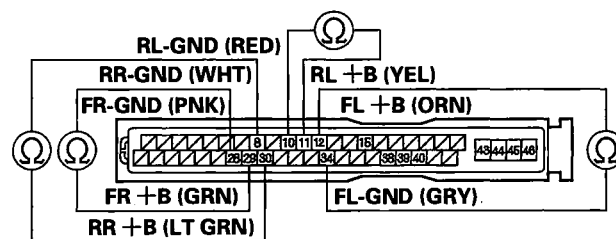
YES—Repair short to body ground in the wire between the VSA modulator-control unit and the appropriate wheel sensor. ■

NO—Replace the appropriate wheel sensor (see page 19-139). ■

17. Measure resistance between the appropriate VSA modulator-control unit 46P connector wheel sensor +B and GND terminals (see table), then Measure resistance between the same terminals and reverse the positive and negative tester probes.

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is the resistance infinity at both directions?

YES—Go to step 18.

NO—Go to step 20.

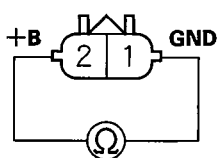
(cont'd)

VSA System Components

DTC Troubleshooting (cont'd)

18. Disconnect the appropriate wheel sensor 2P connector.
19. On the sensor side, measure resistance between appropriate wheel sensor 2P connector terminals No. 1 and No. 2, then measure resistance between the same terminals and reverse the positive and negative tester probes.

WHEEL SENSOR 2P CONNECTOR



Terminal side of female terminals

Is the resistance infinity at both directions?

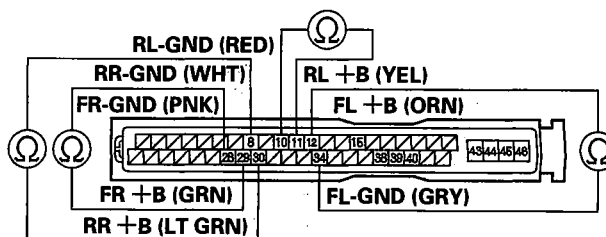
YES—Replace the appropriate wheel sensor (see page 19-139).

NO—Repair open in the wire between the appropriate wheel sensor and the VSA modulator-control unit. ■

20. Check for continuity between the appropriate VSA modulator-control unit 46P connector wheel sensor +B and GND terminals (see table), then check for continuity between the same terminals and reverse the positive and negative tester probes.

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity in both directions?

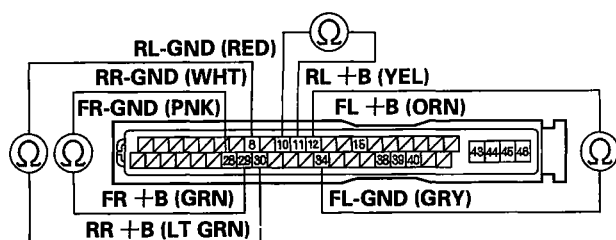
YES—Go to step 21.

NO—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and reset. ■

21. Disconnect the appropriate wheel sensor 2P connector.
22. Check for continuity between the appropriate VSA modulator-control unit 46P connector wheel sensor +B and GND terminals (see table), then check for continuity between the same terminals and reverse the positive and negative tester probes.

DTC	Appropriate Terminal	
	+B	GND
11 (Right-front)	FR +B: No. 29	FR-GND: No. 28
13 (Left-front)	FL +B: No. 12	FL-GND: No. 34
15 (Right-rear)	RR +B: No. 30	RR-GND: No. 8
17 (Left-rear)	RL +B: No. 11	RL-GND: No. 10

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity in both directions?

YES—Repair short in the wires between the VSA modulator-control unit and the appropriate wheel sensor. ■

NO—Replace the appropriate wheel sensor (see page 19-139). ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 12, 14, 16, 18: Wheel Sensor (Electrical Noise/Intermittent Interruption)

NOTE: If the ABS and other indicators come on because of electrical noise, the indicators will go off when you test-drive the vehicle speed at 10 mph (15 km/h) or more and noise is gone.

1. Check the appropriate wheel sensor and magnetic encoder on the front wheel bearing (see page 18-12) or magnetic encoder on the rear hub bearing unit (see page 18-32).

DTC	Appropriate Wheel Sensor
12	Right-front
14	Left-front
16	Right-rear
18	Left-rear

Are they installed correctly and in good condition?

YES—Go to step 2.

NO—Reinstall or replace the appropriate wheel sensor, front wheel bearing, or rear hub bearing unit, and recheck by test-driving. ■

2. Substitute an appropriate known-good wheel sensor (see page 19-139).
3. Turn the ignition switch ON (II).
4. Clear the DTC with the HDS.
5. Test-drive the vehicle at 10 mph (15 km /h) or more.
6. Check for DTCs with the HDS.

Is DTCs 12, 14, 16, and/or 18 indicated?

YES—Go to step 7.

NO—Replace the original wheel sensor (see page 19-139).

7. Substitute an appropriate known-good front wheel bearing (see page 18-12), or rear hub bearing unit (see page 18-32).
8. Clear the DTC with the HDS.
9. Test-drive the vehicle speed at 10 mph (15 km /h) or more.
10. Check for DTCs with the HDS.

Is DTCs 12, 14, 16, and/or 18 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the original front wheel bearing or rear hub bearing unit:

- Front: Replace the front wheel bearing (see page 18-12). ■
- Rear: Replace the rear hub bearing unit (see page 18-32). ■

DTC 21, 22, 23, 24: Magnetic Encoder Malfunction

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Test-drive the vehicle at 31 mph (50 km/h) or more.
4. Check for DTCs with the HDS.

Is DTC 21, 22, 23, and/or 24 indicated?

YES—Go to step 5.

NO—Intermittent failure, the system is OK at this time. Check for loose terminals between the wheel sensor 2P connector and the VSA modulator-control unit 46 P connector. Refer to intermittent failures troubleshooting (see page 19-84).

5. Inspect the appropriate magnetic encoder for debris or cracks.

DTC	Appropriate Magnetic Encoder	Note
21	Right-front	Remove the driveshaft outboard joint from the appropriate wheel hub (see page 18-13).
22	Left-front	
23	Right-rear	Remove the hub bearing unit (see page 18-31).
24	Left-rear	

Is the magnetic encoder surface OK?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the front wheel bearing or the rear hub bearing unit:

- Front: Replace the front wheel bearing (see page 18-12). ■
- Rear: Replace the rear hub bearing unit (see page 18-32). ■

DTC 25: Yaw Rate Sensor (Sensor Unit)

DTC 26: Lateral Acceleration Sensor (Sensor Unit)

1. Substitute a known-good yaw rate-lateral acceleration sensor.
2. Turn the ignition switch ON (II).
3. Clear the DTC with the HDS.
4. Test-drive the vehicle. Drive the vehicle at 19 mph (30 km/h) or more, and go a distance of 984 ft (300 m) or more.
5. Check for DTCs with the HDS.

Is DTC 25 or 26 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the original yaw rate-lateral acceleration sensor. ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 27: Steering Angle Sensor (Hardware)

1. Turn the ignition switch ON (II).
2. Check for DTCs with the HDS.

Is DTC 86 indicated with DTC 27 at the same time?

YES—Do the DTC 86 troubleshooting (see page 19-117). ■

NO—Check the installation of the steering angle sensor (see page 19-134), and for loose terminals at the steering angle sensor 5P connector, then recheck. If necessary, replace the steering angle sensor (see page 19-134). ■

DTC 31, 32, 33, 34, 35, 36, 37, 38: ABS Solenoid

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 31, 32, 33, 34, 35, 36, 37, and/or 38 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 51: Motor Locked

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Test-drive the vehicle. Drive the vehicle at 10 mph (15 km/h) or more, and the engine speed is 2500 rpm or more.
4. Check for DTCs with the HDS.

Is DTC 51 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 52: Motor Stuck OFF

1. Turn the ignition switch OFF.
2. Check the No. 3 (40 A) fuse in the under-hood fuse/relay box.

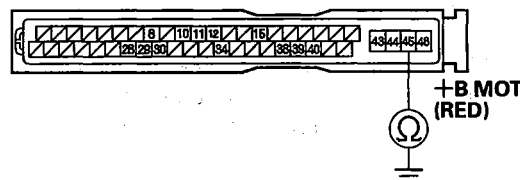
Is the fuse blown?

YES—Go to step 3.

NO—Reinstall the checked fuse, then go to step 5.

3. Disconnect the VSA modulator-control unit 46P connector.
4. Check for continuity between VSA modulator-control unit 46P connector terminal No. 45 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Repair short to body ground in the wire between the No. 3 (40 A) fuse in the under-hood fuse/relay box and the VSA modulator-control unit. ■

NO—Install a new No. 3 (40 A) fuse, then go to step 6.

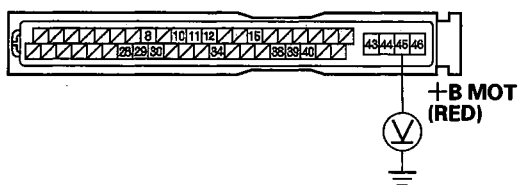
(cont'd)

VSA System Components

DTC Troubleshooting (cont'd)

5. Disconnect the VSA modulator-control unit 46P connector.
6. Measure the voltage between VSA modulator-control unit 46P connector terminal No. 45 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES—Go to step 7.

NO—Repair open in the wire between the No. 3 (40 A) fuse in the under-hood fuse/relay box and the VSA modulator-control unit. ■

7. Reconnect the VSA modulator-control unit 46P connector.
8. Turn the ignition switch ON (II).
9. Clear the DTC with the HDS.
10. Test-drive the vehicle. Drive the vehicle at 10 mph (15 km/h) or more, and the engine speed is 2500 rpm or more.
11. Check for DTCs with the HDS.

Is DTC 52 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 53: Motor Stuck ON

1. Turn the ignition switch ON (II).

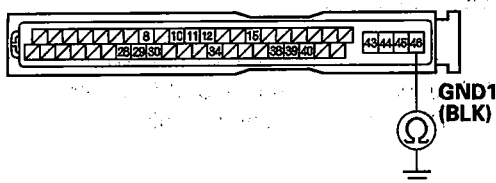
Is the pump motor working?

YES—Replace the VSA modulator-control unit (see page 19-137). ■

NO—Go to step 2.

2. Turn the ignition switch OFF.
3. Disconnect the VSA modulator-control unit 46P connector.
4. Check for continuity between VSA modulator-control unit 46P connector terminal No. 46 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Go to step 5.

NO—Repair open in the wire between the VSA modulator-control unit and body ground (G402). ■

5. Reconnect the VSA modulator-control unit 46P connector.
6. Turn the ignition switch ON (II).

7. Clear the DTC with the HDS.

8. Test-drive the vehicle. Drive the vehicle at 10 mph (15 km/h) or more, and the engine speed is 2500 rpm or more.

9. Check for DTCs with the HDS.

Is DTC 53 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 54: Valve Relay

1. Turn the ignition switch OFF.
2. Check the No. 3 (20 A) fuse in the under-hood fuse/relay box.

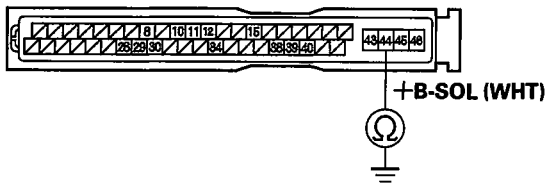
Is the fuse blown?

YES—Go to step 3.

NO—Reinstall the checked fuse, then go to step 5.

3. Disconnect the VSA modulator-control unit 46P connector.
4. Check for continuity between VSA modulator-control unit 46P connector terminal No. 44 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

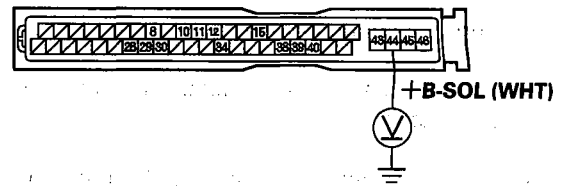
Is there continuity?

YES—Repair short to body ground in the wire between the No. 3 (20 A) fuse in the under-hood fuse/relay box and the VSA modulator-control unit. ■

NO—Install a new No. 3 (20 A) fuse, then go to step 6.

5. Disconnect the VSA modulator-control unit 46P connector.
6. Measure the voltage between VSA modulator-control unit 46P connector terminal No. 44 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES—Go to step 7.

NO—Repair open in the wire between the No. 3 (20 A) fuse in the under-hood fuse/relay box and the VSA modulator-control unit. ■

7. Reconnect the VSA modulator-control unit 46P connector.
8. Turn the ignition switch ON (II).
9. Clear the DTC with the HDS.
10. Turn the ignition switch OFF, then turn it ON (II) again.
11. Check for DTCs with the HDS.

Is DTC 54 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 61: IG1 Voltage Low

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Test-drive the vehicle at 2 mph (2 km/h) or more.
4. Check for DTCs with the HDS.

Is DTC 61 indicated?

YES—Go to step 5.

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

5. Test the battery and check the connections.

Is the battery OK?

YES—Check for a poor connection at the battery terminals, and all IG1 circuit connections between the VSA modulator-control unit 46P connector terminal No. 40 and the under-dash fuse/relay box No. 4 (7.5 A) fuse. If the connections are good, go to the Alternator and Regulator Circuit Troubleshooting (see page 4-28). ■

NO—Replace or charge the battery (see page 22-63). ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 62: IG1 Voltage High

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Test-drive the vehicle at 2 mph (2 km/h) or more.
4. Check for DTCs with the HDS.

Is DTC 62 indicated?

YES—Check for a poor connection at the battery terminals. If the connection are good, go to the Alternator and Regulator Circuit Troubleshooting (see page 4-28). ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 66: VSA Pressure Sensor (Hardware)

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 66 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a know-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 68: Brake Pedal Position Switch Stuck ON (Hardware)

1. Turn the ignition switch ON (II).
2. Clear for DTCs with the HDS.

Is DTC 86 indicated with DTC 68 at the same time?

YES—Do the DTC 86 troubleshooting (see page 19-117).

NO—Go to step 3.

3. Check the BRAKE SWITCH in the VSA DATA LIST with the HDS while moving the brake pedal.

Does it indicate ON when the pedal is pressed, and OFF when pedal is released?

YES—Go to step 4.

NO—Go to step 7.

4. Clear the DTC with the HDS.
5. Test-drive the vehicle at 10 mph (15 km/h) for 60 seconds or more.
6. Check for DTCs with the HDS.

Is DTC 68 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a know-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

7. Turn the ignition switch OFF.
8. Disconnect the brake pedal position switch 4P connector.
9. Do the brake pedal position switch test (see page 22-180).

Is the switch OK?

YES—Check the fuel and emissions systems and troubleshoot the brake pedal position switch signal circuit (see page 11-336). ■

NO—Replace the brake pedal position switch (see page 19-6). ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 81: Central Processing Unit (CPU)

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 81 indicated?

YES—Replace the VSA modulator-control unit (see page 19-137). ■

NO—Intermittent failure, the system is OK at this time. ■

DTC 83: PCM Communication Error

1. Turn the ignition switch ON (II).
2. Check for DTCs with the HDS.

Is DTC 86 indicated with DTC 83 at the same time?

YES—Do the DTC 86 troubleshooting. ■ (see page 19-117) ■

NO—Go to step 3.

3. Check for the fuel and emissions system DTCs with the HDS (see page 11-3).

Are any DTCs indicated?

YES—Do the applicable troubleshooting for the PCM. ■

NO—Go to step 4.

4. Clear the DTC with the HDS.
5. Turn the ignition switch OFF, then turn it ON (II) again.
6. Check for DTCs with the HDS.

Is DTC 83 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a know-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, system is OK at this time. Check for loose terminals between the PCM connector A (44P), and the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 84: Steering Angle Sensor No Center Point Writing

1. Turn the ignition switch ON (II).
2. Check for DTCs with the HDS.

Are any fuel and emissions system DTCs indicated with DTC 84 at the same time?

YES—Troubleshoot fuel and emissions system DTCs, and recheck. ■

NO—Go to step 3.

3. Do the steering angle sensor center point writing with the HDS (see page 19-135).
4. Clear the DTC with the HDS.
5. Turn the ignition switch OFF, then turn it ON (II) again.
6. Check for DTCs with the HDS.

Is DTC 84 indicated?

YES—Replace the steering angle sensor (see page 19-134), then do the steering angle sensor center point writing (see page 19-135). ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals between the steering angle sensor 5P connector and the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 86: F-CAN Communication

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF.

4. Start the engine.

5. Wait at least 5 seconds.

6. Check for DTCs with the HDS.

Is DTC 86 indicated?

YES—Go to step 7.

NO—Intermittent failure, the system is OK at this time. ■

7. Check for the fuel and emissions system DTCs with the HDS (see page 11-3).

Are any DTCs indicated?

YES—Do the applicable troubleshooting for the PCM. ■

NO—Go to step 8.

8. Turn the ignition switch OFF.

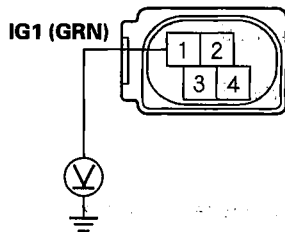
(cont'd)

VSA System Components

DTC Troubleshooting (cont'd)

9. Disconnect the yaw rate-lateral acceleration sensor 4P connector.
10. Turn the ignition switch ON (II).
11. Measure the voltage between yaw rate-lateral acceleration sensor 4P connector terminal No. 1 and body ground.

**YAW RATE-LATERAL ACCELERATION
SENSOR 4P CONNECTOR**



Wire side of female terminals

Is there battery voltage?

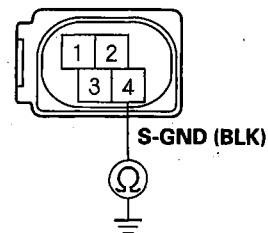
YES—Go to step 12.

NO—Repair open in the wire between No. 4 (7.5 A) fuse in the under-dash fuse/relay box and the yaw rate-lateral acceleration sensor. ■

12. Turn the ignition switch OFF.

13. Check for continuity between yaw rate-lateral acceleration sensor 4P connector terminal No. 4 and body ground.

**YAW RATE-LATERAL ACCELERATION
SENSOR 4P CONNECTOR**



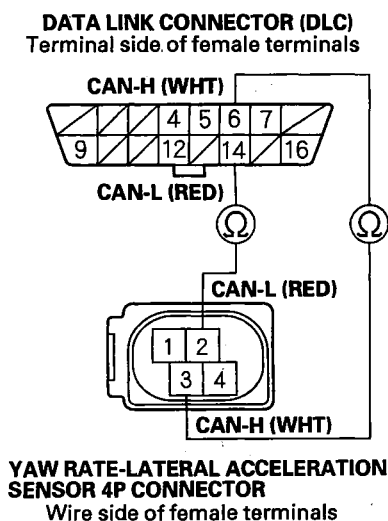
Wire side of female terminals

Is there continuity?

YES—Go to step 14.

NO—Repair open in the wire between the yaw rate-lateral acceleration sensor and body ground (G503). ■

14. Check for continuity between DLC terminals No. 6, No. 14 and yaw rate-lateral acceleration sensor 4P connector terminals No. 3, No.2 individually.



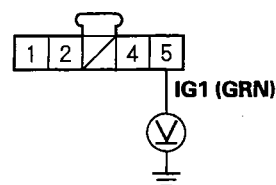
Is there continuity?

YES—Go to step 15.

NO—Repair open in the wire between DLC and the yaw rate-lateral acceleration sensor. ■

15. Disconnect the steering angle sensor 5P connector.
16. Turn the ignition switch ON (II).
17. Measure the voltage between steering angle sensor 5P connector terminal No. 5 and body ground.

STEERING ANGLE SENSOR 5P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES—Go to step 18.

NO—Repair open in the wire between the No. 4 (7.5 A) fuse in the under-dash fuse/relay box and the steering angle sensor. ■

18. Turn the ignition switch OFF.

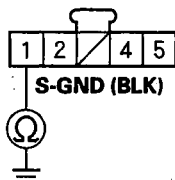
(cont'd)

VSA System Components

DTC Troubleshooting (cont'd)

19. Check for continuity between steering angle sensor 5P connector terminal No. 1 and body ground.

STEERING ANGLE SENSOR 5P CONNECTOR



Wire side of female terminals

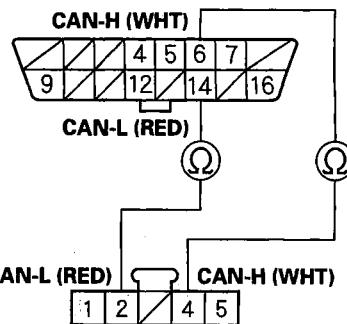
Is there continuity?

YES—Go to step 20.

NO—Repair open in the wire between the steering angle sensor and body ground (G502). ■

20. Check for continuity between DLC terminals No. 6, No. 14 and steering angle sensor 5P connector terminals No. 2, No. 4 individually.

DATA LINK CONNECTOR (DLC) Terminal side of female terminals



STEERING ANGLE SENSOR 5P CONNECTOR Wire side of female terminals

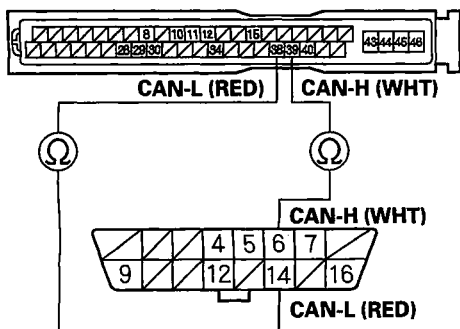
Is there continuity?

YES—Go to step 21.

NO—Repair open in the wire between DLC and the steering angle sensor. ■

21. Check for continuity between VSA modulator-control unit 46P connector terminals No. 38, No. 39 and DLC terminals No. 14, No.6 individually.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR
Wire side of female terminals



DATA LINK CONNECTOR (DLC)
Terminal side of female terminals

Is there continuity?

YES—Go to step 22.

NO—Repair open in the wire between VSA modulator-control unit and DLC. ■

22. Turn the ignition switch ON (II).
23. Clear the DTC with the HDS.
24. Turn the ignition switch OFF.
25. Start the engine.
26. Wait at least 5 seconds.
27. Check for DTCs with the HDS.

Is DTC 86 indicated?

YES—Replace the VSA modulator-control unit (see page 19-137). ■

NO—The system is OK at this time. ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 87: Current Flow into Wheel Sensor Input Amplifier

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 87 indicated?

YES—Do the DTC 11, 13, 15, and/or 17 troubleshooting (see page 19-101). ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 88: Difference in Wheel Speed

1. Check the all four tires.

Are all four tires the correct size and properly inflated?

YES—Go to step 2.

NO—Install the correct tires or set the tires to the correct pressure, and retest by test-driving. ■

2. Check the RF, LF, RR, LR, WHEEL SPD in the VSA DATA LIST with the HDS.

Are all four the same indicated value?

YES—Go to step 3.

NO—Reinstall or replace the wheel sensor(s) (see page 19-139), and recheck by test-driving. ■

3. Check the all magnetic encoders on the front wheel bearings (see page 18-12) or magnetic encoders on the rear hub bearing units (see page 18-32).

Are they installed correctly and good condition?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the front wheel bearing(s) or the rear hub bearing unit(s), and recheck by test-driving:

- Front: Replace the front wheel bearing(s) (see page 18-12). ■
- Rear: Replace the rear hub bearing unit(s) (see page 18-32). ■

DTC 91: VSA System

1. Check the brake system for leaks or mechanical problems.

Is the brake system OK? (no brake fluid leakage, air trapped in the brake system, brake pads worn out)

YES—Go to step 2.

NO—Repair the brake system, then recheck. ■

2. Turn the ignition switch ON (II).
3. Clear the DTC with the HDS.
4. Test-drive the vehicle in a straight line. Accelerate the vehicle up to 6 mph (10 km/h), and stop, then accelerate up to 6 mph (10 km/h).
5. Check for DTCs with the HDS.

Is DTC 91 indicated?

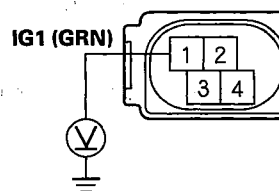
YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84).

DTC 113: Yaw Rate-Lateral Acceleration Sensor (Power Supply)

1. Turn the ignition switch OFF.
2. Disconnect the yaw rate-lateral acceleration sensor 4P connector.
3. Turn the ignition switch ON (II).
4. Measure the voltage between body ground and yaw rate-lateral acceleration sensor 4P connector terminal No. 1.

YAW RATE-LATERAL ACCELERATION SENSOR 4P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES—Replace the yaw rate-lateral acceleration sensor (see page 19-135).

NO—Repair open in the wire between the No. 4 (7.5 A) fuse in the under-dash fuse/relay box and the yaw rate-lateral acceleration sensor. ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 114: Yaw Rate-Lateral Acceleration Sensor Installation Problem

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 114 indicated?

YES—Replace the yaw rate-lateral acceleration sensor (see page 19-135).

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the yaw rate-lateral acceleration sensor 4P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 121, 122, 123, 124: VSA Solenoid

1. Turn the ignition switch ON (II).
2. Clear the DTC with the HDS.
3. Turn the ignition switch OFF, then turn it ON (II) again.
4. Check for DTCs with the HDS.

Is DTC 121, 122, 123, and/or 124 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Intermittent failure, the system is OK at this time. Check for loose terminals at the VSA modulator-control unit 46P connector. Refer to intermittent failures troubleshooting (see page 19-84). ■

DTC 131: Yaw Rate Sensor (Software)

1. Turn the ignition switch ON.

2. Check for DTCs with the HDS.

Is DTC 91 indicated with DTC 131 at the same time?

YES—Do the DTC 91 troubleshooting (see page 19-123).

NO—Go to step 3.

3. Turn the ignition switch OFF.

4. Check the yaw rate-lateral acceleration sensor is properly mounted (see page 19-135).

Is the yaw rate-lateral acceleration sensor installation OK?

YES—Go to step 5.

NO—Reinstall the yaw rate-lateral acceleration sensor, and recheck by test-driving. ■

5. Put the vehicle on a level surface.

6. Turn the ignition switch ON (II).

7. Check the YAW RATE S in the VSA DATA LIST with the HDS.

Is the indicated value within $\pm 5\%/s$?

YES—Go to step 8.

NO—Replace the yaw rate-lateral acceleration sensor (see page 19-135).

8. Clear the DTC with the HDS.

9. Test-drive the vehicle around a number of corners.

10. Check for DTCs with the HDS.

Is DTC 131 indicated?

YES—Go to step 11.

NO—Intermittent failure; the most probable cause is that the vehicle has been driven on an extremely canted road. The system is OK at this time. ■

11. Turn the ignition switch OFF.

12. Substitute a known-good yaw rate-lateral acceleration sensor (see page 19-135).

13. Turn the ignition switch ON (II).

14. Clear the DTC with the HDS.

15. Test-drive the vehicle around a number of corners.

16. Check for DTCs with the HDS.

Is DTC 131 indicated?

YES—Check for loose terminal in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the original yaw rate-lateral acceleration sensor (see page 19-135). ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 132: Lateral Acceleration Sensor (Software)

DTC 133: Lateral Acceleration Sensor (Joint Failure)

1. Turn the ignition switch ON (II).

2. Check for DTCs with the HDS.

Is DTC 91 indicated with DTC 132 or 133 at the same time?

YES—Do the DTC 91 troubleshooting (see page 19-123). ■

NO—Go to step 3.

3. Turn the ignition switch OFF.

4. Check the yaw rate-lateral acceleration sensor is properly mounted (see page 19-135).

Is the yaw rate-lateral acceleration sensor installation OK?

YES—Go to step 5.

NO—Reinstall the yaw rate-lateral acceleration sensor, and recheck by test-driving. ■

5. Put the vehicle on a level surface.

6. Turn the ignition switch ON (II).

7. Check the LATERAL ACCELERATION SENSOR in the VSA DATA LIST with the HDS.

Is it indicated within ± 1 m/s?

YES—Go to step 8.

NO—Replace the yaw rate-lateral acceleration sensor (see page 19-135). ■

8. Clear the DTC with the HDS.

9. Test-drive the vehicle around a number of corners.

10. Check for DTCs with the HDS.

Is DTC 132 or 133 indicated?

YES—Go to step 11.

NO—Intermittent failure; the most probable cause is that the vehicle has been driven on an extremely canted road. The system is OK at this time. ■

11. Turn the ignition switch OFF.

12. Substitute a known-good yaw rate-lateral acceleration sensor (see page 19-135).

13. Turn the ignition switch ON (II).

14. Clear the DTC with the HDS.

15. Test-drive the vehicle around a number of corners.

16. Check for DTCs with the HDS.

Is DTC 132 or 133 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest.

NO—Replace the original yaw rate-lateral acceleration sensor (see page 19-135). ■

DTC 134: Steering Angle Sensor (Software)

1. Turn the ignition switch ON (II).

2. Check for DTCs with the HDS.

Is DTC 86 indicated with DTC 134 at the same time?

YES—Do the DTC 86 troubleshooting (see page 19-117). ■

NO—Go to step 3.

3. Put the vehicle on a level surface, and center the steering wheel spokes.

4. Check STEERING ANGLE in the VSA DATA LIST with the HDS.

With steering wheel in the straight ahead position, is STEERING ANGLE within $\pm 5^\circ$?

YES—Go to step 5.

NO—Check for installation of the steering angle sensor. If installation is good, do the steering angle sensor center point writing (see page 19-135). ■

5. Check the wheel alignment (see page 18-5).

Is the wheel alignment within the specification?

YES—Go to step 6.

NO—Make sure the suspension is not modified, and adjust the wheel alignment correctly, and recheck by test-driving. ■

6. Turn the ignition switch ON (II).

7. Clear the DTCs with the HDS.

8. Test-drive the vehicle around a number of corners.

9. Check for DTCs with the HDS.

Is DTC 134 indicated?

YES—Replace the VSA modulator-control unit (see page 19-137). ■

NO— The system is OK at this time. ■

VSA System Components

DTC Troubleshooting (cont'd)

DTC 137: VSA Pressure Sensor (Software)

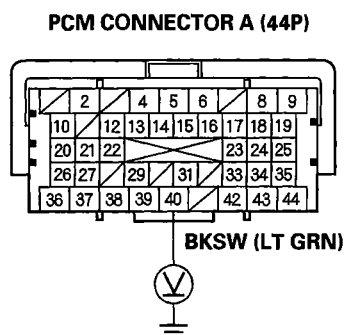
1. Turn the ignition switch OFF (II).
2. Disconnect the brake pedal position switch 4P connector.
3. Do the brake pedal position switch test (see page 22-180).

Is the switch OK?

YES—Go to step 4.

NO—Replace the brake pedal position switch (see page 19-6). ■

4. Short the SCS line with the HDS.
5. Disconnect the PCM connector A (44P).
6. Turn the ignition switch ON (II).
7. Measure the voltage between PCM connector A (44P) terminal No. 40 and body ground.



Terminal side of female terminals

Is there battery voltage when the brake pedal released?

YES—Repair short to power in the wire between the brake pedal position switch and the PCM. ■

NO—Go to step 8.

8. Turn the ignition switch OFF.
9. Substitute a known-good PCM (see page 11-8).
10. Turn the ignition switch ON (II).
11. Clear the DTCs with the HDS.
12. Test-drive the vehicle at 8 mph (12 km/h) for 60 seconds or more.
13. Check for DTCs with the HDS.

Is DTC 137 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the original PCM (see page 11-252). ■

DTC 138: Brake Pedal Position Switch Stuck OFF (Software)

1. Turn the ignition switch OFF.
2. Check the No. 12 (15 A) fuse in the under-hood fuse/relay box.

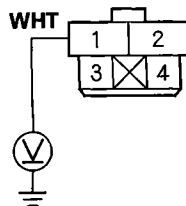
Is the fuse OK?

YES—Reinstall the fuse, and go to step 3.

NO—Replace the fuse, and recheck. If the fuse is blown, check for a short to body ground in the fuse circuit. ■

3. Disconnect the brake pedal position switch 4P connector.
4. Measure the voltage between brake pedal position switch 4P connector terminal No. 1 and body ground.

BRAKE PEDAL POSITION SWITCH 4P CONNECTOR



Wire side of female terminals

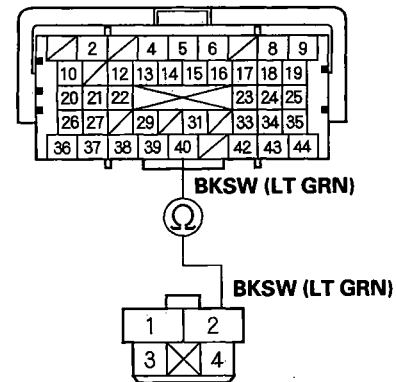
Is there battery voltage?

YES—Go to step 5.

NO—Repair open in the wire between the No. 12 (15 A) fuse in the under-hood fuse/relay box and the brake pedal position switch. ■

5. Short the SCS line with the HDS.
6. Disconnect the PCM connector A (44P).
7. Check for continuity between brake pedal position switch 4P connector terminal No. 2 and PCM connector A (44P) terminal No. 40.

PCM CONNECTOR A (44P) Terminal side of female terminals



BRAKE PEDAL POSITION SWITCH 4P CONNECTOR Wire side of female terminals

Is there continuity?

YES—Go to step 8.

NO—Repair open in the wire between the PCM and the brake pedal position switch. ■

(cont'd)

VSA System Components

DTC Troubleshooting (cont'd)

8. Do the brake pedal position switch test (see page 22-180).

Is the switch OK?

YES—Go to step 9.

NO—Replace the brake pedal position switch (see page 19-35).

9. Substitute a known-good PCM (see page 11-8).

10. Start the engine, then press the brake pedal slowly and hard.

11. Check for DTCs with the HDS.

Is DTC 138 indicated?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

NO—Replace the original PCM (see page 11-252). ■

Symptom Troubleshooting

VSA activation indicator does not go off, and no DTCs are stored

1. Turn the ignition switch ON (II), and watch the VSA activation indicator.

Does VSA activation indicator go off within 2 seconds?

YES—The system is OK at this time. ■

NO—Go to step 2.

2. Turn the ignition switch OFF.
3. Disconnect the VSA OFF switch 5P connector.
4. Check the VSA OFF switch (see page 19-136).

Is the VSA OFF switch OK?

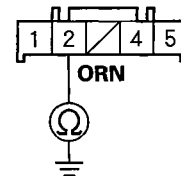
YES—Go to step 5.

NO—Replace the VSA OFF switch (see page 19-136).

5. Remove the gauge control module (see page 22-284).
6. Disconnect the gauge control module (36P) connector.

7. Check for continuity between VSA OFF switch 5P connector terminal No. 2 and body ground.

VSA OFF SWITCH 5P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Repair short to body ground between the gauge control module and the VSA OFF switch. ■

NO—Substitute a known-good gauge control module, then go to step 1 and recheck. If it is OK, replace the original gauge control module (see page 22-284).

VSA System Components

Symptom Troubleshooting (cont'd)

ABS indicator, brake system indicator, and VSA indicator do not go off at the same time

1. Turn the ignition switch OFF.
2. Check the No. 4 (7.5 A) fuse in the under-dash fuse/relay box.

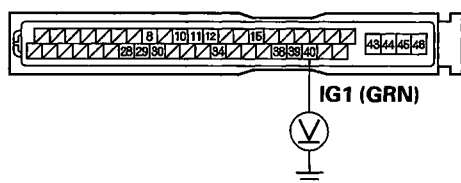
Is the fuse blown?

YES—Install a new No. 4 (7.5 A) fuse, and recheck. ■

NO—Reinstall the checked fuse, then go to step 3.

3. Disconnect the VSA modulator-control unit 46P connector.
4. Turn the ignition switch ON (II).
5. Measure the voltage between VSA modulator-control unit 46P connector terminal No. 40 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there battery voltage?

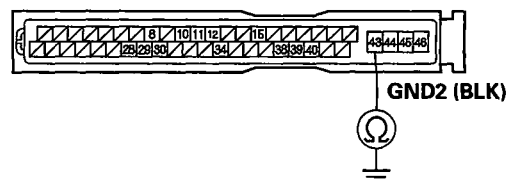
YES—Go to step 6.

NO—Repair open in the wire between the No. 4 (7.5 A) fuse in the under-dash fuse/relay box and the VSA modulator-control unit. ■

6. Turn the ignition switch OFF.

7. Check for continuity between VSA modulator-control unit 46P connector terminal No. 43 and body ground.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR



Wire side of female terminals

Is there continuity?

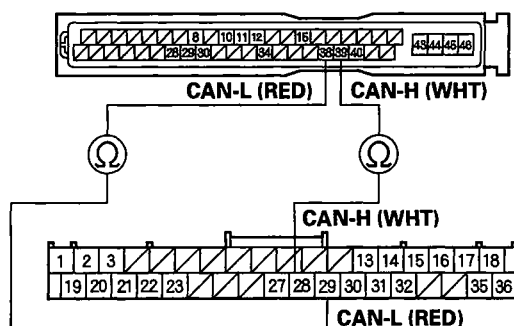
YES—Go to step 8.

NO—Repair open in the wire between the VSA modulator-control unit and body ground (G402). ■

8. Disconnect the gauge control module 36P connector.

9. Check for continuity between VSA modulator-control unit 46P connector terminal No. 38, No. 39 and gauge control module 36P connector No. 29, No. 28 individually.

VSA MODULATOR-CONTROL UNIT 46P CONNECTOR
Wire side of female terminals



GAUGE CONTROL MODULE 36P CONNECTOR
Wire side of female terminals

Is there continuity?

YES—Check for loose terminals in the VSA modulator-control unit 46P connector. If necessary, substitute a known-good VSA modulator-control unit (see page 19-137) and retest. ■

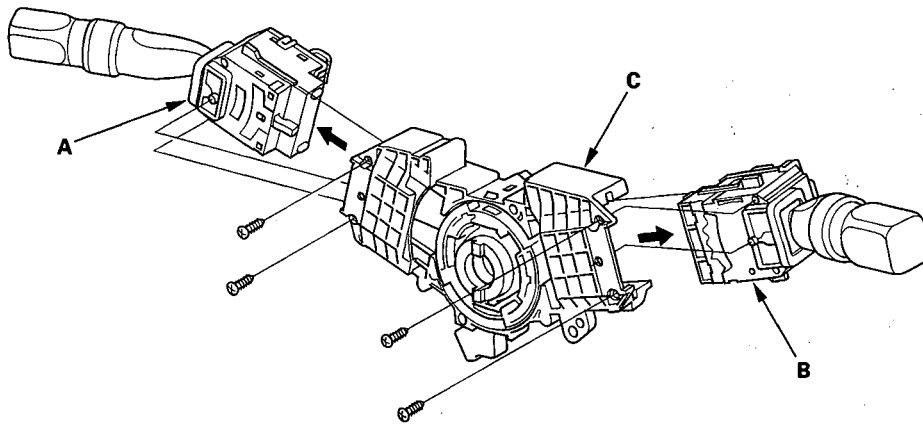
NO—Repair open in the wire between the gauge control module and the VSA modulator-control unit. ■

VSA System Components

Steering Angle Sensor Replacement

NOTE: Do not damage or drop the combination switch as the steering angle sensor is sensitive to shock and vibration.

1. Remove the steering wheel (see page 17-22) and steering column cover (see page 20-107).
2. Remove the combination switch assembly (see page 17-25).
3. Remove the cable reel (see page 24-158).
4. Remove the combination light switch (A) and the wiper/washer switch (B).



5. Replace the combination switch body complete (C).
6. Install the combination switch in the reverse order of removal.

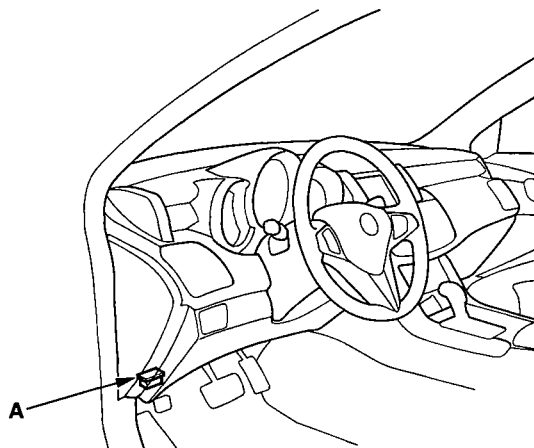
NOTE: Do not remove the steering angle sensor from the combination switch body.

7. After installation, do the steering angle sensor center point writing (see page 19-135).

Steering Angle Sensor Center Point Writing

NOTE: Before doing the steering angle sensor center point writing, park the vehicle on a flat level surface, and turn the steering wheel to the straight ahead position while moving the vehicle.

1. With the ignition switch OFF, connect the HDS to the data link connector (DLC) (A) under the driver's side of the dashboard.



2. Turn the ignition switch ON (II).
3. Make sure the HDS communicates with the vehicle and the VSA modulator-control unit. If it doesn't, troubleshoot the DLC circuit (see page 11-229).
4. Do the steering angle sensor center point writing in the VSA ADJUSTMENT with the HDS.

NOTE: See the HDS Help menu for specific instructions.

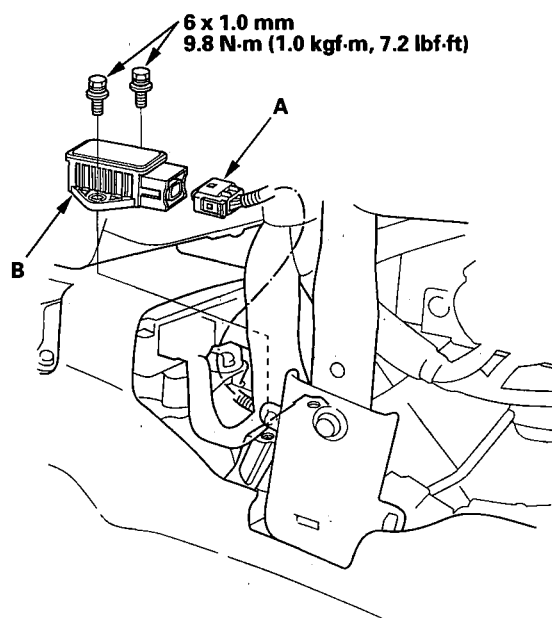
5. Turn the ignition OFF.
6. Verify DTC 84 clears and does not return. If DTC 84 is indicated, do the appropriate troubleshooting.

Yaw Rate-Lateral Acceleration Sensor Replacement

NOTE:

- Do not damage or drop the sensor as it is sensitive.
- Do not use air or electric impact tools.

1. Make sure the ignition switch is OFF.
2. Remove the center console (see page 20-95).
3. Disconnect the yaw rate-lateral acceleration sensor 4P connector (A).

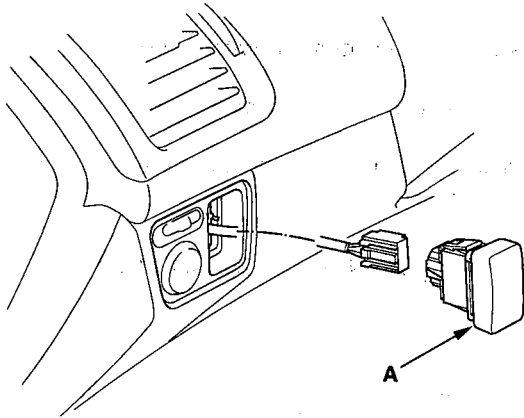


4. Remove the sensor mounting bolts, and remove the yaw rate-lateral acceleration sensor (B).
5. Install in the reverse order of removal.

VSA System Components

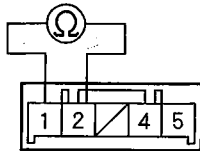
VSA Off Switch Test

1. Make sure the ignition switch is OFF.
2. Remove the VSA OFF switch (A) from the switch panel.



3. Disconnect the VSA OFF switch 5P connector.
4. Check for continuity between VSA OFF switch 5P connector terminal No. 1 and No. 2. There should be continuity when the switch is pushed.

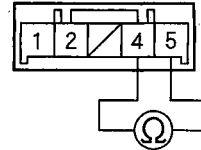
VSA OFF SWITCH 5P CONNECTOR



Terminal side of male terminals

5. Check for continuity between VSA OFF switch 5P connector terminal No. 4 and No. 5. There should be continuity at all times.

VSA OFF SWITCH 5P CONNECTOR



Terminal side of male terminals

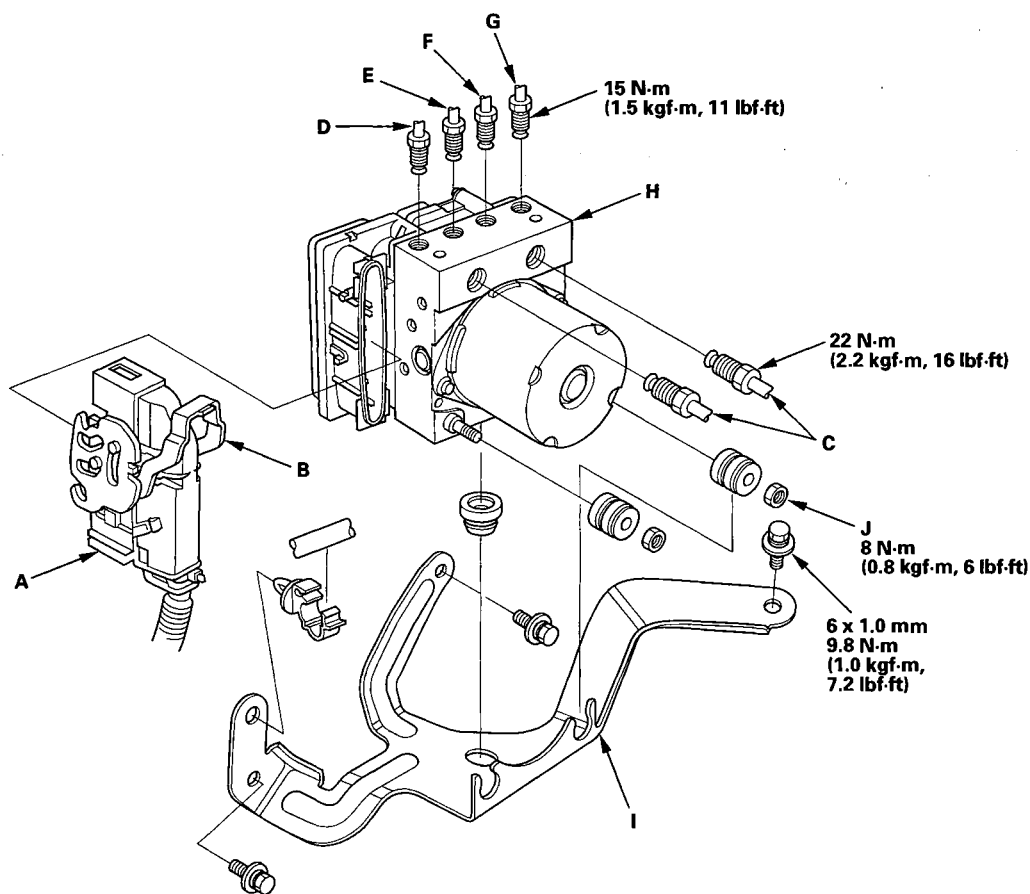
VSA Modulator-Control Unit Removal and Installation

NOTE:

- Do not spill brake fluid on the vehicle; it may damage the paint; if brake fluid gets on the paint, wash it off immediately with water.
- Be careful not to damage or deform the brake lines during removal and installation.
- To prevent the brake fluid from flowing, plug and cover the hose ends and joints with a shop towel or equivalent material.

Removal

1. Make sure the ignition switch is OFF.
2. Disconnect the VSA modulator-control unit 46P connector (A) by pulling up the lock (B); the connector disconnects itself.



3. Disconnect the six brake lines from the VSA modulator-control unit.

NOTE: Brake lines are connected to the master cylinder (C) and to the right-front (D), the left-rear (E), the right-rear (F) and the left-front (G) brake systems.

4. Remove the VSA modulator-control unit (H) with the bracket (I) from the body.
5. Remove the locknuts (J), then remove the VSA modulator-control unit from the bracket.

(cont'd)

VSA System Components

VSA Modulator-Control Unit Removal and Installation (cont'd)

Installation

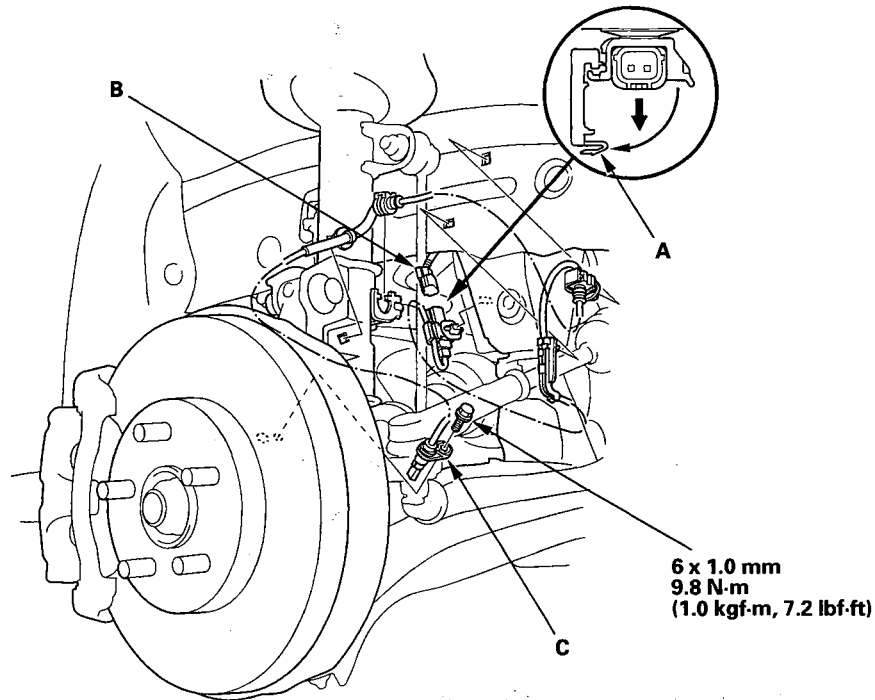
1. Install the VSA modulator-control unit on the bracket, then install the new locknuts.
2. Install the bracket with the VSA modulator-control unit.
3. Reconnect the six brake lines, then tighten the flare nuts to the specified torque.
4. Align the connecting surface of the VSA modulator-control unit 46P connector to the VSA modulator-control unit.
5. Lower the lock of the VSA modulator-control unit 46P connector, then confirm the connector is fully seated.
6. Bleed the brake system (see page 19-9).
7. Start the engine, and check that the ABS and the VSA indicators go off.
8. Test-drive the vehicle, and check that the ABS, and the VSA indicators do not come on.

NOTE: If the brake pedal is spongy, there may be air trapped in the modulator and then induced into the normal brake system during modulation. Bleed the brake system again, (see page 19-9).

Wheel Sensor Replacement

Front

1. Make sure the ignition switch is OFF.
2. Release the connector holding clamps (A), then disconnect the wheel sensor connector (B).



3. Remove the clips, the bolt and the wheel sensor (C).
4. Install the wheel sensor in the reverse order of removal, and note these items:
 - Install the sensor carefully to avoid twisting the wires.
 - If the wheel sensor comes in contact with the wheel bearing, it is faulty.
5. Start the engine, and check that the ABS and the VSA indicators go off.
6. Test-drive the vehicle, and check that the ABS and the VSA indicators do not come on.

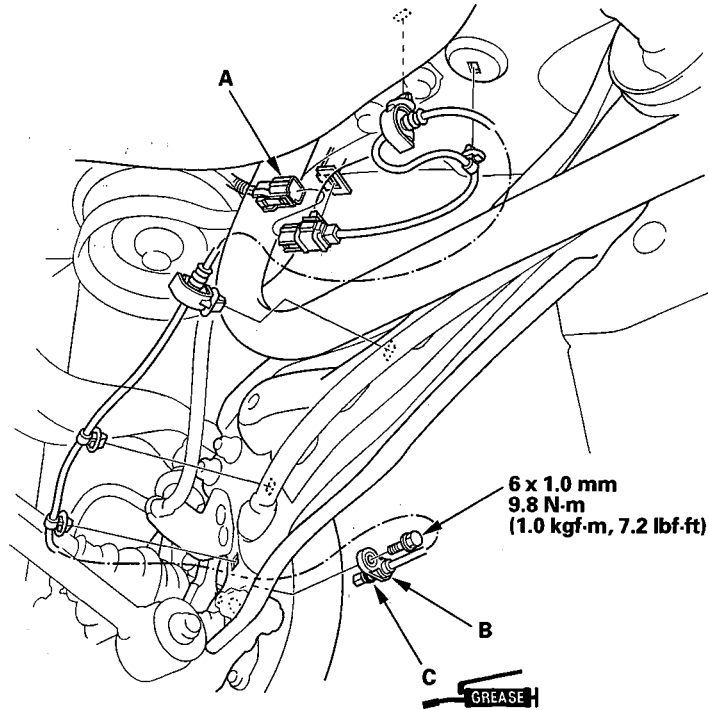
(cont'd)

VSA System Components

Wheel Sensor Replacement (cont'd)

Rear

1. Make sure the ignition switch is OFF.
2. Disconnect the wheel sensor connector (A).



3. Remove the clips, the bolt and the wheel sensor (B).
4. Install the wheel sensor in the reverse order of removal, and note these items:
 - Apply multipurpose grease to the O-ring (C).
 - Install the sensor carefully to avoid twisting the wires.
 - If the wheel sensor comes in contact with the hub bearing unit, it is faulty.
5. Start the engine, and check that the ABS and the VSA indicators go off.
6. Test-drive the vehicle, and check that the ABS and the VSA indicators do not come on.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (If body maintenance is required)

The RDX SRS includes a driver's airbag in the steering wheel hub, a passenger's airbag in the dashboard above the glove box, seat belt tensioners in the front seat belt retractors, driver's seat belt buckle tensioner in the driver's seat belt lower anchor, front passenger's seat belt buckle tensioners in the front passenger's seat belt lower anchor, side curtain airbags in the sides of the roof, and side airbags in the front seat-backs. Information necessary to safely service the SRS is included in this Service Manual. Items marked with an asterisk (*) on the contents page include or are located near SRS components. Servicing, disassembling, or replacing these items require special precautions and tools, and should be done only by an authorized Acura dealer.

- To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal or side collision, all SRS service work must be performed by an authorized Acura dealer.
- Improper service procedures, including incorrect removal and installation of the SRS, could lead to personal injury caused by unintentional deployment of the airbags and/or side airbags.
- Do not bump or impact the SRS unit, front impact sensors, or side impact sensors when the ignition switch is ON (II), or for at least 3 minutes after the ignition switch is turned OFF; otherwise, the system may fail in a collision, or the airbags may deploy.
- SRS electrical connectors are identified by yellow color coding. Related components are located in the steering column, front console, dashboard, dashboard lower panel, in the dashboard above the glove box, in the front seats, in the roof side, and around the floor. Do not use electrical test equipment on these circuits.

