

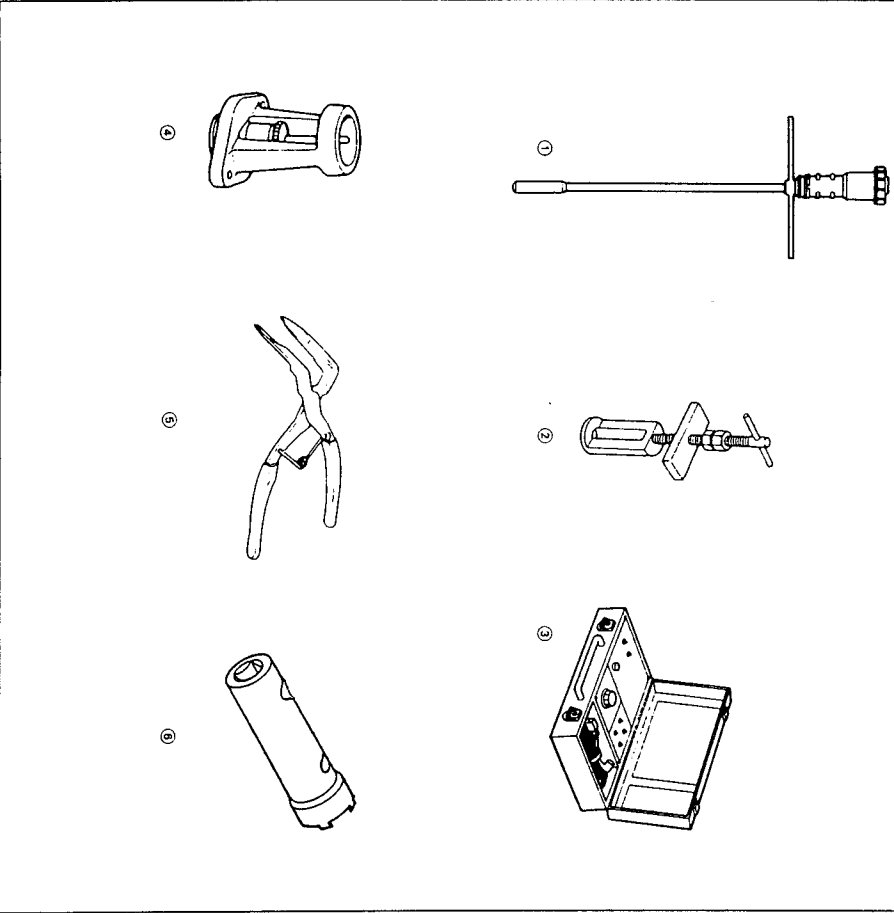
## Brakes (Anti-lock Brake System)

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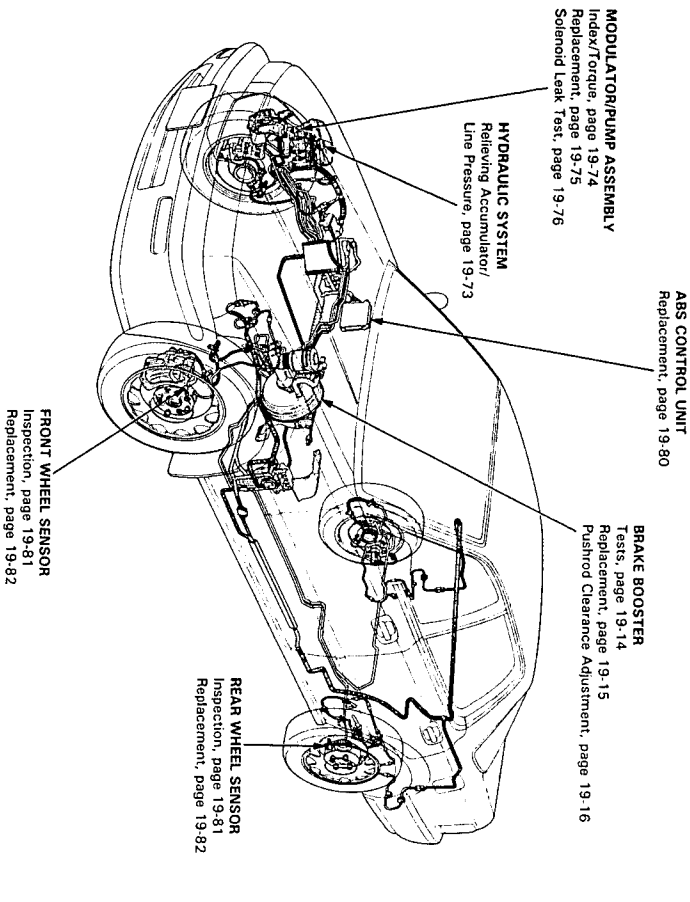




Ref. No.	Tool Number	Description	Qty	Page Reference
①	07HAA-SG00100 or 07HAA-SG00101	Bleeder T-wrench	1	19-51, 58, 71, 77
②	07HAE-SG00100	Brake Spring Compressor	1	19-22, 23, 25, 26
③	07HAJ-SG0010A or 07HAJ-SG0010B	ALB Checker	1	19-45, 47, 77
④	07HAJ-SG00200	ALB Checker (CANADA)	1	19-16
⑤	07JAG-SD40100	Pushrod Adjustment Gauge	1	19-23, 26
⑥	07914-SA50000 07916-6390001	Snap Ring Pliers Locknut Wrench	1	19-21, 26



**WARNING** The accumulator contains high-pressure nitrogen gas, do not puncture, expose to flame or attempt to disassemble the accumulator or it may explode; severe personal injury may result.



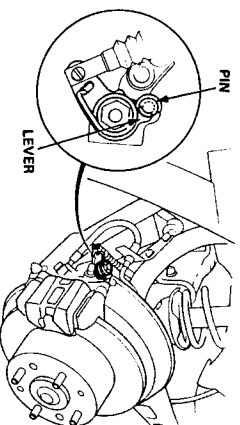
## Parking Brake

### Adjustment

**NOTE:** After rear brake caliper servicing, loosen the parking brake adjusting nut, start the engine and depress the brake pedal several times to set the self-adjusting brakes before adjusting the parking brake.

**WARNING:** Block the front wheels before jacking up the rear of the car.

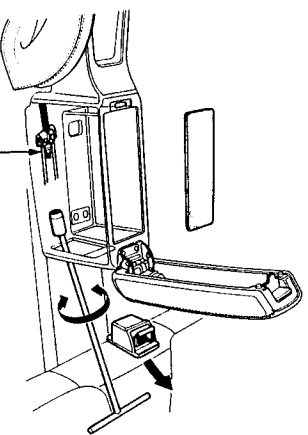
1. Raise the rear wheels off the ground.
2. Make sure the lever of the rear brake caliper contacts the brake caliper pin.



3. Pull the parking brake lever up one notch.
4. Tighten the adjusting nut until the rear wheels drag slightly when turned.

5. Release the parking lever and check that the rear wheels do not drag when turned. Readjust if necessary.

6. With the equalizer properly adjusted, the rear brakes should be fully applied when the parking brake lever is pulled up 7 to 11 clicks.



## Front Brakes

### Torque/Inspection

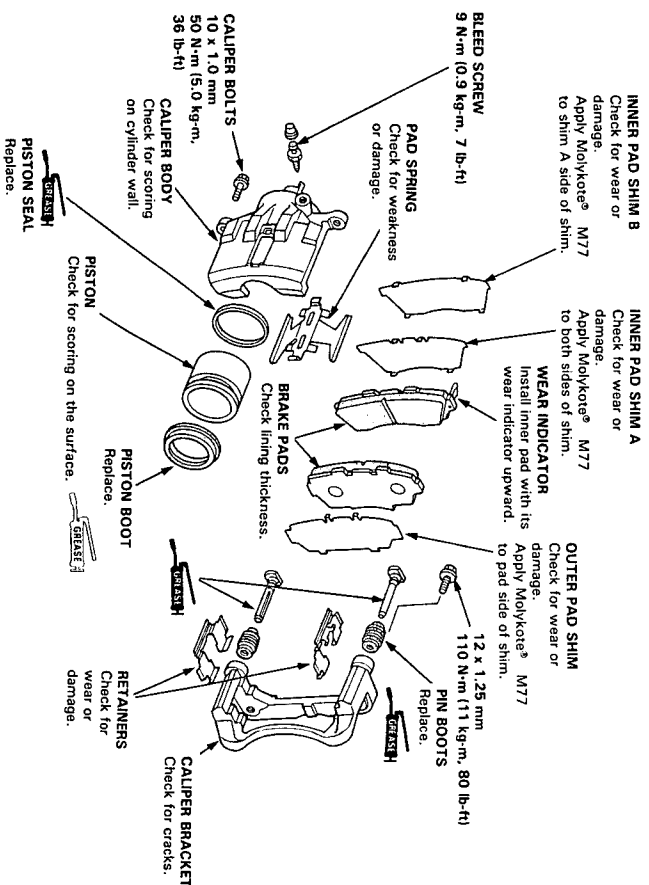
- WARNING:**
  - Never use an air hose or dry brush to clean brake assemblies.
  - Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.
  - Contaminated brake discs or pads reduce stopping ability.

**NOTE:**

- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.

**BRAKE CYLINDER GREASE (P/N 08733-B020E) OR EQUIVALENT**  
**RUBBER GREASE**  
**SILICONE GREASE**

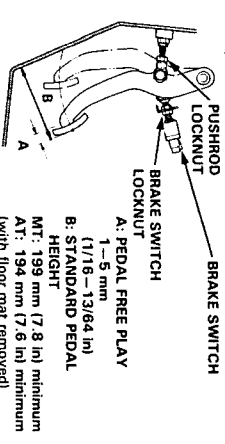
- CAUTION:**
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
  - To prevent spills, cover the hose joints with rags or shop towels.
  - Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
  - Before reassembling, check that all parts are free of dust and other foreign particles.
  - Replace parts with new ones whenever specified to do so.
  - Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
  - Do not mix different brands of brake fluid as they may not be compatible.
  - Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.



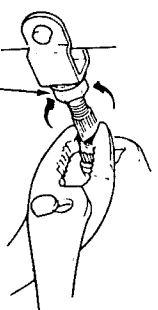
## Pedal Height

### Adjustment

1. Loosen the brake switch locknut and back off the brake switch until it is no longer touching the brake pedal.

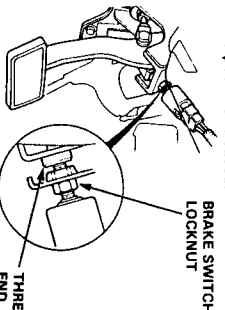


2. Loosen the pushrod locknut and screw the pushrod in or out with pliers until the standard pedal height from the floor is reached. After adjustment, tighten the locknut firmly.



3. Screw in the brake switch until its plunger is fully depressed (threaded end touching the pad on the pedal arm). Then back off the switch 1/2 turn and tighten the locknut firmly.

**CAUTION:** Check that the brake lights go off when the pedal is released.



**Brake Pedal Play Inspection:**  
 Stop the engine and inspect the play by pushing the pedal by hand.

**Brake Pedal Free Play:** 1-5 mm (1/16-13/64 in)

**NOTE:** Do not adjust the pedal height with the pushrod depressed.

**CAUTION:** If the pedal free play is insufficient, it may result in brake drag.



## Front Caliper

### Disassembly/Reassembly

#### ⚠ WARNING

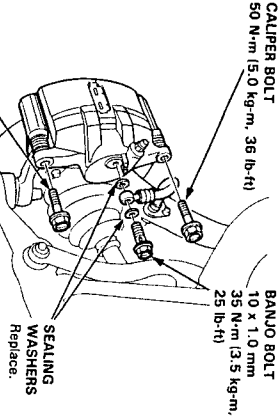
- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA-approved vacuum cleaner to avoid breathing brake dust.

#### CAUTION:

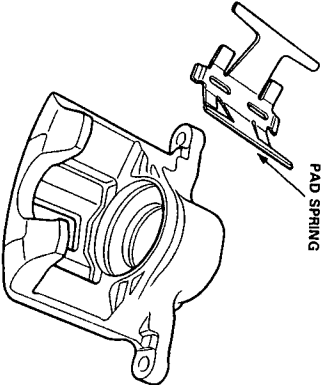
- Do not spill brake fluid on the car, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Remove the banjo bolt and disconnect the brake hose from the caliper.

2. Remove the caliper bolts, then remove the caliper.



3. Remove the pad spring from the caliper body.



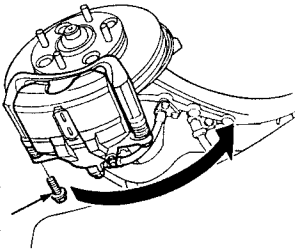
## Front Brake Pads

### Inspection/Replacement

#### ⚠ WARNING

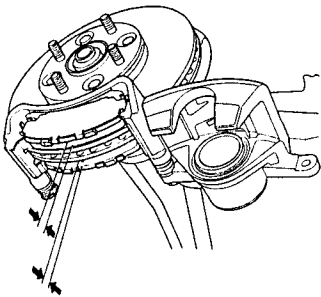
- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.

1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the caliper bolt and the brake hose bracket bolts, then pivot the caliper up out of the way.



3. If the brake pad thickness is less than service limit at step 5, replace the front pads as a set.

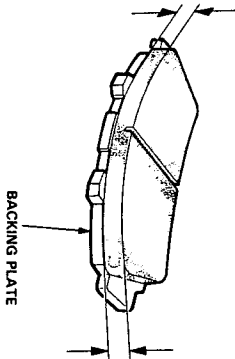
NOTE: Engagement of the brake may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.



4. Remove the pad shims, pad retainers and pads.
5. Using a vernier caliper, measure the thickness of each brake pad lining.

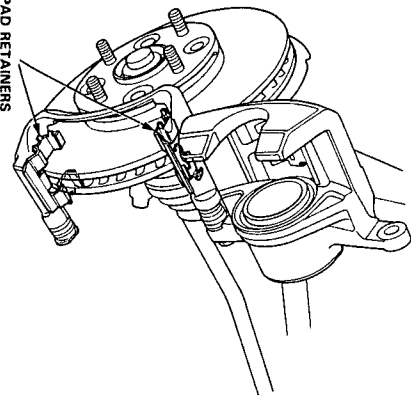
#### Brake Pad Thickness:

Standard: 11.0 mm (0.43 in)  
Service Limit: 1.6 mm (0.06 in)



NOTE: Measurement does not include pad backing thickness.

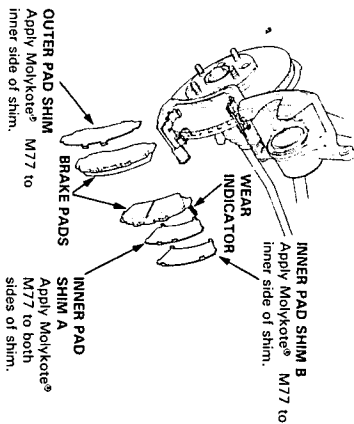
6. Clean the caliper thoroughly, remove any rust, and check for grooves or cracks.
7. Install the pad retainers.



8. Apply Molykote® M77 compound to both sides of the pad shims and the back of the pads.

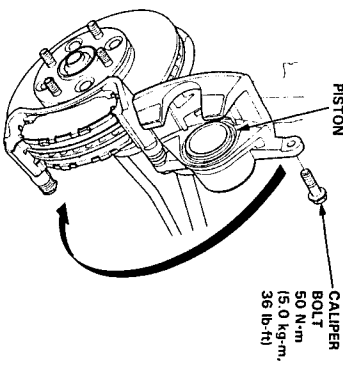
9. Install the brake pads and pad shims correctly.

NOTE: Install the pad with the wear indicator on the inside.



10. Push in the piston so that the caliper will fit over the pads. Keep the boot in position to prevent damaging the boot when pivoting the caliper down.

11. Pivot the caliper down into position, then install the caliper bolt and the brake hose bracket bolts. Tighten the bolts.



12. Depress the brake pedal several times to make sure the brakes work, then road-test.

## Front Caliper

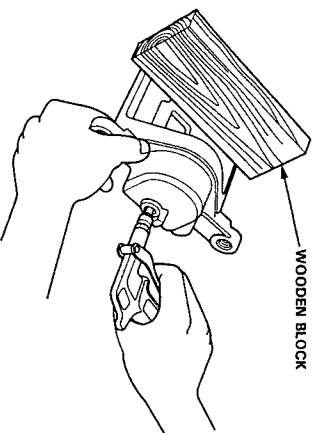
### Disassembly/Reassembly (cont'd)

4. If necessary, apply compressed air to the caliper fluid inlet to get the piston out. Place a shop rag or wooden block as shown to cushion the piston when there are expelled.

Use low pressure air in short spurts.  
Remove the piston from the caliper.

#### WARNING

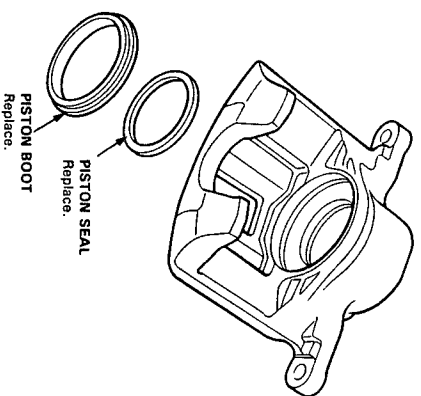
- Do not place your fingers in front of the piston.
- Do not use high air pressure; use an OSHA-approved 30 PSI nozzle.



WOODEN BLOCK

5. Remove the piston boot and piston seal.

**CAUTION:** Take care not to damage the cylinder.



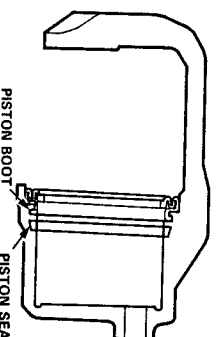
PISTON SEAL  
Replace.

PISTON BOOT  
Replace.

#### CAUTION:

- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Use only clean DOT3 or 4 brake fluid.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

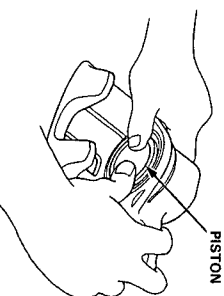
6. Clean the piston and caliper bore with brake fluid and inspect for wear or damage.
7. Apply silicone grease to new piston seal, then install the piston seal in the cylinder groove.
8. Apply rubber grease (refer to page 19-5) to new piston boot, then install the piston boot in the cylinder groove.



PISTON BOOT

PISTON SEAL

9. Lubricate the caliper cylinder and piston with brake fluid, then install the piston in the cylinder with the dished end facing in.



PISTON

10. Reinstall the caliper in the reverse order of removal.

**WARNING** Always reinstall the brake pads in their original positions to prevent loss of braking efficiency.

11. Fill the brake reservoir up and bleed the brake system (see page 19-10).

## Front Brake Disc

### Runout Inspection

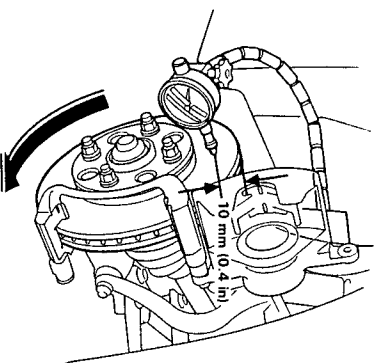
1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the brake disc pads (see page 19-6).
3. Inspect the disc surface for cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use suitable nuts (1.2 x 1.5 mm) and plain washers to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 10 mm (0.4 in) in from the outer edge of the disc.

#### Brake Disc Runout:

Service Limit: 0.10 mm (0.004 in)

5. If the disc is beyond the service limit, refinish the rotor 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.

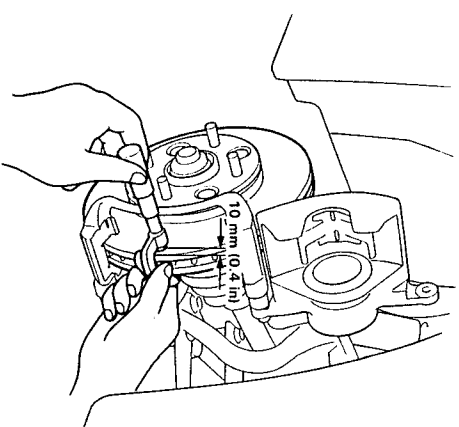
Max. Refinishing Limit: 21.0 mm (0.83 in)



**NOTE:** A new disc should be refinished if its runout is greater than 0.10 mm (0.004 in).

### Thickness and Parallelism Inspection

1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the brake pads (see page 19-6).
3. Using a micrometer, measure disc thickness at eight points, approximately 45° apart and 10 mm (0.4 in) in from the outer edge of the disc.



Brake disc thickness:  
Standard: 23.0 mm (0.91 in)

Brake Disc Parallelism: 0.015 mm (0.0006 in) max.

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

4. If the disc is beyond the service limits for parallelism, refinish the rotor 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: 21.0 mm (0.83 in)



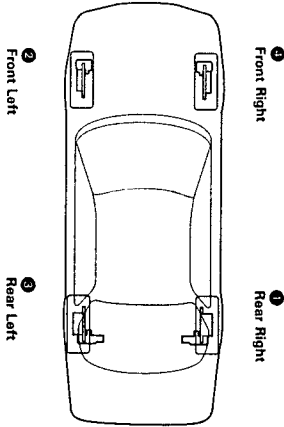
# Bleeding

## CAUTION:

- Use only clean DOT3 or 4 brake fluid.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not spill brake fluid on the car. It may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

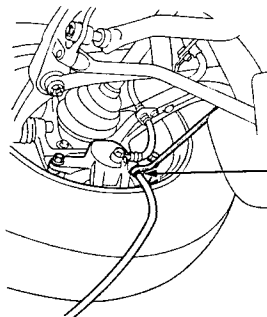
NOTE: The reservoir on the master cylinder must be full at the start of bleeding procedure, and checked after bleeding each brake caliper. Add fluid as required. Use only clean DOT3 or 4 brake fluid.

## BLEEDING SEQUENCE

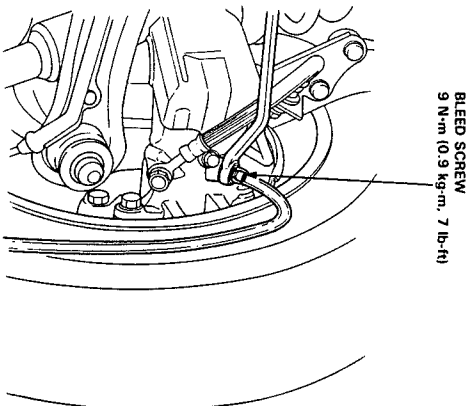


1. Have someone slowly pump the brake pedal several times, then apply steady pressure.
2. Loosen the brake bleed screw to allow air to escape from the system. Then tighten the bleed screw securely.
3. Repeat the procedure for each wheel in the sequence shown above, until air bubbles no longer appear in the fluid.
4. Check the brake performance by road testing.

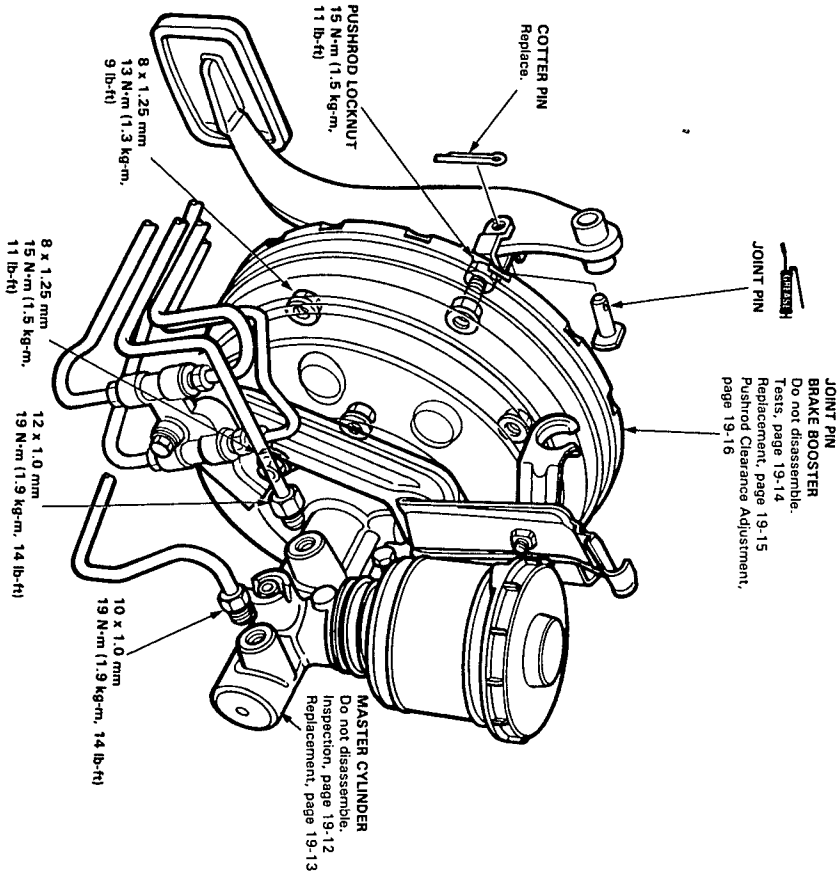
## FRONT:



## REAR:



# Master Cylinder and Brake Booster Index/Torque

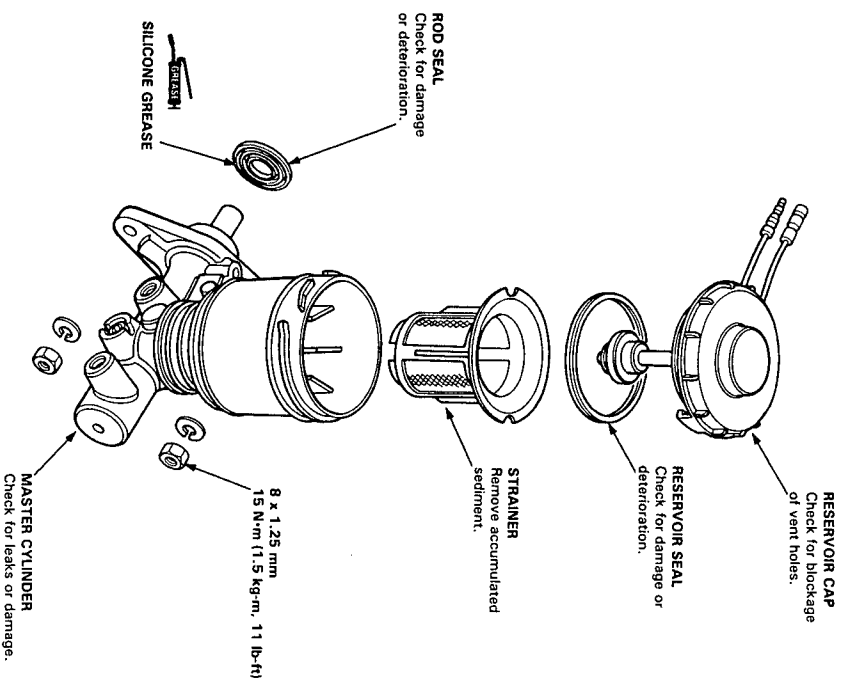


# Master Cylinder

## Index/Inspection

### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not try to disassemble the master cylinder assembly. Replace the master cylinder assembly with a new part if necessary.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT3 or 4 Brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

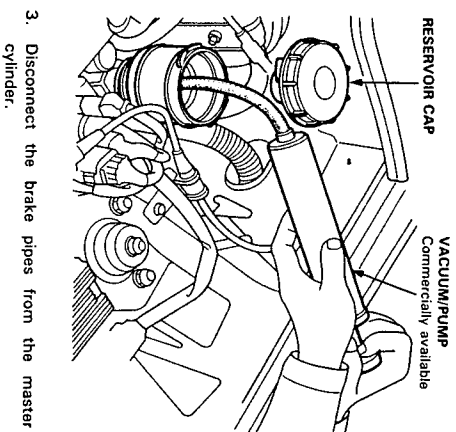


## Replacement

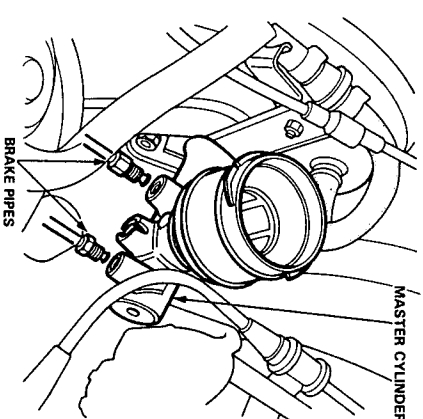
### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

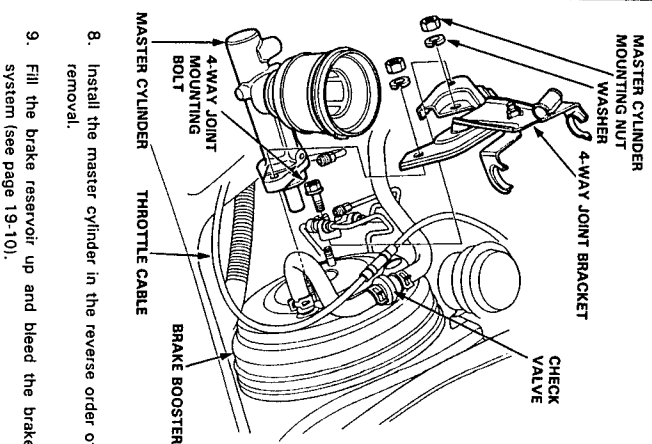
1. Remove the reservoir cap from the master cylinder reservoir.
2. The brake fluid may be sucked out through the top of the master cylinder tank.



3. Disconnect the brake pipes from the master cylinder.



4. Remove the 4-way joint mounting bolt.
5. Disconnect the check valve and the throttle cable from the 4-way joint bracket.
6. Remove the master cylinder mounting nuts, washers and 4-way joint bracket.
7. Remove the master cylinder from the brake booster.



8. Install the master cylinder in the reverse order of removal.
9. Fill the brake reservoir up and bleed the brake system (see page 19-10).

# Brake Booster

## Tests

### Functional Test

1. With the engine stopped, depress the brake pedal several times, then depress the pedal hard and hold that pressure for 15 seconds. If the pedal sinks, the master cylinder, brake line or a brake caliper is faulty.
2. Start the engine with the pedal depressed. If the pedal sinks slightly, the vacuum booster is working. If the pedal height does not vary, the booster or check valve is faulty.

### Leak Test

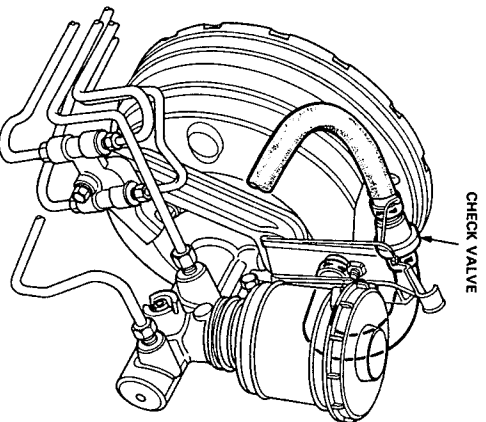
1. Depress the brake pedal with the engine running, then stop the engine. If the pedal height does not vary while depressed for 30 seconds, the vacuum booster is OK. If the pedal rises, the booster is faulty.

**CAUTION:** Do not try to disassemble the booster. Replace the booster assembly with a new one.

2. With the engine stopped, depress the brake pedal several times using normal pressure. When the pedal is first depressed, it should be low. On consecutive applications, pedal height should gradually rise. If the pedal position does not vary, check the booster check valve.

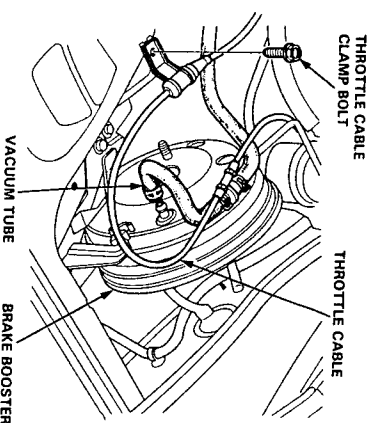
### Check Valve Test

1. Disconnect the brake booster vacuum hose at the booster.
2. Start the engine and let it idle. There should be vacuum available. If no vacuum is available, the check valve is not working correctly. Replace the check valve and retest.

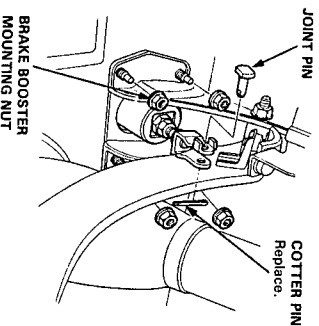


## Replacement

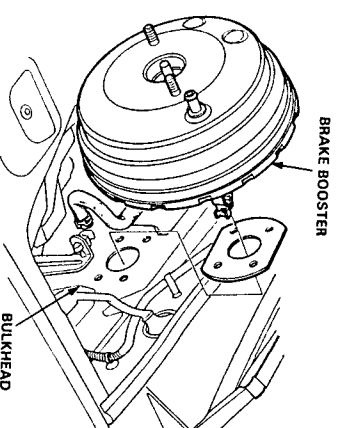
1. Remove the master cylinder (see page 19-13).
2. Remove the throttle cable clamp bolt.
3. Disconnect the vacuum tube from the brake booster.



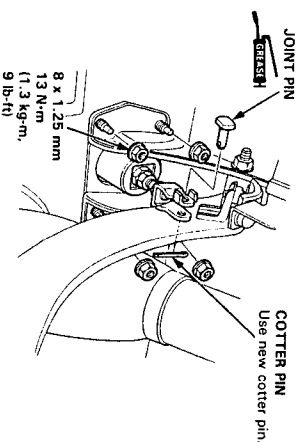
4. Remove the cotter pin and the joint pin.
5. Remove the brake booster mounting nuts.



6. Remove the brake booster from the bulkhead.



7. Install the brake booster in the reverse order of removal.



8. Install the master cylinder (see page 19-13).
9. Fill the brake reservoir up and bleed the brake system (see page 19-10).



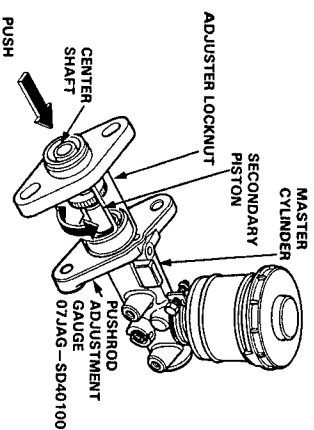


## Brake Booster

### Pushrod Clearance Adjustment

**NOTE:** Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

1. Set the special tool on the master cylinder. Push in the center shaft until the top of it contacts with the end of the secondary piston by turning the adjusting nut.

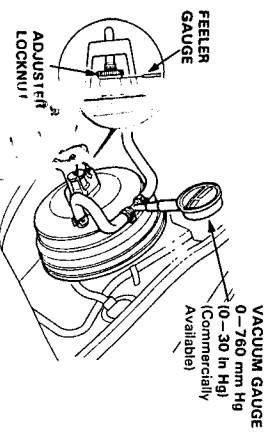


2. Without disturbing the center shaft's position, install the special tool upside down on the booster.
3. Install the master cylinder nuts and tighten to the specified torque.

4. Connect the booster in-line with a vacuum gauge 0-760 mm Hg (0-30 in Hg) to the booster's engine vacuum supply, and maintain a engine speed that will deliver 500 mm Hg (20 in Hg) vacuum.

5. With a feeler gauge, measure the clearance between the gauge body and the adjusting nut as shown.

Clearance: 0-0.4 mm (0-0.02 in)  
Preferred: 0-0.2 mm (0-0.01 in)

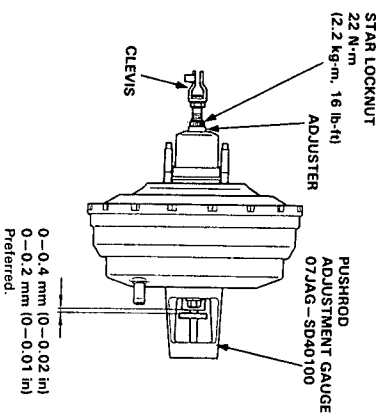


**NOTE:** If the clearance between the gauge body and adjusting nut is 0.4 mm (0.02 in), the pushrod-to-piston clearance is 0 mm. However, the clearance between the gauge body and adjusting nut is 0 mm, the pushrod-to-piston clearance is 0.4 mm (0.02 in) or MORE. Therefore, it must be adjusted and rechecked.

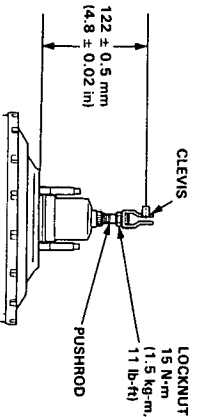
6. If the clearance is incorrect, loosen the star locknut and adjust the clearance by turning the adjuster in or out while holding the pushrod. Tighten the star locknut to the specified torque and remove the special tool.

**NOTE:**

- Adjust the clearance while the specified vacuum is applied to the booster.
- Hold the clevis while adjusting.



7. Adjust the pushrod length as shown if the booster is removed.



8. Install the master cylinder (see page 19-13).

9. After installation, perform the following inspections and adjust if necessary.
  - Brake pedal height (see page 19-4)
  - Brake pedal free play (see page 19-4)

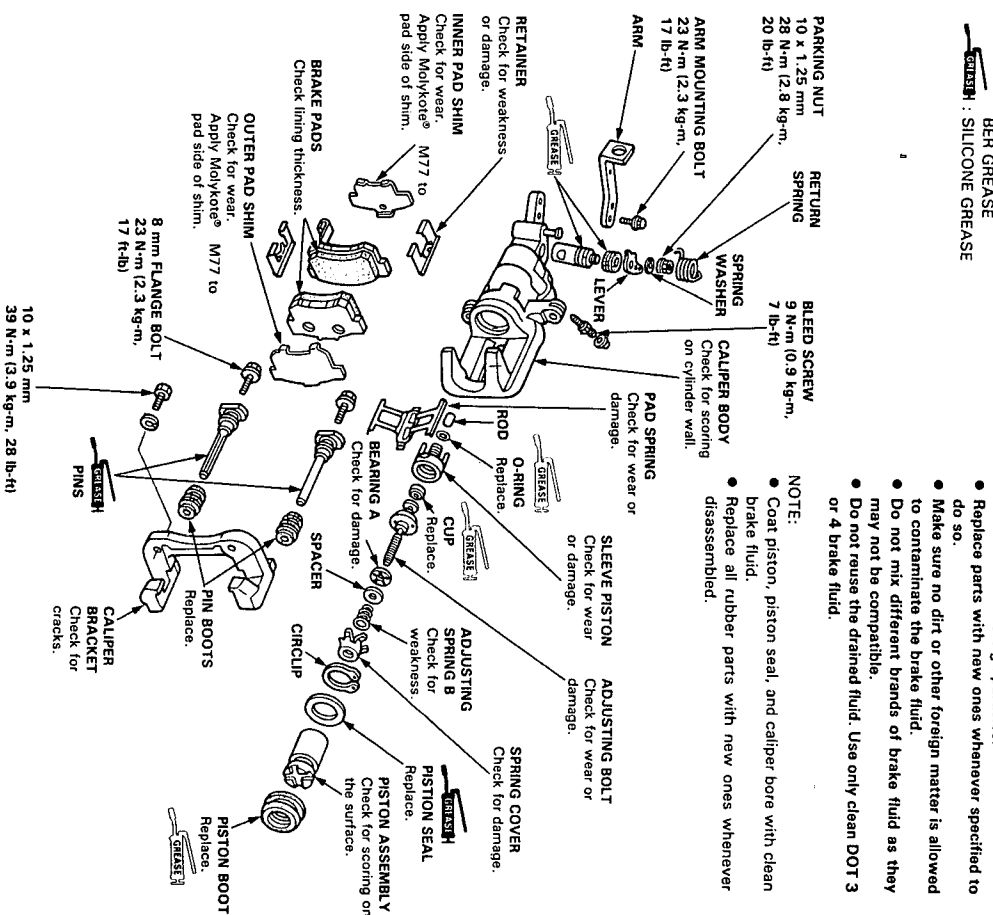
## Rear Brakes

### Torque/Inspection

#### WARNING

- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.
- Contaminated brake discs or pads reduce stopping ability.

**GREASE** : BRAKE CYLINDER GREASE (P/N 08733-8020E) OR EQUIVALENT RUB. BER GREASE  
**GREASE** : SILICONE GREASE



- CAUTION:**
- Do not spill brake fluid on the car; it may damage the paint. If brake fluid does contact the paint, wash it off immediately with water.
  - To prevent spills, cover the 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 dust and other foreign particles.
  - Replace parts with new ones whenever specified to do so.
  - Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
  - Do not mix different brands of brake fluid as they may not be compatible.
  - Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

**NOTE:**

- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.



# Rear Brake Pads

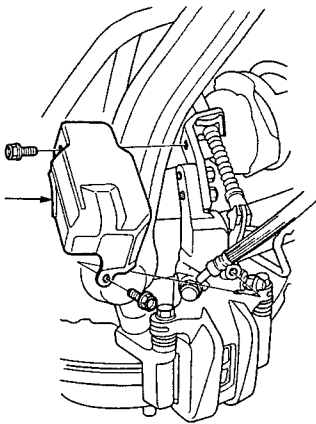
## Inspection/Replacement

### WARNING

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

1. Block the front wheels, loosen the rear wheel lug nuts slightly, support the rear of car on safety stands, then remove the rear wheels.

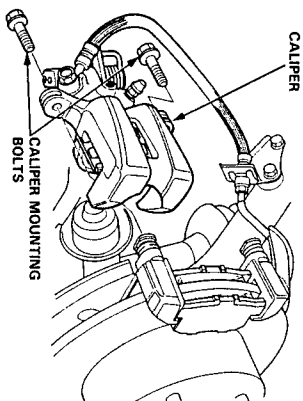
2. Remove the caliper shield.



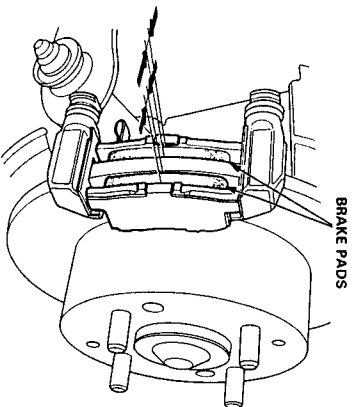
4. Remove the two caliper mounting bolts and the caliper from the bracket.

### CAUTION:

- Thoroughly clean the outside of the caliper to prevent dust and dirt from entering inside.
- Support the caliper with a piece of wire so that it does not hang from the brake hose.



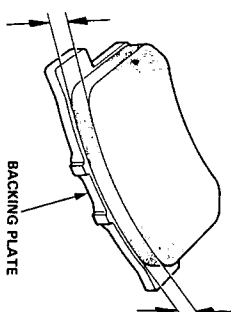
If lining thickness is less than service limit at step 6, replace the rear pads as a set.



5. Remove the pad shims, pads and pad retainers.

6. Using a vernier caliper, measure the thickness of each brake pad lining.

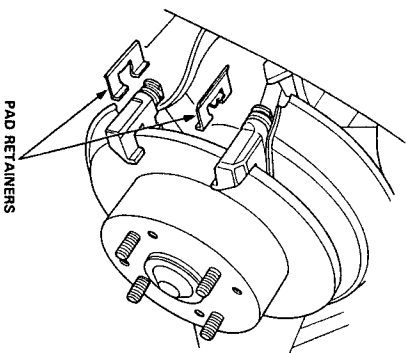
Brake Pad Thickness:  
Standard: 9.0 mm (0.35 in)  
Service Limit: 1.6 mm (0.06 in)



NOTE: Measurement does not include pad backing thickness.

7. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.

8. Make sure that the pad retainers are installed in the correct positions.



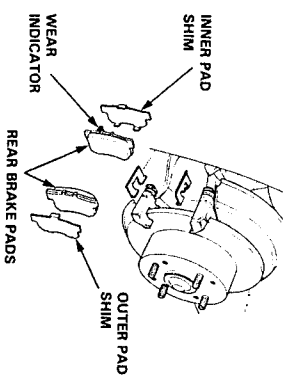
9. Install the new brake pads and pad shims on caliper bracket.

### WARNING

- When reusing the pads, always reinstall the brake pads in their original positions to prevent loss of braking efficiency.
- Contaminated brake discs or pads reduces stopping ability. Keep grease off the discs and pads.

### NOTE:

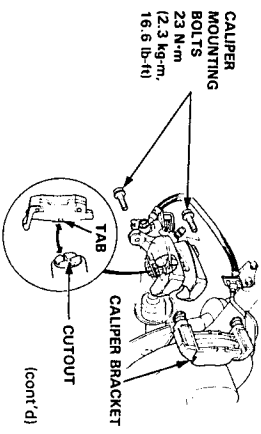
- Apply Molykote® 77 to the shims (see page 19-17).
- Wipe excess grease off the shims.
- Install the inner pad with its wear indicator facing downward.
- Make sure that the pad spring is installed onto the caliper body.



10. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the tab on the inner pad by turning the piston back.

CAUTION: Lubricate the boot with rubber grease to avoid twisting the piston boot. If piston boot is twisted, back it out so it sits properly.

11. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.



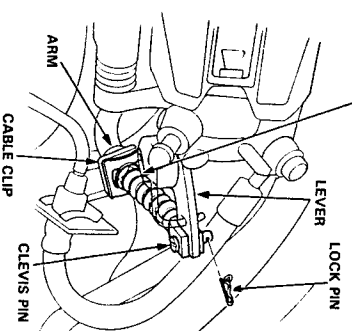
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## Rear Brake Pads

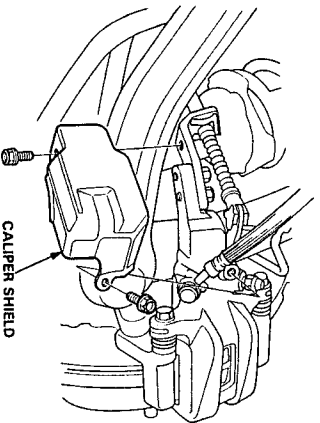
### Inspection/Replacement (cont'd)

12. Insert the cable through the arm and connect the cable to the lever with the clevis pin and lock pin. Install the cable clip securely.

#### PARKING BRAKE CABLE



13. Install the caliper shield.



NOTE: Engagement of the brake 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.

14. Depress the brake pedal several times to make sure the brakes work, then road-test.

NOTE: Clean the mating surface of the wheel and hub before installing the wheel.

## Rear Brake Disc

### Runout Inspection

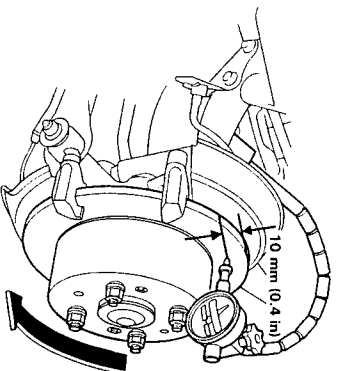
1. Loosen the rear wheel lug nuts slightly, then raise the car and support on safety stands. Remove the rear wheels.
2. Remove the brake pads (see page 19-18).
3. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use wheel nuts and suitable plain washers to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 10 mm (0.4 in) from the outer edge of the disc.

#### Brake Disc Runout:

Service Limit: 0.10 mm (0.004 in)

5. If the disc is beyond the service limit, refinish the rotor.

Max. Refinishing Limit: 8.0 mm (0.31 in)

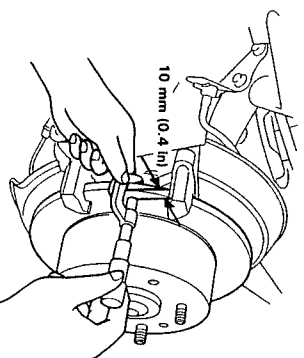


NOTE: A new disc should be refinished if its runout is greater than 0.10 mm (0.004 in).

### Thickness and Parallelism

#### Inspection

1. Loosen the rear wheel lug nuts slightly, then raise the car and support on safety stands. Remove the rear wheels.
2. Remove the brake pads (see page 19-18).
3. Using a micrometer, measure disc thickness at eight points, approximately 45° apart and 10 mm (0.4 in) in from the outer edge of the disc.



#### Brake Disc Thickness:

Standard: 10.0 mm (0.39 in)

Brake Disc Parallelism: 0.015 mm (0.0006 in) max.

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

4. If the disc is beyond the service limits, for parallelism, refinish the rotor.

Max. Refinishing Limit: 8.0 mm (0.31 in)

## Rear Caliper

### Disassembly

#### WARNING

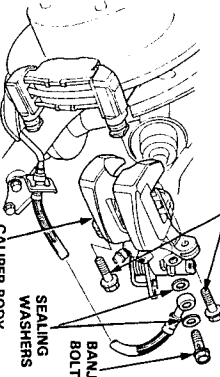
- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA-approved vacuum cleaner to avoid breathing brake dust.

#### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Remove the caliper shield (see page 19-18).
2. Disconnect the parking cable (see page 19-18).
3. Remove the banjo bolt and two sealing washers.
4. Remove the two caliper mounting bolts and caliper body from the bracket.

#### CALIPER MOUNTING BOLTS

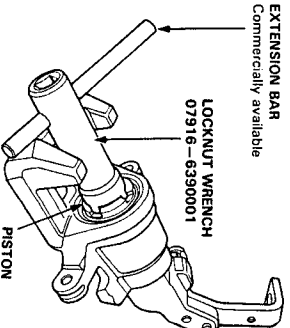


5. Remove the pad spring from the caliper.
6. Remove the piston by rotating the piston using the special tool.

CAUTION: Avoid damaging the piston and piston boot.

#### EXTENSION BAR

Commercially available



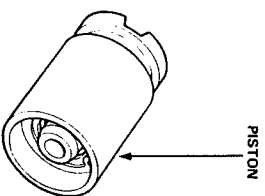
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# Rear Caliper

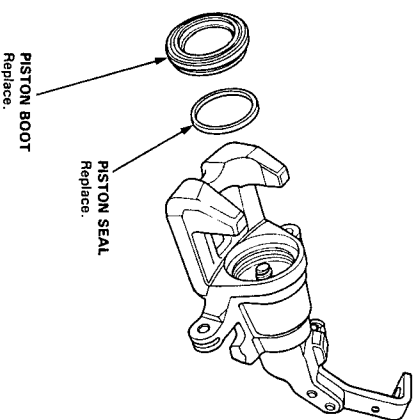
## Disassembly (cont'd)

7. Inspect the piston surface for scratches and wear. Replace it if necessary.



8. Remove the piston boot and piston seal.

**CAUTION:** Take care not to damage the cylinder bore.

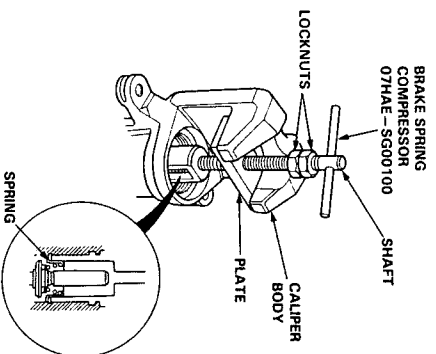


9. Install the special tool between the caliper body and spring cover.

**CAUTION:** Be careful not to damage the inside of the caliper cylinder during caliper disassembly.

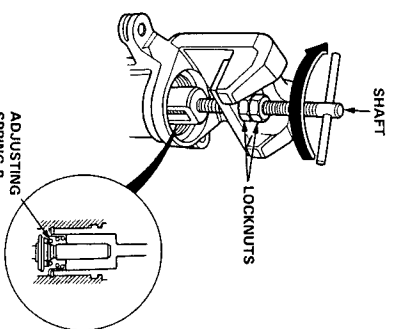
10. Position the locknuts as shown, then turn the shaft until the plate just contacts the caliper body.

**NOTE:** Do not compress the spring under the spring cover.



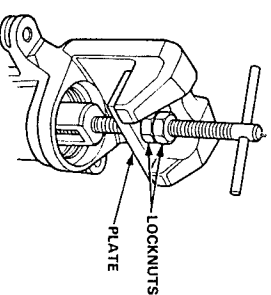
11. Turn the shaft clockwise  $1/4 - 1/2$  to compress the adjusting spring B in the caliper body.

**CAUTION:** To prevent damage to the inner components, do not turn the shaft more than  $1/2$  turn.

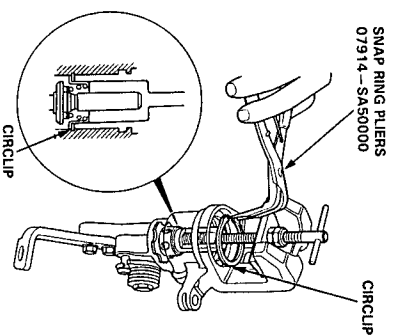


12. Lower the locknuts fully, and tighten the locknuts securely.

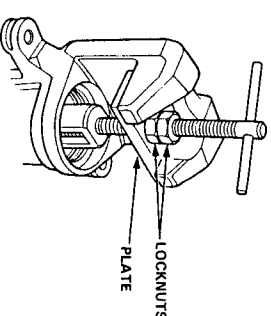
**NOTE:** Keep the locknuts in this position until you reinstall the circlip.



13. Remove the circlip with snap ring pliers.

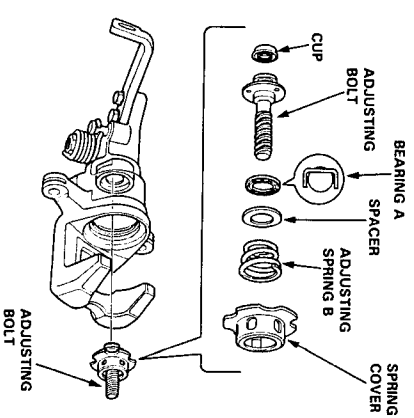


14. Hold the plate with your fingers and turn the shaft counterclockwise. Then, remove the special tool from the caliper.



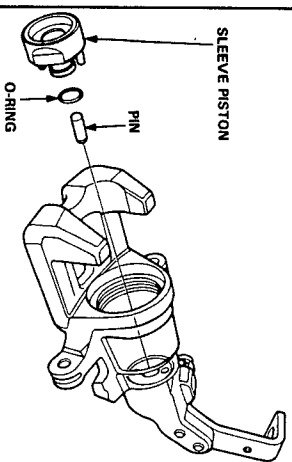
15. Remove the adjusting bolt.

16. Remove the spring cover, adjusting spring B, spacer, bearing A and cup from the adjusting bolt.



## Disassembly (cont'd)

17. Remove the sleeve piston, and remove the pin from the cam.

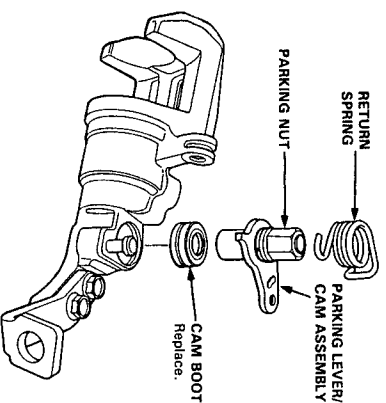


18. Remove the return spring.

19. Remove the parking lever and cam as an assembly from the caliper body.

**CAUTION:** Do not loosen the parking nut with the cam installed in the caliper body. If the lever and shaft must be separated, hold the lever in a vise and loosen the parking nut.

20. Remove the cam boot.



## Reassembly

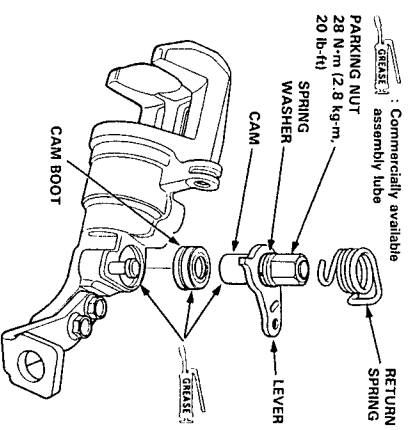
### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

1. Pack all cavities of the needle bearing with commercially available assembly lube.
2. Coat the new cam boot with commercially available assembly lube and install it in the caliper body.
3. Apply commercially available assembly lube to the pin contacting area of the cam.
4. Install the cam and lever assembly into the caliper body.
5. Install the return spring.

### CAUTION:

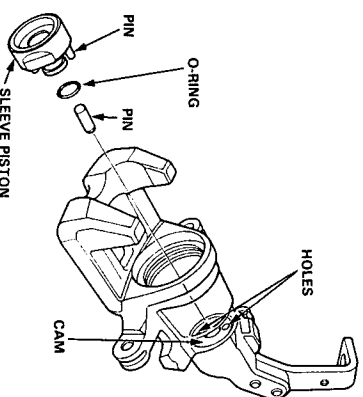
- When the cam and lever were separated, be sure to assemble them before installing the cam in the caliper body. Install the lever and spring washer, apply locking agent to the threads, and tighten the parking nut while holding the lever with a vise.
- Avoid damaging the cam boot since it must be installed before the cam.
- When installing the cam, do not allow the cam boot lips to turn outside in.



6. Install the pin in the cam.

7. Install a new O-ring on the sleeve piston.

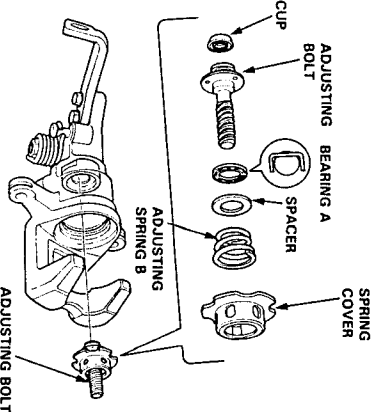
8. Install the sleeve piston so the hole in the bottom of the piston is aligned with the pin in the cam, and two pins on the piston are aligned with the holes in the caliper.



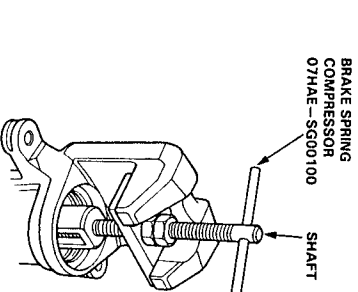
9. Install a new cup with its groove facing the bearing A side on the adjusting bolt.

10. Fit the bearing A, spacer, adjusting spring B and spring cover on the adjusting bolt, and install in the caliper cylinder.

**NOTE:** Install the bearing A with its open end facing the spacer.



11. Install the special tool and turn the shaft until it bottoms out.



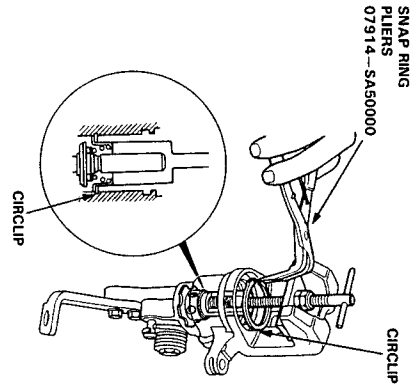
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# Rear Caliper

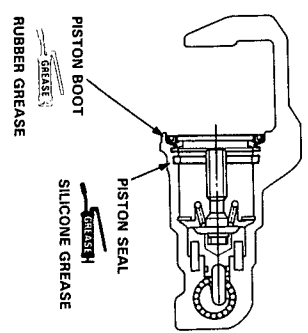
## Reassembly (cont'd)

- Check that the flared end of the spring cover is below the circlip groove.
- Install the circlip in the groove, then remove the special tool.

NOTE: Check that the circlip is seated in the groove properly.

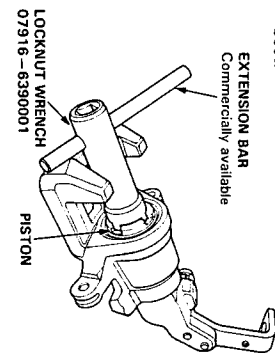


- Coat the new piston seal with silicone grease and install it in the caliper.
- Apply the brake cylinder grease (P/N: 08733 -B020E) or equivalent rubber grease to the sealing lips and inside of a new piston boot, and install it in the caliper.

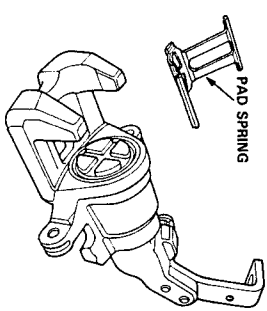


- Coat the outside of the piston with brake fluid and install it on the adjusting bolt while rotating it clockwise.

CAUTION: Avoid damaging the piston and piston boot.



- Install the pad spring on the caliper.

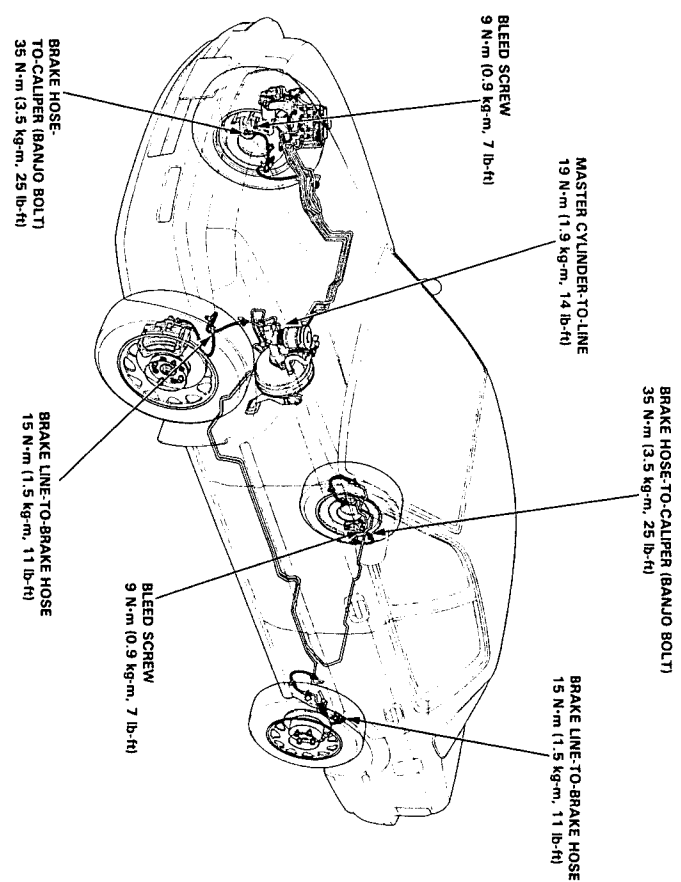


- Install the brake pad retainers and brake pads.
  - Install the caliper on the caliper bracket and tighten the caliper mounting bolts.
  - Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.
  - Connect the parking brake cable to the arm on the caliper.
  - Fill the see brake reservoir up and bleed the brake system (see page 19-10).
  - Operate the brake pedal several times, then adjust the parking brake lever.
- NOTE: Before adjustments, make sure the lever on the caliper contacts the brake caliper pin (see page 19-4).
- Install the caliper shield and tighten the bolts.

# Brake Hoses/Pipes Inspection

- Inspect the brake hoses for damage, leaks, interference or twisting.
- Check the brake lines for damage, tipping, rusting or leakage. Also check for bent brake lines.
- Check for leaks at hose and line joints or connections, and retighten if necessary.

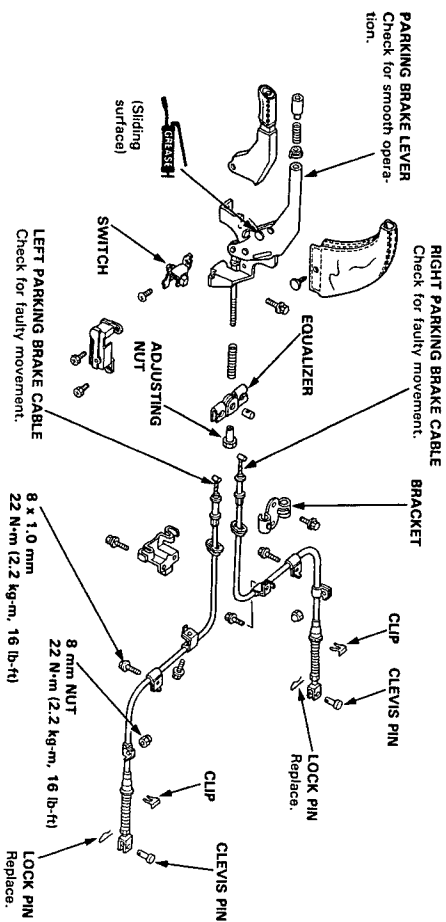
CAUTION: Replace the brake hose clip whenever the brake hose is serviced.



## Parking Brake

### Disassembly and Reassembly

**CAUTION:** The parking brake cables must not be bent or distorted. This will lead to stiff operation and premature cable failure.



## Anti-lock Brake System (ABS)

### Features/Construction/Operation

In a conventional brake system, if the brake pedal is depressed very hard, the wheels can lock before the vehicle comes to a stop. In such a case, the stability of the vehicle is reduced if the rear wheels are locked, and maneuverability of the vehicle is reduced if the front wheels are locked, creating an extremely unstable condition.

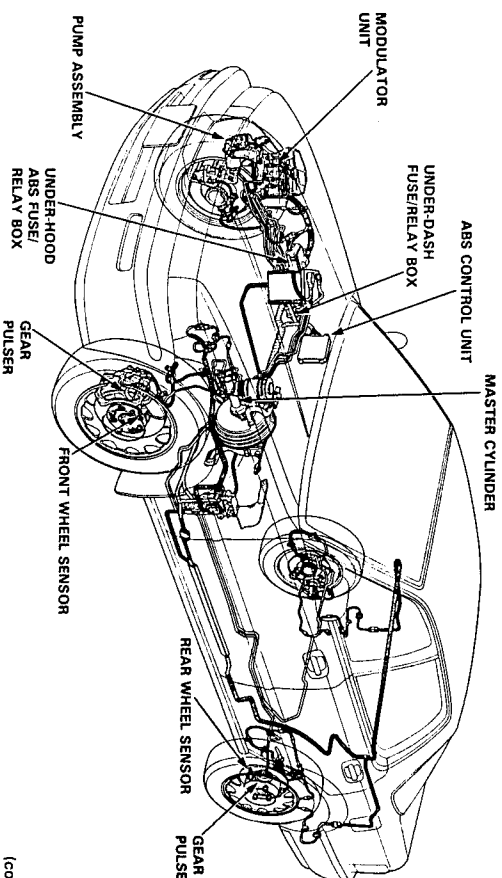
The Anti-lock Brake System (ABS) modulates the pressure of the brake fluid applied to each caliper, thereby preventing the locking of the wheels, whenever the wheels are likely to be locked due to hard braking. It then restores normal hydraulic pressure when there is no longer any possibility of wheel locking.

#### Features

- Increased braking stability can be achieved regardless of changing driving conditions.
- The maneuverability of the vehicle is improved as the system prevents the front wheels from locking.
- When the anti-lock brake system goes into action, a kickback is felt on the brake pedal.
- The system is equipped with a self-diagnosis function. When an abnormality is detected, the ABS indicator light comes on. The location of the system's trouble can be diagnosed from the frequency of the ABS indicator light blinks.
- This system has individual control of the front wheels and common control ("Select Low") for the rear wheels.
- "Select Low" means that the rear wheel that would lock first (the one with the lowest resistance to lock-up) determines anti-lock brake system activation for both rear wheels.
- The system has a fail-safe function that allows normal braking if there's a problem with the anti-lock brake system.

#### Construction

In addition to the conventional braking system, the anti-lock brake system is composed of: gear pulsers attached to the rotating part of individual wheels; wheel sensors, which generate pulse signals corresponding to the revolution of the gear pulsers; ABS control unit, which controls the working of the anti-lock brake system by performing calculations based on the signals from the individual wheel sensors and the individual switches; modulator unit, which adjusts the hydraulic pressure applied to each caliper on the basis of the signals received from the ABS control unit; an accumulator, in which high-pressure brake fluid is stored; a pressure switch, which detects the pressure in the accumulator and transmits signals to the ABS control unit; a pump assembly, which supplies the high-pressure working fluid to the accumulator by means of a pump; a motor relay for driving the pump assembly; a fail-safe relay, which cuts off the solenoid valve ground circuit when the fail-safe device is at work; and, an ABS indicator light.



(cont'd)



# Anti-lock Brake System (ABS)

## Features/Construction/Operation (cont'd)

### Master Cylinder

#### 1. Construction

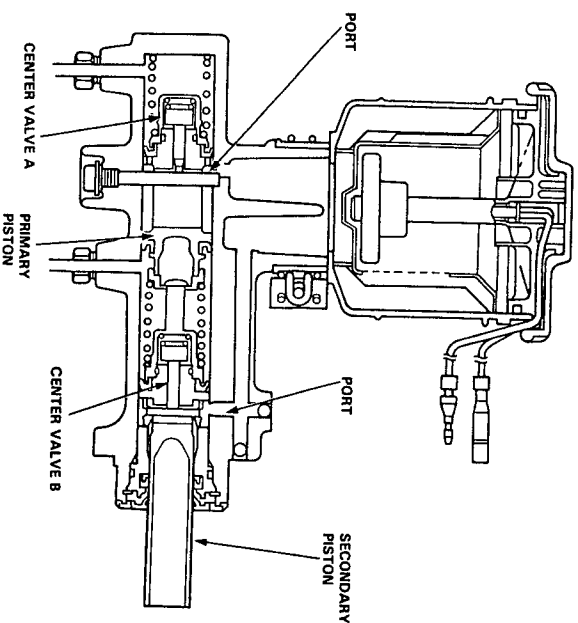
A tandem master cylinder is used to improve the safety of the braking system. In addition, center valves are used so as to match the anti-lock brake system operation.

The master cylinder has one reservoir tank which is connected to the cylinder sections by two small holes. It has two pistons: primary and secondary, which are crisscross connected with the calipers so that the fluid pressure works separately on each system (front right wheel & rear left wheel, and front left wheel & rear right wheel).

A stop bolt for controlling movement of the primary piston is provided at the side of the master cylinder body. A reed switch for detecting the brake fluid volume is also provided in the cap of the reservoir tank.

#### 2. Operation

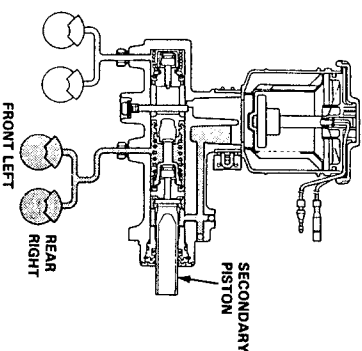
When the brake pedal is depressed, the secondary piston is pushed through the brake booster and the center valve B is closed so that fluid pressure is generated on the secondary side. At the same time, the primary piston is pushed by the secondary fluid pressure and the center valve A is closed so that braking fluid pressure is generated both on the primary and secondary sides. When the brake pedal is released, the primary and secondary pistons are returned to the original position by the brake fluid pressure and piston spring.



#### 3. Responses when fluid is leaking

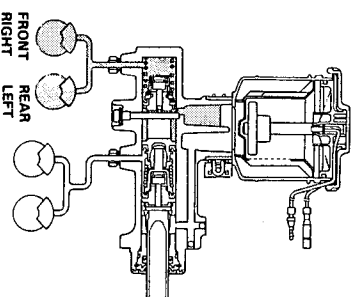
##### (1) In case of leaking from the primary system:

Since the fluid pressure on the primary side does not rise, the primary piston is pushed by the fluid pressure of the secondary piston and the tension of the piston spring until the end hits on the cylinder, the braking is performed by the fluid pressure on the secondary side.



##### (2) In case of leaking from the secondary system:

The secondary piston does not produce fluid pressure, keeps moving ahead, hits on the end surface of the primary piston so that the primary piston is pushed under the same condition as an ordinary rod. Therefore, the braking is conducted by the fluid pressure on the primary side.



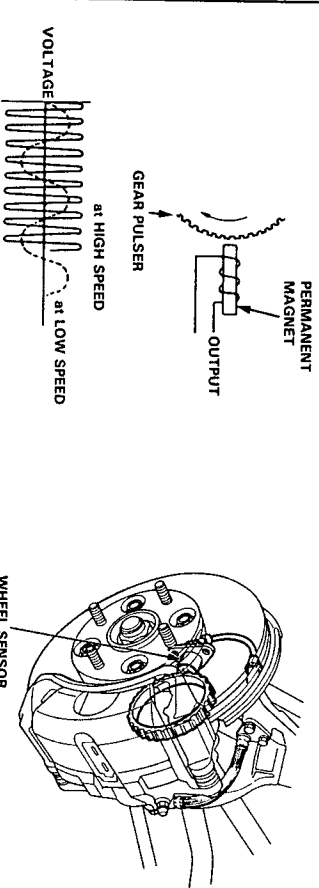


# Anti-lock Brake System (ABS)

## Features/Construction/Operation (cont'd)

### Wheel Sensor

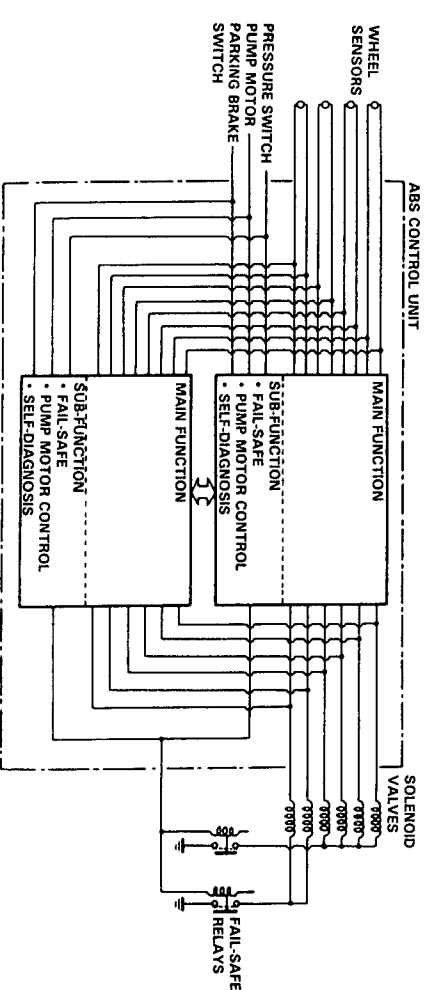
The wheel sensor is a contactless type that detects the rotating speed of a wheel. It is composed of a permanent magnet and coil. When the gear pulser attached to the rotating parts of each wheel (front wheel: outboard joint of the driver-shaft, rear: hub bearing unit) turn, the magnetic flux around the coil in the wheel sensor alternates, generating voltages with frequency in proportion to wheel rotating speed. These pulses are sent to the ABS control unit and the ABS control unit identifies the wheel speeds.



### ABS Control Unit

The ABS control unit consists of a main function section, which controls the operation of the anti-lock brake system, and a subfunction, which controls the pump motor and "self-diagnosis".

1. Main Function  
The main function section of the ABS control unit performs calculations on the basis of the signals from each wheel sensor and controls the operation of the anti-lock brake system by putting into action the solenoid valves in the modulator unit for each front brake and for the two rear brakes.
2. Sub-Function  
The sub-function section gives driving signals to the pump motor and also gives "self-diagnosis" signals, necessary for backing up the anti-lock brake system.

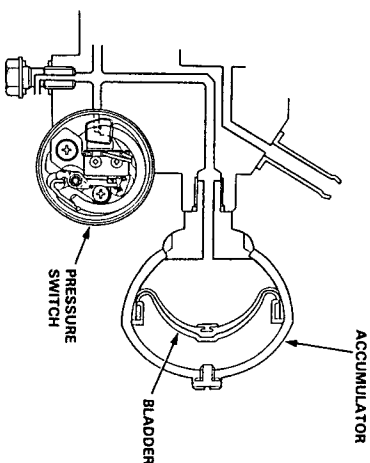


# Anti-lock Brake System (ABS)

## Features/Construction/Operation (cont'd)

### Accumulator

The accumulator is a pneumatic type which accumulates high-pressure brake fluid fed from the pump incorporated in the pump assembly. When the anti-lock brake system operates, the accumulator and the pump supply high-pressure brake fluid to the modulator valve via the inlet side of the solenoid valve.

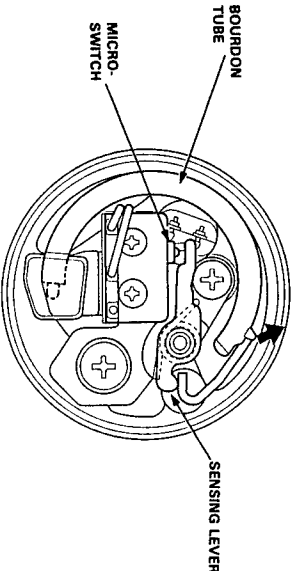


### Pressure Switch

The pressure switch monitors the pressure accumulation (pressure from the pump) in the accumulator and is turned off when the pressure becomes lower than a prescribed level. When the pressure switch is turned off, the switching signal is sent to the ABS control unit. Upon receiving the signal, the ABS control unit activates the pump motor relay to operate the motor. If the pressure doesn't reach the prescribed value, the ABS indicator light comes on.

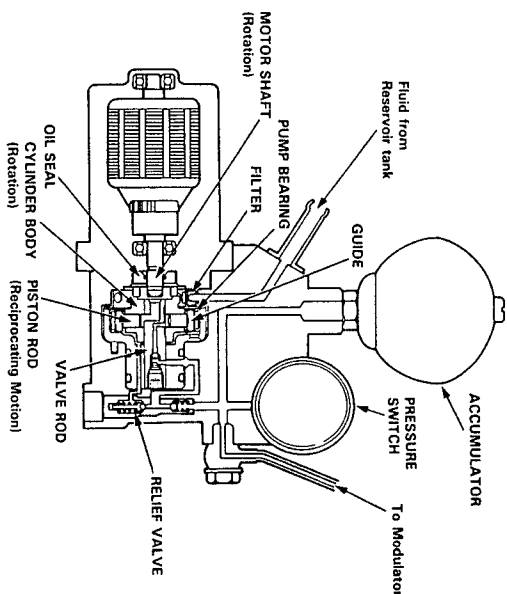
### Operation

When the pressure in the accumulator rises, the Bourdon tube in the pressure switch deforms outwards. When the free end of the Bourdon tube moves more than the prescribed amount, the micro-switch is activated by the force of the spring attached to the sensing lever. When the pressure in the accumulator decreases due to anti-lock brake system operations, the Bourdon tube moves in the direction opposite to the one described above, and the micro-switch is eventually turned off. Upon receiving this signal, the ABS control unit activates the motor relay to operate the motor.



### Pump Assembly

The pump assembly consists of a motor, filter, guide, piston rod and cylinder body. Since a guide is positioned off-set to the center of the motor shaft, the rotation of the motor and cylinder body provides the reciprocating motion to the piston rod. The brake fluid is thus pressurized and fed to the relief valve, accumulator and modulator unit. As the pressure in the accumulator exceeds the prescribed level, the pressure switch is turned on. Approximately 0.5 seconds after receiving the ON-signal, the ABS control unit stops the motor relay operation. In this state, the pressure in the accumulator reaches 23,000 kPa (230 kg/cm<sup>2</sup>, 3,271 psi). If the pressure doesn't reach the prescribed value after the motor has operated continuously for a specified period, the ABS control unit stops the motor and activates the ABS indicator light.



### Anti-lock Brake System (ABS) Indicator Light

The ABS control unit turns on the ABS indicator light when one or more of the below described abnormalities is detected. This is only a partial list.

- When the operating time of the motor in the pump assembly exceeds the specified period.
- When vehicle running time exceeds 30 seconds without releasing the parking brake lever.
- When one of the rear wheels is locked during running.
- When absence of speed signals from any of the four wheel sensors is detected.
- When the activation time of all solenoids exceeds a given time or an open circuit is detected in the solenoid system.
- When solenoid output is not detected in the simulated anti-lock brake system operation carried out during running at speeds of 8 mph (10 km/h) or more.

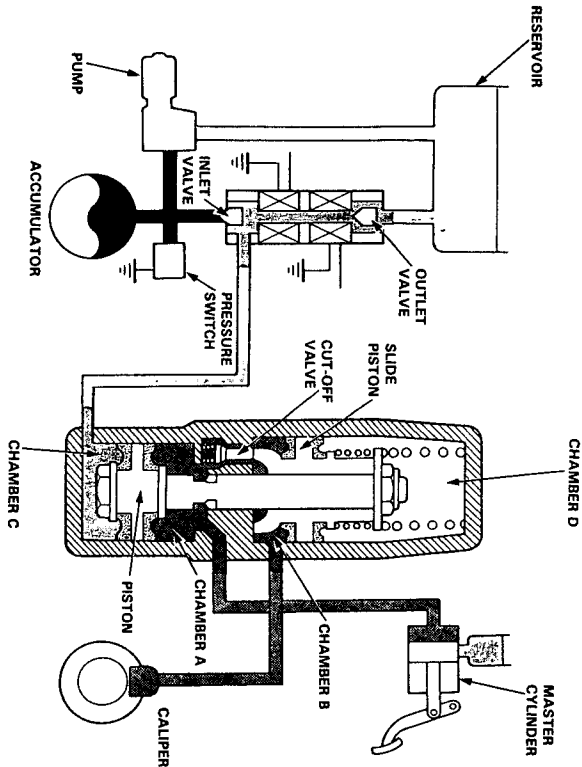
To check the ABS indicator light bulb, the light is activated when the ignition switch is turned on. It is turned off after the engine is started if there is no abnormality in the system.

(cont'd)

# Anti-lock Brake System (ABS) Features/Construction/Operation (cont'd)

## Operation

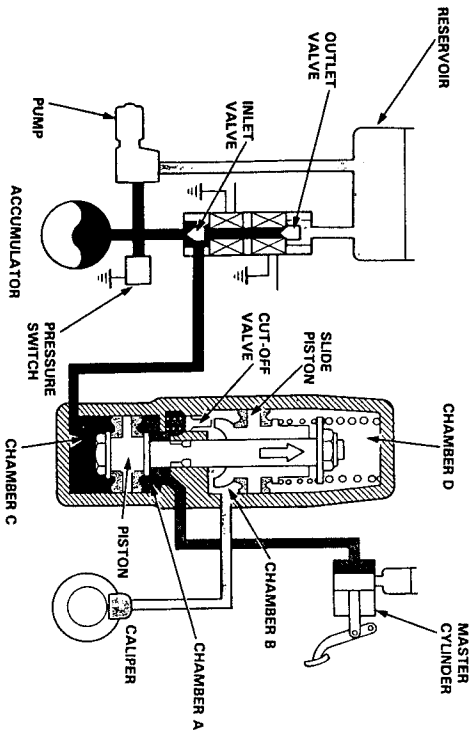
1. Ordinary Braking Function
- In ordinary brake operations, the cut-off valve in the modulator is open, transmitting the hydraulic pressure from the master cylinder to the brake callipers via chamber A and chamber B. Chamber C is connected to the reservoir through the outlet valve, which is normally open. The hydraulic pressure source (pump, accumulator, pressure switch, etc.) via the inlet valve, which is normally closed, Chamber D serves as an air chamber. Under these conditions, the pressures of chambers C and D are maintained at about atmospheric pressure, permitting regular braking operations.



If brake inputs (force exerted on brake pedal) are excessively large and a possibility of wheel locking occurs, the ABS control unit operates the solenoid valve, closing the outlet valve and opening the inlet valve. As a result, the high pressure is directed into chamber C, the piston is pushed upward, causing the slide piston to move upward and the cut-off valve to close. As the cut-off valve closes, the flow from the master cylinder to the caliper is interrupted, the volume of chamber B, which is connected to the caliper, increases, and the fluid pressure in the caliper declines. When both of the valves, inlet and outlet, are closed (when only the outlet valve is activated) the pressure in the caliper is maintained constant.

When the possibility of wheel locking ceases, it is necessary to restore the pressure in the caliper. The solenoid valve is therefore turned off (outlet valve: open, inlet valve closed).

Process	Caliper Pressure	Outlet Valve		Inlet Valve	
		Electric Power	Hydraulic Circuit	Electric Power	Hydraulic Circuit
Caliper pressure declining		ON	Close	ON	Open
Caliper pressure constant		OFF	Close	OFF	Close
Caliper pressure increasing		OFF	Open	OFF	Close

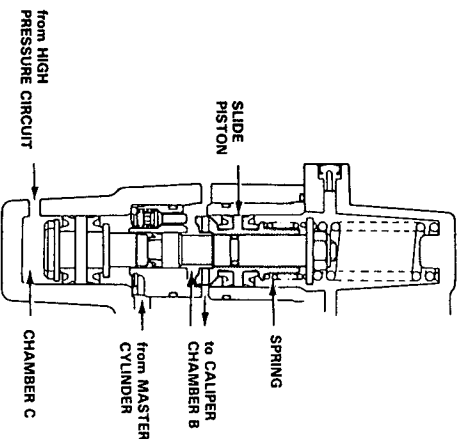


# Anti-lock Brake System (ABS)

## Features/Construction/Operation (cont'd)

### 2. Slide Piston Function

When the car is used on rough roads where the tires sometimes lose adhesion, the anti-lock brake system may function excessively, causing a very large volume of brake fluid to flow into chamber C. When this occurs, the piston is moved excessively, resulting in an abnormal loss of pressure in chamber B. In order to overcome this problem, the slide piston is kept in proper position by spring force to prevent the pressure in chamber B from becoming negative.



### 3. Kickback

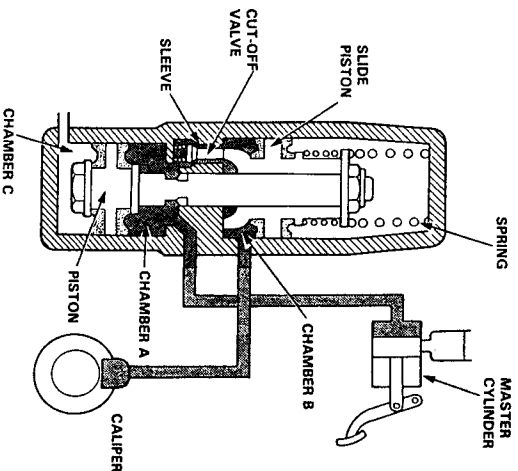
When the anti-lock brake system is functioning, the piston moves upward, the volume of chamber B increases, and the fluid pressure on the caliper side is reduced. At the same time, the volume of chamber A is reduced and the brake fluid is returned to the master cylinder. When the brake fluid is pushed back to the master cylinder, the driver can feel the functioning of the anti-lock brake system because the brake pedal is kicked back.

### 4. Proportioning Control Valve Function

In the modulator for the rear wheels, the diameters of the piston and the slide piston are distinctly different. This provides a Proportioning Control Valve function to prevent the rear wheels from locking during an emergency stop.

#### (1) Before the Turning Point:

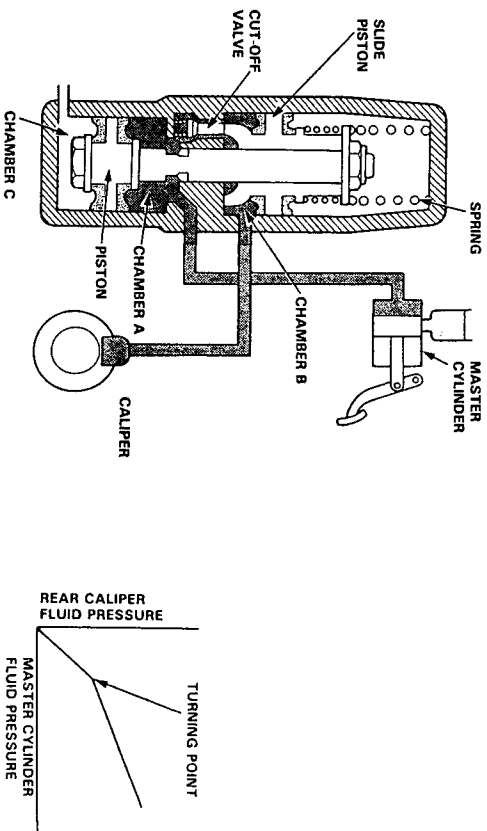
1) When the fluid pressure from the master cylinder is below the turning point, the cut-off valve is always pushed downward by the force of the slide piston and its spring. Under these conditions, there is a gap between the cut-off valve shoulder and the sleeve. Chamber A and chamber B are therefore connected through the gap. The pressure from the master cylinder flows into the rear calipers through chamber A and chamber B.



## Anti-lock Brake System (ABS)

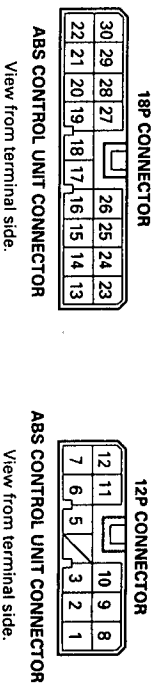
### Features/Construction/Operation (cont'd)

- 2) When the fluid pressure from the master cylinder reaches the turning point, the force on the slide piston overcomes the force of the spring, causing the slide piston to travel upward. The cut-off valve, previously being in contact with the bottom of the slide piston, then moves upward and the cut-off valve shoulder hits the sleeve, blocking the fluid passages (the fluid pressure at this point is called the turning point).

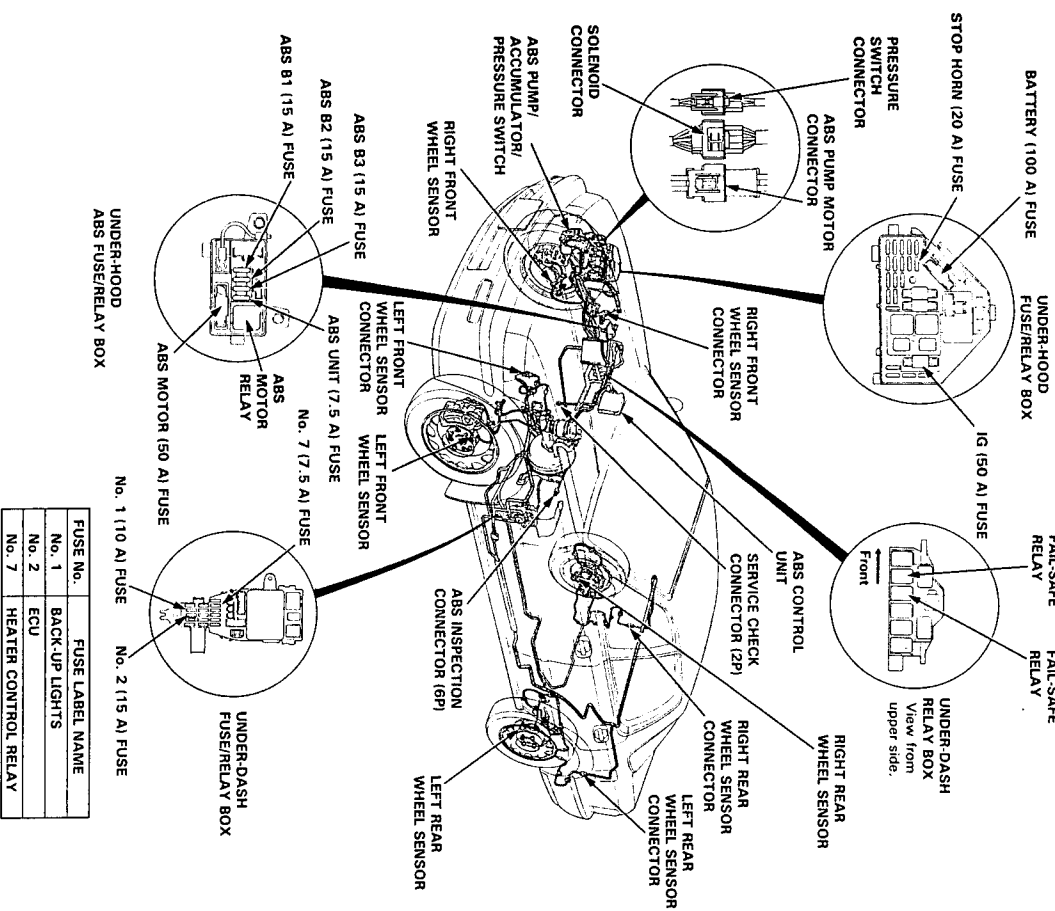


#### (2) After the turning point:

As the fluid pressure from the master cylinder increases, the pressure in chamber A becomes higher, causing a force to push down the large diameter portion of the piston. Consequently, the slide piston comes down, the cut-off valve is pushed downward by the bottom of the slide piston, allowing chambers A and B to connect momentarily. As this occurs, pressure in chamber B increases, the slide piston is pushed upward, the cut-off valve goes up, and the connection between chamber A and chamber B is blocked again. As described above, when the pressure in the master cylinder is above the turning point, the slide piston reduces the pressure in the rear caliper to the prescribed amount by repeating this process.



# Wiring/Connector Location



FUSE No.	FUSE LABEL NAME
No. 1	BACK-UP LIGHTS
No. 2	ECU
No. 7	HEATER CONTROL RELAY

# ALB Checker

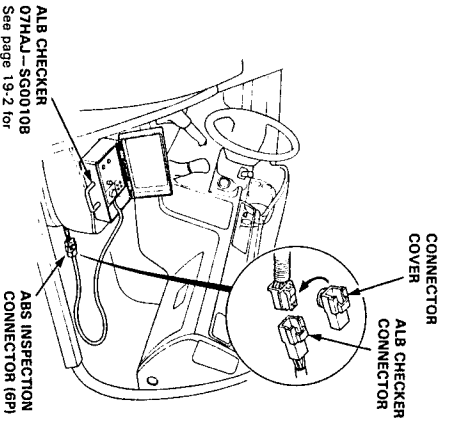
## Function Test

### NOTE:

- The ALB checker is designed to confirm proper operation of the anti-lock brake system (ABS) by simulating each system function and operating condition. Before using the checker, confirm that the anti-lock brake system (ABS) indicator light is not indicating some other problem with the system. The light should go on when the ignition is first turned on and then go off and stay off one second after the engine is started.
- The checker should be used through modes 1 – 5 to confirm proper operation of the system in any one of the following situations:
  - After replacing any ABS component.
  - After replacing or bleeding the system fluid (0 mode not necessary).
  - After any body or suspension repair that may have affected the sensors or their wiring.
- The procedure for modes 1 – 5 are on this page and 19-46, mode "0" (wheel sensor signal) is on page 19-47.

**WARNING** Disconnect the ALB checker before driving the car. A collision can result from a reduction, or complete loss, of braking ability causing severe personal injury or death.

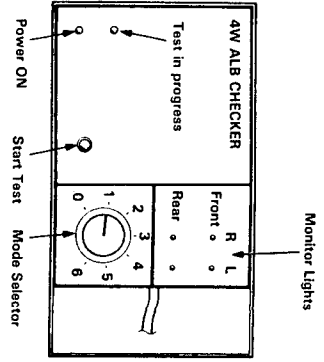
- With the ignition switch off, disconnect the ABS inspection connector (6P) from the connector cover located on the cross-member under the passenger's seat and connect the ABS inspection connector (6P) to the ALB checker.



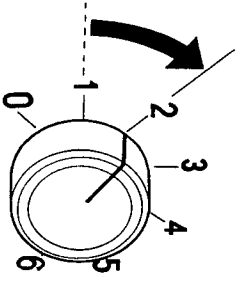
**NOTE:** Place the vehicle on level ground with the wheels blocked, put the transmission in neutral for manual transmission models, and in [P] position for automatic transmission models.

- Start the engine and release the parking brake.
- Operate the ALB checker as follows:
  - Turn the Mode Selector switch to "1".
  - Push the Start Test switch:
    - The test in progress light should come ON.
    - In one or two more seconds, all four monitor lights should come on (if not the checker is faulty).
    - The ABS indicator light should not come ON.

**NOTE:** When the test in progress indicator light is ON, Don't turn the Mode Selector switch.



- Turn the Mode Selector Switch to "2".



(cont'd)



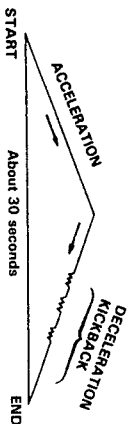
## ALB Checker

### Function Test (cont'd)

- Depress the brake pedal firmly and push the Start Test switch.

The ABS indicator light should not go on while the Test in Progress light is ON. There should be kickback on the brake pedal.

NOTE: The operation sequence simulated by Modes 2, 3, 4 and 5:



- Turn the Mode Selector switch to "3", "4" and "5".

Perform step 5 for each of the test mode positions.

Mode 1:  
Sends the simulated driving signal 0 mph (0 km/h) → 113 mph (180 km/h) → 0 mph (0 km/h) of each wheel to the ABS control unit. There should be NO kickback.

Mode 2:  
Sends the driving signal of each wheel, then sends the lock signal of the left rear wheel to the ABS control unit. There should be kickback.

Mode 3:  
Sends the driving signal of each wheel, then sends the lock signal of the right rear wheel to the ABS control unit. There should be kickback.

Mode 4:  
Sends the driving signal of each wheel, then sends the lock signal of the left front wheel to the ABS control unit. There should be kickback.

Mode 5:  
Sends the driving signal of each wheel, then sends the lock signal of the right front wheel to the ABS control unit. There should be kickback.

Mode 6:  
Not used on this model.

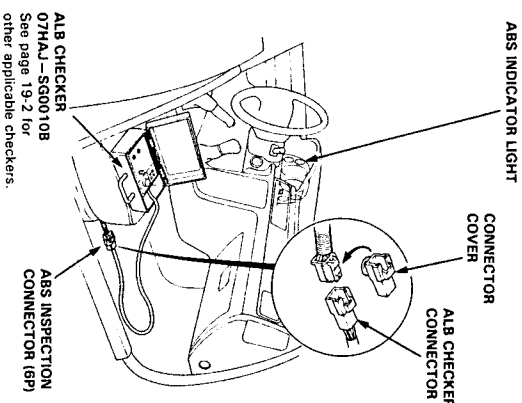
#### Inspection points:

- The ABS indicator light comes ON.
  - Check the Diagnostic Trouble Code (DTC) and go to the troubleshooting, see page 19-49.
- There is little or no kickback in modes 2 through 5 and the ABS indicator light does not come ON.
  - Air in the high pressure line.
  - Restricted high pressure line.
  - Faulty modulator unit.

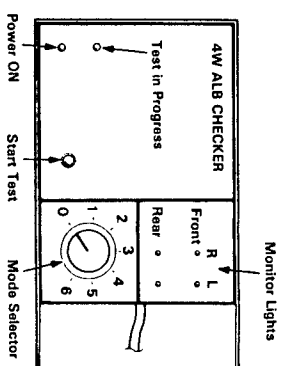
## Wheel Sensor Signal Confirmation

NOTE: Use the ALB checker (mode "0") to confirm proper wheel sensor operation.

- Disconnect the ABS inspection connector (6P) from the connector cover located on the cross-member under the passenger's seat and connect the ABS inspection connector (6P) to the ALB checker.



- Raise the car so that all four wheels are off the ground and support on safety stands.
- Turn the ignition switch ON.
- Turn the Mode Selector switch to "0".



- With the transmission in neutral, rotate each wheel briskly (one revolution per second) by hand, and confirm that its respective monitor light on the checker blinks as the wheel rotates.

#### NOTE:

- Rotating a wheel too slowly will produce only a weak blink of its monitor light that may be difficult to see.
- In bright sunlight, the monitor light may be difficult to see. Perform tests in a shaded area.
- In some instances, it may not be possible to spin the front wheels fast enough to get a monitor indication. If necessary, start the engine and slowly accelerate and decelerate the front wheels; the monitor lights should blink, indicating a good wheel sensor signal.

If any monitor light fails to blink, check the suspected sensor, its air gap and its wiring/connectors.





# Troubleshooting

## Anti-lock Brake System (ABS) Indicator Light

### ABS Indicator Light Circuit:

**CAUTION:** Use only the digital multimeter to check the system.

1. The ABS indicator light does not go on when the ignition switch is turned on.

Check the following items. If they are OK, check the ABS control unit connectors. If not loose or disconnected, substitute a known-good ABS control unit and recheck:

- Blown ABS indicator light bulb.
- Open circuit in YEL wire between the No. 1 BUCK-UP LIGHTS (10 A) fuse in the under-dash fuse/relay box and gauge assembly.
- Open circuit in BLU/RED wire between gauge assembly and ABS control unit.
- Poor ground connection between the ABS control unit to the body.

2. The ABS indicator light remains ON after the engine is started, however the ABS indicator light does not blink any DTC. Check the following items:

- Loose or poor connection of the wire harness at the ABS control unit.
- Faulty ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box.
- Open circuit in WHT wire between ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box and ABS control unit.
- Open circuit in BLK/YEL wire between the No. 7 HEATER CONTROL RELAY (7.5 A) fuse in the under-dash fuse/relay box and ABS control unit.
- Short circuit in BLU/RED wire between gauge assembly and ABS control unit.
- Open circuit in WHT/BLU wire between after-nator and ABS control unit.

If the problem is not found, substitute a known-good ABS control unit and recheck whether the ABS indicator light remains ON.

### Temporary Driving Conditions:

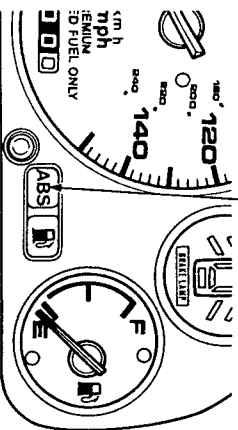
1. The ABS indicator light comes on and the ABS control unit memorizes the Diagnostic Trouble Code (DTC) under certain conditions.

**NOTE:** The DTCs are explained on page 19-50.

- The tire(s) adhesion is lost due to excessive cornering speed.  
DTCs: 5, 5-4, 5-8.
- The vehicle loses traction when starting from a stuck condition on a muddy, snowy, or sandy road.  
DTCs: 4-1, 4-2, 4-4, 4-8.
- When the parking brake is applied for more than 30 seconds while the vehicle is being driven.  
DTC: 2-1.
- The vehicle is driven on an extremely rough road.

The ABS is OK, if the ABS indicator light goes off after the engine is restarted.

### ABS INDICATOR LIGHT



2. If you receive a customer's report that the ABS indicator light sometimes comes on, check the system using the ALB checker to confirm whether there is any trouble in the system.  
See page 19-45.

3. The ABS indicator light will come on and the ABS control unit will memorize a DTC when there is insufficient battery voltage to the ABS control unit. An example would be when the battery is so weak that the car must be jump started. After the battery is sufficiently recharged, the ABS indicator light will work normally after the engine is stopped and restarted.

However, after recharging the battery, the DTC must be cleared from the ABS control unit's memory by disconnecting the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box for at least three seconds.

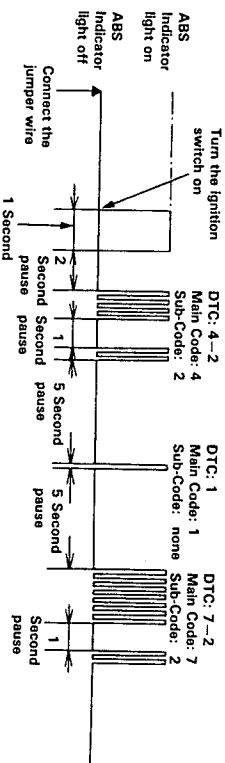
### Diagnostic Trouble Codes (DTCs):

1. Disconnect the service check connector from the connector cover located under the glove box.
2. Connect the two terminals of the service check connector with a jumper wire.
3. Turn the ignition switch ON, but do not start the engine.
3. Record the blinking frequency of the ABS indicator light.

The blinking frequency indicates the Diagnostic Trouble Code (DTC).

**CAUTION:** Before starting the engine, disconnect the jumper wire from the service check connector, or else the Malfunction Indicator Lamp (MIL) will stay on with the engine running.

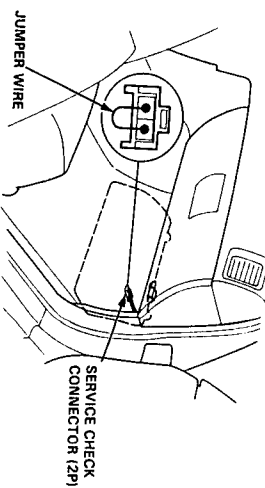
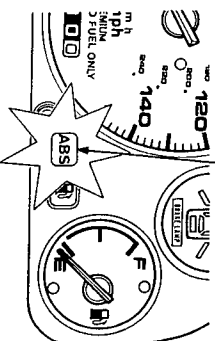
### DTC indication pattern



### NOTE:

- The ABS control unit can indicate three DTCs (one, two or three problems).
- If the ABS indicator light does not light, see Troubleshooting of ABS Indicator Light Circuit page 19-48.
- If you miscount the blinking frequency, turn the ignition switch off then on to cycle the ABS indicator light again.
- After the repair is completed, disconnect the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box for at least three seconds to erase the ABS control unit's memory. Then turn the ignition key on again and recheck.
- The memory is erased if the connector is disconnected from the ABS control unit or the ABS control unit is removed from the body.
- After recording the main and sub-code (if applicable), refer to the Symptom-to-System Chart.

### ABS INDICATOR LIGHT



# Troubleshooting

## Symptom-to-System Chart

DIAGNOSTIC TROUBLE CODE (DTC)		PROBLEMATIC COMPONENT/ SYSTEM	AFFECTED					PAGE	OTHER COMPONENT	PAGE
MAIN CODE	SUB CODE		FRONT RIGHT	FRONT LEFT	REAR RIGHT	REAR LEFT				
	—	ABS pump motor over-run	—	—	—	—	—	19-51	Solenoid ABS pump motor Pressure switch	
	②	ABS pump motor circuit problem	—	—	—	—	—	19-53	ABS motor relay ABS unit fuse ABS motor fuse	19-78
	③	High pressure leakage	—	—	—	—	—	19-56	Solenoid(s)	
	④	Pressure switch	—	—	—	—	—	19-57		
	⑥	Accumulator gas leakage	—	—	—	—	—	19-58		
	①	Parking brake switch-related problem	—	—	—	—	—	19-58	Brake fluid level switch Brake system light	
①	①	Pulser(s)	○					19-81	Wheel sensor installation	
	②			○	○					
④	①	Wheel sensor	○					19-59		
	②			○	○					
③	—	Wheel sensor(s)			○	○		19-61	Modulator unit Rear brake drag	
	④					○				
⑥	—	Fail-safe relay	○			○		19-63		19-80 (Function Test)
	①			○			○			
⑦	②	Solenoid related problem		○				19-67	ABS B3 (15 A) fuse ABS B1 (15 A) fuse Front fail-safe relay Rear fail-safe relay	
	④									

## Flowcharts

Diagnostic Trouble Code (DTC) 1: ABS Pump Motor Over-run (20 seconds)

CAUTION: Use only the digital multimeter to check the system.

Pre-test step:

- Check for fluid leaks from the functional parts and replace the faulty parts if there is a leak.

Functional parts:

- Modulator unit
- ABS Pump assembly
- High pressure hose/pipe

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 1 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (see page 19-73).

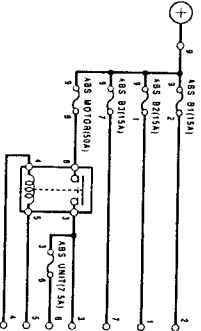
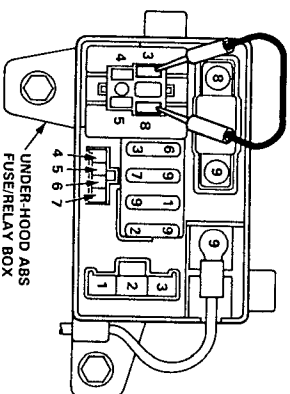
Remove the ABS pump motor relay.

Connect the No. 3 and 8 terminals using a jumper wire for about eight seconds.

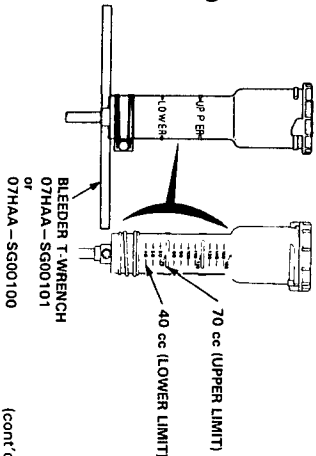
Does the ABS pump motor run with an increasingly loud, raspy sound?  
YES  
NO  
Pump runs with a constant soft sound:  
Bleed air from anti-lock brake system using the procedure on page 19-73 and check the pump sound again.

Check the accumulator fluid quantity by bleeding the high pressure line with the Bleeder T-wrench.

Is there 40–70 cc?  
YES  
NO (To page 19-52)



UNDER-HOOD ABS FUSE/RELAY BOX CIRCUIT DIAGRAM



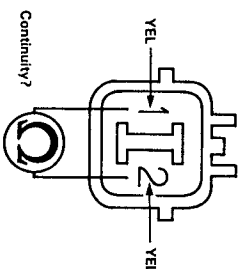
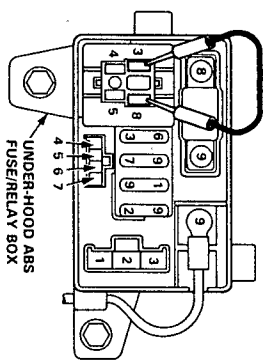
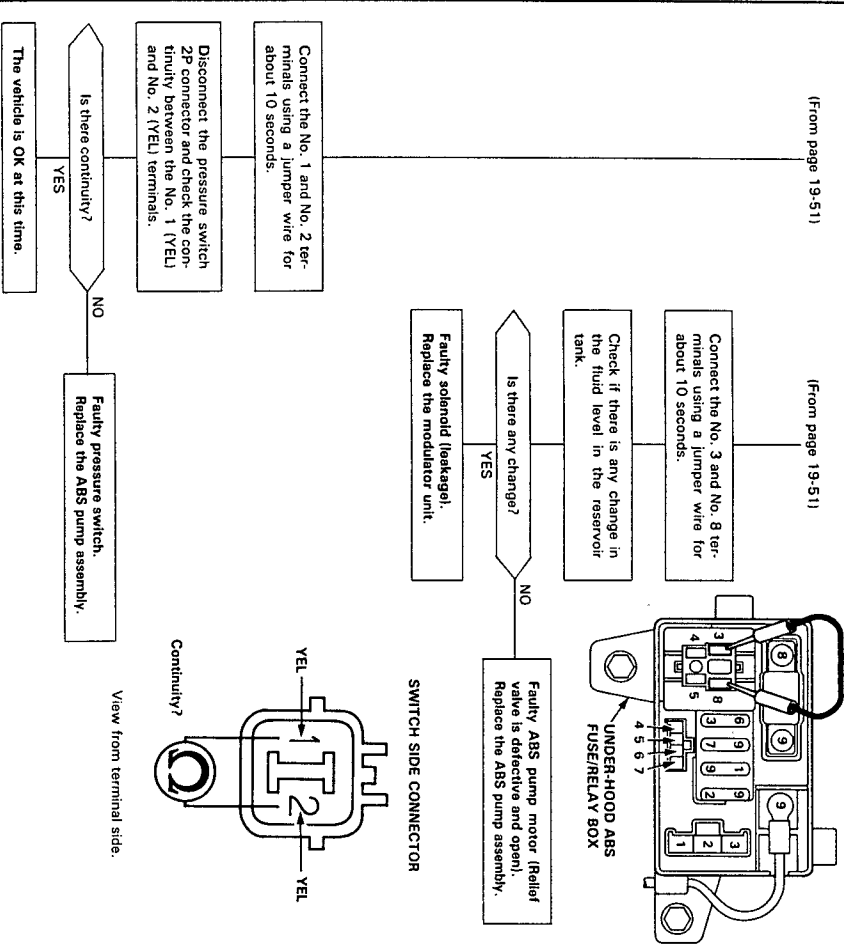
(To page 19-52)

(cont'd)



# Troubleshooting

## Flowcharts (cont'd)



### Diagnostic Trouble Code (DTC) 1-2: ABS Pump Motor Circuit Problem

**CAUTION:** Use only the digital multimeter to check the system.

**NOTE:** If a malfunction is detected, this code appears and the fail-safe function is activated. The ABS indicator light comes ON after restarting the engine until the DTC is erased (by disconnecting the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box for three seconds).

#### Pre-test steps:

- Check ABS MOTOR (50 A) fuse in the under-hood ABS fuse/relay box.
- Check No. 7 HEATER CONTROL RELAY (7.5 A) fuse in the under-dash fuse/relay box.
- Check ABS UNIT (7.5 A) fuse in the under-hood ABS fuse/relay box.
- Check for loose under-hood ABS fuse/relay box connectors.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 1-2 is indicated.

Check the ABS pump motor relay (see page 19-80).

Does it work properly?

YES

Replace the ABS pump motor relay.

NO

Connect the No. 3 and No. 8 terminals using a jumper wire.

Does the ABS pump motor run?

YES

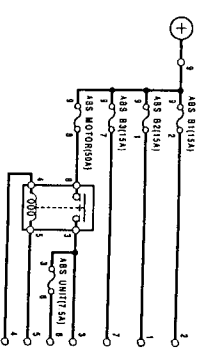
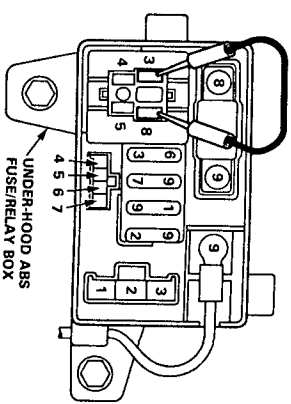
(To page 19-55)

NO

Disconnect the jumper wire.

Remove the ABS UNIT (7.5 A) fuse in the under-hood ABS fuse/relay box.

Turn the ignition switch ON.



UNDER-HOOD ABS FUSE/RELAY BOX CIRCUIT DIAGRAM

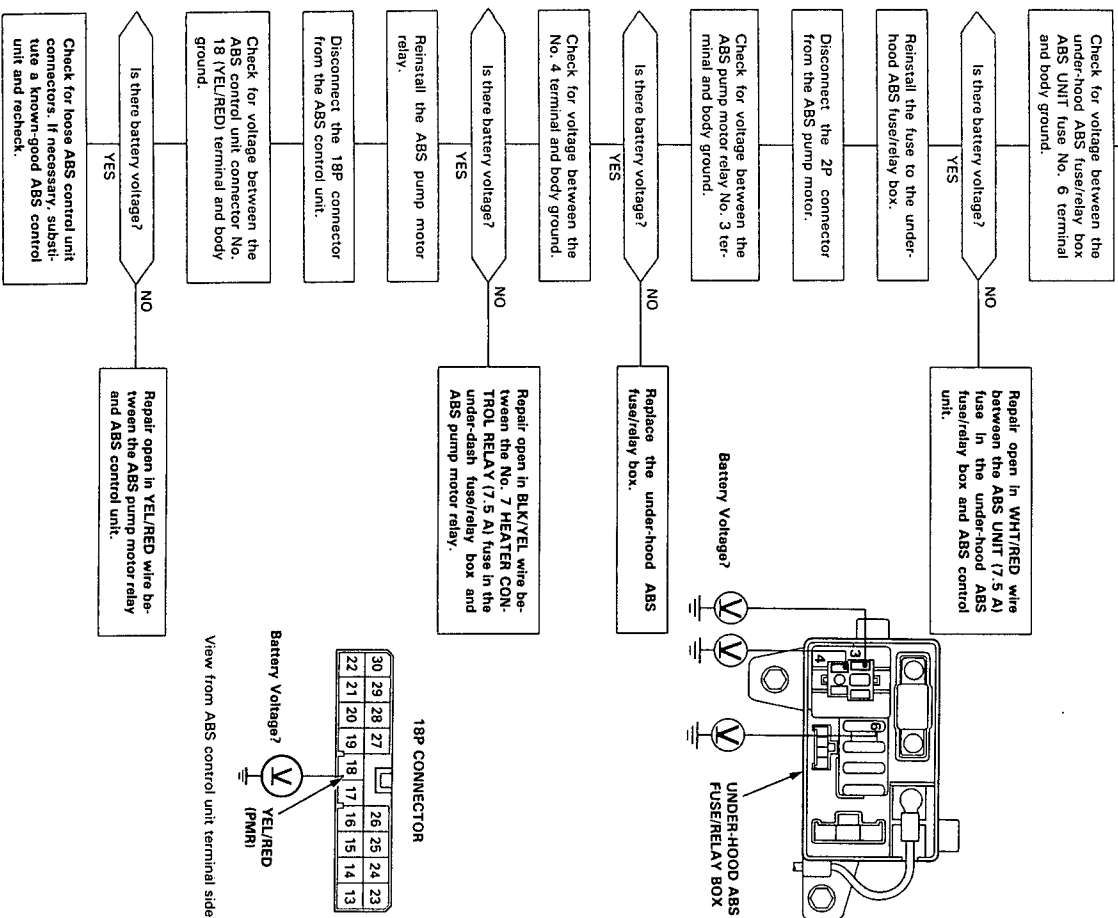
(To page 19-54)

(cont'd)

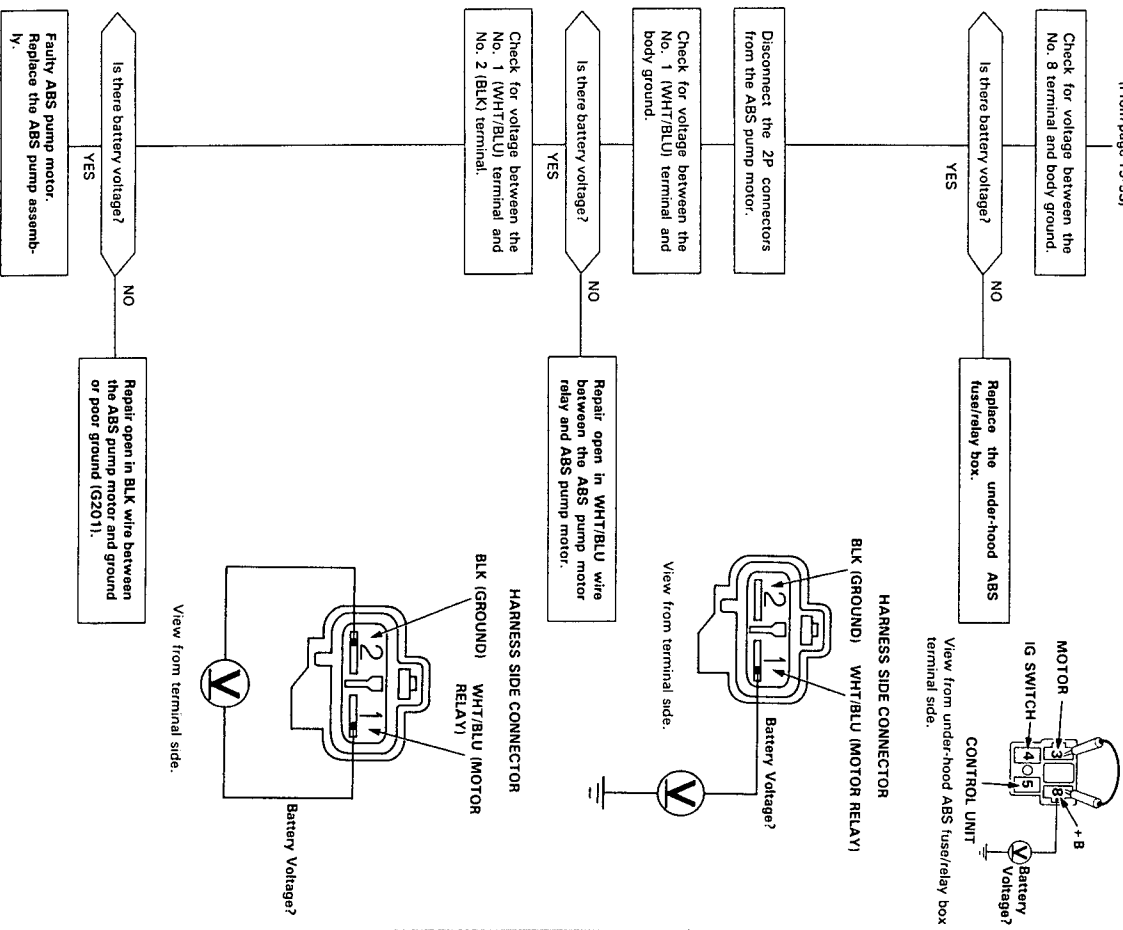
# Troubleshooting

## Flowcharts (cont'd)

(From page 19-53)



(From page 19-53)



# Troubleshooting

## Flowcharts (cont'd)

### Diagnostic Trouble Code (DTC) 1-3: High Pressure Leakage

**CAUTION:** Use only the digital multimeter to check the system.

#### Pre-test steps:

- Check reservoir fluid level, and if necessary, fill to the MAX level line.
- Check for fluid leaks from the functional parts and replace the faulty parts if there is a leak.

#### Functional parts:

- Modulator unit
- ABS Pump assembly
- High pressure hose/pipe

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 1-3 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (see page 19-71).

Remove the ABS pump motor relay.

Connect the No. 3 and No. 8 terminals using a jumper wire for about 10 seconds.

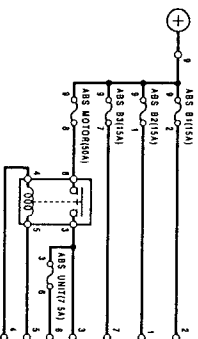
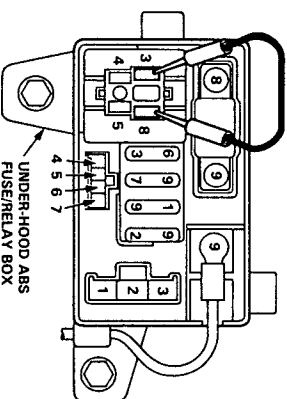
Disconnect the 2P connector from the pressure switch.

After 30 minutes, check for continuity between the No. 1 (YEL) and No. 2 (YEL) terminals on the switch side of connector.

Is there continuity?  
NO  
YES

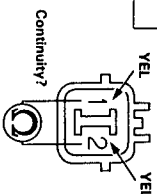
The vehicle is OK at this time.

Faulty solenoid (leakage).  
Replace the modulator unit.



UNDER-HOOD ABS FUSE/RELAY BOX CIRCUIT DIAGRAM

#### SWITCH SIDE CONNECTOR



Continuity?  
View from terminal side.

### Diagnostic Trouble Code (DTC) 1-4: Pressure Switch Circuit

**CAUTION:** Use only the digital multimeter to check the system.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 1-4 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (see page 19-72).

Disconnect the 2P connector from the pressure switch.

Check the continuity of pressure switch between the No. 1 (YEL) and No. 2 (YEL) terminals.

Is there continuity?  
NO  
YES

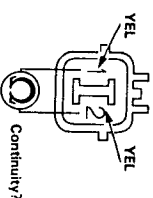
Faulty the pressure switch (closed).  
Replace the ABS pump assembly.

Check for continuity between the No. 1 (YEL) terminal and body ground on the harness side connector.

Is there continuity?  
NO  
YES

Repair short in YEL wire between the ABS control unit and pressure switch.

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.

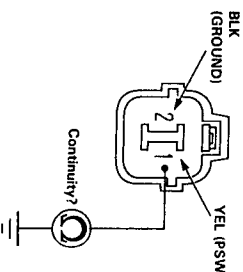


Continuity?

#### SWITCH SIDE CONNECTOR

View from terminal side.

#### HARNESS SIDE CONNECTOR



Continuity?  
View from terminal side.



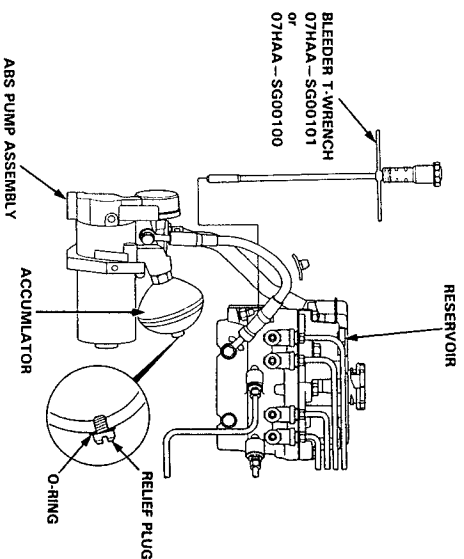
# Troubleshooting

## Flowcharts (cont'd)

### Diagnostic Trouble Code (DTC) 1-8: Accumulator Gas Leakage

#### Check the following items:

- The relief plug O-ring is loose.
- The relief plug O-ring is out of place.
- Bleed the high pressure line with the Bleeder T-wrench. Operate the ABS pump motor for 10 seconds and bleed the high pressure line again with the Bleeder T-wrench. If no fluid or more than 70 cc of fluid come out, replace the ABS pump assembly.



### Diagnostic Trouble Code (DTC) 2-1: Parking Brake Switch Related Problem

If the parking brake has been released, the following items are possible causes. If they are OK, check the ABS control unit connectors for good connection. If not loose or disconnected, substitute a known-good ABS control unit and recheck.

**NOTE:** Before troubleshooting DTC 2-1, remove the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box for three seconds to clear the ABS control unit's memory, then test drive the car.

If the ABS indicator light stays off, the probability is that the car was driven with the parking brake applied.

- The parking brake is applied for more than 30 seconds while driving.
- The brake fluid level in the master cylinder is too low.
- GRN/RED wire is shorted between the brake system light and parking brake switch.
- GRN/RED wire is shorted between the brake system light and brake fluid level switch.
- The brake system light bulb is blown.
- GRN/RED has an open between the brake system light and ABS control unit.

### Diagnostic Trouble Codes (DTCs) 4-1 to 4-8: Wheel Sensor(s)

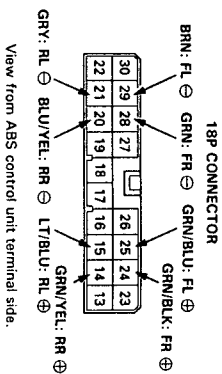
#### CAUTION: Use only the digital multimeter to check the system.

**NOTE:** If a malfunction is detected, this code appears and the fail-safe function is activated. The ABS indicator light may come ON after restarting the engine until the DTC is erased (by disconnecting the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay box for three seconds).

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTCs 4-1, 4-2, 4-4 and/or 4-8 are indicated.

Disconnect the 18P connector from the ABS control unit.

Check the resistance of each sensor between the positive and negative:  
• GRN/BLK: Front Right Positive  
• GRN: Front Right Negative  
• GRN/BLU: Front Left Positive  
• BRN: Front Left Negative  
• GRN/YEL: Rear Right Positive  
• BLU/YEL: Rear Right Negative  
• LT BLU: Rear Left Positive  
• GRV: Rear Left Negative

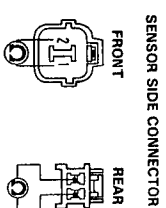


Is there Front: 750–1200 Ω, Rear: 1100–1600 Ω?  
YES: Check each wire for continuity to ground.  
NO: Disconnect the 2P connector of the wheel sensor.

Check for resistance between the sensor terminals.

Is there Front: 750–1200 Ω, Rear: 1100–1600 Ω?  
YES: (To page 19-60)  
NO: Replace the wheel sensor.

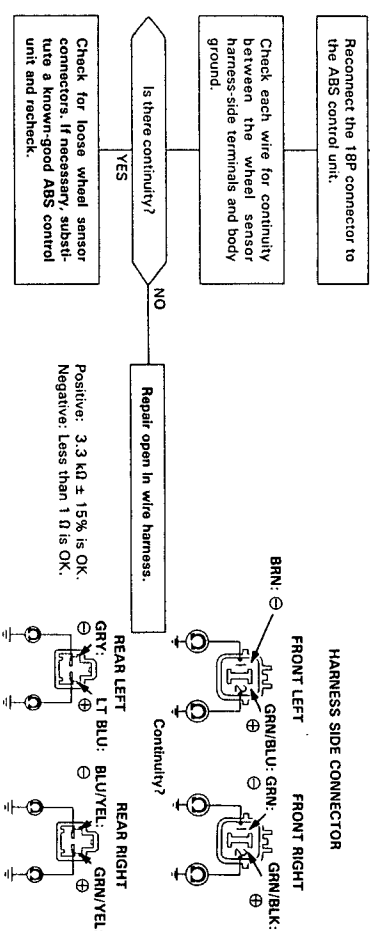
Is there continuity?  
YES: Repair short in sensor wire or Replace the wheel sensor.  
NO: Check for loose ABS control unit connectors. Check that the sensor is installed properly. If necessary, substitute a known-good ABS control unit and recheck.



# Troubleshooting

## Flowcharts (cont'd)

(From page 19-59)



### Diagnostic Trouble Codes (DTCs) 5 to 5-8: Wheel Sensor(s)

**CAUTION:** Use only the digital multimeter to check the system.

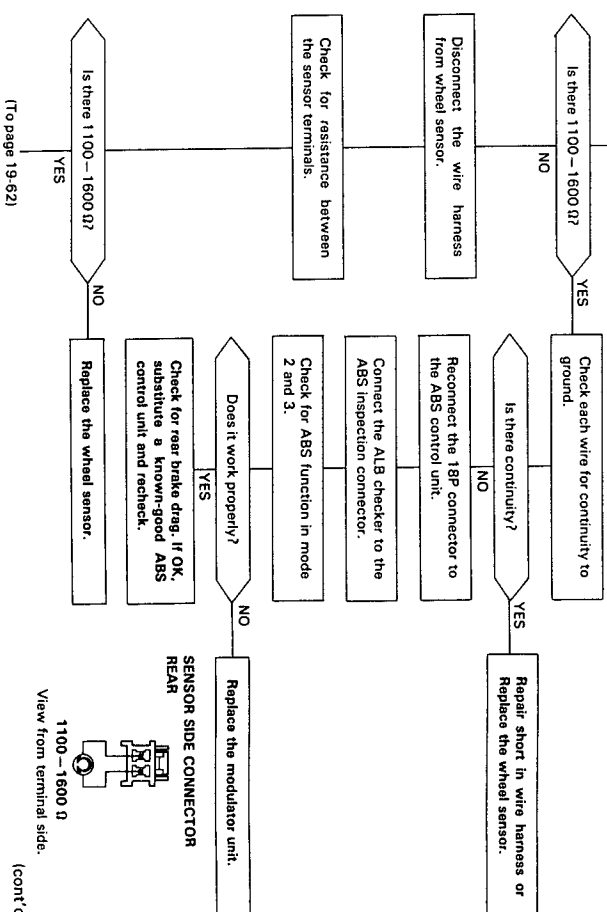
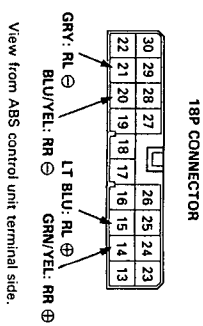
**NOTE:** If a malfunction is detected, this code appears and the fail-safe function is activated. The ABS indicator light may come ON after restarting the engine until the DTC is erased (by disconnecting the ABS B2 (15 A) fuse in the under-hood ABS fuse/relay for three seconds.)

- With engine running, ABS indicator light is ON.
- With service check connector jumped (see page 19-49), DTCs 5, 5-4 or 5-8 are indicated.

Disconnect the 18P connector from the ABS control unit.

Check the resistance of each sensor between the positive and negative:

- GRN/YEL: Rear Right Positive
- BLU/YEL: Rear Right Negative
- LT BLU: Rear Left Positive
- GRY: Rear Left Negative



# Troubleshooting

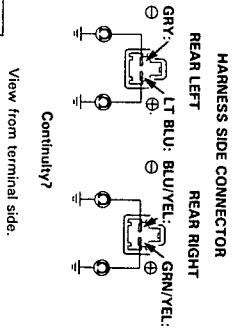
## Flowcharts (cont'd)

(From page 19-61)

Reconnect the 18P connector to the ABS control unit.

Check each wire for continuity between the wheel sensor harness side terminals and body ground.

Is there continuity?  
YES  
Check for loose wheel sensor connectors. If necessary, substitute a known-good ABS control unit and recheck.  
NO  
Repair open in wire harness.



### Diagnostic Trouble Code (DTC) 6-1: Front Fail-Safe Relay Circuit

**CAUTION:** Use only the digital multimeter to check the system.

#### Pre-test steps:

- Check ABS B1 (15 A) fuse and ABS B3 (15 A) fuse in the under-hood ABS fuse/relay box.
- Check for loose under-hood ABS fuse/relay box connectors.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 6-1 is indicated.

Remove the front fail-safe relay.

Check relay function (page 19-80).

Does it work properly?  
YES  
Turn the ignition switch ON.  
NO  
Replace the front fail-safe relay.

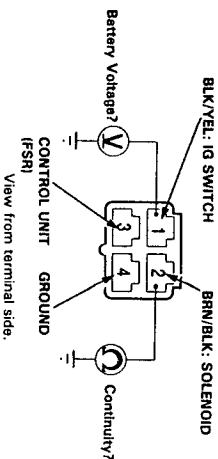
Check for voltage between the front fail-safe relay No. 1 (BLK/YEL) terminal and body ground.

Is there battery voltage?  
YES  
Turn the ignition switch OFF.  
NO  
Repair open in BLK/YEL wire between the No. 7 HEATER CONTROL RELAY (7.5 A) fuse in the under-dash fuse/relay box and front fail-safe relay.

Disconnect the 10P connector from the solenoid.

Check for continuity between the front fail-safe relay No. 2 (BRN/BLK) terminal and body ground.

Is there continuity?  
YES  
Repair short in BRN/BLK wire between the solenoid and front fail-safe relay.  
NO  
Remove the rear fail-safe relay.



(To page 19-64)

(cont'd)





# Troubleshooting

## Flowcharts (cont'd)

(From page 19-63)

Check each wire for continuity between the solenoid terminals and body ground.  
No. 4 (BRN/BLK): Front Right  
No. 6 (BRN/BLU): Front Left

Is there continuity?

YES  
Faulty solenoid (short).  
Replace the modulator unit.

Disconnect the 18P and 12P connector from the ABS control unit.

Check each wire for continuity between the ABS control unit and body ground.  
No. 8 (RED/BLK): Front Right  
No. 1 (YEL/BLK): Front Right  
No. 10 (RED/BLU): Front Left  
No. 3 (YEL/BLU): Front Left  
Inlet  
Outlet

Is there continuity?

YES  
Repair short in wire between the solenoid and ABS control unit:  
YEL/BLK: Front Right Inlet  
YEL/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Check for continuity between the No. 17 (YEL/GRN) terminal and body ground.

Is there continuity?

YES  
Repair short in YEL/GRN wire between the ABS control unit and front fail-safe relay.

Reinstall the front fail-safe relay.

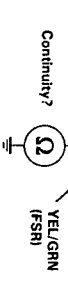
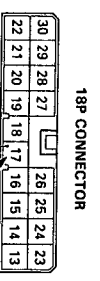
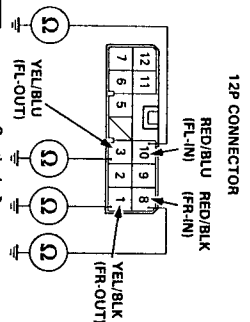
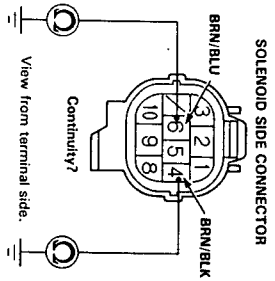
Turn the ignition switch ON.

Check for voltage between the ABS control unit connector No. 17 (YEL/GRN) terminal and body ground.

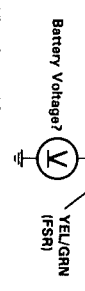
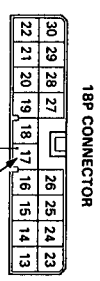
Is there battery voltage?

YES  
Repair open in YEL/GRN wire between the front fail-safe relay and ABS control unit.

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.



View from ABS control unit terminal side.



View from ABS control unit terminal side.

Diagnostic Trouble Code (DTC) 6-4: Rear Fail-Safe Relay Circuit  
CAUTION: Use only digital multimeter to check the system.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 6-4 is indicated.

Remove the rear fail-safe relay.

Check relay function (page 19-80).

Does it work properly?  
YES  
Replace the rear fail-safe relay.

Turn the ignition switch ON.

Check for voltage between the fail-safe relay No. 1 (BLK/YEL) terminal and body ground.

Is there battery voltage?

NO  
Repair open in BLK/YEL wire between the No. 7 HEATER CONTROL RELAY (7.5 A) fuse in the under-dash fuse/relay box and front fail-safe relay.

Turn the ignition switch OFF.

Disconnect the 10P connector from the solenoid.

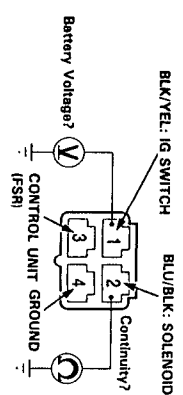
Check for continuity between the fail-safe relay No. 2 (BLU/BLK) terminal and body ground.

Is there continuity?

YES  
Repair short in BLU/BLK wire between the solenoid and rear fail-safe relay.

Remove the front fail-safe relay.

(To page 19-66)



View from terminal side.

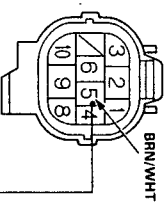
(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

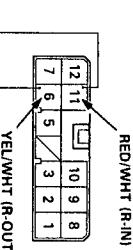
(From page 19-65)

SOLENOID SIDE CONNECTOR



View from terminal side.

12P CONNECTOR



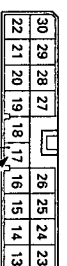
View from ABS control unit terminal side.

18P CONNECTOR



View from ABS control unit terminal side.

18P CONNECTOR



View from ABS control unit terminal side.



Diagnostic Trouble Code (DTC) 7-1 and 7-2: Front Solenoid Related Problem

CAUTION: Use only the digital multimeter to check the system.

Pre-test steps:

- Check ABS B1 (15 A) fuse in the under-hood ABS fuse/relay box.
- Check ABS B3 (15 A) fuse in the under-hood ABS fuse/relay box.
- Check for loose under-hood ABS fuse/relay box connectors.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTCs 7-1 and/or 7-2 are indicated.

Disconnect the 10P connector from the solenoids.

Check for resistance between the solenoid terminals:  
No. 1 (RED/BLK) and No. 4 (BRN/BLK): Front Right Inlet  
No. 3 (RED/BLU) and No. 6 (BRN/BLU): Front Left Inlet

Is there 1 – 3 Ω?  
YES: Faulty solenoid. Replace the modulator unit.

Check for resistance between the solenoid terminals:  
No. 8 (YEL/BLK) and No. 4 (BRN/BLK): Front Right Outlet  
No. 10 (YEL/BLU) and No. 6 (BRN/BLU): Front Left Outlet

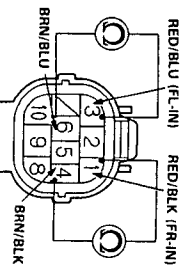
Is there 1 – 3 Ω?  
YES: Faulty solenoid. Replace the modulator unit.

Disconnect the 12P connector from ABS control unit.

Check each wire for continuity between the control unit and front solenoid:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

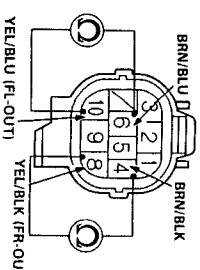
Is there continuity?  
YES: Repair open in wire between the solenoid and control unit:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet  
(To page 19-68)

SOLENOID SIDE CONNECTOR



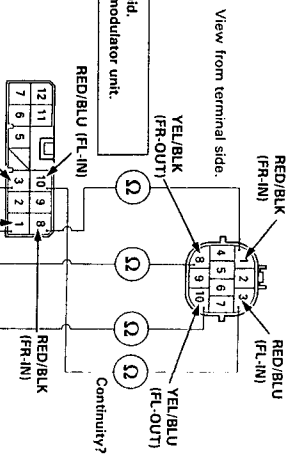
View from terminal side.

SOLENOID SIDE CONNECTOR



View from terminal side.

HAIRNESS SIDE CONNECTOR



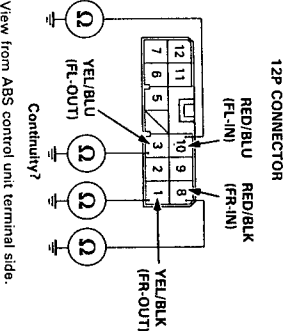
View from ABS control unit terminal side.

# Troubleshooting

## Flowcharts (cont'd)

(From page 19-67)

Check each wire for continuity between the ABS control unit and body ground:  
No. 8 (RED/BLK): Front Right Inlet  
No. 1 (YEL/BLK): Front Right Outlet  
No. 10 (RED/BLU): Front Left Inlet  
No. 3 (YEL/BLU): Front Left Outlet



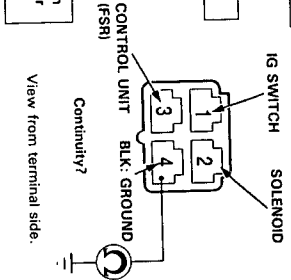
Is there continuity?  
NO  
Remove the front fail-safe relay.  
Check for relay function (page 19-80).

Repair short in wire between the solenoid and ABS control unit:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Does it work properly?  
YES  
Replace the front fail-safe relay.

Check for continuity between the No. 4 (BLK) terminal and body ground.

Is there continuity?  
YES  
Check BRN/BLK wire for continuity between the solenoids and front fail-safe relay.

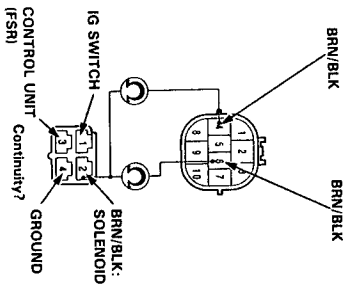


View from terminal side.

Repair open in BLK wire between the fail-safe relay and ground or poor ground (G401, G402).

Is there continuity?  
NO  
Repair open in BRN/BLK wire between the solenoids and front fail-safe relay.

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.



View from terminal side.

12P CONNECTOR

## Diagnostic Trouble Code (DTC) 7-4: Rear Solenoid Problem

CAUTION: Use only the digital multimeter to check the system.

— With engine running, ABS indicator light is ON.  
— With service check connector jumped (see page 19-49), DTC 7-4 is indicated.

Disconnect the 10P connector from the solenoids.

Check for resistance between the solenoid terminals:  
No. 2 (RED/WHT): Rear Inlet  
No. 5 (BRN/WHT): Rear Inlet  
No. 3 (YEL/WHT): Rear Outlet  
No. 1 (RED/WHT): Rear Outlet

Is there 1 – 3  $\Omega$ ?  
YES  
Faulty solenoid. Replace the modulator unit.

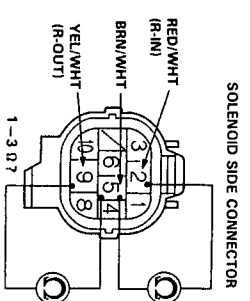
Disconnect the 12P connector from ABS control unit.

Check each wire for continuity between the ABS control unit and rear solenoid:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

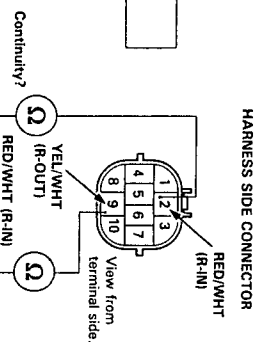
Is there continuity?  
YES  
Repair open in wire between the solenoid and ABS control unit:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

Check each wire for continuity between the ABS control unit and body ground:  
No. 11 (RED/WHT): Rear Inlet  
No. 6 (YEL/WHT): Rear Outlet

Is there continuity?  
YES  
Repair short in wire between the solenoid and ABS control unit:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

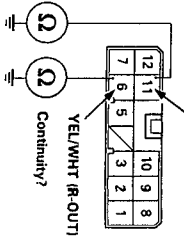


View from terminal side.



View from ABS control unit terminal side.

12P CONNECTOR



View from ABS control unit terminal side.

(To page 19-70)

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

(From page 19-69)

Remove the rear fail-safe relay.

Check for relay function (page 19-80).

Does it work properly?

YES

Check for continuity between the No.4 (BLK) terminal and body ground.

Is there continuity?

YES

Check BLU/BLK wire for continuity between the solenoid and rear fail-safe relay.

Is there continuity?

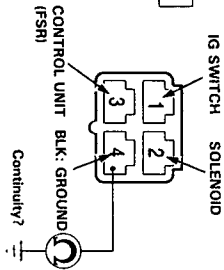
YES

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.

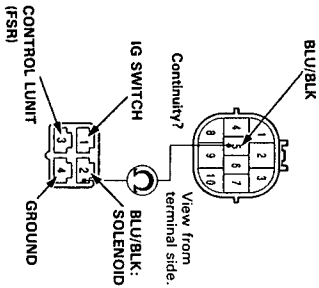
Replace the rear fail-safe relay.

Repair open in BLK wire between the fail-safe relay and ground or poor ground (G401, G402).

Repair open in BLU/BLK wire between the solenoid and rear fail-safe relay.



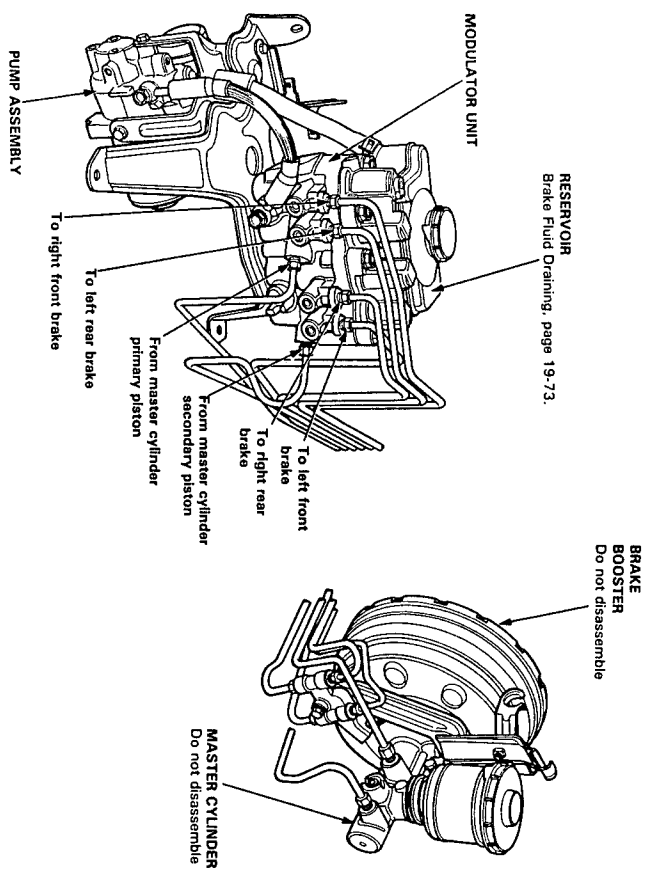
HARNESS SIDE CONNECTOR



# Hydraulic System

## Index/Hydraulic Connections

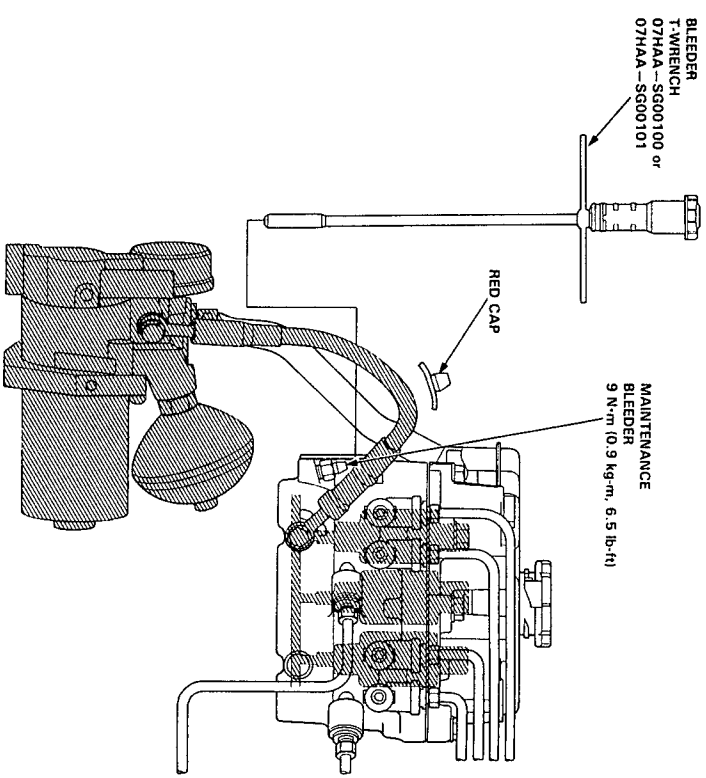
**CAUTION:** Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.



## Relieving Accumulator/Line Pressure

**WARNING** Use the Bleeder T-wrench before disassembling the parts shaded in the illustration.

1. Open the hood.
2. Remove the red cap from the bleeder on the modulator body.
3. Install the special tool on the bleeder screw and turn it out slowly 90° to collect high-pressure fluid into the reservoir. Turn the special tool out one complete turn to drain the brake fluid thoroughly.
4. Retighten the bleeder screw and discard the fluid.
5. Reinstall the red cap.



## Reservoir Brake Fluid Draining

1. Draining brake fluid from modulator tank:  
The brake fluid may be sucked out through the top of the modulator tank with a syringe. It may also be drained through the pump joint after disconnecting the pump hose.

2. Draining brake fluid from master cylinder:  
Loosen the bleed screw and pump the brake pedal to drain the brake fluid from the master cylinder.

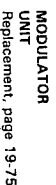
**WARNING**

- High-pressure fluid will squirt out if the shaded tube is removed or the modulator head 8 mm and 10 mm bolts are loosened.
- To drain high-pressure brake fluid, follow the procedure on this page.

### - Replacement

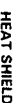
**CAUTION:**

- MODULATOR/PUMP ASSEMBLY

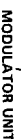


- CAUTION:**

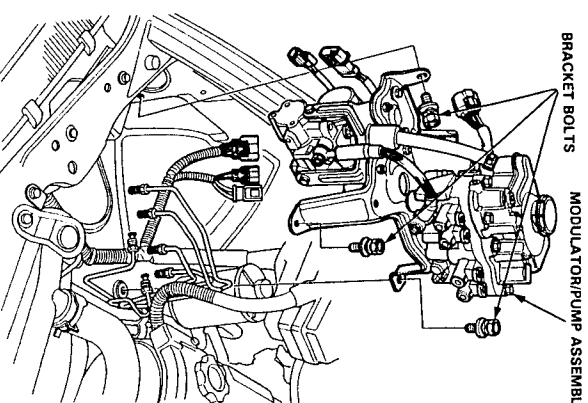
1. Drain the brake fluid from the modulator unit (see page 19-73).
2. Remove the heat shield.



- UNDER-HOOD  
FUSE/RELAY BOX



- MODULATOR/PUMP ASSEMBLY**



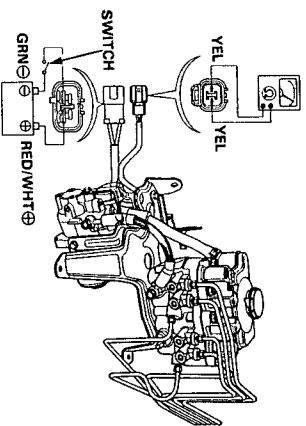
6. Install the modulator/pump assembly in the reverse order of removal.
7. Fill the modulator reservoir and bleed the modulator, accumulator/line high-pressure fluid from the maintenance bleeder with the special tool (see page 19-73).
8. Refill the modulator reservoir to the MAX level.

## Modulator Unit

### Solenoid Leak Test

**NOTE:** If a solenoid leaks excessively, the brake fluid level in the modulator reservoir will rise when operating the pump motor. The modulator reservoir may also overflow.

1. Connect an ohmmeter between the YEL and YEL terminals of the accumulator pressure switch connector.
2. Attach the positive (+) lead of a fully charged 12 V battery to the RED/WHI terminal of the pump motor connector and negative (-) lead to the GRN terminal, and install a switch between as shown.
3. Turn the switch on to allow sufficient pressure to build up within the accumulator and check for continuity. If the ohmmeter shows continuity (pressure switch turned on), run the pump motor for 10 seconds more, then turn the switch off.



- Check if the solenoid hisses or squeaks. Replace the modulator unit if the solenoid hisses or squeaks.
- Check the pressure switch for continuity within 30 minutes. It is normal if there is continuity. If there is no continuity, a solenoid is faulty and the modulator unit must be replaced.

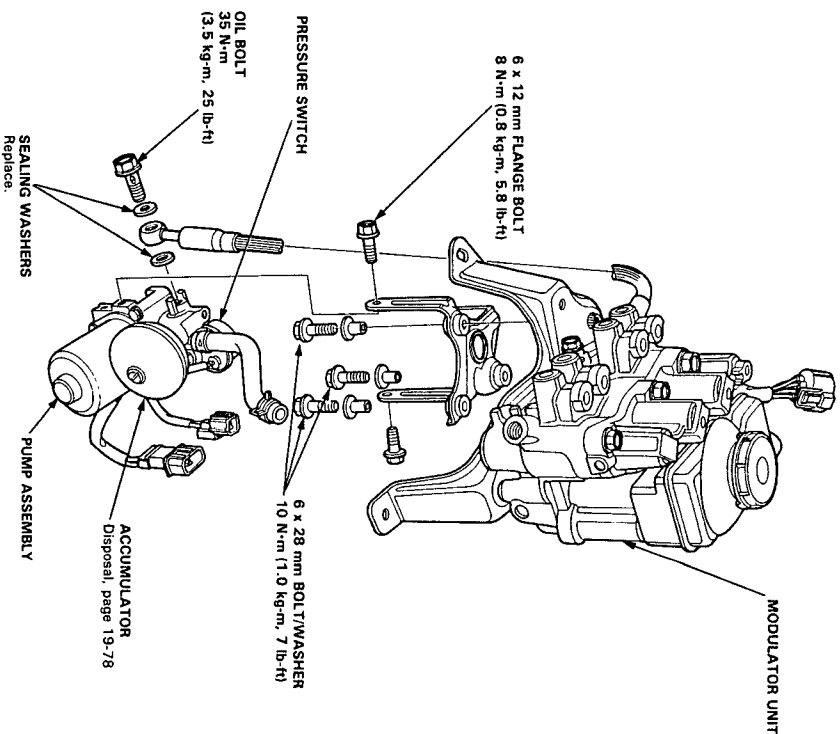
## Pump Assembly

### Index/Torque

**WARNING** Before removing the modulator-to-pump high-pressure line, be sure to relieve the fluid pressure from the maintenance bleeder (see page 19-73).

#### CAUTION:

- Be careful not to bend or damage the brake pipe when removing the pump assembly.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not try to disassemble the pump assembly. Replace the assembly with a new part if necessary.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

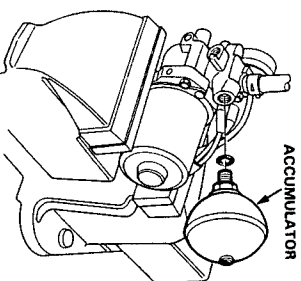


## Accumulator

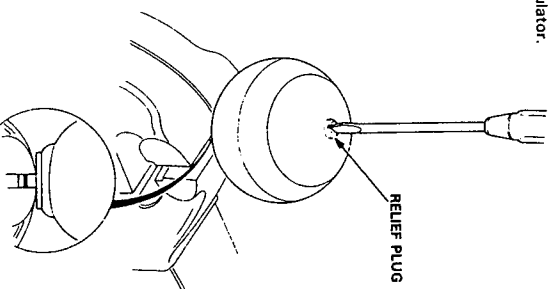
### Disposal

**WARNING** The accumulator contains high pressure nitrogen gas. Do not puncture, expose to the flame, or attempt to disassemble the accumulator or it may explode and severe personal injury may result.

1. Secure the pump assembly in a vise and remove the accumulator by turning it counterclockwise with a open-end wrench.



2. Secure the accumulator in a vise so that the relief plug points straight up.
3. Slowly turn the plug 3-1/2 turns and then wait three minutes for all pressure to escape.
4. Remove the plug completely and dispose of the accumulator.



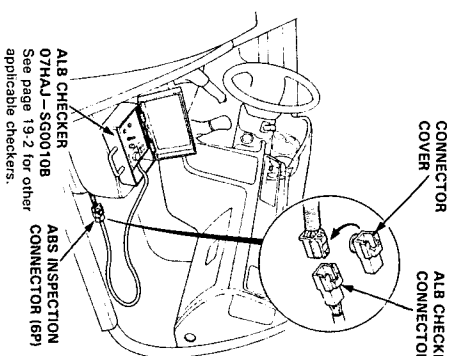
## Bleeding

### Air Bleeding with ALB Checker

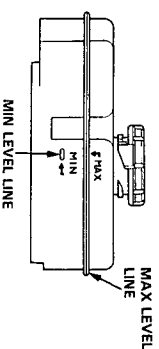
#### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint. If brake fluid does contact the paint, wash it off immediately with water.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

1. Place the vehicle on level ground with the wheels blocked. Put the transmission in neutral for manual transmission models, and in **P** position for automatic transmission models. Release the parking brake.
2. Disconnect the ABS inspection connector (6P) from the cross-member under the passenger's seat and connect the ABS inspection connector (6P) to the ALB checker.

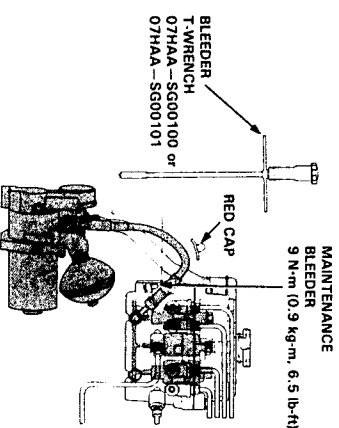


3. Fill the modulator reservoir to the MAX level line and install the reservoir cap.



4. Start the engine and allow it to idle for a few minutes, then stop it. Check the fluid level in the modulator reservoir and refill to the MAX level line if necessary.

5. Bleed high-pressure fluid from the maintenance bleeder with the special tool.



6. Start the engine and allow it to idle for a few minutes, then stop it. Check the fluid level in the modulator reservoir and refill to the MAX level line if necessary.

7. Turn the Mode Selector switch of the checker to 2.

8. While depressing the brake pedal firmly, push the Start Test switch to operate the modulator. There should be kickback on the brake pedal. If not, repeat steps 5 to 8.

**NOTE:** Continue to depress the brake pedal firmly when operating the checker.

9. Turn the Mode Selector to 3, 4, and 5. Perform step 8 for each of the test mode positions.

10. Refill the modulator reservoir to the MAX level line and install the reservoir cap.

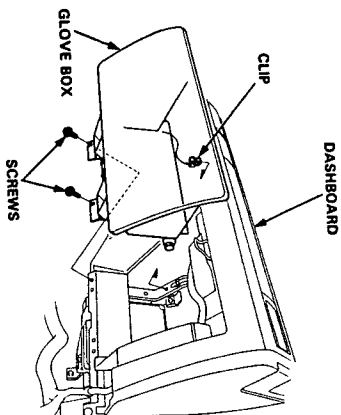
**WARNING** Disconnect the ALB Checker before driving the car. A collision can result from a reduction or complete loss of braking ability, causing severe personal injury or death.



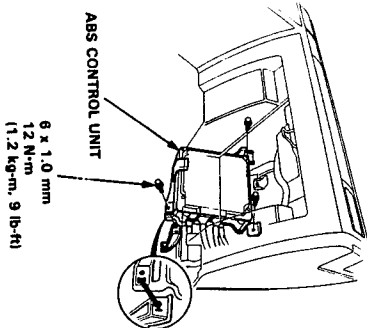
## Electronic Components

### ABS Control Unit Replacement

1. Remove the glove box.

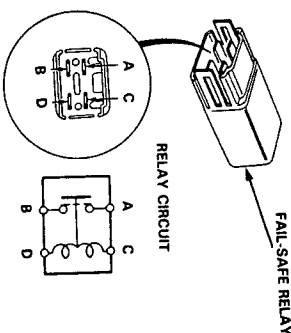


2. Remove the mounting bolts, then remove the ABS control unit.

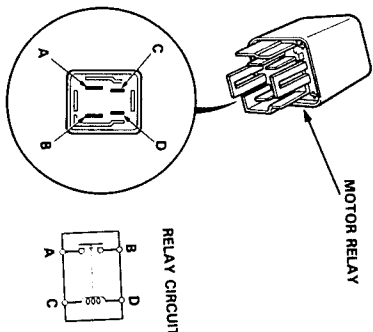


### Relay Inspection

1. Remove the fail-safe relay from the under-dash fuse/relay box (Location: see page 19-44).
2. Check for continuity between the terminals A and B. There should be no continuity.
3. Connect a 12 V battery across the terminals C and D. There should be continuity between the terminals A and B.



4. Remove the motor relay from the under-hood ABS fuse/relay box (Location: see page 19-44).
5. There should be continuity between the C and D terminals.
6. There should be continuity between the A and B terminals when the battery is connected to C and D terminals. There should be no continuity when the battery is disconnected.



## Pulsers/Wheel Sensors

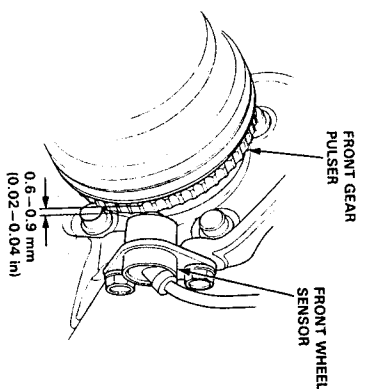
### Inspection

#### Front

1. Check the pulser for chipped or damaged teeth and replace if necessary.
2. Measure the air gap between the sensor and pulser all the way around while rotating the driveshaft by hand.

Standard: 0.6–0.9 mm (0.02–0.04 in)

NOTE: If the gap exceeds 0.9 mm (0.04 in) at any point, the probability is a distorted knuckle, which should be replaced.

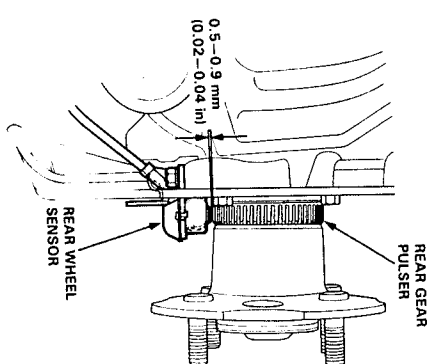


#### Rear

1. Remove the rear caliper assembly.
2. Remove the rear brake disc.
3. Check the rear pulser for chipped or damaged teeth and replace if necessary.
4. Measure the air gap between the sensor and pulser all the way around while rotating the hub bearing unit by hand.

Standard: 0.5–0.9 mm (0.02–0.04 in)

NOTE: If the gap exceeds 0.9 mm (0.04 in) at any point, the probability is a distorted knuckle, which should be replaced.



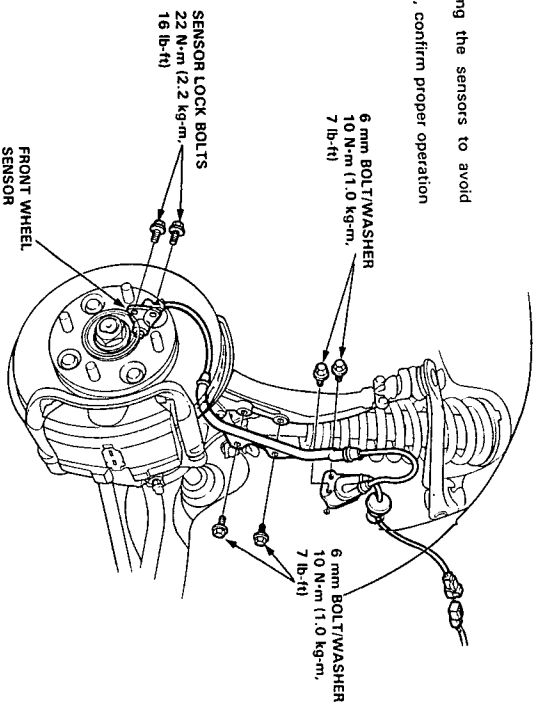
# Pulsers/Wheel Sensors

## Wheel Sensor Replacement

### Front

#### NOTE:

- Be careful when installing the sensors to avoid twisting the wires.
- After sensor replacement, confirm proper operation (see page 19.47).



### Rear

#### NOTE:

- Be careful when installing the sensors to avoid twisting the wires.
- After sensor replacement, confirm proper operation (see page 19.47).

