2001-02 BRAKES

Anti-Lock - MDX

DESCRIPTION & OPERATION

When the brake pedal is pressed during driving, the wheels can lock before the vehicle comes to a stop. In such an event, the maneuverability of the vehicle is reduced if the front wheels are locked, and the stability of the vehicle is reduced if the rear wheels are locked, creating an extremely unstable condition. The ABS precisely controls the slip rate of the wheels to ensure maximum grip force from the tires, thereby ensures maneuverability and stability of the vehicle. The ABS calculates the slip rate of the wheels based on the vehicle speed and the wheel speed, then it controls the brake fluid pressure to reach the target slip rate. See **Fig. 1** .

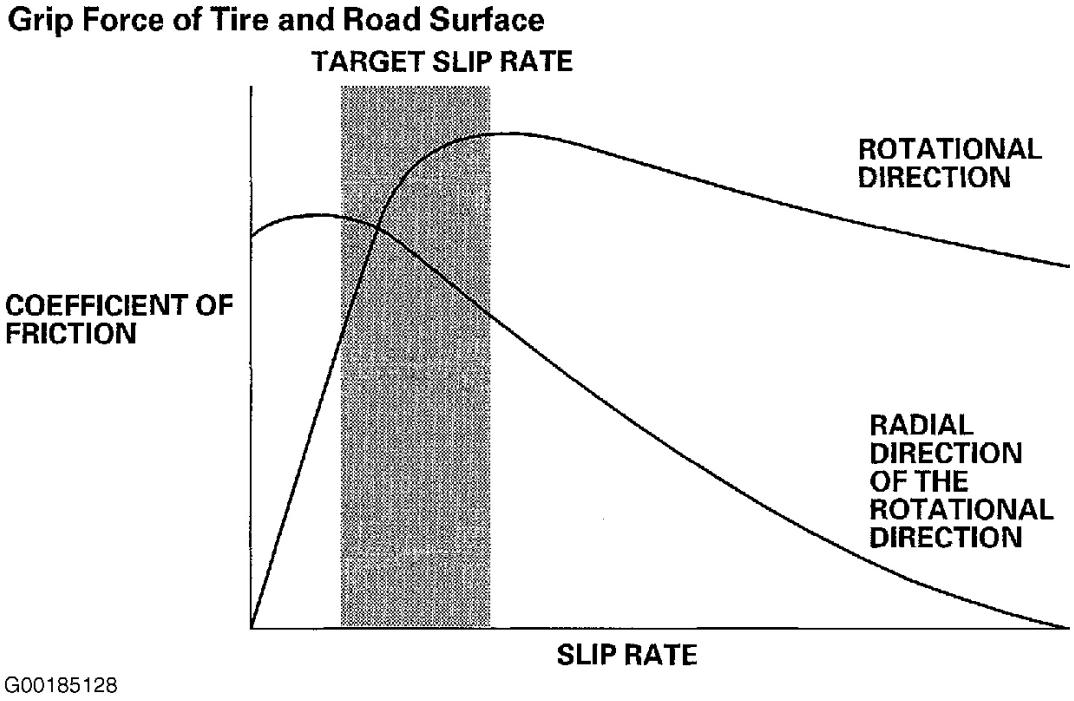


Fig. 1: Grip Force Of Tire & Road Surface Graph
Courtesy of AMERICAN HONDA MOTOR CO., INC.

NOTE: For more information on brake system, see DISC - MDX, 3.2CL, 3.2TL & 3.5RL article.

NOTE: See Fig. 2 for component locations.

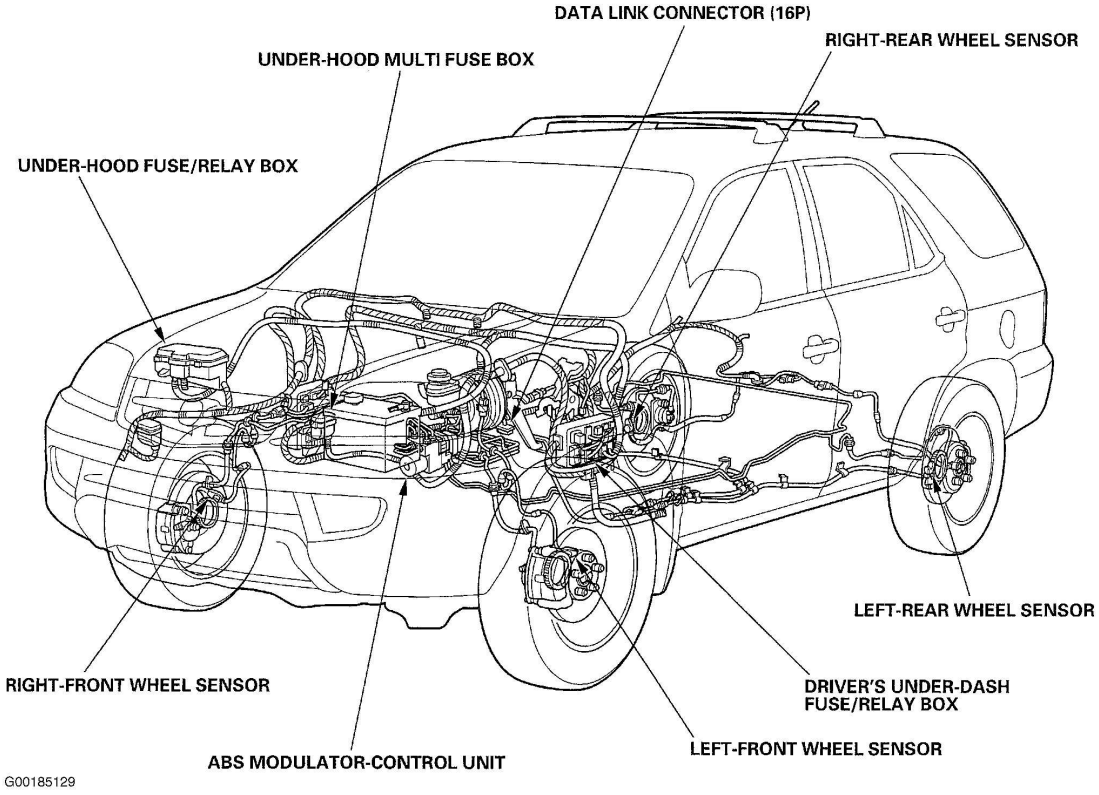


Fig. 2: Locating Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ABS CONTROL UNIT

Main Control

The ABS control unit detects the wheel speed based on the wheel speed sensor signal it received, then it calculates the vehicle speed based on the detected wheel speed. The control unit detects the vehicle deceleration based on the rate of deceleration. The control unit calculates the slip rate of each wheel and transmits the control signal to the modulator unit solenoid valve when the slip rate is high. See **Fig. 3** .

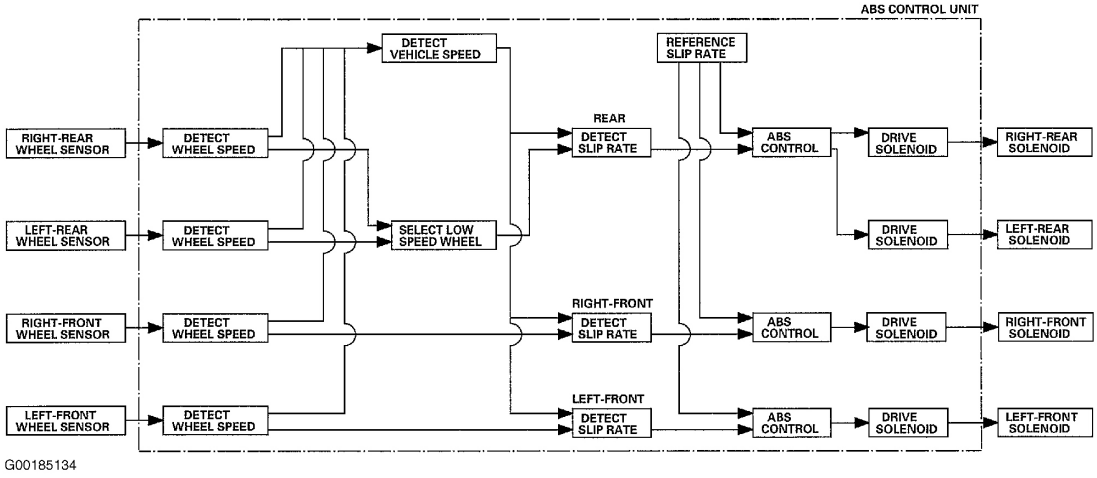


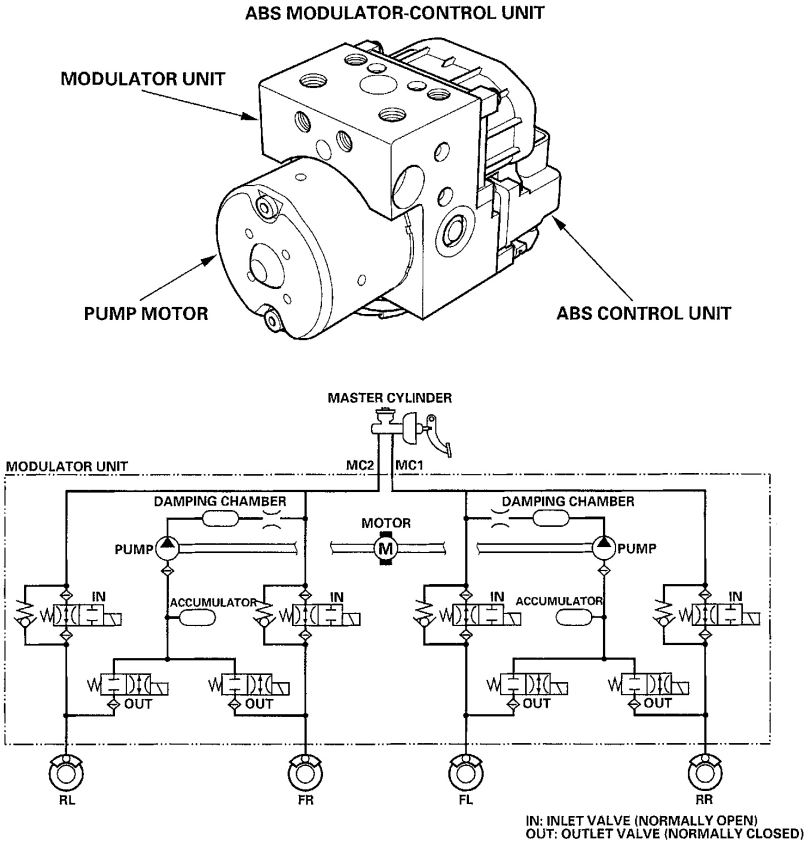
Fig. 3: Identifying ABS Control Unit Circuit Path
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Electronic Brake Distribution (EBD) Control

The electronic brake distribution (EBD) function helps control vehicle braking by adjusting the rear brake force before the ABS operates. Based on the wheel sensor signals, the ABS control unit uses the modulator to control the rear brakes individually. When the rear wheel speed is less than the front wheels speed, the ABS control unit retains the current rear brake fluid pressure by closing the inlet valve in the modulator. As the rear wheel speed increases and approaches the front wheel speed, the control unit increases the rear brake fluid pressure by momentarily opening the inlet valve. This whole process is repeated very rapidly. While this is happening, there is kickback at the brake pedal. During self-diagnosis, if the ABS control unit detects a problem that affects the EBD, it turns on the brake system indicator and the ABS indicator.

ABS MODULATOR

The ABS consists of the inlet solenoid valve, outlet solenoid valve, reservoir, pump, pump motor, and the damping chamber. The modulator reduces the caliper fluid pressure directly. It is a circulating-type modulator because the brake fluid circulates through the caliper, reservoir, and the master cylinder. The hydraulic control has three modes: pressure intensifying, pressure retaining, and pressure reducing. The hydraulic circuit is an independent four-channel type, one channel for each wheel. See **Fig. 4** .



Pressure intensifying mode:	Inlet valve open, outlet valve closed Master cylinder fluid is pumped out to the caliper.
Pressure retaining mode:	Inlet valve closed, outlet valve closed Caliper fluid is retained by the inlet valve and outlet valve.
Pressure reducing mode:	Inlet valve closed, outlet valve open Caliper fluid flows through the outlet valve to the reservoir.
Motor operation mode:	When starting the pressure reducing mode, the pump motor is ON. When stopping ABS operation, the pump motor is OFF. The reservoir fluid is pumped out by the pump, through the damping chamber, to the master cylinder.

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Fig. 4: Identifying ABS Modulator-Control Unit
Courtesy of AMERICAN HONDA MOTOR CO., INC.

KICKBACK & PUMP MOTOR

The motor operates when ABS is functioning, and fluid in reservoir is forced out to master cylinder, causing kickback at brake pedal.

SELF-DIAGNOSTIC SYSTEM

ABS control unit performs 2 self-diagnostic functions. Initial diagnosis is performed from the time engine starts

until ABS indicator lights go off. Regular diagnosis is continuously performed from time indicator lights go off on start-up until ignition is turned off. When a problem is detected, ABS control unit will turn ABS indicator light on, go into fail-safe mode, stop ABS control, and memorize DTC.

When ABS modulator/control unit detects a problem and either indicator light comes on, ABS modulator/control unit will store a DTC. ABS modulator/control unit can store any number of DTCs. The DTCs are indicated in order of ascending number. DTCs are memorized in EEPROM (non-volatile memory) and cannot be erased from memory by disconnecting battery. See **CLEARING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING. When 2 or more DTCs are stored in ABS modulator/control unit, trouble shoot DTCs in order of appearance. If complaint cannot be verified, establish conditions present when indicator light came on. If possible, test drive vehicle under similar conditions. If neither indicator light comes on during test drive, check for loose connectors and/or terminals. Shake wiring and connectors while diagnosing. Attempting to follow diagnostic test procedures when indicator is not lit may lead to faulty diagnosis.

WHEEL SPEED SENSOR

The wheel sensors are the magnetic contactless type. As the gear pulser teeth rotate past the wheel sensor's magnetic coil, AC current is generated. The AC frequency changes in accordance with the wheel speed. The ABS control unit detects the wheel sensor signal frequency and thereby detects the wheel speed. See **Fig. 5** . When the wheel speed drops sharply below the vehicle speed, the outlet valve opens momentarily to reduce the caliper fluid pressure. The pump motor starts at this time. As the wheel speed is restored, the inlet valve opens momentarily to increase the caliper fluid pressure.

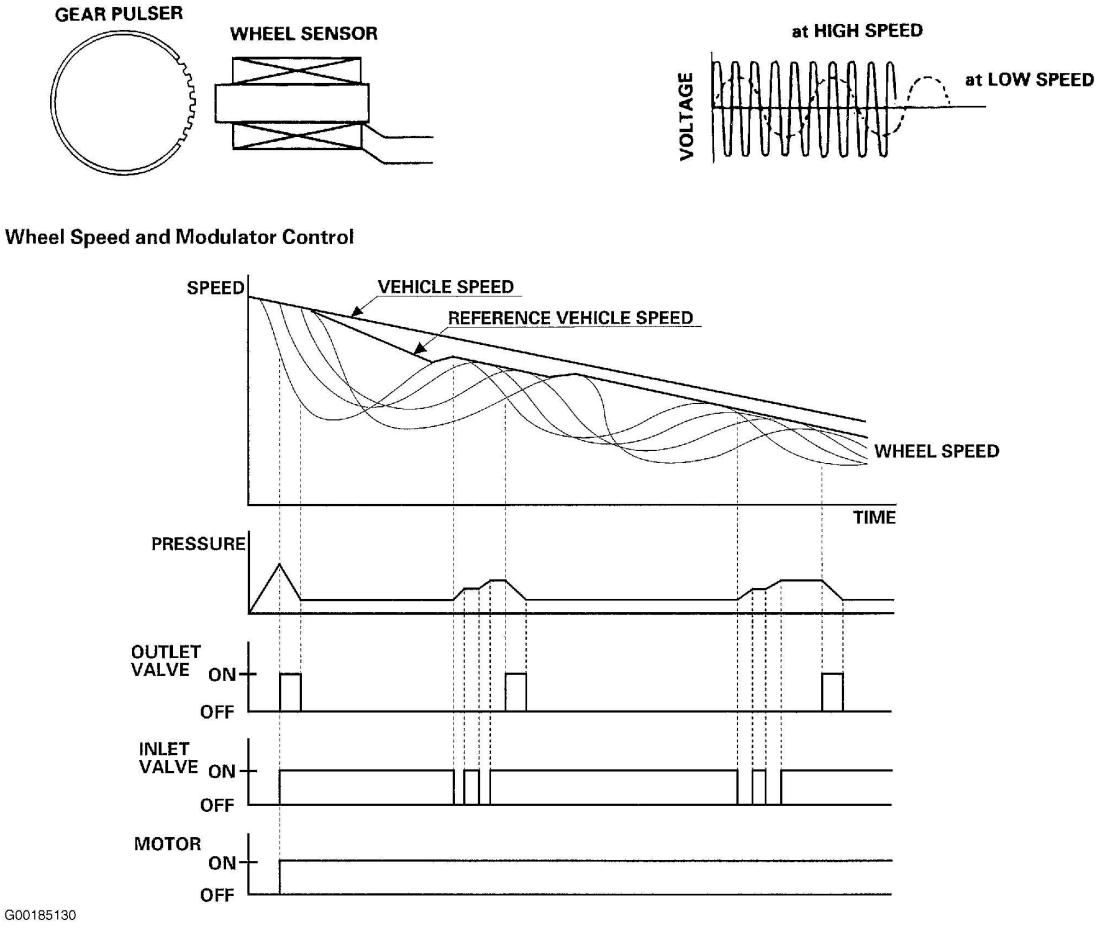

Fig. 5: Identifying Wheel Speed & Modulator Control Graph
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLEEDING BRAKE SYSTEM

HYDRAULIC SYSTEM BLEEDING

CAUTION: DO NOT spill brake fluid on painted surfaces. To avoid paint damage, immediately clean any spilled brake fluid with a clean cloth and clear water.

Fill master cylinder with clean brake fluid. Fluid should meet DOT 3 specifications. Bleed brake calipers in following sequence: LF, RF, RR, LR. Have someone slowly pump brake pedal several times, then apply steady pressure. Loosen bleed screw to allow air to escape system. Tighten bleed screw to specification. Refill the reservoir on the master cylinder to the MAX (upper) level line. Recheck fluid level.

TROUBLESHOOTING

SYSTEM INDICATORS

If the system is okay, the ABS indicator goes off once after turning the ignition switch ON (II) without starting the engine, and then come on again and go off several seconds later after starting the engine. This occurs because the ABS control unit is turned on by the IG2 power source. The ABS indicator or ABS system indicator comes on when the ABS control unit detects a problem in the system. The ABS indicator or ABS system indicator will also come on under these conditions, even though the system is operating properly:

- The vehicle goes into a spin.
- The ABS continues to operate for a long time.
- The vehicle is subjected to an electrical signal disturbance.
- Only drive wheels rotate.
- One drive wheel is stuck.

To determine the actual cause of the problem, question the customer about the problem, taking these conditions into consideration.

- When a problem is detected and the ABS indicator comes on, there are cases when the indicator stays on until the ignition switch is turned OFF, and cases when the indicator goes off automatically when the system returns to normal. For DTC 61, the indicator goes off automatically when the system returns to normal. For all other codes, the indicator stays on until the ignition switch is turned OFF.
- For DTCs 11, 13, 15, 17, 31, 32, 33, 34, 35, 36, 37, 38 and 54 or 81: The ABS indicator stays on until the ignition switch is turned OFF whether or not the system returns to normal.
- For DTCs 12, 14, 16, 18, 21, 51, 52 or 53: The ABS indicator goes off when the vehicle is driven again and the system is okay after the ignition switch is turned from OFF to ON (II).

DIAGNOSTIC TROUBLE CODES

The memory can hold any number of DTCs. However, when the same DTC is detected more than once, the more recent DTC is written over the earlier one. Therefore, when the same problem is detected repeatedly, it is memorized as a single DTC. The DTCs are indicated in the order they occurred, beginning with the most recent. The DTCs are memorized in the EEPROM (non-volatile memory). Therefore, the memorized DTCs cannot be canceled by disconnecting the battery.

TROUBLE SHOOTING

The troubleshooting flowchart procedures assume that the cause of the problem is still present and the ABS indicator and/or system indicator is still on. Following the flowcharts when the ABS indicator and/or system indicator DOES NOT come on can result in incorrect diagnosis. The connector illustrations show the female terminal connectors with a single outline and the male terminal connectors with a double outline.

Question the customer about the conditions when the problem occurs, and try to reproduce the same conditions for troubleshooting. Find out when the ABS indicator and/or system indicator came on, such as during ABS control, after ABS control, when vehicle speed was at a certain speed, etc.

When the ABS indicator does not come on during the test drive, but troubleshooting is performed based on the DTC; check for loose connectors, poor contact of the terminals, etc. before you start troubleshooting. After troubleshooting, clear the DTC, and test drive the vehicle. Make sure the ABS indicator and ABS system indicator do not come on. See **CLEARING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING.

DIAGNOSIS & TESTING

RETRIEVING DIAGNOSTIC TROUBLE CODES

Honda PGM Tester Method

NOTE: Trouble codes can be retrieved with Honda PGM tester or with SCS Service Connector (07PAZ-0010100).

Connect SCS Service Connector (07PAZ-0010100) or Honda PGM tester to 16P data link connector located under driver's side of the dashboard. Turn ignition switch to ON position and follow the prompts on the Honda PGM Tester to display the DTCs on the screen. After determining the DTC, perform appropriate test under DIAGNOSTIC TESTS. See **Fig. 6** for DTC index.

NOTE: See the Honda PGM Tester user's manual for specific instructions.

DTC	Detection Item
DTC:11	Right-front wheel sensor (open/short to body ground/short to power)
DTC:12	Faulty right-front wheel sensor pulse signal
DTC:13	Left-front wheel sensor (open/short to body ground/short to power)
DTC:14	Faulty left-front wheel sensor pulse signal
DTC:15	Right-rear wheel sensor (open/short to body ground/short to power)
DTC:16	Faulty right-rear wheel sensor pulse signal
DTC:17	Left-rear wheel sensor (open/short to body ground/short to power)
DTC:18	Faulty left-rear wheel sensor pulse signal
DTC:21	Continuous operation (chipped pulser)
DTC:31	Solenoid
DTC:32	Solenoid
DTC:33	Solenoid
DTC:34	Solenoid
DTC:35	Solenoid
DTC:36	Solenoid
DTC:37	Solenoid
DTC:38	Solenoid
DTC:51	Motor lock
DTC:52	Motor stuck off
DTC:53	Motor stuck on
DTC:54	Main relay stuck off
DTC:61	Ignition voltage
DTC:81	CPU (Central Processing Unit)

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Fig. 6: DTC Trouble Shooting Index
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Service Check Signal (SCS) Circuit Method

With the ignition switch OFF, connect the Honda PGM Tester to the 16P Data Link Connector under the driver's side dashboard. Short the SCS circuit-to-body ground using the Honda PGM Tester. Turn the ignition switch ON (II) without pressing the brake pedal.

NOTE: If you press the brake pedal when turning the ignition switch ON (II), the system shifts to the DTC clearing mode.

The blinking frequency indicates the DTC. DTCs are indicated by a series of long and short blinks. One long blink equals 10 short blinks. Add the long and short blinks together to determine the DTC. See **Fig. 7** . After determining the DTC, perform appropriate test under DIAGNOSTIC TESTS. See **Fig. 6** for DTC index.

NOTE: If the DTC is not memorized, the ABS indicator will go off for 3.5 seconds, and then come back on. If the ABS indicator stays on, trouble shoot for TEST A: BRAKE SYSTEM INDICATOR DOES NOT GO OFF under SYSTEM TESTS.

The system will not indicate the DTC unless these conditions are met:

- The brake pedal is not pressed.
- The ignition switch is turned ON (II).
- The SCS circuit is shorted to body ground before the ignition switch is turned ON (II).

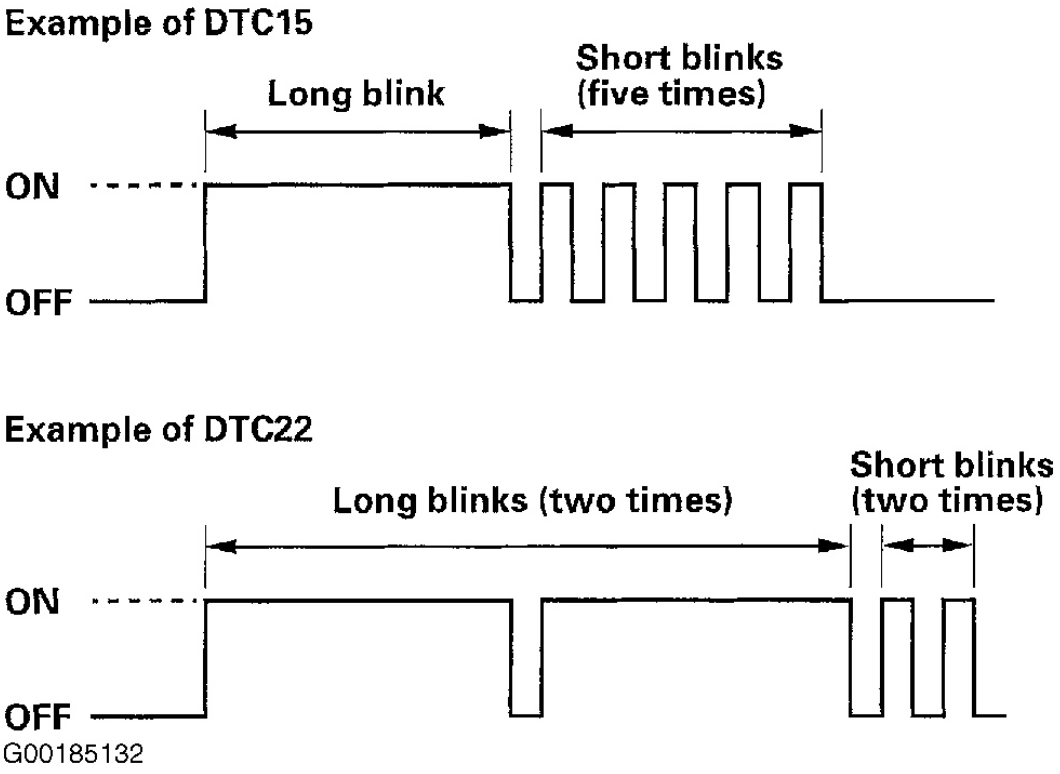


Fig. 7: Example Of DTC Frequencies
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CLEARING DIAGNOSTIC TROUBLE CODES

NOTE: Trouble codes can be cleared with Honda PGM tester or with SCS Service Connector (07PAZ-0010100).

With the ignition switch OFF, connect he Honda PGM Tester to the 16P Data Link Connector under the driver's side of the dashboard. Turn the ignition switch ON (II), and clear the DTC by following the screen prompts on the PGM Tester. For Cycling the Ignition Switch Method: Clear the DTC by turning the ignition switch from ON to OFF at least 20 times.

DIAGNOSTIC TROUBLE CODES (DTC) LIST

DTC	Description
DTC 11, 13, 15 & 17	Wheel Sensor & Open/Short-To-Body Ground/Short-To-

	Power
DTC 12, 14, 16 & 18	Wheel Sensor & Wheel Sensor Pulse Signal
DTC 21	CONTINUOUS OPERATION (CHIPPED PULSER)
DTC 31, 32, 33, 34, 35, 36, 37 & 38	SOLENOID
DTC 51	MOTOR LOCK
DTC 52	MOTOR STUCK OFF
DTC 53	MOTOR STUCK ON
DTC 54	MAIN RELAY STUCK OFF
DTC 61	IGNITION VOLTAGE
DTC 81	CENTRAL PROCESSING UNIT

DIAGNOSTIC TESTS

See **Fig. 6** for DTC index.

DTC 11, 13, 15 & 17: WHEEL SENSOR & OPEN/SHORT-TO-BODY GROUND/SHORT-TO-POWER

Code Description

DTC 11

Right-Front wheel sensor, Open/Short-To-Body Ground/Short-To-Power

DTC 13

Left-Front wheel sensor, Open/Short-To-Body Ground/Short-To-Power

DTC 15

Right-Rear wheel sensor, Open/Short-To-Body Ground/Short-To-Power

DTC 17

Left-Rear wheel sensor, Open/Short-To-Body Ground/Short-To-Power

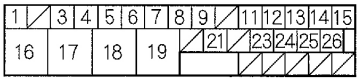
For DTC testing flow chart, see **Fig. 8** .

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

1. Disconnect the ABS control unit 31P connector.
2. Start the engine.
3. Measure the voltage between the appropriate wheel sensor (+) circuit terminal of the ABS control unit 31P connector and body ground (see table).

DTC	Appropriate Terminal
11 (Right-front)	No. 5: FRS (+)
13 (Left-front)	No. 7: FLS (+)
15 (Right-rear)	No. 3: RRS (+)
17 (Left-rear)	No. 9: RLS (+)

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there battery voltage?

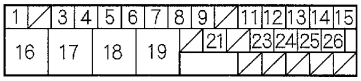
YES—Repair short to power in the (+) circuit wire between the ABS modulator-control unit and the appropriate wheel sensor. ■

NO—Go to step 4.

4. Turn the ignition switch OFF.
5. Check for continuity between the appropriate wheel sensor (+) circuit terminal and body ground (see table).

DTC	Appropriate Terminal
11 (Right-front)	No. 5: FRS (+)
13 (Left-front)	No. 7: FLS (+)
15 (Right-rear)	No. 3: RRS (+)
17 (Left-rear)	No. 9: RLS (+)

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there continuity?

YES—Go to step 6.

NO—Go to step 7.

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6. Disconnect the harness 2P connector from the appropriate wheel sensor, then check for continuity between the (+) and (−) terminals of the harness and body ground.

Is there continuity?

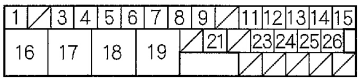
YES—Repair short to body ground in the (+) or (−) circuit wire between the ABS modulator-control unit and the wheel sensor. ■

NO—Replace the wheel sensor. ■

7. Check the resistance between the appropriate wheel sensor (+) and (−) circuit terminals (see table).

DTC	Appropriate Terminal	
	(+) Side	(−) Side
11 (Right-front)	No. 5: FRS (+)	No. 4: FRW (−)
13 (Left-front)	No. 7: FLS (+)	No. 6: FLW (−)
15 (Right-rear)	No. 3: RRS (+)	No. 1: RRW (−)
17 (Left-rear)	No. 9: RLS (+)	No. 8: RLW (−)

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there 450—2,000 Ω ?

YES—Check for loose ABS control unit 31P connector. If necessary, substitute a known-good ABS modulator-control unit, and recheck. ■

NO—Go to step 8.

8. Disconnect the harness 2P connector from the appropriate wheel sensor, and check the resistance between the (+) and (−) terminals of the wheel sensor.

Is there 450—2,000 Ω ?

YES—Repair open in the (+) or (−) circuit wire, or short between the (+) circuit wire and the (−) circuit wire between the ABS modulator-control unit and the wheel sensor. ■

NO—Replace the wheel sensor. ■

Fig. 8: DTC 11, 13, 15 & 17 Wheel Sensor Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 12, 14, 16 & 18: WHEEL SENSOR & WHEEL SENSOR PULSE SIGNAL

Code Description

DTC 12

Right-Front wheel sensor, Wheel Sensor Pulse Signal.

DTC 14

Left-Front wheel sensor, Wheel Sensor Pulse Signal.

DTC 16

Right-Rear wheel sensor, Wheel Sensor Pulse Signal.

DTC 18

Left-Rear wheel sensor, Wheel Sensor Pulse Signal.

For DTC testing flow chart, see **Fig. 9** .

DTC 12, 14, 16, 18: Wheel Sensor Pulse Signal

NOTE: If the ABS indicator comes on for the reasons described below, the indicator goes off when you test-drive the vehicle at 31 mph (50 km/h).

- Only the drive wheel rotated
- The vehicle spun
- Electrical noise

1. Visually check for appropriate wheel sensor and pulser installation (see table).

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

Are they installed correctly?

YES—Go to step 2.

NO—Reinstall or replace the appropriate wheel sensor or pulser.■

2. Disconnect the ABS control unit 31P connector.

3. Measure the resistance between the appropriate wheel sensor (+) and (−) circuit terminals (see table).

DTC	Appropriate Terminal	
	(+) Side	(−) Side
12 (Right-front)	No. 5: FRS (+)	No. 4: FRS (−)
14 (Left-front)	No. 7: FLS (+)	No. 6: FLS (−)
16 (Right-rear)	No. 3: RRS (+)	No. 1: RRS (−)
18 (Left-rear)	No. 9: RLS (+)	No. 8: RLS (−)

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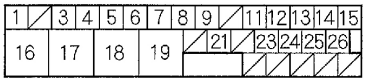
ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there less than 450 Ω ?

YES—Repair short to wire between the appropriate wheel sensor (+) and (−) circuits.■

NO—Go to step 4.

4. Check for continuity between the appropriate wheel sensor (+) circuit terminal and other wheel sensor (+) circuit terminals (see table).

DTC	Appropriate Terminal	Other Terminal		
12	No. 5: FRW (+)	No. 7	No. 3	No. 9
14	No. 7: FLW (+)	No. 5	No. 3	No. 9
16	No. 3: RRW (+)	No. 5	No. 7	No. 9
18	No. 9: RLW (+)	No. 5	No. 7	No. 3

Is there continuity?

YES—Repair short to wire between the appropriate wheel sensor and the other wheel sensor.■

NO—Clear the DTC, and test-drive the vehicle. If the ABS indicator comes on and the same DTC is indicated, replace the ABS modulator-control unit.■

Fig. 9: DTCs 12, 14, 16 & 18 Wheel Sensor Pulse Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 21: CONTINUOUS OPERATION (CHIPPED PULSER)

For DTC testing flow chart, see **Fig. 10** .

DTC 21: Continuous Operation (Chipped Pulser)

1. Clear the DTC.
2. Test-drive the vehicle at 19 mph (30 km/h) or more.

   Does the ABS indicator come on and is DTC 21 indicated?

   YES – Go to step 3.

   NO – The system is OK at this time. ■
3. Check the pulser gear for a chipped tooth.

   Is the pulser OK?

   YES – Check for a loose ABS control unit 31P connector. If necessary, substitute a known-good ABS modulator control unit, and recheck. ■

   NO – Replace the driveshaft. (Chipped pulser gear) ■

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Fig. 10: DTC 21: Continuous Operation Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 31, 32, 33, 34, 35, 36, 37 & 38: SOLENOID

For DTC testing flow chart, see **Fig. 11** .

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

1. Clear the DTC.
2. Test-drive the vehicle.

Does the ABS indicator come on and are DTCs 31, 32, 33, 34, 35, 36, 37 or 38 indicated?

YES – Replace the ABS modulator-control unit. ■

NO – The system is OK at this time. ■

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Fig. 11: DTCs 31, 32, 33, 34, 35, 36, 37 & 38 Solenoid Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 51: MOTOR LOCK

For DTC testing flow chart, see **Fig. 12** .

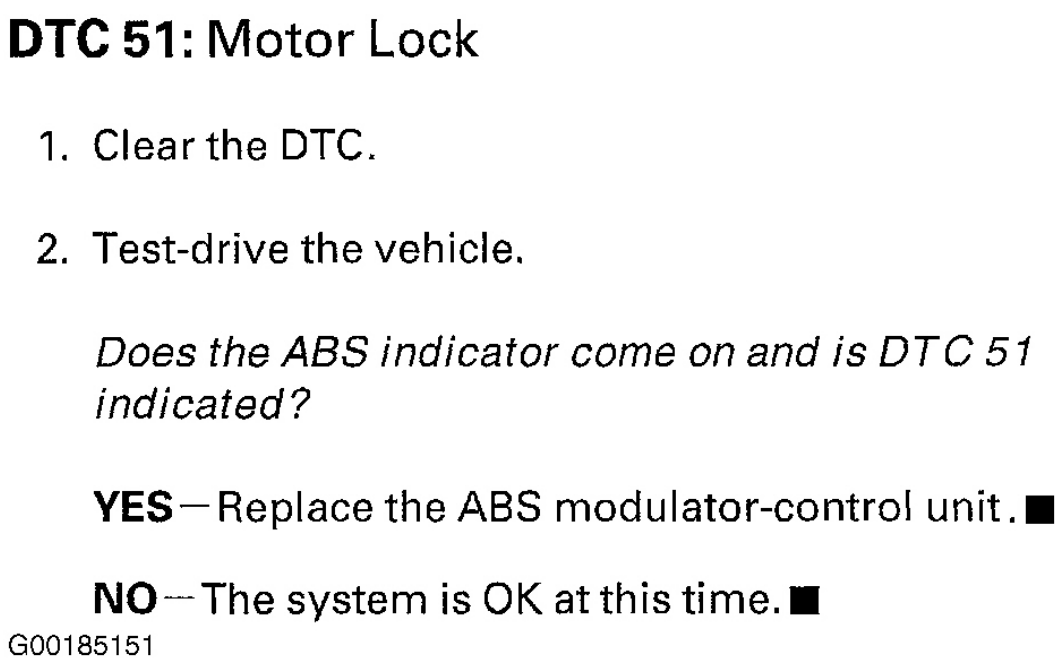


Fig. 12: DTC 51: Motor Lock Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 52: MOTOR STUCK OFF

For DTC testing flow chart, see **Fig. 13** .

DTC 52: Motor Stuck Off

1. Check the ABS PUMP (40 A) fuse in the under-hood multi fuse box, and reinstall the fuse if it is OK.

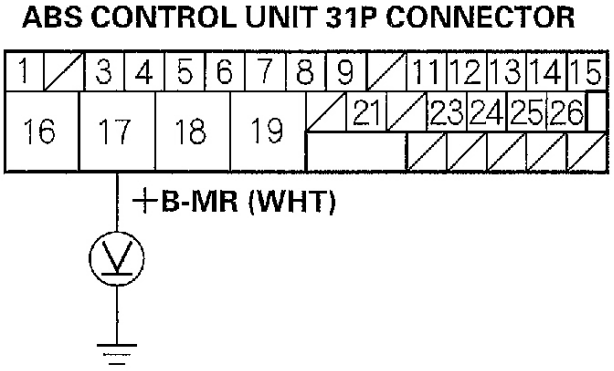
   Is the fuse OK?

   YES—Go to step 2.

   NO—Replace the fuse, and recheck.■

2. Disconnect the ABS control unit 31P connector.

3. Measure the voltage between the ABS control unit 31P connector terminal No. 17 and body ground.



Wire side of female terminals

Is there battery voltage?

YES—Replace the ABS modulator-control unit.■

NO—Repair open in the wire between the ABS control unit and the under-hood multi fuse box.■

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Fig. 13: DTC 52: Motor Stuck Off Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 53: MOTOR STUCK ON

For DTC testing flow chart, see **Fig. 14** .

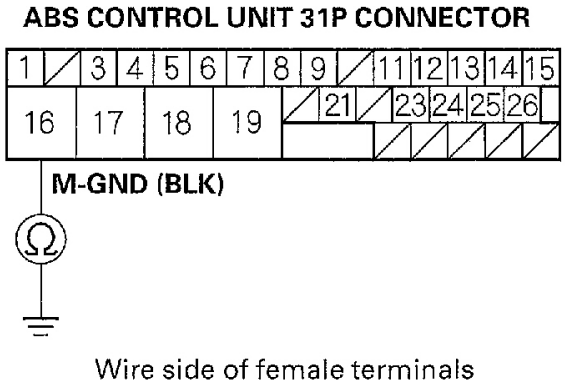
DTC 53: Motor Stuck On

1. Clear the DTC.
2. Test-drive the vehicle.

   Does the ABS indicator come on and is DTC 53 indicated?

   YES — Go to step 3.

   NO — Intermittent failure, the system is OK at this time. ■
3. Disconnect the ABS control unit 31P connector.
4. Check for continuity between the ABS control unit 31P connector terminal No. 16 and body ground.



   Is there continuity?

   YES — Replace the ABS modulator-control unit. ■

   NO — Repair open in the wire between the ABS control unit and body ground. ■

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Fig. 14: DTC 53: Motor Stuck On, Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 54: MAIN RELAY STUCK OFF

For DTC testing flow chart, see **Fig. 15** .

DTC 54: Main Relay Stuck Off

1. Check the ABS F/S RLY (20A) fuse in the under-hood multi fuse box, and reinstall the fuse if it is OK.

   Is the fuse OK?

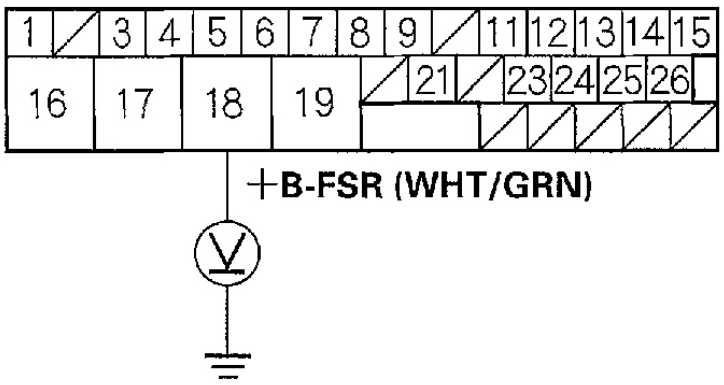
   YES—Go to step 2.

   NO—Replace the fuse, and recheck. ■

2. Disconnect the ABS control unit 31P connector.

3. Measure the voltage between the ABS control unit connector terminal No. 18 and body ground.

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES—Replace the ABS modulator-control unit. ■

NO—Repair open in the wire between the ABS control unit and the under-hood multi fuse box. ■

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Fig. 15: DTC 54: Main Relay Stuck Off Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 61: IGNITION VOLTAGE

For DTC testing flow chart, see **Fig. 16** .

DTC 61: Ignition Voltage

1. Check the R/C MIRROR (7.5A) fuse in the driver's under-dash fuse/relay box, and reinstall the fuse if it is OK.

   Is the fuse OK?

   YES — Go to step 2.

   NO — Replace the fuse and recheck. ■

2. Clear the DTC.

3. Test-drive the vehicle.

   Does the ABS indicator come on and is DTC 61 indicated?

   YES — Go to step 4.

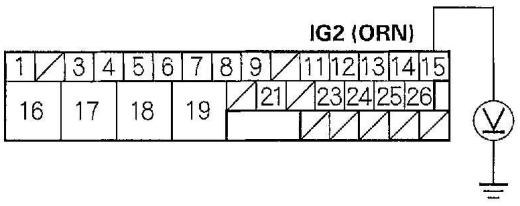
   NO — The system is OK at this time. ■

4. Disconnect the ABS control unit 31P connector.

5. Turn the ignition switch ON (II).

6. Measure the voltage between the ABS control unit 31P connector terminal No. 15 and body ground.

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Is there battery voltage?

YES — Replace the ABS modulator-control unit. ■

NO — Repair open in the wire between the ABS control unit and the under-hood multi fuse box. ■

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Fig. 16: DTC 61: Ignition Voltage Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DTC 81: CENTRAL PROCESSING UNIT

For DTC testing flow chart, see **Fig. 17** .

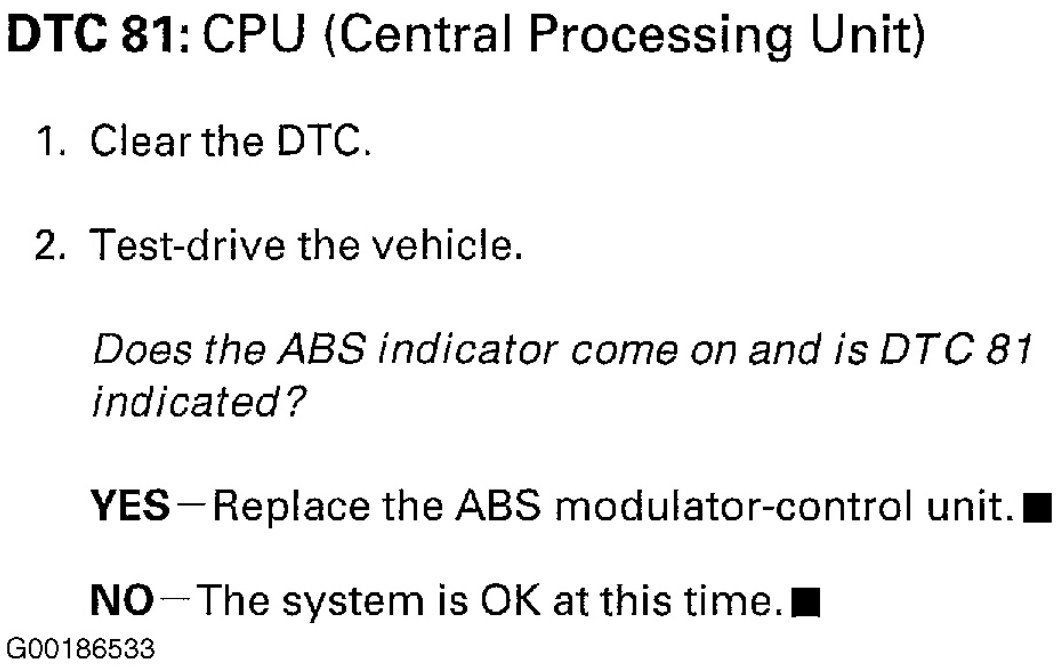

Fig. 17: DTC 81: Central Processing Unit Testing Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SYSTEM TESTS

For symptom trouble shooting index, see **Fig. 18** .

Symptom	Diagnostic procedure	Perform Test
ABS indicator does not come on	ABS indicator circuit troubleshooting	A
ABS indicator does not go off and no DTC is stored	ABS indicator circuit troubleshooting	B
Brake system indicator does not come on	Brake system indicator circuit troubleshooting	C
Brake system indicator does not go off and no DTC is stored	Brake system indicator circuit troubleshooting	D

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Fig. 18: Symptom Trouble Shooting Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TEST A: BRAKE SYSTEM INDICATOR DOES NOT COME ON

For test chart, see **Fig. 19** and **Fig. 20** .

1. With the parking brake released, turn the ignition switch ON (II), and watch the brake system indicator.

   Does the brake system indicator come on?

   YES – Go to step 3.

   NO – Go to step 2.

2. Turn the ignition switch OFF then ON (II) again.

   Does the ABS indicator come on?

   YES – Go to step 12.

   NO – Repair open in the indicator power source circuit. ■

   - Blown BACK UP LIGHT (10A) fuse.
   - Open in the wire betwcen the BACK UP LIGHT (10A) fuse and the gauge assembly.
   - Open circuit inside the fuse box.

3. Start the engine, and apply the parking brake.

   Does the brake system indicator come on?

   YES – The system is OK at this time. ■

   NO – Go to step 4.

4. Turn the ignition switch OFF.

5. Disconnect the parking brake switch connector from the switch.

6. Turn the ignition switch ON (II).

7. Measure voltage between the parking brake switch connector terminal and body ground.

   Is there battery voltage?

   YES – Replace the parking brake switch. ■

   NO – Go to step 8.

8. Turn the ignition switch OFF.

9. Remove the gauge assembly.

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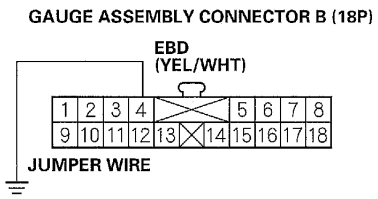
10. Connect the gauge assembly connector B (18P) terminal No. 4 and body ground with a jumper wire.



Wire side of female terminals

11. Turn the ignition switch ON (II).

    Does the parking brake indicator come on?

    YES – Repair open in the GRN/RED wire between the gauge assembly and the parking brake switch. ■

    NO – Replace the printed circuit board in the gauge assembly. ■

12. Start the engine, and apply the parking brake.

    Does the brake system indicator come on?

    YES – Go to step 16.

    NO – Go to step 13.

13. Turn the ignition switch OFF.

14. Remove the gauge assembly.

15. Check the brake system indicator bulb.

    Is the bulb OK?

    YES – Replace the printed circuit board in the gauge assembly. ■

    NO – Replace the brake system indicator bulb. ■

16. Turn the ignition switch OFF.

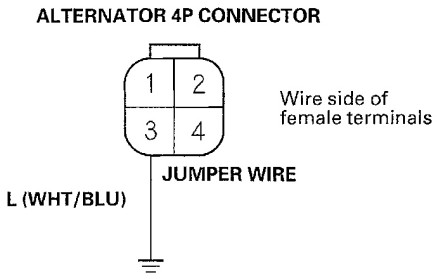
17. Disconnect the alternator connector (4P).

    – Go to Test 2 of 2

Fig. 19: Brake System Indicator Does Not Come On, Trouble Shooting Chart (1 of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

– From Test 1 of 2

18. Connect the alternator connector (4P) WHT/BLU terminal and body ground with a jumper wire.



19. Turn the ignition swich ON (II).

Does the brake system indicator come on?

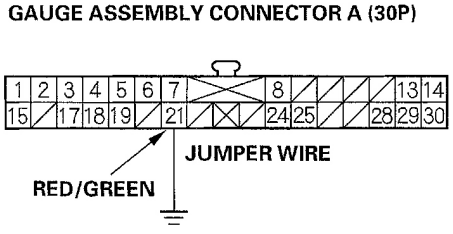
YES – Replace the alternator or repair the charging system circuit. ■

NO – Go to step 20.

20. Turn the ignition switch OFF.

21. Remove the gauge assembly.

22. Connect the gauge assembly connector A (30P) terminal No. 21 and body ground with a jumper wire.



23. Turn the ignition switch ON (II).

Does the brake system indicator come on?

YES – Repair open in the WHT/BLU wire between the alternator and the gauge assembly. ■

NO – Replace the printed circuit board in the gauge assembly. ■

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Fig. 20: Brake System Indicator Does Not Come On, Trouble Shooting Chart (2 of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TEST B: BRAKE SYSTEM INDICATOR DOES NOT GO OFF

For test chart, see **Fig. 21** .

1. Release the parking brake.
2. Start the engine.

   Does the brake system indicator go off?

   YES – The system is OK at this time. ■

   NO – Go to step 3.
3. Check the ABS indicator.

   Does the ABS indicator stay on?

   YES – Read the ABS DTCs, and do the applicable troubleshooting. ■

   NO – Go to step 4.
4. Turn the ignition switch OFF.
5. Disconnect the ABS control unit 31P connector.
6. Start the engine, and check the brake system indicator.

   Does the brake system indicator go off?

   YES – Replace the ABS modulator-control unit. ■

   NO – Check the brake system indicator circuit. ■

   - Short to body ground between the gauge assembly, the parking brake switch and the ABS control unit, or short to body ground between the gauge assembly and the brake fluid level switch.
   - Parking brake switch stuck ON.
   - Brake fluid level switch stuck ON.
   - Short to body ground in the WHT/BLU wire between the gauge assembly and the alternator.
   - Faulty alternator.

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Fig. 21: Brake System Indicator Does Not Go Off, Trouble Shooting Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TEST C: ABS INDICATOR DOES NOT COME ON

For test chart, see **Fig. 22** .

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

   Does the ABS indicator come on?

   YES—The system is OK at this time.■

   NO—Go to step 2.

2. Turn the ignition switch OFF then ON (II) again.

   Does the brake system indicator come on?

   YES—Go to step 3.

   NO—Repair open in the indicator power source circuit.■

   - Blown BACK UP LIGHT (10A) fuse.
   - Open in the wire between the BACK UP LIGHT (10A) fuse and gauge assembly.
   - Open circuit inside the fuse box.

3. Turn the ignition switch OFF.

4. Disconnect the ABS control unit 31P connector.

5. Turn the ignition switch ON (II).

   Does the ABS indicator come on?

   YES—Check for loose terminals in the ABS control unit 31P connector. If necessary, substitute a known-good ABS modulator-control unit, and recheck.■

   NO—Go to step 6.

6. Check the ABS indicator bulb in the gauge assembly.

   Is the bulb OK?

   YES—Go to step 7.

   NO—Replace the ABS indicator bulb.■

7. Turn the ignition switch OFF.

8. Remove the gauge assembly.

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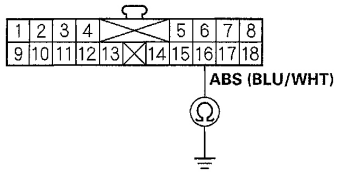
9. Disconnect gauge assembly connector B (18P).

10. Check for continuity between gauge assembly connector B (18P) terminal No. 16 body ground.

GAUGE ASSEMBLY CONNECTOR B (18P)



Wire side of female terminals

Is there continuity?

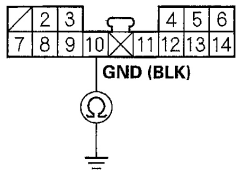
YES—Repair short to body ground in the wire between the gauge assembly and the ABS control unit.■

NO—Go to step 11.

11. Connect gauge assembly connector B (18P), and disconnect gauge assembly connector C (14P).

12. Check for continuity between gauge assembly connector C (14P) terminal No. 10 and body ground.

GAUGE ASSEMBLY CONNECTOR C (14P)



Wire side of female terminals

Is there continuity?

YES—Check for loose terminals in the gauge assembly connectors. If the connectors are OK, replace the printed circuit board in the gauge assembly.■

NO—Repair open in the wire between the gauge assembly and body ground (G501).■

Fig. 22: ABS Indicator Does Not Come On, Trouble Shooting Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TEST D: ABS INDICATOR DOES NOT GO OFF

For test chart, see **Fig. 23** .

1. Check the ABS F/S RLY (20A) fuse in the under-hood multi fuse box, and reinstall the fuse if it is OK.

   Is the fuse OK?

   YES—Go to step 2.

   NO—Replace the fuse, and recheck. If the fuse is blown, check for a short to body ground in this fuse circuit. If the circuit is OK, replace the ABS modulator-control unit.■

2. Check the R/C MIRROR (7.5A) fuse in the under-dash fuse/relay box, and reinstall the fuse if it is OK.

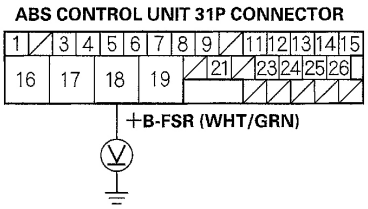
   Is the fuse OK?

   YES—Go to step 3.

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

3. Disconnect the ABS control unit 31P connector.

4. Measure the voltage between terminal No. 18 and body ground.



Wire side of female terminals

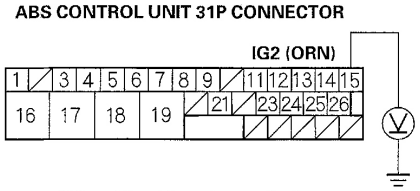
   Is there battery voltage?

   YES—Go to step 5.

   NO—Repair open in the wire between the ABS F/S RLY (20A) fuse and the ABS control unit.■

5. Turn the ignition switch ON (II).

6. Measure the voltage between the ABS control unit 31P connector terminal No. 15 and body ground.



Wire side of female terminals

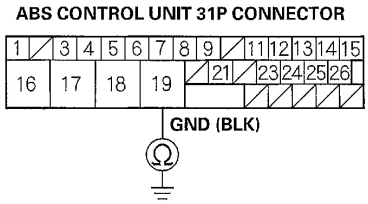
   Is there battery voltage?

   YES—Go to step 7.

   NO—Repair open in the wire between the No. 16 (7.5A) fuse and the ABS control unit.■

7. Turn the ignition switch OFF.

8. Check for continuity between the ABS control unit 31P connector terminal No. 19 and body ground.



Wire side of female terminals

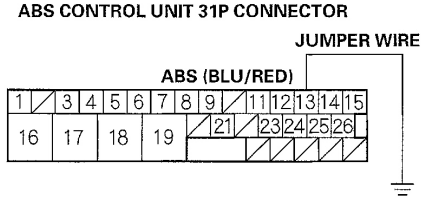
   Is there continuity?

   YES—Go to step 9.

   NO—Repair open in the wire between the ABS control unit and body ground (G301).■

9. Turn the ignition switch ON (II).

10. Connect the ABS control unit 31P connector terminal No. 13 and body ground with a jumper wire.



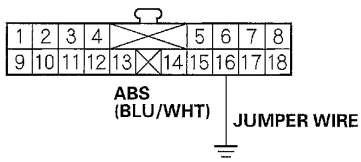
Wire side of female terminals

   Does the ABS indicator go off?

   YES—Check for loose terminals in the ABS control unit 31P connector. If necessary, substitute a known-good ABS modulator-control unit, and recheck.■

   NO—Go to step 11.

11. Connect gauge assembly connector B (18P) terminal No. 16 and body ground with a jumper wire.



Wire side of female terminals

   Does the ABS indicator go off?

   YES—Repair open in the wire between the gauge assembly and the ABS control unit.■

   NO Check for loose gauge assembly connector B (18P). If the connector is OK, replace the printed circuit board in the gauge assembly.■

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Fig. 23: ABS Indicator Does Not Go Off, Trouble Shooting Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

PULSERS/WHEEL SENSORS

Removal & Installation

Install the sensors carefully to avoid twisting wires. See **Fig. 25** . Check the front and rear pulser for chipped or damaged teeth. Measure the air gap between the wheel sensor and the pulser all the way around while rotating the pulser. If the gap exceeds 0.04" (1.0 mm), repair as needed. See **Fig. 24** .

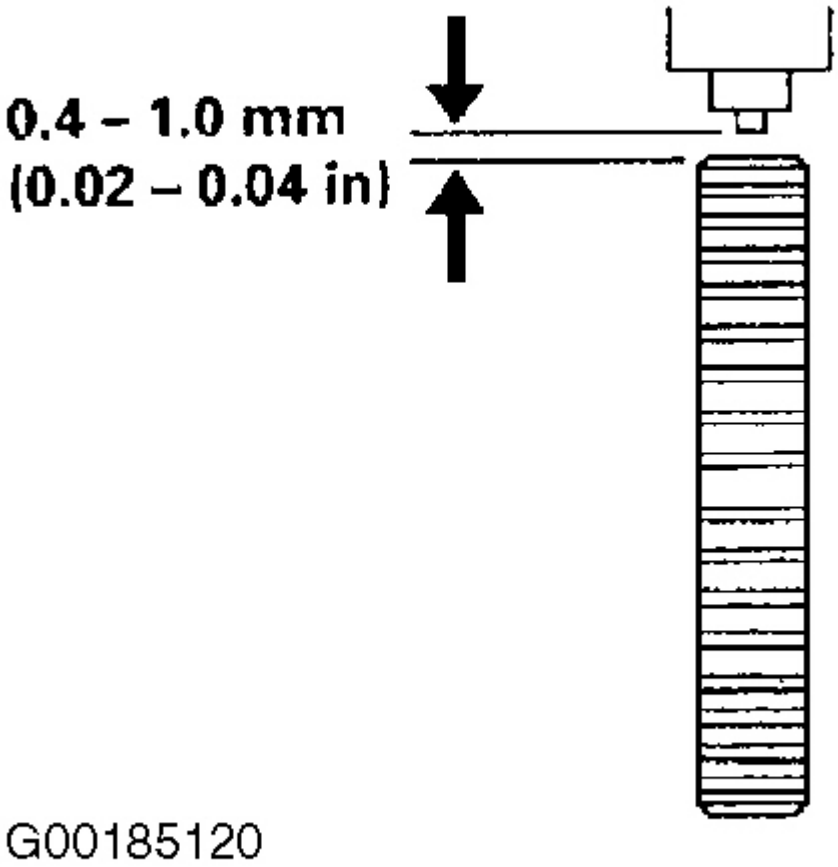


Fig. 24: Identifying Gap For Pulser

Courtesy of AMERICAN HONDA MOTOR CO., INC.

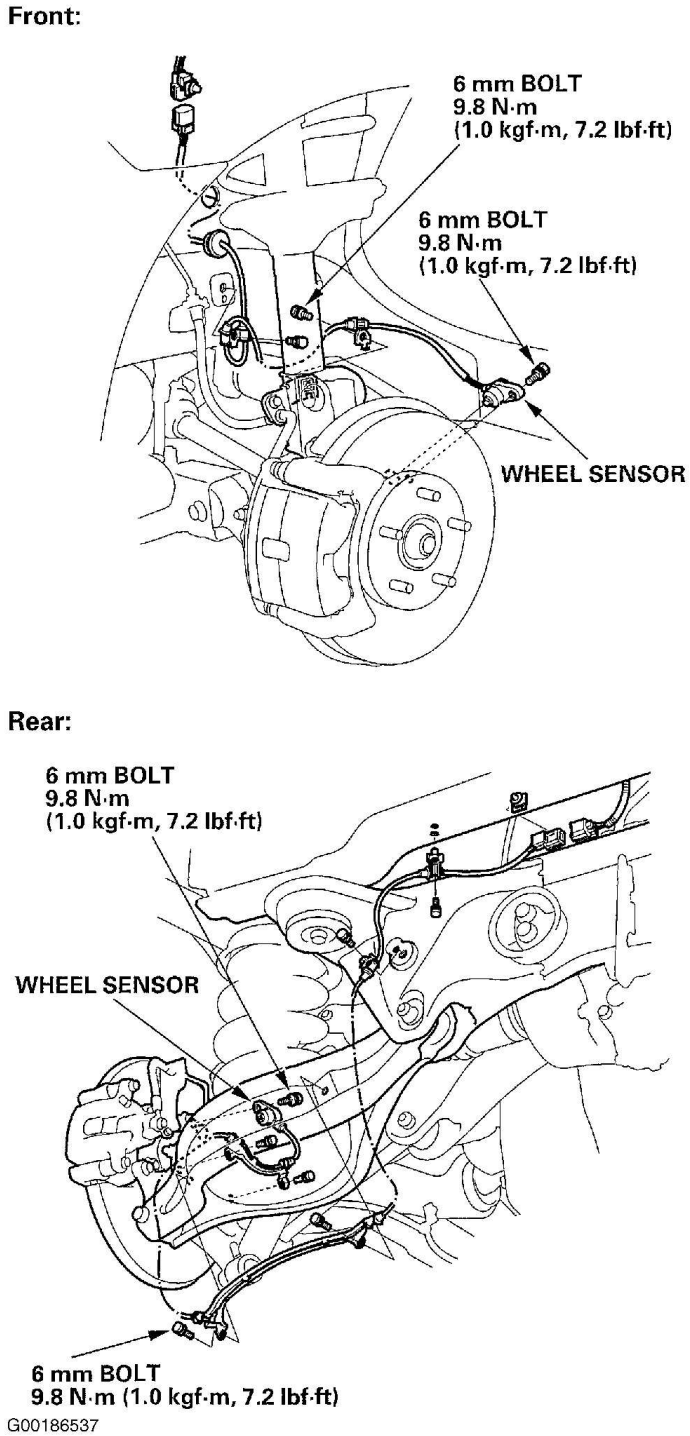


Fig. 25: Identifying Wheel Sensors
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ABS MODULATOR-CONTROL UNIT

CAUTION: DO NOT spill brake fluid on painted surfaces. To avoid paint damage, immediately clean any spilled brake fluid with a clean cloth and clear water. To prevent the brake fluid from flowing, plug and cover the hose ends and joints with a shop towel or equivalent material.

CAUTION: Take care not to damage or deform the brake lines during removal and installation.

Removal

Pull up on the lock of the ABS control unit 31P connector, then disconnect the connector. Disconnect the 6 brake lines. Remove the two 8 mm nuts. Remove the ABS modulator-control unit. See **Fig. 26** .

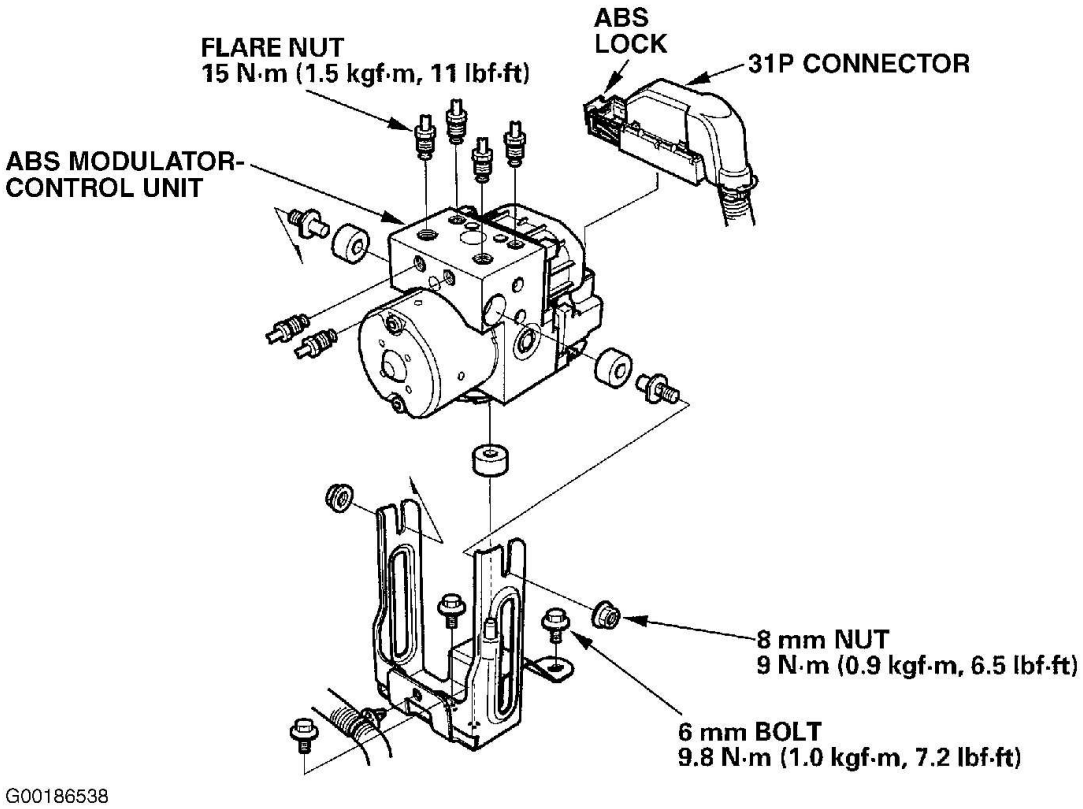


Fig. 26: Exploded View Of ABS Modulator-Control Unit
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install ABS modulator/control unit to bracket. Install and tighten the two 8 mm nuts. Align the connecting surface of the ABS control unit 31P connector. Push the lock of the ABS control unit connector until you hear it click into place, then connect the connector.
2. Bleed brake system, starting with the front wheels. Bleed hydraulic brake system. See **HYDRAULIC SYSTEM BLEEDING** under BLEEDING BRAKE SYSTEM. Start engine and ensure that ABS indicator goes off. Test drive vehicle and confirm that ABS system is functioning properly.

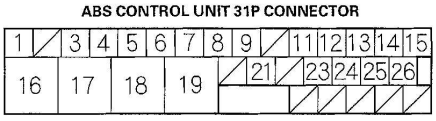
TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	**Ft. Lbs. (N.m)**
Brake Line Flare Nuts	11 (15)
	INCH Lbs. (N.m)
8 mm, ABS Modulator Control Unit Mounting Nuts	89 (10)
6mm, ABS Modulator Control Unit Mounting Bolt	89 (10)
Wheel Speed Sensor	89 (10)

PIN VOLTAGE CHARTS

See **Fig. 27** and **Fig. 28** for pin voltage chart.



Terminal number	Wire color	Terminal sign (Terminal name)	Description	Measurement		
				Terminals	Conditions (Ignition switch ON (II))	Voltage
1	BLU/YEL	RRS (−) (Rear-right signal negative)	Detects right-rear wheel sensor signal	1−3	Wheel Spin wheel at 1 turn/second	AC: 0.053 V or above Oscilloscope 0.15 Vp-p or above
3	GRN/YEL	RRS (+) (Rear-right signal positive)				
4	GRN	FRS (−) (Front-right signal negative)	Detects right-front wheel sensor signal	4−5		
5	GRN/BLK	FRS (+) (Front-right signal positive)				
6	BRN/BLK	FLS (−) (Front-left signal negative)	Detects left-front wheel sensor signal	6−7		
7	GRN/BLU	FLS (+) (Front-left signal positive)				
8	PNK	RLS (−) (Rear-left signal negative)	Detects left-rear wheel sensor signal	8−9	Stops	About 2.5 V
9	PNK/BLK	RLS (+) (Rear-left signal positive)				
11	GRY	DIAG-K (Diagnosis K)	Communicates with the Honda PGM Tester	—	—	—
12	BRN	DIAG-L (Diagnosis L)	DTC indication	—	—	—

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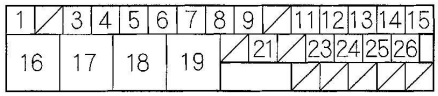
Fig. 27: ABS Control Unit Inputs & Outputs Pin Voltage Chart (1 of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ABS CONTROL UNIT 31P CONNECTOR



Wire side of female terminals

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Measurement			
				Terminals	Conditions (Ignition switch ON (II))		Voltage
13	BLU/ WHT	ABS	Drives ABS indicator	13 – GND	ABS indicator	ON	About 5 V
						OFF	Below 1 V
14	WHT/ BLK	STOP	Detects brake pedal position switch signal	14 – GND	Brake pedal	Pressed	Battery voltage
						Released	0 V
15	ORN	IG2	Power source for activating the system	15 – GND	—		Battery voltage
16	BLK	M-GND (Motor ground)	Ground for the pump motor	16 – GND	—		Below 0.3 V
17	WHT	+B-MR (+B motor relay)	Power source for the pump motor	17 – GND	At all times		Battery voltage
18	WHT/ GRN	+B-FSR (+B fail-safe relay)	Power source for the valve relay	18 – GND	At all times		Battery voltage
19	BLK	GND	Ground for the modulator assembly	19 – GND	—		Below 0.3 V
21	YEL/ WHT	EBD (Electronic brake distribution)	Drives brake system indicator	21 – GND	Engine running, parking brake	Pressed	Below 0.3 V
						Released	Battery voltage
23	GRY/ YEL	RLP (Rear-left pulse)	Outputs left-rear wheel sensor signal	—	—		—
24	GRY/ RED	RRP (Rear-right pulse)	Outputs right-rear wheel sensor signal				
25	WHT/ RED	FLP (Front-left pulse)	Outputs left-front wheel sensor signal				
26	LT GRN	FRP (Front-right pulse)	Outputs right-front wheel sensor signal				

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Fig. 28: ABS Control Unit Inputs & Outputs Pin Voltage Chart (2 of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

WIRING DIAGRAMS

See **ANTI-LOCK BRAKES** in MDX article in SYSTEM WIRING DIAGRAMS ACURA.