2001-02 ACCESSORIES & EQUIPMENT

Multiplex Control Systems - MDX

DESCRIPTION

WARNING: Deactivate air bag system before performing any service operation. See AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

Multiplex control system consists of door, driver and passenger multiplex control units. If vehicle is equipped with Driving Position Memory System (DPMS), a driver's power seat control unit is also included in multiplex system. These control units are integrated with each other using multiplex communication lines. See **Fig. 1** . For more diagnostic information on DPMS, see DRIVER'S POSITION MEMORY SYSTEMS - MDX article.

Multiplex control system includes a multiplex function, a wake-up/sleep function, fail-safe function, and a 2-mode self-diagnostic function. Self-diagnostic mode 1 is used to diagnose multiplex control system. Self-diagnostic mode 2 is used to diagnose a failure in input line of each system.

Multiplex control system includes engine oil pressure indicator circuit, seat belt reminder circuit, lights-on and key-in reminder, and key light timer circuits. Other controlled systems include dash illumination brightness control, entry illumination, automatic lights off system, power door locks, power windows and moon roof (with key-off timer operation), wiper/washers (with speed respondent intermittent wiper), security alarm system, interlock system and memory seat and mirror control.

OPERATION

MULTIPLEX COMMUNICATION FUNCTIONS

Multiplex control system reduces number of wire harnesses by sending digital signals over shared multiplex communication lines. Each multiplex control unit converts input signals from each switch to digital signals, and transmits these as serial data signals. Transmitted serial data signals are converted back to switch signals by receiving multiplex control unit for switch operation. Dedicated communication lines exist between door multiplex control unit and driver's multiplex control unit (Brown wire), and between driver's multiplex control unit, driver's power seat control unit and passenger's multiplex control unit (Pink wire). See **WIRING DIAGRAMS** .

WAKE-UP & SLEEP FUNCTIONS

Wake-up and sleep modes are used to decrease parasitic draw on battery when ignition is off, . In sleep mode, multiplex control unit stops communication and CPU control functions when system operation is not needed. When any monitored system or switch operates, such as a door being unlocked, related multiplex control unit will change from sleep function to wake-up function. A wake-up signal is then sent to other multiplex control units. When ignition switch is turned off, there is a 10-second delay before sleep mode begins. Sleep mode will not begin if any door is open.

FAIL-SAFE FUNCTIONS

To prevent improper operation, multiplex system has a fail-safe function. In fail-safe mode, output signals will use default values until fault is corrected (i.e. faulty control unit or communication line). Each multiplex control unit contains a hardware fail-safe output signal default when there is a CPU failure. There are also software fail-safe defaults that ignore faulty multiplex control unit signals and allows system to continue to function.

COMPONENT LOCATIONS

MULTIPLEX CONTROL UNITS

Door Multiplex Control Unit

Unit is located in driver's door and is incorporated into power window master switch. See **Fig. 1** .

Driver's Multiplex Control Unit

Unit is located on fuse/relay block behind driver-side kick panel. See **Fig. 1** .

Passenger's Multiplex Control Unit

Unit is located on fuse/relay block behind passenger-side kick panel. See **Fig. 1** .

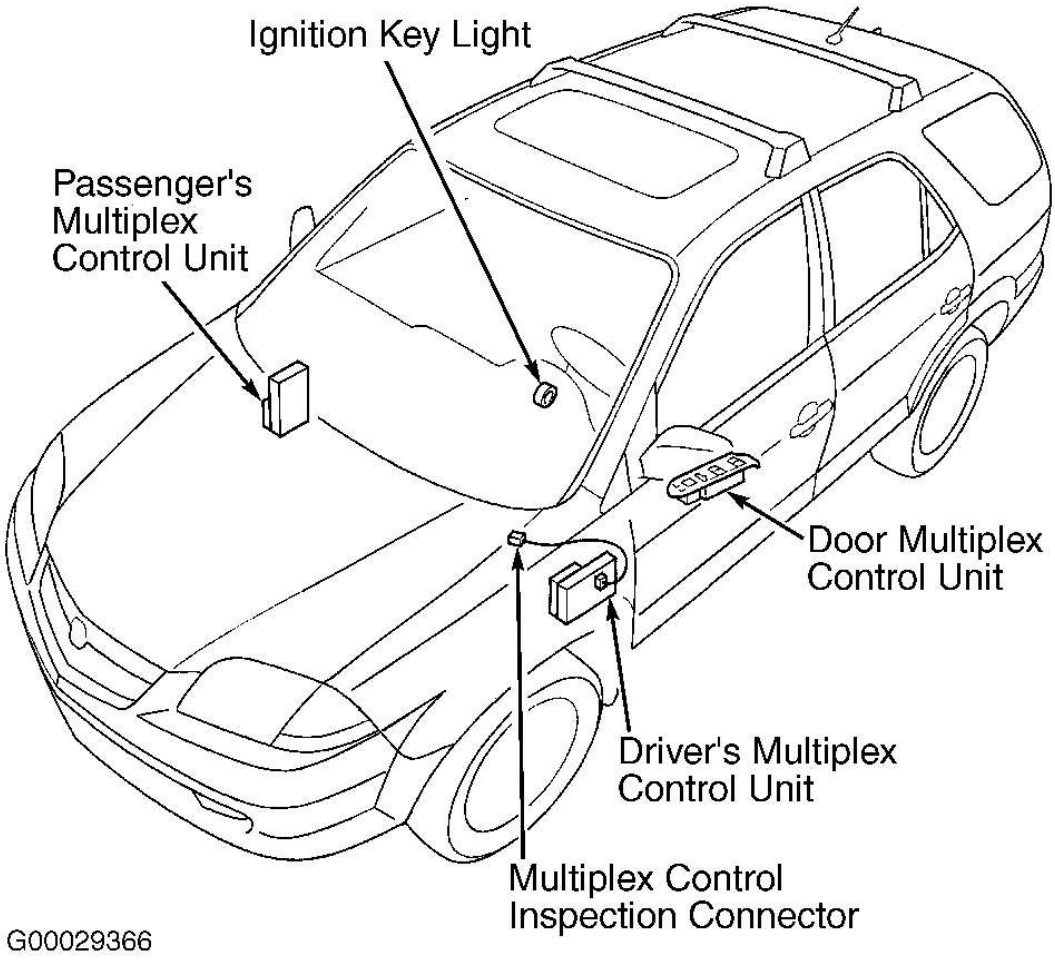


Fig. 1: Locating Multiplex Control System Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Driver's Power Seat Control Unit (With DPMS)

Unit is mounted to bottom of driver's seat. See **Fig. 2** .

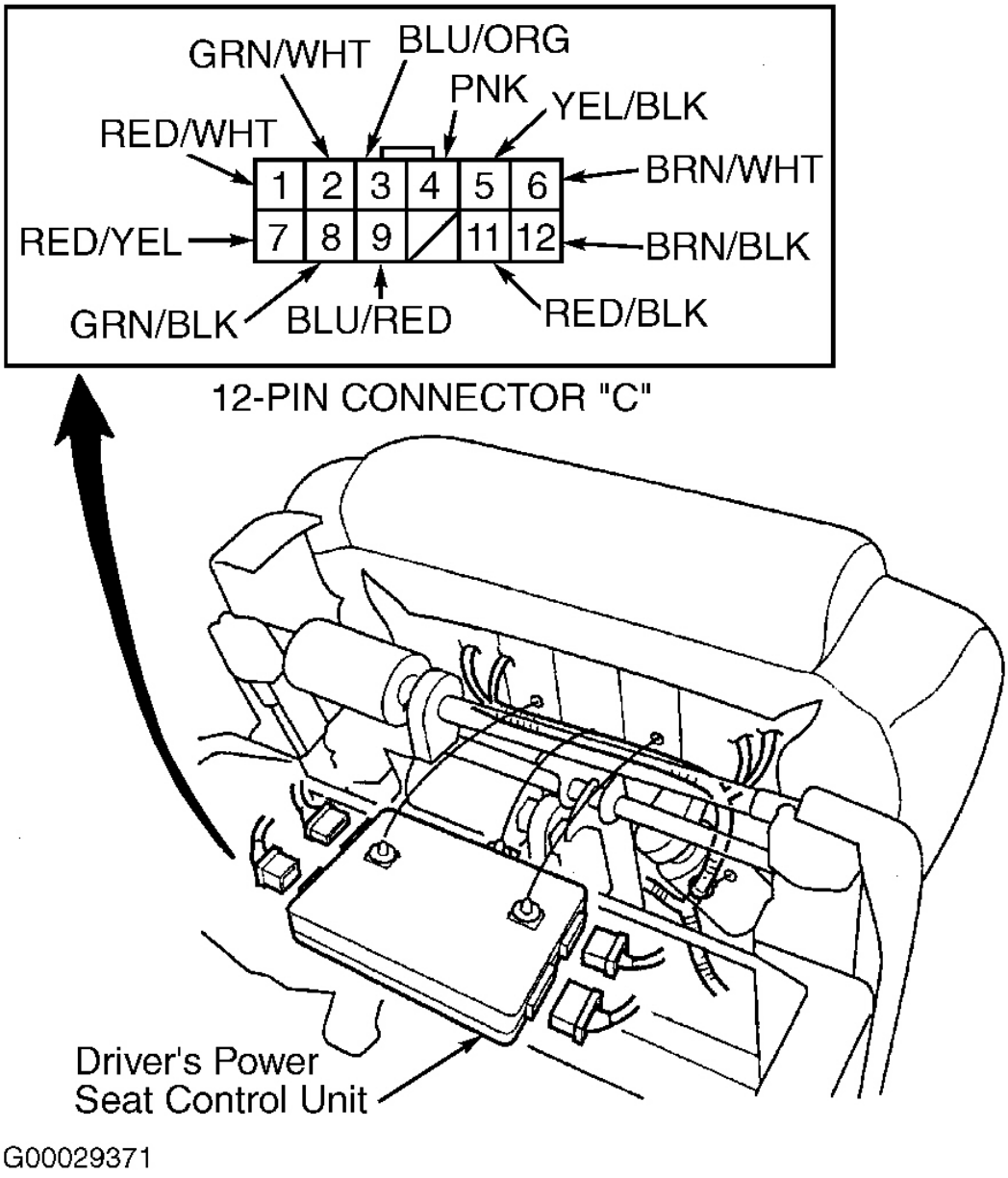


Fig. 2: Locating Driver's Power Seat Control Unit
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SYSTEM TESTS

WARNING: Deactivate air bag system before performing any service operation. See AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag

system. Air bag may deploy.

NOTE: If fault still exists after verifying multiplex control system operation, return to appropriate article that directed you to this article.

SELF-DIAGNOSTIC SYSTEM

1. Ensure fuse No. 9 (10-amp) in driver's underdash fuse/relay box and fuse No. 13 (7.5-amp) in passenger's underdash fuse/relay box are okay. If fuse(s) are not okay, find and repair cause of blown fuse. See **WIRING DIAGRAMS** . If fuse(s) are okay, go to next step.
2. Locate multiplex control unit diagnostic test connector under steering column, taped to brake switch wiring harness. See **Fig. 3** . Turn ignition on. Connect SCS Service Connector (07WAZ-001010A) to multiplex control unit diagnostic test connector and wait for at least 5 seconds.

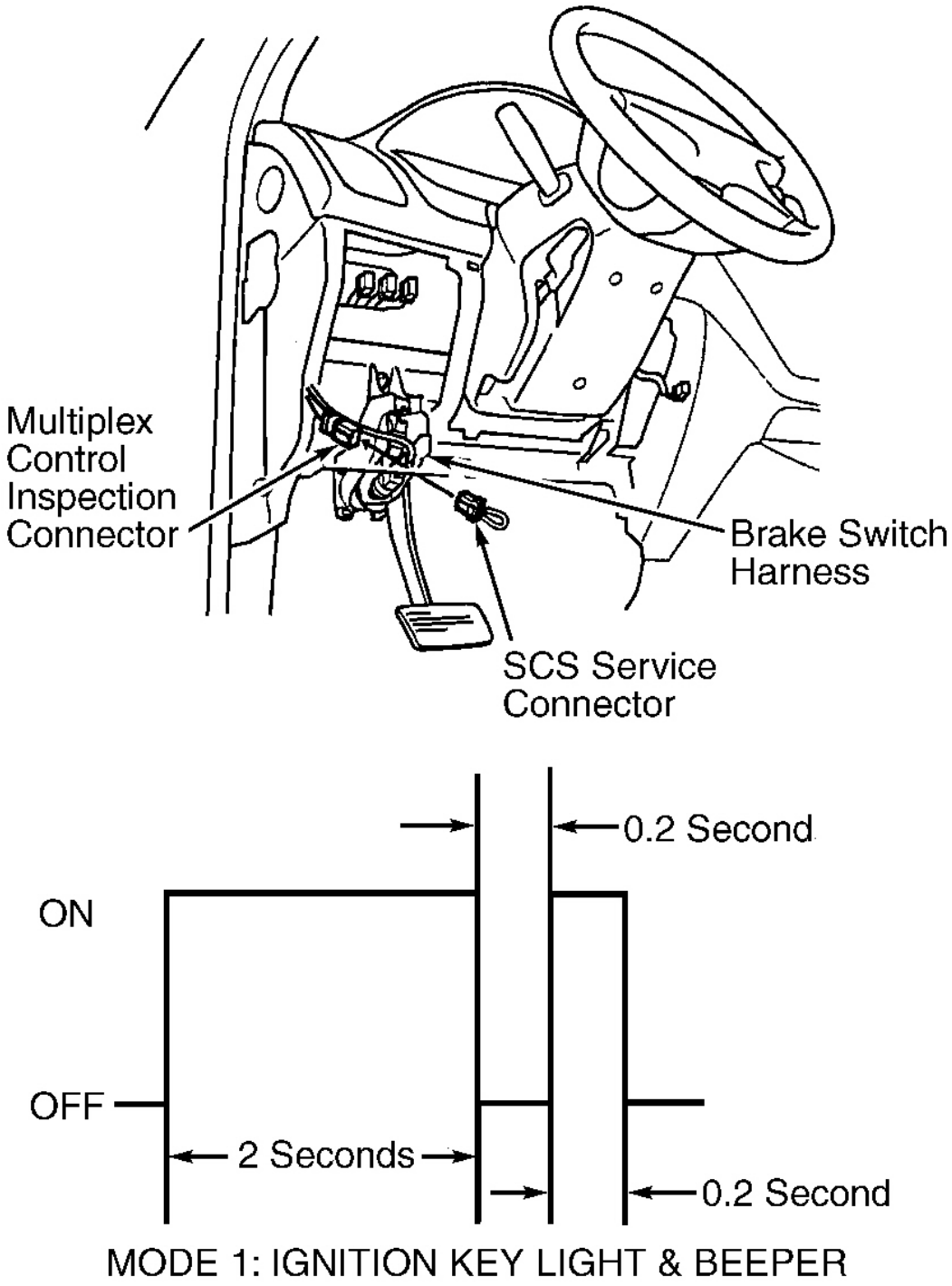


Fig. 3: Entering Self-Diagnostic Mode

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Observe ignition switch light and buzzer. They should come on for 2 seconds, then off for .2 seconds, then back on again for .2 seconds. This confirms that you are in MODE 1 of self-diagnostics function. After entering MODE 1, go to next step. If ignition switch light and buzzer do not operate as specified, go to step 5 .
4. If a DTC is present, ignition switch light and buzzer will indicate DTC by the number of times they turn on and off. If a DTC is indicated, go to step 7 . If no DTCs are indicated, go to next step.
5. Check continuity between multiplex control unit diagnostic test connector and driver's multiplex control unit terminal A15 (Light Blue wire). See **WIRING DIAGRAMS** . If continuity exists, go to next step. If continuity does not exist, repair open circuit in wiring. If wiring is okay, replace driver's underdash fuse/relay block. After repairs, recheck for DTCs.
6. Check continuity between ground and Black wire at multiplex control unit diagnostic test connector. If continuity is indicated, go to step 13 . If continuity is not indicated, repair open circuit to ground in Black wire. After repairs, recheck for DTCs.
7. One second after entering MODE 1, ignition switch light flashes and buzzer sounds to indicate DTC is present. If more than one DTC is present, system will indicate them in ascending order and will repeat every 3 seconds. See **DTC DIAGNOSIS** table. Note DTC(s) and go to next step.

DTC DIAGNOSIS

DTC	Probable Cause
1 (1)	Driver's Control Unit Can Not Receive Signal From Door Control Unit
2 (1)	Driver's Control Unit Can Not Receive Signal From Passenger's Control Unit
3 (1)	Driver's Control Unit Can Not Receive Signal From Power Seat Control Unit (DPMS)
4 (1)	Not A Valid Code
5 (2)	Malfunction In Driver's Control Unit
6 (1)	Door Control Unit Can Not Receive Signals From Other Control Units
7 (1)	Passenger's Control Unit Can Not Receive Signals From Other Unit

(1) Diagnose using **COMMUNICATION LINES** under CIRCUIT TESTS.

(2) Replace driver's multiplex control unit and recheck DTCs.

8. Turn ignition off. Check communication lines for continuity. See **COMMUNICATION LINE CONTINUITY** . If continuity is not present on either wire, repair open circuit between control units. If continuity exists on both circuits, go to next step.

COMMUNICATION LINE CONTINUITY

Communication Line	Wire Color
Door Unit To Driver's Unit	Brown
Driver's Unit To Passenger's Unit Or Power Seat Unit	Pink

9. Turn ignition switch on. Test for appropriate voltages at control units. See **COMMUNICATION LINE VOLTAGE** . If voltages are correct, communication lines are okay. Go to next step. If voltages are incorrect, check for open or short circuit in communication line, poor connection at either control unit or faulty circuit in transmitting unit.

COMMUNICATION LINE VOLTAGE

Communication Line (Wire Color)	Voltage
From Door Control Unit To Driver's Control Unit (Brown Wire)	3.5-9.5
From Driver's Control Unit To Passenger's Control Unit Or Driver's Power Seat Control (DPMS) Unit (Pink Wire)	3.0-10.0

10. Shift system to SLEEP mode. Turn ignition off. Open and close a door to cancel key off operation timer in power window system. Ensure all doors are closed and exterior lights are off. If switches related to multiplex control unit are not operated, multiplex control system will shift to SLEEP mode after one minute. All switches must be in OFF position, except door lock knob switches. Go to next step.
11. Confirm SLEEP mode. Check for voltage on multiplex control unit wake-up communication lines (Brown wire for door-to-driver's control unit; Pink wire from driver's, passenger's or driver's power seat control unit). See **WIRING DIAGRAMS** . Battery voltage should be present. Check parasitic draw at battery while changing to sleep mode. Parasitic draw should change from 70-80 milliamps to less than 10-20 milliamps.

NOTE: When ignition is turned on, all multiplex control units wake up at the same time, without talking to each other. When any switch in multiplex system is turned on, it wakes up its corresponding control unit, which in turn wakes the other control units. If any multiplex control unit is faulty and cannot wake up, several parts of multiplex system will not operate.

12. Confirm WAKE UP mode. After confirming sleep mode, look at the following lists for switch most closely associated with the problem. Operate switch to see if its corresponding control unit wakes up.

Passenger's multiplex control unit switches:

- Front passenger's door switch.
- Front passenger's key cylinder switch (LOCK/UNLOCK).
- Front passenger's door lock switch (LOCK/UNLOCK).
- Front passenger's door lock knob switch (UNLOCK).
- Power mirror switch (DPMS).
- Right rear door lock knob switch (UNLOCK).

- Security input for radio and navigation unit (disconnect radio connector to test).

Driver's multiplex control unit switches:

- Ignition key switch (insert key).
- Headlight switch.
- Park/taillight switch.
- Driver's door switch.
- Left rear door switch.
- Tailgate latch switch.
- Engine hood switch.
- Keyless entry transmitter (LOCK).
- Keyless entry transmitter (UNLOCK).
- Keyless entry transmitter (PANIC).

Door multiplex control unit switches:

- Driver's door key cylinder switch (LOCK/UNLOCK).
- Driver's door lock knob switch (LOCK/UNLOCK).
- Driver's door lock switch (LOCK/UNLOCK).
- Position 1 switch (DPMS).
- Position 2 switch (DPMS).
- Power window master switch.

If all components operate properly, WAKE UP mode is okay. Go to next step. If WAKE UP mode does not function, test power and ground inputs to all 3 multiplex control units. See **DOOR MULTIPLEX CONTROL UNIT** ,**DRIVER'S MULTIPLEX CONTROL UNIT** and **PASSENGER'S MULTIPLEX CONTROL UNIT** under PIN VOLTAGE TESTS. Repair as necessary.

NOTE: To enter self-diagnostic MODE 2, vehicle must already be in self-diagnostic MODE 1. To cancel MODE 2, remove SCS service connector for at least 10 seconds or turn ignition off.

13. Activate MODE 2 diagnostics. To switch from MODE 1 to MODE 2, disconnect SCS Service Connector (07WAZ-0010100) for 5-10 seconds, then reconnect SCS service connector. Ignition key light and beeper should come on for 2 seconds, then turn off and back on twice more at .2 second intervals. This confirms that system has gone from MODE 1 to MODE 2. Go to next step.
14. Check the following lists and operate the switch most closely related to the problem.

NOTE: When testing door lock knob, ensure that passenger's door lock knob is in LOCK position.

Passenger's multiplex control unit switches:

- Front passenger's door switch.
- Front passenger's key cylinder switch (LOCK/UNLOCK).
- Front passenger's door lock switch (LOCK/UNLOCK).
- Front passenger's door lock knob switch (UNLOCK).
- Power mirror switch (DPMS).
- Right rear door switch.
- Right rear door lock knob switch (UNLOCK).
- Security input for radio and navigation unit (disconnect radio connector to test).

Driver's multiplex control unit switches:

- Brake light switch.
- Instrument cluster lights brightness control.
- Driver's door switch (OPEN).
- Driver's seat belt switch (BUCKLED).
- Hood switch (OPEN).
- Engine oil pressure switch (DISCONNECTED/RECONNECTED).
- Headlight switch (PARK/TAILLIGHT).
- Ignition key switch.
- Keyless entry transmitter (LOCK).
- Keyless entry transmitter (UNLOCK).
- Keyless entry transmitter (PANIC).
- Parking brake switch.
- Tailgate latch switch.
- A/T gear position switch (PARK).
- Windshield wiper/washer switch, except MIST switch.

Door multiplex control unit switches:

- Driver's door key cylinder switch (LOCK/UNLOCK).
- Driver's door lock knob switch (LOCK/UNLOCK).
- Driver's door lock switch (LOCK/UNLOCK).
- Power window master switch.
- Driving position memory switch (MEMO/POSITION 1/POSITION 2).

DPMS-equipped vehicles:

- Recline limit switch.
- Driver's power seat adjustment (all directions).

NOTE: Key cylinder switches should only beep or flash when turned to LOCK or UNLOCK position. If they beep or flash when returning switch to NEUTRAL

position, switch is defective.

If related circuit of switch operates properly, ignition key light will flash and buzzer will sound. Go to appropriate article in ACCESSORIES & EQUIPMENT to further diagnose problem. If circuit is faulty, there will be no system response when switch is operated. Go to next step.

15. Check several other circuits listed for affected control unit. If ignition key light flashes and buzzer sounds when other switches are operated, repair short or open circuit to switch tested in previous step. Multiple failed circuits could mean that control unit has failed, even if DTC was not set. If several circuits have failed, substitute a known-good control unit, then recheck system. If there is still a malfunction, substitute a known-good control unit for next most likely failed control unit.

COMMUNICATION LINES

NOTE: An open in a communication line will cause most systems to not operate because one multiplex control unit cannot wake up other multiplex control units. Multiplex control units that are not awake will wake up when a related switch is operated. Turning ignition switch to ON position will wake up all multiplex control units. If a communication line is shorted to ground:

- **Most systems do not operate because one of the control units will not wake up other control units.**
- **Control unit can wake up by a related switch operation, but other control units cannot wake up by a switch operation.**
- **All control units wake up by turning ignition switch to ON position.**

Door-To-Driver's Multiplex Control Unit

1. Turn ignition off. Check continuity in communication line (Brown wire) between door multiplex control unit harness connector terminal A15 and driver's multiplex control unit harness connector terminal A2. See **WIRING DIAGRAMS** . If continuity exists, go to next step. If continuity does not exist, repair open in Brown wire. After repairs, recheck DTCs.
2. Turn ignition on. Check voltage in communication line (Brown wire) between ground and door multiplex control unit harness connector terminal A15, and driver's multiplex control unit harness connector terminal A2. Voltage should be 3.5-9.5 volts at both terminals. If voltage is not as specified, go to next step.
3. If voltage is greater than 9.5 volts, check for short in circuit or poor contact or faulty circuit at connector on receiver side of unit. If voltage is less than 3.5 volts, check for short to ground or short to another wire in circuit. Check for poor contact or faulty circuit at connector on transmitter side unit. Repair as necessary. After repairs, recheck DTCs.

Driver's-To-Passenger's Multiplex Control Unit Or To Driver's Power Seat Multiplex Control Unit (With DPMS)

1. Turn ignition off. Check continuity in communication line (Pink wire) between driver's multiplex control unit harness connector terminal B1, passenger's multiplex control unit harness connector terminal B9, and

driver's power seat multiplex control unit harness connector terminal C4 (if equipped with DPMS). See **Fig. 2** , **Fig. 5** and **Fig. 6** . See **WIRING DIAGRAMS** . If continuity exists between all 3 control units, go to next step. If continuity does not exist between all 3 control units, repair open in Pink wire. After repairs, recheck DTCs.

2. Turn ignition on. Check voltage in communication line (Pink wire) between ground and following:
   - Driver's multiplex control unit harness connector terminal B1.
   - Passenger's multiplex control unit harness connector terminal B9.
   - Driver's power seat multiplex control unit harness connector terminal C4 (if equipped with DPMS).

   Voltage should be 3-10 volts. If voltage is not as specified, go to next step.

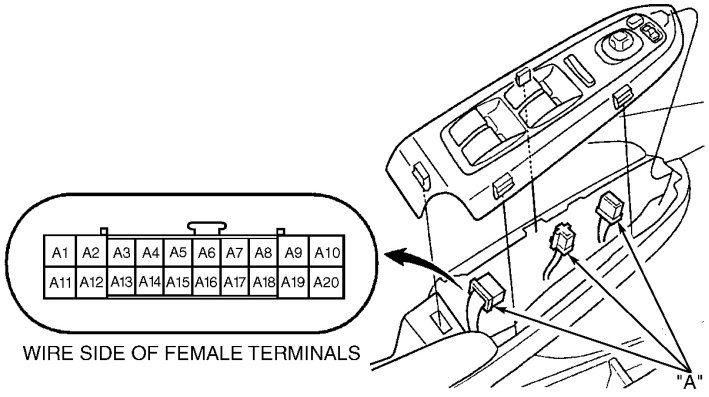
3. If voltage is greater than 10 volts, check for short in circuit or poor contact, or faulty circuit at connector on receiver side of unit. If voltage is less than 3 volts, check for short to ground or short to another wire in circuit. Check for poor contact or faulty circuit at connector on transmitter side of unit. Repair as necessary. After repairs, recheck DTCs.

PIN VOLTAGE TESTS

DOOR MULTIPLEX CONTROL UNIT

CAUTION: To avoid damaging connector terminals, backprobe non-waterproof connectors from harness side.

Remove driver's door switch trim to gain access to door multiplex control unit connector. Turn ignition off. Disconnect door multiplex control unit 20-pin harness connector. See **Fig. 4** . Check connector terminals and contacts. Repair as necessary and retest system. If connector terminals and contacts are okay, perform input tests. If test results are as specified, perform testing procedure on passenger's multiplex control unit. See **PASSENGER'S MULTIPLEX CONTROL UNIT** .



Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
A1	WHT/YEL	Under all conditions	Check for voltage to ground: There should be battery voltage.	• Blown No. 13 (7.5A) fuse in the passenger's under-dash fuse/ relay box • An open in the wire
A2	GRN/WHT	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 54 (40A) fuse in the under-hood fuse/relay box. • Blown No. 15 (20A) fuse in the passenger's under-dash fuse/ relay box • Faulty power window relay • An open in the wire
A12	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G401) • An open in the wire
A19	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G601) • An open in the wire

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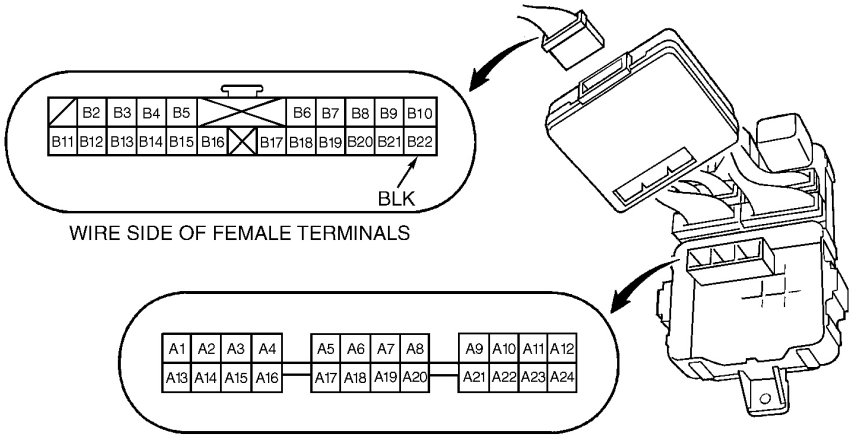
Fig. 4: Door Multiplex Control Unit Input Test
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PASSENGER'S MULTIPLEX CONTROL UNIT

Turn ignition off. Remove passenger's multiplex control unit from fuse/relay block, behind right kick panel. See **INSTRUMENT PANEL FUSE/RELAY BLOCK** under REMOVAL & INSTALLATION. See **Fig. 5** . Check terminals and contacts. Repair as necessary and retest system. If terminals and contacts are okay, perform input tests. If test results are as specified, perform testing procedure on driver's multiplex control unit. See **DRIVER'S MULTIPLEX CONTROL UNIT** .



Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
A24	Fuse/relay box socket	Under all conditions	Check for voltage to ground: There should be battery voltage.	• Blown No. 13 (7.5A) fuse in the passenger's under-dash fuse/ relay box • An open in the wire
A8		Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G651) • An open in the wire
A22		Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 9 (10A) fuse in the driver's under-dash fuse/relay box • An open in the wire
A12		Under all conditions	Check for continuity to ground: There should be continuity	• Poor ground (G651) • Faulty passenger's fuse box • Faulty power window relay • An open in the wire
B22	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G503) • An open in the wire

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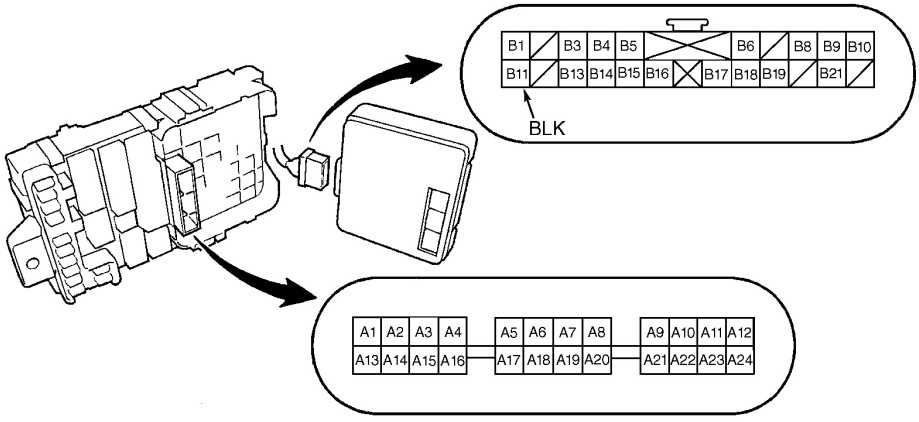
Fig. 5: Passenger's Multiplex Control Unit Input Test
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DRIVER'S MULTIPLEX CONTROL UNIT

Turn ignition off. Remove driver's multiplex control unit from fuse/relay block, behind left kick panel. See **INSTRUMENT PANEL FUSE/RELAY BLOCK** under REMOVAL & INSTALLATION. Check terminals and contacts. Repair as necessary and retest system. If terminals and contacts are okay, perform input tests. See **Fig. 6** . If test results are as specified, go to **SYSTEM TESTS** .



Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
A12	Fuse/relay box socket	Under all conditions	Check for voltage to ground: There should be battery voltage.	• Blown No. 13 (7.5A) fuse in the passenger's under-dash fuse/ relay box • An open in the wire
A14		Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G401) • An open in the wire
A24		Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown No. 9 (10A) fuse in the driver's under-dash fuse/relay box • An open in the wire
A13		Ignition key is inserted into the ignition switch	Check for continuity to ground: There should be continuity.	• Faulty ignition key switch • An open in the wire • Poor ground (G401)
A1		Under all conditions	Attach to ground: Ignition key light should come on.	• Blown No. 47 (20A) fuse in the under-hood fuse/relay box • Blown LED • An open in the wire
A15		Short the multiplex control inspection connector terminals.	Check for continuity to ground: There should be continuity.	• Poor ground (G401) • Faulty driver's fuse/relay box • An open in the wire
B11	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G501) • An open in the wire

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Fig. 6: Driver's Multiplex Control Unit Input Test
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

WARNING: Deactivate air bag system before performing any service operation. See AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

POWER WINDOW MASTER SWITCH

Removal & Installation

Switch is held into door panel by 3 clips and 2 hooks. Gently pry up on back of power window master switch assembly. Pull up and rearward to remove. Disconnect harness connectors. Remove 4 screws and remove switch from face plate. To install, reverse removal procedure.

INSTRUMENT PANEL FUSE/RELAY BLOCK

Removal & Installation

NOTE: Obtain radio anti-theft code and write down radio presets before disconnecting battery. Reprogram anti-theft code and radio stations after repairs are complete.

1. Deactivate air bag system. See AIR BAG RESTRAINT SYSTEMS article. Disconnect negative battery cable and then positive battery cable. WAIT at least 3 minutes before beginning repairs under instrument panel.
2. Remove door sill molding, and then left or right side kick panel. Remove access panel. Remove fuse/relay block mounting bolt and pull fuse/relay block down. Disconnect harness connectors and remove fuse/relay block. To install, reverse removal procedure.

WIRING DIAGRAMS

For 2001 model wiring diagrams, see **BODY CONTROL MODULES** in SYSTEM WIRING DIAGRAMS in ELECTRICAL.

For 2002 model wiring diagrams, see **BODY CONTROL MODULES** in SYSTEM WIRING DIAGRAMS in ELECTRICAL.