Pinpoint Tests -- Air Bag System

AIR BAG SENSOR CIRCUIT HIGH RESISTANCE OR OPEN FAULT CODE 41

Normal Operation

Each air bag sensor has an internal resistor. The air bag diagnostic monitor uses the resistors in the air bag sensors in combination with the two resistors inside the air bag diagnostic monitor to create a tightly controlled diagnostic voltage at pin 11 (circuit 944A "GN/W"). The air bag sensors are tied together inside the air bag diagnostic monitor at pins 17 (circuit 933 "BR/GN"), 18 (circuit 932 "BR/R") and 19 (circuit 931 "BR/BK"). Therefore, the resistors in the air bag sensors are connected in parallel. The parallel combination of all the air bag sensor resistors should be equal to 393 ohms. The resistance of each air bag sensor should be 1180 ohms (±12 ohms).

The resistors inside the air bag diagnostic monitor are connected to pins 11 (circuit 944A "GN/W") and 12 (circuit 944B "GN/W") and are equal in value. Note that circuits 944A and 944B are tied together inside the joint connector. Therefore, the two resistors inside the air bag diagnostic monitor are connected in parallel and will function the same as one resistor of half the original value. The air bag system is wired so that current will flow from both pins 11 and 12 through the center cowl safing rear air bag sensor and out to the driver side air bag module and through the joint connector and out to the passenger side air bag module. Current flows through the driver side air bag module and into pin 10 (circuit 937 "GY") and through the passenger side air bag module and into the pin 9 (circuit 939 "GN/R"). Current then flows from pins 10 and 9 through the diodes inside the air bag diagnostic monitor and out to the primary crash air bag sensors through pins 17, 18, and 19. The current flows through each primary crash air bag sensor resistor and stops at the case ground of each primary crash air bag sensor. Pin 11 is the midpoint of the resistor network and voltage at pin 11 will change with vehicle charging system voltage. The expected voltage at pin 11 is shown in the table below:

DIAGNOSTIC PIN VOLTAGE CHART

Charging System Voltage	Voltage on Pin 9	Voltage on Pin 10	Voltage on Pin 11	Voltage on Pin 17	Voltage on Pin 18	Voltage or Pin 19
9.0	1.9	1.9	1.9	1.4	1.4	1.4
9.5	2.0	2.0	2.0	1.5	1.5	1.5
10.0	2.1	2.1	2.1	1.6	1.6	1.6
10.5	2.2	2.2	2.2	1.7	1.7	1.7
11.0	2.3	2.3	2.3	1.8	1.8	1.8
11.5	2.4	2.4	2.4	1.9	1.9	1.9
12.0	2.5	2.5	2.5	2.0	2.0	2.0
12.5	2.6	2.6	2.6	2.1	2.1	2.1
13.0	2.7	2.7	2.7	2.2	2.2	2.2
13.5	2.8	2.8	2.8	2.3	2.3	2.3
14.0	2.9	2.9	2.9	2.4	2.4	2.4
14.5	3.0	3.0	3.0	2.5	2.5	2.5

15.0	3.1	3.1	3.1	2.6	2.6	2.6
15.5	3.2	3.2	3.2	2.7	2.7	2.7
16.0	3.3	3.3	3.3	2.8	2.8	2.8

The air bag diagnostic monitor measures the vehicle charging system voltage at pin 13 (battery input). By measuring the voltage at pin 13, the air bag diagnostic monitor can accurately predict what the voltage at pin 11 should be in a normal functioning system.

If the resistance of one or more of the air bag sensors has increased in value, then the equivalent resistance of the air bag sensors will be greater than 393 ohms. When the air bag sensor resistance increases, there is less overall resistance pulling the diagnostic voltage down. Therefore, the voltage at pin 11 will increase and the air bag diagnostic monitor will flash a code 41 to indicate high resistance (or an open circuit) in one of the air bag sensor circuits. Another situation that may cause high voltage on pin 11 is if resistance builds up across the normally open center cowl safing rear air bag sensor contacts. Safing sensor do not normally have resistance across their contacts. The resistance across center cowl safing rear air bag sensor contacts should be infinite (open). If resistance appears across the center cowl safing rear air bag sensor contacts, then current will flow from pin 15 (circuit 951 "GN/Y") through the abnormal resistance across the center cowl safing rear air bag sensor contacts and into circuit 944A "GN/W". Since the voltage at pin 15 is battery voltage or higher, this will also cause an increase in voltage at pin 11 and the air bag diagnostic monitor will flash a code 41.

Possible Causes

Higher than normal voltage on pin 11 can be caused by:

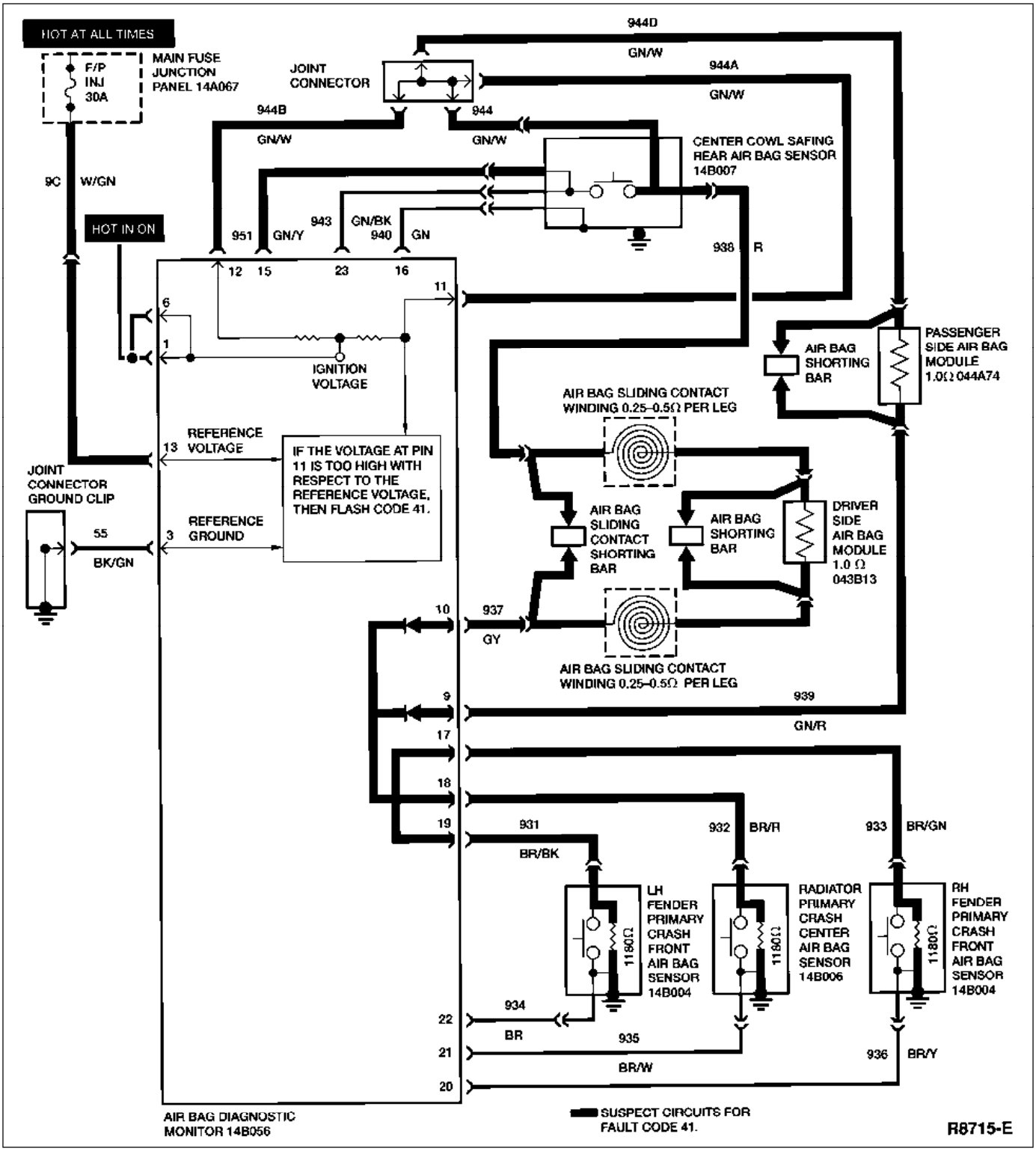
(1) An open in one or more of the circuits between the air bag diagnostic monitor and the primary crash air bag sensors. Circuits 933 "BR/GN", 932 "BR/R", or 931 "BR/BK" may have an open circuit in the wiring.

(2) An abnormally high resistance value across one or more of the primary crash air bag sensors. One or more of the primary crash air bag sensor resistors may have too high resistance or may be a completely open circuit.

(3) An intermittent open between the positive terminal of the battery and pin 13 may cause the air bag diagnostic monitor to determine that voltage on pins 17, 18 and 19 is too high with respect to the voltage on pin 13.

(4) Resistance across the center cowl safing rear air bag sensor. The center cowl safing rear air bag sensor is a normally open switch with infinite resistance across its contacts. If the center cowl safing rear air bag sensor is faulty and some resistance builds up across the open contacts, the voltage on circuit 951 ("GN/Y") will pull up the voltage on circuit 944A ("GN/W").

Electrical Schematic -- Air Bag Sensor Circuit High Resistance or Open Fault Code 41



Pinpoint Test -- Air Bag Sensor Circuit High Resistance or Open Fault Code 41

- 41-1: VERIFY CONDITION
- 41-2: DEACTIVATE SYSTEM/MEASURE VOLTAGE ON PIN 11
- 41-3: SERVICE POOR CONNECTIONS
- 41-4: MEASURE PRIMARY CRASH AIR BAG SENSOR RESISTANCE
- 41-5: MEASURE RESISTANCE OF PRIMARY CRASH AIR BAG SENSOR WITH ABNORMAL READING
- 41-6: CHECK RESISTANCE ACROSS PINS 15 AND 11
- 41-7: MEASURE RESISTANCE OF CENTER COWL SAFING REAR AIR BAG SENSOR