
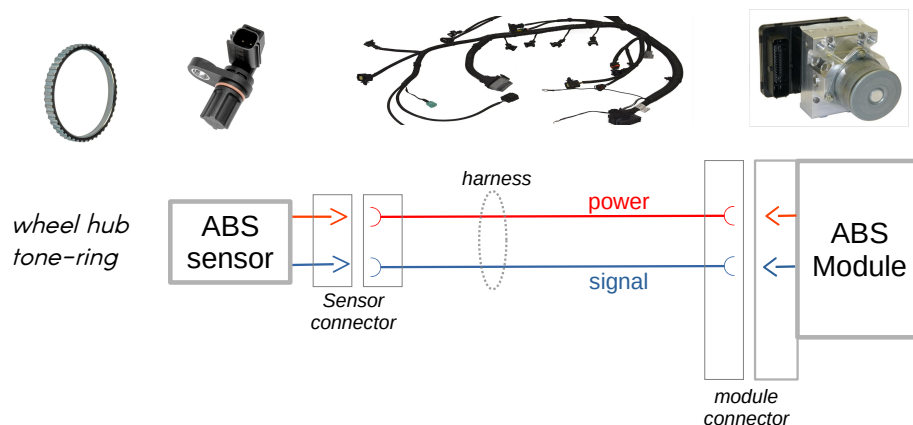


Diagnosing "Active" ABS wheel speed sensor faults

This tutorial covers the diagnosis of "active" ABS wheel speed sensor (WSS) system warnings. These sensor types are also known as "Hall-Effect" or "Magneto-resistive". They are most often 2-wire sensors and operate by detecting the rotation of a toothed "tone ring" in the wheel hub.

Symptoms:

- ABS light 
- Dashboard ABS system warning message
- [OBD-2 diagnostic error codes related to ABS sensor](#)



What could possibly go wrong?

- Wheel tone ring is broken
- Sensor head is dirty
- Sensor gap to tone ring is incorrect
- Sensor electronics are damaged
- Electrical contacts are damaged or corroded
- Wires in the harness are damaged (open or shorted out)
- ABS module not working
- Other modules not working or not communicating with ABS system

1. Verify status of problem

- a) Scan automobile, record, and clear Diagnostic Trouble Codes (DTC)
- b) Turn the ignition off and back on
- c) Scan automobile again and record DTC's
- d) **Are ABS related scan codes present?**

Yes? Go to section 2

No? Problem appears to be intermittent. Go to section (intermittent)

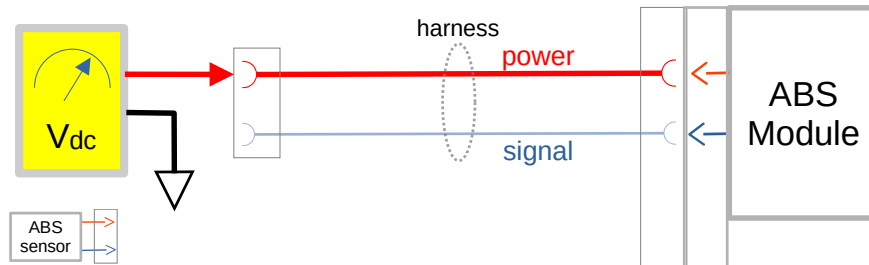
2. Check connectors and wiring for damage and corrosion

Perform a careful visual inspection of all connections and wiring

- a) Ignition off
- b) Clean contacts with contact cleaner and dry before re-assembly
- c) Repair damage as necessary
- d) Go to section 1 and verify repairs
- e) **If error codes remain go to section 3**

3. Is there power from the ABS module to the Wheel Speed Sensor (WSS) ?

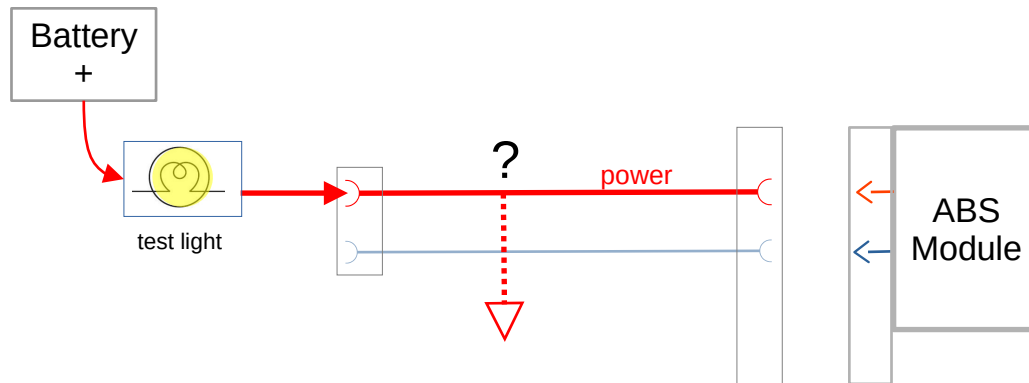
Measure DC voltage from ABS at WSS sensor connector



- a) ABS module connected to harness
- b) Determine which WSS connector position is sensor **Power** **Position** _____
- c) Disconnect WSS sensor connector **Lead color** _____
- d) Ignition on
- e) Measure DC voltage from power terminal of connector (reference to battery minus) Depending on the car make, this voltage is usually 5 or 12 volts
- f) Is the sensor **Power** voltage in the expected range? **Voltage** _____
Yes? Go to step 6
No? Go to step 4

4. Is the WSS Power shorted to ground in the harness?

Probe harness Power line with injection from battery powered test light



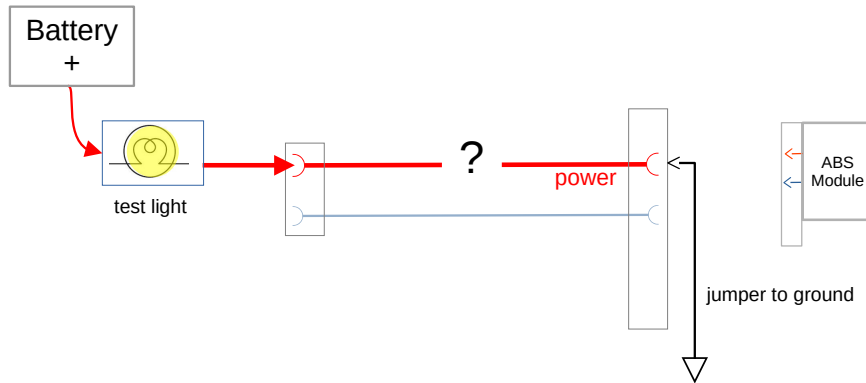
- WSS and ABS connectors disconnected
- Probe Power terminal (at either WSS or ABS end of harness) with test light connected to battery plus.
- Does the test light shine?**

Yes? Repair ground fault in harness

No? Go to step 5

5. Is WSS sensor power line open in harness?

Probe one end of harness Power line with injection from battery powered test light with other end jumpered to ground



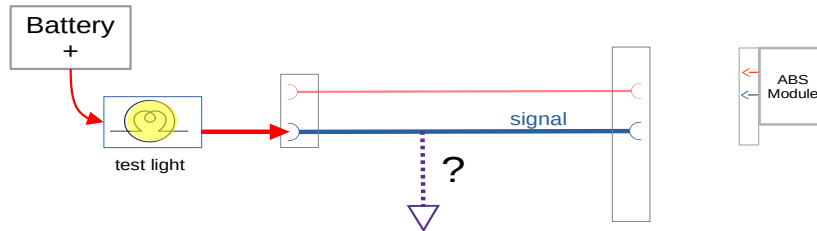
- WSS and ABS connectors disconnected
- Jump **sensor power** wire to ground at ABS connector
- Probe Power terminal at either WSS end connector with test light connected to battery plus.
- Does the test light shine?**

Yes? Go to step 6 (suspected fault in ABS controller)

No? Repair open fault in harness

6. Is the WSS signal circuit shorted to ground?

Probe one end of harness Signal circuit with injection from battery powered test light.



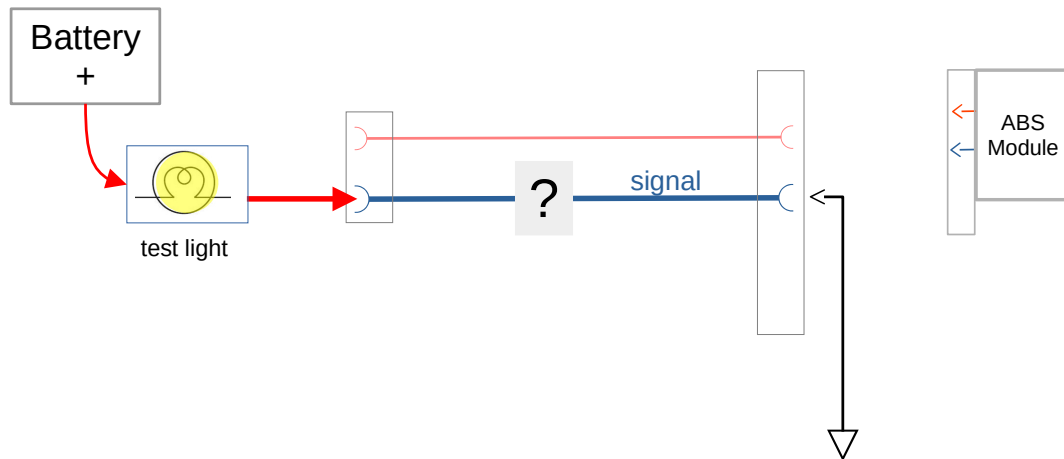
- WSS and ABS connectors disconnected
- Probe Signal terminal (at either WSS or ABS end of harness) with test light connected to battery plus.
- Does the test light shine?**

Yes? Repair ground fault in harness

No? Go to step 7

7. Is WSS sensor Signal line open in harness?

Probe one end of harness Signal circuit with injection from battery powered test light with other end jumpered to ground



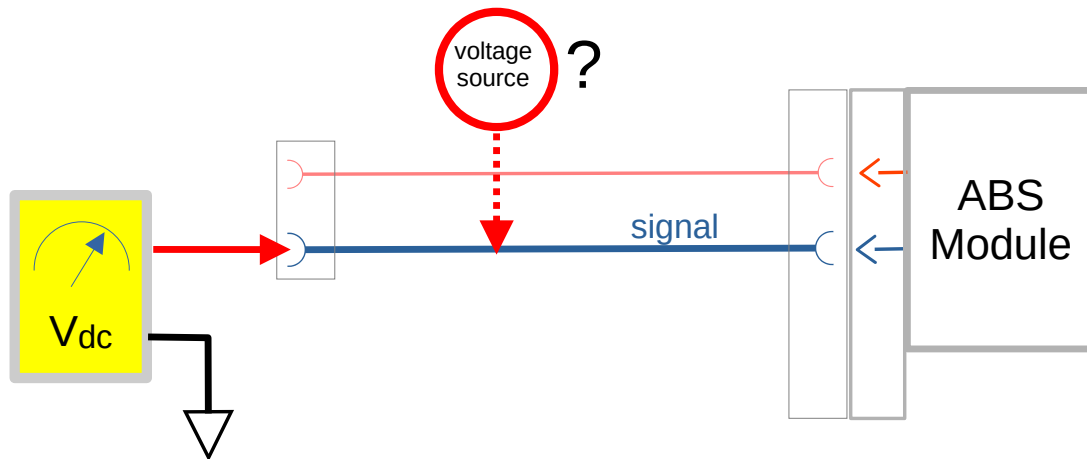
- WSS and ABS connectors disconnected
- Jump sensor **Signal** wire to ground at ABS connector
- Probe Signal terminal at WSS end connector with test light connected to battery plus.
- Does the test light shine?**

Yes? Go to step 8

No? Repair open fault in harness Signal circuit

8. Is WSS sensor Signal line shorted to voltage?

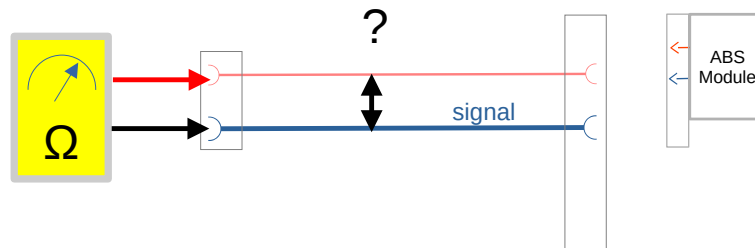
Measure voltage between Signal circuit and ground



- ABS module connected to harness
- Ignition on
- Measure voltage between Signal contact on WSS end of harness to ground
- Is voltage greater than 1 volt?
Yes? Repair Signal circuit for short
No? Go to section 9

9. Are the Signal and Power circuits shorted together?

Measure resistance between Signal and Power lines in harness



- WSS and ABS connectors disconnected
- Measure resistance between Signal and Power lines in harness
- Is the resistance greater than 5 ohms?

Yes? Go to section 10

No? Repair short circuit in harness between Signal and Power lines

10. Is the WSS functional?

Sensor circuit integrity

- measure Signal voltage at sensor and ABS
- install known good sensor
- cross jumper with another sensor

Functional test of WSS

- measure signal while spinning wheel

Generic OBD-2 codes related to ABS wheel speed sensor function

- C0035** - Left Front Wheel Speed Circuit Malfunction
- C0040** - Right Front Wheel Speed Circuit Malfunction
- C0041** - Right Front Wheel Speed Sensor Circuit Range/Performance (EBCM)
- C0045** - Left Rear Wheel Speed Circuit Malfunction
- C0046** - Left Rear Wheel Speed Sensor Circuit Range/Performance (EBCM)
- C0050** - Right Rear Wheel Speed Circuit Malfunction
- C0051** - LF Wheel Speed Sensor Circuit Range/Performance (EBCM)
- C0221** - Right Front Wheel Speed Sensor Circuit Open
- C0222** - Right Front Wheel Speed Signal Missing
- C0223** - Right Front Wheel Speed Signal Erratic
- C0225** - Left Front Wheel Speed Sensor Circuit Open
- C0226** - Left Front Wheel Speed Signal Missing
- C0227** - Left Front Wheel Speed Signal Erratic
- C0229** - Drop Out of Front Wheel Speed Signals
- C0235** - Rear Wheel Speed Signal Circuit Open
- C0236** - Rear Wheel Speed Signal Circuit Missing
- C0237** - Rear Wheel Speed Signal Erratic
- C0238** - Wheel Speed Mismatch
- C0245** - Wheel Speed Sensor Frequency Error

Tools and supplies

Digital multimeter

Needle backprobe leads

Inspection light

Inspection mirror

12-Volt incandescent test light

electronic wiring diagram of ABS system

Rust penetrating oil (WD40)

Electronic contact cleaner

Tooth pick and Q-tips

rags

References

<https://www.hella.com/techworld/uk/Technical/Sensors-and-actuators/Check-change-ABS-sensor-4074/>