# ABS I Diagnostic Methods

By Brian Curry corrected by Gianni Becattini, November 2010
September 1998

Generally when the ABS lights start flashing, people start seeing dollar signs since there seems to be very little info on it out there, and what is there, has you testing using the BIG DOLLAR $$$ BMW test tool.

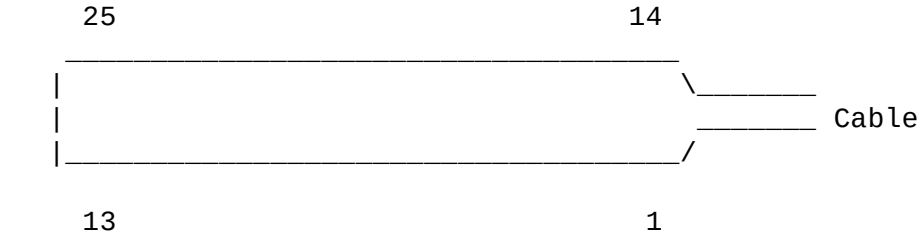
This is some info on how to find out what is causing the fault using a Volt Ohm Meter (VOM) and then how to investigate and narrow it down more using that same VOM. This is written based on ABS I. ABS II is similar, but has different codes.

The fault code is indicated at the diagnostic connector that the BMW tool connects to. On my K75 the diagnostic connector is located on the bike right side under the side panel. It plugs into a blue "blank" connector tiewrapped to the frame. There are three pins on this connector. I was not able to detect any voltage on the outer, number 1 and 3 pins.

The center, number 2, pin is where the fault codes are indicated. This pin has about 0.5 to 0.75 volts on it with the bike shut off. When the ignition is turned on, the voltage rises to about 10 volts. When all is well, it stays at 10 volts. However, if there is a fault, it drops towards zero (pulses) in a periodic manner. When there is a fault, every so often, the voltage pulses downwards toward 0 volts. The number of pulses, indicates the fault number. In other words, if it pulses downwards 4 times, that indicates that there is a problem with the fault code number 4 items. The pulsing also occurs when the ignition is first turned on and the voltage is rising to ~10 volts, but it is easier to spot when it occurs periodically later. I was able to see the pulses easily using an analog meter. It can also be seen using a digital meter. There is not enough current available to light a light. I tried.

With the fault code number, troubleshooting can proceed.

First the ABS plug is numbered as shown below. Yes, it is a PITA to get the ABS brain out and the plug disconnected from the ABS I but some tests have to be done from there. With the pin sockets toward you, and the cable on the right, it is numbered from the right to the left, bottom and then top. This is important.




System voltage test. Power is supplied on Pin 15, and Pin 14 is ground. Connect to them, and confirm that when the ignition is turned on, the voltage is the same as at the battery.

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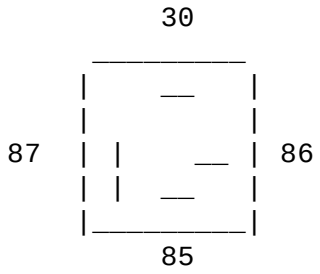
| Fault Code 1 - Front Pressure Modulator | |
|---|---|
| ABS connector pins of interest | 6,9,10 |
| Test Value | resistance |
| Resistance 6-9 | ~4.48 k-ohms |
| Resistance 6-10 | ~16.7 K-ohms (Error: read 174k!) |

| | |
|---|---|
| Resistance 9-10 | ~19.5 K-ohms (Error: read 174k!) |

If an open is indicated, check the wires from the brain plug to the Modulator plug. If those connections are OK, the modulator is bad.

Remove the ABS relay in the electrical box under the tank. The relay is at the front of the box, on the left side, just beside where the front wiring harness enters the box. Measure resistance from the ABS relay socket to ground. Measure from 87 to frame ground. It should measure 17.4 K-ohms.

Socket:




Again, if it is open circuit check from the socket to the Modulator plug. Then check from Terminal 31 of the Modulator to ground. Again, if the wiring is good, the modulator is bad.

With the ignition off, the ABS relay socket connection Pin 30 should be the same as the battery voltage. If not, check that connection point is secure, and the red wire from the battery to connection point 30.

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Fault Code 2 - Rear Pressure Modulator

| | |
|---|---|
| ABS connector pins of interest | 7,11,12 |
| Test Value | resistance |
| Resistance 7-11 | ~4.48 K-ohms |
| Resistance 7-12 | ~16.7 K-ohms (Error: read 174k!) |
| Resistance 11-12 | ~19.5 K-ohms (Error: read 174k!) |

If an open is indicated, check the wires from the brain plug to the Modulator plug. If those connections are OK, the modulator is bad.

Remove the ABS relay in the electrical box under the tank. The relay is at the front of the box, on the left side, just beside where the front wiring harness enters the box. Measure resistance from the ABS relay socket to ground. Measure from 87 to frame ground. It should measure 17.4 K-ohms.

Again, if it is open check from the socket to the Modulator plug. Then check from Terminal 31 of the Modulator to ground. Again, if the wiring is good, the modulator is bad.

With the ignition off, the ABS relay socket connection Pin 30 should be the same as the battery voltage. If not, check that connection point is secure, and the red wire from the battery to connection point 30.

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Fault Code 3 - Front Wheel Speed Sensor

| | |
|---|---|
| ABS connector pins of interest | 1,2 |
| Test Value | resistance |
| Resistance 1-2 | ~135 +/-20 ohms |

If the reading is an open circuit, measure resistance from ABS connector pins 1 and 2 to the frame ground. It should be an open circuit. If it is not, check the wiring to the speed sensor. If the wiring is OK, the sensor is shorted internally and it will need to be replaced.

If resistance reading is not correct, check wiring from pins 1 and 2 to the front wheel speed sensor, and the plug connection at the front wheel speed sensor. If the wiring is good, the speed sensor is bad and needs replacement.

If the resistance reading is correct, replace the ABS brain.

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| Fault Code 4 - Rear Wheel Speed Sensor | |
|---|---|
| ABS connector pins of interest | 3,4 |
| Test Value | resistance |
| Resistance 3-4 | ~135 +/-20 ohms |

If the reading is an open circuit, measure resistance from ABS connector pins 3 and 4 to the frame ground. It should be an open circuit. If it is not, check the wiring to the speed sensor, if the wiring is OK, the sensor is shorted internally and it will need to be replaced.

If the resistance reading is not correct, check wiring from pins 3 and 4 to the rear wheel speed sensor, and the plug connection at the rear wheel speed sensor. If the wiring is good, the speed sensor is bad, and needs replacement.

If the resistance reading is correct, replace the ABS brain.

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Fault Code 5 - Battery Voltage Too Low

Power (~12.6V) is supplied on Pin 15, and Pin 14 is ground. Connect to them, and confirm that when the ignition is turned on, the voltage is the same as at the battery.

If not: Check the battery charge and condition (Load test.) Check the pin 14 to frame ground connection. Check the battery, frame, and engine ground connections. Check ABS connector pin 15 to ignition switch terminal 15. Check wiring from the battery positive connector to the ignition switch.

If all the wiring is OK, replace the ABS brain.

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| Fault Code 6 - ABS relay | |
|---|---|
| ABS connector pins of interest | 17,19 |
| Test Value | resistance |
| Resistance 17-19 | <92 OHMS (LESS THAN 92 OHMS) |

If an open circuit is indicated check ABS connector pin 17 to the ABS relay socket terminal connection 86, and check ABS connector pin 19 to the ABS relay socket terminal connection 85. If the wiring is good, then check the relay.

If the resistance is off, measure between relay terminals 85 and 86. If it is not less than 92 ohms, replace the relay.

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| Fault Code 7 - ABS Control Unit | |
|---|---|
| ABS connector pins of interest | 1,3,17 |
| Test Value | resistance |
| Resistance | Open circuit to ground. |

Measure between each of the pins and ground, it should indicate an open circuit. Pin 1 is the front wheel speed circuit and should be open to the speed sensor shell. Pin 3 is the rear wheel speed circuit and should be open to the speed sensor shell. Pin 17 is the ABS relay socket terminal 86 and should be a open circuit from it to ground. Also, from Pin 17 to ABS relay socket terminal 86, it should be a closed circuit.

If these indicate correct, the ABS brain is bad.

(In at least one instance the ABS faulted, indicating the ABS brain, but it would reset, and worked fine afterward. So, there might be some conditions that are intermittent and self curing. If so, knowing how to reset the brain and see if it has cured itself, may have saved you a BUNCH OF MONEY.)

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Fault Code 8 - Outside influence
Speed sensor gap

This fault can be caused by low battery voltage, loose wheel speed sensor, or incorrect speed sensor gap.

The battery voltage has already been tested by now, testing sequentially. Grab them, and check that the sensors are secure. Check the speed sensor gaps. My front wheel sticker says 0.35-0.65 mm. However the Service manual and the owner's manual say that it should be 0.60-0.65 mm front, and rear. It is to be measured where the chisel punch point is on the speed sensor (toothed gear).

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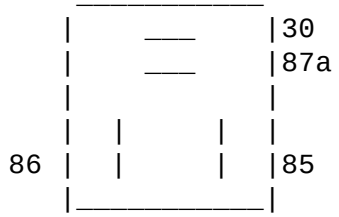
| ABS Warning indicator is continuously on | |
|---|---|
| ABS connector pins of interest | 18,19 |
| Test Value | resistance |
| Resistance 18-19 | 110 +/-20 ohms |

If it is not correct, check from ABS connector pin 18 to the ABS warning relay terminal 86 and, check from ABS connector pin 19 to the ABS warning relay terminal 85. (The warning relay is in the electrical box, front right, just to the right of the wiring harness entry. The relay terminal orientation and numbering are different from the ABS relay.)

Socket:




The wiring should have virtually no resistance to the socket. The relay coil resistance between pins 86 and 85 should be 110 +/-20 ohms.

| ABS connector pin of interest | 5 |
|---|---|

| Test Value | resistance |
| --- | --- |
| Resistance | Open circuit to ground. |

Measure from ABS connector pin 5 to frame ground.

If it is an open circuit replace the brain. If an open circuit is not indicated, check pin 5 to the ABS switch. If wiring is good, replace the ABS switch.

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I would like to thank Steve Burkholtz who in a message back on 16 Oct 1997 noticed that the center pin voltage varied. Using a VOM to determine the fault codes takes some skill, but is WAY CHEAPER than using the BMW tool, which I think is about US$1500!

Also to be thanked is Richard Paton <RICHARD@DYNAMO.COM.AU> who on 15 Oct 1997 gave instructions for resetting the ABS.

Thanks to Rob Scott who confirmed that you can see the pulsing with a digital voltmeter. (And who saved himself a trip to the dealer to find out what was wrong, and reset the ABS computer.)

Now, after correcting the problem, and resetting the fault code, take a ride and see that the ABS stays happy. The fault code memory only stores one fault code. So, if there are two problems, the fault code will have to be read again, and then the next problem identified and corrected.

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Does this work? Yes, I tried it on my bike. I created a fault by disconnecting the rear wheel sensor. I did this with the power on, and the diagnostic indicator line immediately went into fault code number 4 indication. (Apparently they are active sensors and opens are detected.) The ABS did not work. I tried. I reconnected the rear wheel sensor, reset the ABS, and the ABS was working again.

Rob Scott had his ABS fault on the way to Missoula. Using this procedure, he found it was indicated to be the brain. But it reset fine, and is working now. (Or he has a battery or regulator going south.)

Go forth, investigate, test, and fix!!! Then you only have to spend the money to replace the expensive bits that have passed on, rather than for the mechanics time, and that expensive little BMW Diagnosis tool.



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