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LE Jetronic Diagnosis

CHECK THE BASICS

Before any electrical diagnosis takes place always **consider** the basics. The following list will assist you in **considering** other areas of the motorcycles operating systems that may prevent operation or effect performance.

Determine if any of the listed items below might be a contributing factor to the malfunction of the motorcycle. Check them.

1. **Battery Fully Charged:** >12.6 VDC
2. **Check Fuel Supply:** If necessary perform fuel pressure test.

@ idle = 1.8 to 2 bar

@ 3000 RPM = 2.2 to 2.5 bar

Leakdown should hold 80% of 3000 RPM pressure for 40 minutes. If fuel pressure holds leakdown test but fuel pressure is low with the engine running, gently squeeze the fuel return line to the fuel tank with tool 88 88 6 133 010 while watching the fuel pressure gauge. Pressure should raise quickly, **Do not exceed 4 bar of fuel pressure.**

If the pressure does not raise quickly, check for pinched supply line, clogged fuel filter or pump intake screen, defective pressure regulator, etc.

3. **Fuel Control:** Check Ti at injectors. Use the BMW Multi-Tester and the Fuel Injector Test Adapter Cable covered in the Test Equipment section.

With all test equipment hooked up to the motorcycle start the engine (if possible) and maintain an engine speed of 950 RPM's. Press the "Ignition Dwell Angle & Duty Cycle" button on the BMW Multi-Tester. The display of the BMW Multi-Tester should read:

- 3.5 to 4.0%

If tested Ti value differs from nominal value above, consider all of the factors contributing to Ti:

- TD signal from the ICU • Throttle position switch • Engine Temp (NTC)
- Air volume and temperature signals from Air Flow Meter

3. **Air Volume:** Check Brass Air Screw Setting

Check brass air screw settings on the throttle housings. Turn the screws in until seated (lightly). Back the screws out to the spec below.

- K75 = 1 ½ to 1 ¾ turns
- K100 = 1 ¼ to 1 ½

4. **Adjust CO:** If necessary adjust at air flow meter. Read with exhaust gas analyzer= 2.00%

5. **Integrity of Air Intake System:** If necessary perform False Air Quick Test.

A. Change crankcase oil.

Note: False Air Quick Test should only be performed in a well ventilated area, free from open flame or sparks. Use Caution, have a fire extinguisher present and wear protective gear.

B. Use acetylene gas (3-5 lbs) with a medium tip to determine if a false air leak is present.

C. Start engine and run at the first idle position.

Caution: In the following step if the engine backfires the acetylene could start to burn. If this should occur, pull back and shut off the torch.

D. Position the acetylene around all hose clamps, joints, O-rings, and gaskets (any place air can enter).

- If engine runs faster: air leak present

If an air leak is present, engine speed will rise at the point of leak. Fix leak and recheck.

6. **Static Ignition timing setting:** K75 = 4° BTDC K100, up to and including 1987 = 6° BTDC 1988 and up = 4° BTDC

7. **Engine Compression Test:**

Allow engine to warm up to normal temperature. Remove all spark plugs, disconnect supply voltage at terminal 15 of the coils. Unplug the 25 pin connector from the Fuel injection control unit. Check that battery is fully charged.

Throttle wide open, press start button, allow six pulses of the compression tester needle.

Results: 140 - 200 lbs per cylinder. All cylinders should be within 20% of each other.

LE Jetronic Test Steps

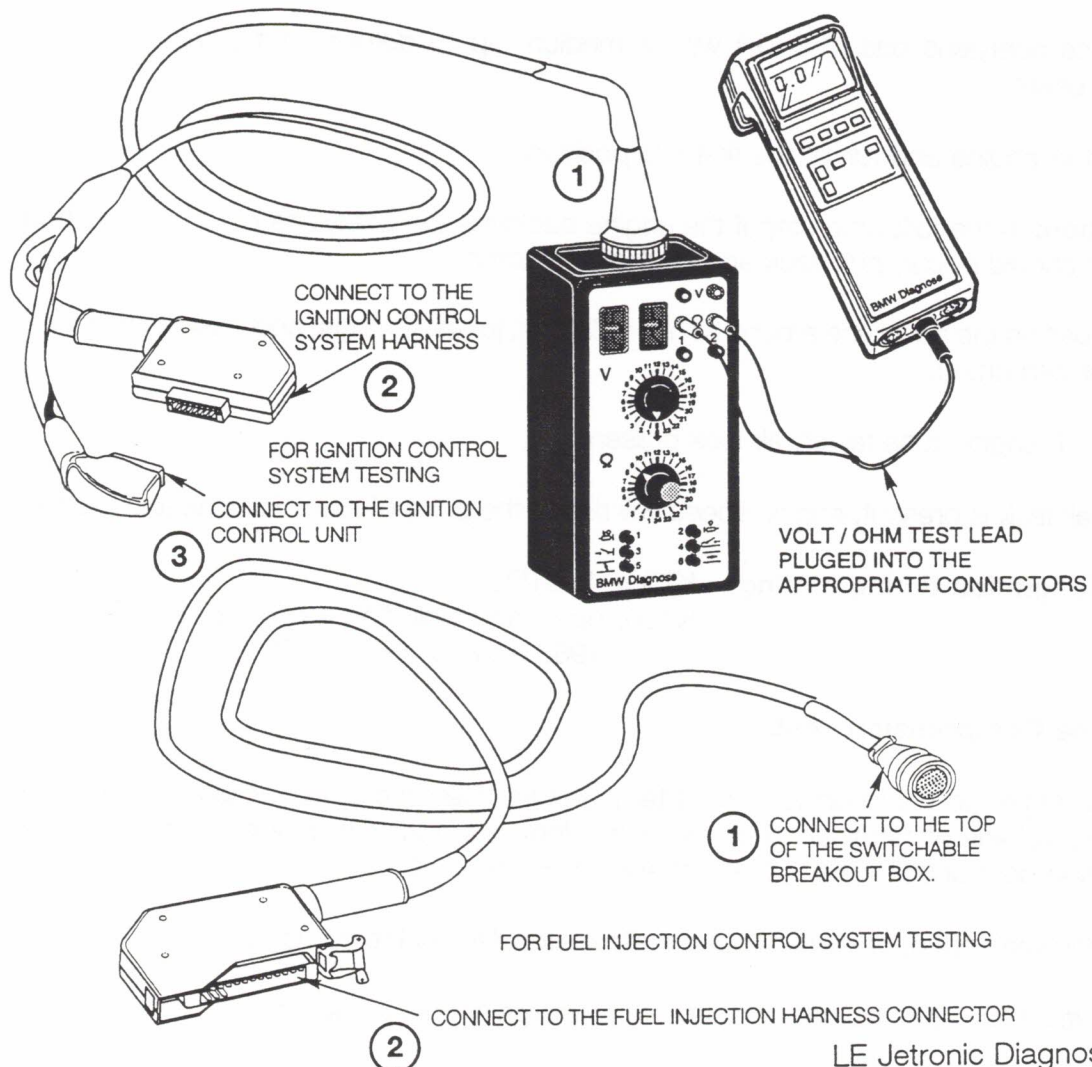
The LE Jetronic System is diagnosed using the BMW Multi-Tester alone and in conjunction with the Switchable Breakout Box. Follow the instructions in each test step to double check the test equipment hook up.

All of the equipment connections are made with the special harness adapters as outlined in the test equipment section of this manual.

When the source of trouble is not known, proceed exactly in accordance with the first test step separated by ignition and fuel injection systems. If a displayed value differs considerably from the nominal value, chances are you have found the problem. Further investigation in the troubled area will resolve the malfunction.

Test Lead Hook Up

Connect the BMW Multi-Tester, Switchable Breakout Box and Test Leads as shown below.



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

1. Ignition Control Unit Power Supply and Ground

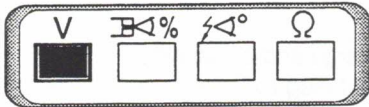
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 10 = 12 V Power
Pin 1 = Ground

Test Conditions:

1. ICU NOT connected to Test Lead. Connect tester lead to ignition harness.

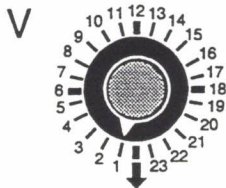
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.
- BLACK RED +



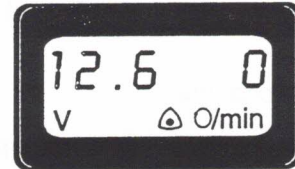
4. Switchable breakout box V knob at position 1.



5. Turn ignition switch to ON position.

BMW Multi-Tester Display:

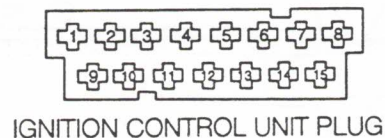
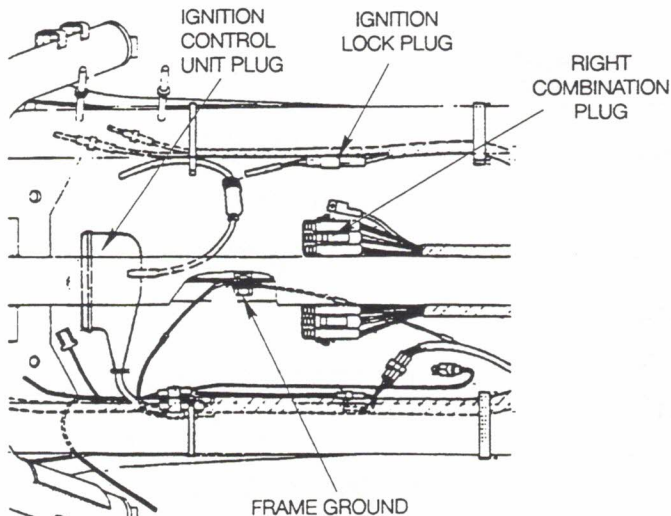
Voltage reading should be the same as battery voltage.



If display voltage fall below 12.6 V, check the following:

- Battery charge and condition.
- Pin 1 of ICU plug to frame ground (brown wire).
- Ground connection at battery, frame, engine.
- Pin 10 of ICU plug to pin 2 of the right combination plug (green/yellow wire).
- Pin 2 (green/yellow) of right combination plug. Check for voltage with tester. Should read battery voltage and 0 volts when emergency switch is operated.
- Pin 9 of the right combination plug to ignition lock/switch (green).
- Red wire from ignition switch to battery +.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

2. Fuel Injection Relay Coil Control Voltage

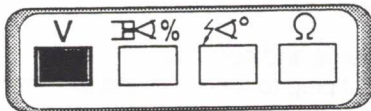
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 7 = 12 V Power
Pin 1 = Ground

Test Conditions:

1. ICU NOT connected to Test Lead. Connect tester lead to ignition harness.

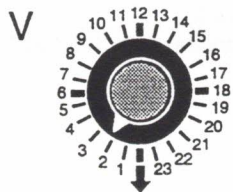
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.
- BLACK RED +



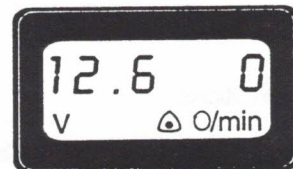
4. Switchable breakout box V knob at position 2.



5. Turn ignition switch to ON position.

BMW Multi-Tester Display:

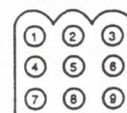
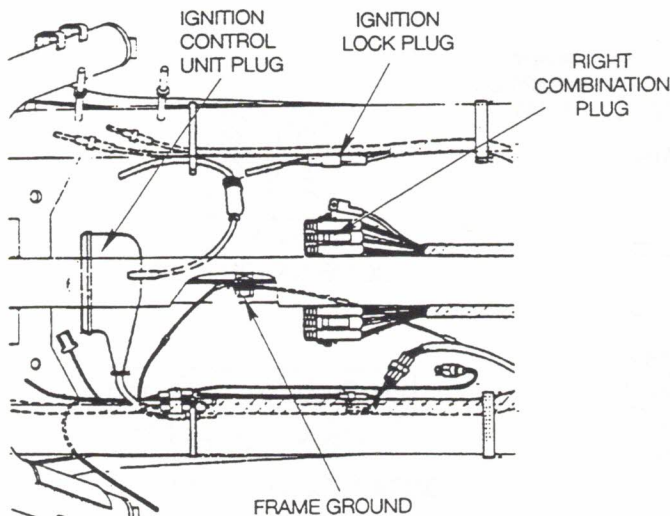
Voltage reading should be the same as battery voltage.



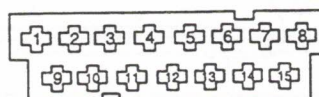
If display voltage falls below 12.6 V, check the following:

- Battery charge and condition.
- Pin 1 of ICU plug to frame ground (brown wire).
- Ground connection at battery, frame, engine.
- Pin 7 of ICU plug to terminal 85 of the fuel injection relay plug (yellow/brown wire).
- Ohmic value of fuel injection relay coil. Measure between terminals 85 and 86 (≈ 75 ohms).
- Terminal 86 of the fuel injection relay plug (yellow/green wire) to pin 2 of the right combination plug.

Connector Locations / Pin Identification



RIGHT SIDE COMBINATION PLUG



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

3. K100 Ignition Coil Power Supplies (K75 Go To Next Page)

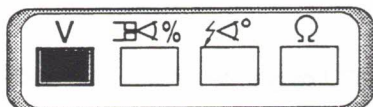
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 14 = 12 V Actual (Ign. Coil 1)
 Pin 9 = 12 V Actual (Ign. Coil 2)
 Pin 1 = Ground

Test Conditions:

1. ICU NOT connected to Test Lead. Connect tester lead to ignition harness.

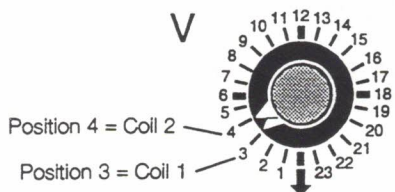
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.
 - BLACK RED +



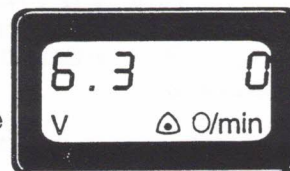
4. Switchable breakout box V knob at position:



5. Turn ignition switch to ON position.

BMW Multi-Tester Display:

Voltage reading will be half of battery voltage due to a safety resistor in the switchable breakout box.



If display voltage is less than half of direct battery measurement for either coil, check the following:

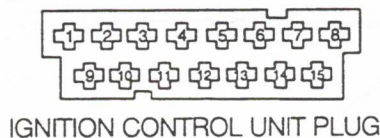
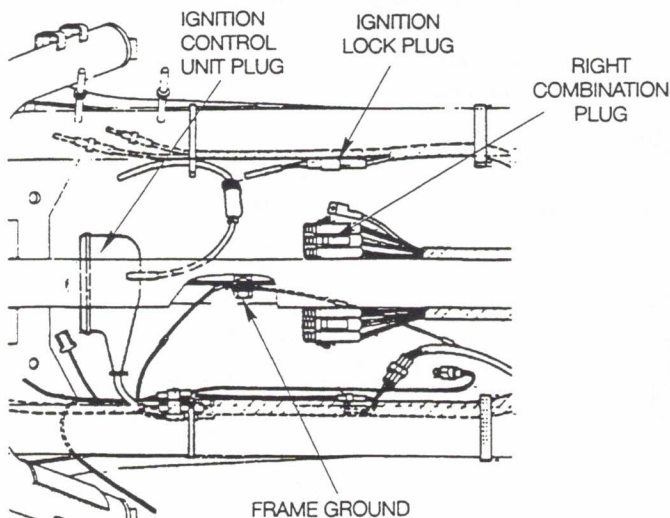
Coil 1

- Pin 14 of ICU plug to terminal 1 of ignition coil 1 (black/blue wire).
- Ohmic value of the primary windings of ignition coil 1. Measure between terminals 1 and 15 (≈ 2.2 ohms).
- Terminal 15 of ignition coil 1 to Pin 2 of the right combination plug.

Coil 2

- Pin 9 of ICU plug to terminal 1 of ignition coil 2 (black/red wire).
- Ohmic value of the primary windings of ignition coil 2. Measure between terminals 1 and 15 (≈ 2.2 ohms).
- Terminal 15 of ignition coil 2 to pin 2 of the right combination plug.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

3. K75 Ignition Coil Power Supplies (K100 Go To Previous Page)

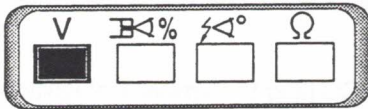
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 14 = 12 V Actual (Ign. Coil 1)
 Pin 9 = 12 V Actual (Ign. Coil 2)
 Pin 12 = 2 V Actual (Ign. Coil 3)
 Pin 1 = Ground

Test Conditions:

1. ICU NOT connected to Test Lead. Connect tester lead to ignition harness.

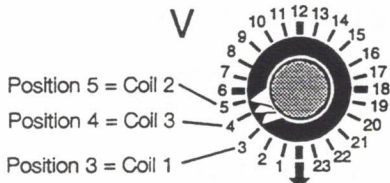
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.
 - BLACK RED +

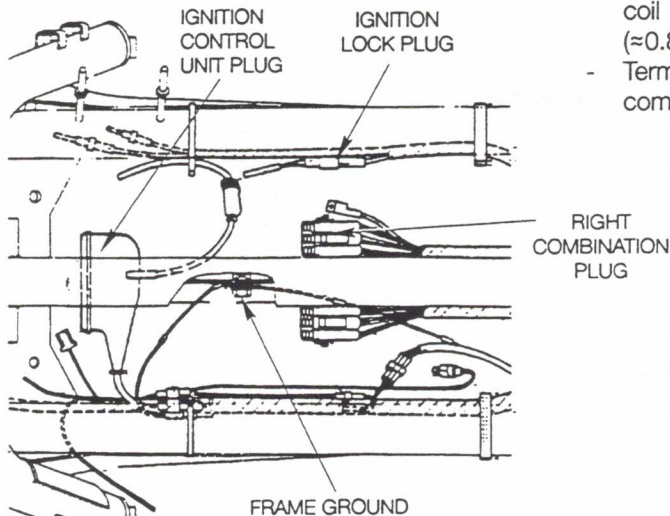


4. Switchable breakout box V knob at position:



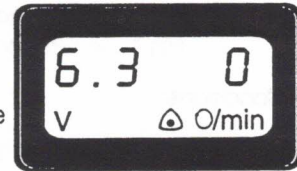
5. Turn ignition switch to ON position.

Connector Locations / Pin Identification



BMW Multi-Tester Display:

Voltage reading will be half of battery voltage due to a safety resistor in the switchable breakout box.



If display voltage is less than half of direct battery measurement for either coil, check the following:

Coil 1

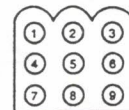
- Pin 14 of ICU plug to terminal 1 of ignition coil 1 (black/blue wire).
- Ohmic value of the primary windings of ignition coil 1. Measure between terminals 1 and 15 (≈ 0.8 ohms).
- Terminal 15 of ignition coil 1 to Pin 2 of the right combination plug.

Coil 2

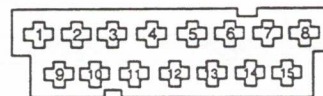
- Pin 12 of ICU plug to terminal 1 of coil 2 (black/red wire).
- Ohmic value of the coils primary windings. Measure between terminals 1 and 15 (≈ 0.8 ohms).

Coil 3

- Pin 9 of ICU plug to terminal 1 of ignition coil 3 (black/green wire).
- Ohmic value of the primary windings of ignition coil 3. Measure between terminals 1 and 15 (≈ 0.8 ohms).
- Terminal 15 of ignition coil 3 to pin 2 of the right combination plug.



RIGHT SIDE COMBINATION PLUG



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

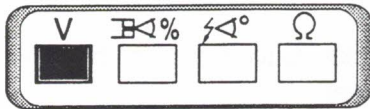
4. Start Signal (This signal notifies the ICU that the start button has been pressed)

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 6 = 12 V
Pin 1 = Ground

Test Conditions:

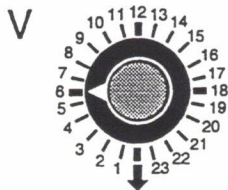
1. ICU NOT connected to Test Lead.
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



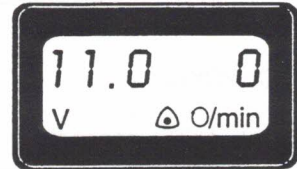
4. Switchable breakout box V knob at position 6.



5. Turn ignition switch to ON position.

BMW Multi-Tester Display:

With the starter button depressed Voltage reading should be ≈ 10 V.



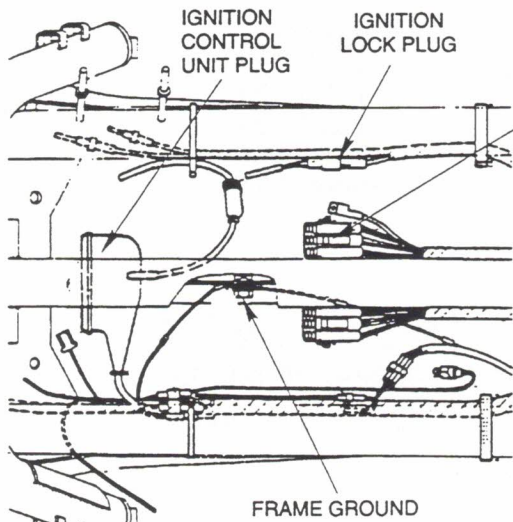
Is the neutral lamp on?. If not, pull the clutch lever. If voltage is still less then above spec, check the following:

- ✓ Pin 6 of the ICU to pin 1 of the right combination plug (black/yellow wire).
- ✓ Pin 1 of right combination plug to starter switch (black green wire).
- ✓ Pin 6 of the right combination plug to clutch plug (black/green wire).
- ✓ Clutch switch
- ✓ Clutch plug to (green/black wire) to fuse #1.
- ✓ Fuse #1 to (green/yellow wire) pin 2 of the right combination plug.

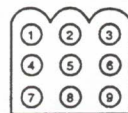
If voltage value is OK when pulling the clutch lever check the following:

- ✓ Pin 6 of the right combination plug (black/green wire) to pin 5 of the instrument cluster plug.
- ✓ Plug contacts on and in the instrument cluster.
- ✓ Pin 6 of the instrument cluster plug (green/black) to fuse plate.

Connector Locations / Pin Identification

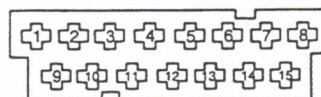
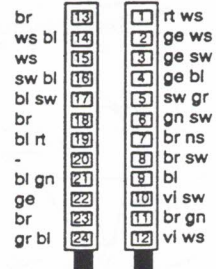


RIGHT COMBINATION PLUG



RIGHT SIDE COMBINATION PLUG

INSTRUMENT CLUSTER PLUGS



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

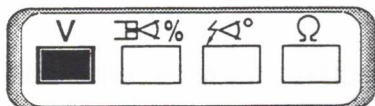
5. Starter Relay Control Circuit Voltage (Has voltage reached the ICU for starter relay activation?)

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 6 = 12 V
Pin 1 = Ground

Test Conditions:

1. ICU NOT connected to Test Lead, but motorcycle harness connected to tester.
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



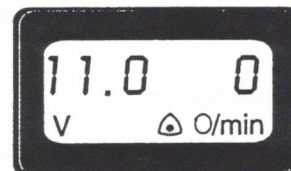
4. Switchable breakout box V knob at position 7.



5. Turn ignition switch to ON position. Push starter button.

BMW Multi-Tester Display:

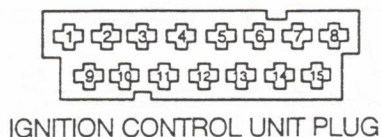
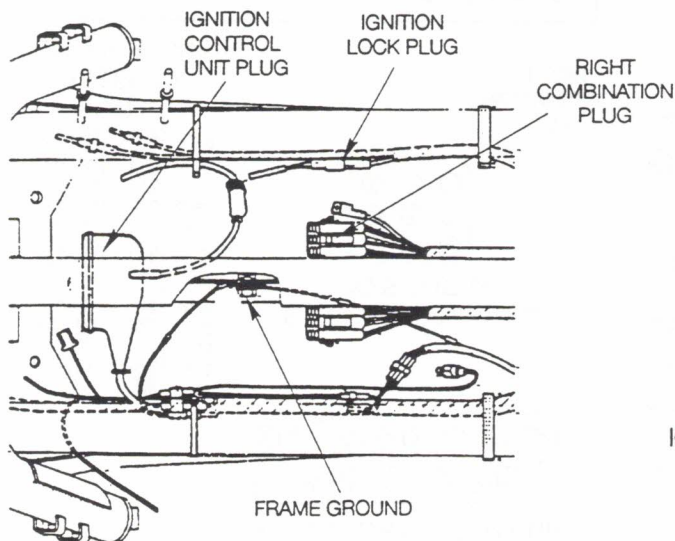
With the starter button depressed, voltage reading should be > 10 V.



If voltage is not within 10% of above spec, check the following:

- ✓ Pin 11 of the ICU to terminal 85 of the starter relay (brown/red wire).
- ✓ Ohmic value of starter relay coil (20 ohms). Measure terminal 85 to 86 of starter relay.
- ✓ Terminal 86 of starter relay plug to pin 1 of right combination plug (black/yellow wire) providing that previous test step 4 value is OK.
- ✓ Pin 6 of the right combination plug to clutch plug (black/green wire).

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

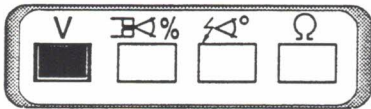
6. ICU Activation of Starter Relay (The ICU supplies a ground for activation of the starter relay coil).

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 11 = < 2 V
Pin 1 = Ground

Test Conditions:

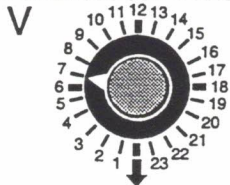
1. ICU connected to Test Lead, motorcycle harness connected to tester.
2. Fuel injection control unit disconnected.
3. BMW Multi-Tester V button Pressed



4. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



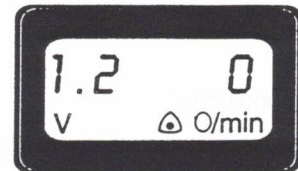
5. Switchable breakout box V knob at position 7.



5. Turn ignition switch to ON position. Push starter button.

BMW Multi-Tester Display:

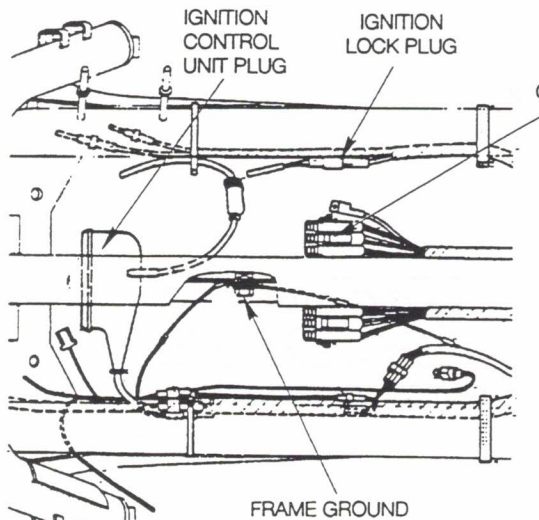
With the starter button depressed, voltage reading should be < 2 V.



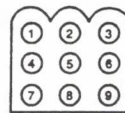
If voltage display does not meet the above spec check the following:

- ✓ As long as previous test steps 1-5 are OK, replace the ignition control unit.

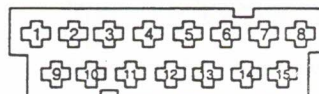
Connector Locations / Pin Identification



RIGHT COMBINATION PLUG

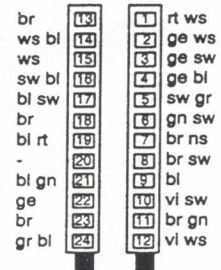


RIGHT SIDE COMBINATION PLUG



IGNITION CONTROL UNIT PLUG

INSTRUMENT CLUSTER PLUGS



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

7. Hall Sensor Signal Shield

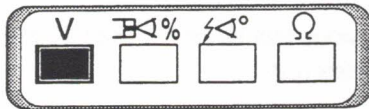
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 4 = 0 V
Pin 1 = Ground

Test Conditions:

1. ICU connected to Test Lead. Test harness lead connected to motorcycle harness.

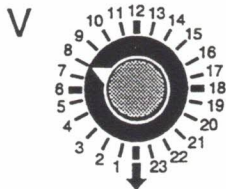
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.

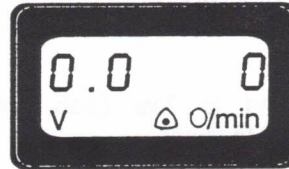


4. Switchable breakout box V knob at position 8.



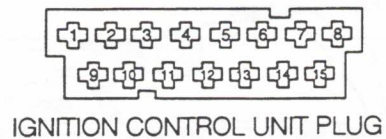
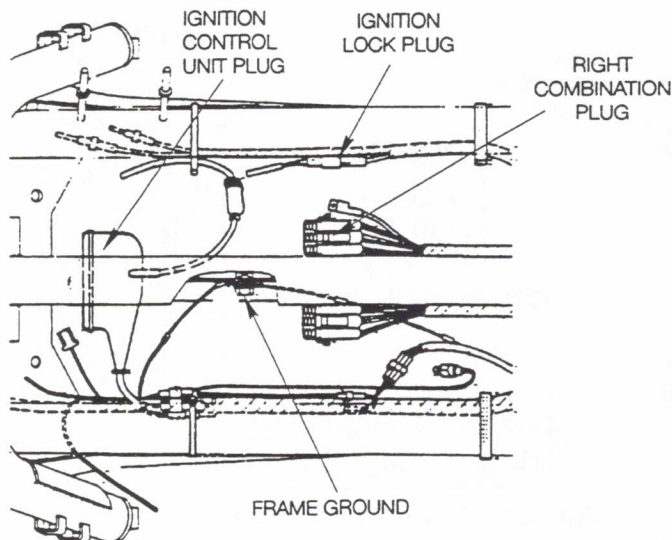
5. Turn ignition switch to ON position.

BMW Multi-Tester Display:



If any voltage reading other than the above spec is displayed, and test step 1 is OK, replace the ignition control unit.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

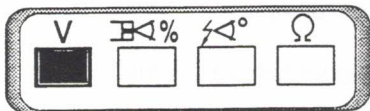
8. Hall Sensor Ground

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 3 = 0 V
Pin 1 = Ground

Test Conditions:

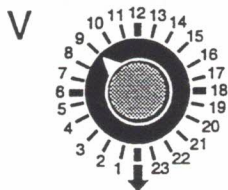
1. ICU connected to Test Lead.
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.

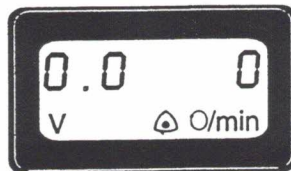


4. Switchable breakout box V knob at position 9.



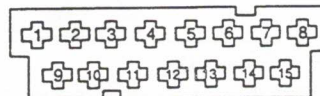
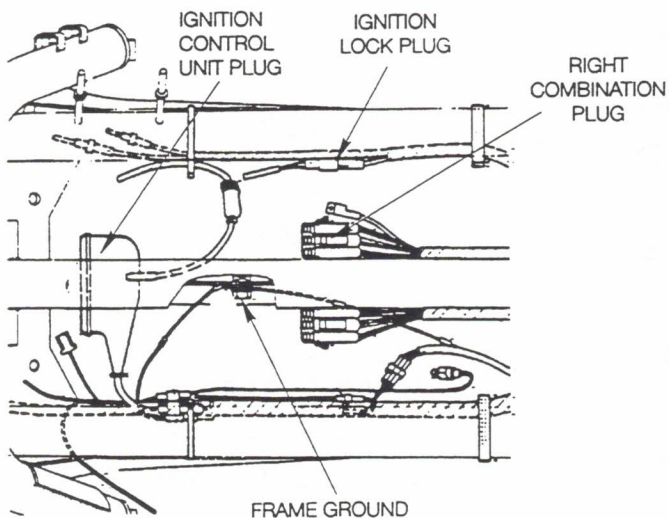
5. Turn ignition switch to ON position.

BMW Multi-Tester Display:



If any voltage reading other than the above spec is displayed and test step 1 is OK, replace the ignition control unit.

Connector Locations / Pin Identification



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

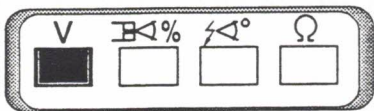
9. Hall Sensor Operating Power

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 2 = >11 V
Pin 1 = Ground

Test Conditions:

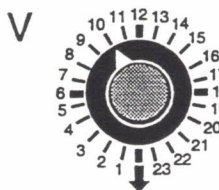
1. ICU connected to Test Lead.
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position 10.



5. Turn ignition switch to ON position.

BMW Multi-Tester Display:



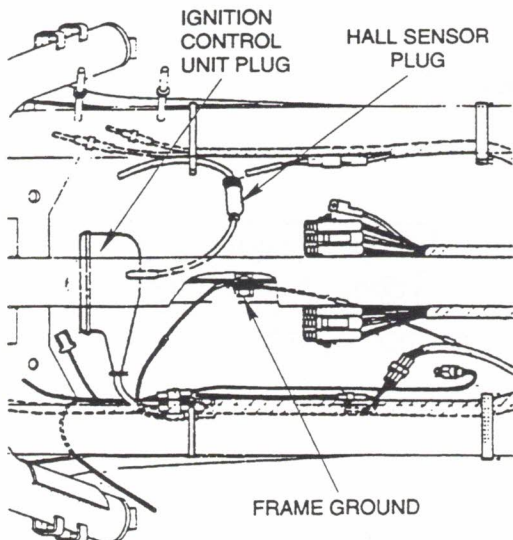
If the displayed voltage reading is below the above spec, check the following:

Disconnect plug for hall sensor found under the fuel tank.

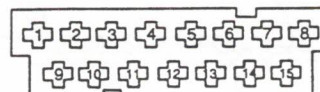
If the voltage reading is still below spec, check the wire from pin 2 of the ICU (red wire) to the Hall sensor plug for a possible short to ground. If it is OK the ICU is defective.

If the voltage reading falls within spec after disconnecting the hall sensor plug replace the hall sensor.

Connector Locations / Pin Identification



HALL SENSOR PLUG



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

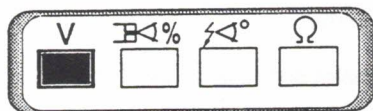
10. ICU Activation of Fuel Injection Relay

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: Pin 7 = < 2 VDC
Pin 1 = Ground

Test Conditions:

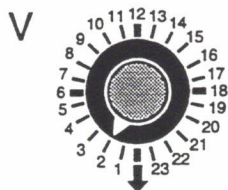
1. ICU connected to Test Lead. Test lead connected to motorcycle harness.
2. BMW Multi-Tester V button Pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



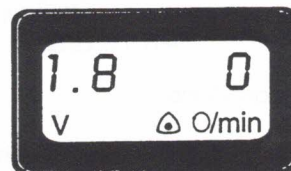
4. Switch V knob to position 2.



5. Turn ignition switch to ON position. Push starter button and start the engine.

BMW Multi-Tester Display:

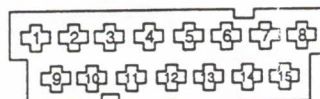
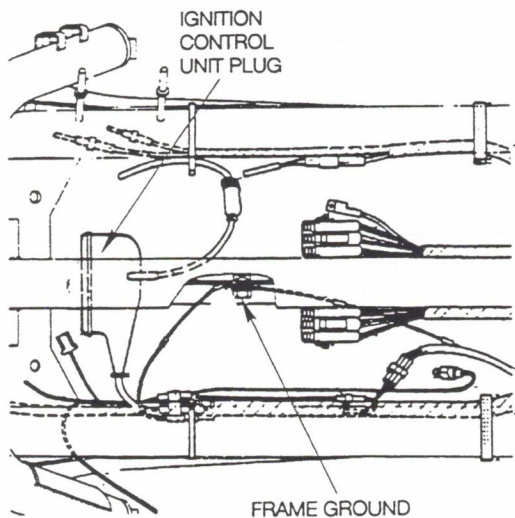
With the starter button depressed and the engine running, the voltage reading should be < 2 VDC.



The starter speed must be sufficient for this and the following tests.

If voltage reading is not within spec and test steps 1-6 were OK, replace the Ignition control unit.

Connector Locations / Pin Identification



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

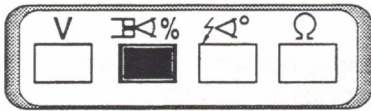
11. Hall Sensor Signal #1.

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

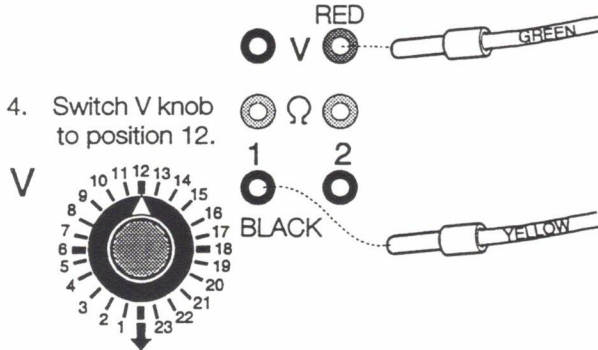
Tested Pins: Pin 5 = 10% Duty Cycle (K100)
 23% Duty Cycle (K75)
 Pin 1 = Ground

Test Conditions:

1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



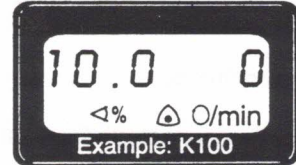
4. Switch V knob to position 12.

V

5. Turn ignition switch ON and start the engine.

BMW Multi-Tester Display:

With the engine running at idle, the duty cycle display should be as shown.

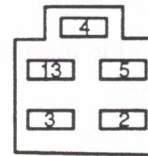
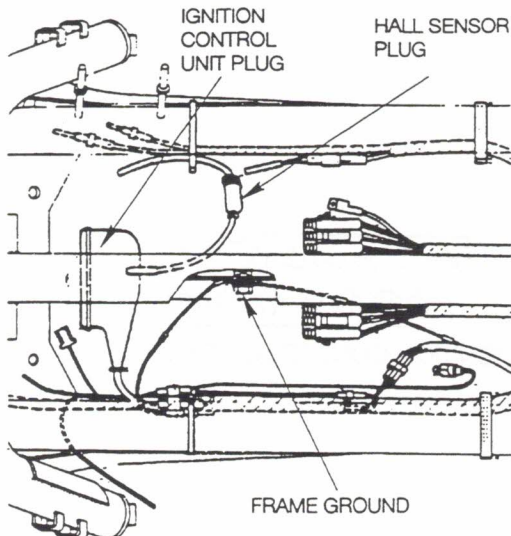


K100 = 10%
 K75 = 23%

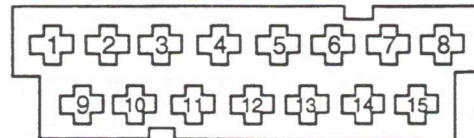
If duty cycle of Hall Sensor #1 is not within spec, check the following:

- ✓ Hall plug to make sure it is connected.
- ✓ Wires from ICU pins 2, 3 and 5 (red, black and orange) for opens or shorts to Hall Sensor plug.
- ✓ Replace Hall Sensor.
- ✓ Replace Ignition Control Unit.

Connector Locations / Pin Identification



HALL SENSOR PLUG



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

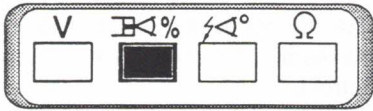
12. Hall Sensor Signal #2.

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

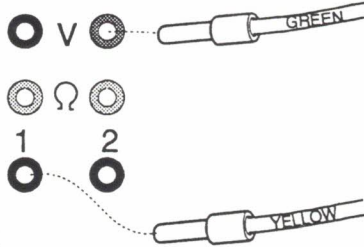
Tested Pins: Pin 13 = 10% Duty Cycle (K100)
 23% Duty Cycle (K75)
 Pin 1 = Ground

Test Conditions:

1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position 13.

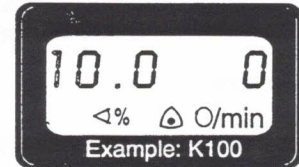
V



5. Turn ignition switch ON and start the engine.

BMW Multi-Tester Display:

With the engine running at idle, the duty cycle display should be as shown.

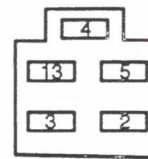
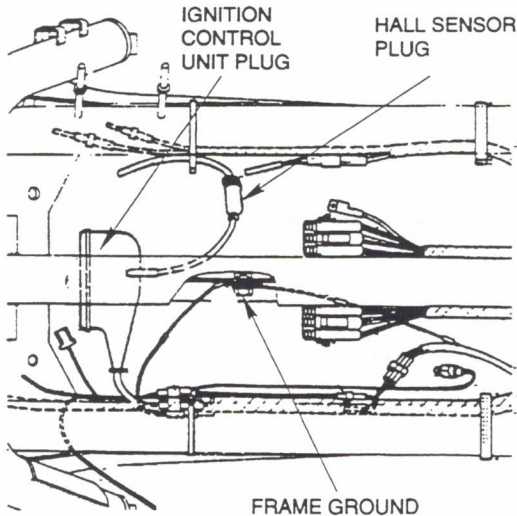


K100 = 10%
 K75 = 23%

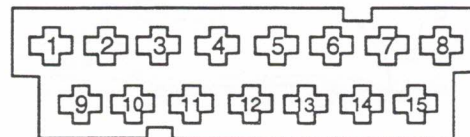
If duty cycle of Hall Sensor #2 is not within spec, check the following:

- ✓ Hall Plug to make sure it is connected.
- ✓ Wires from ICU pins 2, 3 and 13 (red, black and brown) for opens or shorts to Hall Sensor plug.
- ✓ Replace Hall Sensor.
- ✓ Replace Ignition Control Unit.

Connector Locations / Pin Identification



HALL SENSOR PLUG



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

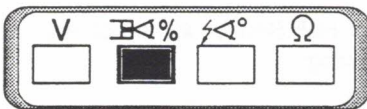
13. TD Signal Output (Terminal #8 ICU to Terminal #1 FICU)

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

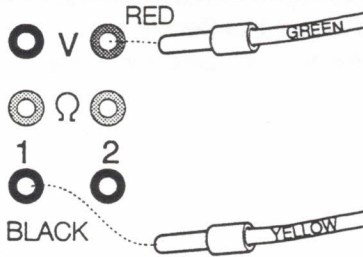
ICU Tested Pins: Pin 8 = 20% Duty Cycle (K100)
 34% Duty Cycle (K75)
 Pin 1 = Ground

Test Conditions:

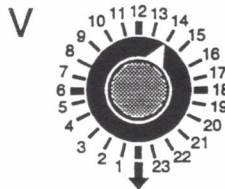
1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



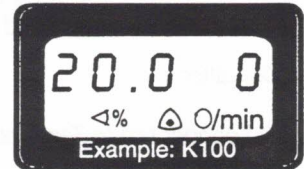
4. Switch V knob to position 14.



5. Turn ignition switch ON and start the engine.

BMW Multi-Tester Display:

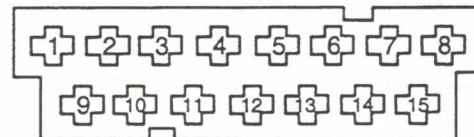
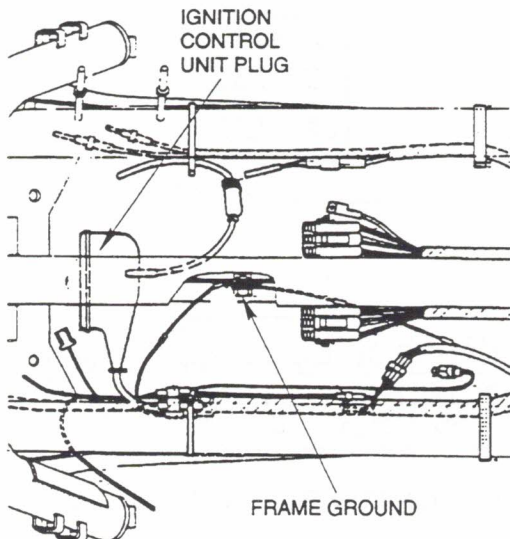
With the engine running at idle, the duty cycle display should be as shown.



K100 = 20%
 K75 = 34%

If the TD signal is not within spec and ignition control systems tests 1, 11 and 12 are OK, replace the ignition control unit.

Connector Locations / Pin Identification



IGNITION CONTROL UNIT PLUG

LE JETRONIC IGNITION CONTROL SYSTEM TESTS

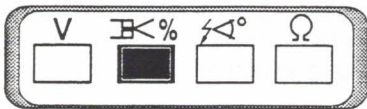
14. Ignition Coil 1 Primary Control Signal - K100 and K75

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

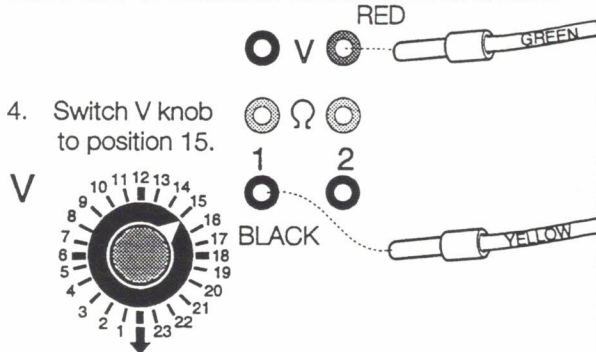
Tested Circuit: Internal Control Unit Monitoring of primary ignition coil triggers (final stage monitoring).

Test Conditions:

1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



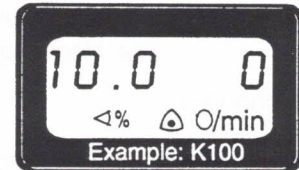
5. Turn ignition switch ON and start the engine.

BMW Multi-Tester Display:

With the engine running:

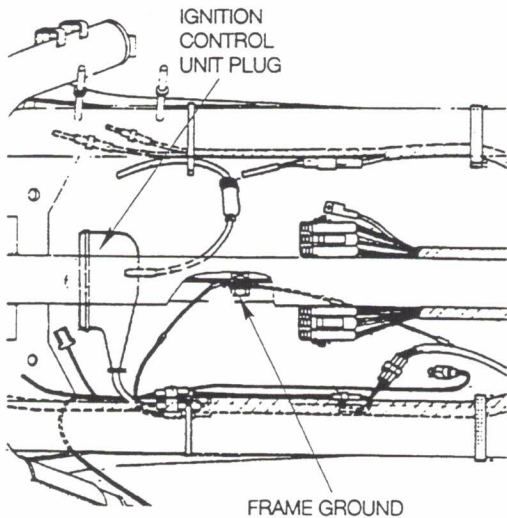
K100 @ idle = 10%

K75 @ Choke stage (≈1500 RPM) #1 = 8.5%



If the primary trigger signal is not within spec and ignition control systems tests 1, 2, 3, 11 and 12 are OK, replace the ignition control unit.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

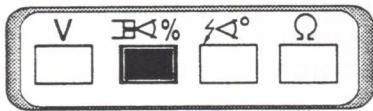
15 . Ignition Coil 2 Primary Control Signal - K100 and K75

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Circuit: Internal Control Unit Monitoring of primary ignition coil triggers (final stage monitoring).

Test Conditions:

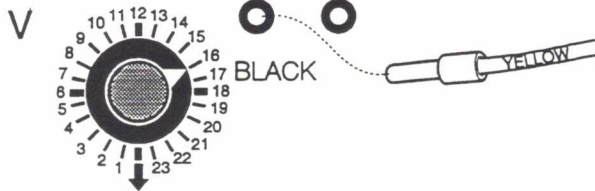
1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position 16.



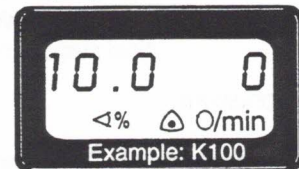
5. Turn ignition switch ON and start the engine.

BMW Multi-Tester Display:

With the engine running:

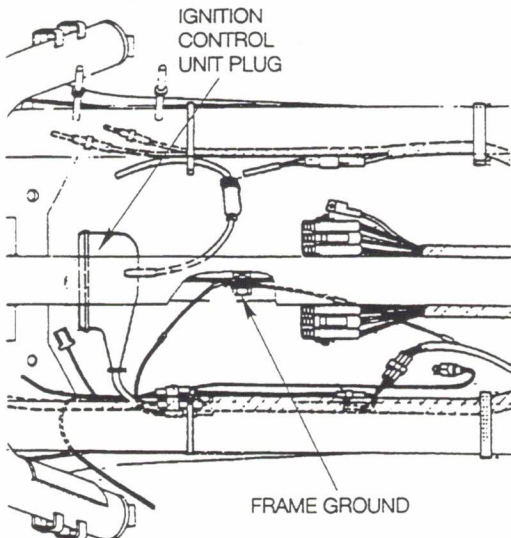
K100 @ idle = 10%

K75 @ Choke stage (≈1500 RPM) #1 = 8.5%



If the primary trigger signal is not within spec and ignition control systems tests 1, 2, 3, 11 and 12 are OK, replace the ignition control unit.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

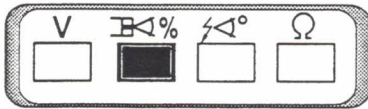
16. Ignition Coil 3 Primary Control Signal - K75 ONLY!

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

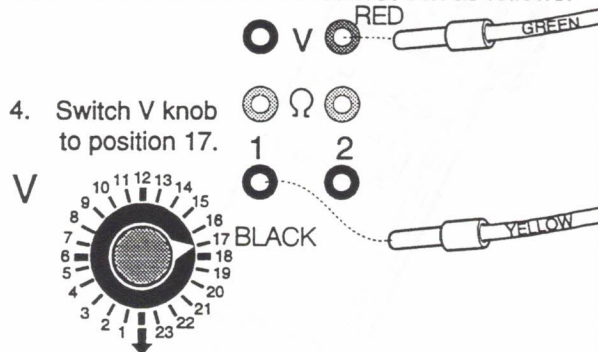
Tested Circuit: Internal Control Unit Monitoring of primary ignition coil trigger (final stage monitoring).

Test Conditions:

1. ICU connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



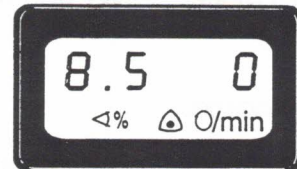
3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



5. Turn ignition switch ON and start the engine.

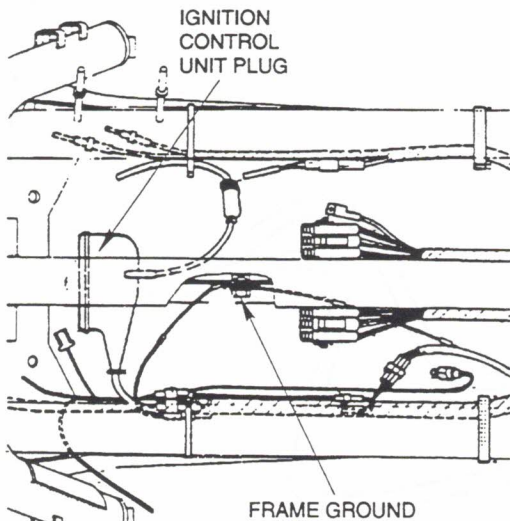
BMW Multi-Tester Display:

With the engine running with choke stage set to #1, the duty cycle should be as shown.



If the primary trigger signal is not within spec and ignition control systems tests 1, 2, 3, 11 and 12 are OK, replace the ignition control unit.

Connector Locations / Pin Identification



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

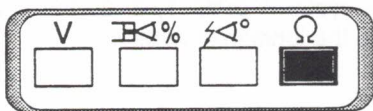
17. Ignition Coil Primary Windings Resistance Test - K100 and K75

Test Equipment: BMW Multi-Tester

Tested Circuit: Primary Coil Winding

Test Conditions:

1. ICU NOT connected to Test Lead.
2. BMW Multi-Tester Ω button pressed

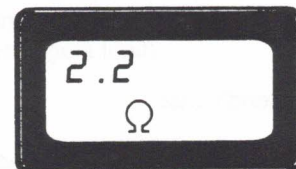


3. Perform zero calibration procedure on the tester.
4. Volt/Ohm Leads from BMW Multi-Tester connected terminals 1 and 15 of each ignition coil.
5. Check all coils.

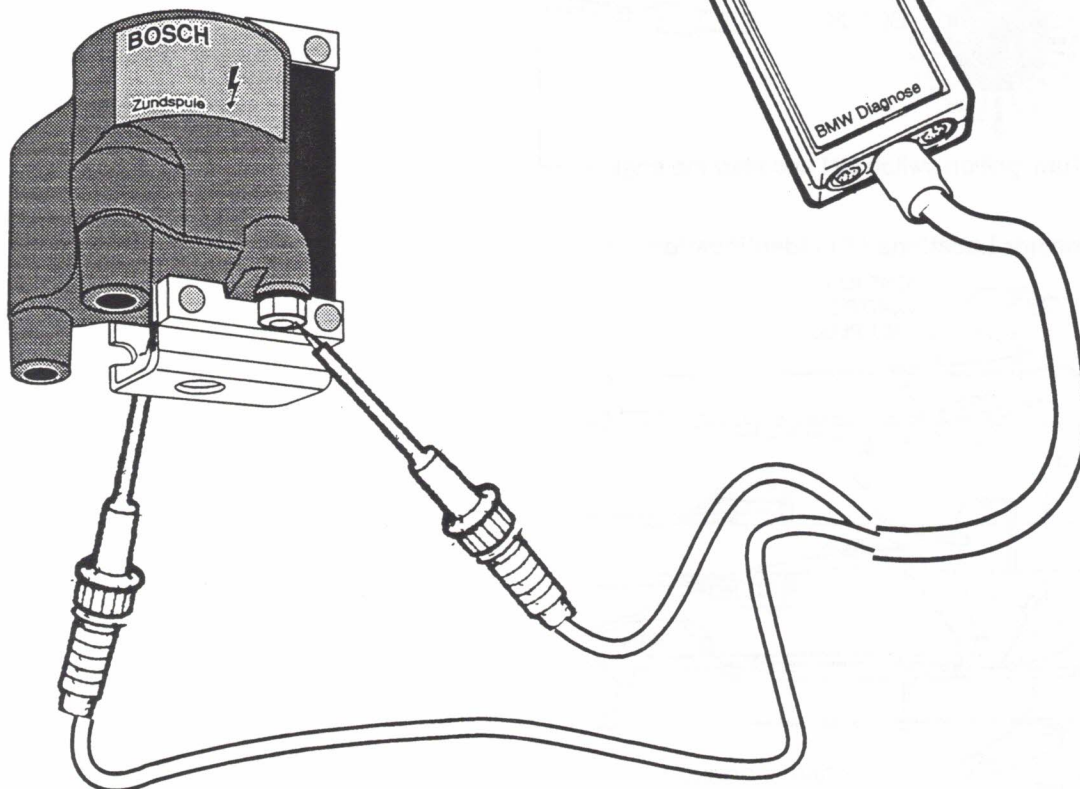
BMW Multi-Tester Display:

K100 ≈ 2.2 ohms

K75 ≈ 0.7 ohm



If resistance value is not within spec replace the ignition coil.



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

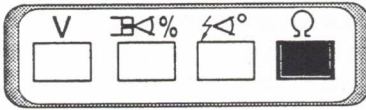
18. Ignition Coil Secondary Windings Resistance Test - K100 and K75

Test Equipment: BMW Multi-Tester

Tested Circuit: Secondary Coil Winding

Test Conditions:

1. ICU NOT connected to Test Lead.
2. BMW Multi-Tester Ω button pressed



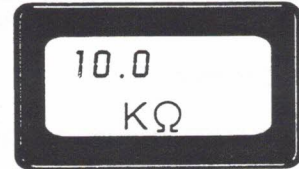
3. Perform zero calibration procedure on the tester.
4. Volt/Ohm Leads from BMW Multi-Tester connected to:

K100= terminals 4a and 4b of ignition coils.
K75= terminals 4 and 1 of ignition coils

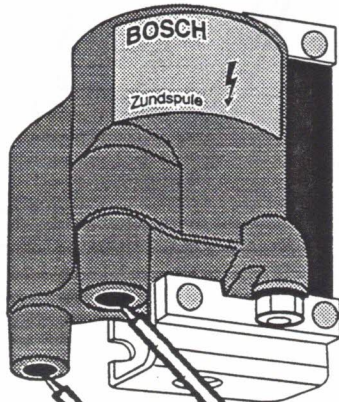
5. Test all coils.

→ **BMW Multi-Tester Display:**

K100 and K75
 ≈ 10.0 K ohms



If resistance value is not within spec, replace the ignition coil.



Example: K100



LE JETRONIC IGNITION CONTROL SYSTEM TESTS

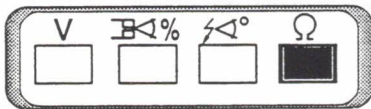
19. Ignition Coil Secondary Winding and Spark Plug Lead Test - K100 ONLY!

Test Equipment: BMW Multi-Tester

Tested Circuit: Secondary Coil Winding and Spark Plug Lead Resistance

Test Conditions:

1. ICU NOT connected to Test Lead.
2. BMW Multi-Tester Ω button pressed



3. Perform zero calibration procedure on the tester.
4. Volt/Ohm Leads from BMW Multi-Tester connected to spark plug connectors.

NOTE: K75 has one coil per cylinder and only one lead per coil. The lead has an air gap. Therefore, you cannot measure through the leads.

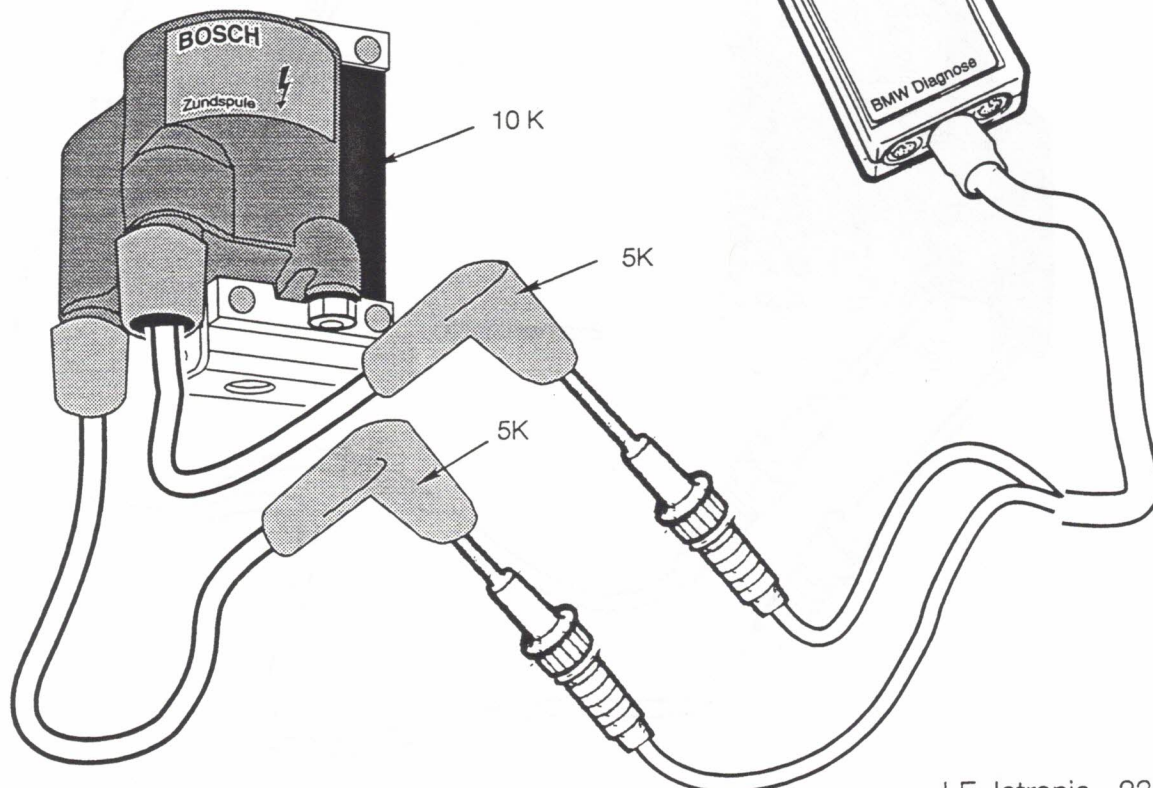
5. Test both coils with wires.

→ **BMW Multi-Tester Display:**

K100 ≈ 20.0 K ohms



If resistance value is not within spec, replace spark plug leads with known good leads and recheck. If test is still not within spec, replace the ignition coil.



LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

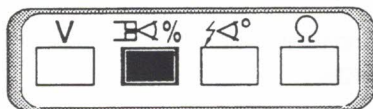
1. TD Signal - K100 and K75 (Terminal #8 ICU to Terminal #1 FICU)

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

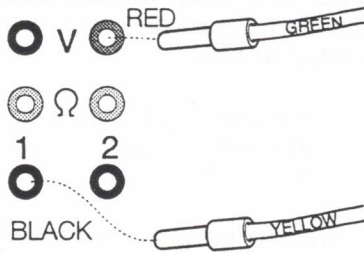
FICU Tested Pins: Pin 8 = 20% Duty Cycle (K100)
34% Duty Cycle (K75)
Pin 1 = Ground.

Test Conditions:

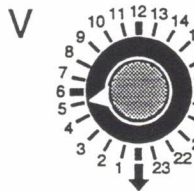
1. Fuel Injection harness 25 pin plug connected to Test Lead.
2. BMW Multi-Tester Duty Cycle button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.

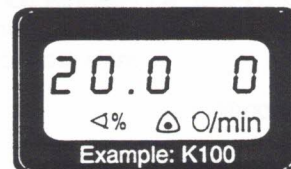


4. Switch V knob to position 5.



BMW Multi-Tester Display:

With the ignition key on and the starter button depressed the tester display should read as shown.



- K100 = 20% - K75 = 34%

If the tester readings are not within 10% of the above specifications, check the following:

PIN 5:

- Check the ground circuit continuity to the main ground connection under the fuel tank. Check battery ground connections and drive unit ground.

PIN 1:

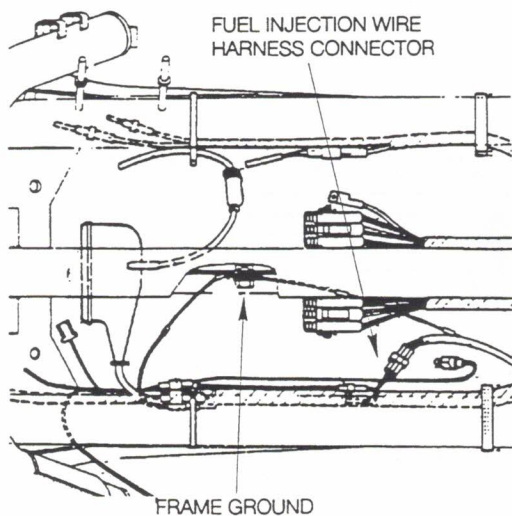
- Pin 1 (yellow / red wire) of control unit plug to the wire harness connector. Check for good contact.

- Check yellow / red wire from the wire harness connector to pin 8 of the ignition control unit. If wire checks out OK and ignition control unit test step 13 is not OK, replace the ignition control unit

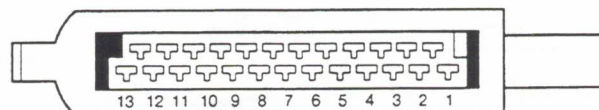
PIN 9:

- Pin 9 (green / red wire) of the fuel injection control unit plug to wire harness connector. Check for good contact at plug and power from the fuel injection relay.

Connector Locations / Pin Identification



FUEL INJECTION CONTROL UNIT 25 PIN PLUG



HARNESS LEADING TO THE FUEL INJECTION CONTROL UNIT

LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

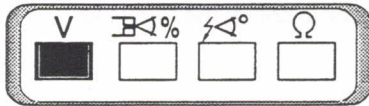
2. Fuel Injection Control Unit Power Supply - K100 and K75

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 9 - Fuel Injection power supply
5 - Fuel Injection control system main ground.

Test Conditions:

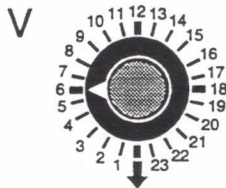
1. Fuel Injection harness 25 pin plug connected to Test Lead.
2. BMW Multi-Tester V button pressed



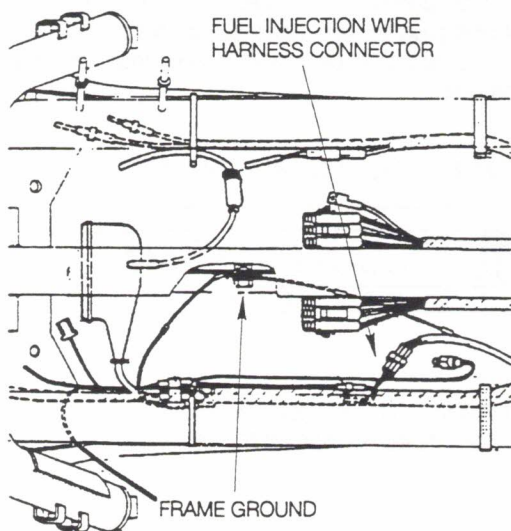
3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



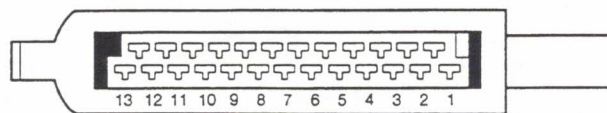
4. Switch V knob to position 6.



Connector Locations / Pin Identification



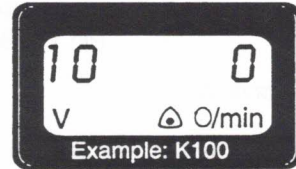
FUEL INJECTION CONTROL UNIT 25 PIN PLUG



HARNESS LEADING TO THE FUEL INJECTION CONTROL UNIT

BMW Multi-Tester Display:

With the ignition key on and the starter button depressed the tester display should read as shown.



If the tester readings are not within 10% of the above specifications, check the following:

- Battery Condition: Check battery connections and battery charge.

PIN 9:

- Pin 9 (green / red wire) of the fuel injection control unit plug to wire harness connector. Check for good contact at plug and power from the fuel injection relay.

- Check green red wire from harness plug to fuel injection relay terminal 87. Is connection OK?

- Does the fuel pump run when the ignition key is first turned on and starter button pressed? If it does, the control circuit and power supply to the fuel injection relay are OK.

If it does not, check the the power supply to the fuel injection relay and check test steps 2 and 10 of the ignition control unit.

LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

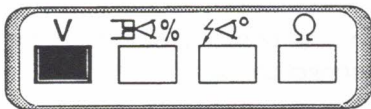
3. Fuel Injection Control Unit Start Signal - K100 and K75

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 4 - Start Signal from start switch
5 - Fuel Injection control system main ground.

Test Conditions:

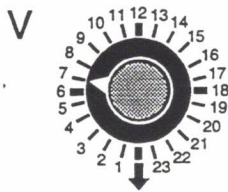
1. Fuel Injection harness 25 pin plug connected to Test Lead.
2. BMW Multi-Tester V button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position 7.



BMW Multi-Tester Display:

With the ignition key on and the starter button depressed the tester display should read as shown.



If the tester readings are not within 10% of the above specifications, check the following:

- Battery Condition: Check battery connections and battery charge.

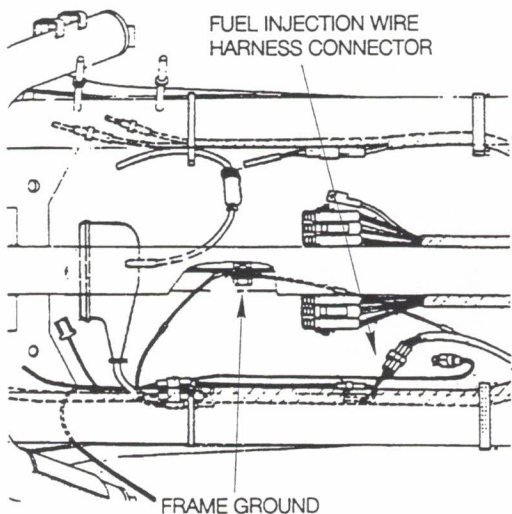
PIN 4:

- Pin 4 (black yellow wire) of the fuel injection control unit plug to wire harness connector. Check for good contact at plug.

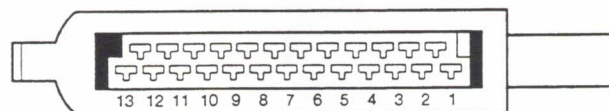
TERMINAL 86 STARTER RELAY:

- With the ignition key on and the starter button pressed, check for voltage with tester. Should read \approx 8 volts.

Connector Locations / Pin Identification



FUEL INJECTION CONTROL UNIT 25 PIN PLUG



HARNESS LEADING TO THE FUEL INJECTION CONTROL UNIT

LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

4. Air Flow Meter (Air Temperature Sensor) - K100 and K75

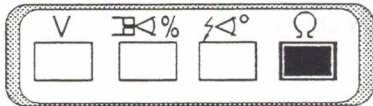
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 8 - Resistor power in side
5 - Fuel Injection control system
main ground.

Test Conditions: Remove Fuse #6

1. Fuel Injection harness 25 pin plug connected to Test Lead. Ignition Switch OFF.

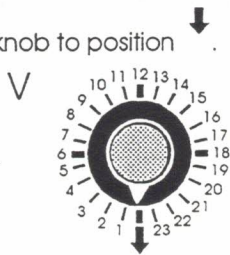
2. BMW Multi-Tester Ω button pressed.



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position



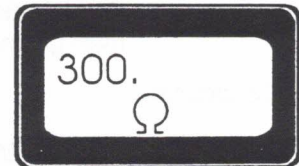
5. Perform a Zero Balance of the Tester as described in the Tools section of this manual.

6. Set Ω knob to position 11.



BMW Multi-Tester Display:

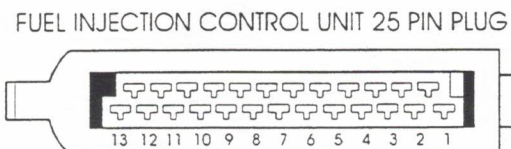
Display should read as shown.



If the tester readings are not within 10% of the above specifications check the following:

- Check the wires from pins 8 and 5 of the fuel injection control unit plug,
 - Pin 8 = white/red
 - Pin 5 = brown
- to the air flow meter connector.
- If the wires and connections are OK replace the Air Flow Meter.

Connector Locations / Pin Identification



LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

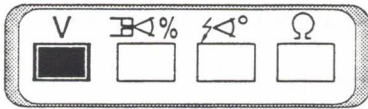
5. Air Flow Meter Potentiometer Wiper - K100 and K75

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

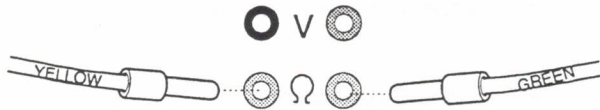
Tested Pins: 7 - Potentiometer Wiper Contact
5 - Fuel Injection control system main ground.

Test Conditions:

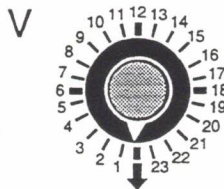
1. Fuel Injection harness 25 pin plug connected to Test Lead.
2. BMW Multi-Tester V button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position ↓.

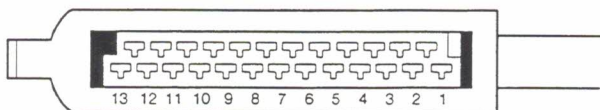


5. Set Ω knob to position 12.



Connector Locations / Pin Identification

FUEL INJECTION CONTROL UNIT 25 PIN PLUG



BMW Multi-Tester Display:

Ignition ON, Starter button depressed.



Display should read 1 to 3 volts.

When starter is depressed, this signal is generated from small amount of air flow moving the air flap.

The signal should rise to 3 volts as the throttle is opened with the starter button depressed. This increase in voltage is a result of the increased air flow due to the opening of the throttle bodies.

If the tester readings are not within 10% of the above specifications, check the following:

- Access the air flow meter air sensing flap. Check if flap is sticking. The flap should move smoothly with no restriction.
- The voltage should raise linearly from approximately 1 to 8 volts with the flap at the wide open position. Slowly let the sensing flap return to the rest position. The voltage should return linearly to the 1 volt DC reading.
- If the meter display of the voltage is not steady (momentarily opens), the air flow meter must be replaced.
- Check the wiring from pins 9, 7 and 5 of the fuel injection control unit plug to the air flow meter for opens.
- Also check wire from pin 7 of fuel injection control unit plug for shorts to ground.

LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

6. Engine Coolant Temperature Sensor (NTC)

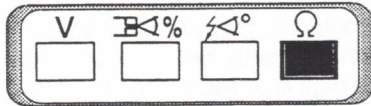
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 10 - Sensor Signal
5 - Ground

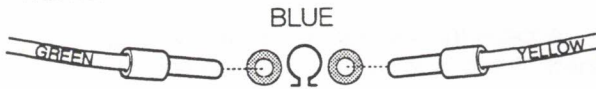
Test Conditions:

1. Fuel Injection harness 25 pin plug connected to Test Lead. **Ignition Switch OFF.**

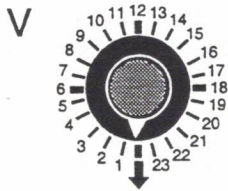
2. BMW Multi-Tester Ω button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position \downarrow .



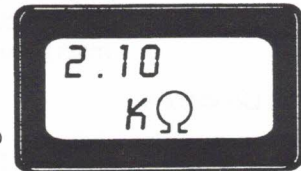
5. Perform a Zero Balance of the Tester as described in the Tools section of this manual.

6. Set Ω knob to position 13.



BMW Multi-Tester Display:

Display should read as shown.



Engine at operating temp
= 200 to 500 Ω

Ambient temperature = 2 to 6 K Ω

If the tester readings are not within 10% of the above specifications check the following:

- Check the wires from pins 10 and 5 of the fuel injection control unit plug for opens or shorts,
 - Pin 10 = violet/green
 - Pin 5 = brown

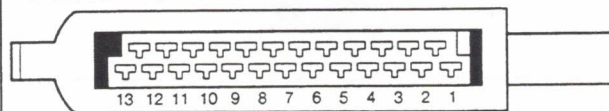
to the temperature sensor connector and ground.

If the wires and connections are OK replace the temp sensor.

Temperature ($^{\circ}\text{C}$)	0	20	90
Resistance (Ω)	≈ 5500	≈ 2500	≈ 250

Connector Locations / Pin Identification

FUEL INJECTION CONTROL UNIT 25 PIN PLUG



LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

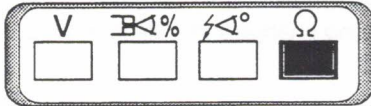
7. Grounds

Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 13 - Control unit ground
5 - Air Flow Meter potentiometer ground

Test Conditions:

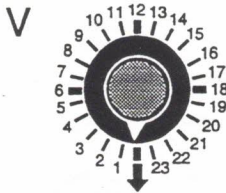
1. Fuel Injection harness 25 pin plug connected to Test Lead. **Ignition Switch OFF.**
2. BMW Multi-Tester Ω button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position ↓.



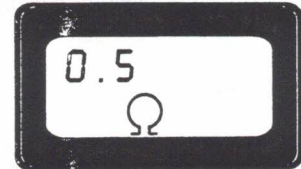
5. Perform a Zero Balance of the Tester as described in the Tools section of this manual.

6. Set Ω knob to position 14.



BMW Multi-Tester Display:

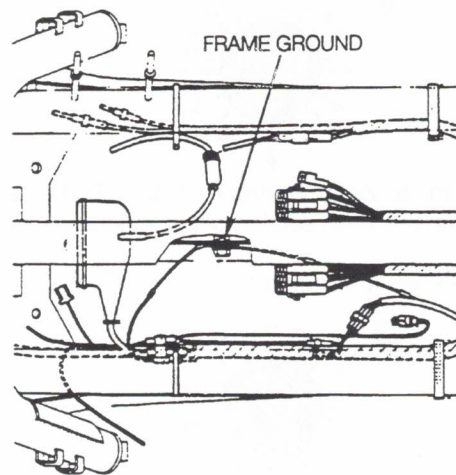
Display should read 0.5Ω.



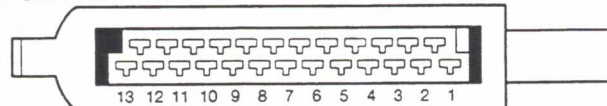
If tester display reads any thing other than the above, check the following:

- Look for corrosion or loose contacts at any ground connection
- Look for opens in the wiring or connections of the ground circuits.

Connector Locations / Pin Identification



FUEL INJECTION CONTROL UNIT 25 PIN PLUG



LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

8. Throttle Switch - Idle Contacts

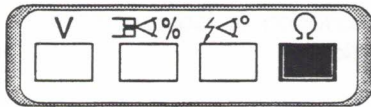
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 2 - Idle Position Signal
9 - Power supply to Throttle valve Switch

Test Conditions:

1. Fuel Injection harness 25 pin plug connected to Test Lead. **Ignition Switch OFF.**

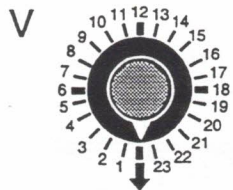
2. BMW Multi-Tester Ω button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position ↓



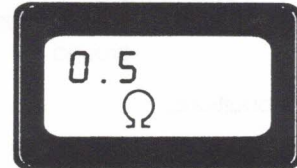
5. Perform a Zero Balance of the Tester as described in the Tools section of this manual.

6. Set Ω knob to position 16.



BMW Multi-Tester Display:

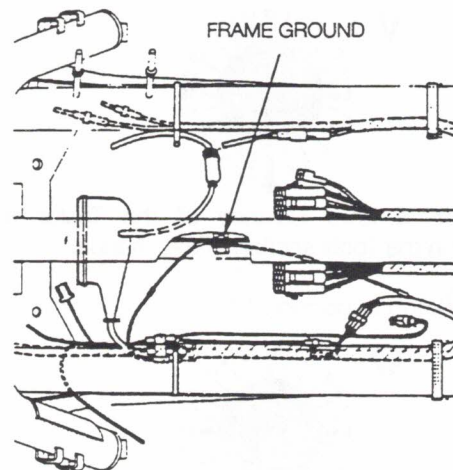
With throttle grip at idle position, the display should read $< 0.5 \Omega$.



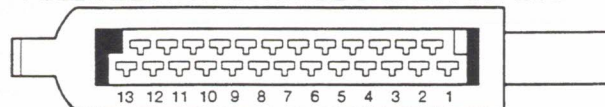
If tester display reads any thing other than the above, check the following:

- Proper adjustment of throttle valve switch. (Does reading change if throttle is moved slightly?)
- Opens or shorts in throttle valve wiring.
- Proper function of the throttle valve switch. (Check switch continuity at switch connector.)

Connector Locations / Pin Identification



FUEL INJECTION CONTROL UNIT 25 PIN PLUG



LE JETRONIC FUEL INJECTION CONTROL SYSTEM TESTS

9. Throttle Switch - Full Throttle Contact

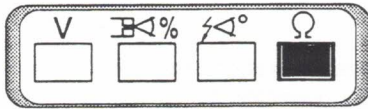
Test Equipment: BMW Multi-Tester and Switchable Breakout Box

Tested Pins: 3 - Full Throttle Position Signal
9 - Power supply to Throttle valve Switch

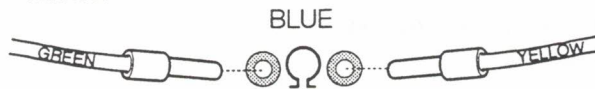
Test Conditions:

1. Fuel Injection harness 25 pin plug connected to Test Lead. **Ignition Switch OFF.**

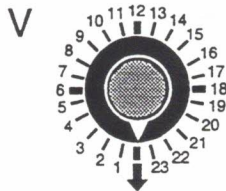
2. BMW Multi-Tester Ω button pressed



3. Volt/Ohm Leads from BMW Multi-Tester connected to switchable breakout box as follows.



4. Switch V knob to position ↓



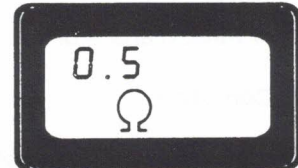
5. Perform a Zero Balance of the Tester as described in the Tools section of this manual.

6. Set Ω knob to position 17.



BMW Multi-Tester Display:

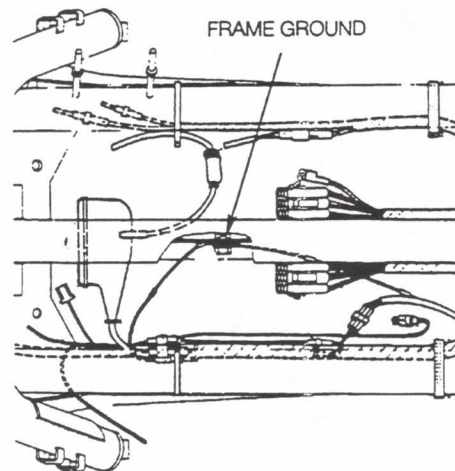
With throttle grip at full throttle position, the display should read $<0.5 \Omega$.



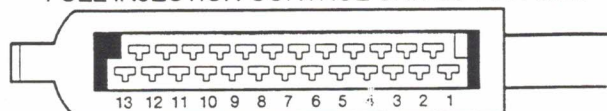
If tester display reads any thing other than the above, check the following:

- Proper adjustment of throttle valve switch. (Does reading change if throttle is moved slightly further at the linkage instead of the grip?)
- Opens or shorts in throttle valve wiring.
- Proper function of the throttle valve switch. (Check switch continuity at switch connector.)

Connector Locations / Pin Identification



FUEL INJECTION CONTROL UNIT 25 PIN PLUG



LE JETRONIC FUEL INJECTION SYSTEM TEST

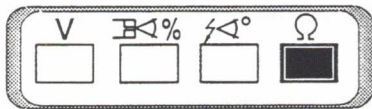
10. Air Flow Sensor

Test Equipment: BMW Multi-Tester and Volt / Ohm Leads and Adapters

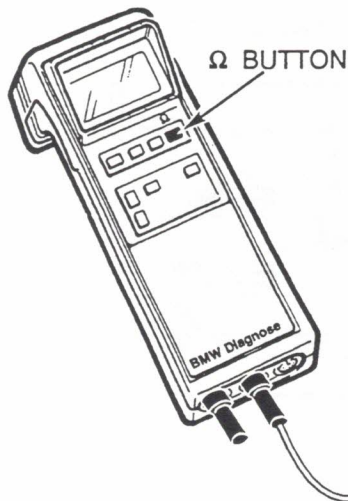
Tested Pins: 8 and 9 of Fuel Injection Control Unit (FICU)

Test Condition:

1. Ignition switch to OFF position.
2. Remove Fuse 6.
3. FICU plug disconnected
4. BMW Multi-Tester Ω button pressed.

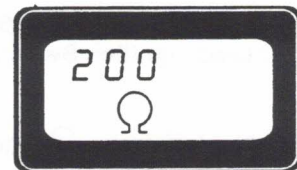


5. Perform zero calibration procedure on the tester.
6. Volt/Ohm leads from BMW Multi-Tester connected between pins 8 and 9 of Fuel Injection Control Unit plug.



BMW Multi-Tester Display:

Resistance =
 $\approx 200\Omega$

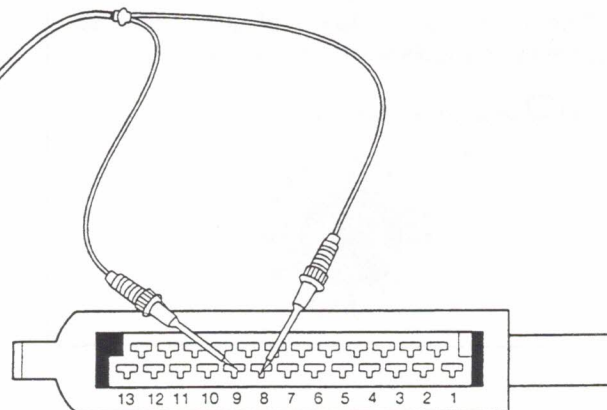


If resistance reading is correct, perform test on Air Flow Sensor connector, terminals 8 and 9.

If resistance reading is not correct, replace Air Flow Sensor.

If resistance reading is correct, check the following:

- ✓ Plug connectors and harness for corrosion.
- ✓ Wires between Fuel Injection CU plug and Air Flow Sensor plug.



FUEL INJECTION CONTROL UNIT 25 PIN PLUG

LE JETRONIC FUEL INJECTION SYSTEM TEST

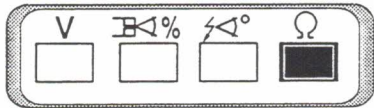
11. Central Ground

Test Equipment: BMW Multi-Tester and Volt / Ohm Leads and Adapters

Tested Points: Central Ground (under tank) and battery ground.

Test Condition:

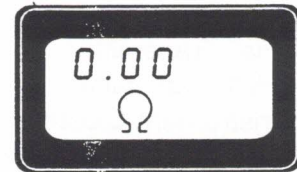
1. Ignition switch to OFF position.
2. BMW Multi-Tester Ω button pressed.



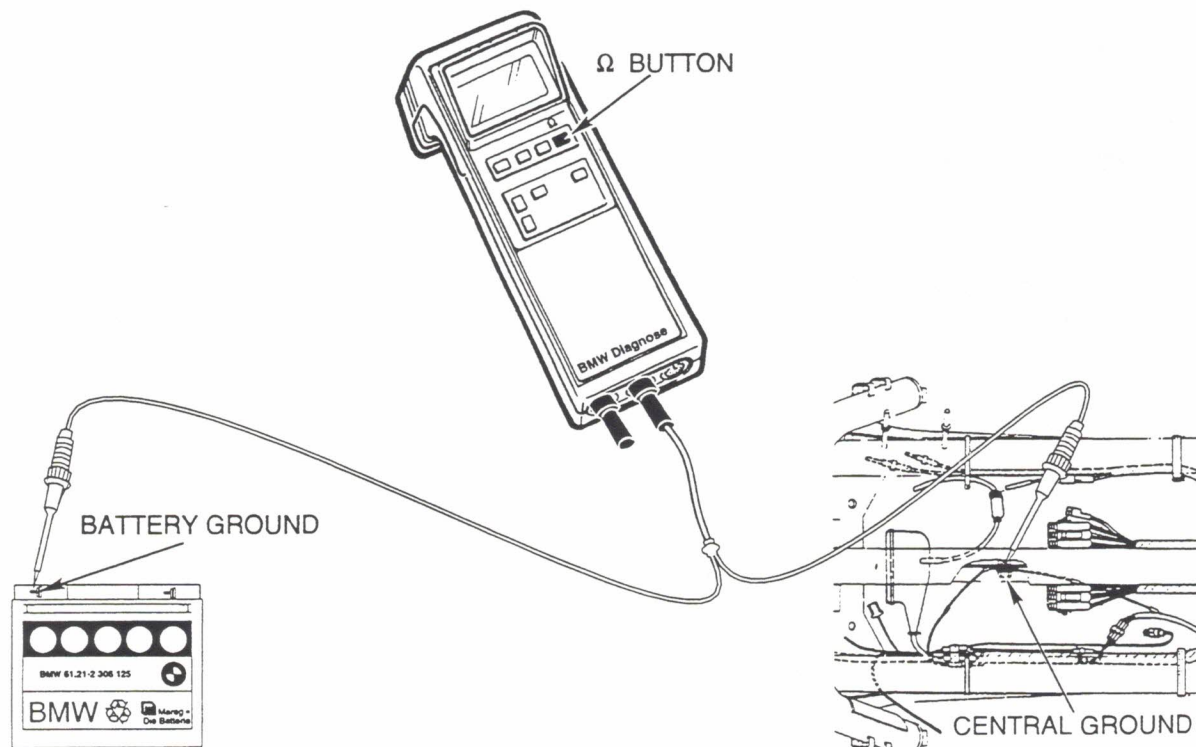
3. Perform zero calibration procedure on the tester.
4. Volt/Ohm leads from BMW Multi-Tester connected between central ground screw and battery ground.

BMW Multi-Tester Display:

Resistance =
< 0.03 Ω



If resistance reading is not correct, check all ground terminals and wires for looseness, corrosion, breaks, etc.



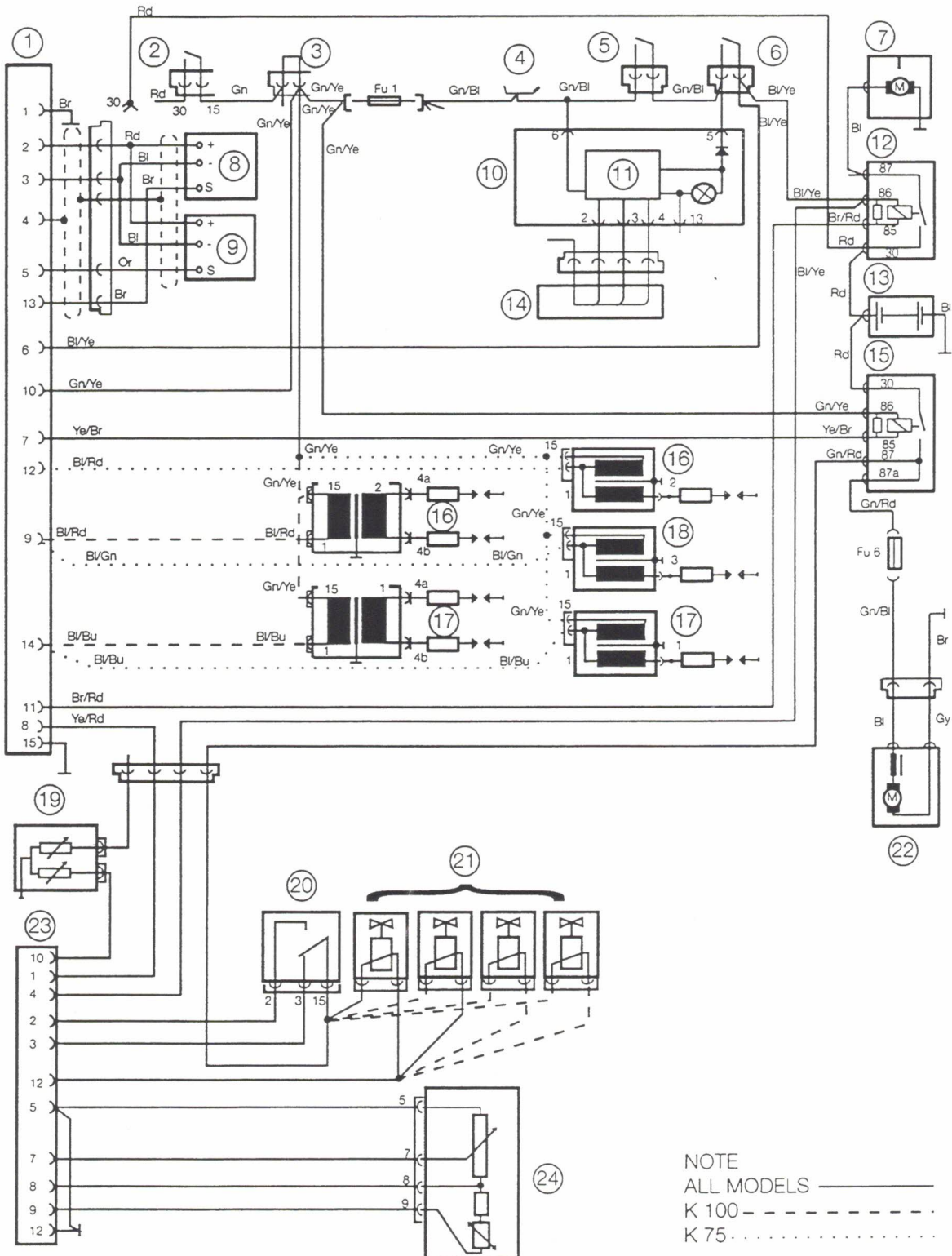
ELECTRICAL SCHEMATIC - LE-JETRONIC

COMPONENT LISTING

1	Ignition Control Unit (ICU)	14	Transmission Switch
2	Ignition Lock	15	Injection Relay
3	Emergency Off Switch	16	Ignition Coil 2
4	Bulb Tester	17	Ignition Coil 1
5	Clutch Switch	18	Ignition Coil 3
6	Starter Switch	19	Engine Temperature Sensor
7	Starter	20	Throttle Switch
8	Hall Transmitter	21	Fuel Injectors
9	Hall Transmitter	22	Fuel Pump
10	Instrument Cluster	23	Fuel Injection Control Unit (FICU)
11	Range Indicator	24	Air Flow Sensor
12	Starter Relay		
13	Battery		

WIRE COLOR CODES

Bl = Blue
Br = Brown
Ye = Yellow
Gn = Green
Gy = Grey
Rd = Red
Bl = Black
Vo = Violet



NOTE
 ALL MODELS ———
 K 100 - - - - -
 K 75

SYMBOLS AND ABBREVIATIONS

The following symbols and abbreviations are used in this manual.

Bar = Unit for pressure (1 Bar = 14.504 psi)

≈ = Approximately

°C = Degrees Celsius

°F = Degrees Fahrenheit

Ω = Ohm

KΩ = Kohm = 1000 times value

V = Volt

 = Duty Cycle

< = Less than number following

> = Greater than number following

CU = Control Unit

FICO = Fuel Injection Control Unit

ICU = Ignition Control Unit

MCU = Motronic Control Unit

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Volt / Ohm Leads and Adapters	Test Equipment - 4
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BMW Motorcycle Test Equipment

In 1985 the K100 was introduced. With it came the introduction of the first fully electronic engine management system; LE-Jetronic. Also introduced at that time was the electronic test equipment to fully diagnose the new systems.

From 1985 to present, BMW Motorcycle electronic test equipment consists of:

- BMW Diagnose Handheld Multi-Tester with associated leads
- BMW Diagnose Switchable Breakout Box with associated leads (LE Jetronic Motorcycles Only!)

BMW Diagnose Handheld Multi-Tester (BMW Multi-Tester)

DESCRIPTION

A portable, hand held, electronic tester with digital display. Operates on internal battery power or external power source.

CAPABILITIES

When connected to the appropriate systems, and using the correct leads, the BMW Multi-Tester:

- *Tests, Ignition Control Unit and System
Fuel Injection Control System
* = *LE Jetronic Only!*

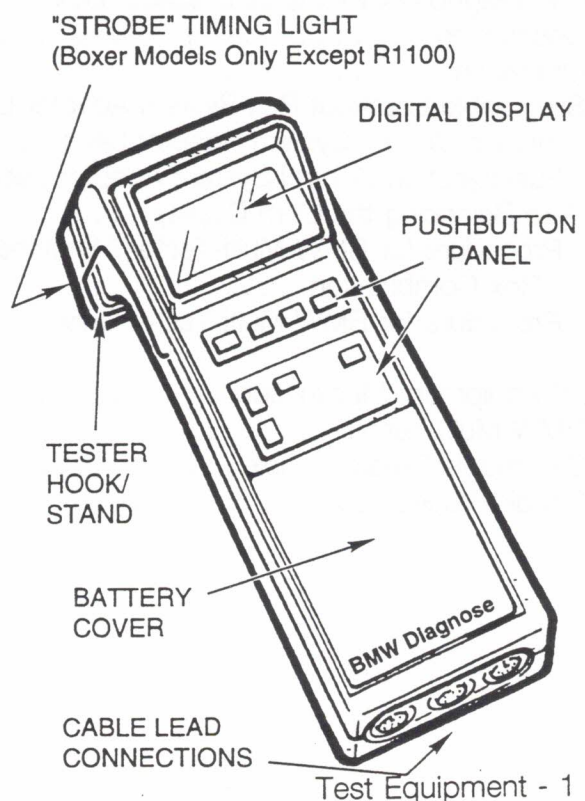
These tests include measuring:

- Voltage & Resistance values
- Ignition Timing and Advance in °
- Ignition Dwell angle and Duty Cycle
- Engine Speed in RPM

These tests are performed using the Switchable Breakout Box on LE Jetronic. Some of the tests can be done on Motronic and standard ignition systems. This is done using adapters and special leads for the BMW Multi-Tester described further on.

- Displays, The Fault code memory of the Motronic and ABS control Units.

MODEL USAGE: All BMW Motorcycles.



BMW Multi-Tester Operation

SWITCHING THE BMW Multi-Tester "ON" AND "OFF"

To switch the tester ON, press any one of the four test program buttons for at least one second. The BMW Multi-Tester automatically switches OFF if there is no change in the readings within approximately 80 seconds and if no program buttons are pressed.

PUSHBUTTON PANEL IDENTIFICATION



IGNITION DWELL ANGLE & DUTY CYCLE

Displays the dwell angle and duty cycle of the ignition system components and signals. Also used to display Ti of injector. Use this function with the volt / ohm test lead and injector test lead.



IGNITION TIMING DISPLAY (BOXER MODELS ONLY EXCEPT R 1100)

Displays the ignition timing in crankshaft degrees. Use this function with the inductive pickup test lead on Cyl. #1 spark plug lead.



VOLTAGE MEASUREMENT

This button displays voltage values. The tester has a max display of 35.9 V DC and min of 0.0. If a "-" symbol is before the reading, check the test leads for correct polarity at point of hook up.




RESISTANCE MEASUREMENT

This button will display resistance values in Ω and $K\Omega$. Use with the Volt/Ohm lead.



ENGINE SELECTION

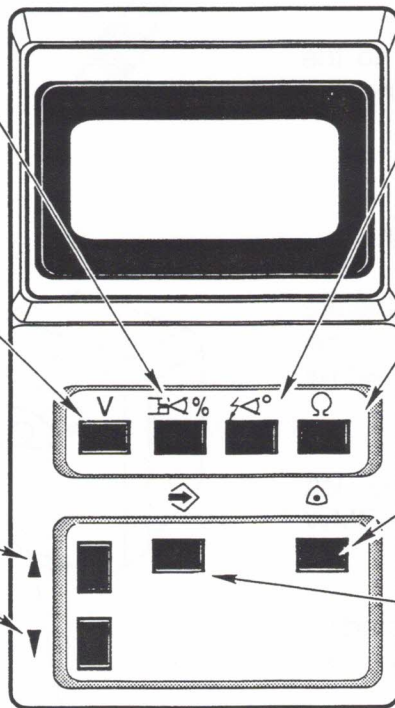
Make sure  is in display when using tester on BMW Motorcycles.

IGNITION TIMING ADVANCE ANGLE ADJUSTMENT

▲ advances in increments, ▼ retards in increments.

This adjustment advances/retards the timing light and display in crankshaft degrees.

Pressing ▲ & ▼ simultaneously resets timing light and display back to 0.0 in one step.



DISPLAY STORE



"Freezes" the value being displayed. Reset displayed value by pressing store or another test program button.

Bottom of Tester

POWER SUPPLY

Connections for AC Charger or Motorcycle Battery leads



DATA AND MEASURING

Connections for KTE 201 ABS/MOTRONIC Diagnosis cable or Volt/Ohm Lead

INDUCTIVE PICKUP

Connection for Lead

BMW Multi-Tester Leads and Connections

GENERAL

When connecting a test lead to any test equipment or motorcycle component or wiring harness, make sure of the following:

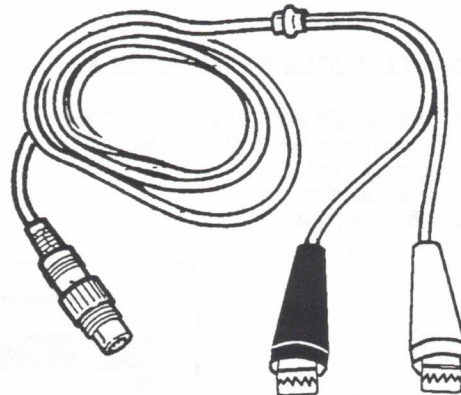
- The motorcycle engine is "OFF".
- The motorcycle ignition key switch is "OFF".
- The motorcycle transmission is in "Neutral".

EXTERNAL POWER SOURCE LEADS

Motorcycle Battery

The BMW Multi-Tester can operate using the motorcycle's 12 volt DC battery. This lead connects to the left connector on the bottom of the BMW Multi-Tester.

The red clip of the lead connects to the positive terminal of the battery and the black clip to the negative terminal.



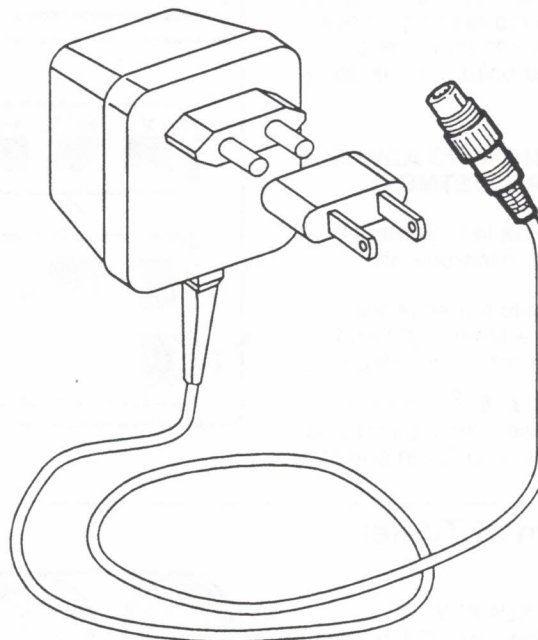
AC Voltage Converter / Charger

The BMW Multi-Tester can also operate using an AC voltage converter. This converter plugs into a 110 volt AC - 60 Hz outlet.

This lead also connects to the left connector on the bottom of the BMW Multi-Tester.

The BMW Multi-Tester can be operated by its internal NiCd battery without an external power source.

When the display of the BMW Multi-Tester indicates "LO BATT" the NiCd batteries are weak and must be recharged using the AC Converter/ Charger. The charge time is approximately 14 hours.



BMW Multi-Tester Leads and Connections (Cont'd)

MEASURING LEADS AND ADAPTERS

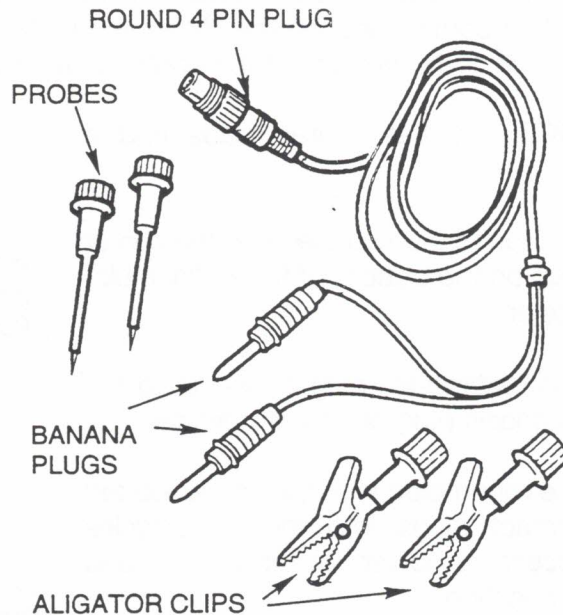
Volt / Ohm Leads and Adapters

This lead enables the BMW Multi-Tester to measure voltage and resistance values.

The round 4 pin plug of the lead connects to the center plug on the bottom of the BMW Multi-Tester.

The other end has two banana plugs (yellow and green) for connection to the voltage and ohm sockets of the Switchable Breakout Box. The yellow banana plug is for positive (+) connection, the green banana plug is for negative (-) connection.

Also included with this lead are two types of adapters for the banana plugs:

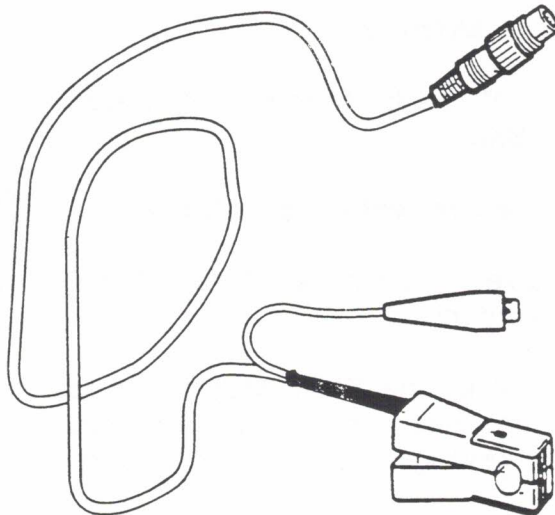


Clamp-On Inductive Pickup

This lead is used on all models to check engine speed RPM's.

For all Boxer models except the R1100, this lead enables the tester to check and adjust ignition timing with the strobe light and display of the tester. This adjustment advances/retards the strobe light and the tester displays the adjustment in crankshaft degrees.

The round three pin plug of the lead connects to the right plug on the bottom of the BMW Multi-Tester. The inductive pickup is clamped onto the spark plug wire of the #1 cylinder on all Models except K75 and on the #3 plug wire on the K75 Model. The ground lead is connected to a known good chassis ground.



MEASURING LEADS AND ADAPTERS (Cont'd)

ABS / Motronic Diagnosis Cable - KTE-201

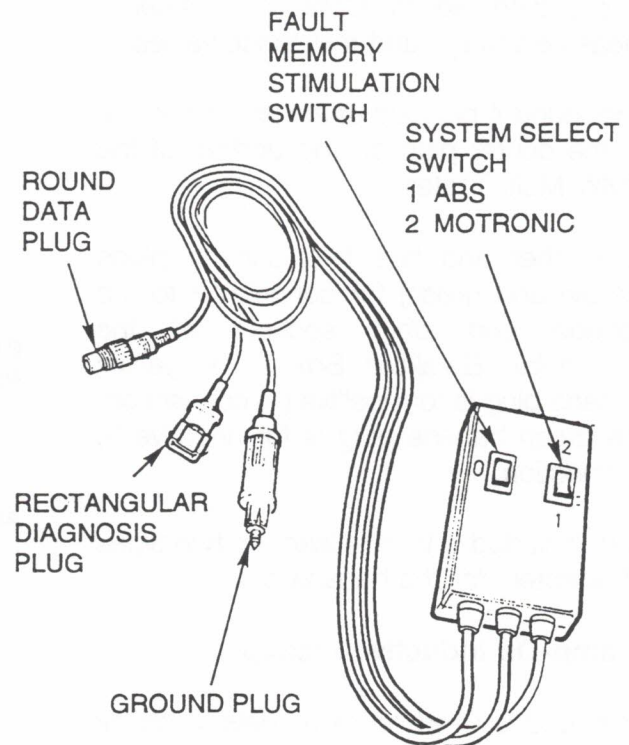
This cable enables the BMW Multi-Tester to communicate with the ABS or Motronic control unit. This communication link allows the BMW Multi-Tester to acquire fault codes stored in the fault code memory of the control unit and display them.

The KTE-201 has three leads and a switch box.

- The round plug connects to the center plug on the bottom of the BMW Multi-Tester
- The rectangular plug connects to the diagnosis plug on the motorcycle.
- The round plug with the spring loaded contact plugs into the motorcycles accessory power socket for a ground connection.

The switch box has two switches:

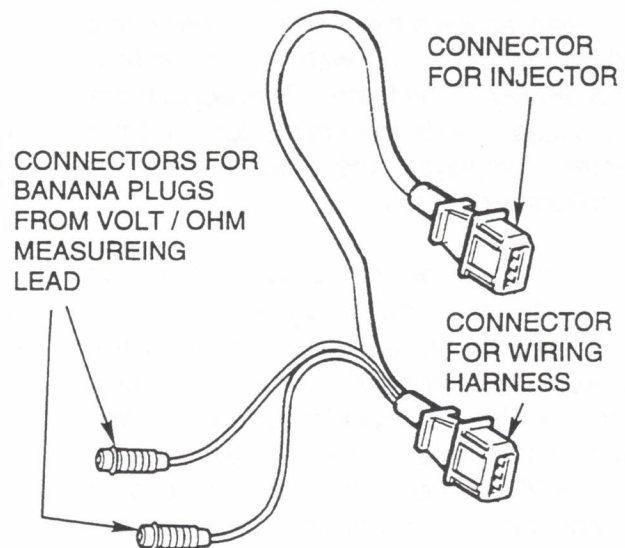
- System Select Switch - Selection of system for diagnosis.
 1. ABS
 2. Motronic
- "O" Fault Memory Stimulation Switch.



Fuel Injector Test Adapter Cable

This cable allows the tester to tap into the fuel injector circuit.

This enables the BMW Multi-Tester to check the resistance value of the fuel injector windings and check the Ti of the injector.



BMW Diagnose Switchable Breakout Box (Used on LE Jetronic Equipped Motorcycles Only!)

DESCRIPTION

The Switchable Breakout Box is a device that enables the BMW Multi-Tester to easily access all of the test values from the tested system. The test values are attained without the need of dismantling the wiring harnesses, or unplugging the connectors at the components to access all of the measuring points. Special system adapter leads are used to connect the Switchable Breakout box to the tested system.

The Switchable Breakout Box was designed and manufactured to communicate only with the LE Jetronic control system. Subsequently, it can not be used with the Motronic or ABS systems.

When Testing the Fuel Injection or Ignition systems of LE Jetronic, the Switchable Breakout and the BMW Multi-Tester are both adjusted for test setup. Double check both pieces of equipment for correct settings.

OPERATION

OSCILLOSCOPE CONNECTIONS

An ignition oscilloscope can be connected directly to the switchable breakout box. If available, follow the oscilloscope instructions.

VOLTAGE TEST STEP KNOB

This knob has 23 numbered increments that relate to the numbered test steps for volts.

The volt/ohm leads from the tester must be connected to the V sockets when using this knob:

- Yellow plug to red socket
- Green plug to black socket

In the last position is an ↓ . When the knob is in this position, the voltage tests are locked out.

When the voltage tests are locked out, the Resistance Test Step Knob controls the switchable breakout box.

Test Equipment - 6

63 PIN CONNECTOR FOR TEST LEADS

PLUG CONNECTIONS FOR:

Voltage Testing using the Volt / Ohm Leads of Multi-Tester

Resistance Testing using the Volt/Ohm Lead of Multi-Tester

Special Function Leads

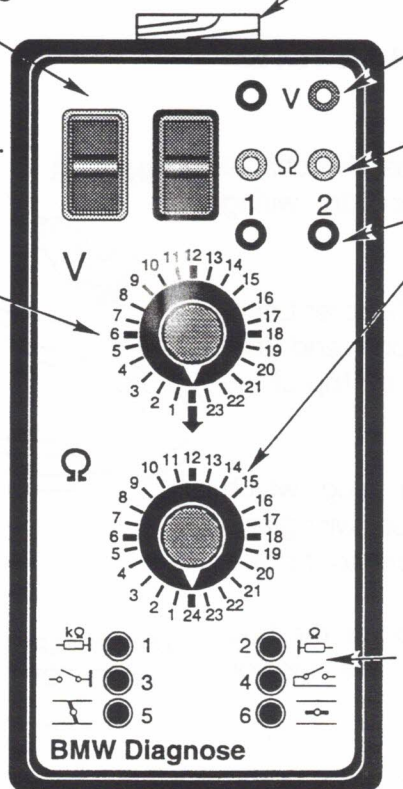
RESISTANCE TEST STEP KNOB

With the volt knob in the ↓ position, this knob controls the switchable breakout box. Like the Volt knob, it has numbered positions that relate directly to the test steps for resistance measuring.

The volt/ohm leads must be connected to the blue Ω plugs when using this knob.

SIMULATION SWITCHES

At introduction of the switchable breakout box these switches were used. With model evolution some of the values have changed making the use of these switches obsolete



Switchable Breakout Box System Adapter Leads

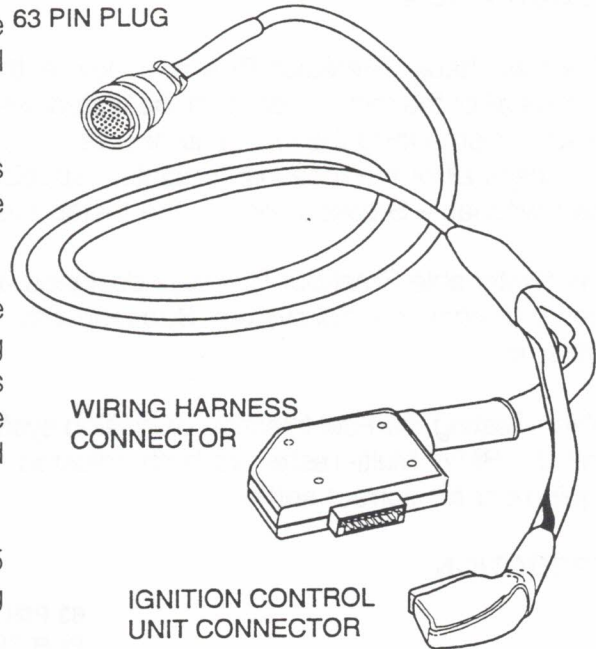
IGNITION CONTROL SYSTEM ADAPTER LEAD

This lead is used to connect the Switchable ^{63 PIN PLUG} Breakout Box in series with the Ignition Control Unit and the system wiring connector.

It has a 63 pin plug at one end that connects to the 63 pin connector on top of the Switchable Breakout Box.

At the other end are two connectors. These are connected to the ICU and system wiring harness 15 pin connector. Using this configuration will allow monitoring of the communication signals between the ICU and system.

Connecting just the system wiring harness 15 pin plug to the adapter lead will allow checking of the components and wiring integrity.



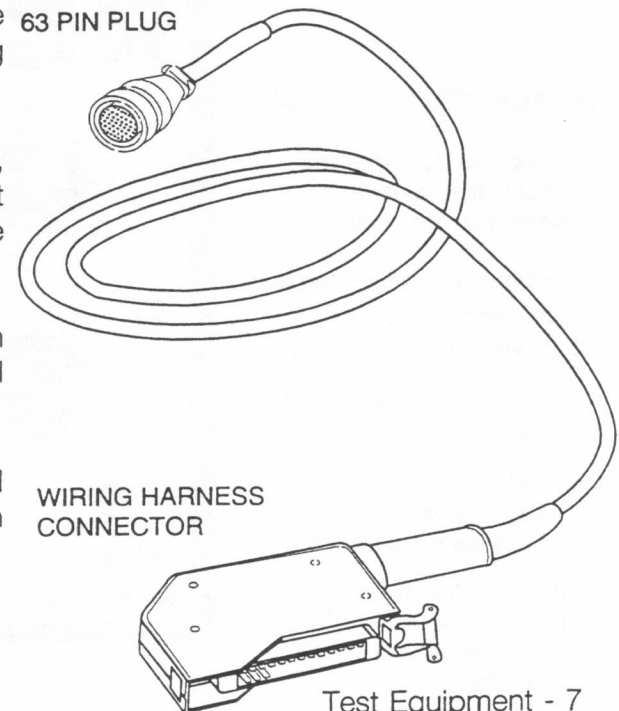
FUEL INJECTION CONTROL SYSTEM ADAPTER LEAD

This Lead is used to connect the Switchable ^{63 PIN PLUG} Breakout Box to the fuel injection wiring harness 25 pin plug.

Like the Ignition Control System Adapter Lead, It also has a 63 pin plug at one end that connects to the 63 pin connector on top of the Switchable Breakout Box.

At the other end is a 25 pin plug which connects to the fuel injection system wiring and components to the Switchable Breakout box.

This lead will not allow connection of the Fuel Injection Control Unit as does the Ignition Control System Adapter Lead.



Zero Balancing The Ohm Display

Zero balancing the display when measuring resistance is a crucial pretest requirement. If the tester is not zero balanced, incorrect readings could result causing unnecessary replacement of parts.

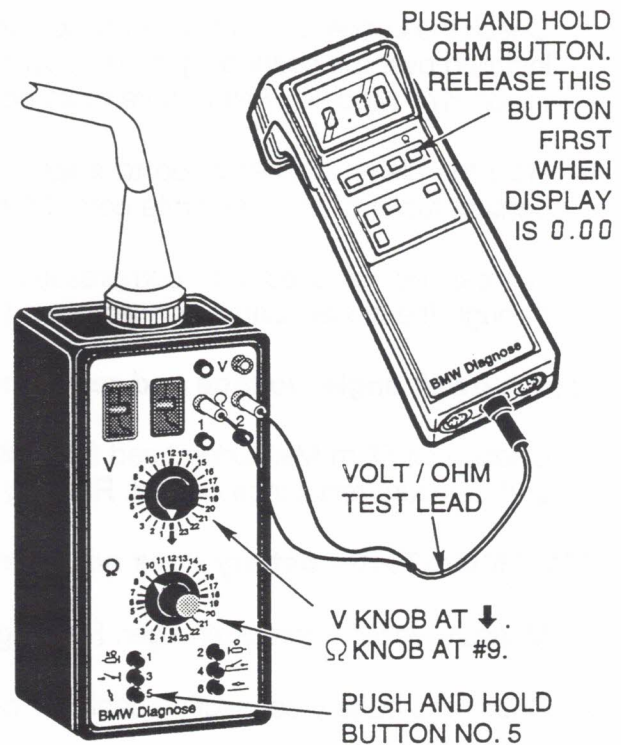
PROCEDURE FOR BMW Multi-Tester / SWITCHABLE BREAKOUT BOX COMBINATION

Connect the BMW Multi-Tester and Switchable Breakout Box together with the volt ohm measuring lead plugged into the Ω sockets. Adjust the knobs of the Switchable Breakout box as shown.

Simultaneously press button #5 of the switchable breakout box and the Ω button of the BMW Multi-Tester. Hold buttons down until Ohmic value is displayed as 0.00 Ω .

Once display has "Zeroed" release the BMW Multi-Tester Ω button first.

Always zero balance the tester just prior to every resistance measurement test. If the tester turns itself off after the 80 second time period, the display should be balanced again when ready to do test.

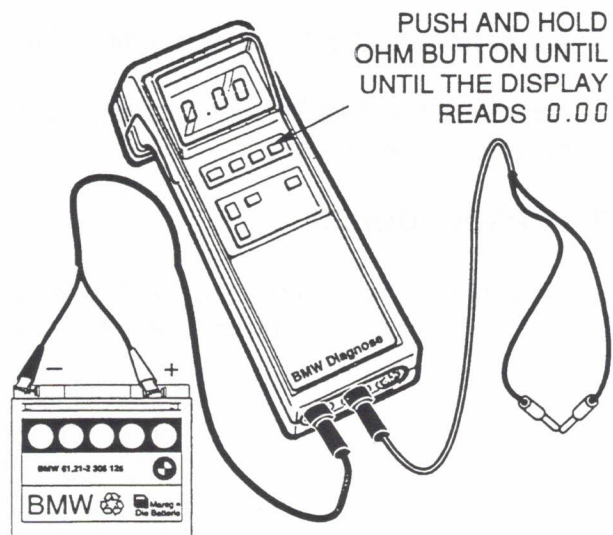


PROCEDURE FOR BMW Multi-Tester ONLY

Connect the Volt/Ohm lead to the tester.

Hold the banana plugs of the test leads together.

Hold the ohm button of the BMW multi-tester down until the display of the tester reads "0.00".



Test Equipment Malfunction

If you encounter illogical readings when using the test equipment and the tested circuit or component checks out OK, check the test equipment for malfunctions.

BMW Multi-Tester

- Fault in **engine speed**.
 1. Check the connection of clamp-on inductive pickup. The clamp connection must be installed over the spark plug cable of cyl 1 on all Models except K75 and on cylinder #3 on K75 Models. Ferrite core must be entirely closed.
 2. Hold the clamp connector up to a light. There must be no light gap between the contact faces of the two ferrite core halves.

Dirt can be removed with compressed air or a clean soft cloth can be inserted through the closed clamp connector and pulled through.
- Fault in **dwll angle, voltage and resistance measurements**
 1. Check Volt/Ohm Measuring Lead for continuity. Check with a separate multi-meter and measure resistance of lead. Reading must be 0 Ω .
- **BMW Multi-Tester battery does not charge**.
 1. Measure voltage across charger. Reading must be 8.4 V to 10 V DC.
 2. Check the battery connection cable for continuity.

SWITCHABLE BREAKOUT BOX

- Check switch position for correct setting. Check leads are plugged into correct sockets.
- Check the BMW Multi-Tester for faults. Connect a different BMW Multi-Tester up to the switchable breakout box.

REPAIR PROCEDURES

- If equipment needs repair, pack the equipment with accessories in the original packaging. Enclose a written description of the malfunction. Send to:

Robert Bosch Corporation
Service Department
2800 South 25th Ave.
Broadview, Ill. 60153