

CHAPTER 15 - TROUBLESHOOTING

EMERGENCY TROUBLESHOOTING

IMPORTANT! After connecting the battery on motorcycles equipped with EFI, you must turn the key ON, press the RUN button, and then turn the key OFF for at least 15 seconds to reset the ECU sensors.

If the bike is difficult to start or will not start at all, do not wear down the battery by excessive starter use. Check for obvious problems before getting out your tools - perform the steps listed below. If it still won't start, refer to the appropriate troubleshooting procedure in this chapter.

1. Check gas flow. Does the tank have fuel?
Check fuel flow from the tank to the carburetor. Is the petcock in the ON position? Pull the fuel line and see if fuel flows freely to the carburetor. The line may be stopped up or blocked by foreign matter. If the carburetor is getting fuel, then check the electrical system.
2. Check that the battery is fully charged using the listed battery tester. If using a digital multimeter (DMM), the voltage reading should be at least 12.8 volts.
3. Check for spark using the listed spark tester. Check to see if the plug wires are on tight. If there is no spark at the plugs check for loose connections at the coil and battery.

The three basics an engine needs to run properly are:

- a. correct gas/air mixture.
- b. compression.
- c. a spark at the right time.

If one or more is missing, the engine will not run.

SYSTEM TROUBLESHOOTING

A - Battery Discharging:

Check battery terminal connections.

Test battery.

Check circuit breaker.

Check charging system.

Check voltage regulator.

Check the rotor and stator - refer to **Chapter 14, Electrical** for the general description and removal/ installation instructions.

Refer to the *Battery and Charging System* section below and flow chart for testing procedures.

B - Engine will turn but not start:

Check for spark.

Check for loose connections at coil and battery.

Check ignition module.

Check the crank position sensor.

Check continuity to the **RUN/OFF** button.

Check the EHC. Refer to the front of this chapter for a general description and removal/ installation instructions. Refer to the *Ignition System* section and flow chart for testing procedures.

C - Engine is hard starting or locks up during start:

Check the compression relief valves.

Check the battery.

BATTERY AND CHARGING SYSTEM

The battery is the heart of the electrical system. All other electrical components in the system are dependant on the charge and condition of the battery. A weak or faulty battery may cause starting, ignition, and EHC-related issues. The OEM battery is maintenance-free and specified to meet the demanding needs of the large V-Twin engine.

CAUTION: DO NOT REPLACE WITH A CONVENTIONAL LEAD-ACID BATTERY.

Battery connections must be clean and dry. Clean connections with a solution of water and baking soda and apply a commercial protectant to prevent corrosion. Check this on every bike that comes into your shop.

If the motorcycle will not be started for more than 30 days, connect the battery to a tender using float-type charge technology to prevent sulfating - a cause of premature battery failure.

Replace worn or missing battery hold down straps and pads to reduce the risk of battery damage and vibration.

Switch ignition to OFF position and disconnect the battery when servicing electrical system components. Remove the negative battery cable first and install last.

CHAPTER 15 - TROUBLESHOOTING

The battery must be fully charged and pass a load test before proceeding to the Charging System Flowchart.

BATTERY LOAD TEST

Set default CCA to 325 CCA and estimate the temperature (actual BDM battery is rated 310 CCA).

CURRENT DRAIN TEST

1. Ignition Key to the OFF position.
2. Remove seat.
3. Disconnect the ground (-) cable from battery negative (-) terminal.
4. Measure battery current using instructions provided with DMM.
5. Connect red (+) probe of the DMM to the ground cable and connect black (-) probe to negative (-) terminal of battery.
6. Current should read less than 2mA for Carbureted Models and less than 3.5mA for EFI models. (EFI models will draw ~500mA for 15seconds when meter is first attached).
7. If an over current condition is found, locate the faulty component or harness by disconnecting one harness at a time, until current draw is within specifications. When current draw is within specifications, the last connection disconnected will be the circuit or component affected. Use the electrical schematic to aid in fault location.

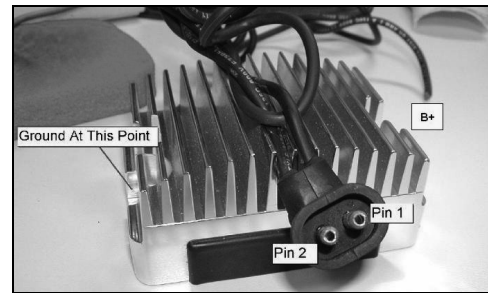
VOLTAGE REGULATOR (VR)

Do not disconnect the B+ wire from the circuit breaker and measure voltage to determine if the voltage regulator (VR) is faulty. The VR will not charge if there is no battery load. Follow the Charging System Flowchart to troubleshoot charging problems.

The VR is grounded through the case, so the mounting bolts must be tight. Add this as a check on every bike that comes into your shop. Check and clean the VR mounting location whenever the VR has been removed from the motorcycle.

VR TEST PROCEDURE

Use the following flowcharts to determine if the charging system indicates a faulty VR. Review the DMM users manual, as some resistance measurements may be over the capability of the meter and show an "Open" or "OL," etc. This indicates a very high resistance and should be considered $>2M\Omega$.



PCB TESTING

Remove gas tank. Unplug JST connector to either the left or right control. Plug test pigtail into handlebar control and test continuity from any given circuit to the black wire of the pigtail.

STARTER CURRENT DRAW TEST

Using an induction ammeter, attach the ammeter to the positive side of the battery. With the ignition ON, press the start switch. Take a reading off the ammeter. There should be an initial surge when first turning over the engine. Typical starter current draw should be between 160 and 180 Amperes. If the starter draw exceeds 200 Amperes, remove the starter for further testing.

COIL TESTING

With a DMM set to read Ohms, measure the resistance between the primary (low tension) wire and ground, or ground terminal. The reading should be low (2.5 to 3.1 Ohms) (0.5 Ohms for the EFI coil). Next, measure the secondary (high tension) wire and ground. This should be a high reading (10.000 to 12.000 Ohms). If the coil is outside of these specs, the coil might be bad.

STARTER VOLTAGE DROP TEST

Attach the red meter lead to the positive post on the battery. Attach the black lead to the component in the circuit (solenoid). Activate the starter and observe the meter reading. The meter

CHAPTER 15 - TROUBLESHOOTING

will read the voltage drop. Ideal voltage drop would be zero or have no drop at all. A typical circuit drop is less than 1 Volt. If voltage drop is greater, backtrack through the circuit until the source of the drop is found. This same test can be performed on the negative side also. Attach the black lead of the meter to the negative side of the battery and the red side to the ground you wish to check.

STATOR/ROTOR TEST

To check for a grounded stator, turn ignition OFF, and disconnect the regulator from the stator plug in the crankcase. Connect an Ohmmeter between the crankcase and either stator socket. There should be no continuity across either test point. Any other readings indicate a grounded stator which must be replaced.

RESISTANCE CHECK

Using an Ohmmeter, measured resistance across the stator plug should be between 0.1 to 0.2 Ohms. If resistance is higher, the stator is damaged, and must be replaced. Be sure to subtract the DMM lead resistance from the measured value.

AC OUTPUT TEST

Disconnect the regulator and connect an AC voltmeter across both stator plugs. Run the engine to 2000 rpms. The AC output should read between 32-40 AC Volts (16-20 per 1000 rpms). If the output is below specifications, a charging problem has occurred and the stator/rotor needs to be replaced.

NOTE: Always recheck voltage output after making repairs.

VOLTAGE REGULATOR BLEED TEST

Regulator must be connected to the battery. Unplug the regulator from the stator, and using a light, touch one probe to a known good ground, and the other to the regulator pins, one at a time. If the light glows, replace the regulator.

CURRENT DRAW TEST

Using a load tester, place the induction pickup or current probe pickup over the negative battery cable. Disconnect the regulator from the stator and

start the motorcycle. With the ignition and all continuously running lights turned ON (headlight on hi beam), read the total current draw. Compare this reading to that obtained in the CURRENT AND VOLTAGE OUTPUT TEST. The current output should exceed current draw by 3.5 amps, minimum. Reconnect the regulator.

CURRENT AND VOLTAGE OUTPUT TEST

Connect the load tester leads to the battery terminals. Place the induction pickup over the positive regulator cable. Run the engine to 3000 rpms and increase the load to obtain a constant 13.0 volts. Current output should be 26-32 Amps.

VOLTAGE OUTPUT TEST

Remove load. Read the load tester voltage meter. Voltage to battery must never exceed 14.8 volts. If voltage is higher, replace regulator.

SPEED SENSOR TEST

First, test that the red wire reading is 12 volts. Test the black wire for continuity. Using the proper equipment, raise the rear tire, and check voltage at the green signal wire while spinning the tire. The reading should be between 0 and 6 volts. If no voltage registers, replace the speed sensor.

CRANK SENSOR TEST

Disconnect the plug wires and unplug the crank sensor. Set the DMM to measure AC volts and measure across both pins of the plug. While cranking the engine, you should see AC voltage greater than 1 Volt. If no voltage registers, replace the crank sensor.

IGNITION MODULE TEST

Inspect the ignition module. Is the red LED illuminated with the key in the ON position? Inspect the blue and yellow LEDs. Do they illuminate when the front and rear cylinder are triggered? Use the break out box and a DMM to test A19 power harness to B27 backbone harness.

NOTE: These flowcharts are informational, and exist for troubleshooting purposes only. If you need more than 0.3 hours to troubleshoot an issue, please contact BDM Technical Support at 316-219-7000. All current Warranty policies remain in effect.