

The TRIUMPH Corporation

SERVICE BULLETIN

September 18, 1967

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TO ALL EASTERN TRIUMPH DEALERS

SUBJECT: Comprehensive Test and Troubleshooting Instructions for all 6 and 12 Volt Battery Ignition Models ("B" & "C" Range from 1963) using Lucas RM19 A.C. Equipment.

There are five basic tests that should be performed when there is doubt that the motorcycle's electrical system is functioning properly. These are in order:

1. Battery and Ground Connection Test
2. Charge Rate Test: (D.C. current input to battery).
3. Alternator Output Test: - A.C. voltage output of alternator
4. Rectifier Output Test: - D.C. voltage output from rectifier
5. Zener Diode Test

It is absolutely essential that a well charged, properly rated battery be in the motorcycle's wiring system for these tests.

Although this bulletin emphasizes the use of a Tri-Cor model "750" test set, any reliable electrical test instrument may be used as long as a one ohm resistor of at least 100 watts rating is used in parallel with the A.C. or D.C. voltmeter when required. Be sure when making any test connections that the loose leads and wires are not in a position to short together or to ground.

By referring to the three schematic drawings on page H10 of the latest CD411 (white cover with blue printing), it is apparent that the same basic electrical system is used in all coil ignition (from 1963) Triumphs whether they are 6 or 12 volt equipped machines. Rotor, stator, and rectifier are or can be the same for 6 or 12 volt equipped models. The actual voltage output of the alternator is controlled by the internal resistance of the battery.

Test #1: Battery and Ground Connection Test

1. Set the voltmeter switch to D.C. Turn the load resistor OFF. Turn the motorcycle lights on for 10-15 seconds, then immediately after turning the lights off:
2. Check the voltage between the positive (+) and negative (-) battery terminals. The voltmeter must read at least 6.0 or 12.0 volts for either 6 or 12 volt batteries. If the battery does not read these minimum voltages, it must be replaced or recharged before the rest of the testing is continued.
3. Leave the black (-) voltmeter wire attached to the negative battery terminal and move the red (+) voltmeter wire to a good clean ground point on the motorcycle frame. This voltage reading and the one obtained in step #2 must be the same. If they are not, the battery is not grounded properly. Check the

fuse with an ohmmeter or test light to verify that it is good. Also, check the connections at the battery, frame and fuse holder to see that they are clean and tight.

Once it has been determined that a well charged, properly grounded battery is connected in the motorcycle's electrical system proceed as follows:

Test #2: D.C. Charge Rate

1. Disconnect the wires from the middle terminal of the rectifier.
2. Disconnect the wire to the Zener diode (if fitted) and tape or place it where it cannot short to ground.
3. Connect the red ammeter lead to the Brown/White wires removed from the rectifier.
4. Connect the black ammeter lead to the middle rectifier terminal.
5. Start the engine and observe the ammeter. With the engine at approx. 3,000 RPM (45 mph in 4th gear) you should obtain at least these MINIMUM readings:

500cc: All to H40527

500cc: All from H40528

650cc: 6T up to DU5824
TR6 & TL20 up to DU24874

650cc: 6T-DU5825-DU24874

650cc: All from DU24875

6 VOLT

12 VOLT

12 VOLT

OFF 2.5 amps

4.8 amps

4.8 amps

PILOT 2.0 amps

NOT NECESSARY*

NOT NECESSARY*

HEAD (High Beam) 1.75 amps

1.8 amps

NOT NECESSARY*

If the readings on the chart above are obtained, then the basic battery charging system is good. The trouble then will lie in a short somewhere in the wiring system, or else the Zener diode will shorted or open (see Test #5).

If these readings are not obtained, a quick check should be made to see if there is continuity between the battery and rectifier. Proceed as follows:

- 1) Turn the load resistor OFF. Turn the voltmeter switch to D.C.
- 2) Leave the engine shut off and turn the ignition key on.
- 3) Connect the red voltmeter lead to ground.
- 4) Connect the black voltmeter lead to the rectifier end of the Brown/White wire that connects to the middle rectifier terminal.

The D.C. voltage obtained should be within 1/2 volt of the battery voltage. If it is not, there is a short, open or poor connection in the wiring between the battery and the rectifier. Look for the open possibility first by checking for continuity thru the ammeter. If the voltage obtained compares favorably with the battery voltage then the trouble lies elsewhere in the charging system and you should proceed with test #3 as follows:

* These readings are not necessary because in these positions the headlight switch has no effect on the current output of the alternator for these model motorcycles.

Test #3: Alternator Output Test

1. Connect all wiring back to normal.
2. Disconnect the three alternator stator leads (Green/Yellow, Green/Black, Green/White) at the alternator side of the connectors under the engine.

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3. Set the voltmeter switch to A.C.. Turn the load resistor switch on.
4. Connect either voltmeter lead to the White/Green wire.
5. Start the engine and run it approx. 3,000 RPM.

By connecting the other voltmeter lead to the following three combinations of wires, at least the following MINIMUM readings should be noted:

All "B" & "C" Range 6 or 12 Volt

Green/Black	4.0
Green/Yellow	6.5
Green/Black and Green/Yellow (connected together)	8.5

Lower readings than these minimum figures indicate a stator malfunction or demagnetized rotor. The stator can be checked for malfunctions as follows:

For the following open and short tests use an ohmmeter or electrical circuit test light (such as Tri-Cor #233).

- To check the stator:

Shorted Winding Test:

There should be no continuity between any stator lead and the metal stator frame (or a good clean ground on the engine).

Open Winding Test:

There should be continuity between any combination of two of the three stator leads.

If all three A.C. voltage readings are zero or low and the stator checks out OK, the rotor is demagnetized or not turning with the crankshaft. It will be necessary to pull the primary cover and check the rotor at this point. If the rotor is properly attached to the crankshaft, then it is demagnetized and will have to be replaced.

NOTE: Reversed battery polarity can demagnetize the rotor and damage the rectifier. All A.C. equipped Triumphs have a positive (+) ground.

If test #3 fails to point out any trouble then proceed as follows:

Test #4: Rectifier Output Test

1. Reconnect all wiring to normal.
2. Disconnect the wire to the Zener diode (if fitted) and tape or place it where it cannot short to ground.
3. Disconnect the Brown/White wire at the middle terminal of the rectifier.
4. Turn the load resistor switch ON. Set the voltmeter switch to D.C..
5. On all 6 volt models and 12 volt 6T models, disconnect the Green/Yellow alternator stator wire from the alternator side of the connector under the engine. Using a double connector (Lucas #850641), connect this

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Green/Yellow wire to the Green/Black wire under the engine so the Green/Black - Green/Yellow wires from the alternator connect to the Green/Black wire of the main wiring harness. This connection bypasses the ignition and light switches for test purposes and feeds the full A.C. output of the alternator to the rectifier.

6. Connect the red voltmeter lead to the rectifier mounting stud.
7. Connect the black voltmeter lead to the middle (D.C.) rectifier terminal.
8. Start the engine. At approx. 3,000 RPM the D.C. voltage should be from 8.0 - 9.0 volts on all 6 and 12 volt models.
9. Change the red voltmeter lead to a good ground on the frame. The D.C. voltage reading should be the same as in step #8. If it is lower, the rectifier is poorly grounded to the frame. Check that the red ground wire is attached to the rectifier mount stud. Replace the rectifier if steps #8 or #9 yield no or low voltage.

NOTE: If the rectifier mount unit has to be tightened be sure to hold the hex bolt head at the plate end of the rectifier while tightening.

On 12 volt equipped motorcycles, a 5th test is sometime necessary to determine if the Zener Diode is functioning properly. Proceed as follows:

ZENER DIODE TEST:

1. Reconnect all wiring to normal.
2. Disconnect the wire to the Zener diode.
3. Connect the red voltmeter lead to a good ground.
Connect the black voltmeter lead to Zener diode terminal.
Turn the load resistor OFF. Set the voltmeter switch to D.C.
4. Connect the red ammeter lead to the Zener diode terminal.
Connect the black ammeter lead to the Zener diode wire terminal.
5. On 6T's with 12 volt systems, connect the Green/Black and Green/Yellow alternator leads together as in Step #5 of the rectifier test.
6. Start the engine and gradually increase the engine speed from an idle. Observe the voltmeter and ammeter as follows:
 1. When the voltmeter reads 12.75 volts the ammeter must read zero.
 2. When the ammeter reads 2 amps., the voltmeter should read between 13.5 and 15.5 volts.

Failure to conform to either test indicates a replacement diode should be fitted.

NOTE: When fitting a new diode, be sure the ground wire is attached in back of the heat sink. Never allow any foreign material to come between the heat sink and the diode. Always tighten the Zener diode unit to a torque of 17-24 lb. inch ($1\frac{1}{2}$ - 2 lb. ft).

By performing these four or five simple tests, the basic charging system's efficiency can be established.

If these tests fail to show any trouble then the fault must be a short or open in the wiring harness, switches, or lights. By comparing the schematic drawings with the wiring diagrams found in CD446 or CD411, you can easily troubleshoot the system with an ohmmeter, voltmeter, or test light and pinpoint the trouble.