
LUCAS SERVICE
INFORMATION

TEST CARD
NO.5

**Motorcycles
Fitted with
Electrical
Component Box**



Joseph Lucas (Sales and Service) Ltd.,
Great Hampton Street, Birmingham 18.

TEST CARD

MOTORCYCLES FITTED WITH ELECTRICAL COMPONENT BOX

RECOMMENDED TEST EQUIPMENT

Wilkson Test Box or (Wil/73)
 A.C. Moving Coil Voltmeter Scale 0-15V
 D.C. Moving Coil Voltmeter Scale 0-18V
 D.C. Moving Coil Ammeter Scale 5-0-25A
 Load Resistor (1-ohm) capable of carrying 15 A.
 Load Resistor (0.5-ohm) capable of carrying 24 A.
 A length of cable, for use as jumper lead.

TEST 1. BATTERY

A. Hydrometer Readings

If possible, take specific gravity readings of the electrolyte in each cell.

BATTERY CONDITION	SPECIFIC GRAVITY (CORRECTED TO 15°C (60°F))	
	Climates normally Below 25°C (77°F)	Climates normally Above 25°C (77°F)
Fully Charged	1.270 - 1.290	1.210 - 1.230
70% Charged	1.230 - 1.250	1.170 - 1.190
Discharged	1.110 - 1.130	1.050 - 1.070

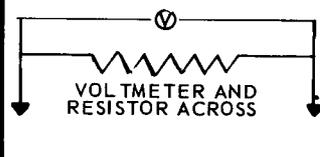
Electrolyte temperature correction

For every 10°C (18°F) below 15°C (60°F), subtract 0.007
 For every 10°C (18°F) above 15°C (60°F), add 0.007

A variation of more than 40 points (0.040) between any cells indicates that the battery is suspect and should be thoroughly checked by a Service Centre or Agent.

TEST 4. ALTERNATOR OUTPUT

- (a) Disconnect the alternator leads at the snap connectors.
- (b) Connect A.C. voltmeter (with 1 ohm resistor in parallel), as detailed in table below.
- (c) Start engine and run at approximately 3,000 rev/min. noting voltmeter reading.

VOLTAGE MEASUREMENT POINTS		MINIMUM VOLTAGE READINGS
		Two lead RM 21
White/Green	Green/Yellow	9V
Any one lead and stator (earth)		NO READING

CONCLUSIONS: If the reading is low, check rotor by substitution. Zero reading indicates open-circuited coil(s).
 A reading between any lead and stator laminations indicates earthed coil(s).

TEST 5. RECTIFIER

- (a) Disconnect the Zener diode, (Test 3b) and reconnect the alternator.
- (b) Disconnect the Brown/Blue cable at the snap connector junction.
- (c) Connect the voltmeter (with 1-ohm resistor in parallel) red cable to earth and black cable to Brown/Blue cable from the box.
- (d) Disconnect the White/Yellow cable from the other snap connector and using the jumper lead connect the cable from the box to the negative terminal of the battery.
- (e) Start the engine and run at approximately 3,000 rev/min.

B. High Rate Discharge

(Battery must be at least 70% charged).

Connect voltmeter and high rate discharge resistor (0.5 ohm) across battery terminals for 15 seconds.

BATTERY VOLTAGE	VOLTMETER READING
12	9.4
6	4.8

A steady reading, not lower than those quoted, indicates the battery condition is satisfactory.

A lower (or rapidly falling) voltage indicates the battery is faulty.

TEST 2. CONNECTIONS

Ensure that all leads are in position and that all connections are clean and tight.

TEST 3. D.C. INPUT TO BATTERY

- (a) Connect D.C. ammeter in main battery line (between battery negative terminal and battery cable). Red lead to cable, black lead to battery terminal.
- (b) Disconnect the Zener Diode (Remove both the Brown/Blue cables from the 2MC capacitor).
- (c) Start engine and run at approximately 3,000 rev/min. Operate lighting switch.

Lighting switch position	MINIMUM CURRENT READING
	Two lead stator
Off	4.5 A
H/Lamp M/Beam	1.0 A

CONCLUSIONS: If the above or higher readings are obtained, the battery is in good condition.

If the readings are lower, test the alternator (Test 4).

MINIMUM VOLTAGE READING
7.5V

CONCLUSIONS: If meter reading is at least the value stated, the rectifier is satisfactory. A low reading indicates a faulty rectifier. Remove and bench test.

NOTE: Stop the engine before disconnecting the voltmeter.

TEST 6. ZENER DIODE

- (a) Disconnect both Brown/Blue cables at 2MC capacitor.
- (b) Connect D.C. ammeter Red lead to straight Lucar and Black lead to the right-angled Lucar.
- (c) Connect D.C. voltmeter black cable to the straight Lucar and the Red lead to earth.
- (d) Ensure all lights etc. are switched off.
- (e) Start engine, slowly increase speed and check meter readings.

CURRENT	DIODE VOLTS
Nil	Up to 12.75
2 A	13.5 - 15.5

Special Note: THE BATTERY MUST BE IN A FULLY CHARGED STATE. If the battery condition is poor it should be temporarily replaced by a battery known to be good.

CONCLUSIONS: Zener diode must be replaced if:-
 (i) Current flows, before 12.75V is reached.
 (ii) Voltmeter registers more than 15.5V, before 2 A is shown on the ammeter.

When refitting or replacing Zener diode, tightening torque must not exceed 24 - 28 lbf ins (2.71 - 3.16 Nm).

TEST 7. IGNITION

- (a) Connect D.C. voltmeter Black lead to terminal of the Black/White cable at the contact breaker and Red lead to earth.
- (b) Ensure contact points are open.
- (c) Switch on ignition. Voltmeter should indicate battery volts.
- (d) Ignition still on, close contact points. Voltmeter reading should fall to zero.

CONCLUSIONS: No reading for test (c) may indicate faulty ignition switch, open-circuit primary winding, broken lead, short circuit to earth on C.B. lead, faulty capacitor or blown main fuse. Use the Black voltmeter lead as a probe and check the circuit until fault is found. If a reading is obtained for test (d), there is a voltage drop across the contact points (dirty contacts) or poor distributor earth.

TEST 8. 2MC CAPACITOR

- (a) **Periodic Check**
 - (i) Disconnect Battery and insulate the negative lead.
 - (ii) Ensure Zener diode is still in circuit.
 - (iii) Start and run engine. Full lighting should be available.

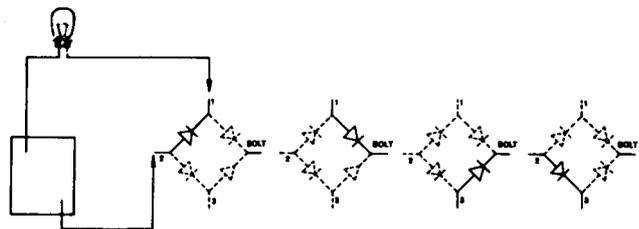
CONCLUSIONS: If engine does not fire and run, proceed to next check.

- (b) **Efficiency Check**
 - (i) Disconnect capacitor.
 - (ii) Connect capacitor direct to 12 volt battery for 5 seconds. (See polarity note).
 - (iii) Disconnect battery and let charged capacitor stand for 5 minutes.
 - (iv) Connect the D.C. voltmeter across the terminals, (See polarity note), and note the initial reading after the overswing. This should be at least 9V, if the capacitor is serviceable.

Polarity Note: 2MC capacitors are polarity-conscious, so that correct battery connections must be made. The smaller Lucar terminal blade (rivet marked red), is positive and the larger double Lucar connector is the negative terminal.

CONCLUSIONS: If reading is less than 9V, the capacitor is leaking (inefficient) and must be replaced.

RECTIFIER BENCH TEST



Connect a 12 volt, 45 - 50 watt bulb and 12 volt battery across terminals 2 and 1. (For a period not exceeding 30 seconds). Repeat test with reversed battery polarity.

Carry out similar tests on terminals Bolt and 1, Bolt and 3, 2 and 3.

Lamp should illuminate fully in one direction only for each of the connections made.

CONCLUSIONS: Rectifier must be replaced if:-

- (a) Bulb illuminates in both directions.
 - (b) Bulb does not illuminate in either direction.
- } for each connection made

FAULT DIAGNOSIS PROCEDURE

Set out below is the recommended procedure for locating some of the more probable electrical faults.

If in doubt about the cause of the trouble, always apply a systematic testing procedure.

IGNITION CIRCUIT

(a) Engine will not start - difficult to start - misfires.

- (i) Check battery.
- (ii) Check main fuse (if fitted).
- (iii) Check there is spark at plug.
- (iv) Ensure timing, contact breaker and plug gaps are satisfactory.
- (v) Check ignition capacitor by substitution.
- (vi) Check wiring for loose connections.
- (vii) Apply Tests 6 and 7.

CHARGING CIRCUIT

(a) Battery in low state of charge.

- (i) Check main fuse (if fitted).
- (ii) Apply Test 1.
- (iii) If charge rate is low proceed with Tests 3, 4, 5 and 6.

(b) Excessive circuit voltage, indicated by burnt out or blackened bulbs, burned ignition contacts.

- (i) Check battery and rectifier earths.
- (ii) Check battery for sulphation.
- (iii) Check wiring for loose connections particularly Zener diode.
- (iv) Apply Test 3, 4, 5 and 6.

(c) No charge (on ammeter).

- (i) Check main fuse (if fitted).
- (ii) Check earths at battery and rectifier.
- (iii) Apply Test 1.
- (iv) Check alternator output Test 3. If satisfactory apply Tests 4 and 5.

LIGHTING CIRCUIT

(a) Failure of lights (engine stationary).

- (i) Check battery.
- (ii) Check main fuse (if fitted).
- (iii) Check bulbs.
- (iv) Check switch connections.
- (v) Check all wiring (Test 2).

(b) Lamps light at first then fade.

- (i) Check battery.

(c) Brilliance varies with engine speed.

- (i) Check battery.
- (ii) Check Zener diode connections.
- (iii) Apply Test 5.

(d) Lights flicker.

- (i) Check wiring and battery connections.

(e) Headlamp illumination insufficient.

- (i) Check battery.
- (ii) Check for voltage drop.
- (iii) Check bulb for discoloration, or sagging filament.
- (iv) Check lamp setting and cleanliness of reflector.
- (v) Apply Test 5.