

DOT MOTORCYCLE CLUB 2010

ALTERNATOR TESTING INSTRUCTIONS

The Series 114 Alternator consists of a six pole Stator ring 5" in diameter with six coils and a six pole permanent magnet rotor. There are three main leads coloured white, light green and orange. Three coils are connected in series to white and light green, the other three coils are connected in series to white and orange. The AC output from these coils is converted to DC by a bridge rectifier. The alternator output is controlled by the Lights switch on the headlamp which connects three or six coils according to its position.

Emergency Starting

The ignition switch EMG emergency position is intended for starting when the battery is discharged.

In this position the two groups of alternator coils are connected in parallel, and if the Lights switch is in the OFF position the full output of the alternator goes into the battery. This will raise the voltage of a discharged battery to a level sufficient to start the engine. In the EMG position the charge rate is high — the engine should not be run in EMG too long. The boost charge thus provided may be used to restore a discharged battery. Switch over to IGN after ten minutes.

Rotor Demagnetised

Although the WIPAC Rotor is robustly built and holds a very high magnetic charge, it can become demagnetised if the machine is run with battery connections reversed, or if the rectifier breaks down. A demagnetised rotor should be returned to WIPAC for satisfactory remagnetisation.

Testing

Testing of component parts can be carried out using the following instruments:

- 0-12V DC voltmeter.
- 0-15V AC voltmeter.
- 1 ohm resistor (capable of carrying 8A).
- 10-0-10A DC ammeter.

Accurate high grade moving coil instruments must be used. The 1 ohm resistor must also be accurate, otherwise valid readings cannot be obtained. *Engine speed* when testing should be in the region of 2,500 r.p.m. Tests should not be attempted at speeds below 2,000 r.p.m. A few revs. above or below 2,500 will not affect the readings of an alternator in good condition.

Charge Rate Test

- (1) First check the battery voltage which, if fully discharged, should be substituted for one that is in good condition.
- (2) Disconnect the brown negative lead from the double connector.
- (3) Connect the DC ammeter in series with the battery wire and the double connector.
- (4) Run the engine at 3,000 r.p.m., the minimum permissible readings are shown in the following table:—

Ignition Switch	Lights Switch	Charge Rate
IGN	OFF	1.0A
IGN	LOW	1.3A
IGN	HIGH	1.0A
EMG	OFF	6.0A

The engine speed and battery condition will affect the charge rate. Compare the figures shown in the table with the indicated values to confirm whether the system is functioning correctly or not.

N.B. If the charge rate is down with lights on HIGH check the main bulb wattage.

Low or No Charge Rate Test

Check the alternator output by:

- (1) Disconnect the white, orange and light green wires from the four-way connector. If a maroon colour lead is also used, leave this in position.
- (2) Using the AC voltmeter with the 1 ohm resistor across the terminals (parallel) join one wire from the voltmeter to the white wire, the other meter wire to the orange wire. Run the engine at a speed equivalent to 30 m.p.h. in top gear, the voltage reading should be between 6.2V and 6.8V. Transfer the meter wire from the orange wire to the light green and repeat the test. A low reading on one of these tests indicates a fault in the coils. A low reading on both tests can be due to a partially demagnetised rotor. If no reading is shown in both tests, the alternator is defective (see test 3).
- (3) A short circuit to earth on one or more coils will affect the AC voltage output. To check use the DC voltmeter in series with a battery in good condition. Connect the wire from the meter to the white wire, the battery wire to a good and convenient earth on the engine. If a reading is shown on the meter, one or both coils are shorting to EARTH.

Note—The white wire is common to all coils.

Remove the alternator cover, check the alternator wires for damaged insulation, also coil connections before discarding the alternator.

When the fault is located, repeat the tests previously described.

Rectifier Tests

Before testing, verify the earth connection is clean and secure, check also the wires attached to the rectifier for loose connections.

Note—Rectifier trouble is most commonly due to reversed battery connections, which can also demagnetise the rotor, if the engine is run with these connections reversed. The battery positive terminal is connected to EARTH (translucent), the negative is the feed line (brown).

Ignition and Lighting Switches

Both switches in the headlamp are mechanically identical and will interchange, the switch knobs being differently marked. If one switch is suspect take off the lamp rim and glass. Pull off the cable plugs and reverse their location. A further check will indicate if the switch is defective or otherwise. Replace the cable plugs in correct position after changing the switch.

Replacement switches should be of the improved type which can be identified by a NYLON post for the switch knob. Old type switches use a steel post.

Plug Location

The blue plug is for the lighting system and the black for ignition.

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ELECTRICAL SERVICE

Lamp Bulb Blowing

Premature bulb failure involving all or many of the light bulbs at one time on a full DC battery system is caused by a defective connection in the battery line.

This line starts at:

- (1) The frame end of the translucent lead from the positive battery terminal.
- and proceeds:
- (2) Positive battery terminal.
 - (3) Negative battery terminal.
 - (4) Brown wire from battery negative to 4-hole connector (bullet terminal).
 - (5) Brown wire from 4-hole connector to ammeter (bullet terminal).
 - (6) Ammeter terminal with brown wire.
 - (7) Ammeter terminal with blue wire.
 - (8) Both ends of short insulated link wire in the ignition switch plug, which joins blue ammeter wire to brown wire going to Lights switch.

Should the ammeter develop internal open circuit, bulbs will blow, also should the battery have little or no electrolyte, this is a partial or complete open circuit with the same results. There is finally the remote possibility of one of the actual wires in the battery line being broken—again, bulbs will blow.

For quick checking, test connections in this order:

- (1) Both battery terminals.
- (2) Both ammeter terminals.
- (3) All brown wires into 4-hole connector.

Ignition System

Special Note—The star-shaped washer for contact breaker pivot is not detachable. If the engine fails to start and there is no spark at the sparking plug points, examine the contact breaker by:

- (1) Check the gap at full separation 0.020" and reset if necessary (ensure feeler gauge is free from oil).
- (2) Check condition of contact points which should have a grey frosted condition. The presence of oil or grease in the contact breaker compartment will cause a black matt condition.
- (3) Clean points with an abrasive strip or alternatively fine grade emery cloth. Pass a strip of clean paper, or rag soaked in petrol, across the points after cleaning.
- (4) Check free movement of contact breaker arm on its pivot.

Adjusting Contact Breaker Gap

This adjustment is effected by altering the position of the fixed contact point by:

- (1) Releasing slightly the locking screw.
- (2) Adjust the gap by turning the eccentric screw (close to the fibre pad) in the required direction, with the fibre pad on the rocker arm on the cam lobe (maximum separation) 0.020". Retighten the lock screw when adjustment is correct.

Lubrication

The felt pad should be impregnated with H.M.P. grease. Use sparingly, an excess can affect contact points surface.

Before replacing the contact breaker cover, check the

condenser fixing for security. If attention to the contact breaker fails to produce a spark, check the circuit by:

- (1) Switch on the ignition, rotate the engine very slowly until the contact points close. A discharge of 3 to 4 amps will be shown on the ammeter if current is passing. As the ammeter is not closely calibrated, a more accurate check can be made by using the DC ammeter between the brown battery wire and its connector.
- (2) If a discharge is not shown on the ammeter with contact points closed, then current is not passing through the primary windings in the HT coil.

With ignition switch ON check the dark green wire attached to the coil by:

- (1) Removing this wire from the coil terminal.
- (2) Connect one side of the DC voltmeter to the end of the dark green wire, the other side of the meter to earth.

If there is no reading on the meter, check the ignition (black) plug in the headlamp.

If the internal insulated wire bridge across two of the plug terminals (see wiring diagram) is fractured or disconnected, this will allow the engine to start with the switch in either EMG or IGN, but not in both, as one switch connection is out of circuit. Renew the bridge connection.

Ignition Coil Test

- (1) Use a battery with one wire attached to the DC voltmeter with a short length of wire attached to the other voltmeter terminal.
- (2) Disconnect the two wires attached to the coil, also the HT cable.
- (3) Use a further wire on the second battery terminal. Connect the free end of this wire, also the meter wire across the coil terminals. If there is continuity, a reading will show on the meter indicating the primary winding is in order.
- (4) Transfer one wire from the coil terminal to the centre HT connection, if there is continuity a lower voltage reading will show by reason of the higher resistance of the secondary winding.
- (5) Place one of the test wires on to one of the two coil terminals, the other to the coil case. No reading should show. Use the test wires on the HT connection and the case. No reading should show.

A meter reading on one or both tests means the windings are earthed, the coil should be replaced.

Usually a defective primary winding will produce a weak spark, conversely, an intermittent spark is associated with a faulty secondary winding. Where doubt exists, test by substitution.

Condenser (see *Ignition System*)

If the condenser is suspect, use a sound condenser with two crocodile clips attached to it.

Remove contact breaker cover, attach one clip to the connection on the contact breaker terminal, the other to a convenient earth position.

Running the engine with the external condenser in use will prove if the condenser is faulty or otherwise.

Vivid blue arcing at the contact points is indicative of a faulty condenser.