TRIUMPH

1979 T140E
Ignition System
Charging System
Description
&
Troubleshooting Guide

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TRIUMPH MOTORCYCLES
1979 Electrical Specification

Major changes from 1978 to 1979 are a new design alternator (Model RM24) and the introduction of electronic ignition. Other changes include restyling of the switchgear and headlight and repositioning of the warning lights and ignition/light switch, which are now mounted between the speedometer and tachometer.

The charging system comprises the alternator (rotor and stator), a plate-type rectifier pack and a voltage control zener diode. These components and a circuit diagram are illustrated in FIGS. 1 & 2.

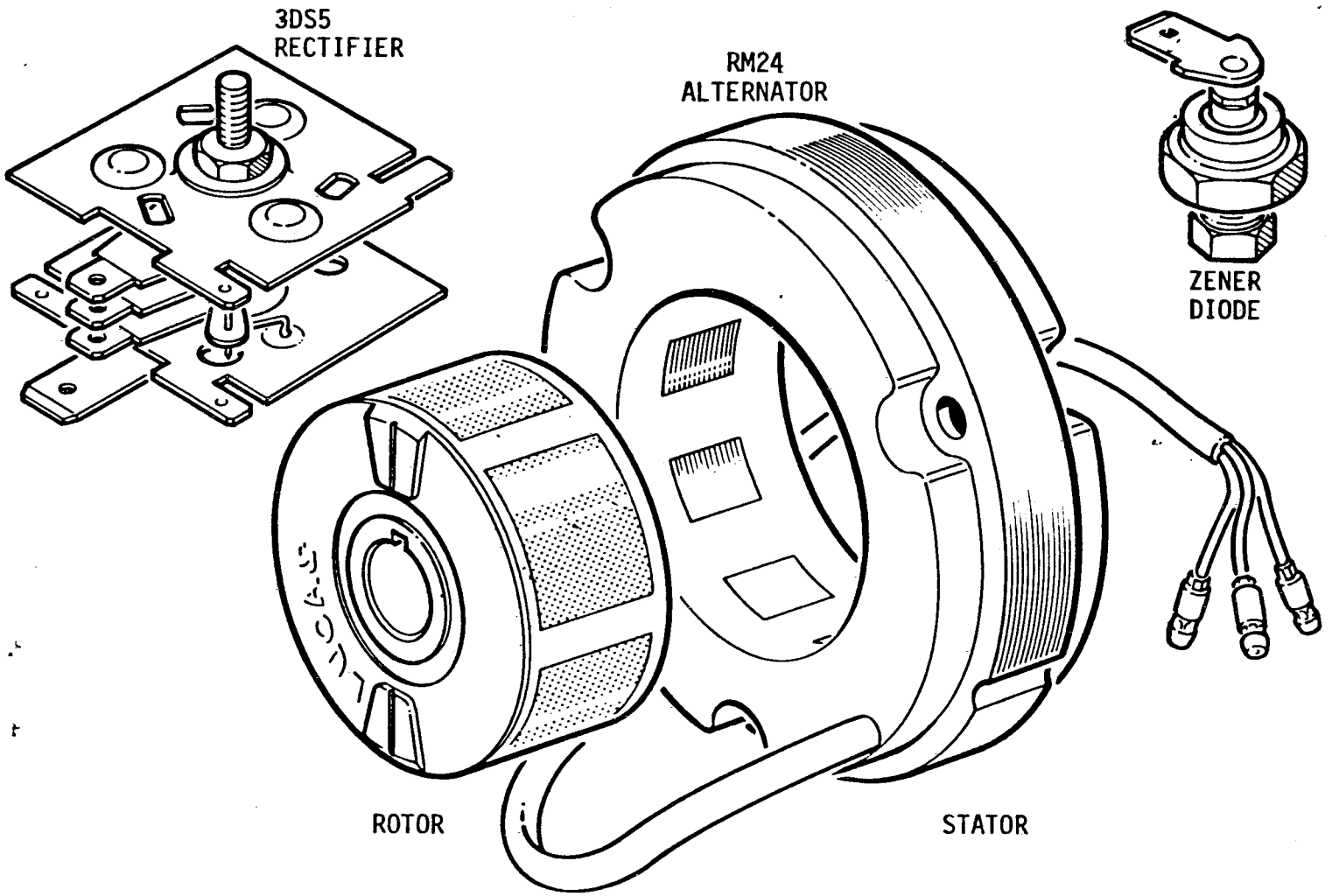

FIG. 1. CHARGING SYSTEM COMPONENTS

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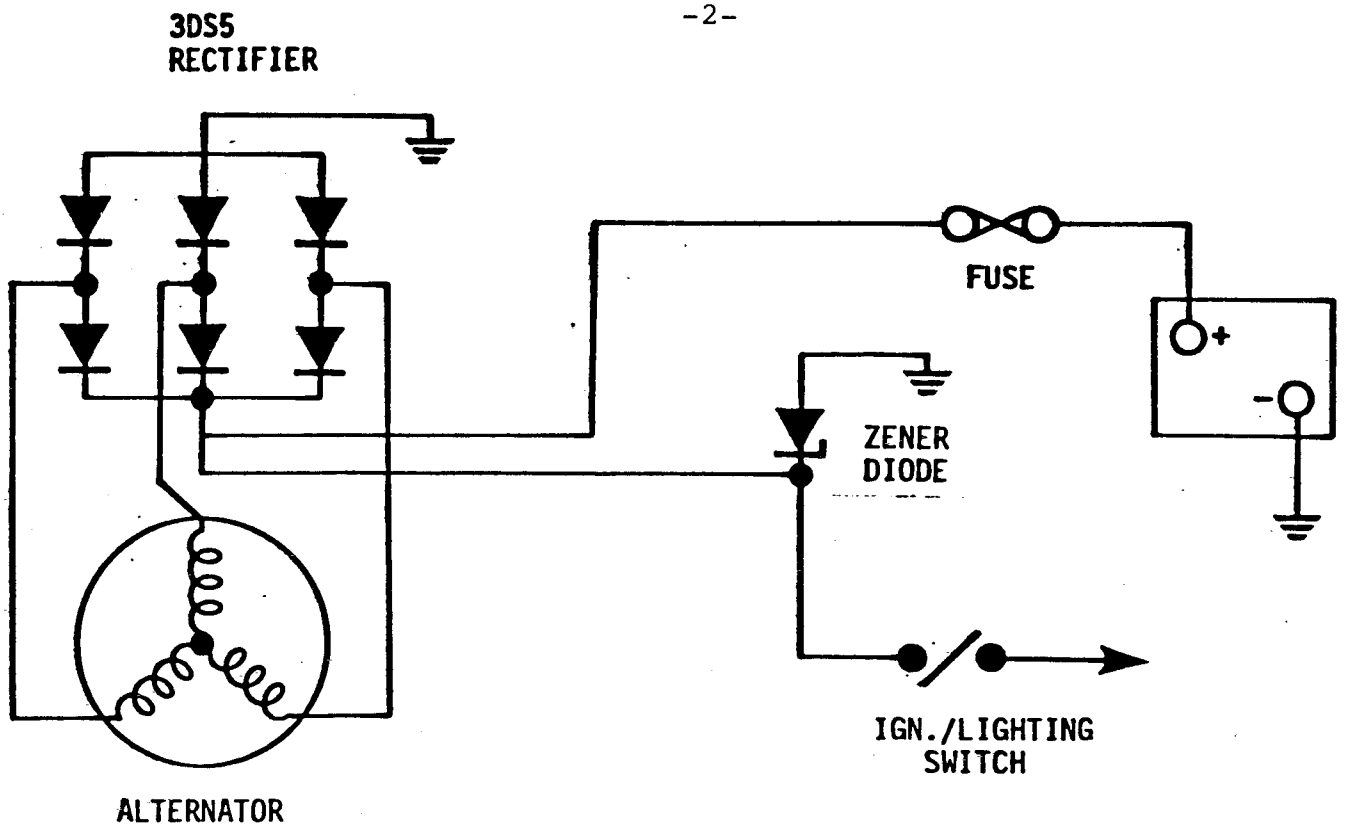

FIG. 2. CHARGING CIRCUIT

The ignition system comprises an electronic amplifier unit, a pick-up assembly, a reluctor and two (twin) ignition coils. These components and a circuit diagram are illustrated in FIGS. 3 & 4.

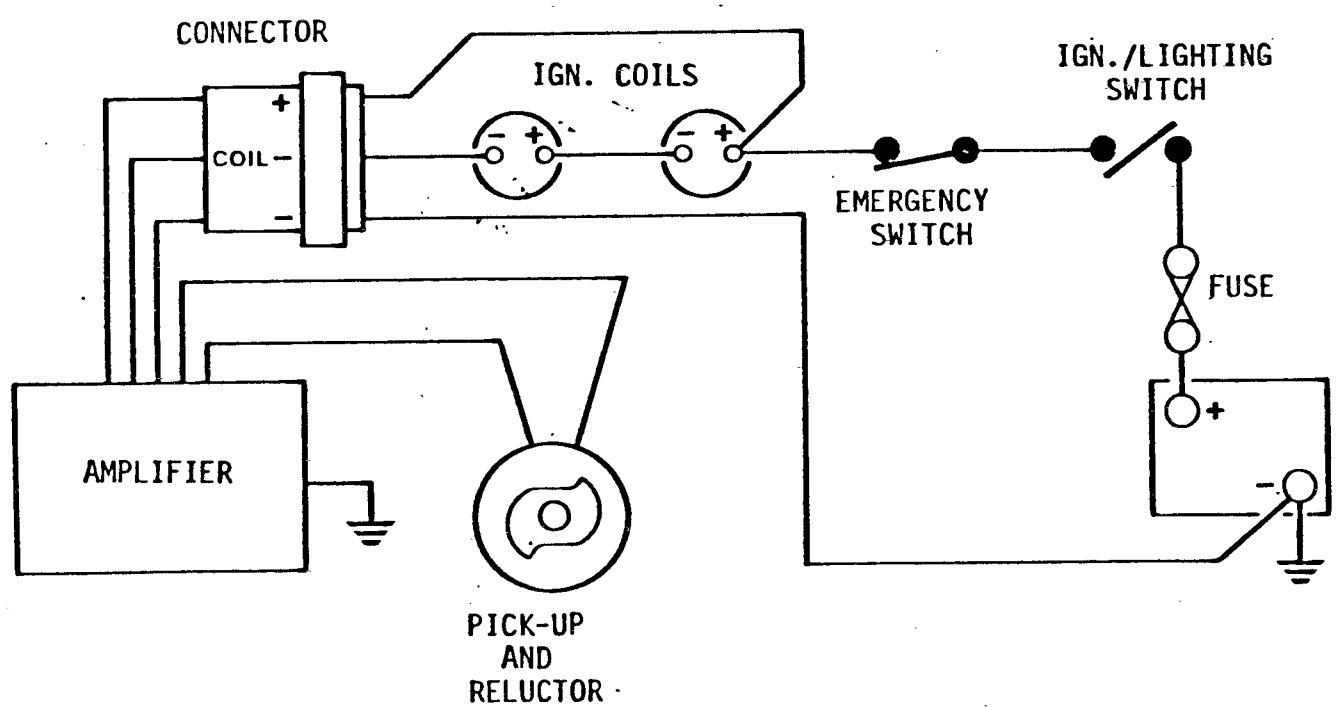

FIG. 3. IGNITION CIRCUIT

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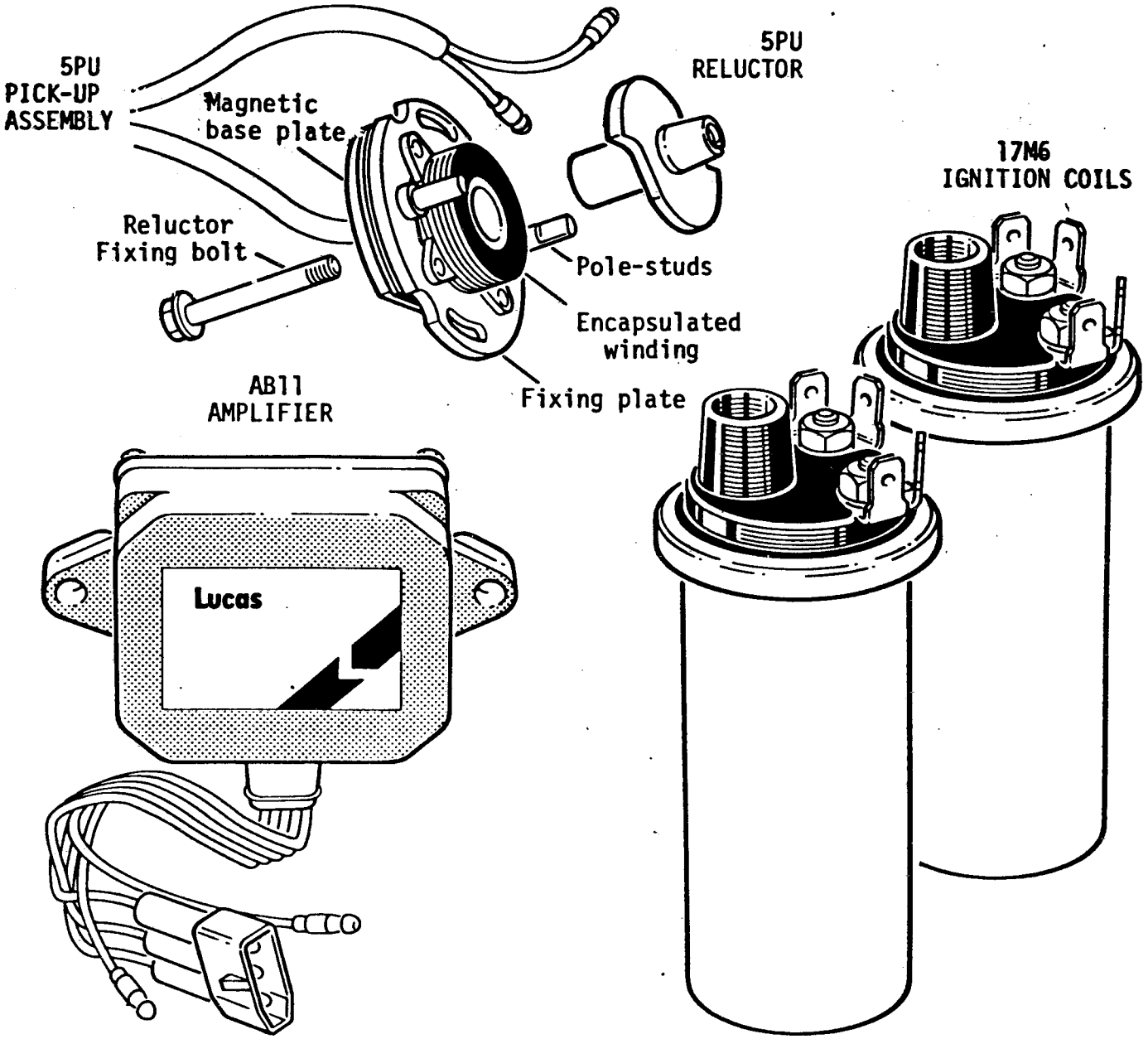

FIG. 4. IGNITION SYSTEM COMPONENTS

1. CHARGING SYSTEM TECHNICAL DATA

The alternator produces 3 phase AC, rectified to DC by a 3DS5 rectifier and voltage controlled by a zener diode.

Alternator RM24

Rotor	Permanent magnet
Stator	3-phase AC
AC output (Measured between any two stator leads)	4.5V (min.) at 1000 rev/min 6.5V (min.) at 5000 rev/min
DC output (Measured between rectifier large terminal and earth)	11A (max.) at 5000 rev/min

Continued...

Stator resistance .. .. 0.80 - 0.95 ohm
(Measured between any two stator leads)

Stator insulation .. .. 100 megohms (min.) at 500V DC
(Measured between any one of the stator leads and laminations)

Rectifier 3DS5

Six diode plate-type rectifier.. .. .. Surge and polarity conscious. The DC circuits must not be disconnected while the engine is running.

Zener diode voltage regulator

Standard negative earth type
Regulating voltage.. .. .. 14.7 - 15.8V

2. IGNITION SYSTEM TECHNICAL DATA

The two 6V ignition coils are connected in series to provide simultaneous HT sparking. The engine still fires in the correct sequence with the spurious sparks having no effect.

The primary circuit of the ignition coils is electronically switched by the remotely mounted amplifier unit which is triggered by pulses from the pick-up and reluctor working in conjunction with each other.

17M6 Ignition coil

Primary winding resistance: 1.7 - 1.9 ohms

AB11 Amplifier

A remotely mounted electronic switching system contained in a cast aluminum box.

5PU Pick-up

A rivetted assembly comprising encapsulated winding, a fixing plate with pole-studs, and a permanent magnet sandwiched between the fixing plate and a base plate. The assembly is a stationary component mounted in the engine crankcase, around the reluctor. Two fixing screws tighten on slots in the fixing plate, the slots providing adjustments for static ignition timing.

5PU Reluctor

A specially shaped steel timing device, mounted on the end of the camshaft. Its position relative to the camshaft is determined by a keyway. Fixing is by means of a hexagon-headed bolt.

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Working Principles

When the ignition is switched ON, the amplifier unit is conductive and current flows through the primary windings of the two series-connected ignition coils and through the amplifier unit to earth.

A permanent magnetic field surrounds the pick-up base plate, the encapsulated winding and the pole-studs. When the engine is cranked, the arms of the rotating reluctor approach these poles, causing the field strength to change which produces a pulse in the pick-up winding. This pulse is transmitted to the amplifier unit, causing it to switch off and break the primary circuit of the ignition coils. The HT spark is then produced in the conventional manner.

Operating Characteristics

(i) Electronic advance curve

The advance curve is automatically determined by the amplifier unit.

ENGINE REV/MIN	DEGREES ADVANCE	ENGINE REV/MIN	DEGREES ADVANCE
100	0	3000	36
500	9	3500	38
1000	19	5000	40
2000	30		

(ii) Voltage operating range

Limits: 8 - 16V. Within this voltage range:

(a) A maximum timing tolerance of 1.5^{o} is permissible at 2000 reluctor rev/min.

(b) Consistent sparking, without missing, must occur at reluctor speed range of 90 - 4000 rev/min.

3. CHARGING SYSTEM FAULT DIAGNOSIS AND TESTING

NOTE 1

If the battery is incapable of starting the engine, it must be recharged or a slave battery utilized for testing purposes. (Observe polarity. Reverse connections will damage the rectifier.)

NOTE 2

Test requirements: Center zero 25A moving-coil ammeter
AC Voltmeter
DC Voltmeter
1 ohm (100W) load resistor

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Flat or Discharged Battery

SUSPECT: The battery, the alternator and rectifier, and the voltage control zener diode (proceed to TEST 1).

Overcharged Battery

SUSPECT: Voltage control zener diode (proceed to TEST 1).

TEST 1: Alternator Charging Current

Connect ammeter in series with the battery positive cable. It is convenient to do this at the battery feed side of the main fuse, in which case connect BLACK lead to cable and RED lead to fuse.

Run the engine at approximately 2000 rev/min and switch the headlamp to main beam. The ammeter should show a small amount of charge, indicating the alternator is exceeding the maximum continuous electrical load.

If the test is satisfactory, stop engine, restore original connections and proceed directly to TEST 5.

If the test is unsatisfactory, proceed to TEST 2.

TEST 2: Alternator AC Output

Disconnect the three snap connectors between alternator and rectifier. Connect AC voltmeter, with a 1 ohm (100W) load resistor across its terminals, for three tests as shown in FIG. 5. Run the engine at approximately 2000 rev/min for each test.

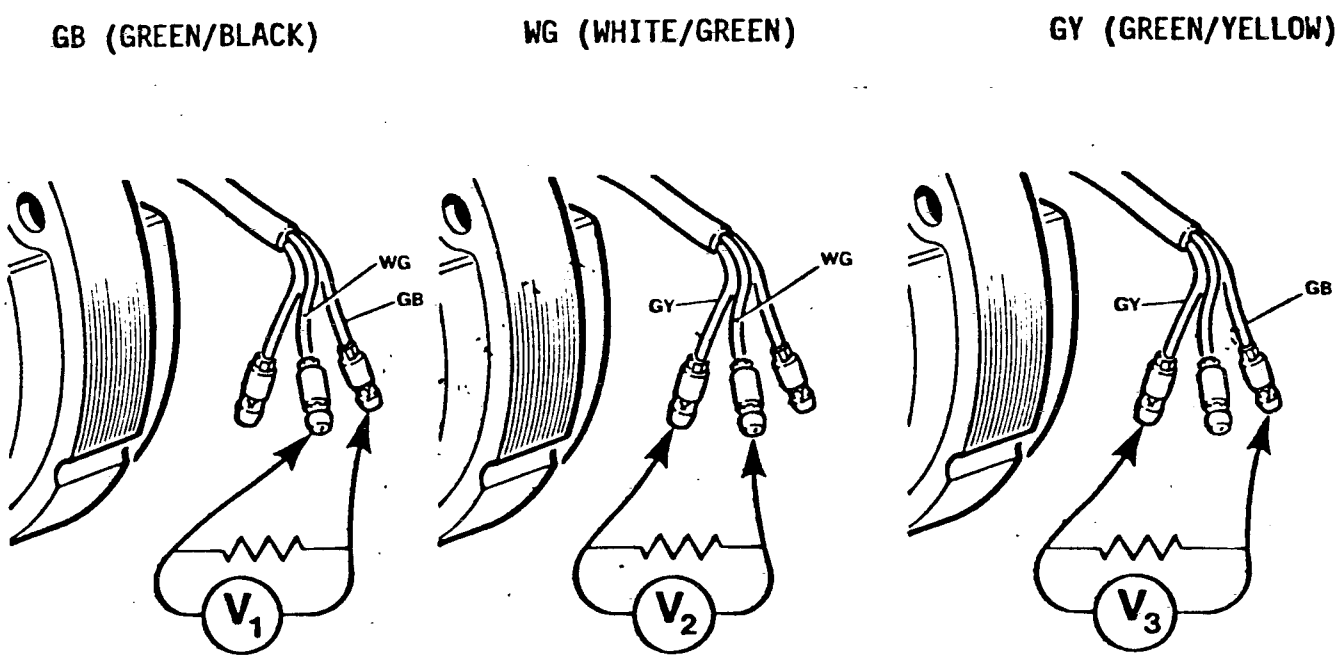

FIG. 5 ALTERNATOR AC OUTPUT TEST

Continued...

The voltmeter should show 5V minimum for all three tests, in which case the alternator AC output is satisfactory. Stop engine, restore original connections and proceed to TEST 3.

If zero or a low voltage is obtained in two tests, the alternator stator is faulty.

If zero or a low voltage is obtained in all three tests, either the alternator stator is faulty or the rotor is demagnetized. Determine whether the stator can be eliminated by checking the resistance and insulation of its windings (Refer page 4).

TEST 3: Alternator AC Continuity

Remove the ignition amplifier housing, for access to the rectifier.

Disconnect the three alternator connections to the rectifier (See FIG. 6) and repeat TEST 2 at the ends of the disconnected rectifier leads. The test result should be the same as TEST 2, in which case stop the engine, restore original connections and proceed to TEST 4.

Test unsatisfactory, check snap connectors and leads to rectifier.

GB (Green black) WG (White Green) GY (Green Yellow)

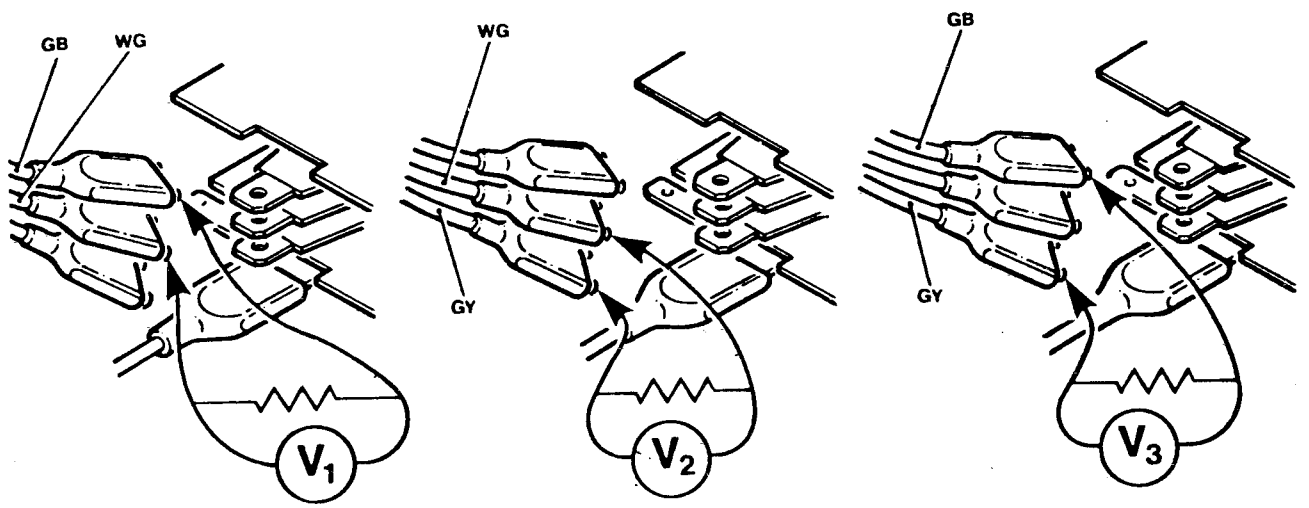

FIG 6. ALTERNATOR AC CONTINUITY TEST

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TEST 4: Rectifier DC Output

Disconnect the large (DC output) terminal of the rectifier. Connect DC voltmeter with a 1 ohm (100W) load resistor across its terminals, as shown in FIG. 7. Run the engine at approximately 2000 rev/min.

The voltmeter should show 9V min., in which case stop the engine, restore original connections and refit the ignition amplifier housing and proceed to TEST 5.

If zero or a low voltage is obtained, the rectifier is faulty.

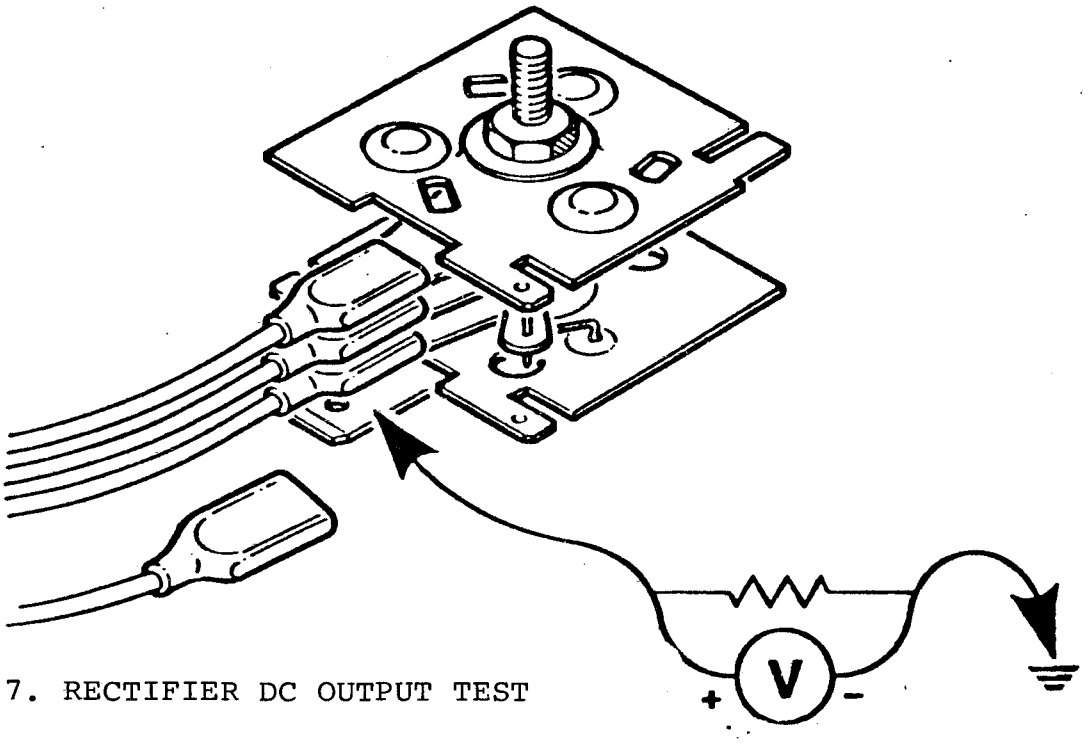

FIG. 7. RECTIFIER DC OUTPUT TEST

TEST 5: Zener Diode Voltage Regulator

Disconnect zener diode. Connect ammeter and DC voltmeter as shown in FIG. 8.

Note: The load resistor connected across the voltmeter terminals for TEST 4 is not required for this test.

Start and run engine at increasing speed until ammeter shows 2A, then observe voltmeter reading.

The voltmeter should show 13.5 - 15.3V, in which case the charging system is now proved satisfactory. Stop the engine, restore original connections and fit new battery.

If voltage is outside the limits, replace zener diode.

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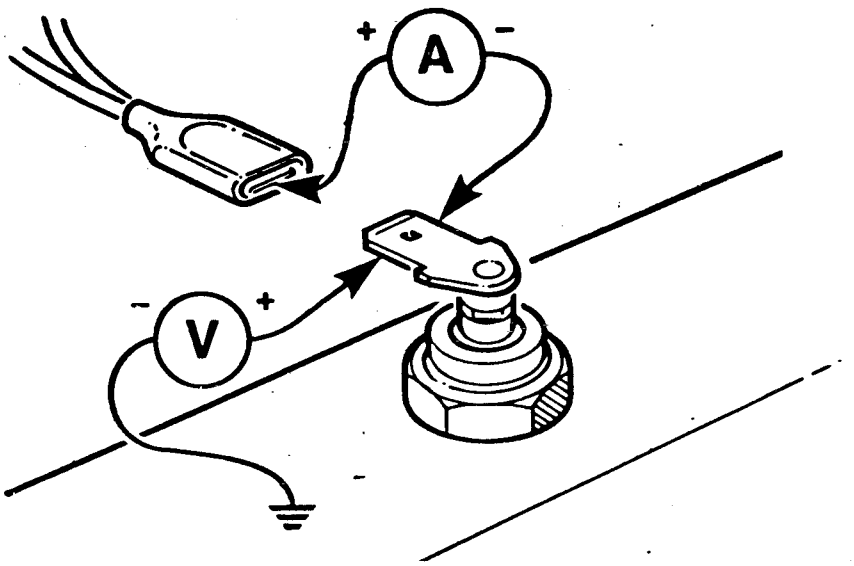

FIG. 8. ZENER DIODE VOLTAGE REGULATOR TEST

4. IGNITION SYSTEM FAULT DIAGNOSIS AND TESTING

NOTE: Test requirements: DC voltmeter
Ohmmeter

Engine Fails to Start

Suspect: Discharged battery or no spark at one or both spark plugs.

Check battery and if satisfactory proceed to TEST 1.

Engine Runs on One Cylinder Only

Suspect: Spark plug, HT lead, or ignition coil.

Proceed to TEST 1, then if necessary TEST 2.

Engine Misfires or Runs Erratic

Suspect: Spark plugs, HT leads, ignition timing, ignition coil, electronic amplifier and associated pick-up.

Clean spark plugs and check gaps. Check timing. Finally, prove all items by substitution.

TEST 1: HT Spark at Plugs

Remove spark plugs and lay them on engine, HT leads connected and spark gaps visible. Switch on ignition, crank engine and check for regular sparking at both plugs.

If the test is satisfactory, check ignition timing. If this is also satisfactory, then the ignition system is not the cause of the engine failing to start.

Continued...

If sparking occurs at one plug only, interchange the two plugs and repeat test. If fault is now transferred from one HT lead to the other, replace the non-sparking plug. If fault is not transferred, either the HT lead or ignition coil associated with the non-sparking plug is faulty (proceed to TEST 2). Leave spark plugs removed from engine.

If there is no sparking at both plugs, check primary circuit of ignition coils (proceed directly to TEST 3).

TEST 2: HT Spark at Ignition Coils

Remove HT lead from one of the ignition coils and fit substitute lead. Position free end of lead about 6 mm or ¼" from a good earth point (e.g. coil fixing bracket). Switch on ignition, crank engine and check for regular sparking at end of lead. Repeat test with other coil.

Sparking from both coils, replace faulty HT lead (Reference TEST 1).

Sparking from one coil only, replace non-sparking coil.

No sparking from either coil, check primary circuit of ignition coils (proceed to TEST 3). Leave spark plugs removed from engine.

TEST 3: Ignition Coil Primary Circuit

With reference to FIG. 9, disconnect the WB (WHITE/BLACK) lead from ignition coil No. 2, switch on the ignition and connect DC voltmeter in four tests A, B, C, & D as shown.

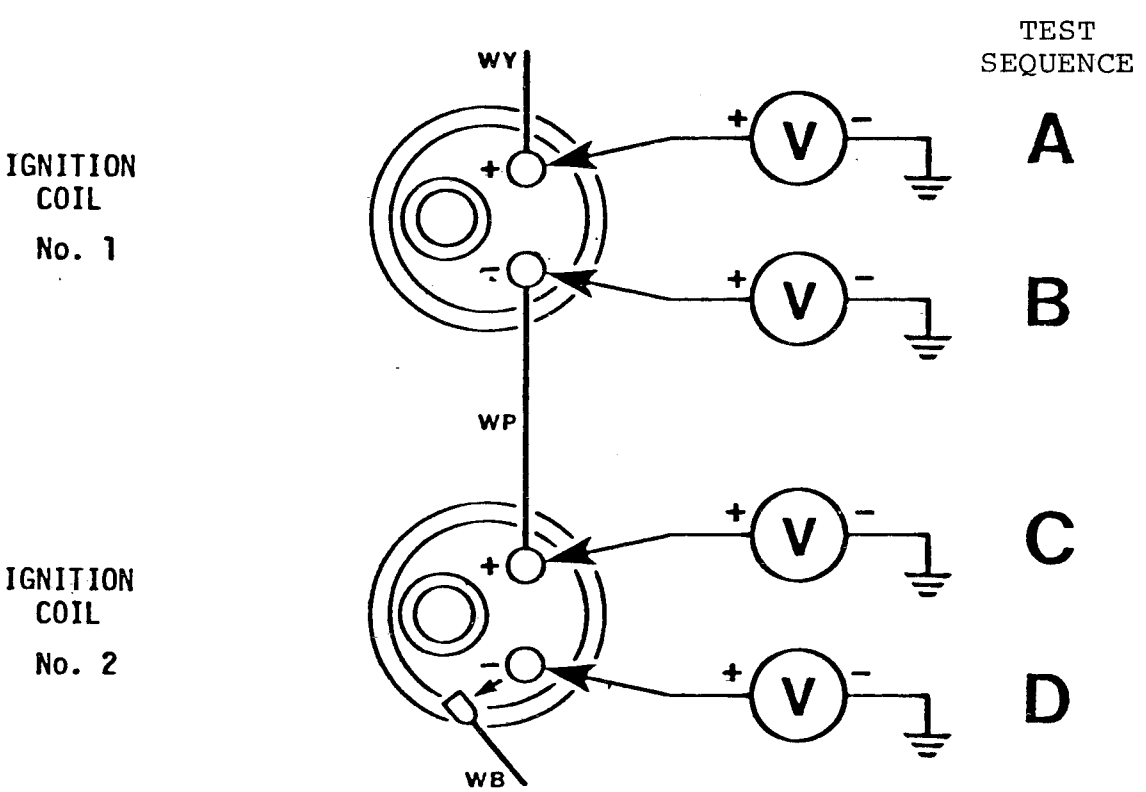

FIG. 9. IGNITION COIL PRIMARY CIRCUIT TESTS

Continued...

Voltmeter should show battery voltage (12V) for each test, in which case leave ignition switched on and voltmeter connected as for Test D and proceed directly to (v).

(i) No voltage in Test A: Ascertain reason for lack of supply voltage between coil, ignition switch and battery.

(ii) No voltage in Test B: Coil primary winding open-circuit. Replace coil.

(iii) No voltage in Test C: Coil-to-coil WP (WHITE/PINK) lead open-circuit.

(iv) No voltage in Test D: Coil primary winding open-circuit. Replace coil.

(v) Reconnect WB (WHITE/BLACK) lead to coil No. 2. Voltmeter needle should now show zero volts, indicating the coil primary circuit is satisfactory. Proceed to TEST 4, leaving ignition switched on and voltmeter connected as for Test 3D.

If voltmeter still shows battery voltage, the coil primary circuit is not being connected to earth by the function of the amplifier, which is now suspect.

Before replacing the amplifier, check the wiring.

(i) Disconnect the amplifier at the 3-pin molded connector assembly.

(ii) Identify main harness side of the connector assembly.

(iii) Connect DC voltmeter in three tests A, B, & C as shown in FIG. 10

Voltmeter should show battery voltage for each test. If the test is satisfactory, amplifier is faulty. If zero voltage is shown in any test, rectify open circuit lead(s) or connection(s).

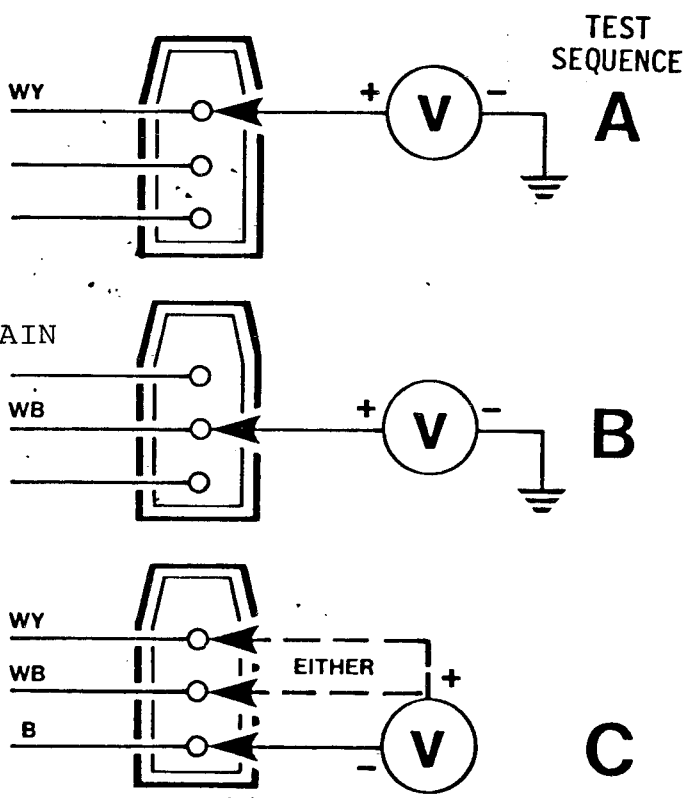

FIG. 10. AMPLIFIER MAIN HARNESS CONNECTOR, WIRING TESTS

Continued...

TEST 4: Amplifier Switching

Voltmeter connected as in Test 3D, crank engine. The voltmeter needle should now oscillate between zero volts and battery voltage (12V), confirming the coil primary circuit is being switched on and off by the amplifier unit. The ignition system is therefore satisfactory.

If the voltmeter needle remains at zero volts while the engine is cranked, the amplifier unit and its associated pick-up are both suspect. Check whether the pick-up can be eliminated, TEST 5.

TEST 5: Pick-up Winding Resistance Continuity

Disconnect the WHITE/ORANGE and WHITE/PURPLE leads at the amplifier unit. Identify the two leads connected to the pick-up and check the resistance and continuity of the pick-up winding by connecting an ohmmeter between the two leads. Ohmmeter should show 650 - 750 ohms.

If the test is satisfactory, replace the amplifier.

If the test is unsatisfactory, replace the pick-up.

NOTE: The pick-up fixing screws also determine the rotary position in which the pick-up is fixed relative to ignition timing. The screws locate in slots which provide adjustment for ignition timing when the pick-up is fitted. Before disturbing the fixing screws of the original pick-up, choose a datum point on the pick-up (e.g. a shoulder of the magnetic base plate) and scribe a mark on the engine as a timing reference, otherwise when fitting the new pick-up the timing will need to be reset and this will necessitate the use of a strobe light.

TEST 6: Ignition Timing

A strobe light is necessary. Remove plug cover on opposite side of engine from pick-up, to expose timing mark on alternator rotor. Refer to motorcycle manufacturer's instructions for ignition timing data and procedure.