Electrical System and Instruments

CONTENTS

IGNITION SYSTEM

The ignition system is comprised of Battery, Ignition Switch, Coil with certain special features, Electronic Unit, Distributor with inductive pick-up, two Resistances and Sparking Plugs.

DISTRIBUTOR

The Distributor is driven by a spiral gear on the camshaft and rotates in a clockwise direction. The breaker points in the distributor have been replaced by a pulse generator consisting of a Stator, Detecting Coil and Permanent Magnet.

The pulse generator is connected to an Electronic Control Unit (E.C.U.) in which the signal from the Distributor is converted and amplified. The E.C.U. is connected to the coil.

Ignition spark advance is achieved by mechanical advance and a vacuum diaphram unit. The advance is mechanically controlled, according to engine speed, by governor weights inside the Distributor body and according to engine load by vacuum control acting directly on the base plate. As vacuum advance does not operate at idling speed due to the butterfly plates being closed, a correctly retarded spark is obtained for starting.

Note:
The dwell angle cannot be read, neither can it be adjusted.

REMOVING – REFITTING (DISTRIBUTOR) – Fig. 1

Note:
The mixture regulator must be removed to reach the distributor. Mark the following before removing the distributor:

1. Position of distributor body in relation to cylinder head.
2. Position of rotor arm in relation to cylinder head.

This will aid reassembly and avoid having to retime the ignition:

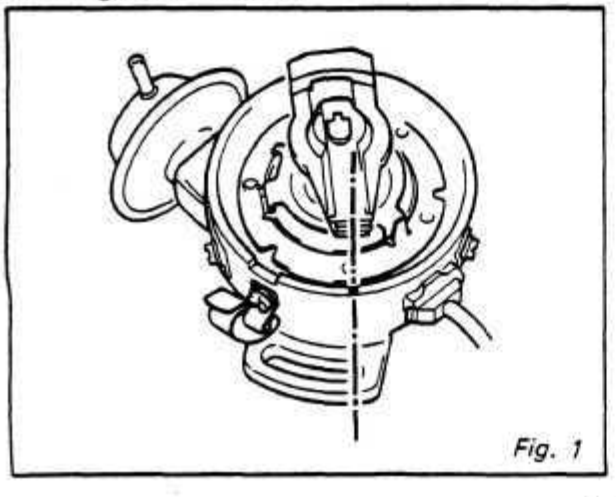

Fig. 1

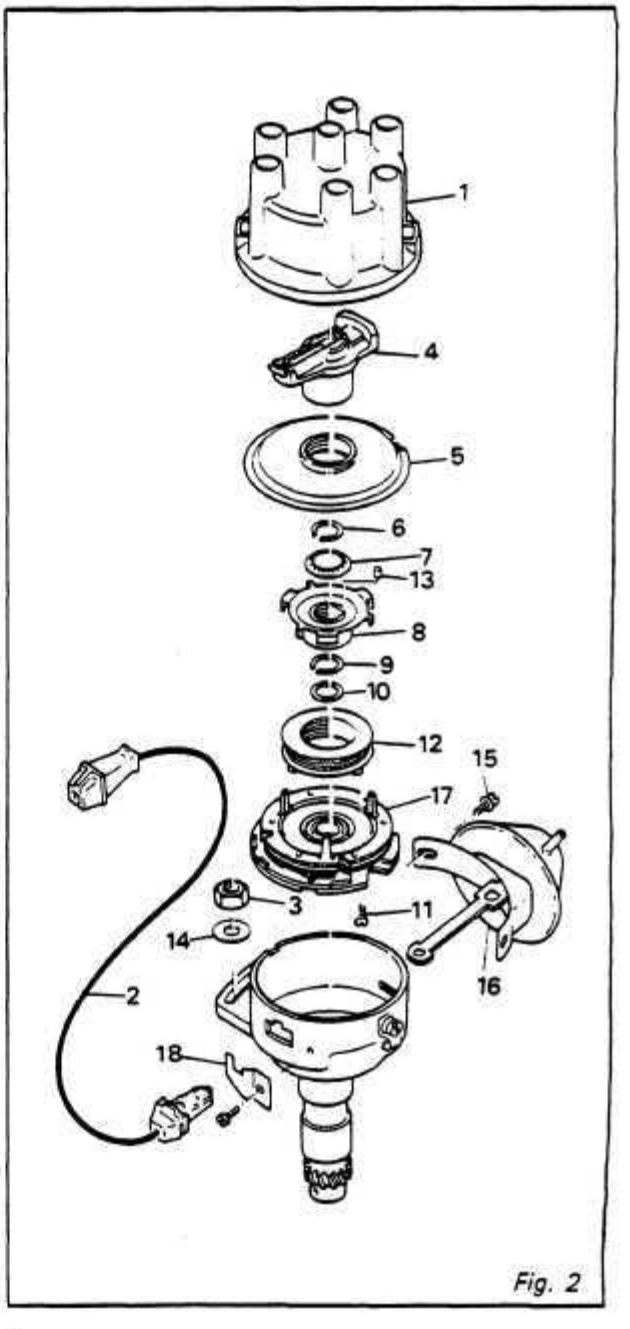

Fig. 2

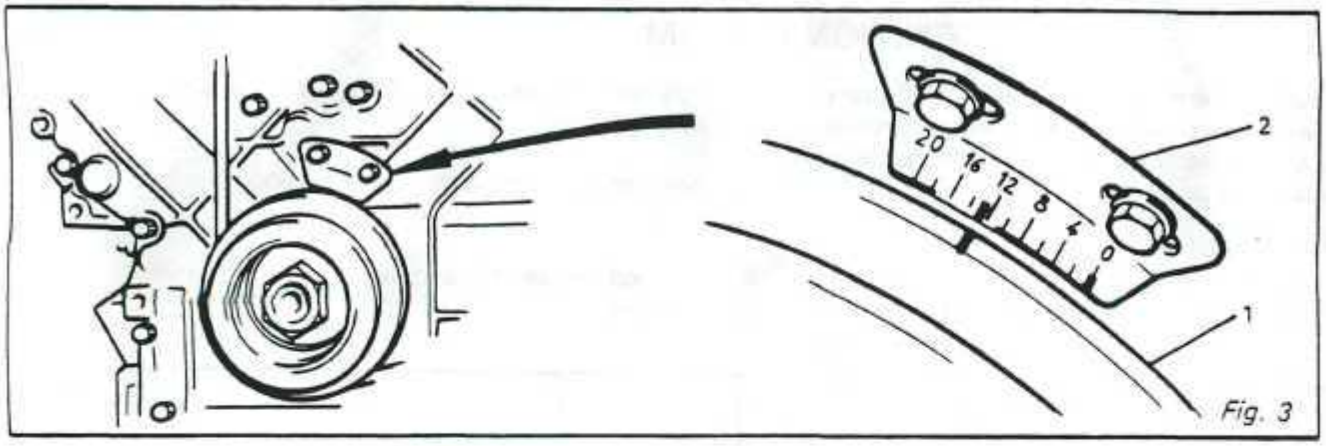

Fig. 3

1. Disconnect Battery.
2. Remove Distributor Cap (1). *Fig. 2*
3. Disconnect wire (2) between E.C.U. and Distributor.
4. Unscrew distributor retaining nut (3) and washer (14).
5. Remove Distributor.

REFITTING — Figs. 2 and 3

Follow the marks made on dismantling, check the Timing and adjust if required.

If in doubt as to the position of the Distributor proceed as follows for a first approximate setting:—

1. Set cylinder No. 1 to T.D.C. — firing stroke (line up marks on Crankshaft Pulley (1) and Calibrated Bracket (2) attached to the Timing Chain cover).
2. Line up the Rotor Arm (3) to the No. 1 Cylinder mark on Distributor Body (4). Note that the Distributor Spindle is driven by spiral gears and allow for this when lowering, also make sure Timing Adjustment Slot passes over the Fixing Stud. Then refit the Mixture Regulator (Gaskets must be renewed).

SETTING THE IGNITION TIMING — Fig. 4

There are two slots cut into the Crankshaft Pulley indicating No. 1 and No. 6 Cylinder T.D.C. A Timing Plate (2) is provided on the Timing Cover indicating 0° to 20° advance. The engine must be running at 775 ± 50 R.P.M. for this adjustment.

1. Connect up Strobe Light (3) to Cylinder No. 1 or No. 6.
2. Set the Crankshaft Pulley (1) Timing Slot opposite the Fixed Timing Line 13° by means of moving the Distributor.

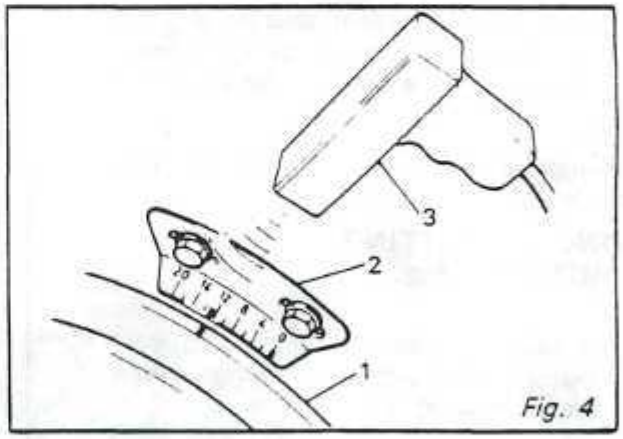

Fig. 4

DISMANTLING DISTRIBUTOR — Fig. 2

1. Remove Distributor Cap (1), Rotor Arm (4) and Dust Cover (5).
2. Unscrew Bracket (18) to remove low Tension Wire (2).
3. Remove Circlip (6) and Starwasher (7), holding Rotor (8), lever Rotor (8) off, with two screw drivers.
4. Remove Circlip (9) and Compensating Washer(s) (10).

5. Remove Screws (15) and withdraw Vacuum Valve (16), withdraw Coil Magnet (12) and Base Plate (17) as an assembly.

6. Remove three Screws (11) and remove Coil Magnet (12). Take care not to lose the Rotor Key (13).

ELECTRONIC CONTROL UNIT (E.C.U.) — Fig. 5

The E.C.U. module controls the operation of the ignition coil and determines the proper dwell angle. The module is a sealed component and must be replaced as a unit when confirmed as the cause of ignition breakdown. The module monitors engine operation by the varying voltage pulses it receives from the pulse generator in the Distributor. This then converts the signal received which breaks this current suddenly to obtain induced H.T. current at the coil output terminal.

This H.T. current is sent to each spark via a rotor arm in the same way as in the conventional distributor.

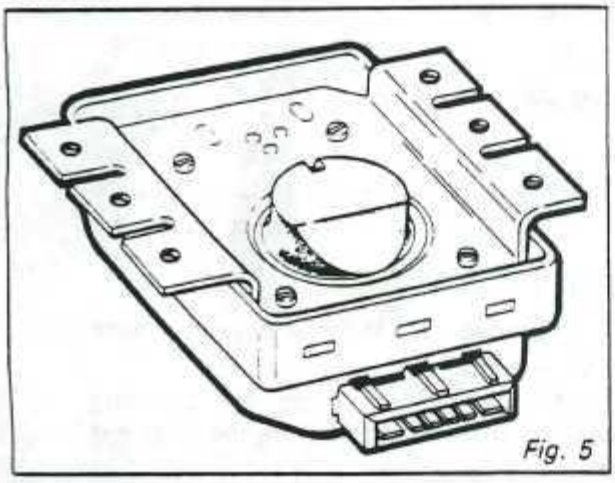

Fig. 5

COMPENSATING RESISTOR — Fig. 6

A dual resistance ballast resistor is used to control primary circuit voltage and current flow.

When the ignition is switched "on" the current flow is reduced by both resistors to prevent overheating of the coil. In operation to provide increased coil voltage for starting the engine, one half of the ballast resistor is by-passed during the engine cranking process to reduce the circuit resistance. The coil primary voltage and current will increase thus increasing secondary output voltage.

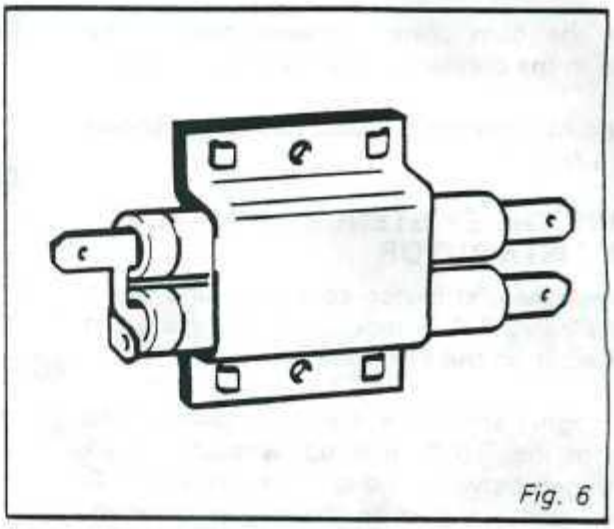

Fig. 6

CHECKING THE TRANSISTORIZED IGNITION SYSTEM

Preliminary Checks

1. Disconnect plug lead from plug, fit replacement spark plug in the lead.

2. Earth plug to cylinder head and get a colleague to crank engine, a spark should jump the gap in the plug.

Each plug should be checked, if no spark occurs, check components.

CHECKING THE COMPONENTS

Checking the resistances:
Connect an ohm meter across the terminals on both resistances. Meter should indicate approximately 0.5 ohm/Resistance.

Checking the Ignition Coil:
L.T. circuit connect an ohm meter between Battery + terminal and distributor terminals on the ignition coil, meter should indicate approximately 1 ohm.

H.T. circuit connect the ohm meter between the Battery + terminal and H.T. output socket on the ignition coil, meter should indicate approximately 7000 ohm.

WARNING: THESE RESISTANCES ARE HIGH.

Checking the Distributor:
Connect the ohm meter between the two terminals in the L.T. connector, meter should indicate approximately 1000 ohm.

Connect the ohm meter between one of the terminals in the connector and distributor body.

Meter should show open circuit. Resistance shows there is a fault.

PROVING THE EXISTENCE OF A FAULT IN THE DISTRIBUTOR

Disconnect the distributor connector and insert two wires from a T.D.C. pick up into the sockets in the connector on the electronic unit side.

Take a magnet and move it smartly towards and away from the T.D.C. pick up. Should a spark jump the gap between the ignition coil and H.T. lead the distributor must be changed or replaced.

If the ignition is faulty when the engine is running:

It is adviseable to change the electronic unit when misfiring or jerky operation occurs, only after first checking the following:

- Spark Plugs
- H.T. Leads
- Position Plug Leads
- Distributor
- Ignition Coil

Checking the Curves on the Oscilloscope:
The control voltage curve cannot be checked on the oscilloscope and this voltage cannot be altered. Only the H.T. curve can be checked in the same way as for a conventional distributor.

The dwell angle cannot be read neither can it be adjusted.

SPECIFICATIONS

Distributor

Rotation	: Clockwise
Firing Order	: 1-6-3-5-2-4
Resistor Value	0.5 ohm each (1.0 ohm total)
Ignition Timing	: 13° ± 2° B.T.D.C. at 775 ± 50 rpm
Centrifugal Advance	: 1000 rpm = 0° 2000 rpm = 10° 3000 rpm = 14° 4000 rpm = 20°
Vacuum Advance	: 5 in HG = 3° 10 in HG = 12° 15 in HG = 20°
Induction Coil Resistance	: 895 – 1,275 ohm
Trigger/Stator air gap	: 0.25 mm (use non magnetic feeler gauge)

Coil

Primary Winding Resistance	: 0.95 – 1.4 ohm at 20°C
Secondary Winding Resistance	: 5.5 – 8.5 kohms
Average Current Value Through Primary Winding at idle	: 3.2 amps
Spark Plugs	: Bosch HR6 DS
Spark Plug Gap	: 0.6 mm to 0.7 mm (.024 to .028)
Spark Plug Tightening Torque	: 17 – 20 Nm (13 to 15 ft./lb.)

Precautions

- Never disconnect an H.T. wire with engine running.
- Any H.T. wire disconnected for checking purposes must be earthed before the engine is started.
- When the engine is running dangerously high, voltages which may prove fatal are present in this circuit.