



Chapter 5 Part B:

Ignition system - transistorised type

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Degrees of difficulty

Easy , suitable for novice with little experience 	Fairly easy , suitable for beginner with some experience 	Fairly difficult , suitable for competent DIY mechanic 	Difficult , suitable for experienced DIY mechanic 	Very difficult , suitable for expert DIY or professional 
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Specifications

General

System type	Transistorised. 12 volt battery and coil
Firing order	1-3-4-2 (No 1 cylinder at crankshaft pulley end)

Spark plugs

Type and gap	Refer to Chapter 1 <i>Servicing specifications</i>
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HT leads

Type:	
1.05 litre	Champion LS-05 boxed set
1.3, 1.6 and 1.8 litre	Champion LS-07 boxed set

Coil

Pre August 1987:	
Primary winding resistance	0.52 to 0.76 ohm
Secondary winding resistance	2400 to 3500 ohm
From August 1987:	
Primary winding resistance	0.6 to 0.8 ohm
Secondary winding resistance	6900 to 8500 ohm

Distributor

Rotor rotation:	
1.05 and 1.3 litre	Anti-clockwise
1.6 and 1.8 litre	Clockwise
Dwell angle (1.05, 1.3 and 1.6 litre):	
Setting	44 to 50° (50 to 56%)
Wear limit	42 to 58° (47 to 64%)
Rotor cut-out speed:	
1.05 and 1.3 litre *	6600 to 7000 rpm
1.6 and 1.8 litre **	6150 to 6460 rpm

* Discontinued from 1986 models

** Only on engine without hydraulic tappets

Torque wrench settings

	Nm	lbf ft
Spark plugs:		
1.05 and 1.3 litre	25	18
1.06 and 1.8 litre	20	15
Knock sensor (1.8 litre)	20	15

1 General information and precautions

General information

TCI-H system

The transistorised (TIC-H) ignition system functions in a similar manner to that described in Part A of this Chapter for the contact breaker system, with the following exceptions. An electronic sender unit replaces the contact points and condenser in the distributor and a remotely-mounted electronic switch unit controls the coil primary circuit (see illustrations).

Ignition timing is advanced and retarded automatically, to ensure that the spark occurs at just the right instant for the particular load at the prevailing engine speed.

Ignition advance is controlled both mechanically and by a vacuum-operated system. The mechanical governor mechanism comprises two weights, which move out from the distributor shaft as the engine speed rises due to centrifugal force. As they move outwards they rotate the cam relative to the

distributor shaft, and so advance the spark. The weights are held in position by two light springs, and it is the tension of the springs which is largely responsible for correct spark advancement.

Vacuum control comprises a diaphragm, one side of which is connected via a small bore pipe to the inlet manifold, and the other side to the distributor baseplate. Depression in the inlet manifold, which varies with engine speed and throttle opening, causes the diaphragm to move, so moving the baseplate, and advancing or retarding the spark. A fine degree of control is achieved by a spring in the vacuum assembly.

Digifant system

Fitted to the 1.8 litre (code PB and PF) engine, the Digifant ignition system uses the TCI-H system described above but in addition, incorporates a knock sensor which senses the onset of pre-ignition and retards ignition timing accordingly. Normal ignition timing is automatically adjusted by the Digifant control unit which also controls the fuel injection system. Because of this, there are no centrifugal advance weights in the distributor (see illustration).

Work procedures are basically as given for the TIC-H system, except for those described in the relevant Sections.

Precautions

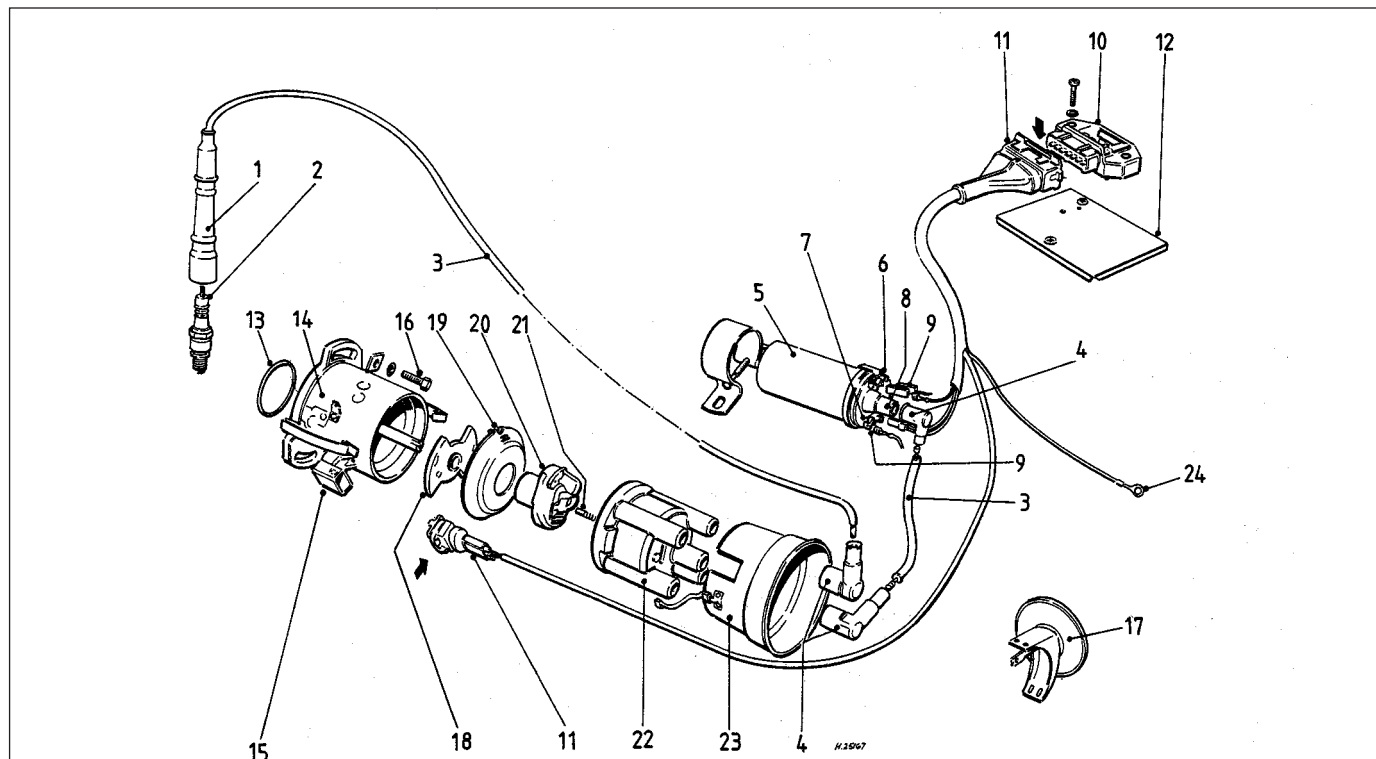
In addition to the precautions listed in Part A of this Chapter, note the following:

- a) When turning the engine at starter speed without starting, the HT lead must be pulled from the centre of the distributor cap and kept earthed to a suitable part of the engine or bodywork
- b) If the system develops a fault and it is necessary to tow the vehicle with the ignition on, the wiring must be disconnected from the TCI-H switch unit
- c) Do not under any circumstances connect a condenser to the coil terminals

2 Spark plugs - renewal

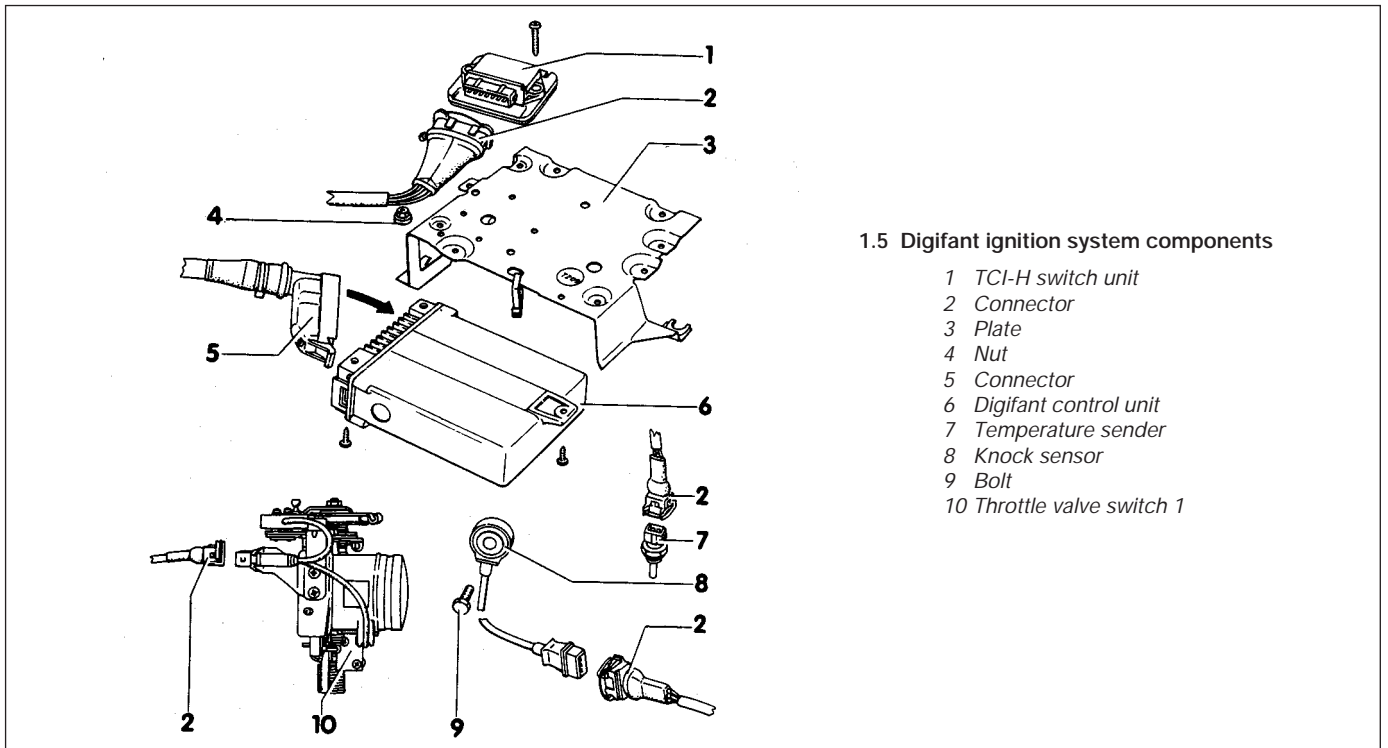
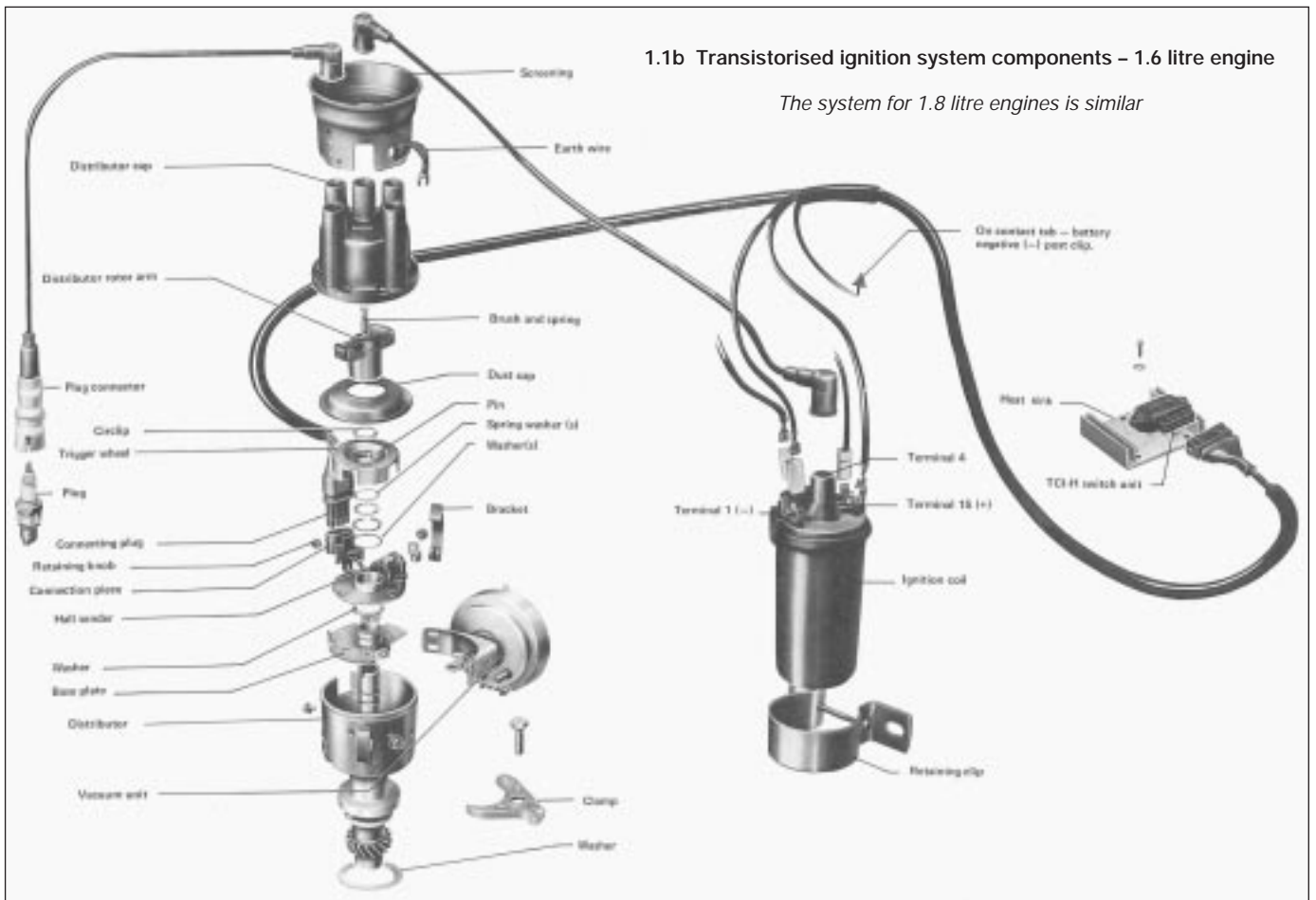


Refer to Chapter 1, Section 15



1.1a Transistorised ignition system components - 1.05 and 1.3 litre engines

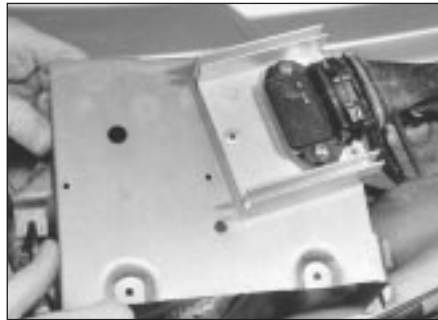
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|-------------------------|----------------------|----------------|------------------|-----------------------------|
| 1 Connector | 6 Terminal (-) | 11 Connector | 16 Screw | 21 Carbon brush with spring |
| 2 Spark plug | 7 Terminal 15 (+) | 12 Heat sink | 17 Vacuum unit | 22 Distributor cap |
| 3 HT lead | 8 Terminal 4 | 13 O-ring | 18 Bearing plate | 23 Screening ring |
| 4 Suppression connector | 9 Connectors | 14 Distributor | 19 Dust cover | 24 Earth lead |
| 5 Ignition coil | 10 TCI-H switch unit | 15 Hall sender | 20 Rotor arm | |



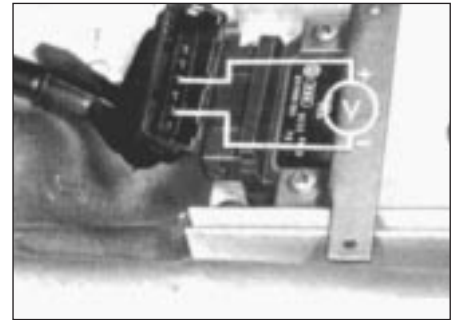
5B•4 Ignition system - transistorised type



4.2a Carefully prise free plastic cover . . .



4.2b . . . for access to ignition switch



4.3 Voltmeter connection when testing ignition switch unit

3 HT leads, distributor cap and rotor arm - inspection and renewal



Refer to Section 3 in Part A of this Chapter

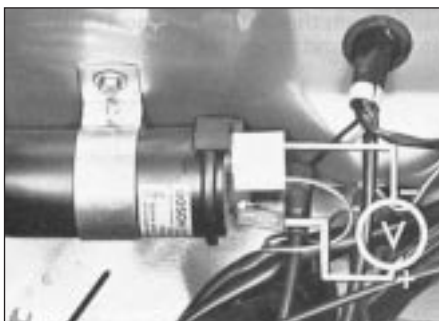
4 Switch unit - testing



- 1 When making this test, the coil must be in good condition.
- 2 Remove the plastic cover on the right-hand side of the plenum chamber for access to the switch unit (see illustrations).
- 3 Disconnect the multi-plug from the switch unit and connect a voltmeter between terminals 4 and 2 (see illustration).
- 4 Switch on the ignition and check that



4.6a Multi-plug connection to Hall sender on side of distributor



4.6b Voltmeter connection to coil when testing ignition switch unit and coil

battery voltage, or slightly less, is available. If not, there is an open-circuit in the supply wires.

- 5 Switch off the ignition and reconnect the multi-plug to the switch unit.
- 6 Pull the multi-plug from the Hall sender on the side of the distributor (see illustration), then connect a voltmeter across the low tension terminals on the coil (see illustration).
- 7 Switch on the ignition and check that there is initially 2 volts, dropping to zero after 1 to 2 seconds. If this is not the case, renew the switch unit and coil.
- 8 Using a length of wire, earth the centre terminal of the distributor multi-plug briefly. The voltage should rise to at least 2 volts. If not, there is an open-circuit or the switch unit is faulty.
- 9 Switch off the ignition and connect the voltmeter across the outer terminals of the distributor multi-plug.
- 10 Switch on the ignition and check that 5 volts is registered on the voltmeter.
- 11 If a fault still exists, renew the switch unit.
- 12 Switch off the ignition, remove the voltmeter and reconnect the distributor multi-plug.

5 Hall sender - testing



- 1 Check that the ignition system wiring and plugs are fitted correctly.
- 2 The coil and TCI-H unit must both be in good condition.



5.4 Voltmeter connection when testing Hall sender

3 Pull the HT lead from the centre of the distributor cap and earth it to the engine or bodywork.

- 4 Pull back the rubber boot from the switch unit and connect a voltmeter between terminals 6 and 3 (see illustration).
- 5 Switch on the ignition and turn the engine by hand in its normal direction of rotation. The voltage should alternate from between 0 and a minimum of 2 volts. If not, the sender is faulty and must be renewed.

6 Distributor - removal and refitting



Note: On 1.05 and 1.3 litre engines equipped with hydraulic tappets, distributor removal and refitting is basically the same as described in Part A of this Chapter for the contact breaker type

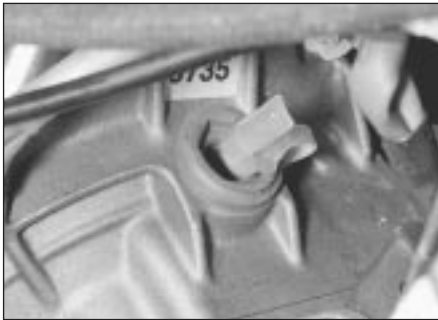
TCI-H system

Removal

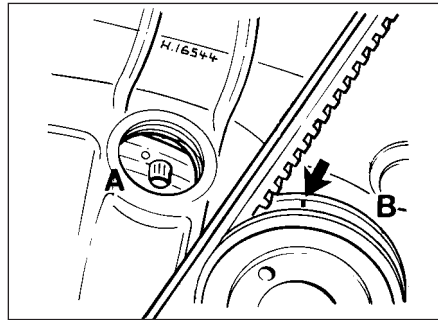
- 1 Pull the high tension connection from the centre of the ignition coil and remove the caps from the spark plugs.
- 2 Disconnect the screen (suppression) earth lead (see illustration) and withdraw the screen, then release the clips and lift off the distributor cap. Do not allow the cap retaining clips to fall inwards or the rotor or trigger wheel may be damaged.
- 3 Disconnect the control unit lead multi-plug by releasing the wire retaining clip.



6.2 Transistorised distributor earth lead connection to body (from screen)

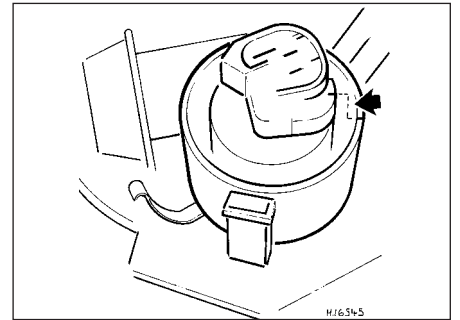


6.4a TDC blanking plug - manual gearbox



6.4b TDC timing marks -
1.6 and 1.8 litre engines

A Flywheel/driveplate
B Crankshaft pulley



6.4c Rotor arm position when at TDC -
1.8 litre engine

4 Unscrew and remove the TDC sensor or blanking plug from the top of the gearbox (see illustration) then turn the engine over until the TDC "O" mark is aligned with the timing pointer (see illustration). If not already marked, scribe an alignment mark on the distributor body in line with the tip of the rotor arm (see illustration). Also mark the distributor body and cylinder block in relation to each other.

5 Pull the vacuum pipe(s) from the vacuum control unit, marking the position of the pipes if there is more than one.

6 Remove the bolt and washer from the distributor clamp plate and remove the clamp plate. Withdraw the distributor and remove the gasket, which must be renewed (see illustrations).



6.6a Distributor removal - 1.8 litre engine



6.6b The gasket must be removed

Refitting

7 Refitting is a reversal of the removal procedure. When the distributor is in position, check that the rotor arm points to the No. 1 cylinder mark before tightening the clamp plate bolt.

8 On completion, check and if necessary adjust the ignition timing.

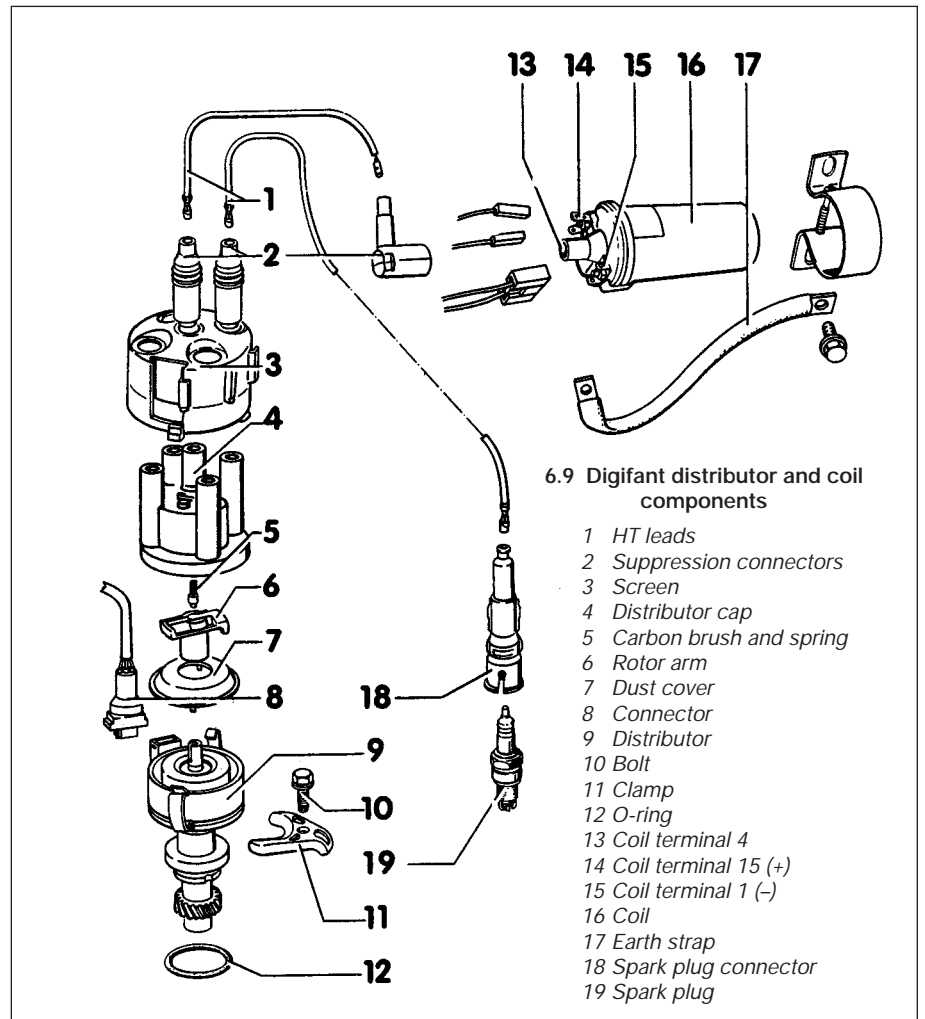
Digifant system

Removal

9 Release the distributor screen and cap. Place the cap to one side complete with HT leads (see illustration).

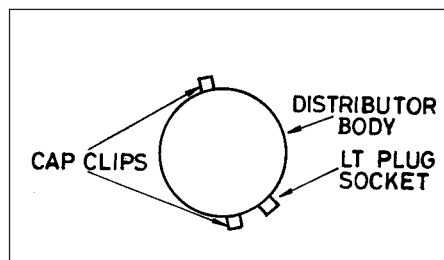
10 Disconnect the wiring harness plug from the side of the distributor body.

11 Unscrew the clamp plate screw, remove the clamp plate and withdraw the distributor.

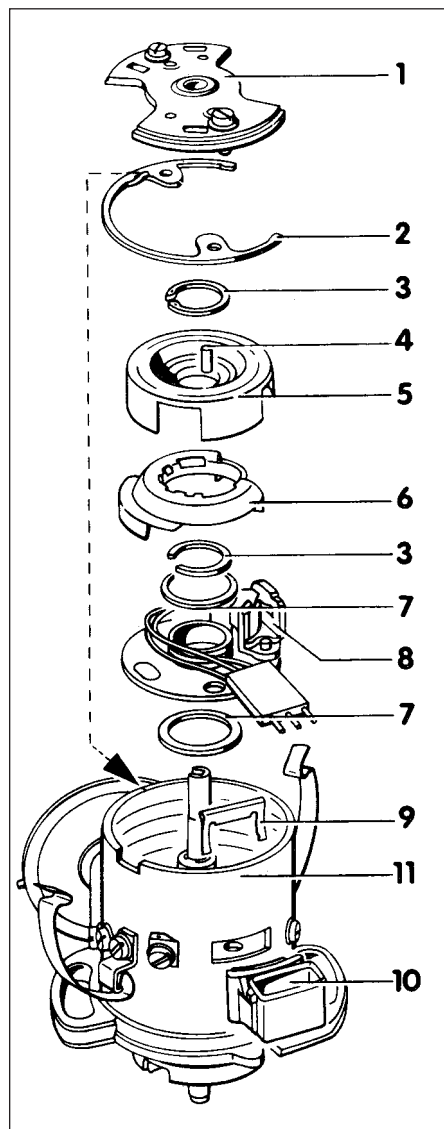


6.9 Digifant distributor and coil components

- 1 HT leads
- 2 Suppression connectors
- 3 Screen
- 4 Distributor cap
- 5 Carbon brush and spring
- 6 Rotor arm
- 7 Dust cover
- 8 Connector
- 9 Distributor
- 10 Bolt
- 11 Clamp
- 12 O-ring
- 13 Coil terminal 4
- 14 Coil terminal 15 (+)
- 15 Coil terminal 1 (-)
- 16 Coil
- 17 Earth strap
- 18 Spark plug connector
- 19 Spark plug



6.15 Distributor installation position - Digifant system



7.1 Transistorised ignition distributor components - 1.05 and 1.3 litre engines

- | | |
|-------------------|---------------|
| 1 Bearing plate | 7 Shims |
| 2 Tensioning ring | 8 Hall sender |
| 3 Circlip | 9 Clip |
| 4 Pin | 10 Connector |
| 5 Rotor | 11 Main body |
| 6 Cover | |

Refitting

12 Before fitting the distributor, set No. 1 piston to TDC. When correctly set, the flywheel mark or the crankshaft pulley vibration damper mark should align with the matching mark on the casing or belt cover. The mark on the camshaft sprocket must align with the joint of the camshaft cover.

13 Using a screwdriver, turn the slot in the end of the oil pump driveshaft so that it is parallel with the crankshaft centre-line.

14 Set the rotor arm so that it points to the mark (No. 1) on the distributor body rim.

15 Install the distributor so that the wiring harness LT plug socket is in the position shown (see illustration). Check and if necessary adjust the ignition timing.

7 Distributor - overhaul

Note: Before commencing work, check that spare parts are available.

1.05 and 1.3 litre engines with hydraulic tappets

1 Distributor overhaul for these engine types is as described in paragraphs 2 to 14 but with reference to the accompanying illustration (see illustration) and the following:

- a) The distributor shaft is supported by a bearing plate which is removed by loosening the two screws securing it to

the tensioning ring. Before removing the ring make a mark on the rim of the distributor body in line with the guide lug.
b) Shims are provided above and below the Hall sender and these should be selected to eliminate axial clearance and to provide for movement by the vacuum unit.

All other engines

2 Wipe clean the exterior of the distributor.

3 Pull the rotor arm from the driveshaft then lift off the dust cover. Do not allow the cap retaining clips to touch the rotor during subsequent operations (see illustrations).

4 Prise out the locking ring and withdraw the rotor up the shaft. Collect the locating pin (see illustrations).

5 Undo the retaining screws securing the vacuum unit. Remove the vacuum unit, disengaging its operating arm (see illustration).

6 Remove the locking ring and collect the washers from the shaft.

7 Undo the cap clip and baseplate retaining screws from the body and lift out the Hall sender unit and the baseplate (see illustration).

8 Clean all the components and examine them for wear and damage.

9 Inspect the inside of the distributor cap for signs of burning or tracking. Make sure that the small carbon brush in the centre of the distributor cap is in good condition and can move up and down freely under the influence of its spring.



7.3a Pull free the rotor ...



7.3b ... and lift off the dust cap



7.4a Remove the locking ring and rotor ...



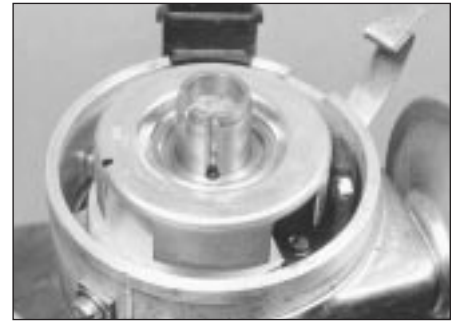
7.4b ... and locating pin from shaft groove (arrowed)



7.5 Vacuum unit removal



7.7 Hall sender unit, retaining ring and washers



7.13 Align rotor indent with groove in shaft when refitting

10 Check that the rotor arm is not damaged. Use an ohmmeter to measure the resistance between the brass contact in the centre of the rotor arm and the brass contact at the edge of the arm. The measured value of resistance should be between 600 and 1400 ohm.

11 Suck on the pipe connection to the vacuum diaphragm and check that the operating rod of the diaphragm unit moves. Retain the diaphragm under vacuum to check that the diaphragm is not perforated.

12 Reassemble the distributor in reverse order of dismantling. Smear a little grease on

the bearing surface of the baseplate and the Hall sender bearing surfaces.

13 Before fitting the rotor (trigger wheel) back over the shaft, locate the small engagement pin in the groove in the shaft. Smear the pin with grease to retain it in position. Align the indent in the rotor inner bore with the groove in the shaft and slide it down into position over the pin (see illustration).

14 On completion, rotate the distributor shaft by hand to ensure that it moves freely. If it does not, then the rotor is possibly distorted and will need renewal.

8 Ignition timing - checking and adjustment



Refer to Chapter 1, Section 17

9 Coil - testing



Refer to Section 9 in Part A of this Chapter

