

# Chapter 5 Part C:

## Ignition system - fully electronic type

The following information is a revision of, or supplementary to, that contained in Part B of this Chapter

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### Degrees of difficulty

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

#### General

System type ..... Fully Electronic Ignition (FEI)

#### Ignition timing

1.8 litre 16 valve engine ..... 5 to 7° BTDC at 950 to 1050 rpm, with vacuum hose connected

#### 1 General information and precautions

##### General information

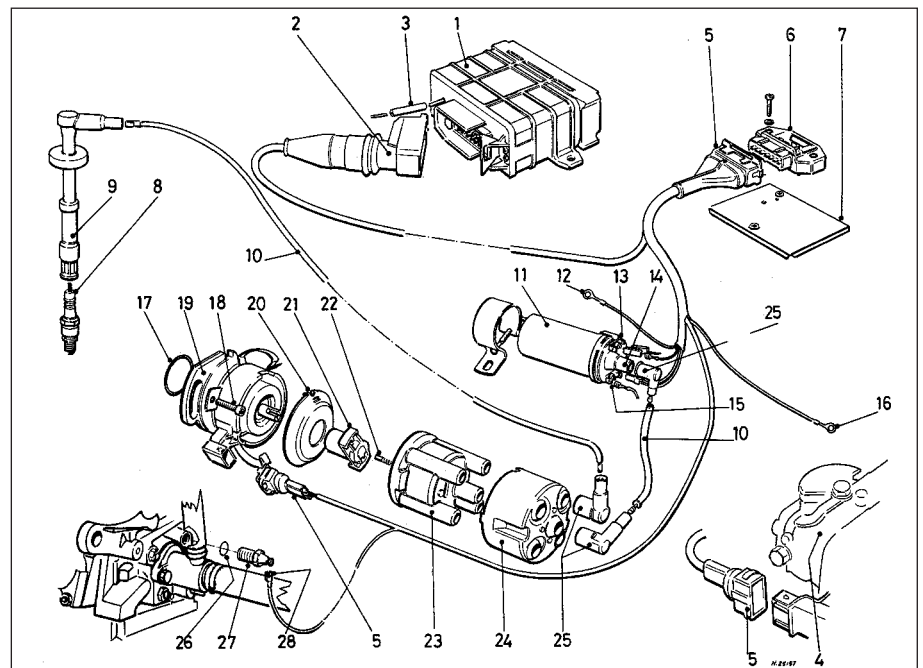
The 1.8 litre 16 valve engine is fitted with a Fully Electronic Ignition (FEI) system (see illustration).

This system functions in a similar manner to the transistorised system described in Part B of this Chapter. In addition, it incorporates an electronic control unit which adjusts the ignition timing electronically according to engine speed, load and temperature. The distributor is not fitted with centrifugal and vacuum advance mechanisms.

##### Precautions

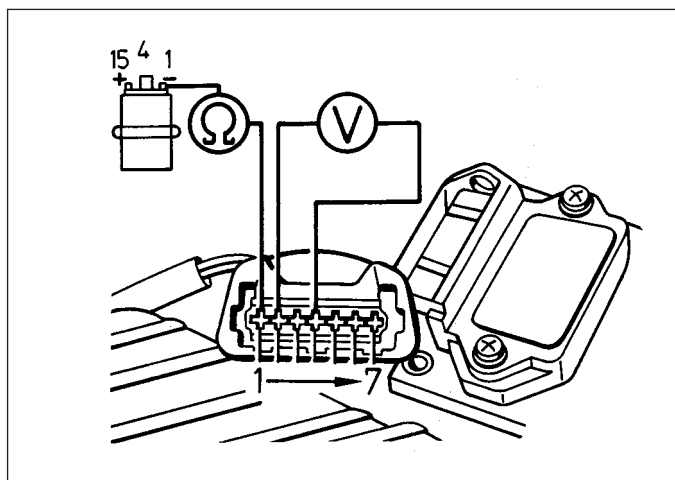
The precautions listed in Parts A and B of this Chapter apply also to the FEI system. Note also the following:

- A digital multi-meter should be used for testing, otherwise readings may be inaccurate
- When using a multi-meter, do not switch between ranges during testing as this may damage components
- Do not under any circumstances use a test lamp, as this will damage the electronic components of the system

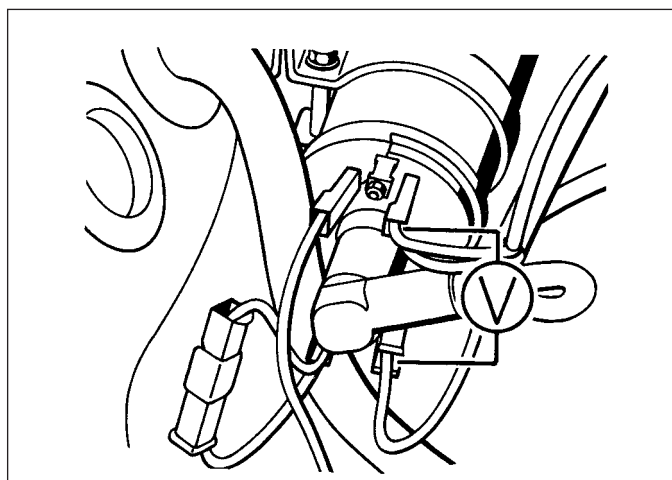


1.1 Fully Electronic Ignition system components

1 FEI control unit	8 Spark plug	16 Earth lead	23 Distributor cap
2 Connector	9 Connector	17 O-ring	24 Suppression cap
3 Vacuum line	10 HT lead	18 Screw	25 Suppression connectors
4 Throttle valve switch	11 Ignition coil	19 Distributor	26 Washer
5 Connector	12 Earth lead	20 Dust cover	27 Temperature sender
6 TCI-H switch unit	13 Terminal 1 (-)	21 Rotor arm	28 Connector
7 Heat sink	14 Terminal 4	22 Carbon brush and spring	



4.3 Testing FEI switch unit



4.5 Voltmeter connection across ignition coil LT terminals when testing FEI switch unit

## 2 Spark plugs - renewal



Refer to Chapter 1, Section 15

## 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 The switch unit is located in the left-hand side of the plenum chamber beneath a plastic cover. The ignition coil should be in good condition before making this test.

2 Depress the wire clip and pull the connector from the switch unit.

3 Connect a voltmeter between terminals 4 and 2 on the connector (see illustration) then switch on the ignition and check that battery voltage is available. Switch off the ignition.

4 Using an ohmmeter, check that there is continuity between terminal 1 on the connector and terminal 1 on the coil.

5 Refit the connector to the switch unit, then connect a voltmeter across the low tension terminals on the coil (see illustration).

6 Release the spring and pull the connector from the control unit, then switch on the ignition. Check that initially a reading of 2 volts is registered on the voltmeter, dropping to zero after one to two seconds. If this is not the case, renew the switch unit and also if necessary, the ignition coil.

7 Using a temporary length of wire, briefly earth terminal 12 on the connector. The voltage should rise to at least 2 volts. If this is not the case, renew the switch unit.

## 5 Control unit - testing



1 Test the switch unit before checking the control unit.

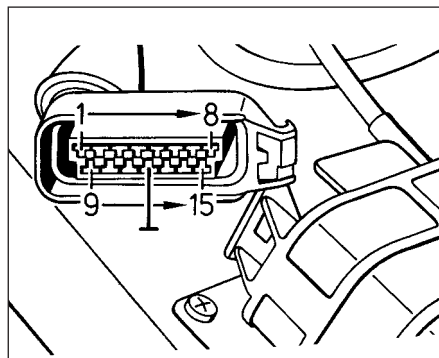
2 Release the spring and pull the connector from the control unit located in the right-hand side of the plenum chamber.

3 Switch on the ignition, then use a voltmeter to check that battery voltage is available between terminals 3 and 5 on the connector (see illustration).

4 Check also that battery voltage is available between terminals 6 and 3, then operate the throttle valve switch and check that the voltage drops to zero. Switch off the ignition.

5 Using an ohmmeter, measure the resistance between the connector terminals 1 to 3. These are the temperature sender terminals and the resistance varies according to the coolant temperature.

6 Press the clip and pull the connector from the side of the distributor. Connect the voltmeter to the two outer terminals of the connector, then switch on the ignition. A reading of 5 volts should be registered. Switch off the ignition.



5.3 FEI control unit connector terminals

7 Connect a voltmeter across the low tension terminals of the ignition coil. Switch on the ignition.

8 Using a temporary length of wire, briefly earth the centre terminal of the distributor connector. The voltage should rise to at least 2 volts and the fuel pump should be heard to operate. If this is not the case, renew the control unit and if necessary check the fuel pump relay.

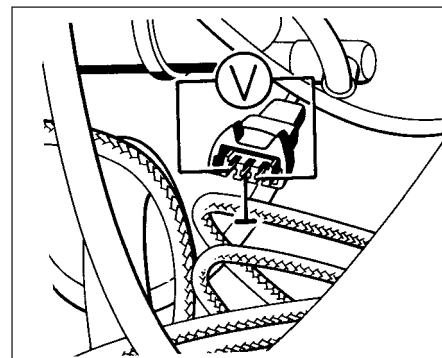
## 6 Hall sender - testing



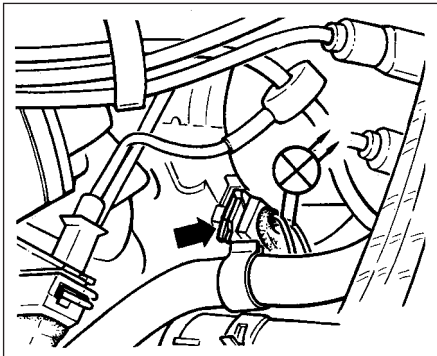
**Note:** A digital multi-meter should be used for testing. Do not use a test lamp

Release the lead connector from the Hall sender unit. Check the voltage supply to the sender unit by connecting a multi-meter between the outer contacts of the plug, then switch on the ignition (see illustration). A minimum reading of 5 volts should be indicated, if not check the FEI control unit and wiring.

To check the signal from the Hall sender unit, slide the rubber grommet away from the sender plug and with the plug connected,



6.1 Testing Hall sender connector on side of distributor



**6.2 Signal check method from Hall sender unit**

attach the diode test light to its centre and outer (brown/white) terminals (see illustration). Operate the starter motor and check that the LED is seen to flicker. If it does not, the Hall sender unit is at fault and must be renewed.

**7 Distributor - removal and refitting**

Refer to Section 6 in Part B of this Chapter for the TCI-H system but ignore the reference to the vacuum pipe and renew the O-ring if necessary.

**8 Distributor - overhaul**

- 1 The only work likely to be necessary on the distributor is the renewal of the Hall sender which is available in kit form including a drive coupling, pin and circlip (see illustration).
- 2 If the rotor arm is defective, it must be removed by crushing with pliers as it is permanently fixed to the shaft with strong adhesive. Clean the shaft and secure the new

rotor arm with adhesive obtained from a VW dealer.

- 3 To renew the Hall sender, first note the position of the drive coupling offset in relation to the rotor arm.

- 4 Support the drive coupling in a vice, then drive out the roll pin after removing the circlip.
- 5 Remove the coupling followed by the shims and plastic washer.
- 6 Remove the shaft complete with rotor arm, followed by the plastic dust cover, shim and plastic washer.

7 Remove the screws and lift the Hall sender from inside the distributor body.

8 Clean all the components, then fit the new Hall sender using a reversal of the removal procedure, but lubricate the shaft with a little grease.

**9 Ignition timing - checking and adjustment**

1 This procedure is as described in Chapter 1, Section 17, for the TCI-H system. Operation of the control unit can also be checked as follows.

2 Run the engine at idling speed and note the basic ignition timing. Pull the vacuum hose from the control unit, then increase the engine speed to 4600 rpm and read off the ignition advance. Deduct the basic advance and the resultant value should be 18°, this being the advance attributable to engine speed.

3 Reconnect the vacuum hose, then run the engine to 4600 rpm. Note the ignition timing. Pull off the vacuum hose and again increase the engine speed to 4600 rpm. The ignition timing should be approximately 20° retarded from the previously-noted figure. This amount indicates the advance attributable to engine vacuum.

**8.1 FEI distributor components**

- 1 Shaft
- 2 Shims
- 3 Plastic washers
- 4 Screw
- 5 Hall sender
- 6 Main body
- 7 Roll pin
- 8 Circlip
- 9 Drive coupling

