






# Chapter 5 Part A:

## Ignition system - carburettor models

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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

For engine to model applications refer to Chapter 2

#### System

Type ..... Electronic (breakerless)

#### Distributor

Make ..... Ducellier or Bosch

Type:

150 A engine .....	Ducellier 525 354
150 C engine .....	Ducellier 525 388
171 engine .....	Ducellier 525 327 or Bosch 0237 009 013
159 engine .....	Ducellier 525 327 or Bosch 0237 009 013

#### HT leads

Type:

BX .....	Champion LS-04
BX 14 (pre Aug 1988) .....	Champion LS-04
BX 16 .....	Champion LS-14
BX 19 (pre 1988) .....	Champion LS-14

#### Ignition coil

Type ..... Bosch 0221 122 317 or Ducellier 520 015

Primary resistance:

Bosch .....	0.82 ohm $\pm$ 10%
Ducellier .....	0.8 ohm $\pm$ 5%

Secondary resistance:

Bosch .....	8250 ohms $\pm$ 10%
Ducellier .....	6000 ohms $\pm$ 5%

#### Ignition timing

Dynamic:

BX .....	8° BTDC at 850 rpm
BX 14:	
Pre Aug 1988 .....	10° BTDC at 850 rpm
From Aug 1988 .....	6 to 10° BTDC at 750 rpm
BX 16:	
Manual gearbox .....	10° BTDC at 900 rpm
Automatic transmission .....	10° BTDC at 850 rpm
RE .....	10° BTDC at 700 rpm
From Sept 1988 .....	10° BTDC at 850 rpm
BX 19 .....	10° BTDC at 850 rpm

## 5A•2 Ignition system - carburettor models

### Spark plugs

	Type	Electrode gap
BX .....	Champion S9YCC / S281YC	0.8 mm / 0.6 mm
BX 14:		
Pre Aug 1988 .....	Champion S9YCC / S281YC	0.8 mm / 0.6 mm
From Aug 1988 .....	Champion RC9YCC / C9YCX	0.8 mm / 0.8 mm
BX16:		
Pre Sept 1988 .....	Champion S7YCC / S279YC	0.8 mm / 0.6 mm
From Sept 1988 .....	Champion RC7YCC / C7YCX	0.8 mm / 0.8 mm
BX 19:		
Pre July 1987 .....	Champion S7YCC / S279YC	0.8 mm / 0.6 mm
From July 1987 .....	Champion RC7YCC / C7YCX	0.8 mm / 0.8 mm

### Torque wrench settings

	Nm	lbf ft
Spark plugs:		
Taper seat type .....	12	9
Flat seat type (with washer) .....	25	18

## 1 General information and precautions

### General information

The ignition system fitted to all carburettor equipped models is of the electronic type and comprises a 12 volt battery, a high output coil, a transistorised module, a distributor with a

magnetic impuser generator and spark plugs (see illustration).

The system relies on the distributor to produce an electrical pulse at each firing point. This pulse is produced by magnetic induction and is amplified by the ignition module which supplies LT current to the coil. HT voltage is generated and distributed in the traditional fashion.

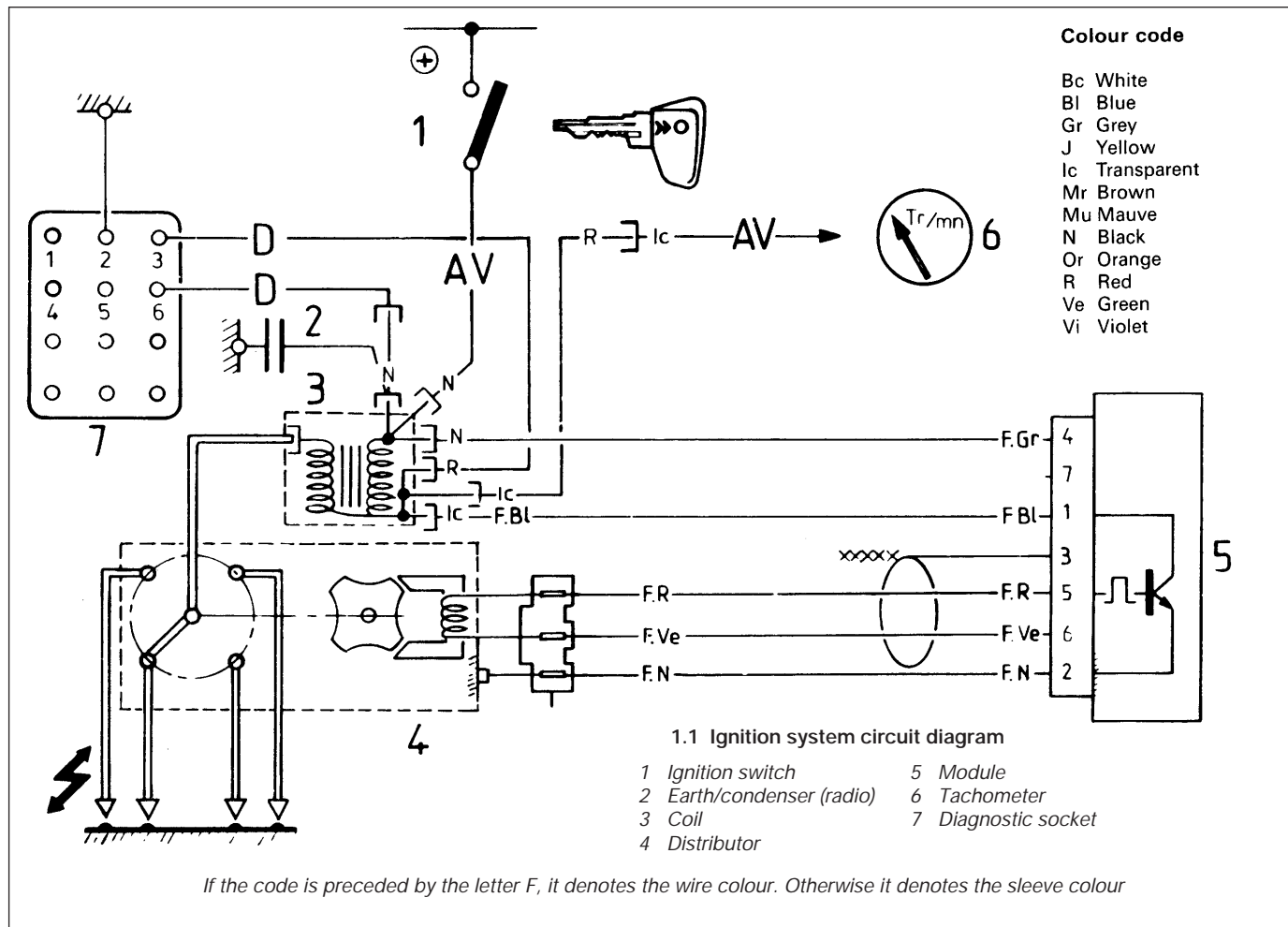
Electronic ignition systems are normally very reliable. Because the effects of contact

breaker wear have been eliminated, the system will not go 'off tune'.

### Precautions

It is necessary to take extra care when working on the electrical system to avoid damage to semi-conductor devices (diodes and transistors), and to avoid the risk of personal injury. Take note of the following points:

a) Before disconnecting any wiring, or



removing components, always ensure that the ignition is switched off.

- b) Always remove rings, watches, etc. before working on the ignition system. Even with the battery disconnected, capacitive discharge could occur if a component live terminal is earthed through a metal object. This could cause a shock or nasty burn.
- c) Do not reverse the battery connections. Components such as the alternator or any other having semi-conductor circuitry could be irreparably damaged.
- d) If the engine is being started using jump leads and a slave battery, connect the batteries positive to positive and negative to negative. This also applies when connecting a battery charger.
- e) Never disconnect the battery terminals, or alternator multi-plug connector, when the engine is running.
- f) The battery leads and alternator multi-plug must be disconnected before carrying out any electric welding on the vehicle.
- g) Never use an ohmmeter of the type incorporating a hand cranked generator for circuit or continuity testing.
- h) The HT voltage generated by an electronic ignition system is extremely high, and in certain circumstances could prove fatal. Persons with surgically-implanted cardiac pacemaker devices should keep well clear of the ignition circuits, components and test equipment.
- i) Do not handle HT leads, or touch the distributor or coil when the engine is running. If tracing faults in the HT circuit, use well insulated tools to manipulate live leads.
- j) When carrying out welding operations on the vehicle using electric welding equipment, disconnect the battery and alternator.

## 2 Spark plugs - removal, inspection and fitting



**Note:** From July 1987, the engines of BX 19 models are fitted with conventional flat-seat spark plugs with washers, instead of the taper-seat plugs without washer used previously. BX 14 and BX 16 models followed suit in August and September of 1988 respectively.

1 The correct functioning of the spark plugs is vital for the correct running and efficiency of the engine. It is essential that the plugs fitted are appropriate for the engine. If the correct type is used and the engine is in good condition, the plugs should not need attention between scheduled replacement intervals. Cleaning is rarely necessary and should not be attempted unless specialised equipment is available as damage can easily be caused to the firing ends.

## Removal

- 2 Pull the HT lead from each plug. Grip the rubber end fitting not the lead, otherwise the lead connection may be fractured (see illustration).
- 3 The plugs are deeply recessed in the cylinder head. It is recommended that dirt is removed from the recesses using a vacuum cleaner or compressed air before removing the plugs, to prevent dirt dropping into the cylinders.
- 4 Unscrew each plug.

## Inspection

- 5 Examination of the spark plugs will give a good indication of the condition of the engine.
- 6 If the insulator nose of the spark plug is clean and white with no deposits, this is indicative of a weak mixture, or too hot a plug.
- 7 If the top and insulator nose are covered with hard black-looking deposits, this is indicative that the mixture is too rich. Should the plug be black and oily then it is likely that the engine is fairly worn, as well as the mixture being too rich.
- 8 If the insulator nose is covered with light tan to greyish brown deposits, then the mixture is correct and it is likely that the engine is in good condition.

## Gap setting

- 9 The spark plug gap is of considerable importance as if it is too large or too small, the size of the spark and its efficiency will be seriously impaired.
- 10 To set the gap, measure it with a feeler blade. Bend open, or close, the outer plug electrode until the correct gap is achieved, see *Specifications*. The centre electrode should never be bent as this may crack the insulation and cause plug failure if nothing worse.
- 11 Special gap adjusting tools are available from most motor accessory stores.

## Fitting

- 12 Screw each plug in by hand. This will make sure that there is no chance of cross-threading.
- 13 Tighten to the specified torque. If a torque wrench is not available, just nip up each plug. It is better to slightly undertighten rather than overdo it and strip the threads from the light alloy cylinder head.



2.2 HT lead removal from spark plug - do not pull on lead

14 Overtightening plugs of the tapered seat type can make them extremely difficult to remove.

15 When reconnecting the plug leads, make sure that they are refitted in their correct order, 1 - 3 - 4 - 2. No 1 cylinder being at the flywheel end of the engine.

## 3 HT leads - maintenance and fitting



- 1 Ensure that the HT leads are numbered before removal, to avoid confusion when refitting.
- 2 Pull each lead from its plug by gripping its end fitting, not the lead, otherwise the lead connection may become fractured.
- 3 Check inside the end fitting for signs of corrosion, which will look like a white crusty powder. Remove any corrosion found.
- 4 Push the end fitting back onto the spark plug, ensuring that it is a tight fit. If not, remove the lead again and use pliers to carefully crimp the metal connector inside the end fitting until it fits securely to the plug.
- 5 Using a clean rag, wipe the entire length of the lead to remove any built-up dirt and grease. Once the lead is clean, check for burns, cracks and other damage. Do not bend the lead excessively or pull the lead lengthways - the conductor inside might break.

## 4 Ignition coil - maintenance and testing



## Maintenance

- 1 Maintenance of the coil is minimal and is limited to periodically wiping its surfaces clean and dry and ensuring that the lead connectors are secure and free from corrosion (see illustration).
- 2 High voltages generated by the coil can easily leak to earth over its surface and prevent the spark plugs from receiving the electrical pulses. Water repellent sprays are now available to prevent dampness causing this type of malfunction.



4.1 The ignition coil

**Testing**

3 Special equipment is required to test a coil and is best left to an auto-electrician. Substitution of another coil is an alternative method of fault tracing.

**5 Distributor cap - removal, inspection and refitting**

**Removal**

- 1 Ensure that the HT leads connected to the distributor cap are numbered before removal, to avoid confusion when refitting.
- 2 Pull each lead from the cap by gripping its end fitting, not the lead, otherwise the lead connection may become fractured.
- 3 Unclip the distributor cap. Alternatively, remove the two screws securing the cap in position (see illustration).

**Inspection**

- 4 Check inside the HT lead end fittings of the cap for signs of corrosion, which will look like a white crusty powder. Remove any corrosion found.
- 5 Wipe the cap clean and carefully inspect it inside and out for signs of cracks, carbon tracks (tracking) and worn, burned or loose contacts.
- 6 Check that the central carbon brush is unworn, free to move against spring pressure and making good contact with the rotor arm.
- 7 Clean and inspect the rotor arm.
- 8 If defects are found, then renew the cap or arm.

**Refitting**

9 Refitting is a reversal of removal. Push the end fitting of each HT lead firmly into the distributor cap, ensuring that it is a tight fit.

**6 Distributor - removal and refitting**

**Removal**

1 Disconnect the HT leads from the spark



6.6 Distributor timing alignment mark - BX 16



5.3 Removing the distributor cap - BX 16

- plugs by pulling on their end connectors (not the leads).
- 2 Unclip the distributor cap. Alternatively, remove the two screws securing the cap in position.
- 3 Release the HT leads from their location clips and position the leads and cap out of the way.
- 4 Disconnect the LT wiring at the plug connector by releasing the spring retaining clip.
- 5 Clean the area around the distributor mounting flange and look for a timing alignment mark.
- 6 On BX and BX 14 models, this alignment mark is normally between the distributor and the cylinder head. On BX 16 and BX 19 models, the mark is between the distributor and fuel pump/thermostat/distributor combined housing (see illustration).
- 7 If no timing alignment mark is visible, scribe a mark across the two faces.
- 8 Undo the retaining nuts and withdraw the distributor.

**Refitting**

- 9 Refit in the reverse order of removal. The distributor drive is offset so there is no possibility of incorrect assembly (see illustration).
- 10 Use the alignment marks noted during removal if refitting the old distributor. If fitting a new unit, set it to the middle of the travel allowed by the slotted holes.
- 11 Check the ignition timing and adjust if necessary.



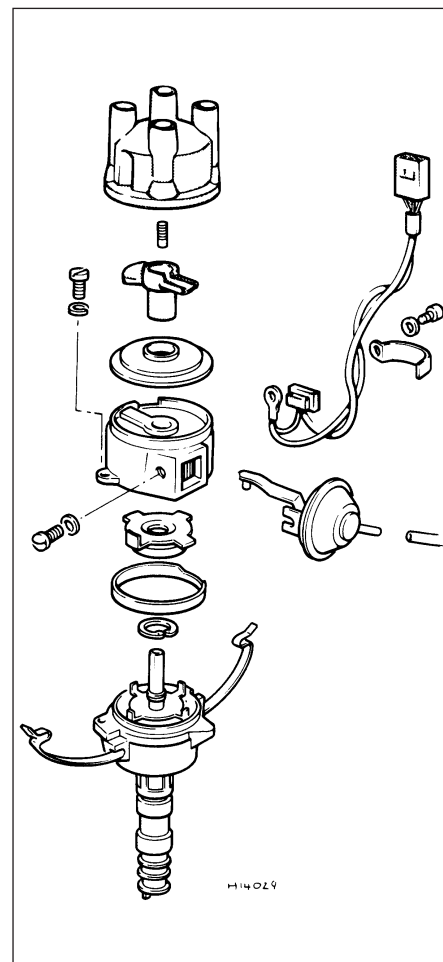
6.9 Distributor drive engagement dog is offset - BX 16

**7 Distributor - dismantling and reassembly**

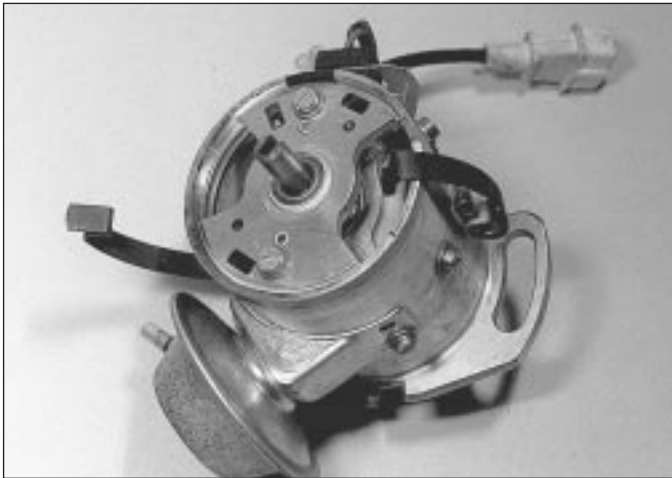
**Note:** Before commencing dismantling, check that spares are available. If the mechanical components of the distributor are worn it will be necessary to renew the complete distributor.

**Ducellier**

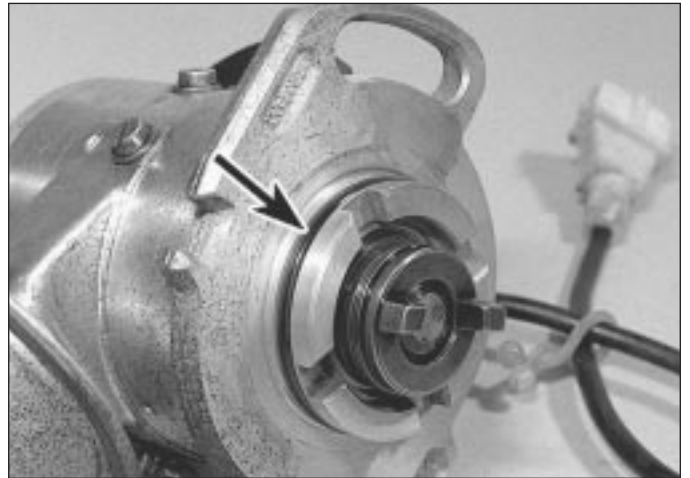
- 1 Remove the screws which hold together the upper and lower halves of the distributor body. The lugs are offset to guarantee correct reassembly. Separate the body sections (see illustration).
- 2 The pick-up coil and vacuum unit can now be removed from the upper body section. Note into which hole the vacuum unit link engages.
- 3 The rotor and centrifugal advance weights can be removed after extracting the circlip from the shaft. The drive dog is secured to the shaft by a pin.
- 4 Reassemble in the reverse order to dismantling.



7.1 Exploded view of Ducellier breakerless distributor



7.5 Remove top plate for access to rotor - Bosch distributor



7.6 Bosch distributor drive dogs and O-ring seal (arrowed)

**Bosch**

5 This procedure is similar to that given for the Ducellier distributor but the distributor body is in one piece (see illustration).

6 Before refitting the distributor, fit a new O-ring seal into the groove in its base (see illustration).

**8 Ignition timing**



**Note:** The ignition timing can only be checked dynamically. A stroboscopic timing light and HT type tachometer will be needed.

1 Start the engine and run it up to its normal operating temperature (cooling fan cuts in). Switch off the engine.

2 Turn the engine over slowly by hand so that the timing mark on the flywheel periphery can be seen through the aperture in the clutch

housing. Highlight the timing mark with white chalk or paint (see illustration).

3 Disconnect the distributor vacuum advance hose.

4 Connect up the timing light and tachometer in accordance with the manufacturer's instructions.

5 Restart the engine and run it at the recommended idle speed. Point the timing light at the timing marks. They should appear stationary and in alignment. If they are not in alignment, loosen the distributor retaining nuts just enough to allow the distributor to be rotated by hand. Turn the distributor body in the required direction to bring the timing marks in alignment, then retighten the distributor retaining nuts.

6 Switch off the engine and remove the timing light and tachometer. Reconnect the ignition vacuum advance hose.

7 Once the timing has been reset, make a timing alignment mark across the faces of the distributor flange and the cylinder head or

distributor housing. This will then act as a timing position guide when the distributor is next removed.

**9 Diagnostic test socket**



The Citroën BX range of models is fitted with a diagnostic test socket for electronic monitoring of engine performance and ignition system condition. Although this facility is of no use to the home mechanic, it does enable a suitably equipped garage to make a quick assessment and with greater accuracy than the usual procedures (see illustration).

With the appropriate equipment the following checks or adjustments can be made:

- a) Primary (LT) circuit condition
- b) Setting of initial advance
- c) Centrifugal and vacuum advance curves
- d) Engine speed

5A



8.2 Flywheel timing mark aligned with advance timing mark on timing plate - BX 16

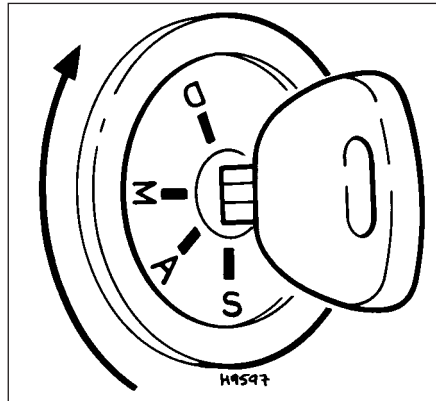


9.1 Diagnostic test socket - BX 16

## 10 Ignition switch and steering lock



Removal and separation of the switch and lock is described in Chapter 11 (see illustration).



### 10.1 Ignition switch positions

- S* Off. Steering locked when key removed
- A* Ignition off, accessories on
- M* Ignition on
- D* Starter motor energised