

Chapter 5

Ignition system

Contents

General information	1	Ignition timing - general information and check	6
Ignition (main) switch - check, removal and installation .see Chapter 9		Neutral switch - check and replacementsee Chapter 9
Ignition HT coils - check, removal and installation	3	Side stand switch - check and replacementsee Chapter 9
Ignition pulse generator coil assembly - check, removal and installation	4	Spark plug gap check and replacementsee Chapter 1
Ignition system - check	2	Ignition control unit - removal and installation	5

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

Specifications

General information

Firing order	Front (232°), Rear (488°)
Spark plugs	see Chapter 1

Ignition timing

At idle	
J and K models	10° BTDC
All other models	8° BTDC
Full advance	31° BTDC @ 7000 rpm

Pulse generator coils

Resistance	450 to 550 ohms at 20°C
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Ignition HT coils

Primary winding resistance	2.2 to 2.6 ohms at 20°C
Secondary winding resistance	
With plug leads	30 to 36 K ohms at 20°C
Without plug leads	20 to 25 K ohms at 20°C

Torque settings

Timing mark inspection cap	10 Nm
Primary drive gear/timing rotor bolt	90 Nm
External oil pipe (J and K models only)	
Upper bolts	10Nm
Lower bolt	23 Nm
Crankcase cover bolts (right side)	10 Nm

1 General information

All models are fitted with a fully transistorised electronic ignition system, which due to its lack of mechanical parts is totally maintenance free. The system comprises a rotor, pulse generator coils, ignition control unit and ignition HT coils (refer to the wiring diagram at the end of Chapter 8 for details).

The triggers on the rotor, fitted to the right-hand end of the crankshaft, magnetically operate the pulse generator coils as the crankshaft rotates. The pulse generator coils send a signal to the ignition control unit which then supplies the ignition HT coils with the power necessary to produce a spark at the plugs.

The system uses two coils, the front coil supplying the front cylinder spark plugs and the rear coil supplying the rear cylinder plugs.

The ignition control unit has an electronic advance function in order to advance the ignition in line with increased engine speeds.

Because of their nature, the individual ignition system components can be checked but not repaired. If ignition system troubles occur, and the faulty component can be isolated, the only cure for the problem is to replace the part with a new one. Keep in mind that most electrical parts, once purchased, cannot be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a replacement part.

2 Ignition system - check

Warning: The energy levels in electronic systems can be very high. On no account should the ignition be switched on whilst the plugs or plug caps are being held. Shocks from the HT circuit can be most unpleasant. Secondly, it is vital that the engine is not turned over or run with any of the plug caps removed, and that the plugs are soundly earthed when the system is checked for sparking. The ignition system components can be seriously damaged if the HT circuit becomes isolated.

1 As no means of adjustment is available, any failure of the system can be traced to failure of a system component or a simple wiring fault. Of the two possibilities, the latter is by far the most likely. In the event of failure, check the system in a logical fashion, as described below. Before testing, check that the battery is in good condition and fully charged (see *Fault Finding Equipment* in the Reference section of this Manual).

2 Disconnect one HT lead from both cylinder spark plugs. Connect each lead to a spare spark plug and lay each plug on the engine

with the threads contacting the engine. If necessary, hold each spark plug with an insulated tool.



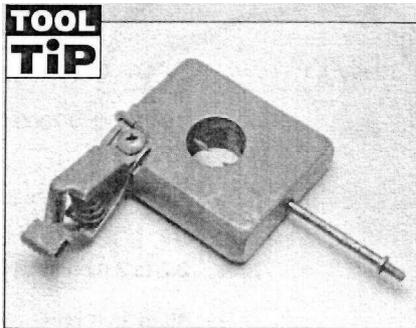
Warning: Do not remove any of the spark plugs from the engine to perform this check - atomised fuel being pumped out of the open spark plug hole could ignite, causing severe injury!

3 Having observed the above precautions, check that the kill switch is in the RUN position, turn the ignition switch ON and turn the engine over on the starter motor. If the system is in good condition a regular, fat blue spark should be evident at each plug electrode. If the spark appears thin or yellowish, or is non-existent, further investigation will be necessary. Before proceeding further, turn the ignition off and remove the key as a safety measure.

4 The ignition system must be able to produce a spark which is capable of jumping a particular size gap. Whilst Honda do not specify the size of this gap, a healthy system should produce a spark capable of jumping at least 6 mm. A simple testing tool can be made to test the minimum gap across which the spark will jump (see **Tool Tip**).

5 Connect one of the spark plug HT leads from one coil to the protruding electrode on the test tool, and clip the tool to a good earth on the engine or frame. Check that the kill switch is in the RUN position, turn the ignition switch ON and turn the engine over on the starter motor. If the system is in good condition a regular, fat blue spark should be seen to jump the gap between the nail ends. Repeat the test for the other coil. If the test results are good the entire ignition system can be considered good. If the spark appears thin or yellowish, or is non-existent, further investigation will be necessary.

6 Ignition faults can be divided into two categories, namely those where the ignition system has failed completely, and those



A simple spark gap testing tool can be made from a block of wood, a large alligator clip and two nails, one of which is fashioned so that a spark plug cap or bare HT lead end can be connected to its end. Make sure the gap between the two nail ends is the same as specified.

which are due to a partial failure. The likely faults are listed below, starting with the most probable source of failure. Work through the list systematically, referring to the subsequent sections for full details of the necessary checks and tests. **Note:** Before checking the following items ensure that the battery is fully charged and that all fuses are in good condition.

- Loose, corroded or damaged wiring connections, broken or shorted wiring between any of the component parts of the ignition system (see Chapter 9).
- Faulty HT lead or spark plug cap, faulty spark plug, dirty, worn or corroded plug electrodes, or incorrect gap between electrodes.
- Faulty ignition switch or engine kill switch (see Chapter 9).
- Faulty neutral or side stand switch (see Chapter 9).
- Faulty pulse generator coils or damaged rotor.
- Faulty ignition HT coil(s).
- Faulty ignition control unit.

7 If the above checks don't reveal the cause of the problem, have the ignition system tested by a Honda dealer. Honda produce a tester which can perform a complete diagnostic analysis of the ignition system.

3 Ignition HT coils - check, removal and installation



Check

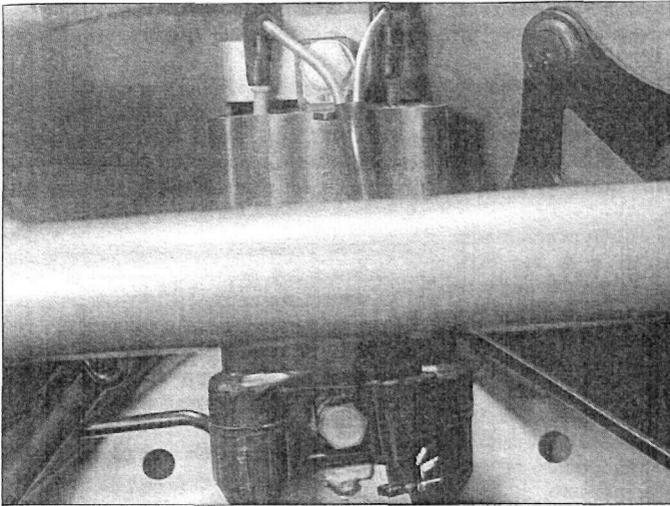
1 In order to determine conclusively that the ignition coils are defective, they should be tested by a Honda dealer equipped with the special diagnostic tester.

2 However, the coils can be checked visually (for cracks and other damage) and the primary and secondary coil resistance can be measured with a multimeter. If the coils are undamaged, and if the resistance readings are as specified at the beginning of the Chapter, they are probably capable of proper operation.

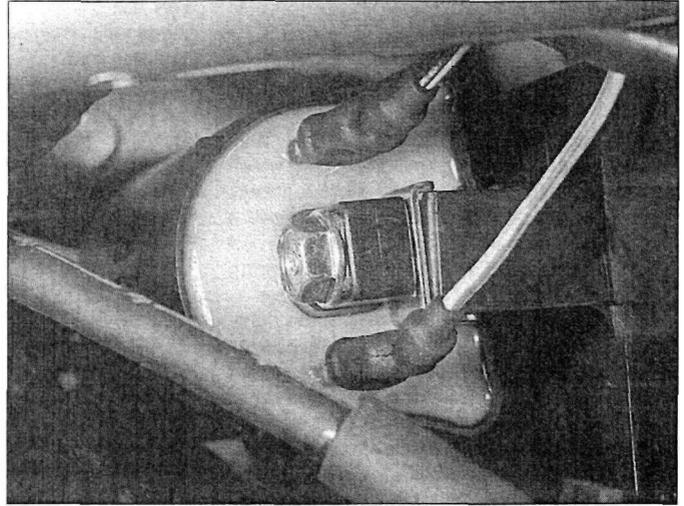
3 Remove the seat (see Chapter 8) and disconnect the battery negative (-ve) lead. To gain access to the coils, remove the fuel tank (see Chapter 4). The front coil is mounted on the frame behind the steering head, and the rear coil is mounted on the frame behind the rear cylinder valve cover (see illustrations).

4 Disconnect the primary circuit electrical connectors from the coil being tested and the HT leads from the spark plugs. Mark the locations of all wires and leads before disconnecting them.

5 Set the meter to the ohms x 1 scale and measure the resistance between the primary circuit terminals (see illustration). This will give a resistance reading of the primary windings and should be consistent with the



3.3a The front coil is mounted behind the steering head



3.3b The rear coil is mounted behind the rear cylinder valve cover

value given in the Specifications at the beginning of the Chapter.

6 To check the condition of the secondary windings, set the meter to the K ohm scale. Connect one meter probe to each HT lead socket (see illustration 3.5). If the reading obtained is not within the range shown in the Specifications, unscrew the plug lead connectors from the coil and measure the resistance between the HT terminals. If both values differ greatly from those specified it is likely that the coil is defective, whereas if only the first reading obtained is suspect then it can be assumed that the fault lies in the plug leads or caps rather than the coil itself.

7 Should any of the above checks not produce the expected result, have your

findings confirmed on the diagnostic tester (see Step 1). If the coil is confirmed to be faulty, it must be replaced; the coil is a sealed unit and cannot therefore be repaired. Note that the HT leads can be removed from the coils and replaced separately.

Removal

8 Remove the seat (see Chapter 8) and disconnect the battery negative (-ve) lead. Remove the fuel tank (see Chapter 4).

9 The front coil is mounted on the frame behind the steering stem, and the rear coil is mounted on the frame behind the rear cylinder valve cover. Disconnect the primary circuit electrical connectors from the coils and disconnect the HT leads from the spark

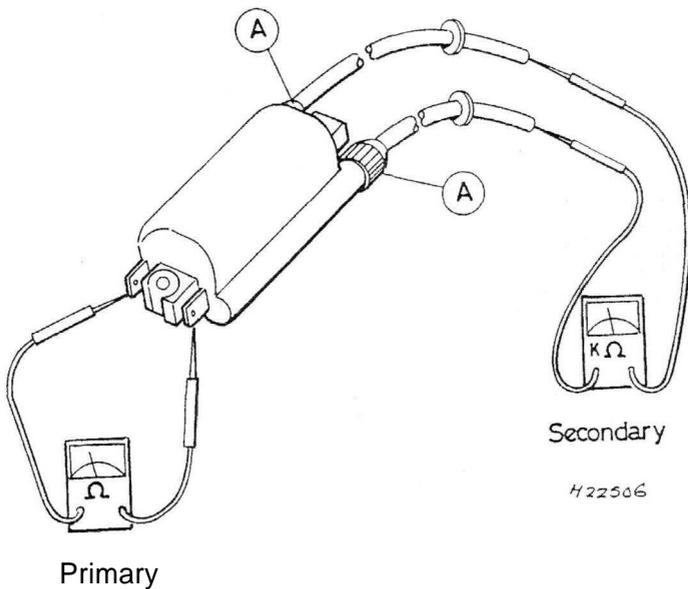
plugs. Mark the locations of all wires and leads before disconnecting them.

10 Unscrew the two bolts securing each coil to the frame and remove the coils (see illustrations 3.3a and 3.3b). Note the routing of the HT leads.

Installation

11 Installation is the reverse of removal. Make sure the wiring connectors and HT leads are securely connected.

4 Pulse generator coils - check, removal and installation



3.5 Ignition HT coil test connections

Release connectors (A) to make secondary winding test without plug leads

Check

1 Remove the seat (see Chapter 8) and disconnect the battery negative (-ve) lead.

2 Trace the pulse generator coil wiring back from the right-hand side crankcase cover and disconnect it at the white 4-pin connector. Using a multimeter set to the ohms x 100 scale, measure the resistance between the white/yellow and yellow wires (for the front cylinder coil) and then between the white/blue and blue wires (for the rear cylinder coil) on the pulse generator coil side of the connector.

3 Compare the reading obtained with that given in the Specifications at the beginning of this Chapter. The pulse generator coils must be replaced if the reading obtained differs greatly from that given, particularly if the meter indicates a short circuit (no measurable resistance) or an open circuit (infinite, or very high resistance).

4 If one or both pulse generator coils are thought to be faulty, first check that this is not due to a damaged or broken wire from the coil to the connector; pinched or broken wires can usually be repaired. Note that the pulse generator coils are not available individually but come as a pair.

5•4 Ignition system

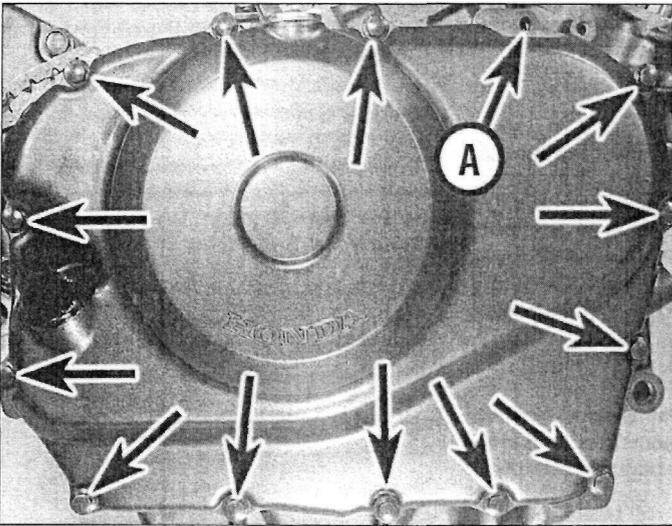
Removal

- 5 Remove the seat (see Chapter 8) and disconnect the battery negative (-ve) lead.
- 6 Trace the pulse generator coil wiring back from the right-hand side crankcase cover and disconnect it at the white 4-pin connector. Free the wiring from its guide on the right-hand frame downtube.
- 7 On J and K models, unscrew the external oil pipe lower bolt from the right-hand side crankcase cover, and the pipe holder bolt from the crankcase. Discard the lower bolt sealing washers as new ones must be used.
- 8 Working in a criss-cross pattern, evenly slacken the right-hand side crankcase cover retaining bolts, noting the position of the clutch cable bracket (see illustration). Lift the

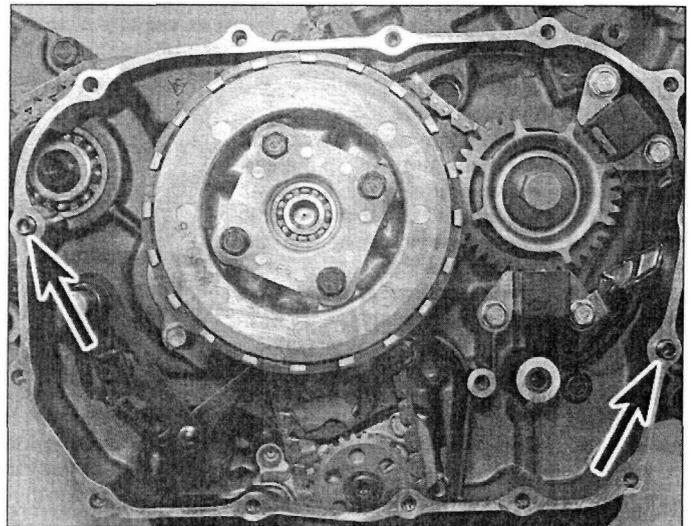
- cover away from the engine, being prepared to catch any residual oil which may be released as the cover is removed.
- 9 Remove the gasket and discard it. Note the positions of the two locating dowels fitted to the crankcase and remove them for safe-keeping if they are loose (see illustration). On J and K models, remove the oil orifice, noting which way round it fits, and discard its O-ring as a new one must be used.
 - 10 Unscrew the two bolts securing each coil, noting the position of the wiring guide plate on the lower coil (see illustration). Remove the rubber wiring grommet from its recess in the crankcase and remove the coil assembly.
 - 11 Examine the rotor for signs of damage and replace if necessary (see Chapter 2).

Installation

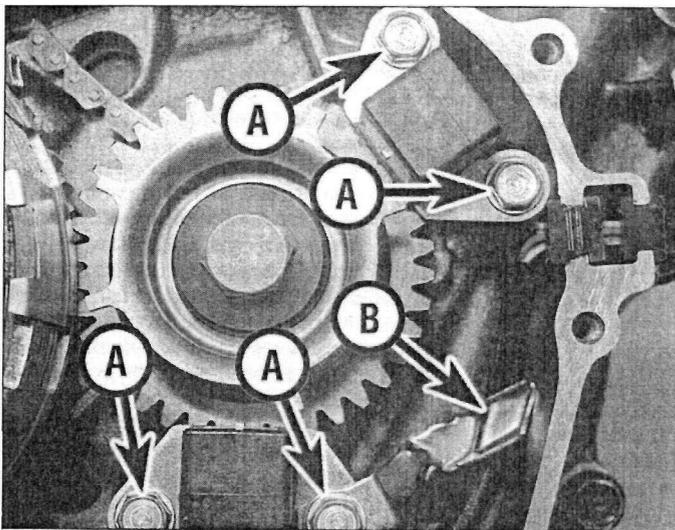
- 12 Install the pulse generator coil assembly onto the crankcase, making sure the wiring guide is correctly installed, and tighten the coil bolts securely (see illustration).
- 13 Apply a smear of sealant to the rubber wiring grommet before fitting it in its recess in the crankcase (see illustration).
- 14 Insert the dowels in the crankcase (see illustration 4.9). On J and K models, fit a new O-ring onto the oil orifice, then install the orifice into the crankcase with its larger diameter hole facing out. Install the crankcase cover using a new gasket and tighten its bolts evenly in a criss-cross sequence, making sure the clutch cable bracket is in its correct position (see illustration 4.8).



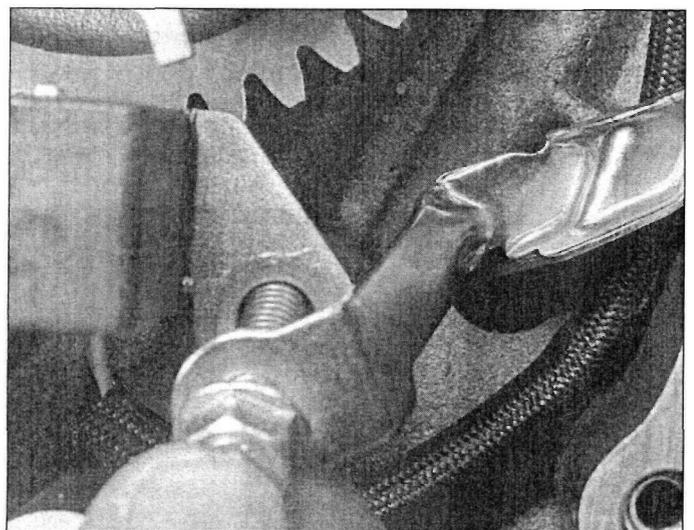
4.8 Right-hand crankcase cover bolts (arrows). Note the location of the cable bracket (A) (shown removed)



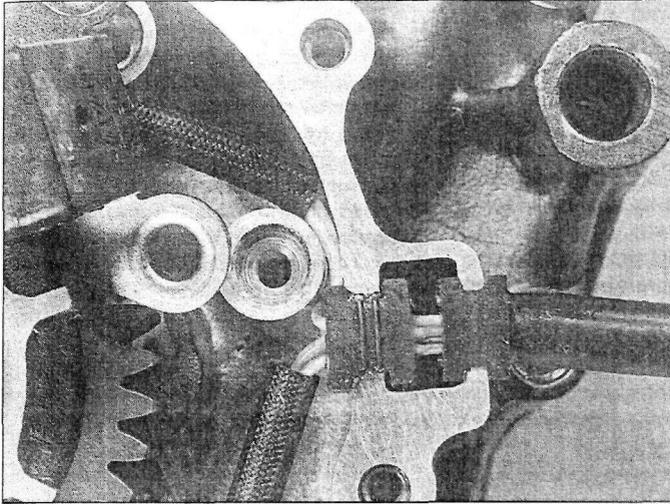
4.9 Note the position of the two dowels (arrows) and remove them if they are loose



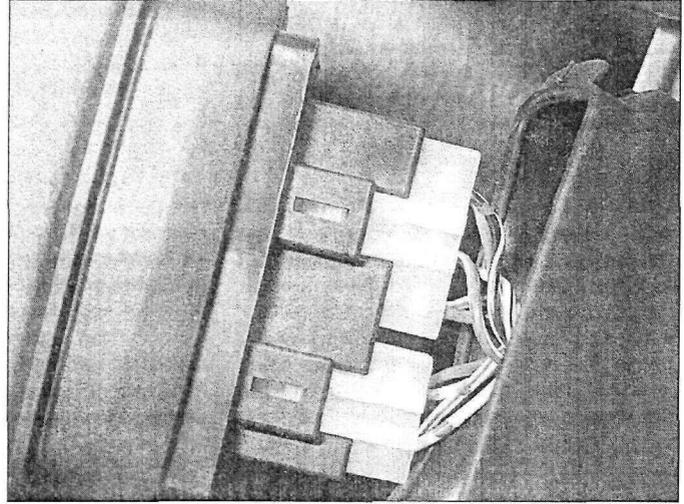
4.10 Pulse generator coil mounting bolts (A). Note the wiring guide (B)



4.12 Install the wiring guide as shown



4.13 Fit the rubber wiring grommet as shown



5.2 Pull back the rubber boot and disconnect the connectors from the ignition control unit

15 On J and K models, install the external oil pipe lower bolt, using new sealing washers, and the pipe holder bolt, and tighten them to the specified torque setting.

16 Route the wiring up to the connector and reconnect it. Secure the wiring in its guide on the right-hand frame downtube.

17 Reconnect the battery negative (-ve) lead and install the seat (see Chapter 8).

5 Ignition control unit - removal, check and installation

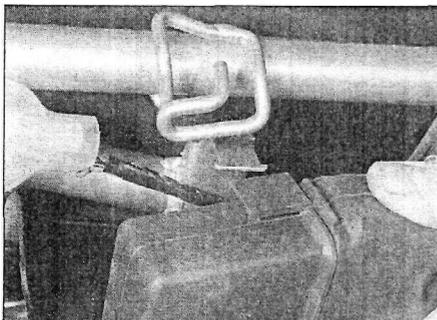
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Removal

1 Remove the seat (see Chapter 8) and disconnect the battery negative (-ve) lead.

2 Remove the rear cowl (see Chapter 8). Pull back the rubber boot covering the ignition control unit wiring connector and disconnect the connectors (see illustration).

3 Either withdraw the ignition control unit from its rubber sleeve, or remove the sleeve from its locating tabs with the unit inside (see illustration).



5.3 The ignition control unit rubber sleeve attaches to tabs on the frame

Check

4 If the tests shown in the preceding Sections have failed to isolate the cause of an ignition fault, it is likely that the ignition control unit itself is faulty. No test details are available with which the unit can be tested on home workshop equipment. Take the machine to a Honda dealer for testing on the diagnostic tester.

Installation

5 Installation is the reverse of removal. Make sure the wiring connector is securely connected and its rubber boot is in place.

6 Ignition timing - general information and check

6/2/89

General information

1 Since no provision exists for adjusting the ignition timing and since no component is subject to mechanical wear, there is no need for regular checks; only if investigating a fault

such as a loss of power or a misfire, should the ignition timing be checked.

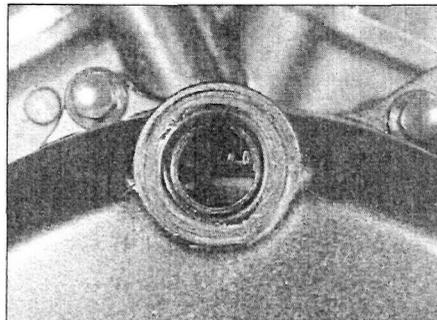
2 The ignition timing is checked dynamically (engine running) using a stroboscopic lamp. The inexpensive neon lamps should be adequate in theory, but in practice may produce a pulse of such low intensity that the timing mark remains indistinct. If possible, one of the more precise xenon tube lamps should be used, powered by an external source of the appropriate voltage. **Note:** Do not use the machine's own battery as an incorrect reading may result from stray impulses within the machine's electrical system.

Check

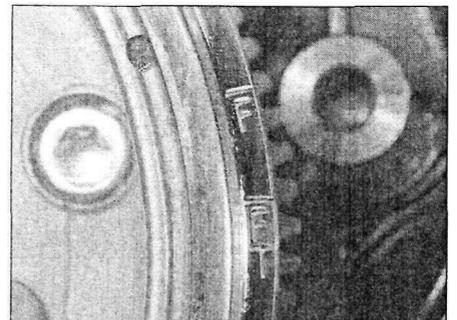
3 Warm the engine up to normal operating temperature then stop it.

4 Unscrew the timing mark inspection cap from the left-hand side crankcase cover (see illustration).

5 The timing mark on the rotor is an "F" which indicates the firing point at idle speed (note that each cylinder has its own "F" mark, that for the front cylinder being adjacent to the "FT" mark, that for the rear cylinder being adjacent to the "RT" mark) (see illustration). The static



6.4 Timing mark inspection hole



6.5 Front cylinder timing mark is represented by the scribed line next to the single F

5•6 Ignition system

timing mark with which this should align is a notch in the top of the inspection hole.

HINT	<i>The rotor timing mark can be highlighted with white paint to make it more visible under the stroboscope light.</i>
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6 Connect the timing light to the front cylinder HT lead as described in the manufacturer's instructions.

7 Start the engine and aim the light at the static timing mark.

8 With the machine idling at the specified speed, the timing F mark should align with the static timing mark.

9 Slowly increase the engine speed whilst observing the timing mark. The timing mark should move anti-clockwise, increasing in relation to the engine speed until it reaches the full advance point (no identification letter).

10 As already stated, there is no means of adjustment of the ignition timing on these

machines. If the ignition timing is incorrect, or suspected of being incorrect, one of the ignition system components is at fault, and the system must be tested as described in the preceding Sections of this Chapter.

11 When the check is complete, examine the condition of the timing mark inspection cap O-ring, replacing it if necessary, then smear some molybdenum disulphide grease onto the cap threads. Install the cap and tighten it to the torque setting specified at the beginning of the Chapter.