

Chapter 5 Ignition system

Note: Unless specifically mentioned in this Chapter, the information given for the 1982 750 Sabre applies to the UK VF750S-C, and that for the 1987 and 1988 700/750 Magnas applies to the UK VF750C-H and C-J respectively.

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Specifications

Firing order..... 1-2-3-4

Cylinder identification..... See illustration 1.1 in Chapter 2

Ignition timing

Initial (at 'F' mark)

1982 and 1983 750 Sabres, 1982 through 1984 700/750 Magna models	10° BTDC @ idle speed
1984 and 1985 700 Sabres, 1985 through 1988 700/750 Magna models	15° BTDC @ idle speed
1100 models.....	10° BTDC @ idle speed

Full advance

1982 through 1985 700/750 Sabres, 1982 through 1984 700/750 Magna models.....	37° BTDC @ 3,300 rpm
1985 and 1986 700 Magna models.....	37° BTDC @ 3,500 rpm
1987 and 1988 700/750 Magna models	40° BTDC @ 3,500 rpm
1100 models.....	37° BTDC @ 3,800 rpm

Pulse generators

Resistance

1982 through 1986 models.....	480 ohms ±10%
1987 and 1988 700/750 models	450 to 550 ohms
Air gap (1100 models).....	0.4 to 0.6 mm (0.016 to 0.024 in)

Ignition HT coils

Primary resistance

1985 and 1986 700 Magna models.....	2.0 ohms
1987 and 1988 700/750 Magna models	2.6 to 3.2 ohms
All other models	2.8 ohms

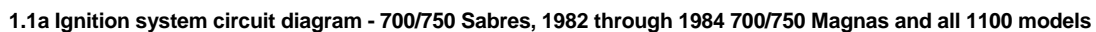
Secondary resistance (with plug caps on)

1985 and 1986 700 Magna models.....	29 to 40 K ohms
1987 and 1988 700/750 Magna models	21 to 29 K ohms
All other models	21 to 28 K ohms

Secondary resistance (with plug caps removed)

1985 and 1986 700 Magna models.....	20.6 to 27.4 K ohms
1987 and 1988 700/750 Magna models.....	13 to 17 K ohms
All other models	13.6 to 15.5 K ohms

Spark plugs..... See Chapter 1



- | | | |
|------------------------------|---------------------|-----------------|
| 7 Battery | 4 Pulse generators | 7 Spark plugs |
| 2 Ignition main (key) switch | 5 Spark units | 8 To tachometer |
| 3 Engine kill (stop) switch | 6 Ignition HT coils | |

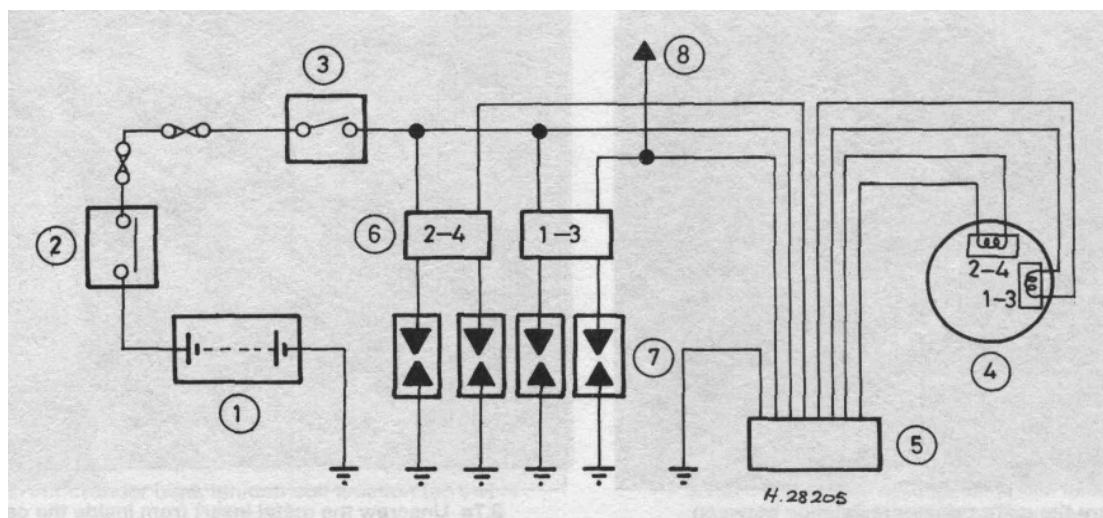
Each ignition HT coil supplies two spark plugs.

The rear cylinders (1 and 3) operate off one coil and the front cylinders (2 and 4) off the other. For any given cylinder, the plug is fired twice for every engine cycle, but one of the sparks occurs during the exhaust stroke and therefore performs no useful function. This arrangement is usually known as a 'spare spark' or "wasted spark" system. 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, can't be returned. To avoid unnecessary expense, make very sure the faulty component has been positively identified before buying a replacement part.

The raised trigger on the starter clutch body magnetically operates the pulse generator coils as the crankshaft rotates. The pulse generators transmit a signal to the spark unit(s) which then supplies the ignition coils with the power necessary to produce the spark at the plugs. The spark unit(s) advances the ignition electronically.

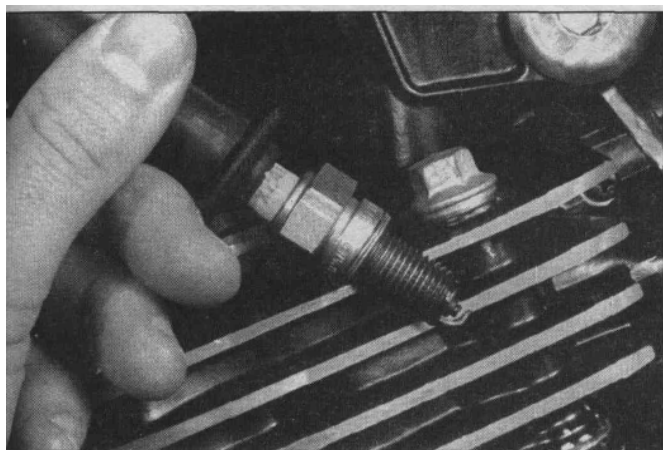


- | | | |
|------------------------------|---------------------|-----------------|
| 7 Battery | 4 Pulse generators | 7 Spark plugs |
| 2 Ignition main (key) switch | 5 Spark units | 8 To tachometer |
| 3 Engine kill (stop) switch | 6 Ignition HT coils | 9 To fuel pump |



1.1c Ignition system circuit diagram - 1987 and 1988 700/750 Magna models

- | | | |
|------------------------------|---------------------|-----------------|
| 1 Battery | 4 Pulse generators | 7 Spark plugs |
| 2 Ignition main (key) switch | 5 Spark units | 8 To tachometer |
| 3 Engine kill (stop) switch | 6 Ignition HT coils | |



2.2 Position the test spark plug so that its threads touch the cylinder head - hold it there with insulated pliers if necessary

2 Ignition system - check

Warning: The energy levels in electronic systems can be very high. On no account should the ignition be switched on while the plugs or plug caps are being held. Shocks from the secondary (HT) circuit can be most unpleasant. Secondly, it is vital that the plugs are soundly grounded (earthed) when the system is checked for sparking. The ignition system components can be seriously damaged if the secondary (HT) circuit becomes isolated. Refer to illustration 2.2

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.

2 Disconnect the wires from No.1 and No.2 cylinder spark plugs and connect each lead to a spare spark plug. Lay each plug on the engine with the threads contacting the engine (**see illustration**). If necessary, hold each spark plug with an insulated tool. **Warning:** Don't remove one of the spark plugs from the engine to perform this check - atomized 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, strong 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 Note that there are essentially two ignition circuits, one for cylinders 1 and 3, and another for cylinders 2 and 4. If one pair of cylinders is firing well, but the other isn't, only the components of that circuit must be tested. If one plug in a circuit is not firing correctly, but the other one is, the problem will probably lie in the plug cap or the wire. If the problem is occurring in all four plugs, the fault may be in the ignition switch, engine stop switch or the wiring leading to or from them. 5 Ignition faults can be divided into two categories, namely those where the ignition system has failed completely, and those 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 8).
- Faulty ignition or engine kill switch (see Chapter 8).
- Faulty gearchange/neutral/OD switch (see Chapter 8).
- Faulty pulse generators or damaged trigger.
- Faulty ignition HT coil(s).
- Faulty spark unit(s).

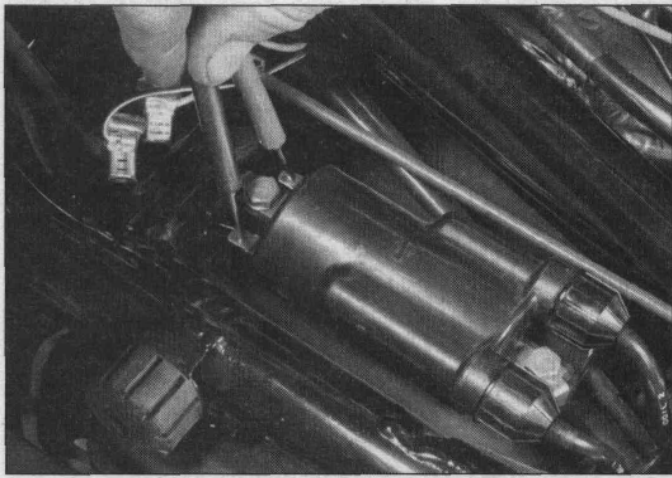
3 Ignition HT coils - check, removal and installation

Check

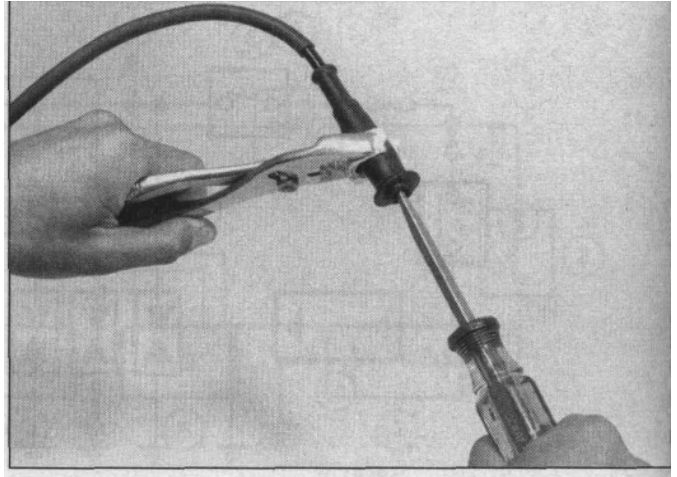
Refer to illustrations 3.5, 3.7a, 3.7b and 3.8

1 In order to determine conclusively that the ignition coils are defective, they should be tested by an authorized Honda dealer service department which is equipped with the special electrical tester required for this check.

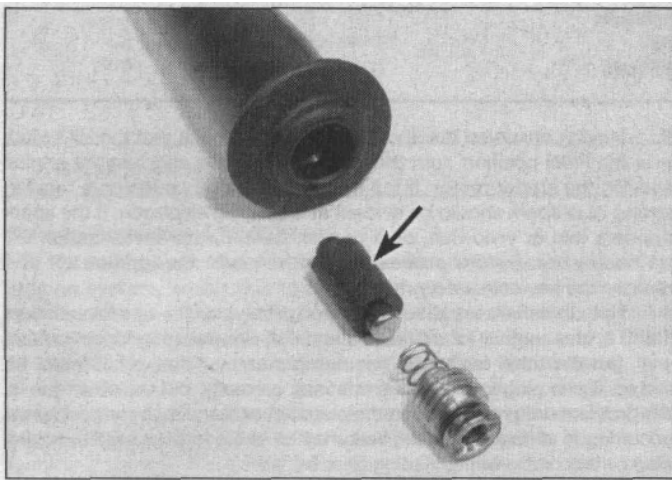
2 However, the coils can be checked visually (for cracks and other damage) and the primary and secondary coil resistances can be measured with an ohmmeter. If the coils are undamaged, and if the



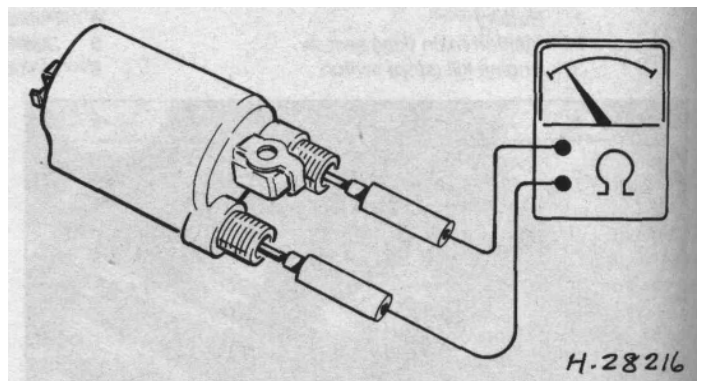
3.5 Measure the coil's primary resistance between the low tension terminals



3.7a Unscrew the metal insert from inside the cap .



3.7b ... to free the resistor (arrow) on 1982 through 1986 models



3.8 On 1987 and 1988 models, the secondary coil resistance can be measured directly at the high tension terminals

resistances are as specified, they are probably capable of proper operation.

3 To gain access to the coils, remove the fuel tank (see Chapter 4). Refer to Steps 12 through 15 and the wire colors (see *Wiring diagrams* at the end of this manual) to identify the coils for the front (2-4) and rear (1 -3) cylinders.

4 Disconnect the primary circuit electrical connectors from the coil and disconnect the HT lead caps from the plugs that are connected to the coil being checked. Mark the locations of all wires before disconnecting them.

5 Set the meter to the ohms x 1 scale and measure the resistance between the low tension terminals. This will give a resistance reading of the primary windings and should be within the limits given in the Specifications (**see illustration**).

6 To check the condition of the secondary windings, set the meter to the K ohm scale and connect the meter probes to the spark plug caps, noting the reading obtained. If this reading is not within the range shown in the Specifications, refer to Step 7 for all 1982 through 1986 models, or Step 8 for 1987 and 1988 700/750 Magna models.

7 Grip each plug cap in turn with pliers (use padding between the cap and pliers to prevent damage to the cap rubber body) and using a flat-bladed screwdriver, unscrew the metal insert from inside the cap. Slide out the resistor, then slide the rubber body of the cap back along the HT lead to expose the end of the lead (**see illustrations**). Measure the resistance between each HT lead end. If both values obtained

differ greatly from those specified it is likely that the coil is defective. **Note:** If only the first reading obtained is suspect, then the fault lies in the spark plug cap resistor rather than the coil or HT leads itself.

8 Unscrew the terminal nuts and detach the HT leads from the ignition coil. Measure the resistance between the coil terminals (**see illustration**). If both values differ greatly from those specified it is likely that the coil is defective. **Note:** If only the first reading obtained is suspect, then the fault lies in the HT leads/caps.

9 Should any of the above checks not produce the expected result, the coil should be taken to a Honda dealer or auto-electrician for a more thorough check. If the coil is confirmed to be faulty, it must be replaced; the coil is a sealed unit and cannot therefore be repaired.

Removal

Refer to illustrations 3.15a, 3.15b and 3.16

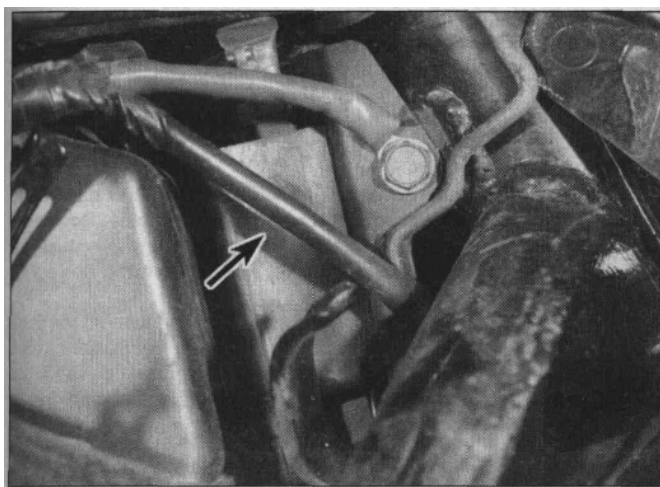
10 Remove the seat.

11 Remove fuel tank (see Chapter 4).

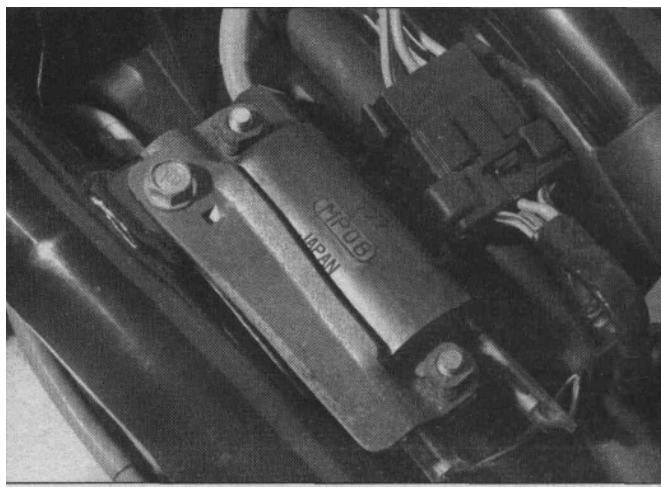
12 On the 1982 750 Sabre and 1982 through 1986 Magna models, the ignition coils are positioned side-by-side across the frame top tubes.

13 On 1983-on 700/750 Sabre models the coil for the front cylinders is mounted on a bracket on the left side of the machine (right side on California models), just to the rear of the radiator (remove the front side cover for access); the coil for the rear cylinders is mounted on the frame top tubes, near the fuel tank's rear mounting.

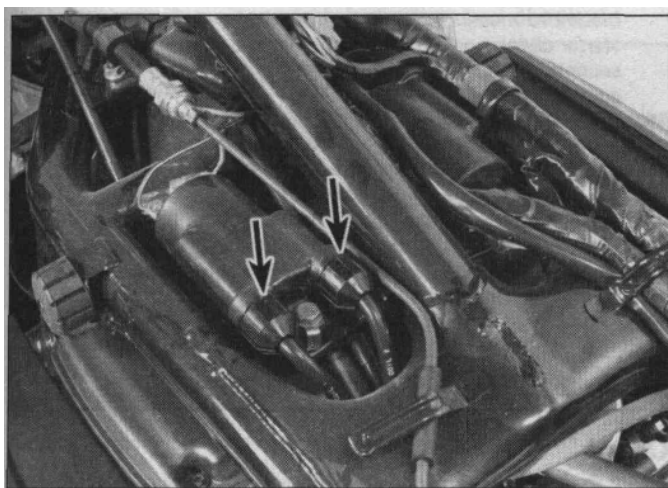
14 The 1100 Sabre's coils are mounted separately on the frame top tubes; the front coil controls the front cylinders and the rear coil controls the rear cylinders.



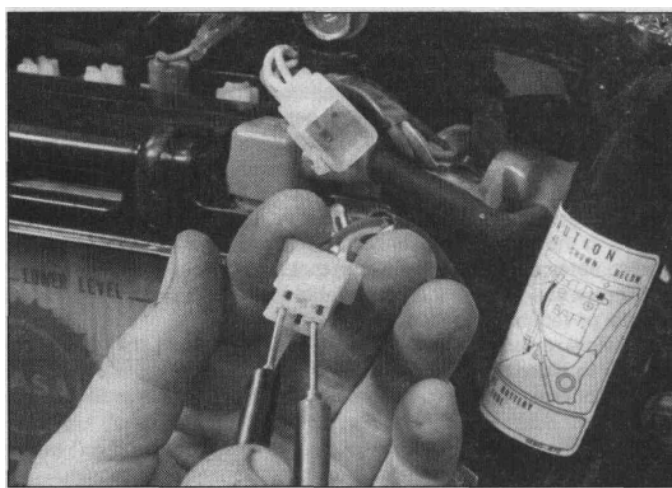
3.15a Front cylinder bank ignition coil location (arrow)...



3.15b ... and rear cylinder bank coil location on 1987 and 1988 700/750 Magnas



3.16 When removing the coil, unscrew the terminal nuts (arrows) to release the HT leads



4.2a Make tests on the engine side of the connector when measuring pulse generator coil resistance

15 On 1987-on Magna models the coil for the front cylinders is mounted on the right side of the steering head (remove plastic cover for access) and that for the rear cylinders is on the frame top tubes (see **illustrations**).

16 Disconnect the spark plug leads from the coil by unscrewing the terminal nuts (**see illustration**).

17 Disconnect the wires from the coil primary terminals, having made note of their original positions.

18 Remove the mounting bolts and lift the coil out.

Installation

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

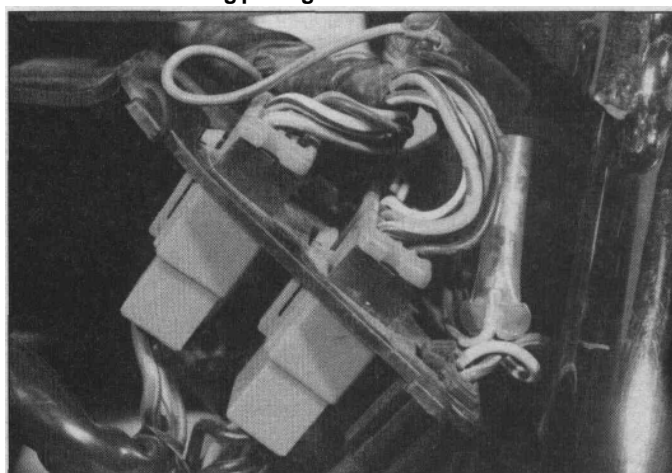
4 Pulse generators - check, removal and installation

Check

Refer to *illustrations 4.2a and 4.2b*

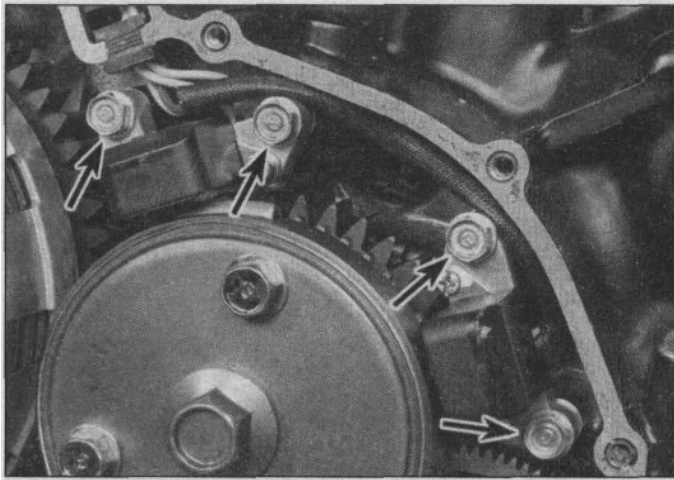
1 Remove the right side cover on 700/750 models and the fuel tank on 1100 models.

2 Trace the pulse generator wires up from the top of the right crankcase cover, and separate the wiring at the multi-pin connector (**see illustration**). Note that the oil pressure switch wire shares the



4.2b Pulse generator connector is located in electrical connector bracket on 1985-on models

same connector as the pulse generator coils on certain models. The connector on 1985-on 700/750 Magnas will be found pressed into the electrical components connector bracket (**see illustration**).



4.11 Pulse generator coils are retained by four bolts (arrows)

3 On all models except the 1985/86 700 Magnas, use a multimeter set to the ohms x 100 scale to measure the resistance between the white/yellow and yellow wires (cylinders 1 and 3) or white/blue and blue wires (cylinders 2 and 4) on the generator side of the connector. Carry out the same test on 1985/86 700 Magnas, but measure between the white/yellow and yellow/blue wires (cylinders 1 and 3) or white/blue and blue/yellow wires (cylinders 2 and 4).

4 Compare the reading obtained with that given in the Specifications at the start of this Chapter. Either coil 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).

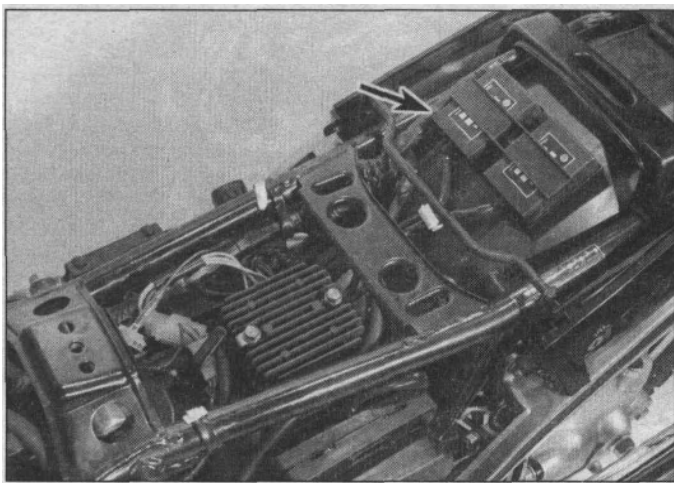
5 Before replacing a pulse generator coil, first check that the fault is not due to a damaged or broken wire from the coil to the connector; pinched or broken wires can usually be repaired.

Removal

Refer to illustration 4.11

6 Remove the right side cover on 700/750 models or the fuel tank on 1100 models, and disconnect the pulse generator wiring at the multi-pin connector.

7 Free the pulse generator wiring from any ties, noting that it may be necessary to disconnect the oil pressure switch wire on certain



5.4 Spark units (arrow) are mounted on rear fender on 700/750 Sabres, 1100 Magnas and early 700/750 Magnas

models.

8 On all models remove the rear brake pedal, and on 1100 Magna models also remove the right footpeg. Drain the engine oil (see Chapter 1).

9 Remove the right crankcase cover bolts. There are two different size bolts, so make a note of their location or store them in the old gasket when this has been removed.

10 Tap the crankcase cover gently with a soft-faced hammer to break the gasket seal, then pull it away from the engine. Do not pry between the gasket sealing surfaces, as damage and eventually oil leaks will occur. Discard the old gasket and remove the dowels for safekeeping if they are loose.

11 Remove the pulse generator mounting bolts and then lift the pulse generator and wiring harness out of position (see illustration). **Note:** On 700/750 models, do not remove the screws marked with white paint; these attach the generators to their brackets and should only be unscrewed if replacement is required.

Installation

12 Installation is the reverse of the removal procedure, noting the following:

- If the pulse generators were removed on 1100 models, use feeler blades to measure the air gap between each coil face and the starter clutch body. If outside of that specified (see Specifications section of this Chapter), loosen the coil bolts and reposition them accordingly.
- Ensure that the pulse generator wiring is routed away from the starter clutch gear and press the wiring grommet into the engine case.
- Be sure to use a new gasket when installing the engine side cover and check that the two dowels are in place.
- Fill the engine with oil to the proper level (see Chapter 1).
- If the pulse generator coils were disturbed, check the ignition timing (see Chapter 1).

5 Spark unit(s) - check, removal and installation

Check

1 If the tests shown in the preceding Sections have failed to isolate the cause of an ignition fault, it is likely that the spark unit(s) is faulty. No test details are provided by the manufacturer so the unit(s) can only be checked by the substitution of a known good replacement.

Removal

All 700/750 Sabre models, 1982 through 1984 700/750 Magna models and all 1100 Magna models

Refer to illustration 5.4

2 Remove the seat and disconnect the battery negative lead.

3 The spark units are mounted on the rear fender. Free the spark unit wiring from any clamps or ties and separate its multi-pin connectors.

4 On 700/750 Sabre models, remove the screw that retains the spark unit upper bracket (see illustration). Note that on the 1985 700 Sabre one of the spark units is situated under the right side cover.

5 Maneuver the spark units free.

1985 and 1986 700 Magna models

6 Remove the seat and the side covers. Disconnect the battery negative lead.

7 Separate the 6-pin and 4-pin connectors housed in the electrical components connector bracket. On the other side of the motorcycle, free the fuel pump from its mounting rubber and remove the screw to release the fuel filter retaining bracket (there's no need to disconnect the pump or filter).

8 Remove the toolbox mounting bolt and withdraw it together with the spark unit.

1987 and 1988 700/750 Magna models

Refer to illustration 5.10

) Remove the seat and the side covers. Disconnect the battery

10 Separate the 6-pin and 4-pin connectors housed in the electrical components connector bracket and lift the spark unit free (it is located at the front of the battery) (see illustration).

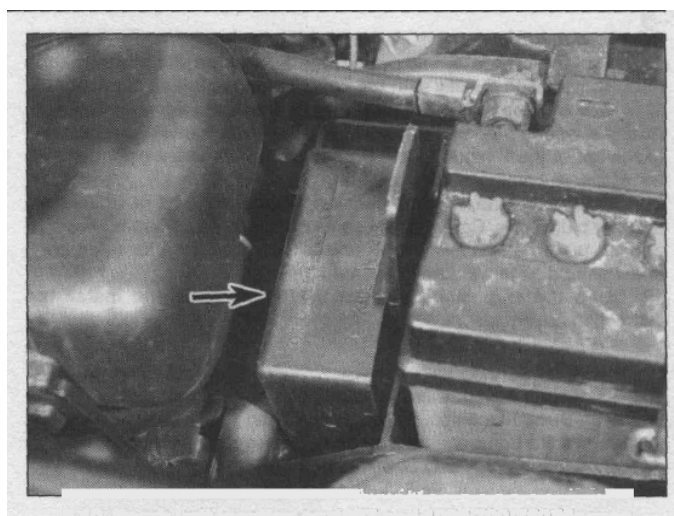
1100 Sabre models

11 Remove the seat and side covers. Disconnect the battery negative lead.

12 The spark units are mounted just to the rear of the fuel tank rear mounting point. Free the spark unit wiring from any clamps or ties and separate its multi-pin connectors. Maneuver the spark units free.

Installation

13 Installation is the reverse of removal ensuring that all wiring connections are correctly made. Reconnect the battery negative lead last.



5.10 Spark unit location on 1987 and 1988 700/750 Magnas

6 Ignition timing - general information and check**General information**

1 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 can only be checked while the engine is running using a stroboscopic (timing) light. The inexpensive neon amps 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**All 1982 through 1986 models**

Note: Access to the ignition timing marks necessitates removal of the alternator cover and some loss of engine oil. Honda supply a cover for certain models which has an inspection aperture for access to the timing marks and allows the task to be carried out without oil loss; its art number is 07998-MB00000 for 1100 Magnas, 07998-MB40000 for 100 Sabres and 1985/86 700 Magnas. Refer to illustration 6.7

Run the engine up to normal operating temperature then stop it.

Note: The idle speed must be correct for this check (see Chapter 1).

Place the motorcycle on its main stand.

Place a drain tray under the alternator cover, then remove its six retaining bolts and remove the alternator cover. Recover its gasket. Wipe any oil off the outside of the alternator rotor.

6 Remove the crankcase rear left cover.

7 Identify the timing marks on the rotor and casing (see illustration). The casing index mark is formed by the crankcase joint. It is advisable to highlight the timing marks with white paint to make them more distinct under the timing light.

8 If using the Honda replacement cover described above, install it at this stage. Note that the replacement cover has an index mark stamped in its aperture.

9 Connect the timing light to either of the rear cylinder plug leads. Start the engine and aim the timing light at the index mark on the casing.

10 With engine at idle speed the F mark on the rotor should align with the index mark. Increase engine speed to 3,500 rpm (1985 and 1986 700 Magnas) or 3,300 rpm (all 700/750 Sabres and earlier Magnas) or 3,800 rpm (all 1100 models) and check that the index mark

lies between the two full advance lines on the rotor. **Note:** Do not run the engine any longer than is necessary to complete this check. If significant oil loss occurs (due to the replacement cover not being used) stop the engine and top up the oil level.

11 Stop the engine, then connect the timing light to either of the front cylinder plug leads. Carry out the same check as described in Step 10, but note that the F mark and full advance lines for cylinders 2 and 4 should align with the index mark.

12 Stop the engine, disconnect the timing light and install the alternator cover using a new gasket. Top up the engine oil (see Chapter 1).

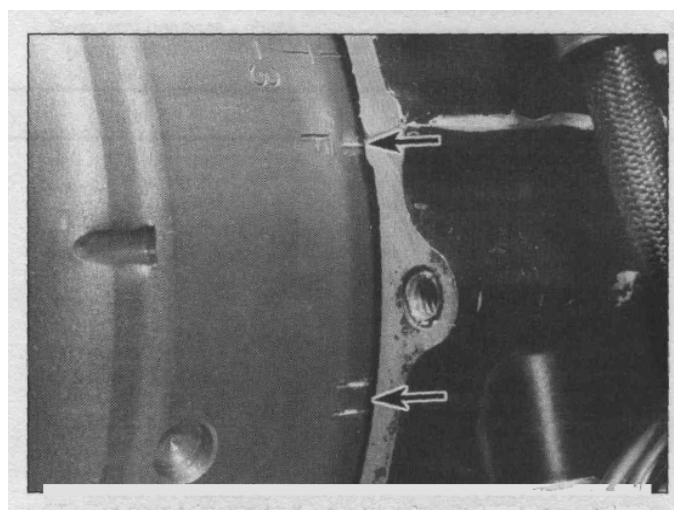
1987 and 1988 700/750 Magna models

Refer to illustration 6.16

13 Run the engine up to normal operating temperature then stop it. **Note:** The idle speed must be correct for this check (see Chapter 1).

14 Using a box wrench or socket, remove the circular inspection cover from the right crankcase cover (it may be very tight!).

15 Connect the timing light to either of the rear cylinder plug leads and start the engine. Aim the light at the index mark on the periphery of



6.7 Timing marks are on alternator rotor on 1982 through 1986 models - F mark at idle (upper arrow) and full advance mark (lower arrow)

the cover aperture.

16 With the engine at idle speed, the F mark on the starter clutch body should align exactly with the cover index mark (**see illustration**).

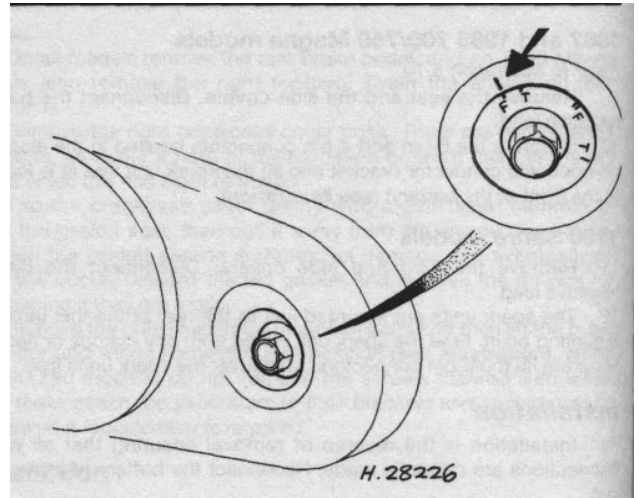
17 Raise engine speed to 3,500 rpm to check the advance function. At this speed the index mark should lie between the two parallel lines to the left of the F mark. **Note:** Do not run the engine any longer than necessary to complete this check.

18 Stop the engine, then connect the timing light to either of the front cylinder plug leads. Carry out the same check as described in Steps 16 and 17, but note that the F mark and full advance lines for cylinders 2 and 4 should align with the index mark.

19 Stop the engine, disconnect the timing light and install the inspection cover.

All models

20 As already stated, there is no means of adjustment of the ignition timing on these machines. If the ignition timing is incorrect one of the ignition system components is at fault, and system must be tested as described in the preceding Sections of this Chapter.



6.16 Ignition timing F mark aligned with casing index mark on 1987 and 1988 700/750 models