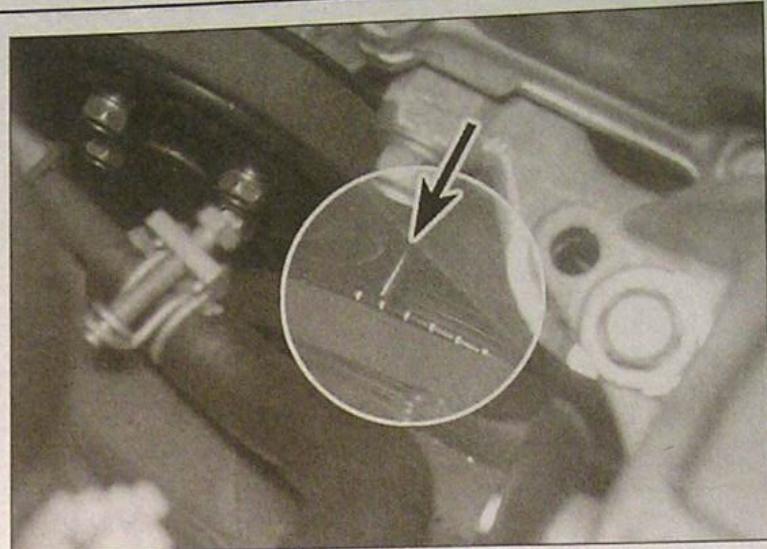


6.7 Disconnecting the power transistor wiring connector - 2.0 litre models



7.2 Crankshaft pulley TDC notch aligned with timing chain cover pointer (arrowed) - 2.0 litre model shown

#### 2.0 litre (Phase I and Phase II) models

6 The power transistor is mounted on the left-hand end of the cylinder head.

7 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual), then disconnect the wiring connector from the power transistor (see illustration).

8 Undo the retaining bolts, and remove the power transistor from the vehicle.

#### 2.0 litre (Phase III) models

9 On 2.0 litre (Phase III) fuel-injected models, the power transistor is an integral part of the distributor, and cannot be renewed separately. If the unit is faulty, the complete distributor body assembly must be renewed.

#### Refitting

10 Refitting is the reverse of removal.

### 7 Ignition timing - checking and adjustment



1 To check the ignition timing, a stroboscopic timing light will be required.

2 The timing marks are in the form of notches on the crankshaft pulley rim, which align with a pointer on the timing chain cover. The notches are spaced at intervals of 5°, and go from 20° before top dead centre (BTDC) to 5° after top dead centre (ATDC). The TDC mark

is highlighted with paint to aid identification (see illustration).

3 Start the engine, warm it up to normal operating temperature, and then switch off. Check the ignition timing as described under the relevant sub-heading.

#### Carburettor models

4 Disconnect the vacuum hose from the distributor vacuum diaphragm unit (non-catalyst models) or the boost pressure sensor (catalyst models), which is mounted on the left-hand suspension mounting turret. Plug the hose end.

5 Connect the timing light to No 1 cylinder (nearest the timing chain) plug lead as described in the timing light manufacturer's instructions.

6 Start the engine, allowing it to idle at the specified speed, and point the timing light at the crankshaft pulley. The relevant timing mark should be aligned with the pointer on the timing chain cover (see Specifications for the correct timing setting).

7 If adjustment is necessary, slacken the two distributor mounting bolts, then slowly rotate the distributor body as required until the crankshaft pulley marks are correctly positioned.



**Warning: At all times, avoid touching the HT leads, and keep loose clothing, long hair, etc, well away from the moving parts of the engine. Once the marks are correctly aligned, hold the distributor stationary, and tighten its**

**mounting bolts to the specified torque. Recheck that the timing marks are still correctly aligned and, if necessary, repeat the adjustment procedure.**

8 When the timing is correctly set, increase the engine speed, and check that the pulley mark advances to beyond the beginning of the timing plate reference marks, returning to close to the specified mark when the engine is allowed to idle; this shows that the centrifugal advance mechanism is functioning, but a detailed check must be left to a Nissan dealer.

9 Reconnect the vacuum hose to the distributor (non-catalyst models) or boost pressure sensor (catalyst models). Check that the timing advances by the correct amount, so that the crankshaft pulley timing marks are correctly positioned (refer to the Specifications for the correct timing setting). If not, it is likely that the vacuum diaphragm unit/boost pressure sensor (as applicable) is faulty, or that the vacuum hose is leaking.

10 When the ignition timing is correct, stop the engine and disconnect the timing light.

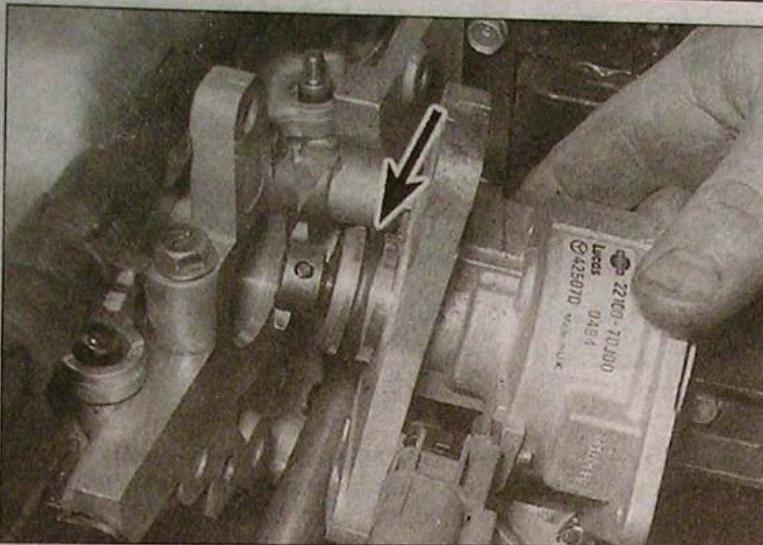
#### Fuel-injected models

11 Disconnect the wiring connector from the throttle potentiometer (see the relevant Part of Chapter 4).

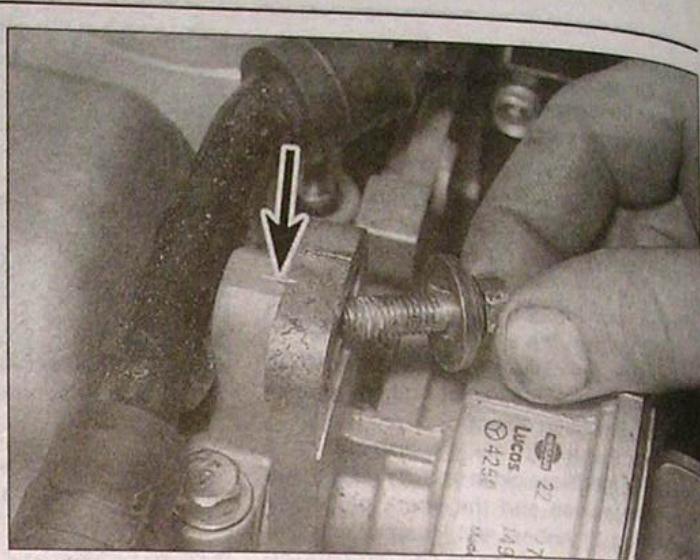
12 Check and adjust the ignition timing as described above in paragraphs 5 to 7.

13 When the ignition timing is correctly set, stop the engine and disconnect the timing light.

14 Reconnect the throttle potentiometer wiring connector.



4.7 Fit a new O-ring (arrowed) and refit the distributor, aligning its drive coupling with the camshaft slot



4.8 Align the marks made prior to removal (arrowed), and refit the distributor mounting bolts

the cylinder head, whilst rotating the rotor arm slightly to ensure that the coupling is correctly engaged (see illustration).

8 Align the marks noted or made on removal, and install the distributor retaining nuts/bolts (as applicable), tightening them lightly only (see illustration).

9 Ensure that the seal is correctly located in its groove, then refit the cap assembly to the distributor and tighten its retaining screws securely (see illustrations). Fold the waterproof cover back over the distributor cap, ensuring that it is correctly located.

10 Reconnect the distributor wiring connector (see illustration) and, where necessary, the vacuum hose to the diaphragm unit.

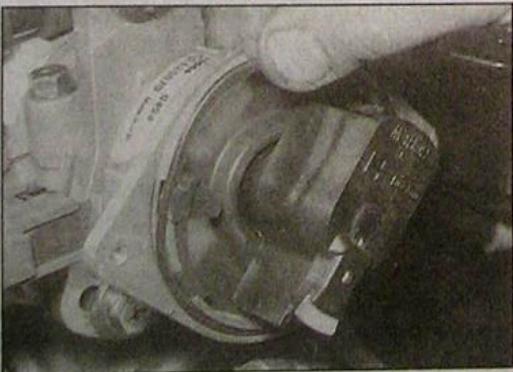
11 Check and, if necessary, adjust the ignition timing as described in Section 7, then tighten the distributor mounting bolts to the specified torque.

## 5 IC ignition unit (carburettor models without a catalytic converter) - removal and refitting



### Removal

1 Remove the distributor as described in Section 4.



4.9a Fit the seal to the distributor body . . .

2 Undo the retaining screw and remove the rotor arm.

3 Using a dab of paint or suitable marker pen, make an identification mark on the top of the distributor toothed reluctor. The mark can then be used to ensure that the reluctor is installed the right way up.

4 Slide the reluctor off the distributor shaft, and recover the roll pin. If necessary, the rotor can be drawn off using a suitable legged puller.

5 Carefully disconnect the wiring connectors from the ignition unit, noting each wire's correct fitted position.

6 Undo the retaining screws, and remove the IC ignition unit from the distributor.

### Refitting

7 Install the IC ignition unit, and securely tighten its retaining screws.

8 Connect the wires to their original locations, taking care not to damage the unit terminals.

9 Using the mark made on removal, ensure that the toothed reluctor is positioned the correct way up, and slide it onto the distributor shaft. Align it with the shaft, and secure the reluctor in position with the roll pin.

10 Refit the rotor arm, and securely tighten its retaining screw.



4.9b . . . then refit the cap and securely tighten its retaining screws

11 Refit the distributor as described in Section 4.

## 6 Ignition power transistor unit - removal and refitting



### Removal

#### Carburettor models with a catalytic converter

1 The power transistor unit is situated in the engine compartment, mounted onto the left-hand suspension mounting turret.

2 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

3 Disconnect the wiring connector from the power transistor.

4 Undo the retaining bolts, and remove the power transistor from the vehicle.

#### 1.6 litre fuel-injected models

5 On 1.6 litre fuel-injected models, the power transistor is an integral part of the distributor, and cannot be renewed separately. If the unit is faulty, the complete distributor body assembly must be renewed.



4.10 Connecting the distributor wiring connector

## 1 Ignition system - general information

### Carburettor models without a catalytic converter

On these models, a breakerless electronic ignition system is used. The system comprises solely of the HT ignition coil and the distributor, both of which are mounted on the left-hand end of the cylinder head, the distributor being driven off the end of the exhaust camshaft.

The distributor contains a toothed reluctor mounted onto its shaft, and the IC ignition unit which is fixed to its body. The system operates as follows.

When the ignition is switched on but the engine is stationary, the IC ignition unit prevents current flowing through the ignition system primary (LT) circuit.

As the crankshaft rotates, the reluctor moves through the magnetic field created by the IC ignition unit. When the reluctor teeth are correctly positioned, a small AC voltage is created. The IC ignition unit uses this voltage to switch and complete the ignition system primary (LT) circuit.

As the reluctor teeth move out of alignment, the AC voltage changes, and the IC ignition unit switches again to interrupt the primary (LT) circuit. This causes a high voltage to be induced in the coil secondary (HT) windings, which then travels down the HT lead to the distributor and onto the relevant spark plug.

In addition to the components described above, an ignition timing retard system is also used. The system is controlled by the thermal vacuum valve (TVV) which is screwed into the right-hand end of the inlet manifold. The TVV is fitted in the vacuum pipe linking the distributor vacuum diaphragm unit to the inlet manifold. When the engine is cold (coolant temperature below 40°C), the TVV cuts off the main vacuum supply. The only vacuum supply to the distributor diaphragm is through the vacuum delay valve (VDV), which contains a restrictor, and therefore the ignition advance is reduced. When engine has warmed up (coolant temperature between 40° and 50°C) the TVV opens the main vacuum supply to the diaphragm.

### Carburettor models with a catalytic converter, and all fuel-injected models

On these models, the ignition system is integrated with the fuel system, to form a combined fuel/ignition system which is controlled by the ECC control unit (carburettor models) or ECCS control unit (fuel-injected models) (see the relevant Part of Chapter 4 for further information on the fuelling side of the system).

The distributor contains a crank angle sensor, or camshaft position sensor, which

informs the control unit of engine speed and crankshaft position. Based on this information, and the information received from its other sensors, the control unit then calculates the correct ignition timing setting, and switches the power transistor unit on and off accordingly. This causes a high voltage to be induced in the coil secondary (HT) windings, which then travels down the HT lead to the distributor and onto the relevant spark plug.

On 2.0 litre models, a knock sensor is incorporated into the ignition system. The sensor is mounted onto the rear of the cylinder block, and prevents the engine 'pinking' under load. The sensor is sensitive to vibration, and detects the knocking which occurs when the engine starts to 'pink' (pre-ignite). The knock sensor sends an electrical signal to the control unit, which in turn retards the ignition advance setting until the 'pinking' ceases.

**Note:** In certain Sections of this Chapter references are made to Phase I, Phase II and Phase III models according to year of production. This classification has been necessary where modifications to the model range affect the repair procedure being described. The Phases relate to the model years as follows:

Phase I - 1990 to June 1993

Phase II - June 1993 to October 1996

Phase III - October 1996 to September 1999

## 2 Ignition system - testing

component, and work methodically to eliminate all other possibilities before deciding that a particular component is faulty.

2 The old practice of checking for a spark by holding the live end of an HT lead a short distance away from the engine is not recommended; not only is there a high risk of a powerful electric shock, but the HT coil or power transistor unit will very likely be damaged. Similarly, never try to 'diagnose' misfires by pulling off one HT lead at a time.

### Engine will not start

3 If the engine either will not turn over at all, or only turns very slowly, check the battery and starter motor. Connect a voltmeter across the battery terminals (meter positive probe to battery positive terminal), then disconnect the ignition coil HT lead from the distributor cap and earth it. Note the voltage reading obtained while turning over the engine on the starter for (no more than) ten seconds. If the reading obtained is less than approximately 9.5 volts, first check the battery, starter motor and charging system as described in the relevant Sections of Part A of this Chapter.

4 If the engine turns over at normal speed but will not start, check the HT circuit by connecting a timing light (following the equipment manufacturer's instructions) and turning the engine over on the starter motor; if the light flashes, voltage is reaching the spark plugs, so these should be checked first. If the light does not flash, check the HT leads themselves, followed by the distributor cap, carbon brush and rotor arm using the information given in Chapter 1.

5 If there is a spark, check the carburettor, referring to Chapter 4A for further information.

6 If there is still no spark, check the voltage at the ignition HT coil '+' terminal; it should be the same as the battery voltage (ie, at least 11.7 volts). If the voltage at the coil is more than 1 volt less than that at the battery, check the feed back through the fusebox and ignition switch to the battery and its earth until the fault is found.

7 If the feed to the HT coil is sound, check the coil's primary and secondary winding resistance as described later in this Section; renew the coil if faulty, but carefully check the condition of the LT connections themselves before doing so, to ensure that the fault is not due to dirty or poorly-fastened connectors.

8 If the HT coil is in good condition, the fault is probably within the IC ignition unit. Testing of the unit should be entrusted to a Nissan dealer.

9 The ignition timing retard system thermal vacuum valve (TVV) can be checked as described for similar components in Part D of Chapter 4. Check the vacuum delay valve (VDV) by blowing through it from both sides of the valve. The valve should pass air freely when blown through from the distributor side of the valve, but resistance should be felt when air is blown through from the



**Warning: Voltages produced by an electronic ignition system are considerably higher than those produced by conventional ignition systems. Extreme care must be taken when working on the system with the ignition switched on. Persons with surgically-implanted cardiac pacemaker devices should keep well clear of the ignition circuits, components and test equipment**

### Carburettor models without a catalytic converter

**Note:** Refer to the warning given in Section 1 of Part A of this Chapter before starting work. Always switch off the ignition before disconnecting or connecting any component, and when using a multi-meter to check resistances.

#### General

1 The components of electronic ignition systems are normally very reliable; most faults are far more likely to be due to loose or dirty connections, or to 'tracking' of HT voltage due to dirt, dampness or damaged insulation, than to the failure of any of the system's components. Always check all wiring thoroughly before condemning an electrical

# Chapter 5 Part B:

## Ignition system

### Contents

Distributor - removal and refitting .....	4	Ignition system - general information .....	1
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Ignition HT coil - removal, testing and refitting .....	3	Ignition system check .....	See Chapter 1
Ignition power transistor unit - removal and refitting .....	6	Ignition timing - checking and adjustment .....	7
		Spark plug renewal .....	See Chapter 1

### 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

#### System type

Carburettor models without a catalytic converter (non-catalyst models) .....	Breakerless electronic ignition
Carburettor models with a catalytic converter (catalyst models) .....	Breakerless electronic ignition controlled by ECC control unit
Fuel-injected models .....	Breakerless electronic ignition controlled by ECCS control unit

#### Firing order

1-3-4-2 (No 1 cylinder at timing chain end)

#### Ignition timing

Carburettor non-catalyst models:	
Distributor vacuum hose disconnected and plugged .....	2° ± 2° BTDC at 750 ± 50 rpm
Distributor vacuum hose connected .....	10° ± 5° BTDC at 750 ± 50 rpm
Carburettor catalyst models:	
Boost pressure sensor hose disconnected and plugged .....	2° ± 2° BTDC at 750 ± 50 rpm
Boost pressure sensor hose connected .....	10° ± 2° BTDC at 750 ± 50 rpm
1.6 litre fuel-injected models .....	10° ± 2° BTDC at 700 ± 50 rpm
2.0 litre models .....	15° ± 2° BTDC at 800 ± 50 rpm

#### Ignition coil

Ignition HT coil resistances: <sup>*</sup>	
1.6 litre fuel-injected models:	
Primary windings .....	2.0 ohms
Secondary windings .....	12.0 kilohms
All other models:	
Primary windings .....	1.0 ohm
Secondary windings .....	10.0 kilohms

<sup>\*</sup>The above results are approximate values, and are accurate only when the coil is at 20°C.  
See text for further information.

#### Torque wrench settings

Distributor mounting bolts:	Nm	lbf ft
1.6 litre models .....	8	5
2.0 litre models .....	15	11

carburettor side of the valve; if not, renew the VDV. On refitting, ensure that the valve is installed the correct way round, with its brown side facing the carburettor.

#### Engine misfires

10 An irregular misfire suggests either a loose connection or intermittent fault on the primary circuit, or an HT fault on the coil side of the rotor arm.

11 With the ignition switched off, check carefully through the system, ensuring that all connections are clean and securely fastened. If the equipment is available, check the LT circuit as described above.

12 Check that the HT coil, the distributor cap and the HT leads are clean and dry. Check the leads themselves and the spark plugs (by substitution, if necessary), then check the distributor cap, carbon brush and rotor arm as described in Chapter 1.

13 Regular misfiring is almost certainly due to a fault in the distributor cap, HT leads or spark plugs. Use a timing light (paragraph 4 above) to check whether HT voltage is present at all leads.

14 If HT voltage is not present on any particular lead, the fault will be in that lead, or in the distributor cap. If HT is present on all leads, the fault will be in the spark plugs; check and renew them if there is any doubt about their condition.

15 If no HT is present, check the HT coil; its secondary windings may be breaking down under load.

#### Carburettor models with a catalytic converter, and all fuel-injected models

16 If a fault appears in the ignition system, first ensure that the fault is not due to a poor electrical connection or poor maintenance; ie, check that the air cleaner filter element is clean, that the spark plugs are in good condition and correctly gapped, that the engine breather hoses are clear and undamaged, referring to Chapter 1 for further information. Also check that the accelerator cable is correctly adjusted, as described in the relevant Part of Chapter 4. If the engine is running very roughly, check the compression pressures and, where possible, the valve clearances, as described in the relevant Part of Chapter 2.

17 The only ignition system checks which can be carried out by the home mechanic are those described in Chapter 1, relating to the spark plugs, and the ignition coil test described in this Chapter. If necessary, the system wiring and wiring connectors can be checked as described in Chapter 12, ensuring that the control unit wiring connector(s) have first been disconnected.

18 On fuel-injected models, a quick check of the system can be carried out using the control unit self-diagnosis mode (see Chapter 4B, Section 12).



3.2a Disconnect the HT lead ...



3.2b ... and wiring connector from the ignition coil ...

19 If the above checks fail to reveal the cause of the problem, the vehicle should be taken to a suitably-equipped Nissan dealer for testing.

### 3 Ignition HT coil - removal, testing and refitting



#### Removal

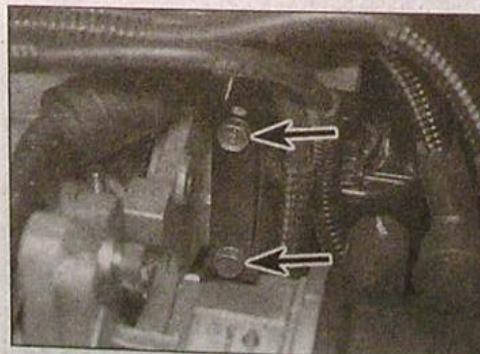
1 The ignition coil is mounted on the left-hand end of the cylinder head. Prior to removal, disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

2 Disconnect the HT lead from the coil, then depress the retaining clip and disconnect the coil wiring connector (see illustrations).

3 Slacken and remove the two retaining bolts, and remove the coil from its mounting bracket on the cylinder head (see illustration).

#### Testing

4 Testing of the coil consists of using a multimeter set to its resistance function, to check the primary (LT '+' to '-' terminals) and secondary (LT '+' to HT lead terminal) windings for continuity. Compare the results obtained to those given in the Specifications at the start of this Chapter. Note that the resistance of the coil windings will vary slightly according to the coil temperature - the results in the Specifications are approximate values for when the coil is at 20°C.



3.3 ... then undo the two bolts (arrowed) and remove the coil from its mounting bracket (2.0 litre model shown)

5 Check that there is no continuity between the HT lead terminal and the coil body.

6 If the coil is thought to be faulty, have your findings confirmed by a Nissan dealer before renewing the coil.

#### Refitting

7 Refitting is a reversal of the relevant removal procedure, ensuring that the wiring connector and HT lead are securely reconnected.

### 4 Distributor - removal and refitting



#### Removal

1 Disconnect the battery negative terminal (refer to *Disconnecting the battery* in the Reference Section of this manual).

2 Unclip the cover (where fitted), then slacken and remove the distributor cap retaining screws. Remove the cap, position it clear of the distributor body, and recover the cap seal.

3 Depress the retaining clip, and disconnect the wiring connector(s) from the distributor.

4 Where necessary, disconnect the hose from the vacuum diaphragm unit.

5 Check the cylinder head and distributor flange for signs of alignment marks. If no marks are visible, using a scribe or suitable marker pen, mark the relationship of the distributor body to the cylinder head. Slacken and remove the two mounting bolts, and withdraw the distributor from the cylinder head. Remove the O-ring from the end of the distributor body and discard it; a new one must be used on refitting.

#### Refitting

6 Lubricate the new O-ring with a smear of engine oil, and fit it to the groove in the distributor body. Examine the distributor cap seal for wear or damage, and renew if necessary.

7 Align the distributor rotor shaft drive coupling key with the slots in the camshaft end, noting that the slots are offset to ensure that the distributor can only be fitted in one position. Carefully insert the distributor into