# Chapter 4 Ignition system

**Contents**



**Specifications**

| | |
|---|---|
| **System** | |
| Early 1500 | 6 volt negative earth. Coil ignition |
| All other models | 12 volt negative earth. Coil ignition |
| **Firing order** | 1 - 3 - 4 - 2 |
| **Distributor** | |
| Type: | |
| All models except 1502, 2002 TI and 2002 TII | Bosch IFUR 4 |
| 1502 | Bosch JF4D4 |
| 2002 TI | Bosch IFR 4 |
| 2002 TII | Bosch IFDR 4 |
| Rotational direction | Clockwise |
| Contact breaker gap | 0.016 in. (0.4 mm) |
| Dwell angle: | |
| 1500/1600 | 59 to 61° |
| 1502 | 59 to 65° |
| 1602 | 61 to 65° |
| 2000/2002 except TI | 59 to 65° |
| 2002 TI | 59 to 61° |
| Static ignition timing: | |
| All models except 2002 TI and 2002 TII | 3° BTDC |
| 2002 TI and 2002 TII | TDC |
| Dynamic ignition timing: | |
| All models except 1502, 2002 TI and 2002 TII | 25° BTDC @ 1400 rpm |
| 1502 | 25° BTDC @ 1900 rpm |
| 2002 TI | 25° BTDC @ 2200 rpm |
| 2002 TII | 25° BTDC @ 2400 rpm |
| 2002 with emission control and air pump | 25° BTDC @ 2000 rpm |
| Maximum centrifugal advance: | |
| 1500/1600/1602 | 18° |
| 2002 | 16° |
| 2002 (automatic transmission) | 2 to 6° |
| 2002 TI and TII | 16° |
| Maximum vacuum advance: | |
| All models except 1502 | 4 to 6° |
| 1502 | 10° |

Ignition advance (engine at operating temperature, vacuum pipe disconnected):

| Rpm | 1502 | 1500/1600/1602 | 2002 |
|---|---|---|---|
| 1000 | 5 to 10° | 23 to 27° | 21 to 25° |
| 1500 | — | 25 to 29° | 26 to 30° |
| 2000 | 26 to 30° | 30 to 34° | 31 to 35° |
| 2500 | 32 to 37° | 34 to 38° | 36 to 40° |
| 2700 | — | — | 38 to 42° |
| 3000 | 34 to 38° | 38 to 42° | — |
| 3500 | — | 40 to 44° | — |
| 3800 | — | 42 to 46° | — |
| 4000 | 38 to 45° | — | — |

| Rpm | 2002 Auto. transmission | 2002 TI | 2002 TII |
|---|---|---|---|
| 1000 | 11 to 15° | 18 to 22° | 2 to 7° |
| 1500 | 17 to 21° | 23 to 27° | 12 to 17° |
| 2000 | 23 to 27° | 28 to 32° | 18 to 22° |
| 2500 | 30 to 33° | 33 to 37° | 24 to 28° |
| 2700 | — | 35 to 39° | — |
| 3000 | 37 to 41° | — | 28 to 32° |
| 3500 | 41 to 45° | — | 30 to 34° |
| 3800 | 42 to 46° | — | — |
| 4000 | — | — | — |
| Vacuum advance starts between | | 4.72 and 5.91 in Hg. (120.0 and 150.0 mm Hg) | |
| Vacuum advance ends between | | 7.68 and 8.27 in Hg. (195.0 and 210.0 mm Hg) | |

33° @ 2000

## Coil

| | |
|---|---|
| Type: | |
| 1500 | |
| Early 6V | Bosch TE6B4 |
| Later 12V | Bosch TE12V |
| 1502/1600/1602 | Bosch TE12V |
| 2002 | Bosch KW12V |
| 2002 (automatic transmission) | Bosch KW12V |
| 2002 TI and 2002 TII | Bosch K12V |

Check Cap + Rotor

13/16" Socket

## Condenser

| | |
|---|---|
| Capacity | 0.23 to 0.32 uf |

Plugs
NGK BP6ES

## Spark plugs

| Type: | 1502 | 1500/1600/1602 | 2002 | 2002 Auto. Transmission | 2002 TI | 2002 TII |
|---|---|---|---|---|---|---|
| Bosch | W145T30 | W200T30 | W200T30<br>W175T30* | W200T30<br>W175T30* | W200T30 | WG200T30<br>W175T30* |
| Beru | — | 200/14/3A | 200/14/3A<br>175/14/3A* | 200/14/3A<br>175/14/3A* | 200/14/3A | G200/14/3<br>175/14/3A* |
| Champion | — | N8Y | N8Y<br>N9Y* | N9Y | N8Y | N9Y |

** Used with 9.5 : 1 compression ratio and in engines with redesigned combustion chambers marked E12 on cylinder head.*

| | |
|---|---|
| Spark plug gap | 0.024 to 0.028 in (0.6 to 0.7 mm) |

0,033

## Torque wrench settings

| | lb/ft | Nm |
|---|---|---|
| Spark plugs | 22 | 30 |

## 1 General description

In order that the engine can run correctly it is necessary for an electrical spark to ignite the fuel/air mixture in the combustion chamber at exactly the right moment in relation to engine speed and load. The ignition system is based on feeding low tension (LT) voltage from the battery to the coil where it is converted to high tension (HT) voltage. The high tension voltage is powerful enough to jump the spark plug gap in the cylinders many times a second under high compression pressures, providing that the system is in good condition and that all adjustments are correct.

The ignition system is divided into two circuits. The low tension circuit and the high tension circuit.

The low tension (sometimes known as the primary) circuit consists of the battery lead to the control box, lead to the ignition switch, lead from the ignition switch to the low tension or primary coil windings (terminal +), and the lead from the low tension coil windings (coil terminal −) to the contact breaker points and condenser in the distributor.

The high tension circuit consists of the high tension or secondary coil windings, the heavy ignition lead from the centre of the coil to the centre of the distributor cap, the rotor arm, and the spark plug leads and spark plugs.

The system functions in the following manner. Low tension voltage is changed in the coil into high tension voltage by the opening and closing of the contact breaker points in the low tension circuit. High tension voltage is then fed via the carbon brush in the centre of the distributor cap to the rotor arm of the distributor cap, and each time it comes in line with one of the four metal segments in the cap, which are connected to the spark plug leads, the opening and closing of the contact breaker points causes the high tension voltage to build up, jump the gap from the rotor arm to the appropriate metal segment and so via the spark plug lead to the spark plug, where it finally jumps the spark plug gap before going to earth.

The ignition is advanced and retarded automatically, to ensure the spark occurs at just the right instant for the particular load at the prevailing engine speed.

The ignition advance is controlled both mechanically and by a vacuum operated system. The mechanical governor mechanism comprises two weights, which move out from the distributor shaft as the engine speed rises due to centrifugal force. As they move outwards they rotate the cam relative to the distributor shaft, and so advance the spark. The weights are held in position by two light springs and it is the tension of the springs which is largely responsible for correct spark advancement.

The vacuum control consists of a diaphragm, one side of which is connected via a small bore tube to the carburettor, and the other side to the contact breaker plate. Depression in the inlet manifold and carburettor, which varies with engine speed and throttle opening, causes the diaphragm to move, so moving the contact breaker plate, and advancing or retarding the spark. A fine degree of control is achieved by a spring in the vacuum assembly.

On cars equipped with an exhaust emission control system, a speed sensitive relay, solenoid valve and carburettor dashpot are used to regulate the operation of the distributor advance vacuum circuit to minimise the emission of fumes during certain operational conditions particularly during deceleration with the accelerator pedal released. Refer to Chapter 3, Fig. 3.33. On all models a resistor is fitted as standard in the coil primary circuit to prevent voltage drop and difficult starting when the starter motor is actuated.