MOVING PARTS

Crankshaft:

this is forged in high resistance bonded steel is soft nitrided. This treatment decreases wear and increases reliability (resistance to fatigue).
It rests on five main supports and shoulders on the central main support.
Eight counterweights arranged through 180° accurately balance the rotating masses.
A channel runs inside the shaft for the lubrication of the main and rod journals.

Main and rod bearing halves:

these are of the three-metal, thin shell type are divided into three dimensional classes to contain the radial play. There are two holes and a circumference groove for the passage of oil located on the front, central and rear main bearing halves.

Flywheel:

this is in cast iron, balanced, and with a ring gear in tempered steel.

Pistons - rods:

the pistons are in silicium-aluminium alloy with self-heating inserts and are divided into three dimensional classes. To ensure correct installation an arrow is stamped onto the piston ceiling which indicates the direction of rotation of the engine.
The rods are in hardened and tempered alloy, with a bushing in copper alloy inserted for the coupling with the gudgeon pin of the piston.
The piston - rod assembly has been lightened to reduce the moving masses.

AUXILIARY ORGANS

Timing:

direct drive by double chain with cemented and tempered on-head camshafts in steel alloy. A reference notch for correct timing has been engraved onto the central journal of the camshaft and relative cap.
The lightweight tappets, of the mechanical type, are composed of a valve cup in alloy steel in contact with the cam.
The control of the valve cup is transmitted to the valve by a cap, in tempered carbonitrided steel, used to regulate the valve clearance.
Particularly important is the introduction of sodium into the exhaust valve which improves the dissipation of the heat to which they are subjected.
The valve seats are sintered in material suitable for operation with unleaded petrol.

Timing variator:

This is of the simplified type which ensures great precision of timing, rapid intervention and high mechanical reliability.
In order to reduce the size of the engine, the actuation valve has been included in the intake manifold with suitable channeling, also present on the cylinder head, which regulates the flow of oil to the variator.

- This device varies the intake valve timing on the basis of engine loading. This parameter is received and processed by the MOTRONIC control unit in the form of an electric signal sent by the air-flow meter as a command, to the solenoid, by way of a relay.

- When the quantity of air taken in by the engine is lower than a pre-set value, the solenoid (1) is deactivated and the valve box (2) pushed by the counterspring (3) is lifted up allowing the passage of oil from the channeling (A) to reach the variator.
  In this case the timing of the intake valves is not changed.
- If the quantity of intake air exceeds the pre-set value, the solenoid (1) is activated and pushes the valve box (2) downwards. In this position the oil arriving from the channeling (A) enters the piston chamber (B) and passes through a hole into the internal channel (C) in the piston.
  The oil can only exit this channel through the upper hole (leading to the oil-to-variator delivery duct (D)) as the lower hole no longer opens onto the exhaust duct (E) as the valve box (2) is lowered.
  The oil passes through the channeling (D) and (F) and reaches the chamber (G) moving the piston (4) axially towards the engine.
  The piston is externally equipped with helical teeth and as a result of the axial movement is forced to rotate clockwise (as seen from the timing side).
  This rotation is transmitted to the pinion through a straight toothed grooved profile. The pinion (5) which is rotated by the threaded tug of the camshaft (6) transmits the rotation to the shaft, and in this way the timing of the intake valves is varied by 30°.
  When the solenoid is deactivated, the valve box (2) returns to the initial position, interrupting the flow of pressurized oil to the piston (4) but permitting the return of the oil to the outlet due to the thrust from the counter spring (7).
- The channeling (L) enables the camshaft journal to be lubricated under the various operating conditions.
- The oil which leaks into the solenoid chamber (H) is discharged through the drainage hole (E).