**ENGINE AUTOPSY**

**Triumph straight-six**

Sporting, cheap and two more pistons than the opposition

The versatile Triumph straight-six powered some of our best loved sporting classics: Velocette, TR6, TR7, TR8, 2000 and 2200. Yet it wasn't designed from scratch as a mass-market sports car engine. It was a cash-strapped development of a humble B31A four-cylinder hissed saloon. The 1952 Standard 9 E engine could be bootstrapped to the B31A, but Standard-Triumph needed more for the new Herald. Director of engineering, Harry Webster, moved the cylinder axes across and found the front end needed. He also discovered that for a little extra outlay, two cylinders could be added to create a straight-eight. It went into production in the Standard Vanguard Luxury Saloon in 1956. In 1963 it powered the Vitesse, and in 1965 the Triumph 2000. Extending the stroke gave the 2488cc needed for a suitably hefty engine for the TR6.

- **[A] THE VALVEGEAR** consists of top-hat pushrods, rocker shaft and followers, valve spring caps (the tiny collars that secure the springs to the valve stems), valve springs, the valves themselves and finally the tappets that act on the camshaft lobes.

- **[B] THE DISTRIBUTOR** is driven by a bevelled gear that meshes with a similar one on the camshaft. The short shaft with the gear on a dial at the bottom that the oil pump impeller shaft bores in.

- **[C] THE CAMSHAFT** can be swapped as an easy route to extra power. Before the Triumph discovered the engine to 2.5 litres, it was hoped that power could be made from a wider camshaft and bigger carburettors. Sadly, 150 bhp was only possible with poor torque, tractability and economy.

- **[D] THE PISTONS** and conrods demonstrate the slight offset of the cylinder axes. See also point [E].

- **[E] THE CRANKSHAFT** is located at the front of the engine just above the crankcase and is driven by a chain. The bearings are in the front and rear of the engine.

- **[F] THE RUBBER OIL SEAL** next to the bearing shims and caps is far better than the solid-steel ring design of many engines with origins in this era.

- **[G] THE ROCKER COVER** is pressed steel with a breather outlet pipe for recirculation into the intake manifold. Spark plugs enter from the opposite side to induction and exhaust.

- **[H] THE WATER PUMP** is a separate casting that bolts to the front of the cylinder head. It is driven by the gear-shaped pulley visible towards the lower left of the casting. The fact that the water pump mounting is not incorporated into the block may indicate the original four-cylinder block's even earlier basis as a subsidiary design with thermo-syphon cooling.

- **[I] THE CYLINDER HEAD** is not a cross-flow design, but at least the ports are not necessarily for the 2.5 litre version. The 2.0 litre engine uses a false head casting. Harry Webster had increased the port size and increased the effective height of the head casting. This allowed a lower flow to take advantage of the extra 500 cc of capacity over the 1965 version.

- **[J] THE TIMING CASE** covers the straightforward four-cylinder pushrod pattern of a small cog on the camshaft, turning at half crank speed via the duplex chain between the two caps.

- **[K] THE CYLINDER BLOCK** features bores that are two to one in the crankcase's centreline. This is known as a bevelled or (less exactly) design and allowed Harry Webster to increase the bore diameter without impinging on the cylinder head stud. It has other advantages: if the engine is in the direction of crank rotation, it has the effect of increasing leverage on the crank during the power stroke and reducing thrust against the cylinder wall. The connecting rod remains closer to vertical during the downward stroke, taking much more on the upward stroke.

- **[L] THE MOUNTING HOLES** on the cylinder block are (clockwise from the right) the circular location for the oil filter, the oil pressure relief mounting hole, the dipstick tube, the distributor housing and fuel pump mounting.

- **[M] THE GASKET BRIDGE** is a small aluminium casting that fits across the base of the crankshaft at the front of the engine block, allowing a continuous seal to be made with the sump.

- **[N] THE CRANKSHAFT PULLEY** requires much to remove - the bolt that ties it to the end of the crankshaft is always very tight. The pulley doubles as a crank damper, so its torsional vibrations are the engine's noise, maintaining its smoothness.

- **[O] THE OIL PUMP** assembly includes the impeller shaft, body and housing, plus the hollow-tipped pickup pipe and the pressure relief valve. It provides the lower pressure to the sump, taking its drive from the front of the distributor shaft. It then等情况 time the engine starts because of the filter's horizontal mounting, which allows oil to drain out whenever the engine is switched off. It's something of a design flaw, as the engine runs for a few seconds without much oil pressure.