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: Vitesse, TR5, TR6, GT6, 2000 and 2500PI. Yet it wasn't designed from scratch as a muscular sports car engine – it was a cash-strapped development of a humble 803cc four-pot from a budget saloon. The 1952 Standard 8 engine could be bored out to 948cc, but Standard-Triumph needed more for the new Herald. Director of engineering, Harry Webster, moved the cylinder axes across and found the room he needed. He also discovered that for a little extra outlay, two cylinders could be added to create a straight-six. It went into production in the Standard Vanguard Luxury Six in 1960. In 1962 it powered the Vitesse, and in 1963 the Triumph 2000. Extending the stroke gave the 2498cc needed for a suitably hairy engine for the TR5.

[A] THE VALVEGEAR consists of (top to bottom) pushrods, rocker shaft and rockers, valve spring caps (with the tiny collets that secure them to the valve stem), valve springs, the valves themselves and finally the tappets that act on the camshaft lobes.

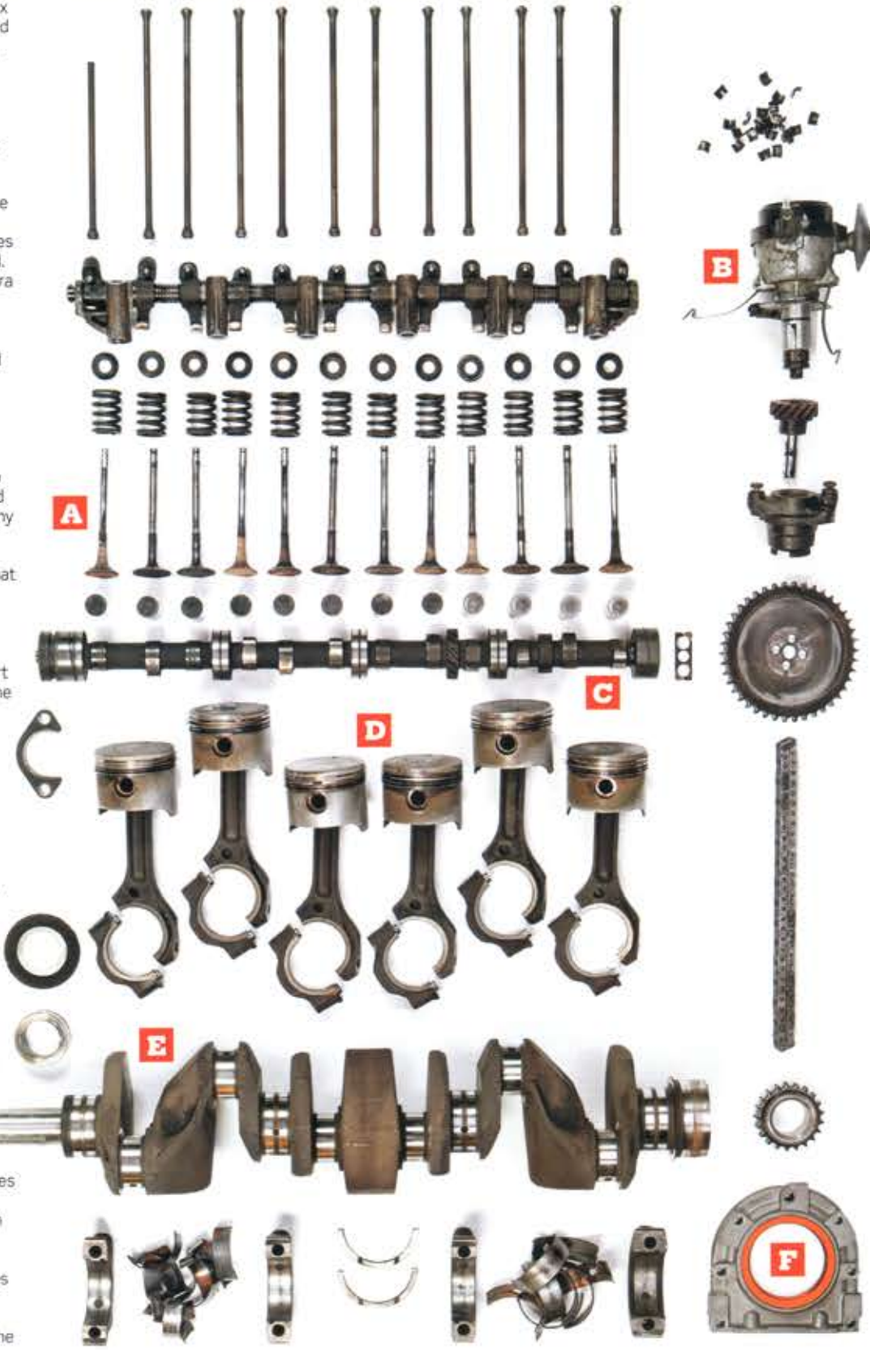
[B] THE DISTRIBUTOR is driven by a bevelled gear that meshes with a similar one on the camshaft. The short shaft with the gear on has a slot at the bottom that the oil pump impeller shaft locates in.

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

[D] THE PISTONS and con-rods demonstrate the slight offset of the cylinder axes. See also point **[K]**.

[E] THE CRANKSHAFT is sealed at the front by a thrower ring (the black one above the nose of the crank) and a keyed sleeve that runs in the seal found in the timing case. The thrust washer is a weak point because it only supports half the crank – most engines have two. The cupro-nickel plating wears off and then the steel beneath erodes, leading to fore-and-aft movement of the crank. In extreme cases, the washer falls off and causes rapid engine failure.

[F] THE RUBBER OIL SEAL next to the bearing shells and caps is far better than the scroll-and-rope design of many engines with origins in this era.



TECH SPEC

Stroke: 95mm Bore: 74.6mm **Power:** 132bhp **Displacement:** 2498cc **Compression Ratio:** 9.5:1 **Torque:** 153lb ft **Pistons:** Aluminium alloy **Block:** Cast iron **Cylinder head:** Cast iron **Sump:** Pressed steel

[G] THE ROCKER COVER is pressed steel with a breather outlet pipe for recirculation into the inlet 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's driven by the boss-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 sidevalve design with thermo-siphon cooling.

[I] THE CYLINDER HEAD is not a cross-flow design, but at least the ports are not 'siamesed'. For this 2.5-litre version to work, Harry Webster had to increase the port and valve sizes and increase the overall depth of the head casting. This allowed sufficient gas-flow to take advantage of the extra 500cc of capacity over the 1998cc version.

[J] THE TIMING CASE covers the straightforward four-stroke pushrod pattern of a small cog on the crankshaft driving a larger cog on the camshaft, turning it at half crank speed via the duplex chain between the two cogs.

[K] THE CYLINDER BLOCK features bores that are located to one side of the crankshaft's centreline. This is known as a désaxé (or 'off axis') design and allowed Harry Webster to increase the bore diameter without impinging on the cylinder head studs. It has other advantages: if the offset is in the direction of crank rotation, it has the effect of increasing leverage on the crank during the power stroke and reducing thrust wasted against the cylinder wall. The connecting rod remains closer to vertical during the downward stroke, tilting much more on the upward stroke.

[L] THE MOUNTING HOLES on the cylinder block are (clockwise from bottom 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 muscle to remove – the bolt that fixes it to the end of the crankshaft is always very tight. The pulley doubles up as a crank damper, soaking up torsional vibrations as the engine revs rise, maintaining its smoothness.

[O] THE OIL PUMP assembly includes the impeller shaft, body and housing, plus the gauze-tipped pick-up pipe and the pressure relief valve. It protrudes into the deeper part of the sump, taking its drive from the base of the distributor shaft. It has to prime the filter every 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.

DISASSEMBLY SAM GLOVER **WORDS** NIGEL BOOTHMAN

THANKS TO: *The Triumph Sports Six Club: 01858 434424, www.tssc.org.uk*

**Statistics and image apply to a 1972 Triumph 2.5PI*