



The Rolls-Royce Merlin engine

The Rolls-Royce Merlin engines fitted to the Lancaster should be the Merlin XX series. However, the BBMF Lancaster operates using Merlin 25, 225 and 500 engines. These are very similar in specification, and for the purpose of this book we will take a closer look at the Merlin 25.

The Merlin 25 is a 12-cylinder, 60°, V12 liquid-cooled engine. It has a compression ratio of 6:1 and its dry weight is 1,430lb.

The two-piece cylinder block is cast from aluminium alloy. There are six cylinder liners in each block, manufactured from high carbon steel. Each piston has three compression and two oil scraper rings. The connecting rods are nickel steel forgings, machined to H-sections. The one-piece six-throw crankshaft is machine forged from chrome-molybdenum steel. The crankcase is cast from aluminium alloy. Two inlet and two exhaust valves are fitted to each cylinder head and each exhaust valve has a sodium-cooled stem.

Cylinders

The two cylinder assemblies, mainly the right- and left-hand blocks, are known as the A and B blocks respectively. Each comprises six cylinders, the upper camshaft drive unit and the camshaft and rocker mechanism, which operates the valves incorporated in the cylinders. Each block consists of a separate alloy skirt, head and six detachable wet steel liners which, when bolted together, form the cylinder block proper. In addition to providing part of the coolant jacket, the head also forms the roofs of the six combustion chambers.

Cylinder liners

Each cylinder liner is shouldered and spigotted at the upper end to enter its respective recess in the bottom of the cylinder head. The cylinder liner is also provided with a sealing ring at its lower end to form a joint with the crankcase, to which it is drawn by the cylinder holding-down studs.

Cylinder block covers

The covers are secured to their respective cylinder blocks by studs and nuts, with a

gasket between the two contacting faces. The main difference between the A and B covers is that the latter incorporates an engine speed indicator drive whilst the former is plain.

Valves

There are two inlet and exhaust valves per cylinder. Both valves are of the trumpet type and have satellite-ended stems. The valve guides are cast iron for the inlet and phosphor-bronze for the exhaust. The valves are not interchangeable. Each valve guide is pressed into its respective bore in the cylinder block until a conical collar near its top end is seated on, and is flush with, the roof of the cylinder block.

Camshaft

A single central camshaft for each cylinder block is mounted in pedestal brackets and operates both inlet and exhaust valves through rockers fitted with adjustable tappets. The camshafts, which are similar for both blocks, are driven from the wheel case by inclined shafts ending in bevel pinions, which mesh with bevel wheels at the end of each camshaft.

Camshaft auxiliary drive

The air compressor and hydraulic pumps for the turrets are mounted on the rear ends of the A and B cylinder heads. Both are driven from the spur gear wheels attached to the camshaft-driven bevel wheels.

Pistons

The pistons are attached to the connecting rods by fully floating gudgeon pins. The connecting rods are of the forked and plain type, the forked rod being fitted to the B-side of the engine.

The pistons are machined from light alloy forgings and are fitted with three compression rings above and one grooved scraper ring below the gudgeon pin. The gudgeon pins are made from hollow steel and are retained in the piston by spring wire circlips. A pair of oil holes are drilled obliquely and upwards towards the centre to meet in the metal above each gudgeon pin bore to assist in cooling the piston.

Crankcase

The crankcase consists of two halves bolted together. The upper portion incorporates the

OPPOSITE
Rolls-Royce Merlin 25.
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- 1 Camshaft cover
- 2 Generator housing, generator not fitted
- 3 Magneto
- 4 Reduction gear
- 5 Ignition harness
- 6 Carburettor
- 7 Two-speed single stage supercharger
- 8 Coolant pump
- 9 Magneto
- 10 Oil control valve
- 11 CSU oil filter