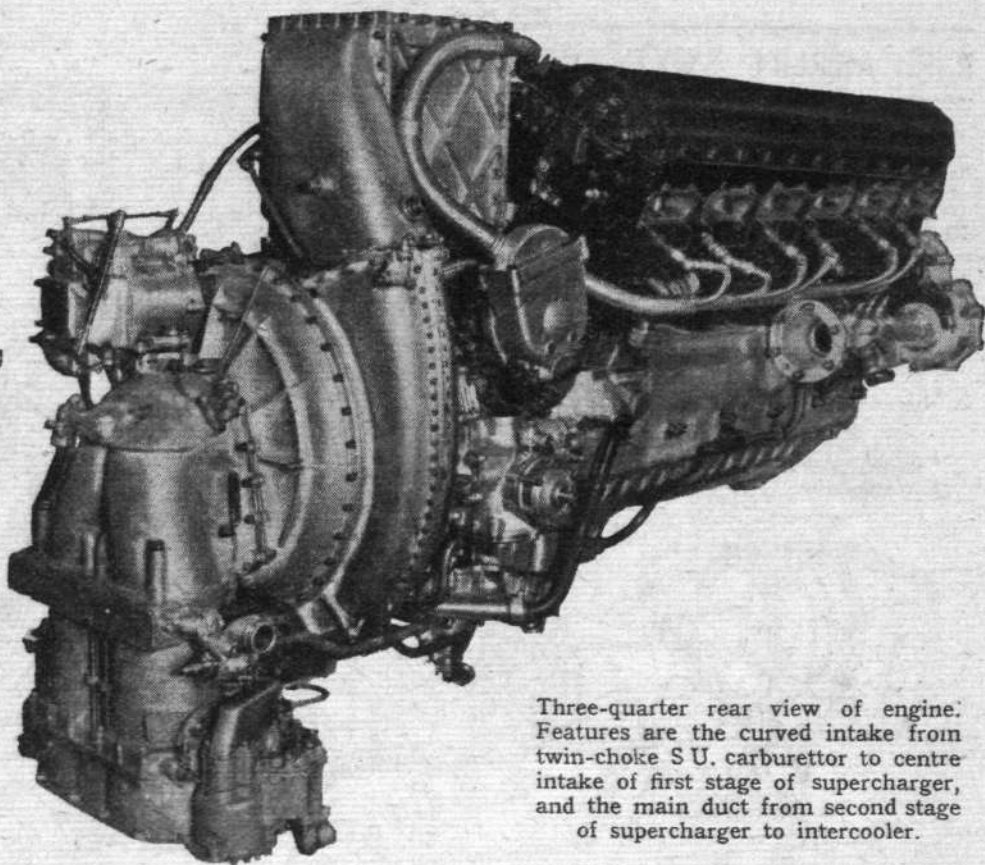


# ROLLS-ROYCE MERLIN "SIXTY-ONE"

NOTABLE BRITISH  
ENGINE PROGRESS :  
TWO-STAGE, TWO-  
SPEED SUPERCHARGER  
ENABLING STRATO-  
SPHERE FLIGHT

By G. GEOFFREY SMITH, M.B.E.



Three-quarter rear view of engine. Features are the curved intake from twin-choke S.U. carburettor to centre intake of first stage of supercharger, and the main duct from second stage of supercharger to intercooler.

PROGRESS in the design of superchargers, particularly during the last three years, is responsible for aircraft engines of a given size developing far greater power at high altitudes. British technical achievement in this field is of the greatest importance in maintaining ascendancy over the enemy, and Rolls-Royce engineers are to be congratulated upon the introduction into service types of the first proved type of two-stage two-speed supercharger. It is on operational duties in the Spitfire, and bears the type number "61."

A month ago the existence of a new Spitfire fitted with the new type 61 Merlin engine was revealed, and brief details appeared in *Flight* of November 10th. This new Spitfire, which has two cannon and four machine guns, has already achieved striking successes in the air both over the Channel and in the Middle East theatre of war. One outstanding achievement was the destruction at a height of over 40,000ft. of three of Germany's stratosphere reconnaissance aircraft, type Ju 86P, which is reputed to have a pressure cabin, diesel engines and exhaust turbo superchargers.

Since the heart of any good aircraft, be it fighter or bomber, is the engine, details now released for pub-

lication of the latest Rolls-Royce contribution to the many notable technical achievements of this world-renowned firm are of particular interest. The "sixty-one" engine is a development of the twelve-cylinder V-type liquid-cooled Merlin, the perfection of which engine before the outbreak of war has meant so much to this country.

The cylinder dimensions of 5.4in. bore by 6in. stroke, giving a capacity of 1,649 cubic inches, or 27 litres, remain the same; compression ratio is 6 to 1, but thanks to the development of a two-speed two-stage supercharger and an improved larger S.U. twin-choke carburettor, designed as a complete separate unit, the power output has been greatly increased, and the engine is capable of maintaining its exceptional performance over a far greater range than hitherto. Operational altitudes with the Spitfire-Merlin 61 combination in conjunction with a four-blade airscrew to absorb the greater power output are now in excess of 40,000ft. Daily paper talk of air combats in the Battle of Britain at 40,000ft. was much exaggerated.

Long years of experiment were necessary to bring the multi-stage supercharger and its necessary intercool-



Three-quarter view of the improved Spitfire fitted with the R.-R. Merlin 61 engine and Rotol four-blade airscrew.

### LEADING PARTICULARS ROLLS-ROYCE MERLIN "61"

NUMBER OF CYLINDERS	12	Two monobloc castings of 6 cylind.rs, with detachable heads. Cylinder banks set at 60°.
BORE AND STROKE	5.40" x 6.00"	
VALVES—2 INLET 2 EXHAUST		per cylinder operated by overhead camshafts via rockers.
COOLING MEDIUM		Pressure water (30% glycol.)
COMPRESSION RATIO	6.0 : 1.	
SUPERCHARGER		Two-speed two-stage with intercooler.
CARBURETTOR		S.U. twin-choke updraught.
TOTAL CAPACITY	1,649 cu. ins. or 27 litres.	
REDUCTION GEAR		Direct spur
RATIO	42 : 1	
DIRECTION OF ROTATION		Airscrew—right-hand Engine—left-hand
ESTIMATED NET DRY WEIGHT	1,600 lb. + 21%.	