



The B.M.W. 801-1 (sometimes known as 801 T.J.) was a turbo-blower version of the 14-cylinder air-cooled 801 radial. "The whole exhaust turbine design looked very promising," says the author of this article.

a very fine piece of work; it has been fully-described and illustrated by the R.A.E.

German technicians felt that considerable improvement could still be made in the drag of piston-engine installations, both liquid and air-cooled. This, however, was only possible with suitable equipment and long, full-scale wind tunnel exploration, such as that executed at Volkenrode, which had already paid good dividends. The B.M.W. 801 fan-cooled installations in the Fw 190 and Dornier 217 E.2 bomber have been widely studied as examples of thorough and ingenious baffling and cowling for air-cooled radial engines; but the Germans believed that a further reduction in drag to the extent of 150 to 200 h.p. was still possible in the Fw 190 installation with the B.M.W. 801 engine, and this work was actually in hand when Germany collapsed.

In an effort to evolve power plants of the order of 3,500 to 4,000 h.p. in the shortest possible time, a good deal of effort was, early in the war, put into developing coupled versions of the Daimler-Benz inverted vee-12 series such as the D.B. 606, 610 and 613. These coupled types are found with left- or right-hand rotation, but were not successful in practice. Contrary to reports, the Daimler-Benz engineers claimed to have developed the gearing to a state where it gave no trouble, but the whole power plant was so congested and badly executed that trouble with fires had been almost insuperable. It will be recalled that these coupled engines appeared on the early version of the Heinkel 177.

Cylinder Multiplicity

It was apparent that no permanent solution was to be found along these lines, and all three major engine constructors had been working on new types, breaking away from the inverted vee-12 liquid-cooled and 14-cylinder air-cooled radial formula. Among the many projects put in hand by Daimler-Benz was the D.B. 604, a 43-litre "X" engine of 24 cylinders, probably intended to produce about 3,500 h.p. The bearings and con.-rods gave trouble, and work was stopped in 1940 by the German Air Ministry. There have also been reports of a D.B. 630, with six blocks of six cylinders and the immense swept volume of 83 litres, giving initially about 4,000 h.p.; but the Daimler-Benz works had been very thoroughly combed by various Allied interests, and we saw nothing of this particular project.

The Junkers contribution to the high-power class was the Jumo 222, a 24-cylinder liquid-cooled engine of about 80 litres capacity with six banks of four cylinders radially disposed. This engine showed promise—although there were various connecting-rod troubles—but work on it had been virtually at a standstill for some months before the end of the war, as all the development capacity available

for piston-engine work (and this was severely limited) was concentrated on the 213 series.

We made a short visit to the various Junkers engine works in the vicinity of Dessau, but damage there was so extensive that little of value could be seen in the quick look round which was all that was possible with the imminent approach of the Russians. Dr. Scheibe, in charge of Jumo piston-engine development, said that out of a large number of Jumo 213 projects, three definite series had crystallised, viz.:

213A	1 stage 2 speed supercharger
213E	2 stage 3 speed supercharger.
213J	2 stage 3 speed, but with a different gear ratio, and having 4 valves per cylinder.

The 213J was the latest mark scheduled for production. The weight with intercooler was 2,325 lb., and the power 2,350 h.p. for take-off on 87-octane fuel at 3,700 r.p.m. They seemed hopeful of quickly obtaining a production rating of 2,600 h.p. from the 213, and appeared willing to accept an abnormally high piston speed and high r.p.m.

Herr B. Bruckman, for many years at Siemens Spandau on air-cooled radial engines, was chief engineer and technical director of all B.M.W. piston and jet engines at the time of the collapse of Germany. He will be remembered as having made a tour of the British engine firms shortly before the war.

In the course of several days at B.M.W., Munich, a considerable amount of information was obtained on their piston-engine development. The main activities had been: (a) to develop the 14-cylinder air-cooled radial 801 up to the limit; (b) to design and make prototypes of the 18-cylinder 802 engine, a double-bank, air-cooled development of the 801; and (c) to develop the 28-cylinder 803 engine, a large 4-bank liquid-cooled radial.

Developments of the 801

The latest production mark of the 801 series was the 801E, which had a very fine pressure-die-cast cylinder-head, chromium-plated cylinder barrels and exhaust valves, and stronger pistons with very thick heads devoid of all ribs.

The 801F incorporated a strengthened crankshaft, which was necessary for powers in excess of 2,000 b.h.p. It was expected that this engine would be rated in production at 2,200 b.h.p. and 2,600 b.h.p. with methanol/water injection.

The 801-1 was the turbo-blower version. The turbo blower was made by B.M.W. themselves, and mounted rather high up behind the engine, with its axis sloping forward about 30 deg. from the vertical. Quite a number of these had been made, and about a dozen were subsequently seen on engine stands lying out in the open on Kassel airfield. The turbine wheel employs hollow steel blades, similar in conception to those in the German jet engines, and the whole exhaust turbine design looked very promising, and in advance of any known American type.

The 802 was an 18-cylinder engine of interesting and unorthodox design, and was the product of the Munich parent firm before the Siemens amalgamation influence had become predominant. The basic design was attributed to Dr. Sachse. Several of these engines were made in 1942, but development in the last few years had been dropped in favour of the 801. Dr. Amman, the engineer in charge of piston-engine development, thought the 802 was a good engine, and felt that if more power was to be the goal, then they would have done better to have switched over to the 802 rather than to flog the 801, which was now about pushed to the limit. He thought that 3,000 b.h.p. would have been obtained fairly easily from the 802; this seemed a reasonable anticipation.

The bore and stroke were 6.14in. x 6.85in., giving a capacity of 58 litres. The weight was 3,380lb. A two-stage three-speed blower gave a rated altitude of 32,000ft., and the maximum engine speed was 2,700 r.p.m. The cooling fan was geared up to 1.85 times crankshaft speed.