

DATA OF THE SALMSON AD. 9 ENGINE.

NUMBER AND ARRANGEMENT OF CYLINDERS.—Nine, static radial.
 TYPE OF CYLINDER.—Steel, air-cooled, aluminium, bolster head.
 BORE.—70 mm. (2.76 in.).
 STROKE.—86 mm. (3.386 in.).
 STROKE/BORE RATIO.—1.228.
 STROKE VOLUME OF ONE CYLINDER.—331 c.c. (20.19 cub. in.).
 TOTAL STROKE VOLUME OF ENGINE.—2,979 c.c. (181.72 cub. in.).
 AREA OF ONE PISTON.—38.48 sq. cm. (5.97 sq. in.).
 TOTAL PISTON AREA OF ENGINE.—346.32 sq. cm. (53.73 sq. in.).
 CLEARANCE VOLUME OF ONE CYLINDER.—72 c.c.
 COMPRESSION RATIO.—5.61.
 INTERNATIONAL RATED B.H.P. AND R.P.M.—50 b.h.p. at 2,000 r.p.m.
 MAXIMUM B.H.P. AND R.P.M.—55 b.h.p. at 2,200 r.p.m.
 PISTON SPEED.—1,129 ft. per min. at 2,000 r.p.m.
 B.M.E.P.—109 lb. sq. in. at 2,000 r.p.m.
 DIRECTION OF ROTATION OF CRANK.—Clockwise facing propeller L.H.T.
 DIRECTION OF ROTATION OF PROPELLER.—Clockwise facing propeller.
 NORMAL SPEED OF PROPELLER.—2,000 r.p.m.
 LUBRICATION SYSTEM.—Dry sump. Gear pumps through rear shaft to crankpin and then splash.
 OIL PRESSURE.—7 lb. sq. in. (minimum); 200 lb. sq. in. (maximum).
 OIL CONSUMPTION PER HOUR.—1.3 pt.
 OIL CONSUMPTION PER B.H.P. HOUR.—0.055 lb.
 TYPE OF CARBURETTOR.—Duplex Zenith type 26 D.K.1.
 FUEL CONSUMPTION PER HOUR.—2½-3 gal.
 FUEL CONSUMPTION PER B.H.P. HOUR.—0.55 lb.
 SPECIFIC GRAVITY FUEL RECOMMENDED.—0.710-0.725.
 TYPE OF MAGNETO.—Salmson 9 cyl.
 FIRING SEQUENCE OF ENGINE.—1, 3, 5, 7, 9. 2, 4, 6, 8.
 SPEED OF MAGNETO.—1,125 engine speed.
 DIRECTION OF ROTATION OF MAGNETOS.—Anti-clockwise (driving end).
 MAGNETO TIMING.—35° early on No. 1 cylinder.
 INLET VALVE OPENS.—5° early.
 INLET VALVE CLOSES.—55° late.
 MAXIMUM LIFT OF INLET VALVE.—7 mm. (0.276 in.).
 CLEARANCE OF INLET TAPPET.—0.2 mm. (0.008 in.).
 EXHAUST VALVE OPENS.—55° early.
 EXHAUST VALVE CLOSES.—5° late.
 MAXIMUM LIFT OF EXHAUST VALVE.—7 mm. (0.276 in.).
 CLEARANCE OF EXHAUST VALVE.—0.2 mm. (0.008 in.).
 DIRECTION OF REV. COUNTER DRIVE (REAR OF ENGINE).—Clockwise.
 SPEED OF REV. COUNTER DRIVE.—½ air-screw speed.
 WEIGHT COMPLETE.—154 lb.

cardan shaft to a Heenan and Froude dynamometer. The cooling air blast was supplied by an electrically-driven centrifugal fan taking air direct from the outside of the building and passing it over the engine through a wind tunnel. The speed of the air at the outlet facing the engine was measured by an A.S.I. The fuel was provided from two overhead tanks and the fuel consumption measured by means of a Brown & Barlow flowmeter. The oil tank was fitted with an electrical heating arrangement in order to control the oil temperature.

For the airscrew test the engine was mounted on a suitable stand and the power absorbed by a calibrated airscrew providing a thrust of 4.7 lb. per b.h.p. When on this stand the air blast over the cylinders provided by this airscrew was approximately 100 m.p.h., falling to 85 m.p.h. in line with the induction and exhaust ports.

For all the runs the fuel used was No. 1 Shell; the lubricating oil Mobiloil Aero H; the magneto Salmson type A.T.9; the ignition setting 31 deg. advance; and the carburetter a Hobson type A.V. 40A.

The first run was that for the preliminary power curve. On this run the corrected b.h.p. ranged from 56.3 at 2,420 r.p.m. to 38.7 at 1,600 r.p.m.

The conditions for the throttle curve run were:—Barometer 772 m., air intake temperature 22 deg. C., oil intake temperature 75 deg. C., and the observed b.h.p. ranged from 54 at 2,310 r.p.m. to 7.1 b.h.p. at 1,100 r.p.m.

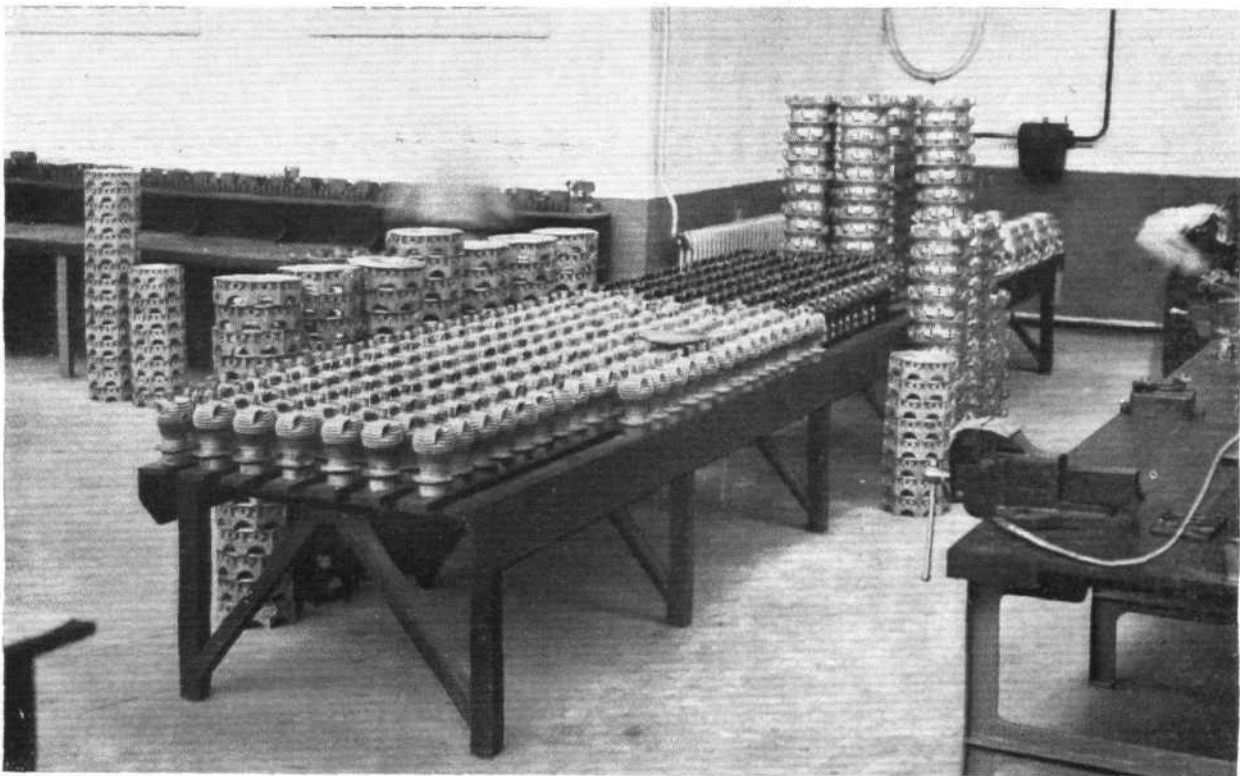
The first period of the endurance test was a run of ten hours at 9/10ths full throttle, the corrected b.h.p. being 44.32, the crankshaft r.p.m. being 2,100, the fuel consumption 0.577 pt. per b.h.p./hr. and the oil consumption 0.6 pt. per hr. This period finished with 5 min. on full throttle at the same r.p.m., the corrected b.h.p. was then 48.75 and the fuel consumption rose to 0.62 pt. per b.h.p./hr. For this period the barometer was 766 m., the air intake temperature 24 deg. C., the oil pressure 50-70 lb. per sq. in., the air speed over the cylinders 110-120 m.p.h., the temperature at the rear of No. 9 cylinder 212-220 deg. C., the oil temperature "in" 72 deg. C., and "out" 47 deg. C.

The second period on the brake, also of ten hours at 9/10ths full throttle, finishing with 5 min. at full throttle produced substantially higher figures.

The third period was the first of two periods with the calibrated airscrew. This was run for ten hours at 2,100 r.p.m., showing an approximate b.h.p. of 42.1. Owing to the characteristics of the power curve, a full throttle reading could not be obtained; the engine was, however, run for 5 min. at 2,300 r.p.m.

The fourth period was also with the calibrated airscrew, and produced practically the same result.

The fifth period was in the form of a detonation test, and was extremely severe for an engine of this type. This was divided into two parts, the first of 9 hr. was run at full throttle on the brake, but with the crankshaft r.p.m. held down to 1,955. Under these conditions the corrected b.h.p. was 46.1, while the fuel consumption was 0.616 pt.



ALMOST MASS PRODUCTION: Having 9 cylinders the little AD.9 Salmson engine provides an opportunity for the engineer to keep his production costs low, as even in each engine the repetition is quite appreciable. This is further enhanced by the fact the firm has laid down 200 engines of this type. Our photograph shows a few of the cylinders and crankcases laid out for inspection. (FLIGHT Photo.)