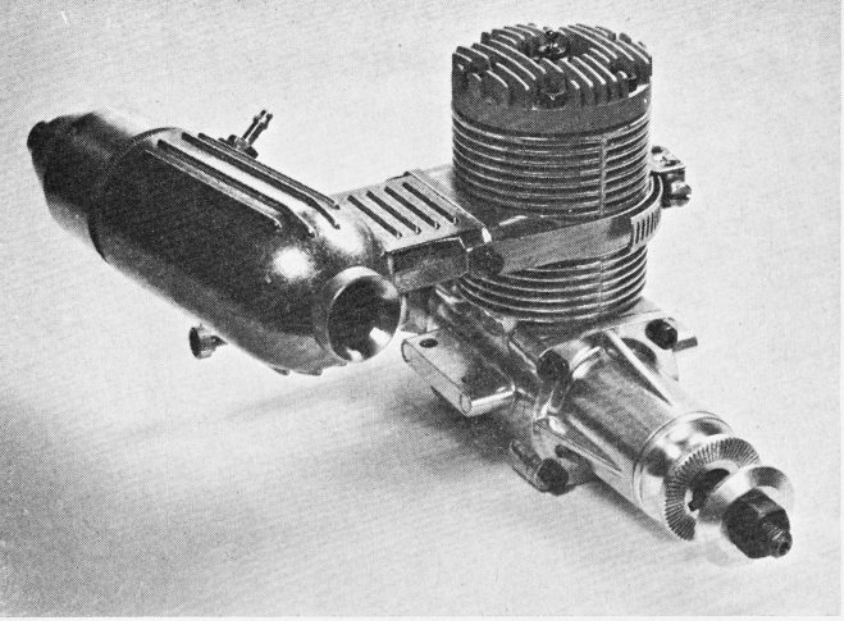


PETER CHINN tests the WEBRA SPEED 61R

AT 18oz. bare weight, or around 22oz. with the maker's recommended silencers, the rear rotary-valve Webra Speed 61R is one of the heaviest 10 c.c. R/C aircraft engines on the market at the present time, but it is also one of the most powerful. In fact, the peak brake-horsepower, determined from our tests, of just over 1.6 bhp gross (i.e. less silencer) was, by a just measurable margin, the highest output figure on standard 5% nitromethane test fuel, determined to date for a 10 c.c. R/C engine.

One must, of course, be wary of drawing conclusions from tests of single examples of given production engines but, on the basis of our findings, the Speed 61R was about 2-3 percent more powerful than the previous highest figure published in the RADIO MODELLER test series (*i.e.* for the O.S. Max 60F-SR in the September 1975 issue) and 8-9 percent above that obtained from the Speed 61R's better known stablemate, the shaft-valve Webra Speed 61F. It must also be pointed out that the Speed 61R reaches a higher maximum output mainly by virtue of an ability to achieve high rpm under light loads and that, on the usual prop sizes, it is unlikely to show any improvement in static rpm readings compared with the other top performing Schnuerle-scavenged 10 c.c. R/C engines. However, in a comparison of actual flight performances on, say, 11 × 7 or 11 × 6 props, the 61R may be expected to reach slightly higher speeds in level flight and in dives where rpm may speed up to around 16,000.

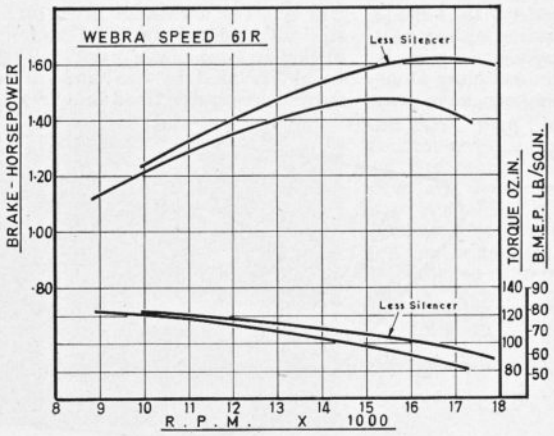
It is as a high-performance marine unit that the Speed 61R should be at its best. A watercooled, flywheel-equipped version of the engine is available and this is now also obtainable with a special extra large choke carburettor equipped with an additional control lever for coupling to an extra servo enabling the needle-valve to be adjusted by remote control.

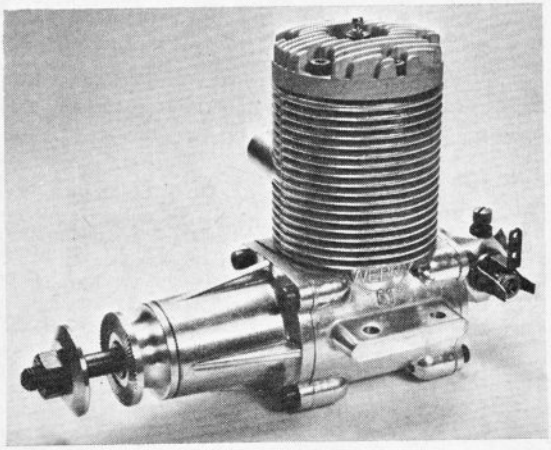
Design and construction summary

Main casting. This comprises the crankcase barrel and full-length cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs, transfer passages and a short exhaust duct.

Cylinder. Hardened steel liner, closely fitted to cylinder casing and located by flange at top. Centrally bridged exhaust port on right side, timed to open and close 70 degrees each side of BDC. Two main transfer ports timed to open and close at 59 degrees each side of BDC. Rectangular third port, diametrically opposite exhaust port, timed to open and close at 55 degrees each side of BDC.

Crankshaft and front end assembly. Counterbalanced hardened steel crankshaft with 12mm. dia. main journal and ⅜in.dia. front journal. Pressed-in 7mm. dia. crankpin with 4mm.dia. spigot for rotary-valve drive. Shaft supported in one 12 × 28 × 8 mm., 8-ball, brass-caged ball





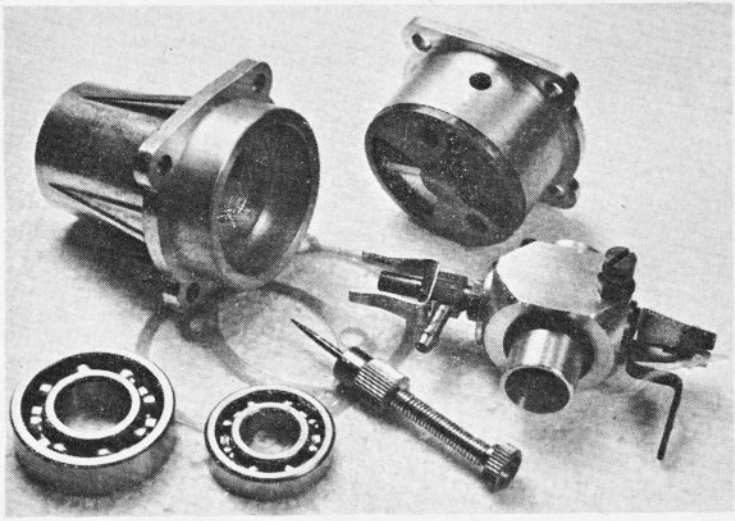
journal bearing at rear and one $\frac{3}{8} \times \frac{7}{8} \times 7/32$in. 8-ball steel caged ball journal bearing at front. Pressure diecast aluminium alloy bearing housing secured to crankcase with four Allen type 3.5mm. cap screws. Paper gasket. Machined aluminium alloy prop driver keyed to shaft with steel 2.5mm. square sunk key.

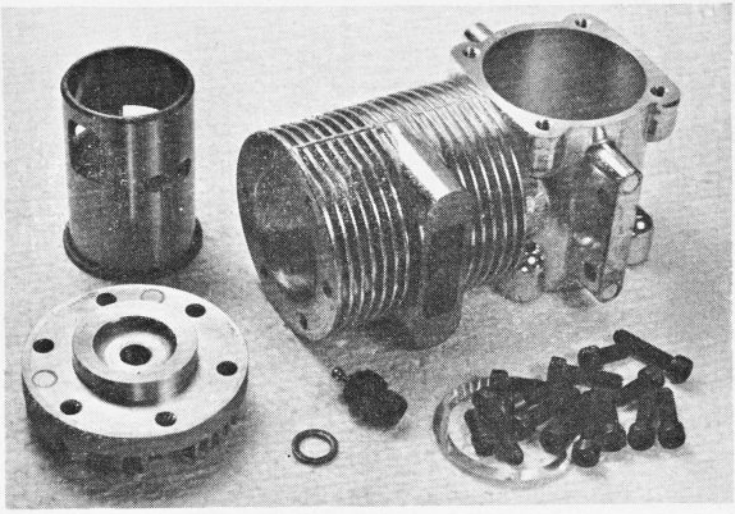
Piston and connecting-rod assembly. Flat crown, deflectorless, forged aluminium piston with single, pinned, compression-ring and rectangular third-port window. Piston has rectangular skirt cutaways fore and aft to prevent masking entry to transfer passages. Forged aluminium alloy connecting-rod, 39mm. between centres, with bronze bushes and lubrication slits at both ends. Tubular 6mm. o.d. gudgeon-pin retained by wire circlips in piston bosses.

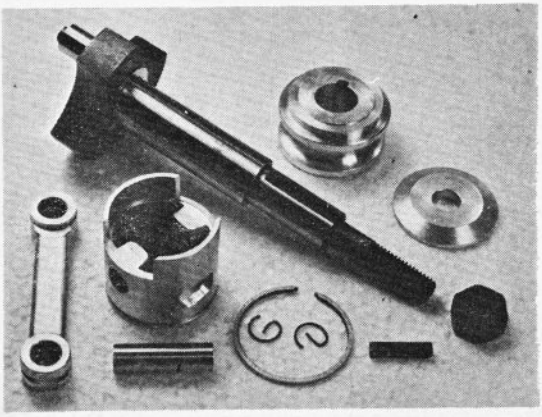
Cylinder-head. Finned, pressure diecast aluminium alloy with shallow bowl shaped combustion chamber surrounded by 4mm. wide squish band. Centrally located glowplug. Head secured to cylinder casing with six 3.5mm. Allen type cap screws. No gasket.

Valve rotor and backplate assembly. Hardened and ground steel counterbalanced disc type valve rotor, 2mm. thick and mounted on bronze pin. Pin pressed into crankcase backplate and secured by socket-head grub screw. Pressure diecast aluminium alloy backplate with 13mm. i.d. boss for carburettor and 11.2mm. i.d. induction port diverging to large quadrant shaped port at rotary-valve. Backplate secured to crankcase by four 3.5mm. Allen type cap screws with paper gasket.

Carburettor. Webra TN two-needle automatic mixture control type with 8mm. i.d. choke. Machined aluminium alloy body containing ground steel throttle barrel. Idling mixture needle mounted in outer end of throttle barrel. Throttle barrel

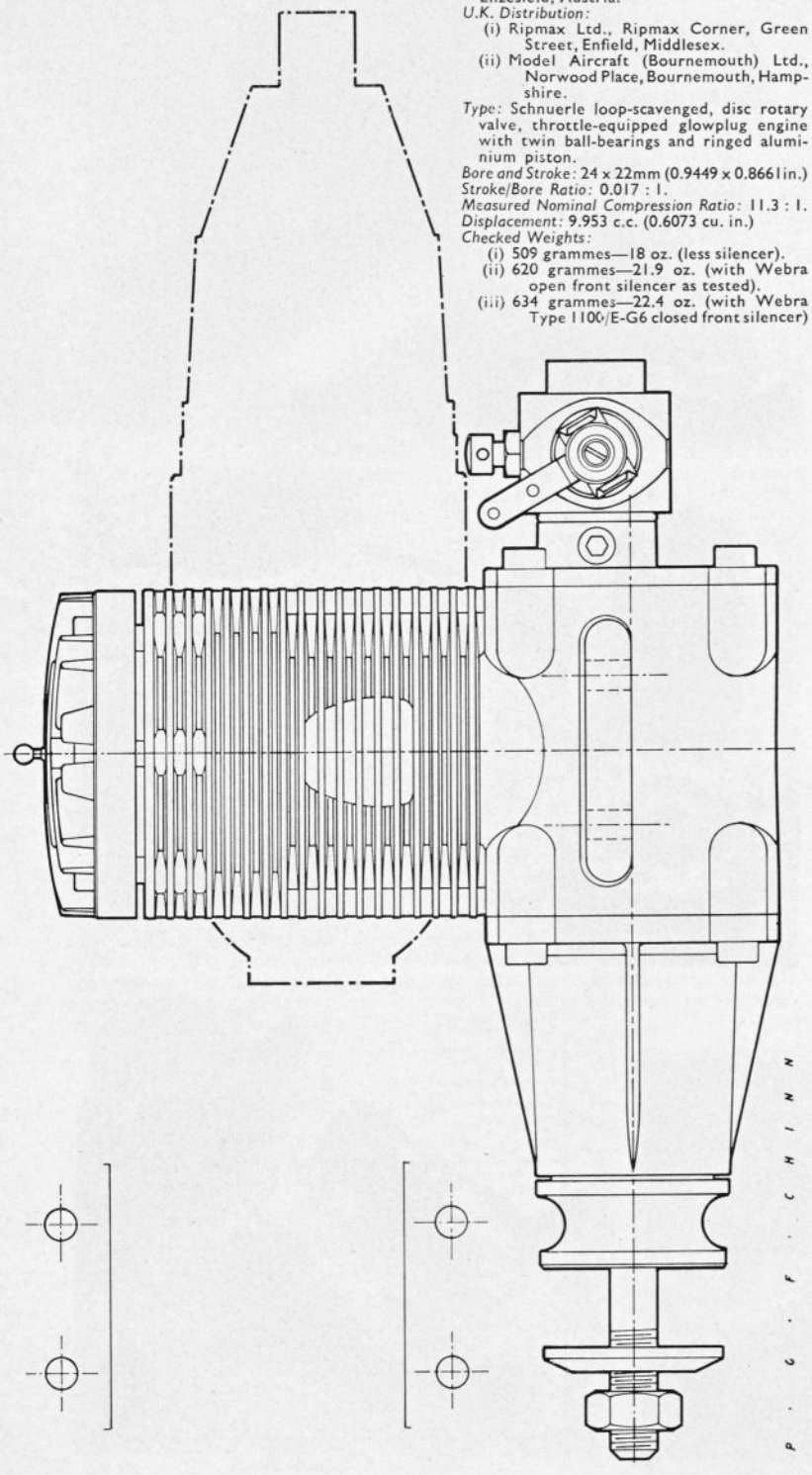






GENERAL INFORMATION

Manufacturer: Webra/M.Eberth, A-2551 Enzesfeld, Austria.
U.K. Distribution:
(i) Ripmax Ltd., Ripmax Corner, Green Street, Enfield, Middlesex.
(ii) Model Aircraft (Bournemouth) Ltd., Norwood Place, Bournemouth, Hampshire.
Type: Schnuerle loop-scavenged, disc rotary valve, throttle-equipped glowplug engine with twin ball-bearings and ringed aluminium piston.
Bore and Stroke: 24 x 22mm (0.9449 x 0.8661in.)
Stroke/Bore Ratio: 0.017 : 1.
Measured Nominal Compression Ratio: 11.3 : 1.
Displacement: 9.953 c.c. (0.6073 cu. in.)
Checked Weights:
(i) 509 grammes—18 oz. (less silencer).
(ii) 620 grammes—21.9 oz. (with Webra open front silencer as tested).
(iii) 634 grammes—22.4 oz. (with Webra Type 1100/E-G6 closed front silencer)



P. G. CHINN

moves sideways as it is rotated so that idle needle tip enters main jet as throttle is closed, thereby reducing fuel flow. Low speed mixture strength adjustable by screwing idle needle in or out. Main mixture control via orthodox needle-valve assembly installed in closed end of throttle housing. Nominal effective choke area: 35 sq.mm.

Silencers. The silencer supplied for use with our test motor was one of the Webra vented front types. This, of pressure diecast aluminium alloy, secured to the engine by means of a worm-drive hose-clip type strap around the cylinder, was similar to that used in our earlier test of the front induction Webra Speed 61F, but had a smaller i.d. vent tube (13mm. instead of 15mm.) and a smaller i.d. outlet (9.5mm. instead of 10mm.) reducing total escape area from 255 sq.mm. to 204 sq.mm.

Test performance

Our test sample came direct from the manufacturer. After running in on a straight 75/25 methanol and castor-oil mixture, tests were carried out on our standard test fuel containing 5 percent nitro-methane. Glowplugs used were standard Webra long-reach type. Atmospheric temperature at the time of testing was 13 deg.C (56 deg.F) and barometric pressure was 1022 mb (30.2 in.Hg).

Starting and running. Handling qualities were excellent. The 61R was hand started easily and showed no viciousness on all normal prop sizes.

Running qualities were also very good with a below average level of vibration.

The test model had one small fault which, initially, caused some inconsistency at the higher speeds. This was due to a machining error on the throttle barrel cam slot which allowed the throttle to rotate past the fully-open position when the throttel arm was moved through its maximum travel, resulting in a drop in power. Full-throttle readings were therefore taken with the fully-open position of the barrel fixed externally.

Power—less silencer. Like other modern high-performance Schnuerle scavenged 10 c.c. engines, the Speed 61R gets its power from an all-round improvement in torque. On test this bettered 120 oz.in. at speeds below 11,000 rpm and was still reaching 100 oz.in. at 16,000 rpm. Propeller speeds included 12,000 rpm on a 12 × 6 Top Flite

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ENGINE TEST

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maple, 13,100 on an 11 × 7½ Power-Prop maple and 14,600 on an 11 × 6 Power-Prop maple, while, on the sizes that might be used for very large or heavy models, 11,200 rpm were obtained on a 13 × 5½ Top Flite standard, 9,500 on a 14 × 6 Top Flite maple and 7,900 on a 15 × 6 Punctilio.

Power—with silencer. The open front Webra silencer caused a slightly greater power loss than was experienced when the similar but less restrictive silencer (see description above) was used on the 61F, but the overall power loss was still very low i.e. about 4 percent at around 12,000 rpm and about 9 percent at the peak. The revolutions at which peak output was determined were reduced by over 1,000 rpm to approximately 15,500. In terms of prop performance, there was a negligible reduction on the larger prop sizes (12 × 6 or larger) and only a 200-400 rpm loss on 11 inch diameters of 6-8 inches pitch.

It has to be admitted, however, that the open front Webra "silencers" are pretty ineffective devices so far as muffling qualities are concerned. Since our tests were carried out, the manufacturer has begun offering a new closed expansion-chamber Webra silencer, the Type 1100/E-G6, having less than half the outlet area of the open front type used in our tests and this should substantially improve noise suppression.

Throttling. Except in regard to the fault already mentioned, the throttle worked well, providing reliable idling and good intermediate reponse. Although rear-induction engines, in general, are not popular with modellers, they do have the merit of placing the carburettor controls at a safer distance from the prop.

Comment

Very powerful, easy to handle and smooth running. Much too noisy on test silencer but should be more acceptable with later type silencer now obtainable. Webra Speed 61F front-induction model likely to remain more popular choice for aircraft use. Speed 61R, in its marine version, now available with special tuned expansion chamber exhaust system, should be of greater interest to power boat enthusiasts.