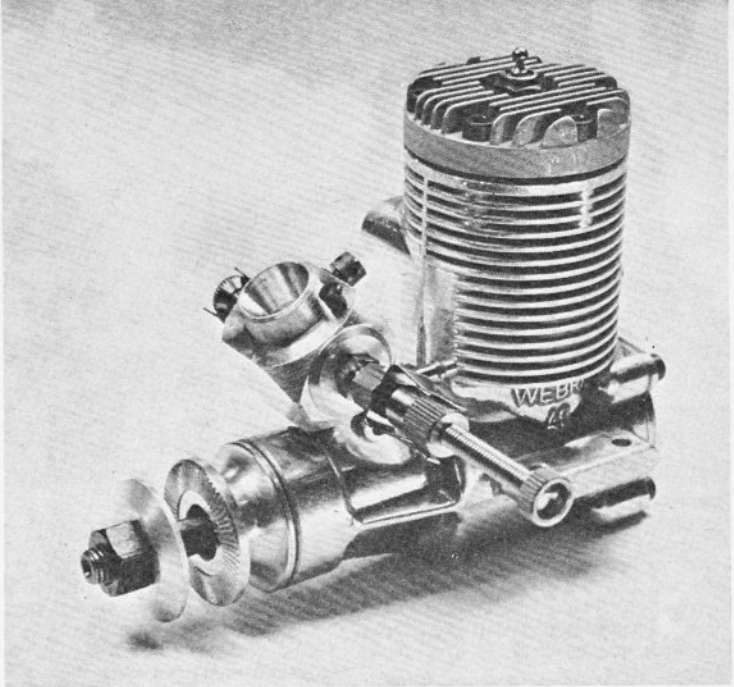
Peter Chinn tests the

WEBRA SPEED 40

"...easy to handle and very powerful"



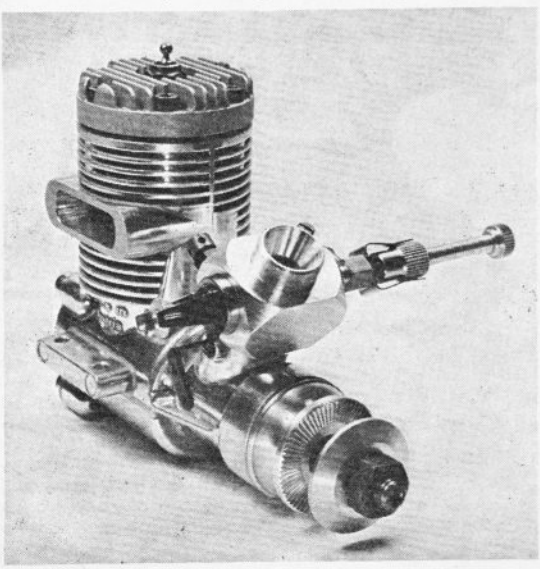
FIRST MARKETED just over a year ago, the Webra Speed 40, as its name suggests, is basically a scaled down version of the Webra Speed 61. These engines, designed by ex HP designer Peter Billes, are made in the Austrian Webra factory, as distinct from the German Webra Blackhead 61 and 40 models that were designed by the late Gunther Bodemann and which are made in Berlin. The main differences between the "Speed" type and the earlier models are to be found in their porting system. The German engines have conventional crossflow scavenging with baffled pistons and diametrically opposed multiple bridged exhaust and transfer ports, whereas the "Speed" engines are Schnuerle scavenged motors with flat crown deflectorless pistons and three transfer ports each fed from a separate channel and angled to direct incoming gas away from the single bridged exhaust port and up into the combustion chamber.

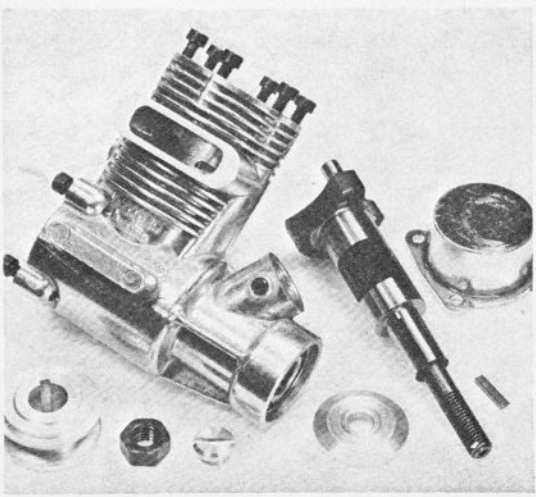
The Speed 40 is slightly larger all round and appreciably heavier than the standard Webra 40, but partially makes up for this by achieving a higher level of performance. In appearance, the engine looks very much like the Speed 61 except in the region of the crankcase front end which, unlike all previous Webra 61 and 40 models, is not detachable. Like the O.S. Max 40F-SR dealt with in the May 1976 issue, the Speed 40 has a "60 size" (i.e. 15mm o.d.) crankshaft main journal and is aimed at the upper end of the "40" market where it is priced accordingly.

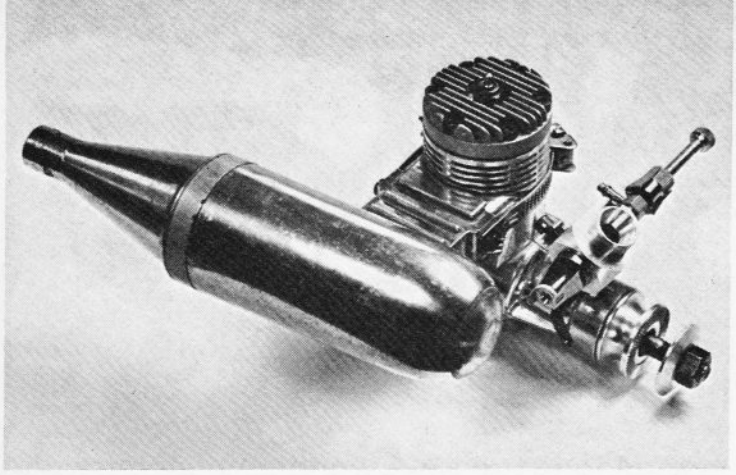
Design and construction summary

Main casting. This consists of the crankcase, full-length finned cylinder casing and front housing in a single pressure die cast aluminium unit. It incorporates cast-in transfer channels, an exhaust duct on the right side, an inclined intake boss and the usual beam mounting lugs.

Cylinder liner. Hardened steel (some earlier examples have chromium plated bore) with 1.7mm wall thickness, tightly fitted to main casting and located by usual top flange. Centrally bridged exhaust port on right side timed to open and close at 75 deg. each side of BDC. Two







main transfer ports flanking exhaust, angled to direct gas to left side of cylinder and timed to open and close at 60 deg. each side of BDC. Rectangular third port, diametrically opposite exhaust port, chamfered to sweep gas upward and timed to open and close at 56 deg. each side of BDC.

Crankshaft and bearings. Counterbalanced hardened steel crankshaft with 15mm o.d. main journal, 3/8in. dia. front journal and integral 5.5mm o.d. hollow crankpin. Rectangular valve port, 14mm long, timed to open at 35 deg. ABDC and close at 50 deg. ATDC and admitting gas to 9.0mm i.d. gas passage.

The crankshaft is counterbalanced by means of cutaway web flanks and is supported in one 15×28mm 9-ball steel caged ball bearing at the rear and one $\frac{3}{8}\times\frac{7}{16}$in. 8-ball brass caged bearing at the front. Ahead of the front bearing, the $\frac{3}{8}$in. shaft length is fitted with a machined aluminium prop driver, both components being milled for a 2.5mm square sunk key. The shaft terminates in a $\frac{1}{4}$-28 UNF thread for the prop nut.

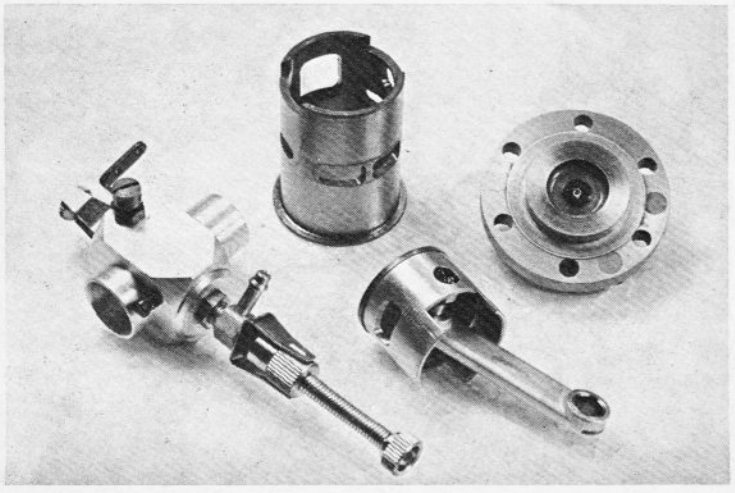
Piston and connecting-rod assembly. Flat crown forged aluminium alloy piston with rectangular skirt cutaways front and rear and rectangular port window on third port side. Single Dykes type piston ring, pinned to prevent rotation. Forged aluminium alloy connecting-rod, 35mm between centres, bronze bushed with oil slits at both ends. Hardened 5mm o.d. tubular gudgeon pin retained by wire circlips.

Cylinder-head and backplate. Pressure die cast aluminium alloy finned cylinder-head with bowl shaped combusion chamber surrounded by sloped 4.2mm wide squishband. Head secured to cylinder casing with six M3.5×0.6 Allen head cap screws. Soft aluminium gasket, 0.2 mm thick on test engine. (Other examples may have different thickness gaskets.)

Deeply recessed pressure diecast aluminium alloy crankcase backplate secured to crankcase with four M3.5 ×0.6 Allen head cap screws. Paper gasket.

Carburettor. Webra TN two-needle automatic mixture control type. Machined aluminium alloy body. Ground steel throttle barrel. Low-speed mixture needle mounted in outer end of throttle barrel. Throttle barrel moves sideways as it is rotated so that low-speed needle tip enters main jet as throttle is closed, thereby reducing fuel flow. Idle mixture adjustable by screwing low speed needle in or out. Main mixture control via orthodox needle-valve assembly installed in closed end of body. 7.5mm i.d. throttle barrel choke giving nominal effective choke area of 28sq.mm. 8mm. i.d. choke optional, giving effective choke area of approximately 33sq.mm.

Silencer. The maker's silencer for the Speed 40 is a new, large (the same silencer is supplied for use with the Webra Speed 61), baffled expansion chamber type. It is of pressure die cast aluminium alloy and is fixed to the engine by means of an Italian "Serratus" worm-drive hose-clip type strap around the cylinder casing. This silencer is 156mm (6$\frac{1}{8}$in.) long, 40mm o.d., has an outlet area of 95sq.mm. and weighs 122 grammes (4.3 oz.).



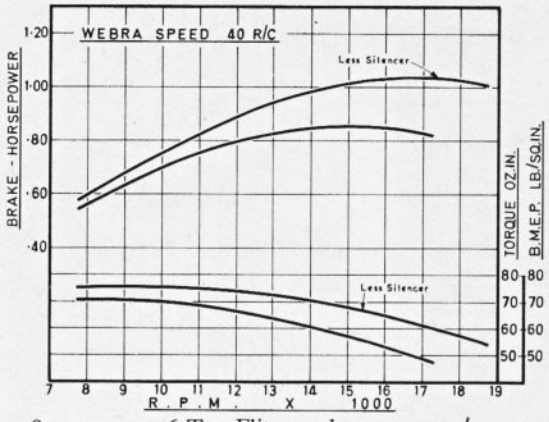
Test performance

Our test sample came direct from the manufacturer. It had been test run before shipment but was nevertheless subjected to our standard running-in procedure using a straight 75/25 mixture of methanol and castor-oil. For the actual performance testing we switched to a 5/20/75 blend of nitromethane, castor-oil and methanol—which is in accordance with the manufacturer's recommendation. Glowplugs used were Webra No.3 platinum filament long-reach standard type. Atmospheric temperature at the time of testing was 8 deg.C (46 deg.F) and barometric pressure was 1018 mb (30.06 in.Hg).

Starting and Running. The Speed 40/s handling qualities were excellent. The engine was hand-started easily on a wide variety of prop sizes both hot and cold.

Running qualities were also good. There was a tendency for speed to fluctuate 100-200 rpm and for the engine to lose power on warming up when loaded for speeds below 12,000 rpm, but the Webra overcame these tendencies when allowed to run nearer to its peak output speeds. Vibration levels were below average.

Power—with silencer. A check on prop revs with the silencer fitted indicated that this silencer accounts for a loss of between 250 rpm and more than 1,000 rpm, depending on the prop used, over the usable load speed range. Prop rpm figures recorded included 9,300 rpm on a 12×6 Top Flite maple, 10,700 on a 12×5 Power Prop, 11,100 on a 11×6 Top Flite maple, 11,800 on an 11×6 Power-Prop maple, 11,350 on an 11×5 Taipan glassfibre nylon,



12,800 on a 10×6 Top Flite maple, 13,400 on a 10×6 Taipan glassfibre nylon, 14,100 on a 9×6 Top Flite maple and 14,900 on a 9×6 Taipan glassfibre nylon.

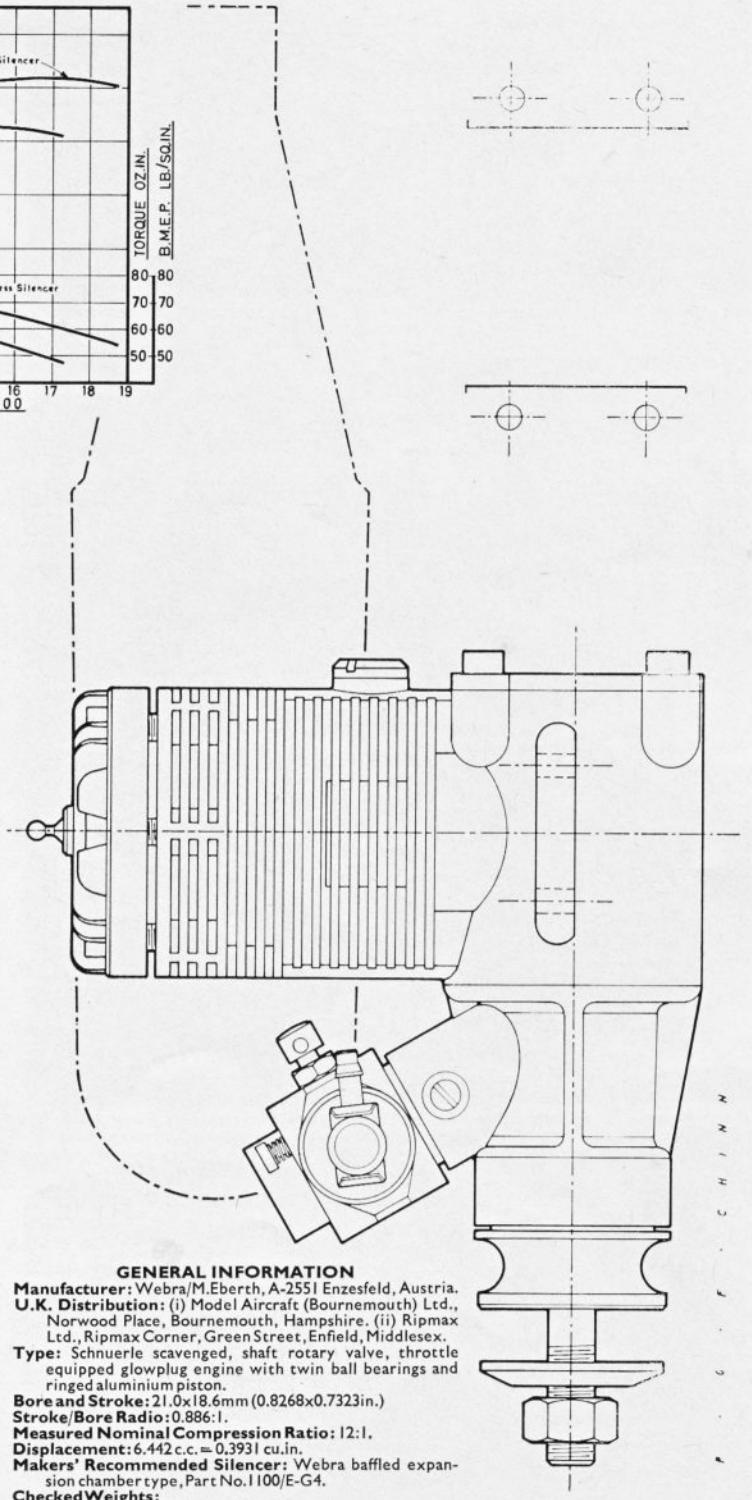
Maximum torque was realised at approximately 9,000 rpm with a figure of just over 70 oz.in. A maximum power output of 0.85 bhp at 15,000 rpm was determined from the torque and rpm readings obtained.

Power—less silencer. With a gross (open exhaust) output on 5 per cent nitro fuel of over 1.0 bhp at between 14,500 and 19,000 rpm, the Webra Speed 40 R/C emerged as one of the two most powerful .40 cu.in. R/C "pattern" engines (the other being the O.S. Max 40F-SR) featured in this test series to date. Using the optional enlarged (8 mm) choke, in place of the standard 7.5mm size, gave a further increase in torque and power sufficient to raise revolutions by an average of 200 rpm on all practical prop sizes.

Throttling. The well-tried Webra TN carburettor worked well and provided a safe idling speed of 2,500 rpm on a 10×6 prop with good recovery and satisfactory mid-range control. A useful feature of the Webra TN carburettor is the recessed screwdriver slot in the idle needle enabling the low speed mixture to be adjusted while the engine is idling.

Comment

Easy to handle and very powerful, with low vibration and good throttle. Well made, although comparison with other examples suggests that occasional dimensional variations in component parts, outside normal manufacturing tolerances, may need to be borne in mind when replacing parts. Fairly heavy, especially when fitted with Webra 1100/E-G4 silencer but robustly constructed. Silencer reasonably effective.



P. G. F. CHINN

GENERAL INFORMATION

Manufacturer: Webra/M.Eberth, A-2551 Enzesfeld, Austria.
U.K. Distribution: (i) Model Aircraft (Bournemouth) Ltd., Norwood Place, Bournemouth, Hampshire. (ii) Ripmax Ltd., Ripmax Corner, Green Street, Enfield, Middlesex.
Type: Schnuerle scavenged, shaft rotary valve, throttle equipped glowplug engine with twin ball bearings and ringed aluminium piston.
Bore and Stroke: 21.0x18.6mm (0.8268x0.7323in.)
Stroke/Bore Radio: 0.886:1.
Measured Nominal Compression Ratio: 12:1.
Displacement: 6.442 c.c. = 0.3931 cu.in.
Makers' Recommended Silencer: Webra baffled expansion chamber type, Part No. 1100/E-G4.
Checked Weights:
(i) 352 grammes—12.4 oz. (less silencer).
(ii) 474 grammes—16.7 oz. (with silencer).