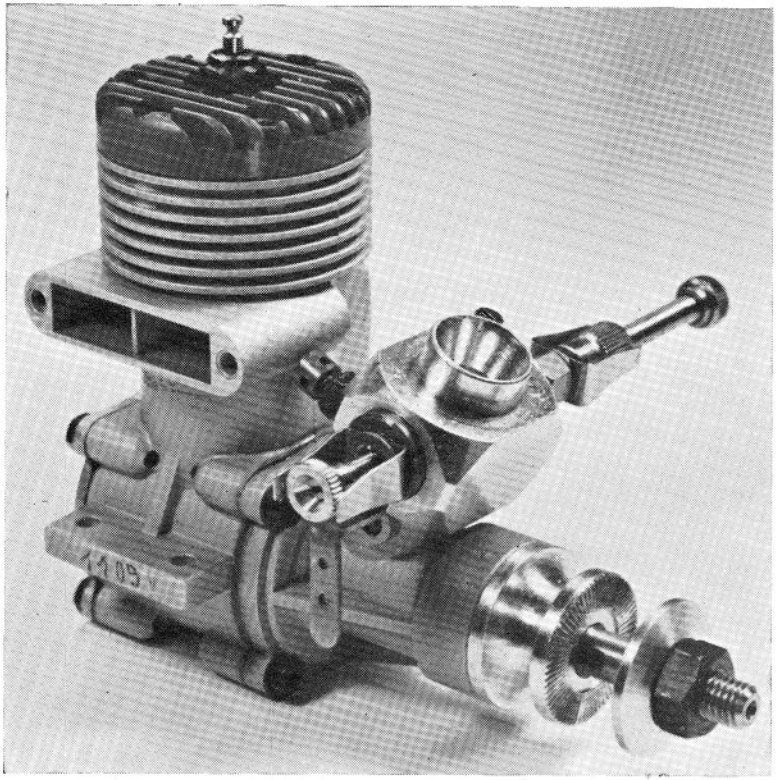


Peter Chinn tests the WEBRA 40 R/C

"... well made, powerful, smooth running..."

THIS new engine from Germany's leading model engine manufacturer is based on the highly successful Webra 61 R/C "Blackhead." Both were designed by Guenther Bodemann who has now been engaged in the design of commercial model i.c. engines for some 20 years.

The Webra 40 R/C is of orthodox design and is intended primarily as a high performance R/C engine for aerobatic and general R/C flying, rather than as a pylon racing 40. As such, it is claimed to be one of the most powerful engines in its class and, as the following report shows, this was confirmed on test.

Design & Construction Summary

Main Casting. This comprises the crankcase barrel and full length cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs and an exhaust duct on the right side, the ends of which are drilled for the silencer fixing studs.

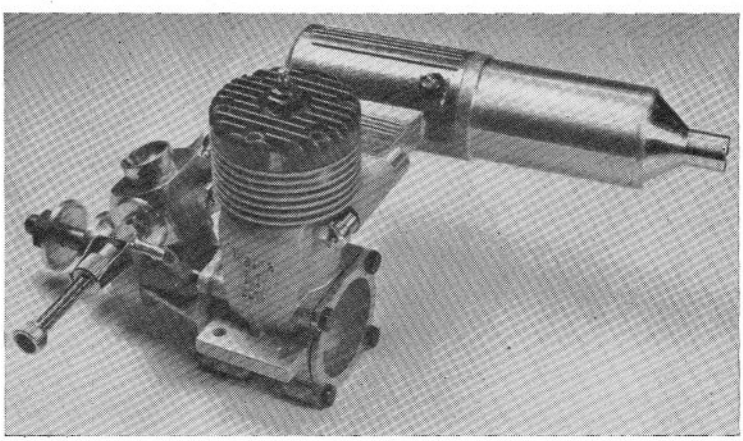
Cylinder Liner. Of hardened, ground and honed steel. Six exhaust ports timed to open and close 67 deg. each side of BDC. Four transfer ports timed to remain open 55 deg. each side of BDC. One 7 mm. dia. skirt transfer port.

Crankshaft and Prop Drive Assembly. Counterbalanced non-hardened steel crankshaft having 12 mm. dia. main journal, 7 mm. dia. front journal and 5 mm. dia. pressed-in hardened crankpin. Rectangular valve port, timed to open at 20 deg. after BDC and to close at 55 deg. after TDC and admitting gas to 8.5 mm. bore gas passage through main journal. Machined aluminium alloy prop driver on parallel 7 mm. shaft length and fixed by 2.5 mm. square sunk key.

Front Housing and Backplate. Pressure diecast aluminium alloy bearing housing with 11 mm. i.d. intake boss for carburettor and containing one SKF 8-ball 12 × 28 mm. (rear) and one SKF 8-ball 7 × 19 mm. (front) brass caged ball journal bearings. Housing aligned in crankcase barrel by o.d. of rear ball bearing and secured with four socket head screws. Pressure diecast aluminium alloy crankcase backplate attached with four hexagon head screws.

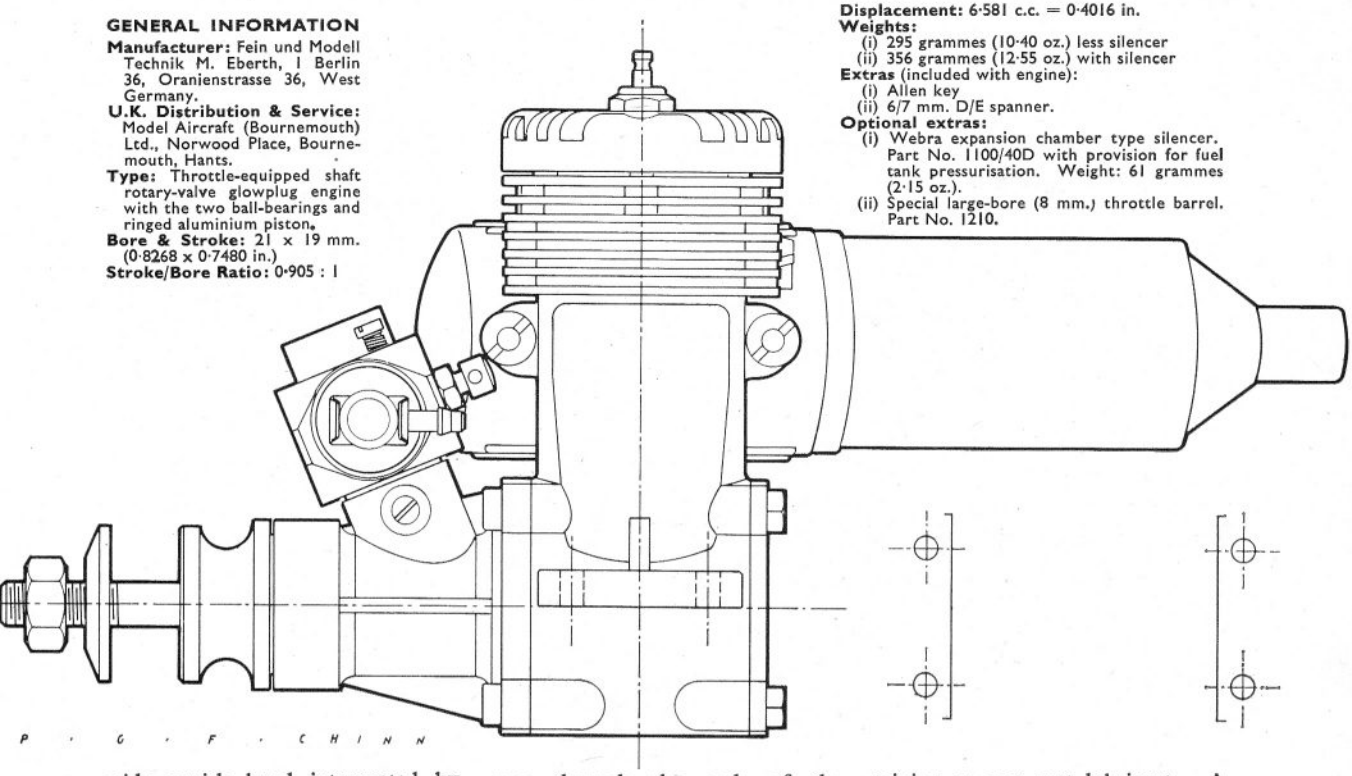
Piston and Connecting-Rod Assembly. Forged Mahle aluminium piston with flat crown, straight baffle and one 7 mm. dia. skirt transfer port. Single compression ring. Forged aluminium alloy connecting-rod with unbushed eyes and oil holes at both ends. Hardened, finely ground 5 mm. dia. solid gudgeon-pin closely fitted to piston bosses and retained by wire circlips.

Cylinder-Head. Pressure diecast colour-anodised (dark grey) aluminium alloy, finned, with central plug hole and attached with six socket head screws. Hemispherical combustion chamber with 2 mm.



GENERAL INFORMATION

Manufacturer: Fein und Modell Technik M. Eberth, 1 Berlin 36, Oranienstrasse 36, West Germany.
U.K. Distribution & Service: Model Aircraft (Bournemouth) Ltd., Norwood Place, Bournemouth, Hants.
Type: Throttle-equipped shaft rotary-valve glowplug engine with the two ball-bearings and ringed aluminium piston.
Bore & Stroke: 21 x 19 mm. (0·8268 x 0·7480 in.)
Stroke/Bore Ratio: 0·905 : 1
Displacement: 6·581 c.c. = 0·4016 in.
Weights:
(i) 295 grammes (10·40 oz.) less silencer
(ii) 356 grammes (12·55 oz.) with silencer
Extras (included with engine):
(i) Allen key
(ii) 6/7 mm. D/E spanner.
Optional extras:
(i) Webra expansion chamber type silencer. Part No. 1100/40D with provision for fuel tank pressurisation. Weight: 61 grammes (2·15 oz.).
(ii) Special large-bore (8 mm.) throttle barrel. Part No. 1210.



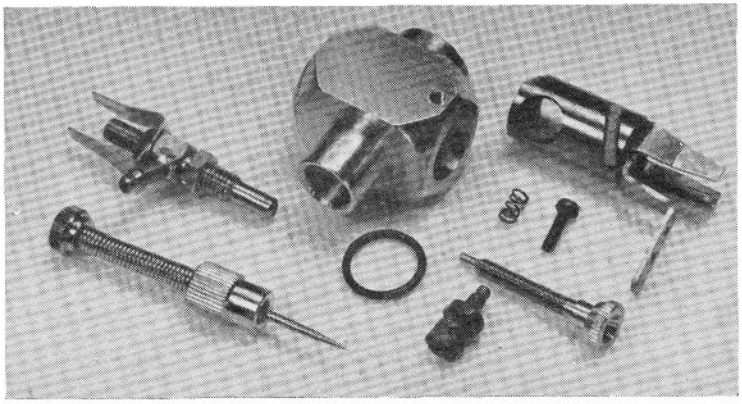
wide squish band interrupted by slot for piston baffle clearance.

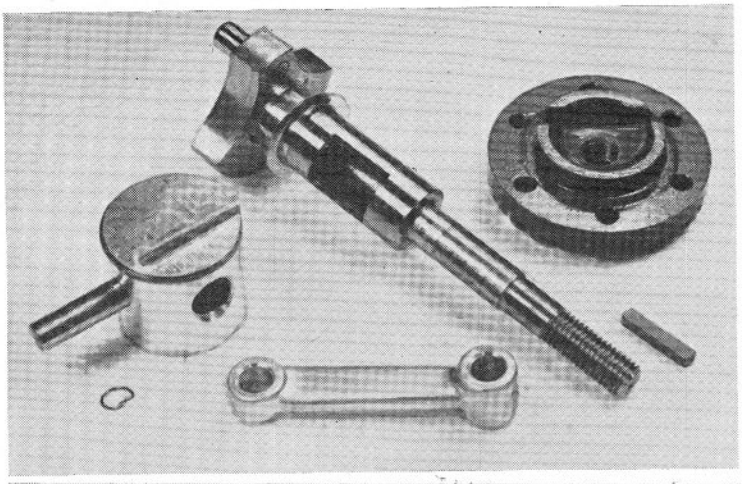
Carburettor. Webra Type TN with automatic mixture control. Machined aluminium alloy carburettor body with ground steel throttle barrel which describes helical path in body. Installed in outer end of barrel is the needle which controls idling mixture and, as barrel moves towards closed position, the tip of this needle enters main jet, thereby reducing fuel flow. The strength of the idling mixture is adjustable by screwing idling screw in or out. Main mixture control is via an orthodox needle-valve assembly installed in opposite end of carburettor body. Standard choke bore is 6.5 mm. and gives an effective choke area of 23 sq. mm. Optional choke for extra power has 8.0 mm. bore and makes possible an effective choke area of 38 sq. mm.

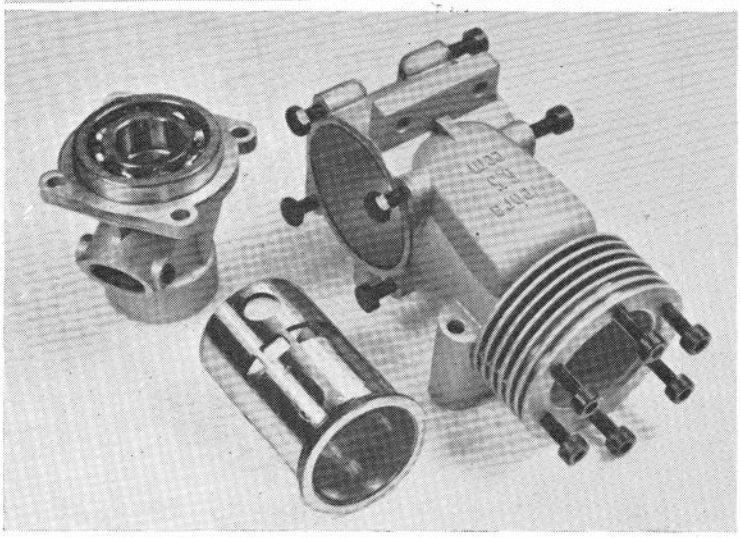
Silencer. The standard Webra silencer for this engine is a conventional cylindrical expansion chamber without baffles and is made in two parts comprising a pressure diecast body and inlet duct, with screw-in machined rear section and 9 mm. i.d. outlet. It includes a screw-in brass outlet nipple to enable exhaust gas pressure to be used to pressurise the fuel tank. The silencer is neatly attached by means of two threaded studs which pass through the ends of the engine's exhaust duct where they are secured by spring washers and brass nuts. The silencer is angled outward 7 deg. to the engine's centre line.

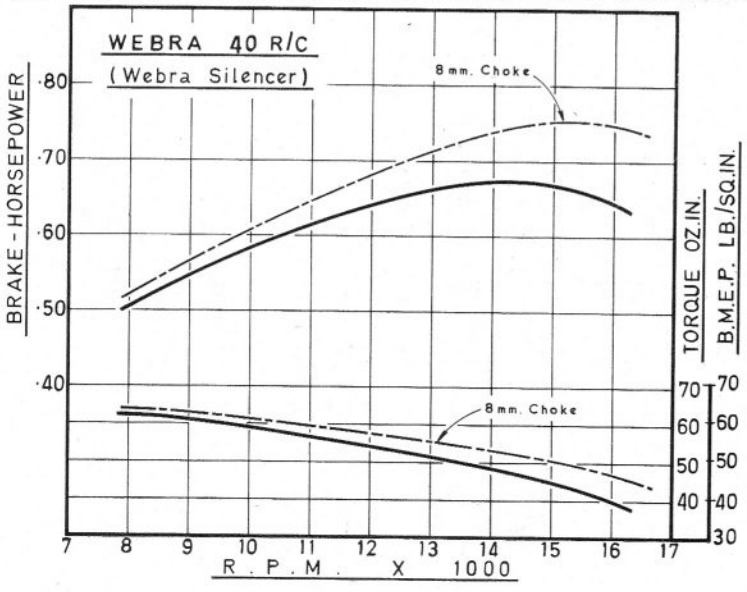
Test performance

Two engines were submitted for test. They came directly from the factory in Berlin but were absolutely stock and had not been run-in. In accordance with the manufacturer's recommendation, initial running-in was carried out on a straight methanol castor-oil mixture containing 30 per cent lubricant. A brief check at this stage indicated that the two engines were very closely matched as regards performance and handling qualities, after which, further running-in and tests were concentrated on one engine. After a total of approximately 1½ hours running time, a change was made to our standard R/C test fuel containing 5 per cent pure nitromethane and 20 per cent castor-oil. Atmospheric temperature at the time of testing was 22 deg. C. (72 deg. F.) and barometric pressure was 30.30in. of mercury. Glow-









plugs used were the standard non-shielded Webra type as supplied with the engine.

Starting and Running. Excellent compression was provided by the Webra's high quality piston ring and, as a result, starting at all times was good. Even when the engine was brand new, i.e. before the ring had become bedded in, compression was good enough to give reasonably easy starting when the motor was warm and very quick starting when cold. The only time that starting became difficult was when the engine was mistakenly choked prior to a warm restart. The best restart procedure here was to close the throttle and flick the prop *without* sucking-in.

Running qualities were also good. At load speeds below about 11,000 r.p.m, there was a slight power loss as the Webra warmed up from cold but this disappeared when the engine was propped for higher speeds. On straight methanol/castor fuel, there was also a tendency for full-throttle rpm to fluctuate through about 200 r.p.m., but this disappeared when nitro fuel was used and the engine then held very steady speeds. Under all conditions, vibration levels were pleasingly moderate.

Power

The version of the Webra TN carburettor fitted as standard to the 40 has a choke diameter only halff a-millimetre smaller than that o-the Webra 61 and its effective choke area of 23 sq. mm. is large for a standard (i.e. non racing) type 40 R/C engine. Indeed, it is as large as on some 60's. Undoubtedly, this contributres to the 40's good power output in standard trim. With the standard silencer fitted, b.h.p. reached approximately 0.67 at 14,000 r.p.m. Low speed torque remained good.

We also tried the Webra 40 with the optional 8 mm. choke which can be used to increase effective choke area by another 60 per cent. This did not make a great deal of difference to low speed torque but there was a substantial top end gain and we recorded a peak b.h.p. of 0.75 at just over 15,000 r.p.m.

The Webra 40 silencer has an outlet area of 64 sq. mm. which is the same as for the Webra 61 silencer and, as one might expect, it did not, therefore, absorb as large a percentage of the engine's gross power output as does the standard silencer on the 61.

Typical prop r.p.m. readings obtained with the standard choke and silencer included 8,600 r.p.m.

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ENGINE TEST

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on an 11 × 7¾ Bartels fibreglass prop, 10,300 r.p.m. on an 11 × 6 Top-Flite maple, 10,800 on an 11 × 6 Power-Prop maple, 11,400 on an 11 × 5 Power-Prop standard, 11,800 on a 10 × 6 Top-Flite maple and 13,200 r.p.m. on a 9 × 6 Top-Flite maple. Switching to the 8 mm. choke and discarding the silencer raised these figures by steadily increasing increments as prop size was reduced. The actual improvements ranged from 200 r.p.m. on the 11 × 7¾ Bartels to a 1,200 r.p.m. increase in revolutions on the 9 × 6.

The manufacturer's recommended prop sizes for normal R/C work are 11 × 5 and 10 × 6. These would seem to be appropriate. Reasonably "fast" examples of each should allow revolutions to approach within 1,000 r.p.m. or so of the peak of the power curve in level flight.

Throttling

It was found necessary to establish a fairly precise idle needle setting to avoid the risk of the engine cutting in the mid range throttle position but once this had been done the TN carburettor provided a very low idle and good intermediate response, especially when the tank was pressurised off the silencer fitting. The latter was particularly helpful when the 8 mm. choke was used.

Comment

Fairly expensive but a nice motor. Well made, powerful, smooth running and easy to handle. Good throttle and silencer.