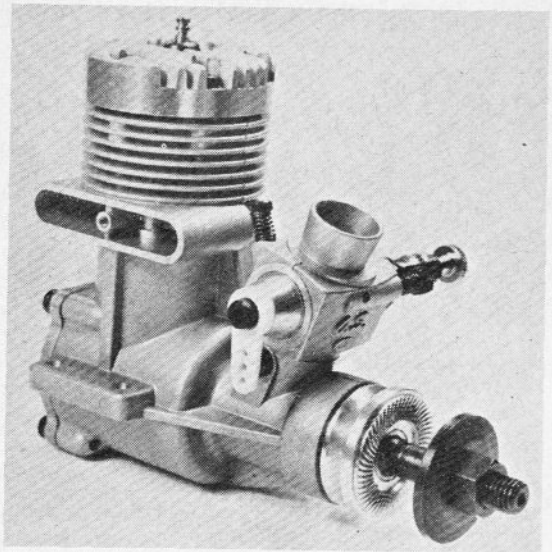


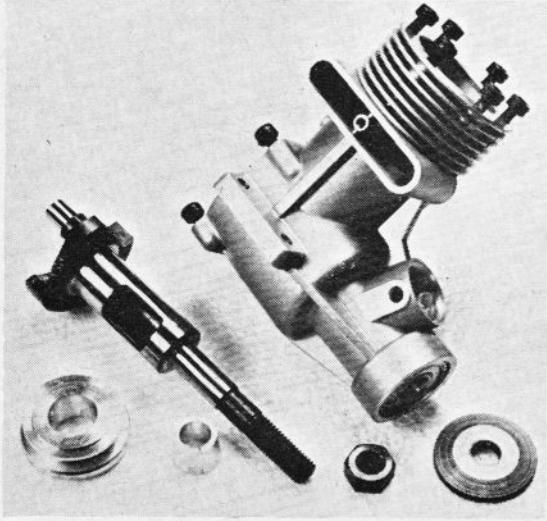
Peter Chinn tests the O.S. MAX 40 R/C

PRODUCTION of this latest .40 cu. in. radio-control engine from O.S. began in September last year and first deliveries were made to the U.K. market about six months ago. The engine has been favourably received in home and overseas markets and demand considerably outstrips supply at the present time.

This new model replaces the O.S.40-SP and O.S.40-P models introduced in 1966 and 1968, respectively, and is a completely new motor (parts are *not* interchangeable with those of its predecessors) in which the aim has been to improve on both the performance and durability of the previous models.

Among the features of this redesigned O.S.40 is a new piston with phosphor-bronze bushed bosses which, together with a new conrod having phosphor-bronze bushes at both ends, should stand up rather better to the sort of abuse that occasionally caused wear problems with the 40P. The piston reverts to the Dykes type ring used in the early production 40P and now runs in a cylinder-liner of hardened chromium-molybdenum steel that has a 50 per cent larger exhaust port area. Piston stroke has been reduced (and cylinder bore enlarged correspondingly) but conrod length is slightly increased. The combustion chamber is now of the squish type and the crankshaft is rebalanced for reduced vibration. The shaft continues to run in twin ball-bearings, supplemented by a phosphor-bronze bushing between them. Mounting dimensions are the same as for the 40P except for a very slightly increased (1 mm.) frontal overhang.

A high standard of quality control is maintained during manufacture. This is seen in the finish of the individual parts of the engine and in the accuracy with which they are made, tolerances being such that the performance levels of individual engines are very closely matched. This, one might add, is something that not every manufacturer manages to achieve.



Design and Construction Summary

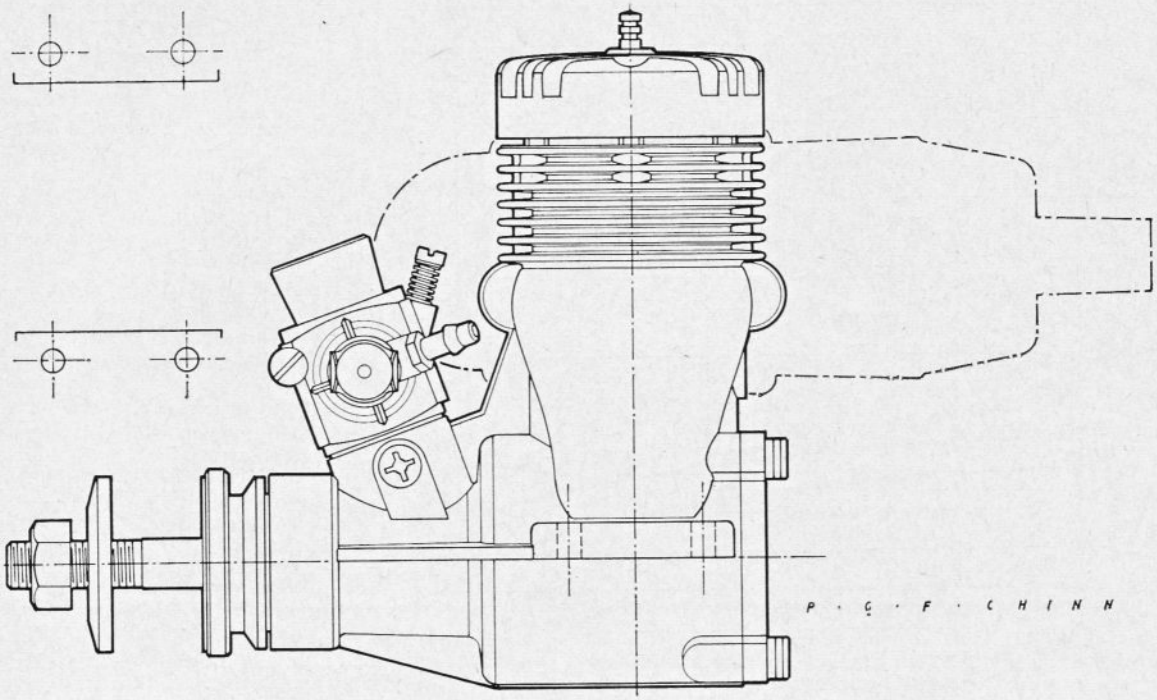
Main Casting. This comprises the crankcase, front housing and full length cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs and a short exhaust duct on the right side.

Cylinder. Finned cylinder casing integral with crankcase and fitted with hardened chromium-molybdenum steel liner. Six exhaust ports timed to open and close at 68deg. each side of BDC. Four transfer ports timed to open and close at 56deg. each side of BDC. Two 6 mm. dia. skirt transfer ports.

Crankshaft and Prop Drive Assembly. Counterbalanced hardened steel crankshaft with 13 mm. o.d. main journal and 7 mm. front journal. Integral 5.5 mm. o.d. hollow crankpin. Rectangular valve port timed to open at 38deg. after BDC and to close at 48deg. after TDC and admitting gas to 9.8 mm. bore gas passage through main journal. Shaft supported in one 13 x 28 mm. 8-ball steel-caged NTN ball journal bearing at rear and one 7 x 19 mm. 7-ball steel-caged NTN ball journal bearing at front, with phosphor-bronze bush between front and rear bearings. Machined aluminium alloy prop driver on alloy split taper collet.

Piston and Connecting-rod Assembly. Piston machined from A7075-T6 aluminium alloy bar and fitted with phosphor-bronze bushes for gudgeon-pin. Piston has flat crown, straight baffle and two 6 mm. dia. skirt transfer ports and is equipped with single Dykes type compression ring. Connecting-rod machined from A7075-T6 aluminium alloy bar, 33 mm. between centres and fitted with phosphor-bronze bushes at both ends. Fully floating 4.5 mm. o.d. tubular gudgeon-pin with Teflon pads.

Cylinder Head. Pressure diecast aluminium alloy, finned, with 3.7 mm. wide squish band, slotted for piston baffle clearance. Bowl shaped combustion chamber with central plug hole having brass thread insert. Recessed 0.4 mm. soft aluminium gasket. Head



secured to main casting with six Allen type hardened chromium-molybdenum steel cap screws.

Backplate. Pressure diecast aluminium alloy secured to crankcase with four Allen type chromium-molybdenum steel cap screws.

Carburettor. O.S. Type 4A barrel-throttle carburettor with airbleed idling mixture control. Pressure diecast aluminium alloy body with brass jet tube and separate plated brass needle-valve holder. Separate fuel inlet nipple. Adjustable nylon throttle arm. Spring loaded adjusting screw for throttle stop and low speed mixture control. Effective choke area approximately 25 sq. mm.

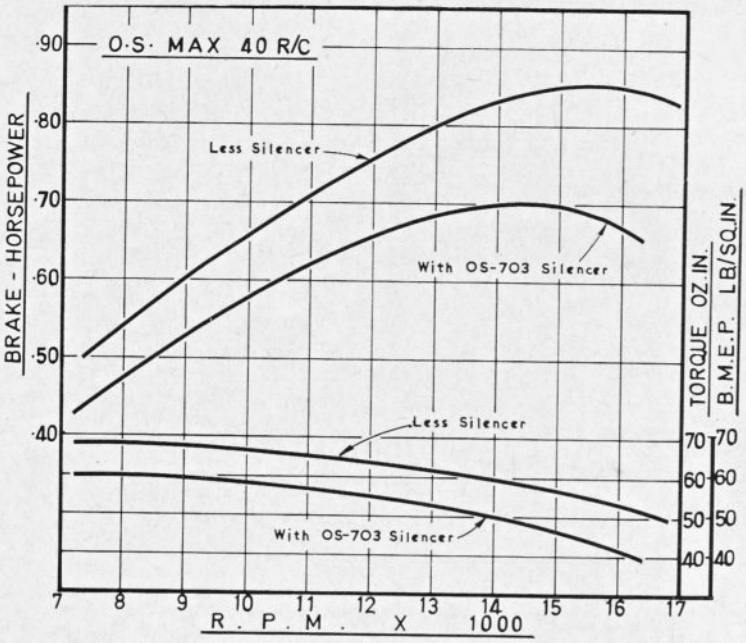
Silencer. The standard silencer for this engine is the O.S.-703 expansion chamber type. This silencer is made in two parts. The detachable rear section has an offset tailpipe and can be rotated through 360 degrees for the most convenient outlet position. The outlet i.d. is 6 mm., restricting the outlet area to a mere 28.3 sq. mm. but can be reamed out to, say, 8 mm. (just over $\frac{5}{16}$ in.) to reduce power loss, where a higher noise level can be tolerated. The O.S.-703 has provision for exhaust priming via a screwed-in brass priming nozzle and is equipped for fuel tank pressurisation via a screw-in brass outlet, also supplied.

Test Performance

Our test sample came direct from the manufacturer slightly in advance of the motor's introduction to the U.K. market. It was a perfect stock example and a second, off-the-shelf sample, picked at random, which was checked against it some months later, proved to have at least equal performance.

Running-in was carried out, as usual, on a 75/25 mixture of methanol and Duckham's castor-oil and followed our usual pattern of a series of short (approx. 2 minute) runs with cooling off periods between each, starting off rich and then, towards the end of the series, leaning out to full power. A 10 x 6 prop was used for running-in.

All performance tests were carried out on our standard R/C test fuel containing 5 per cent pure nitromethane, 25 per cent castor-oil and 70 per cent methanol. Actually, 20 per cent castor-oil appears to be quite adequate after the engine has had two or three hours' running, provided that one does not set the needle-valve to too weak a setting. (In view of the uncertainty surrounding



GENERAL INFORMATION

Manufacturer: Ogawa Model Manufacturing Co. Ltd., Osaka 546, Japan.

U.K. Distributor: E. Keil & Co. Ltd., Russell Gardens, Wick Lane, Wickford, Essex.

Type: Throttle equipped, shaft rotary valve glowplug ignition engine with twin ball bearings and ringed aluminium piston.

Bore & Stroke: 21.2 x 18.4 mm. (0.8346 x 0.7244 in.).

Stroke/Bore Ratio: 0.868:1.

Displacement: 6.495 c.c. or 0.3964 cu. in.

Checked Weights:
(i) 275 grammes—9.7 oz. (less silencer).
(ii) 338 grammes—11.9 oz. (with standard OS-703 silencer).

Equipment included:
(i) OS-703 silencer and optional pressure nipple.
(ii) Allen key for assembly screws.
(iii) Rubber dust plug for exhaust.

the use of synthetic lubricants at the present time, we are inclined to counsel against the use of fuels containing *only* synthetic oil).

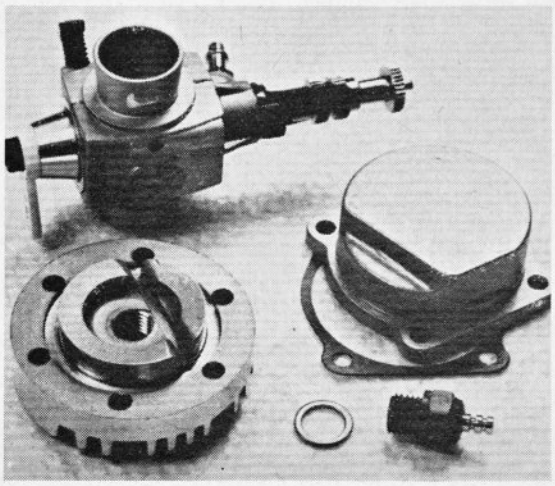
Atmospheric temperature at the time of testing was 12deg.C. (54deg.F.) and barometric pressure was 1031 mb. (30.44in.Hg.). The glowplug used was the medium-reach O.S. No.9, a platinum filament plug without idle-bar.

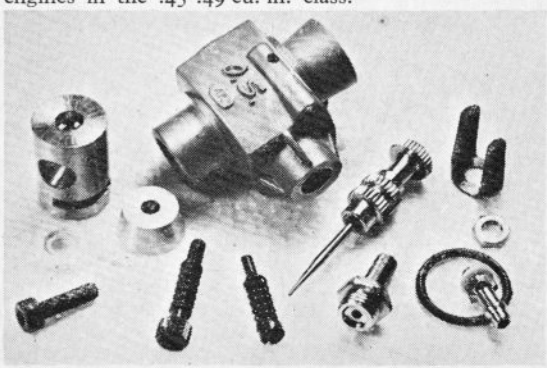
Starting and Running. The general handling and running qualities of this latest O.S.40 are hard to fault. Compression was excellent and, from new, starting, throttle closed, was virtually instantaneous. We simply " guesstimated " the needle setting, primed the cylinder with a few drops of fuel and the motor started from cold on the very first flick of the prop. Hot restarts were immediate without choking the intake. When the engine was just slightly warm, it would restart after one or two choked preliminary turns of the prop. When using the silencer nipple to pressurise the fuel tank, no choking was necessary. The engine exhibited no tendency to flood when using pressure. It remained easy to hand-start on all usable prop sizes.

Early production models of the 40 R/C were set up with rather less piston/cylinder clearance and took longer to thoroughly free-off than more recent examples. Our test motor was one of these early models and for some time after the nominal running-in period, tended, when using the silencer and when loaded for speeds below 12,000 r.p.m., to lose up to 400 r.p.m. between cold and hot readings.

Running qualities were otherwise very good with smooth firing and a moderate level of vibration. The 40 was not critical as regards fuel and fired steadily and smoothly on straight methanol/castor fuels.

Power—Less Silencer. A gross output of 0.85 b.h.p. at 15,500 r.p.m. was determined for the Max 40 R/C using standard 5 per cent nitro fuel. This puts the O.S. right in the top performance bracket so far as front induction 40's are concerned, alongside the HP 40F, K & B 40F and Webra 40 and ahead of many engines in the .45-.49 cu. in. class.

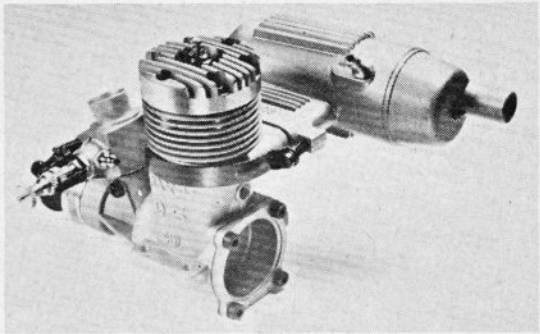




Typical prop r.p.m. recorded on test included 10,500 on a 12 x 5 Power-Prop standard, 11,400 on an 11 x 6 Power-Prop maple, 12,500 on an 11 x 5 Power-Prop standard, 12,700 on a 10 x 6 Top-Flite maple, 13,200 on an 11 x 4 Top-Flite standard, 13,600 on a 10 x 5 Super glassfibre reinforced nylon and 14,200 on a 9 x 6 Top Flite maple.

Power—With Silencer. Unlike the extremely noisy open-front Hirtenberger silencer which causes no loss of power with the HP 40F engine, the O.S.-703 silencer is very quiet, but knocked 500-1,000 r.p.m. off the prop revs quoted above on test and reduced peak output to 0.70 b.h.p. In actual flight tests this has still proved more than adequate to convincingly fly some of the lighter aerobatic models normally seen with 8-10c.c. power units but, where a higher noise level is acceptable, some of the Max 40's high potential can be released by enlarging the 703's small tailpipe as mentioned earlier.

Throttling. Despite the fact that the 4A carburettor is not of an automatic fuel metering type, the Max 40's response to the throttle control was most impressive. On a 10 x 6 prop (probably the best size generally for aerobatic work) the engine throttled down to a mere 2,200 r.p.m. with good mid-range control and safe



recovery. On larger props, steady idling down to less than 2,000 was obtained. Response to needle-valve adjustment was good. Using pressurised fuel feed increases needle response and a lower setting is necessary, of course, but the control remains non-critical.

Comment

One of the best of currently available front induction 40's. High quality construction, powerful, easy to handle, good throttle. Effective silencer included. Reasonably priced.