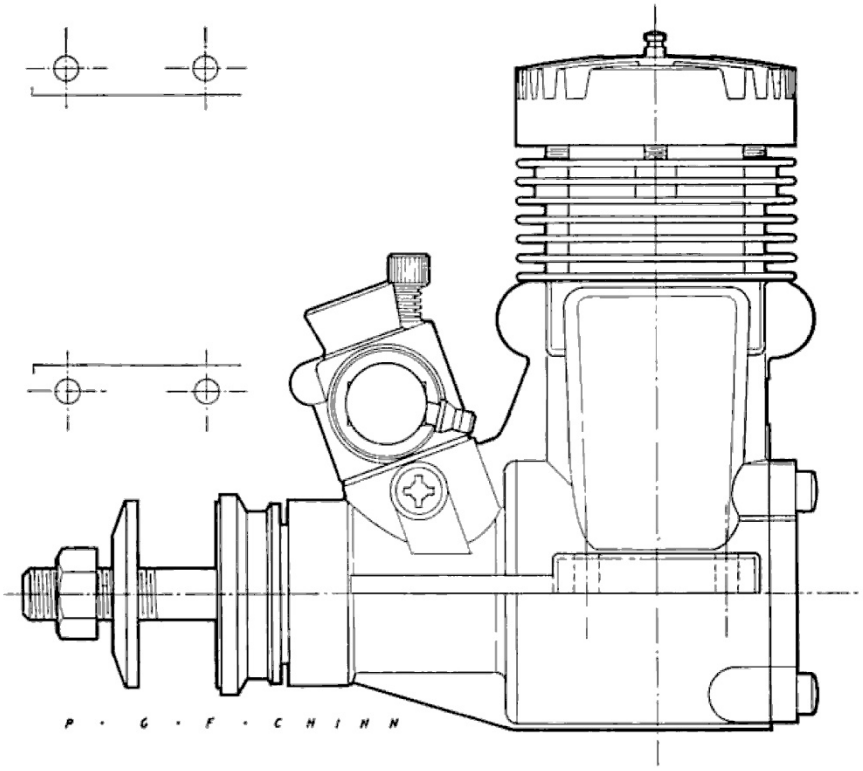
O.S Max-H 40P

ENGINE TEST

by Peter Chinn

O.S. MAX H.40P



The O.S. Max H.40P, the first deliveries of which should have reached Keil kraft stockists by the time these words appear in print, was introduced earlier this year primarily as a power unit for Goodyear class radio controlled pylon racing models. The performance characteristics of the 40P, however, are such as to make it rather more than a specialised engine for just one particular type of R/C model.

Firstly, unlike some 'Goodyear' engines, the 40P still has sufficient throttle response for regular aerobatic and scale type R/C models and it could, having a weight and fuel consumption much lower than for a typical 'sixty', prove popular for the smaller multi models made possible by the lighter proportional radio now on the market.

Secondly, with its high power and excellent throttle range, the 40P has obvious possibilities for control-line Carrier class events. Thirdly, it is possible to convert the engine into a quite formidable C/L Rat-Racing engine. Here, one can replace the R/C carburettor with an H.40-RR type intake venturi and needle-valve assembly and run the engine on a pressurised fuel supply. The H.40-RR venturi is of machined aluminium and has a bore of 11.5 mm. dia. which, even after allowing for the spraybar, gives a cross-sectional choke area of approximately 62 sq. mm. against 23 sq. mm. for the R/C carburettor. We did not test the engine so fitted, but it is reasonable to assume that on suitable fuel an output well in excess of 1.0 b.h.p. would be obtainable. In this form, incidentally, the engine is reduced to a weight of 8.7 oz.

Basically, the 40P is a development of the O.S. Max H.40 (lapped piston) and H.40-SP (ringed piston) R/C engines. Outwardly, it looks similar to these models, but it uses new or modified parts throughout. A new crankshaft is employed giving slightly extended rotary-valve timing and, instead of being supported in one ball-bearing and one bronze bearing, the shaft is carried in two ball-bearings, the bronze bushing being retained but shortened to serve as the gas seal bearing length between them. A new machined prop driver on a split taper collet is used, making the engine slightly longer.

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The aluminium piston is fitted with a single Dykes type low-compression ring, has skirt ports and runs in a new cylinder with modified port timing. The cylinder-head forms a wedge pattern combustion chamber and is the same as that used by the Max H.40-RR control-line rat-racing engine. The carburettor body has a larger bore and no exhaust restrictor is fitted.

The 40P is strongly built and all parts are finely finished.

PERFORMANCE

After setting up our test model 40P, we primed it, attached the plug lead and it started on the very first flick of the prop. This instant cold starting continued through-out the tests. Hot restarts, on the other hand, were poor at first, due to the lack of compression seal provided by the piston ring before the engine had become properly run-in. This difference in starting qualities between hot and cold conditions, with a new ringed engine, is not uncommon and is due to the fact that when cold, the thick oil on the cylinder walls and in the piston-ring grooves provides a better seal. Once the 40P had become reasonably well run-in and the piston-ring had 'bedded-in, hot restarts were virtually instantaneous and particularly so when the engine was not fitted with its silencer. About sixty minutes of accumulated running time were necessary to reach this point. We gave the engine about another hour of running time on various props prior to carrying out torque tests.

Tested with standard O.S. Jetstream 'L' type silencer, the 40P registered a maximum torque of 60 oz.in. at 8,000 r.p.m. on standard 5 per cent nitro fuel. Torque fell off at an increasing rate as load was reduced resulting in the peak power being reached at about 12,400 r.p.m. with a figure just over 0.63 b.h.p.

While this is a very good figure for a silencer equipped R/C engine of only 6.5 c.c., it does not represent a very great improvement on the performance of the original standard lapped-piston Max-H 40 R/C engine tested some three years ago - it is the equivalent, in fact, of only two or three hundred extra revs under a given load at the upper end of the power curve.

It was a startlingly different story when we removed the silencer however. On a prop approximately matched to the peak revs with silencer, the H.40P turned up an additional 1,200 r.p.m. and on the subsequent dynamo-meter tests, recorded a 33 per cent increase in power to 0.84 b.h.p. at approx. 14,300 r.p.m. This extremely impressive performance is an improvement of some 20 per cent on the 'unsilenced' output of the early 40 R/C engine.

Obviously, the standard unmodified O.S. silencer causes an unacceptably high power loss on this particular engine. Some improvement should be possible by removing the silencer nozzle ring and opening out the silencer inlet duct, but users anxious to take the fullest possible advantage of the 4OP's exceptionally high potential, may feel it worth while to experiment with other types of silencers.

In view of the fact that, at the present time, there are no restrictions on the type of fuel used in 40 class engines for competition purposes, we also checked the 40P on a fuel containing 30 per cent laboratory grade nitromethane (equivalent to 42 per cent commercial 70/30 blended nitro). Such a fuel might, for example, be used for R/C pylon racing or for C/L Carrier and, with it, the maximum output of the 40P was further raised to 0.94 b.h.p. at 15,000 r.p.m.

Despite its outstandingly high performance, the 40P was one of the easiest handling engines that we have ever encountered in the 40 class and remained perfectly safe to hand start even on 9 inch diameter props. The carburettor was easy to adjust and, on props such as might be used for ordinary R/C work (e.g. 11x5, 10x6), would provide practical idling speeds of around 2,500 r.p.m. Running qualities were also good with a reasonably low level of vibration throughout the speed range.

Power/Weight Ratio (as tested):
0.96 b.h.p./lb. (with silencer, 5 per cent nitromethane)
1.58 b.h.p./lb. (less silencer, 30 per cent nitromethane)
Specific Output (as tested): 97 b.h.p./litre (with silencer, 5 per cent nitromethane)

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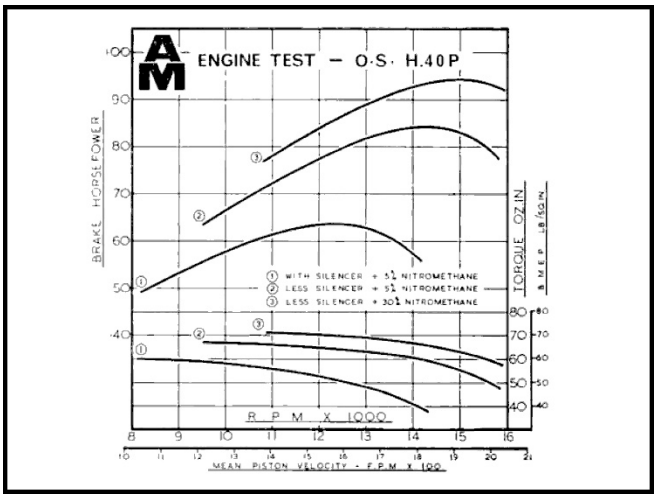
97 b.h.p./litre (with silencer, 5 per cent nitromethane)
145 b.h.p./litre (less silencer, 30 per cent nitromethane)



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SPECIFICATION

Type: Single-cylinder, air-cooled two-stroke cycle glowplug ignition with throttle control. Crankshaft type rotary-valve induction. Twin ball journal main bearing.
Bore: 20.6 mm. (0.8110 in.)
Stroke: 19.5 mm. (0.7677 in.)
Swept Volume: 6.499 c.c. (0.3966 cu. in.)
Stroke/Bore Ratio: 0.947:1.
Weight: 9.5 oz. (10.6 oz. with Jetstream *L' silencer).

General Structural Data

Pressure diecast aluminium alloy crankcase/cylinder/main bearing housing with detachable rear cover secured with four Phillips screws. Case-hardened steel counterbalanced crankshaft with 13 mm. dia. main journal, 9.8 mm. bore gas passage and 6.35 mm. dia. hollow crankpin. Shaft runs in one 13x28 mm. (rear) ball journal bearing and one 7x19 mm. (front ball journal bearing. Gravity cast and machined aluminium alloy piston with baffle, single Dykes type compression ring and two skirt transfer ports. Fully floating case-hardened 5.5 mm. dia. tubular steel gudgeon-pin with brass pads. Machined duralumin connecting- rod with two oil holes at big end. Hardened steel cylinder-liner located in cylinder casing by flange at top and secured by cylinder-head. Pressure die-cast and machined aluminium alloy cylinder-head with cast-in brass thread insert for glow-plug, recessed soft aluminium gasket and secured to cylinder casing with six Phillips screws. Pressure die-cast aluminium alloy carburettor body, seating on rubber gasket and secured with two screws. Ground brass throttle barret rotating in honed bearing surface in carburettor body. Separate idling and air-bleed adjustment screws. Plated brass spraybar assembly with flexible needle-valve extension. Machined aluminium alloy prop driver fitted to shaft with alloy split taper collet. Beam mounting lugs.

TEST CONDITIONS

Running time prior to start: 2 hours.
Fuels used; (a) 5 per cent pure nitromethane, 25 per

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cent Duckhams Racing Castor-oil, 70 per cent I.C.I. Methanol (Tests 1 and 2).
(b) 30 per cent pure nitromethane, 25 per cent Duckhams Racing Castor-oil, 45 per cent I.C.I. Methanol (Test 3).
Glow-plug used: O.S. No. 7 bar type, platinum filament, medium reach.
Air Temperature: 60 deg.F. Barometer: 29.75 in.Hg.
Silencer: O.S. Jetstream Type 'L'.