O.S Max III - .15

The O.S. MAX-III 15

2.5 c.c. Glow Plug Motor

"very light and compact for a high performance 2.5 c.c. . . ."

One of the most successful F/F engines of the past few years has been the O.S. 15 series. In its original Max-I form, the engine first aroused international interest when it was used by Ron Draper of Great Britain to win the World F/F Championship in 1956, an achievement which, with the Max-II model, was repeated in the to6o World Championships when Larry Conover of the U.S.A, was one of the joint winners after 17 consecutive maxima. Two years ago, an entirely new and heavier .15R model, with twin ball-bearings and highly developed induction system, was announced and, with this, George French and Dave Posner last year put up some very impressive performances, the former topping the British Team Trials.

This latter model, however, has thus far been made on a very limited production basis and is relatively expensive so, to fill the demand for a more powerful successor to the simpler Max-II, the Max-III model has been evolved. This is now available in the U.K. from Keil Kraft stock kits.

The Max-III, very light and compact for a high performance 2.5, is similar in general appearance to the Max-II but is not merely a modified version of the earlier engine. Practically every part of the Max-III, from crankcase casting to cylinder head, is new. Among the improvements to detail, the cylinder assembly is now held down with three long screws instead of two a machined dural conrod is used in place of the earlier bushed diecast unit, the cylinder head uses a soft aluminium gasket instead of one of graphited asbestos material, the prop driver is counter balanced and there is provision for both high or low pressure forced-feed fuel delivery. The engine has, however, the same mounting dimensions and bolt hole spacing as the earlier type.

The crankcase, with cast-in bronze bush, is a very clean and well proportioned diecasting of excellent finish. Tapped holes for cylinder attachment arc located each side of the transfer passage and through the center of the very wide exhaust duct, which is webbed for this purpose, and is further strengthened by a vertical stiffener extending down to the mounting lug. The hardened crankshaft has a 9 mm. journal and a 6.5 mm. gas passage. The valve port is 10 mm. long and is narrower than on the Max-II, thereby reducing any risk of crankshaft failure at this point. The valve port is also carefully radiussed to avoid stress raisers al the corners. The induction period is not reduced by the narrower port, however as a correspondingly wider bearing aperture is used and induction timing remains virtually unaltered at 35 deg. ABDC.40 deg. ATDC.

The piston is unchanged and has the usual Max arrangement of two supplementary transfer ports in the piston skirt. The cylinder has one extra cooling fin and a deeper transfer inlet port. Port timing is quite conservative with exhaust and transfer periods of 130 and 105 deg. crank angle, respectively. The cylinder head has a revised combustion chamber shape of hemispherical form on the exhaust side, the plug being offset to the transfer side and center just to the exhaust side of the piston baffle recess.

Model Aircraft Magazine July 1963 by Hlsat

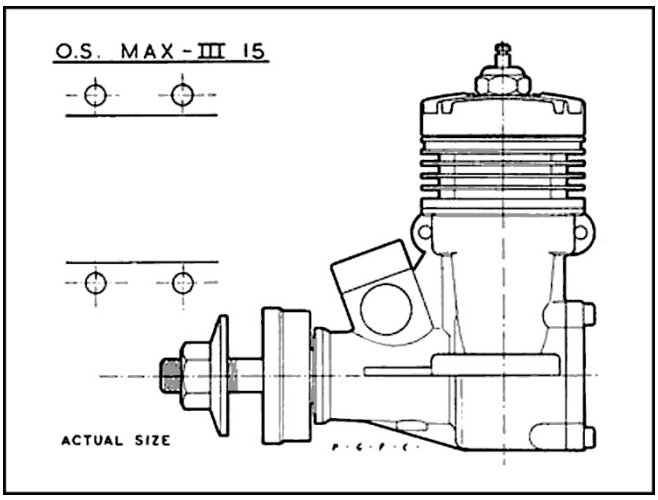
O.S Max III - .15

Without the venturi insert, the carburettor has a bore of 9 mm. The venturi insert sleeves this down to 6.5 mm. the actual area being further reduced by a 3 mm. dia spraybar. This provides good suction without restricting output, but where maximum lop end power is required, several alternative arrangements are easily possible. The venturi can be removed and the open intake used with pressure feed. This can be in conjunction with the standard spraybar or the spraybar can be replaced by a small fixed jet (the other spraybar hole being sealed off), with fuel metering by a 15R type remote needle-valve assembly (a mounting lug for this being provided on the back-plate). This latter arrangement was used to obtain the third set of performance curves (on 50 per cent, nitromethane) indicated in our graph, tank pressurisation being obtained via the back-plate nipple available for these engines. If desired, a higher fuel pressure is possible by drilling and tapping the lug below the main bearing for a rotary valve timed pressure takeoff.

Provision is also made for converting the Max-III 15 to the latest Multispeed R/C version. Tapped holes arc provided inside the exhaust slack for attaching the semi-rotary exhaust throttle and lite special throttle-valve carburettor now has lite addition of a low speed air bleed mixture control like the larger Max-III engines. The Multispeed 15 engine is, of course, also available as a complete unit. These R/C Max 15's have proved extremely popular for single channel R/C, particularly in the U.S., where they have had a number of important contest wins.

Specification.

Type: Single cylinder, air-cooled, loop-scavenged two-stroke cycle, glow-plug ignition. Crankshaft type rotary valve induction.
Bore: 15.19 nun. (0.5980 in.).
Stroke: 13.70 mm. (0.5394 in.).
Swept Volume: 2.483 c.c. or 0.1515 cu. in.
Stroke/Bore Ratio: 0.902: 1.
Weight : 4.0 oz.



General Structural Data.

Pressure diecast aluminium alloy crankcase unit with cast in phosphor- bronze main bearing. Counter balanced, hardened crankshaft with 9 mm. dia. journal and 4 mm. dia. hollow crankpin. Ground and lapped steel cylinder with integral fins and blued anti-corrosion finish. Diecast and machined aluminium alloy cylinder head attached with six Phillips screws, three extra long to secure complete cylinder unit to crank-case. Soft aluminium head gasket. Lightweight Meehanite c.i. piston with fully-floating 3.5 mm. dia. hardened gudgeon-pin having brass end pads. Machined aluminium alloy connecting- rod with lubrication hole at lower end. Plated brass spraybar with double spring ratchet device and flexible needle-valve control extension. Removable machined alloy carburettor venturi with rubber air seal. Provision for high pressure or low pressure fuel system. Beam mounting lugs.

Test Conditions.

Running time prior to test: 2 hours.
Fuels used: (i) 75 per cent. Methanol and 25 per cent. Duckham's Racing Castor-oil; (ii) Record Super-Nitrex (30 per cent, nitromethane); (iii) 50 per cent, nitromethane, 20 per cent, methanol, 7 ½ per cent, nitrobenzene, 12 ½ per cent. Duckham's Racing Castor- oil and 10 per cent. Ucon polyoxide syntetic lubricant.
Ignition plug used: K & B KB-S short reach glow-plug.

Model Aircraft Magazine July 1963 by Hlsat

O.S Max III - .15

Fuel systems used: (i) and (ii) standard suction feed; (iii) low pressure feed from Veco pressure tank via remote needle-valve to open intake.

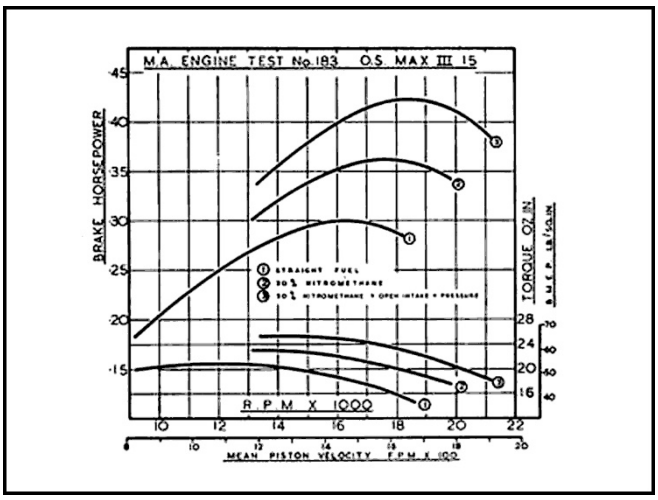
Air temperature: 70 deg. F.
Barometer: 29.6 in. Hg.

Performance.

Towards the end of the running-in period, the opportunity was taken to check the Max-III's reaction to different plugs. The maker's recommended plug for this engine is the O.S. No. 5, but since these are not widely available in the U.K. an alternative was sought. The engine was therefore carefully checked on an 8 X 4 prop and 75/25 methanol castor fuel. On the O.S. No. 5 plug, r.p.m. was 15.100. On a KLG EG. 150, r.p.m. dropped to 14,600, the same figure being obtained on a Veco plug. On a K & B KB-iS plug, however, r.p.m. rose to 15,250 and after a number of other checks, this plug was chosen for all subsequent tests.

Unlike most larger glow-plug engines, the O.S. 15 did not require a lengthy running-in period and would hold a steady speed on the optimum r.p.m. needle setting after about one hour running time. Starting was very good on both suction and pressure feed.

Prop tests indicated that the Max-III 15 does not like being overloaded. We would set 10,000 r.p.m. as its practical minimum operating speed and the engine is definitely at its best at speeds substantially higher—i.e. 15,000 r.p.m. and upwards. An 8 X 4 or 8 X 3 ½ prop is a good choice, with 9 X 4 as the largest practical size. The engine is perfectly happy on 'much smaller props (it sounded at its best when doing 20,400 r.p.m. on a Trucut 7x3 prop) but loading for static speeds of 15,500- 17,500 r.p.m. according to fuel, etc., would appear (rest for contest work. Titus, on an 8x4 Power Prop, we obtained the following r.p.m. on fuels as noted: "straight" fuel 15,400; Super-Nitrex 16,400; Super-Nitrex with pressure-feed and venturi removed 16,700; 50 per cent, nitro with pressure feed and venturi removed 17,200.



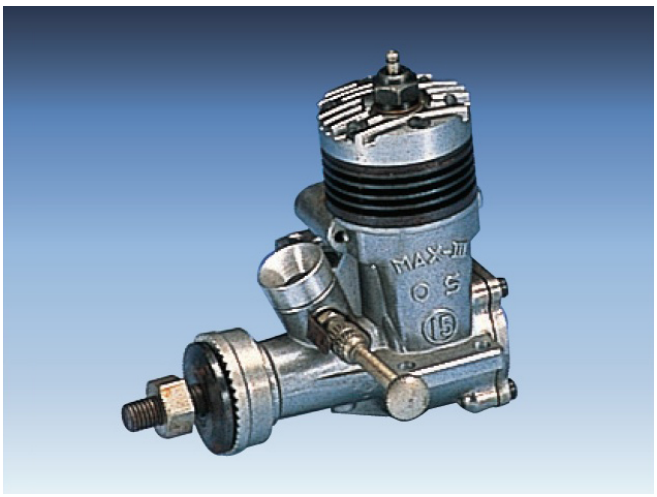
The maker's claims for the Max-III 15 include a b.h.p. figure of just over 0.40 at 16,600 r.p.m. on methanol/nitro- benzene/castor-oil fuel and (with venturi removed) 0.48 b.h.p. at 17,000 r.p.m. on 40 per cent, nitromethane fuel. After a test on straight F.A.I. fuel which gave 0.30 b.h.p. at slightly over 16,000 r.p.m., we rechecked the Max-III on Record Super-Nitrex at 0.36 b.h.p. at 17,500 r.p.m. (Super-Nitrex is no longer available but a similar performance should be obtainable on a 30-35 per cent, nitro mix). Finally, with wide open intake and pressure feed, we obtained 0.425 b.h.p. 18,400 r.p.m. on 50 per cent, nitro. This, while not equalling the manufacturer's figure, is, needless to say, an exceptional performance and the power/weight ratio that it represents is especially worthy of note.

All this was obtained with complete freedom from fuss and without burning out the K & B plug the same plug having been used for all the b.h.p. tests.

Power/Weight Ratio (as tested): 1.20 b.h.p./lb. (min.); 1.70 b.h.p./lb. (max.).
Speeifie Output (as tested): las b.h.p./ litre (min.); 171 b.h.p./litre (max.).

Model Aircraft Magazine July 1963 by Hlsat

O.S Max III - .15



Model Aircraft Magazine July 1963 by Hlsat