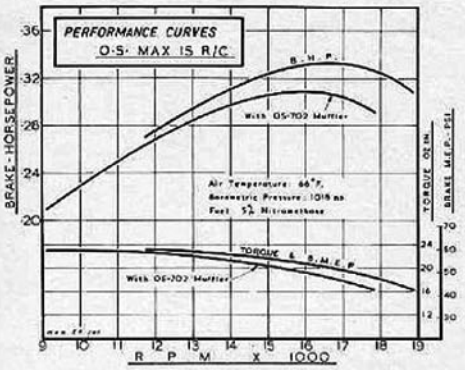
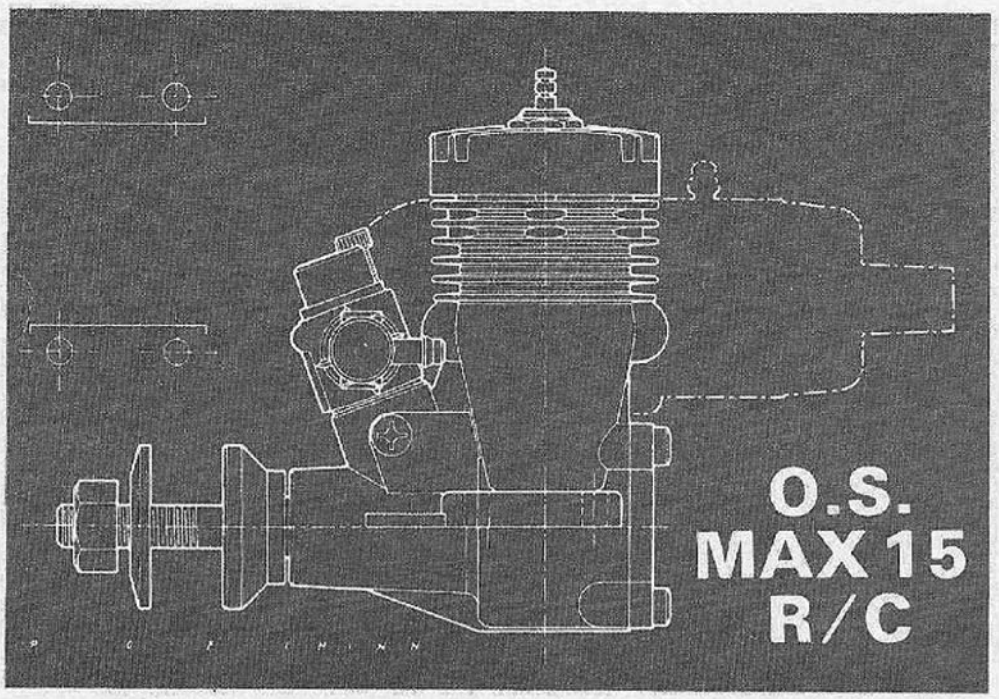
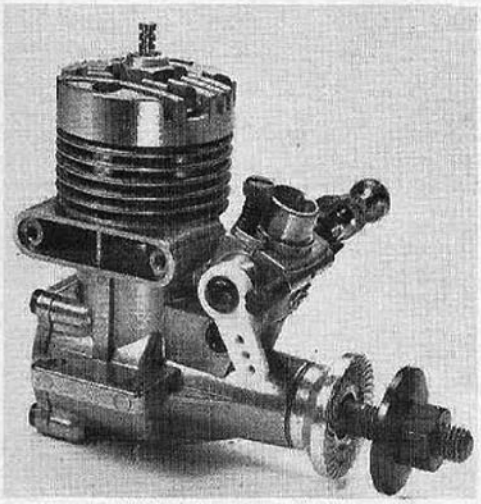


ENGINE REVIEW

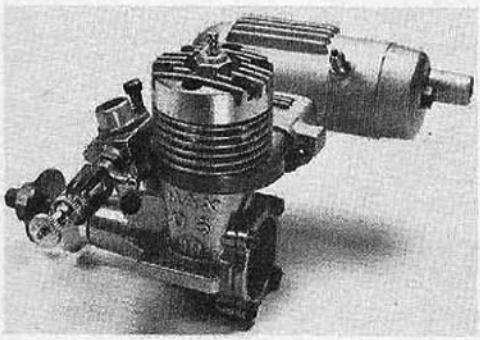
BY PETER G. F. CHINN



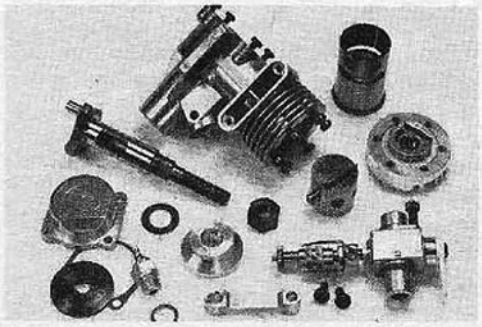
To mark 21st birthday of one of the most popular .15 engines, we present this report on the latest version of the O.S. Max .15 R/C.



Fruits of twenty years' development seen in engine's good power output, easy starting.



Included with engine, the latest OS-702 muffler has pressurized fuel nipple.



Contrasting with previous O.S. 15's. It uses integral crankcase/cylinder casting with a drop-in liner like other O.S. motors.

• This latest version of the O.S. 15 was put into production at the end of 1975, replacing the Max-III 15 model and marking 20 years continuous manufacture of .15 cu.in. O.S. Max engines.

It was with the original Max-I 15 engine that the Ogawa Model Manufacturing Company Ltd first drew world-wide attention to its products when, in 1956, Britain's Ron Draper won the FAI World Free-Flight Championship with a model powered by one of these motors. In 1958, the Max-I was superseded by the improved Max-II 15 which also achieved considerable success, including another World F/F Championship first place, this time in the hands of America's Larry Conover in 1960. An R/C version was also offered and won the rudder-only class at the 1959 U.S. Nationals.

In 1962, the O.S. 15 was again redesigned, reappearing as the Max-III model in both standard and R/C versions. This continued in production with only minor modifications (but, in the R/C version, through a variety of carburetors and speed-control devices) until last year, as already stated. By this time, of course, the standards of performance in FAI free-flight contests had risen to the point where highly developed and very expensive racing type engines (notably the Rossi R.15) were essential for world class events, but the Max-III continued to be in demand for those sections of the market where a good general standard of performance, allied to reliability and reasonable cost, was required for a variety of different types of models and particularly for small R/C aircraft.

There is no doubt, in fact, that the Max-III 15 could have remained in production for several more years but, so far the rest of the extensive O.S. range of engines was concerned, it had, by this time, become something of an odd man out, inasmuch as it still retained the short crankcase and integral-finned steel cylinder of the first Max series engines made back in 1954, whereas all the other current O.S. Max engines had, since 1971, used a drop-in liner in a full-length finned aluminum outer casing integral with the crankcase.

A decision was made, therefore, to bring the 15 into line with the rest of the range by a structural re-design similar to that carried out several years earlier when the Max 20 replaced the Max 19. The result is a very neat little engine of approximately the same overall dimensions and weight as the Max-III model, but of higher performance. Incidentally, the new model is not designated "Max-IV". In common with other O.S. Max engines, series numbers have been dropped and the engine is now simply known as the O.S. Max 15. Design and construction details are as follows:

CRANKSHAFT AND MAIN BEARING. The hardened and ground one-piece crankshaft runs in a phosphor-bronze bearing that is cast into the crankcase. The shaft has a 9 mm o.d. journal, 25 mm long, and a 4 mm o.d. tubular crankpin. It is counterbalanced by web cutaways each side of the crankpin. The shaft is generally similar to the later model Max-III 15 shaft, but is increased from 6.4 mm to 7.1 mm diameter, just ahead of the main bearing, for the new prop driver which is of machined aluminum instead of being pressure cast.

The shaft has a 6.6 mm i.d. gas passage fed from a 10 mm long rectangular valve port. This registers with a parallel sided aperture in the main bearing to give a 190 degree induction period, timed 35° ABDC to 45° ATDC.

A hardened steel shim washer is installed on the shaft between the crankcase nose and rear face of the prop driver to prevent ex-

(Continued on page 91)

cessive wearing of these two soft surfaces when electric starters or pusher props are used.

MAIN CASTING. This, neatly executed in pressure diecast aluminum alloy, comprises the crankcase, finned cylinder casing and front housing in a single unit. The front end is well braced with triangular webs, plus a solid corner section at the junction of the upper forward part of the crankcase, the lower forward part of the cylinder case, the crankcase nose and the carburetor intake boss. There is a wide exhaust stack (with central vertical bridge and with an external vertical stiffening rib connecting it to the right mounting lug) that fits the OS-702 muffler supplied, but is also drilled and tapped at each end to accept the old O.S. Jetstream "S" type muffler. Important joint faces, such as the top of the cylinder casing and the rear face of the crankcase, as well as the front and rear faces of the main bearing, are all machine finished.

CYLINDER AND PISTON ASSEMBLY. Unlike most imported .15 size engines, the O.S. does not use a 15 x 14 mm bore and stroke but continues the slightly shorter stroke (15.2 x 13.7 mm) combination with which it was endowed from the beginning. The new drop-in hardened steel cylinder liner has a 1.3 mm (.051") wall thickness and is located in the main casting by the usual top flange. The rectangular, diametrically opposed bypass and exhaust ports are unbridged and very slightly deeper than on the Max-III. Port timing, practically unchanged, is quite conservative with a 130° exhaust period and a 104° bypass period. As before, the piston has a pair of circular skirt bypass ports which register with similar ports in the cylinder liner to improve gas flow, cooling and lubrication through the piston interior, but these ports are slightly larger in the latest engine: 4.6 mm.dia. (piston) and 5.0 mm.dia. (cylinder) instead of 4.5 mm (piston and cylinder) for the Max-III. The lapped Meehanite piston is otherwise unchanged. It has a radiussed baffle and weighs just 5 grams, which is increased to an equally modest 5.9 grams when the hardened tubular 3.5 mm wrist-pin is fitted. The wrist-pin, unchanged, is full floating and has brass pads. The connecting-rod, also unchanged, is machined from extruded duralumin bar stock, has an oil hole at the lower end and weighs 1.5 grams.

CYLINDER HEAD. This is of pressure diecast aluminum alloy with a cast-in brass thread insert for the glowplug as before, but is a new design. It has deeper fins and the combustion chamber features a 2.5 mm wide squishband. The squishband is, of course, interrupted by a slot for piston baffle clearance. The glowplug is now located centrally instead of being offset to the bypass side. The head is channelled, is fitted with a 0.4 mm (.016") soft aluminum gasket and is secured to the main casting with six 2.5 mm Phillips screws.

The checked nominal geometric compression ratio of our test motor was approximately 9.0:1.

CRANKCASE BACKPLATE. This is also of pressure cast aluminum and is fitted to the crankcase with a gasket and four 2.5 mm Phillips screws.

CARBURETOR. This is an O.S. Type 21 as used by the Max 20 R/C and Max 25 R/C. The Type 21 was also fitted to the Max-III 15 R/C during the last year or two of its production.

The Type 21 carb is a conventional barrel muffler and with an O.S. No. 8 glowplug, included 10,200 rpm on a 9x4 Tornado nylon, 10,400 on a 9x4 Top Flite nylon, 11,800 on a 9x4 Taipan glassfiber-nylon, 12,100 on an 8x6 Power-Prop wood, 13,300 on an 8x5 Power-Prop wood, 14,-300 on a 7x6 Taipan glassfiber-nylon, 14,600 on an 8x4 Power-Prop wood, 14,900 on an 8x4 Taipan glassfiber-nylon, 17,200 on a 7x4 Power-Prop wood and 17,500 on a 7x4 Taipan glassfiber-nylon.

Clearly, the faster 8x4's, such as the Power-Prop and Taipan, are the props to aim for if one wishes to squeeze maximum power from the Max 15 R/C since, in the air, they can be expected to unload the engine to the point when it is close to its peak output. This applies both with and without the muffler and it is satisfying to note that, on test, the Max 15 R/C sounded really crisp and steady, on the 8x4 Taipan in particular. For small fast models, an 8x5 or 7x6 are other possibilities, while, for a large slow-flying lightweight, one could go to a 9x4. The engine is not at its best when loaded for speeds below 11,-000 rpm, however, so it would be best to choose a prop which did not load the engine below this speed.

General running qualities of the Max 15 R/C were good and were accompanied by docile handling characteristics. Instant hand starting was obtained when the engine was cold. Hot restarts were a little less rapid by hand but the response to an electric starter was immediate at all times. There was some power loss on warming up when the motor was loaded for speeds below 12,000 rpm and this became excessive when the engine was loaded for speeds below 10,000 rpm, but at all normal loads, running qualities were good: steady and with a reasonably low level of vibration.

The Type 21 carburetor provided really excellent throttle response with a safe idle of around 2,600 rpm on an 8x4 prop, instant recovery to full power and a good mid-range. Incidentally, we used a muffler pressurized fuel system (except

With regard to the fact that the new Max 15 is still a crossflow scavenged motor with similar port areas and timing, we had not expected it to offer any startling increase in performance over the Max-III 15. In fact, it did rather better than we had expected, with about 13 percent more gross bhp (i.e. less muffler). When fitted with the OS-702 muffler, it was actually over 20 percent more powerful than the Max-III with its more restrictive Jetstream RC-S muffler.

Our test report on the Max-III 15 R/C appeared in the July 1969 issue of M.A.N. Running on standard 5% nitro test fuel, this engine produced just under 0.30 bhp at 16,000 rpm, less muffler, and just short of 0.26 bhp at 15,000 rpm with Jetstream RC-S muffler.

Using the same fuel, the latest Max 15 R/C recorded better than 0.33 bhp at approximately 16,600 rpm, less muffler, and nearly 0.31 bhp at 16,000 rpm with the OS-702 muffler.

The maximum torque recorded by the newer engine was 23 oz.in at around 10,000 rpm; not very much more than for the Max-III 15 R/C which indicated 22 oz.in. at the same speed, but the new engine's higher peak as load was reduced. At the lower speeds, the muffler made little or no difference to power output: only when load was reduced to allow rpm to exceed 12,000 rpm did the power loss due to the muffler become noticeable.

Prop rpm recorded on 5 percent nitro fuel, less muffler and with an O.S. No. 8 glowplug, included 10,200 rpm on a 9x4 Tornado nylon, 10,400 on a 9x4 Top Flite nylon, 11,800 on a 9x4 Taipan glassfiber-nylon, 12,100 on an 8x6 Power-Prop wood, 13,300 on an 8x5 Power-Prop wood, 14,-300 on a 7x6 Taipan glassfiber-nylon, 14,600 on an 8x4 Power-Prop wood, 14,900 on an 8x4 Taipan glassfiber-nylon, 17,200 on a 7x4 Power-Prop wood and 17,500 on a 7x4 Taipan glassfiber-nylon.

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