O.S Max III - .15 RC

ENGINE TEST by Peter Chinn

O.S. Max - III 15 R/C

"... a compact, well made engine of excellent all round performance"

Although the O.S. 15 R/C has. for some years and through several models, enjoyed considerable popularity and is just about the most widely used radio control engine in the 2.5 cc. class, it has never been previously dealt with in our Engine Test series.

The history of the Max 15 series goes back to 1955 when the original Max-1 15 was introduced. At that time, O.S. engines were little known in the U.K., but in the following year they received considerable useful publicity when Britain's Ron Draper won the World Free Flight Power Championship using a Max-I 15. in 1958, the Max-I was replaced by the improved Max-II model and this, too, subsequently achieved a number of important contest wins. The first R/C version was put on the market in the same year. It had a simple butterfly valve, above the spray-bar, coupled to a semi rotary exhaust restrictor.

Since that time, many different throttle designs have been used. First, the butterfly valve assembly was replaced by a more refined unit with airbleed control and this, in a further modified form, was continued in the early version of the entirely redesigned Max-III 15 introduced in 1962. In due course, this throttle assembly was replaced by the more complex barrel throttle carburettor and ''turnstile" type exhaust valve unit as fitted to early models of the Max-19 R/C. This still had the needle valve assembly installed below the throttle, but fuel was taken up. via a short external pipe, to a jet projecting into the throttle barrel. It worked well but was rather vulnerable to crash damage and mishandling and with throttle design now becoming more standardised in the larger O.S. R/C engines, it was not surprising to find a scaled down version of the larger throttle being adopted for the 15 and 19 in 1965.

The present carburettor comprises a ground brass throttle barrel, in a neat pressure diecast aluminium body, with the usual idling adjustment screw and an airbleed screw for controlling low speed mixture strength. Fuel reaches the engine through a tee fitting on the needle-valve assembly, which is mounted on the left hand side of the carburettor and feeds directly into the center of the throttle barrel through an open ended jet. A further change has also recently been made to the coupled exhaust restrictor system. Current engines now have a simpler restrictor consisting of a centrally pivoted blanking plate.

O.S. were among the first manufacturers to offer silencers for their engines and, for the Max-III 15 R/C, one can use either the standard O.S. Jet stream Type

"S", or the Jetstream Type "R/C-S". The difference between these is that the R/C-S type has the addition of a valve, just forward of the out let nozzle, which, linked to the carburettor throttle arm, takes the place of the normal coupled exhaust restrictor. The silencer, which fits neatly on the engine by means of two internal screws, can be positioned close to the cylinder or, by means of a half inch extension duct provided, repositioned so that it is located outside the normal dimensions of an engine cowling. In this latter position the center line of the silencer is IJ in. to the right of the cylinder axis.

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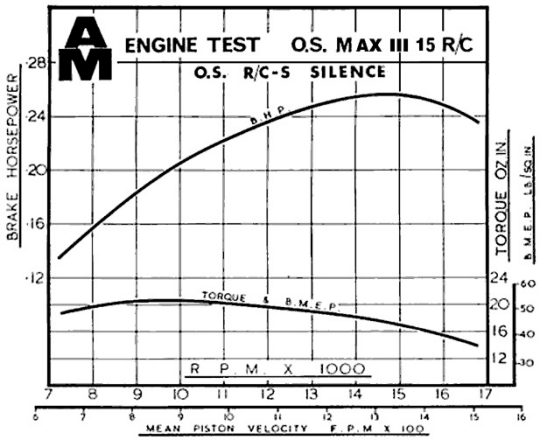

Heading photo shows the Max-III 15 R/C fitted with Jetstream Type R/C-S silencer and optional OS AMA safety pattern spinner nut. To relocate the silencer outside the fuselage width, an extension adaptor is also supplied.
Right: Jetstream silencer incorporates a rotary coupled exhaust restrictor valve.
Fitting is via internal screws into exhaust duct.
Bottom right: parts of the latest throttle type carburettor fitted to the Max III 15 R/C.
Below: parts of the current Max-Ill display neat design and excellent workmanship.

Turning now to the engine itself, this is notable, firstly, for its compact overall dimensions and moderate weight.
The crankcase is a neat pressure diecasting, light hut amply stiffened in the important places.
The hardened and finely ground crankshaft has a large bore gas passage and a long rectangular valve port.
This latter registers with a parallel sided intake aperture in the main bearing to give a (measured) valve timing of 30 deg. ABDC to 47 deg. ATDC.

The cylinder has integral cooling fins and is ported for a (measured) 105 deg. transfer period and a 128 deg. exhaust period.
The lapped piston has a radiussed baffle and features two 4.5 mm. dia. skirt ports on the transfer side for improved scavenging of the piston interior.
These, of course, register with corresponding ports in the lower wall of the cylinder.
The connecting rod is of machined dural.

The cylinder head has a cast-in brass thread insert for the glow-plug, which is offset to the transfer side.
A soft aluminium gasket is recessed into the head and six Phillips screws arc used to secure the head, three of which pass through the cylinder fins and into the crankcase to tie the complete cylinder assembly to the bottom end.

Performance.

Our test engine was a Max-III 15 of 1962 vintage to which one of the latest type throttle assemblies was fitted.

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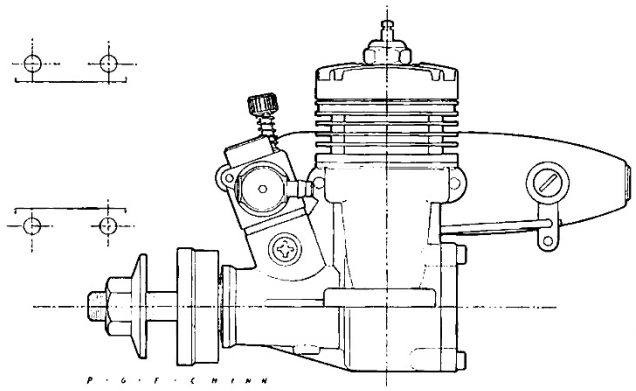
This engine had previously been used for a standard Max-III 15 test and was therefore already run-in. (In this earlier test the engine had produced 0.30 b.h.p. at 16,000 r.p.m. on straight 3/1 fuel in stock condition and 0.425 b.h.p. at 18,500 r.p.m. on 50 per cent nitromethane running on pressure feed with the venturi insert removed and the standard spraybar replaced by a small jet fed from a separately rear mounted metering valve.)
The opportunity was taken to check the parts of this engine against those of a new 1966 model, but no significant modifications were evident.

An O.S. R/C-S type silencer (with extension adaptor) was used for all tests and was only removed to check power loss attributable to the silencer on typical props.
This amounted to 300 r.p.m. on 9 x 4 Tornado nylon.The silencer did not in any way complicate starting procedure.
The O.S. silencers have a small priming hole opposite the exhaust port and, for cold Starting, it is an easy matter, by turning the engine on its side, to squirt some fuel from the fuel can, into the exhaust through this hole. It is difficult, of course, to judge just how much fuel one is injecting into the cylinder in this way, but, happily, the Max 15 R/C does not seem to be at all fussy in this respect and we had no trouble with flooding.



SPECIFICATION.

Type: Single cylinder, air cooled, loop-scavenged two stroke cycle, glow-plug ignition. Shaft type rotary valve induction. Coupled throttle system.

Bore: 15.2 mm. (0.5984 in.)
Stroke: 13.7 mm. (0.5394 in.)
Stroke/Bore Ratio: 0.901 : 1
Weight: 4.6 oz. (5.4 oz with R/C-S silencer and extension, adaptor).

General Structural Data.

Pressure diecast aluminium alloy crankcase/front housing unit with cast in phosphor bronze main bearing and detachable rear cover secured with four Phillips screws. Hardened, counterbalanced crankshaft with 9 mm. dia. journal, 6.5 mm. bore gas passage and 4 mm. dia. hollow crankpin.
Large diameter counterbalancing prop driver keyed to flat on crankshaft. Lightweight lapped Meehanite piston with flat crown, straight baffle, radiussed at base, and two skirt ports. Fully floating 3.5 mm. dia. hardened tubular gudgeon pin with brass end pads.
Machined duralumin connecting rod with lubrication hole at lower end.
Machined steel cylinder with integral cooling fins and blued external finish.
Pressure diecast aluminium alloy cylinder head with cast-in brass thread insert for glow-plug and recessed 0.4 mm. soft aluminium gasket.
Asbestos composition cylinder base gasket.
Pressure diecast aluminium alloy carburettor body seating on rubber grommet in intake boss and secured with two screws.
Ground brass throttle barrel in honed bearing surface in carburettor body.
Plated brass needle valve assembly.
Blued steel, centrally pivoted plate type exhaust restrictor interchangeable with Jetstream "S" or "R/C-S" silencer with or without extension adaptor.

TEST CONDITIONS.

Running time prior to test: 3-4 hours
Fuel used: 5 per cent nitromethane, 25 per cent Duckhams Racing Castor-Oil. 70 per cent I.C.I. methanol.
Glow-plug used: O.S. No. 7 bar type, platinum filament, 1.5 volt, medium reach (3/16 in.)
Air temperature: 70 deg.F.
Barometer: 29.7 in. Hg.
Silencer Type: O.S. Jetstream R/C-S

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The throttle worked well from the start and very little adjustment was found to be necessary. Minimum idling speed obtained on a 9 x 4 Keil Kraft nylon was a mere 2,000 r.p.m. Resetting the idling adjustment to ensure continuous, safe running at any intermediate throttle setting and instant pick up after a long period of idling, we obtained 2,500. 6.600. 8,900 and 10,600 at, respectively, the idle, ¼ open, ½ open and fully open throttle positions.

Maximum prop, r.p.m. figures included 9,500 on a 10 x 3 ½ Top Flite wood, 10,300 on a 9 x 4 Top Flite nylon, 12,100 on an 8 x 5 PAW wood, 13,800 on an 8 x 4 PAW wood and 14,400 on an 8 x 4 Power Prop wood.

On test, maximum torque was developed in the region of 9,500-10,000 r.p.m. where the Max 15 R/C recorded nearly 21 oz. in. Torque declined quite slowly as load was reduced and resulted in the very good output indicated of nearly .25 b.h.p. at between 14,500 and 15,000 r.p.m. This is a very good performance, above average for a silencer equipped 2.5 c.c. R/C engine running on 5 per cent nitro fuel.

We found the Max 15 R/C notably free from excessive vibration over the entire useful speed range. The special prop driver, internally counter- weighted to supplement the crankshaft counterbalance, may help here, although its effect is likely to be beneficial only if the engine is very, rigidly mounted to eliminate the out-of-balance effect thereby introduced at the front end. When propped for r.p.m. below 10,000, the Max 15 lost power as it warmed up, but this loss disappeared under lighter loads and was turned into a gain at the highest speeds, the engine picking up 600 r.p.m., for example, on a 7x3 PAW prop.

Our tests confirmed much of what is already known to Max 15 R/C users. To sum up, this is a compact, well-made engine of excellent all-round performance.

Power/Weight Ratio (as tested with silencer): 0.74 b.h.p./lb.

Specific Output (as tested with silencer): 99 b.h.p./ litre.