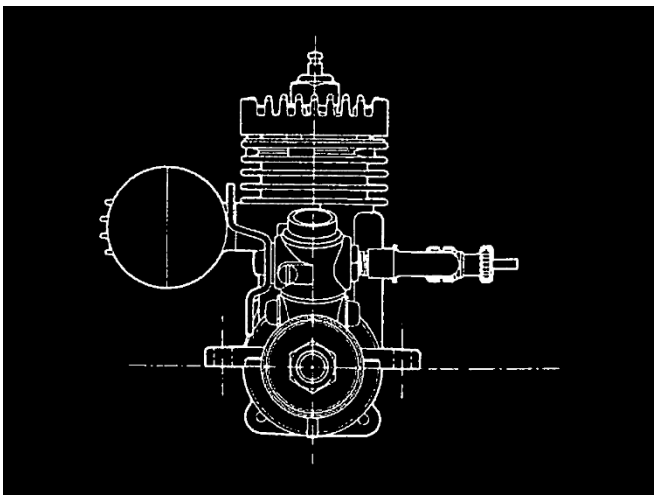
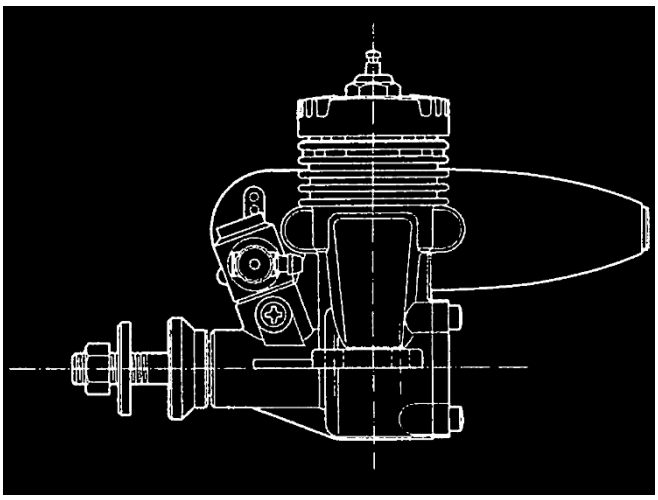
O.S Max 10 - R/C Engine Review by Peter Chinn





The majority of small (.05—.10 cu.in.) R/C engines, both domestic and foreign, are basically standard sport type glow or diesel motors to which a simple throttle device has been added. In many instances, these engines will not “idle” in the true sense of the word, their minimum safe rpm being about “half speed” on any given prop size. This is O.K. if one is aiming only at a level cruising flight on “low speed”, but is too fast to allow engine-on landings unless the model is underpowered to start with.

An exception to this generalization, however, is to be found in the O.S. Max 10 R/C motor introduced to the North American market some months ago by World Engines. This has a throttle range comparable with that of a good large “multi’ engine and, as a result, is particularly well suited to the new three position single channel motor control servos offering high, medium and idling speed positions. The engine also has distinct possibilities for really small multis using, perhap, six channel reed equipment.

Prior to the introduction of the Max 10 R/C, the only throttle equipped O.S. engine of under .15 cu.in. displacement was the Pet 09 R/C: basically the standard low-priced Pet 09 with the addition of a simple throttle valve, above the spray-bar, in an extended venturi. The Max 10 R/C is more expensive and just a trifle larger in displacement .107 cu.in. instead of .099 cu.in., but is entirely different in design. As its name suggests, it follows the typical “Max” layout and is of the latest Max style, using a one piece crankcase/ cylinder block/front housing with drop-in liner. This contrasts with the separate, finned cylinder still used by the Max-III .15 and Max .19 models. Moreover, the Max 10 R/C was designed as an R/C engine at the outset and was not intended to be marketed in a non-throttle version, although, in response to demand from some areas, we understand that a standard model will be offered this year.

In most respects the Max 10 closely resembles a scaled down Max-S 30 or Max-S 35. It is strictly a quality item and there is no skimping on the machine work, or other unwelcome production economies. As we have said, the engine uses a one- piece body casting. This is a well-executed pressure die-casting and has a cast-in phosphor bronze main bearing. It includes beam mounting lugs, an adequately webbed front end and a large exhaust stack that will accept the existing small size O.S. Jetstream mufflers.

The crankshaft is of case-hardened steel, finely ground on its working surfaces. It is counterbalanced by means of cutaway web flanks each side of the 0.157 in. hollow crankpin. The shaft journal is a substantial 0.354 in. dia. and permits a generous 0.256 in. bore gas passage to be used. Both the crankshaft port and bearing aperture are parallel sided for quick opening and closing. Actual valve timing, as measured on our test sample, was approximately 40 deg. ABDC to 45 deg. ATDC. The piston is of Meehanite with a flat crown and filleted baffle.

Model Airplane News Magazine August 1966 by Hlsat

O.S Max 10 - R/C Engine Review by Peter Chinn

Standard Max 10 RC has pivoted plate type exhaust restrictor.

Stripped engine, reveals neat design, quality materials and fine parts workmanship.

It is coupled to a machined conrod, of 24S duralumin, by a 0.137 in.dia. tubular wrist pin of case hardened steel having brass end pads. The cylinder-liner, finely finished both inside and out, is located in the usual way by a flange at the top and is closely fitted to the cylinder casting. Cylinder porting is quite orthodox and timing is fairly conservative. As measured on our test engine, the exhaust opens at 63 degrees before bottom-dead-center and has a 10 degree lead on the bypass, giving durations of 126 degrees and 106 degrees respectively for the exhaust and bypass.

The finned cylinder head is of pressure cast and machined aluminum alloy and has a centrally located glow-plug. The combustion space is basically hemispherical, interrupted in the usual way by a slot for the piston baffle. The head gasket is of the “blowout-proof” type: 0.016 in. soft aluminum and recessed into the head. In place of the usual four screw head fixing of most small engines, or the six screws of many large engines, the Max 10 R/C is almost unique in employing five head screws. Incidentally, we think of only one other current production engine that uses five screws: the West German Webra "Big Ben” 29.

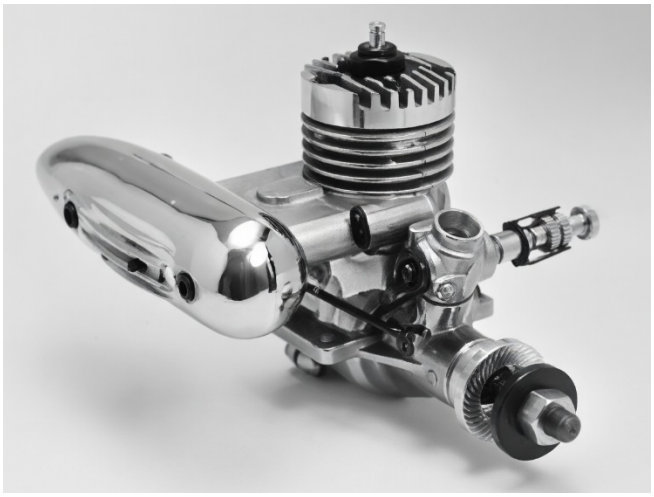
The carburetor fitted to the Max 10 R/C is a smaller, simplified version of those currently used on the larger O.S. R/C engines. It employs a die-cast and machined aluminum body with ground brass throttle barrel and, feeding into the center of the barrel, a jet that is adjustable so that choke area may be varied for more suction or, alternatively, for more power. The needle-valve and tee fitting fuel inlet are both on the left-hand side of the engine and do not interfere in any way with the movement of the throttle control which is on the opposite side. The needle-valve and jet assembly are screwed into the solid end of the carburetor body, unlike the fitting on some other O.S. carburetors in which the assembly was mounted in a separate pressed-in dural plug a feature that has been found to be somewhat vulnerable to crash damage.

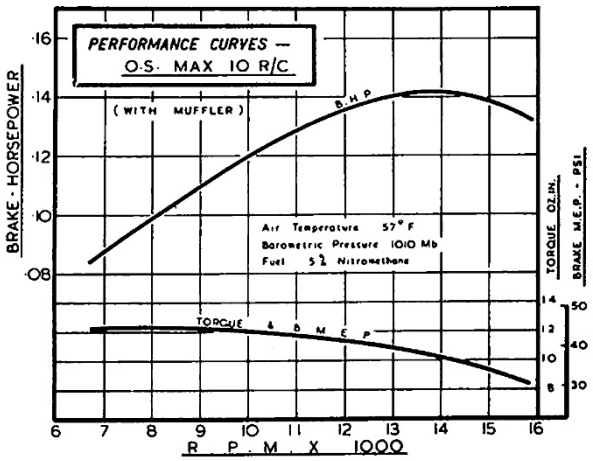
The main difference between the Max 10 carburetor and the larger O.S. throttle-carburetors, is in the absence of both idle stop screw and air-bleed screw. The absence of an idle stop means that the idling position of the throttle barrel has to be established by servo linkage adjustment or by adjusting the position of the throttle arm (held by a single screw) on the throttle barrel. The lack of an air-bleed, or other means of adjusting idling mixture strength, however, does not appear to be a disadvantage on this particular engine since it idles as well as most other engines with air bleeds.

The complete carburetor assembly plugs into the inclined intake boss above the main bearing, where it seats on a rubber gasket and is held in place by two screws. The throttle arm includes an upper and lower crank, the latter being coupled to a centrally pivoted blanking plate type exhaust restrictor. Each crank has two linkage holes and the throttle servo or escapement can therefore be coupled to either end.

Model Airplane News Magazine August 1966 by Hlsat

O.S Max 10 - R/C Engine Review by Peter Chinn





Max 10 RC with O.S. Jetstream muffler. Coupled RC-S type in this photo.

The exhaust restrictor is of course, removed when a muffler is fitted to the engine. If a Jetstream Type "R/C-S" muffler is used, the special restrictor valve in this may be coupled to the throttle arm in place of the regular exhaust restrictor. However, most of our tests on the Max 10 R/C were conducted with a standard Jetstream "S" muffler. This is a little lighter than the "R/C-S" and seems to provide equally good idling. The Jetstream "S" (small) muffler was originally designed for the Max-Ill 15 and Max 19 engines. It seems better suited to the Max 10, providing effective muffling with an rpm loss of only about 200 on most props. We used it with the appropriate extension adapter and with the rear nozzle ring installed.

As with most small engines, little break- in time is called for on the Max 10. We found the engine extremely easy to handle right from the beginning. It would start from cold equally well with the throttle open or closed and, usually, after merely choking the intake for three or four preliminary flips of the prop. Priming into the exhaust port or through the priming hole in the muffler may be used if preferred. Warm, closed-throttle restarts were virtually instantaneous and, if the fuel line was full, without need of choking or priming.

Prior to conducting full performance tests, we checked the Max 10, with and without muffler, on various fuels up to a maximum nitromethane content of 30 percent. These preliminary tests revealed that not a great deal is to be gained by running the Max 10 on anything other than quite a mild fuel. On the most useful size props, the use of a fuel having a pure nitromethane content of 30 percent (or 43 percent commercial "cut" nitromethane) gave a speed increase, on most props, in the region of 300-600 rpm, against, the speeds achieved on a mild fuel of only 5 percent nitro.

Our torque tests were, in fact, carried out on a standard 5 percent nitro fuel and with the muffler fitted. These yielded a maximum torque of 12.5 oz.in. at 8,000 rpm and a peak bhp of just over 0.14 at 14,000 rpm. These must be regarded as quite good for an engine of this weight and displacement equipped with throttle and muffler.

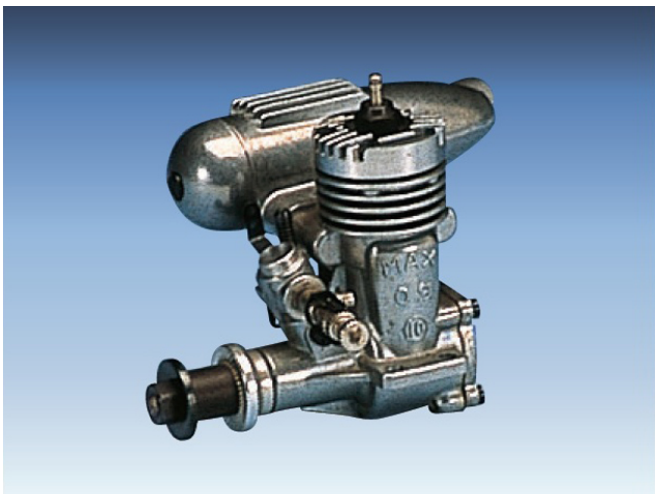
The effectiveness of the throttle was pleasantly surprising. On an 8x4 Power Prop, the Max 10 R/C had a speed range of 2,500 to 11,100 rpm on the bench. Even if the adjustment for safe, in-flight idling, should prove to be nearer 3,000 rpm static, this is a good deal better than can usually be obtained with small displacement engines. We actually had the engine idling as low as 2,100 rpm on a 9x4 Top Flite-nylon, from a full-throttle 8,000 rpm, although this, of course, is normally too large a prop for the Max 10 and, as the instruction leaflet suggests, an 8x4, 8x3 or even a 7x4 will generally be more suitable. The throttle is quite progressive and would, we found, give

Model Airplane News Magazine August 1966 by Hlsat

O.S Max 10 - R/C Engine Review by Peter Chinn

a steady intermediate “cruising” speed of, say, 7,000 rpm on an 8x4. This is a useful feature where a three-position throttle servo, such as the O.S. 101M, is used. Incidentally, we used an O.S. No. 7 bar-type platinum filament plug and this survived all our tests, including several runs at speeds of around 16,000 rpm.

Our finding on the Max 10 R/C can therefore be summarized as follows. Starting and general handling: very good. Power output: good, with the engine proving tolerant both to economical, mild fuel and to the addition of a muffler. For convenience, an idling adjustment stop would be welcome, but throttling was otherwise very good.



Summary of Data.

Type: Loop-scavenged two-stroke cycle with shaft type rotary-valve induction and bronze-bushed main bearing. Throttle type carburetor and coupled exhaust restrictor or muffler.

Weight: 3.2 oz or 3.8 oz with muffler.
Displacement: 1.749 c.c. = 0.1067 cu.in.
Bore: 13.4 mm. (0.5276 in.) Stroke: 12.4 mm. (0.4882 in.)
Stroke/Bore Ratio: 0.925 : 1
Specific Output (as tested with muffler): 1.36 bhp/cu.in.
Power/Weight Ratio (as tested with muffler): 0.60 bhp/lb.
Price: $10.98 (Muffler $2.98 extra).
Manufacturer: Ogawa Model Manufacturing Co. Ltd., Osaka, Japan. U.S. Distributor: World Engines Inc., 8206 Blue Ash Road, Cincinnati, Ohio, 45236.

RESEMBLING LARGER O.S. RC MOTORS, MAX 10 RC IS NEW STANDARD FOR SMALL ENGINES.

Model Airplane News Magazine August 1966 by Hlsat