

FOX 36 R/C 1973

ENGINE REVIEW

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BY PETER CHINN ... reviewed this month is new version of Fox's popular .36 R/C Sport motor which continues company's tradition of reliability and performance at moderate cost. Four-model group comprises both standard and throttle-equipped engines.

- At the present time, the all American Fox engine range comprises 17 different models including nine Radio Control engines. These latter cover just about every significant displacement group from .15 cu. in., to .78 cu.in. Well placed to attract the attention of those needing a reliable, reasonably priced, medium sized motor suitable for everyday R/C Sport Flying is the latest Fox 36 R/C.

This engine supersedes the 36X R/C model dealt with in this series nearly four years ago. Whereas the earlier engine was a development of the Fox 35X (first introduced in 1962 and outstanding in its day) the current 36 R/C is one of a new Fox medium displacement four model group comprising both standard and throttle equipped engines in a choice of .29 or .36 cu.in. displacements.

Compared with the 36X R/C, the new 36 R/C replaces the earlier engine's single needle-bearing with a full length bronze bushing, is lighter, has a removable and less complex carburetor coupled to a semi rotary exhaust restrictor and has provision for fitting a Fox muffler in either closed or open front form. We found the power output slightly below that of the 36X R/C but nevertheless well up to expected levels.

Duke Fox's advertising matter for the new 36 R/C claims 10.500 rpm on a 10 x 6 prop. This is absolutely honest: in fact it is probably too modest. Our motor was a stock sample from a wholesaler's shelf and, on the recommended



Carburetor has throttle arms on both sides, exhaust restrictor need not be removed to fit Fox muffler.

Missile Mist fuel, turned up 10.700 rpm on a Top Flite 10 x 6 maple prop, rising to 11.300 on one of the new Australian Taipan 10 x 6 fiberglass reinforced nylon props.

Design wise, the 36 R/C perpetuates a familiar Fox formula: specifically, shaft rotary valve induction, open loop or crossflow scavenging, a one piece body casting, a light weight lapped cast-iron piston, a substantial counterbalanced crankshaft running in a bronze main bearing and a carburetor of exclusive Fox design.

Let's deal first with the carburetor. There have been many different types of Fox carbs over the years but they have all shown one thing: Duke Fox's determination not to abandon his own ideas on basic carburetor design. As regular readers of this column will know, Fox carbs do not employ the usual type of throttle valve in which the intake air passes through a hole in a semi-rotary barrel, picking up fuel from a coaxial spray bar or jet tube. Instead, Fox throttle valves more closely resemble the butterfly valve used by many automotive carburetors and are used in conjunction with a two or three jet fuel metering system to control mixture strength at varying throttle openings.

In the case of the earlier Fox 36X R/C, three separate jets were used and came into operation

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New carburetor parts: separate high/low speed jets have own adjustment.

successively as the throttle was opened. The amount of fuel released by each jet was adjustable so that exactly the right mixture was supplied for idling, intermediate and high speed operation. As we said in our original report on the 36X R/C, this carburetor worked very well indeed and, in spite of having three needle valves and a throttle-stop to adjust, was quite easy to set up provided that one followed the correct sequence. This involved setting the idle mix first, followed by the intermediate needle and then the main needle: simple enough although rather different from the customary procedure of first establishing the main needle setting and then adjusting the idle mix. However, it is possible that the three needles may have frightened off some prospective customers and, in subsequent Fox carbs, a simplified arrangement has been used in which the intermediate range jet and its needle valve have been eliminated. Mid-range mixture control is now taken care of automatically.

In the carburetor fitted to the latest Fox 36 R/C, adjustable controls are limited to a main needle valve and a low-speed mixture adjustment plus, of course, the usual throttle stop screw. It is a lighter and more compact carburetor than the earlier design and is also simpler than the two-needle type used by the .40 and Eagle .60 models already dealt with in the Engine Reviews.

The throttle valve is milled away to form flats front and back to allow intake air to pass either side of it. It is drilled axially and threaded to take, from the left side, a conventional valve needle and,



Components of 36 R/C indicate construction follows traditional Fox pattern.

from the opposite side, a threaded tubular fuel inlet fitting. The fuel metered by the needle-valve and released into the interior of the throttle valve is then fed into the intake via two jet holes. One of these (the idling jet) is placed in the front "flat" and the other one (the high speed jet) is located in the bottom of the throttle valve and offset to one side. Below the throttle valve the bore of the carburetor body changes shape, as a result of which the offset high-speed jet is completely masked as the throttle is closed and the engine then runs only on its idling jet. The high speed jet remains closed until the throttle is approximately half-open and then begins to open. Some re-adjustment of the point at which the high-speed jet becomes operative is possible by altering the effective length of the small round head throttle retaining screw on the front of the carb body, but this is not mentioned in the maker's instruction leaflet and, when testing the 36 R/C, we found no evidence to suggest that such readjustment might be necessary.

The correct mixture strength for full speed running is obtained in the usual way by means of the needle-valve. However, as previously noted, the same needle-valve also feeds the idling jet. Therefore, to control the amount of fuel released by the idling jet, this has its own adjustment via the screw-in inlet fitting in the opposite end of the throttle valve. Externally, this fitting has a small knurled disk and a light compression-spring (like the main needle-valve) and can be screwed in (to weaken the idling mix) or out (to enrich the idling mix) as needed. The inlet fitting is, itself, acting as

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a needle-valve here, since its tip, in addition to being drilled to accept the needle-valve tip, is externally tapered and projects just beyond the position of the idling jet hole, thereby controlling the amount of fuel fed back to the idling jet.

The rest of the 36 R/C is conventional and, apart from a longer crankcase nose, a differently shaped cylinder-head plus, of course, its carburetor, the engine is similar in appearance and construction to the smaller displacement Fox .29 Control Line/Free Flight motor dealt with in the May 1973 issue.

The body casting is, is usual, of pressure die cast aluminum alloy. It includes a full length finned cylinder casing well stiffened to resist distortion and an integral front housing with a cast-in bronze bushing forming the main bearing. The crankshaft is of hardened steel with a ½ in. o.d. journal, a 3/8 in. i.d. gas passage, a 7/32 in. o.d. solid crankpin and is counterbalanced by means of cutaway web flanks and a machined-in crescent counterweight. A rectangular valve port is used in conjunction with a round intake aperture, giving an induction period (according to measurement of our test motor) of approximately 193 deg. of crank angle, timed from 35 deg. after bottom-dead-center to 48 deg. after top-dead-center. As on most other Fox motors, a substantial steel prop driver is fitted, located by short splines on the shaft.

The drop-in cylinder sleeve has a .037 in. wall thickness and has orthodox porting. The exhaust port extends around 180 deg. of the bore, less a 0.15 in. wide central bridge and remains open, according to measurement of the test motor, for 144 deg. of crank angle. The bypass period is 8 deg. less. Incidentally, timing is symmetrical: unlike many previous Fox engines, the cylinder is not offset relative to the shaft axis. The lapped Meehanite piston is of the usual Fox design, having a thin, straight baffle and an annular internal stiffening rib above the wristpin bosses. The 5/32 in. dia. solid wristpin is retained by wire circlips and couples the piston to a machined aluminum conrod. The pressure cast aluminum cylinder head has the familiar Fox wedge pattern

combustion chamber with inclined glow plug and is attached to the main casting with six screws. A .010 in. aluminum gasket makes the joint with the top flange of the cylinder sleeve.

The current 36 R/C accepts the Fox "B" size muffler and is provided with tapped attachment lugs above and below the exhaust stack, enabling the semi-rotary exhaust valve that is coupled to the throttle, to be retained when the silencer is added.

As is our usual practice, we started the break-in period on a straight 75/25 blend of methanol and castor oil. Unlike the .29 version tested earlier, the .36 ran reasonably well on this simple mixture (an important selling point in some export markets where nitroparaffin additives, such as nitromethane, are not available). Changing to our standard 5 percent pure nitro test fuel, however, added 250 rpm on a 10 x 6 Top Flite prop and a further 250 rpm increase was obtained by changing to the recommended Fox Missile Mist fuel. Glow plugs used were Fox long-reach standard and long-reach R/C. Generally, the R/C plugs gave steadier running and this type was used for all subsequent tests.

As stated at the beginning of this report, the 36 R/C bettered the manufacturer's performance claim of 10.500 rpm on the recommended 10 x 6 size prop and Missile Mist fuel recording 10.700 on a 10 x 6 Top Flite Super-M and 11.300 on a Taipan nylon fiberglass. Other prop rpm figures obtained included 9.600 on an 11 x 6 Power Prop Super-M, 10.400 on an 11 x 5 Power Prop standard, 11.100 on an 11 x 4 Top Flite standard, 11.400 on a 10 x 5 Super nylon fiberglass and 11.800 on a 9 x 6 Top Flite Super-M.

Actually, the recommended 10 x 6 size would seem to be pretty near the optimum size for getting the best performance under normal conditions with this engine. Our test curves indicate that the peak output (0.52 bhp on Missile Mist) is available at around the 12.500 rpm mark so there is no point in using a small prop that would allow the engine to accelerate up to beyond this speed in the air. On the other hand,

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the Fox will pull larger sizes quite comfortably should it be required to do so.

General handling qualities of the 36 R/C were good. Our motor started readily from cold when new and only slightly less eagerly when warm. One snag arises when one is using the muffler it is not then possible to prime directly into the cylinder via the exhaust port. Our personal method of priming the engine for an initial start from cold under these conditions is to remove the glow plug and inject a few drops of fuel through the plug hole. This, we feel, is no handicap since one can, at the same time, check the glow plug and insure that the voltage applied is neither inadequate nor excessive always a good idea as different types of plugs vary quite a bit in their requirements. Naturally some care must be exercised in removing and replacing the plug to avoid damage to the plug hole threads and the ideal tool here is the Fox combination socket wrench. Part No. 90102, which fits both plug and prop nut. An alternative method of priming the cylinder is to prime the crankcase via the carburetor intake and to then rotate the model onto its back while turning the prop to introduce the mixture into the combustion chamber.

Incidentally, as we found with other Fox engines fitted with these mufflers, the Fox B size open-front muffler caused no power loss. Unfortunately, as is inevitably the case with no-loss mufflers, the degree of noise suppression obtained is very limited but the Fox muffler has the merit of being light in weight and very compact.

The throttle worked well and we had no difficulty in setting it up for a safe idle of around 2600 rpm (10 x 6 prop and Missile Mist fuel) with steady intermediate running and instant recovery to full throttle.

No problems were encountered with the 36 R/C at any time and, stripped down at the conclusion of the tests, all parts were found to be in good condition. The single Fox R/C plug used to obtain all the performance figures remained intact and (checked against two new plugs) had not deteriorated to cause any loss of performance.

Summary of Data

Type: Single-cylinder, two-stroke cycle with bronze bushed main bearing. Throttle type carburetor with coupled exhaust restrictor. Optional muffler.

Checked Weights: 8.35 oz. (less muffler)

9.80 oz. (with Fox Type B open front muffler)

9.87 oz. (with Fox Type B closed front muffler)

Displacement: 0.3594 cu.in. (5.889 c.c.)

Bore: 0.800 in.

Stroke: 0.715 in.

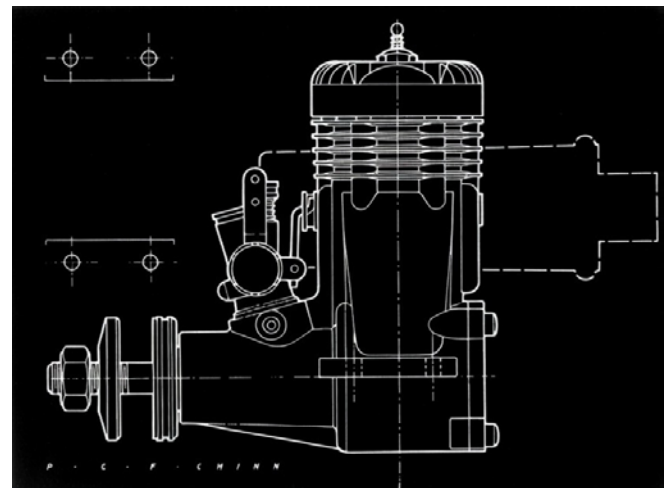
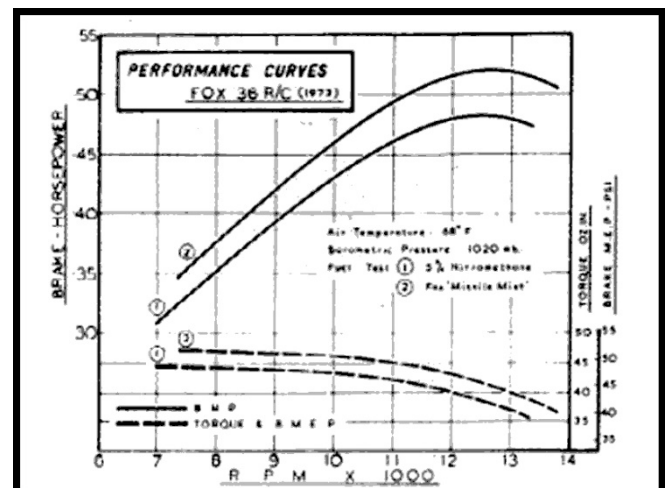
Stroke/Bore Ratio: 0.894:1

Specific Output (as tested): 1.45 bhp/cu.in.
(with muffler and Missile Mist fuel)

Power Weight Ratio (as tested): 0.85 bhp/lb.
(with muffler and Missile Mist fuel)

Manufacturer: Fox Manufacturing Company,
5305 Towson Avenue, Fort Smith, Arkansas
72901.

List Price: \$24.95. ■



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