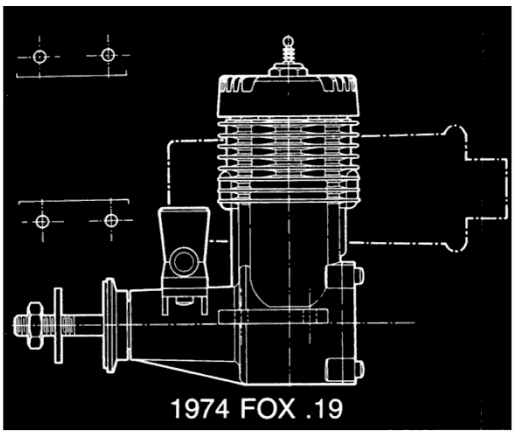
Fox 19



ENGINE REVIEW I

BY PETER G. F. CHINN

Based on Fox 25 design, new 1974 Fox 19 reveals unexpectedly good high-speed performance for Control Line or Free Flight enthusiast.

• **Quote:** The new Fox 19 is similar in appearance and construction to the Fox 25 and will interchange with the larger engine on the same motor mounts. Power output is surprising for a bushing motor our running many ball bearing engines. **Unquote.**

This is how the Fox Manufacturing Company describes its latest 19 engine in the 1974 Fox catalog and a very accurate statement it is too.

'Surprising' is the operative word. As the 19 is basically a sleeved down and de stroked version of the 25, one naturally starts off by expecting something approaching a 20 percent drop in power but the 19 did much, much better than this on test. Admittedly, torque at low speeds was reduced by about 15 percent compared with the figures we obtained for the Fox 25 when testing it two years ago, but the torque curves for the 19, both on our stock 5 percent nitro test fuel and on Fox Missile Mist fuel, were flatter (i.e.. torque was better maintained as load was reduced to raise rpm) and as a result, the 19 peaked at higher rpm than the 25 and, in so doing, achieved a substantially higher power output relative to its displacement. In fact, on Missile Mist, the 19 not only had a higher specific output than the 25, its actual output was slightly higher as well.

This does not mean that the 19 will automatically be faster than the 25 on every prop size. The 19 gets its power mainly from its ability to breathe more easily at test an impressive 0.45 bhp on

74 Fox is slightly shorter in overall height than the 25 is but otherwise it is identical in appearance.

Missile Mist was achieved at nearly 18.000 rpm, a clear 3,000 rpm faster than the 25, but at any load speed below 15,000 rpm, the 25 was superior. In terms of prop revs, this means that in order to realize the I9's best performance, it would be necessary to use nothing larger than an 8x5 prop.

Of course, it is possible that our test sample Fox 19 might have been slightly better than the average off the shelf example, but we would emphasize that the engine was absolutely stock, and we think it was probably fairly representative. Our findings, regarding its performance at high rpm do, in any case, appear to be confirmed by Duke Fox's prop recommendations given in the instruction leaflet accompanying the engine. These read: For most models, an 8 in. dia. 4 in. pitch propeller seems to work best. After you try this, you may want to experiment with an 8-5 or 8-6 or 7-6. We do want to urge you, however, to not put on too large a propeller. This little motor runs very fine in the 14.000 to 18.000 rpm range. The larger propeller you use will lug it down, not only do you get less power out of it, but the carburetion may not work so well.

Fox's claimed performance for the 19 is 15,000 rpm (static) on an 8x4 prop, but this could vary at least 1000 rpm cither way depending on the make and type of prop used. By choosing a "fast" one (i.e., a prop that has. because of its blade shape and section, lower power absorption) it should be quite possible to have the engine turning fast

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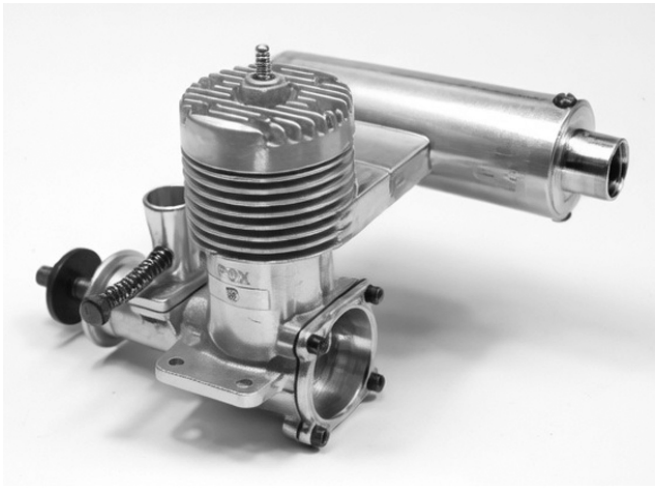
The crankshaft, piston, cylinder-sleeve, connecting rod, and cylinder-head are all new. Generous porting contributes to the high top end power!

enough, to comfortably reach its peak-power output in the air. We tried one of the new Australian Taipan 8x4 glass-fiber nylon props and the 19 turned this at 15,800 rpm on our standard 5 percent nitro test fuel and 16.500 rpm on Missile Mist. On such a prop the Fox would obviously have no difficulty in unwinding to its full potential in flight.

Most users, however, will be content with lower speeds, and in the interests of reasonable glow-plug life, we found it best to prop for speeds of not more than 16.000 rpm with this motor. Checked on 8x5 and 8x6 props, the 19 turned up 14.800 and 13.500 respectively on Power-Prop examples of these two sizes. Moving up to larger sizes, we recorded 12.400 on a 9x4 Top-Rite and 11.100 on a 10x316 Top-Rite, either of which one might use to good effect on a Free Right Scale or Sport model. All these figures, by the way, refer to the performance on Missile Mist.

The handling and running qualities of the Fox 19 were generally good. Cold starts were always obtained easily and quickly after priming the cylinder. The manufacturer advises against attempting to restart the motor before it has had time to cool off, and it is true that, when hot, the Fox can be a bit slow to restart by hand (a starter helps), especially when the muffler is used.
All our test figures, by the way, refer to the I9's



The open front end Fox muffler doesn't muffle very much but it has negligible effect on power output. Typical Fox well cast crankcase and cylinder.

performance less muffler, but we did run a repeat series of tests with the recommended Fox B size muffler fitted. We used the open-front type which doesn't quiet the engine much, but as we found with the 25, does cause a negligible power loss (a just barely measurable reduction of prop rpm at the peak and nothing at all at the lower speeds).

The 19 ran steadily when propped for speeds around 11,000 rpm and upwards and was better still above 13,000 rpm. Loaded below 11,000, its speed fluctuated somewhat although it was better on Missile Mist than on the milder 5 percent nitro mix.

The reasons why the 19 peaks at higher rpm than the 25 are not hard to find when one examines it. Since the engine is basically a reduced-bore, reduced-stroke version of the 25, most of its parts are the same as, or have similar dimensions to, those of the 25. For example, it uses the same carburetor unit, the same gas passage i.d. through the shaft, and the same bypass size as the 25; and since the 19 has a smaller displacement, this is, in effect, the same as increasing the cross sectional areas of these passages by 25 percent.

Breathing is further assisted by modified port timing and a very much longer induction period.

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The rotary valve period of the 25 originally tested was 175° crank angle, whereas the 19 checked out at 195°, opening at 43° ABDC and closing very late at 58° ATDC. The exhaust and bypass periods are also longer. These are likely to vary slightly between individual examples, but the measured periods of our test motor were 140° (exhaust) and 124° (bypass) of crank angle compared with x34° and 120° for the 25.

Taking the individual parts of the 19 in turn, these differ from the 25 parts as follows:
Main casting. This pressure-casting, embodying the crankcase and full length cylinder casing, is basically that of the 25 but has been made one-tenth of an inch shorter (in line with the engine's reduced stroke) by removal of the top fin section. The bronze-bushed front end has a fractionally larger outside diameter compared with the 1972 test model 25.
Crankshaft. The case hardened crankshaft has the same generous shaft o.d. (7/16 in.) and gas passage i.d. (5/16 in.) as the 25 but has a heavier, differently shaped web and counterbalance and a shorter prop-shaft that is reduced in diameter from 1/4 in. to 3/16 in. The milled rectangular valve port is wider and accounts for the engine's longer intake period. The shaft continues to use a solid 5/32 in. crankpin, the latter being re-located to reduce nominal stroke to 0.600 in.
Cylinder-sleeve and piston assembly. Like all other current Fox motors, the 19 uses conventional crossflow scavenging. Ports are rectangular and unbridged. The cylinder sleeve, slightly shorter than that of the 25, has the same outside diameter and the I9's smaller bore is accounted for by an increase in cylinder wall thickness from .045 in. to .060 in. The Meehanite piston is of the usual Fox pattern with a thin baffle and an internal annular stiffening rib above the wristpin bosses. A solid 1/8 in.dia wristpin is used. This is free floating in the front wristpin hole of the piston, but the rear hole is tapered so that when the wristpin is pressed home, it is retained securely in the piston without the need of clips or pads. This arrangement, peculiar to the smaller Fox engines, was first used many years ago on the Fox 15 and is also used by the 25.

We make no excuse for repeating a warning we have given before, which is that owners should note, if the need arises to remove the wristpin, that this must be withdrawn forward from the piston i.e., carefully pressed out from the rear.
A new and better quality, alloy connecting rod replaces the pressure-cast rod used by the 25 tested two years ago. A comparison of the bearing condition of both types of rod after extensive tests confirmed that the new rod should have a considerably longer life. We have not examined a recent 25 engine to see whether the new rod is fitted to this motor as well, but this seems likely as both engines accept the same rod size.
Cylinder-Head. The pressure die-cast cylinder head features a curved, wedge-patterned combustion chamber on the exhaust side with squish area on the bypass side. It is channeled for a 15 thou, aluminum gasket, has a central plug hole, and is secured to the cylinder casting with six Phillips screws.
Back-plate, etc. The carburetor, identical with the 25 carb, has a base flange by which it is attached with two screws, to a rectangular saddle cast onto the crankcase nose. It has a brass, spray-bar assembly and an effective choke area of approximately 12.5 sq.mm.

The crankcase back-plate is marked "Fox 19" but is otherwise identical with the 25 back-plate. It is stepped at the top to clear the piston skirt at bottom-dead-center.

As stated, the Fox 19 has exactly the same mounting dimensions as the Fox 25. It also happens to be almost exactly the same weight, so it is quite feasible to use cither engine in the same model.

One of the many useful accessory products offered by the Fox company is a safe breaking-in compound called Lustrox. We have used this to good effect, from time to time, over a period of many years, and although the 19 was by no means tight when new, a little Lustrox was used during the first few runs to hasten the break-in. At the conclusion of the tests, following approximately four hours running-time including a

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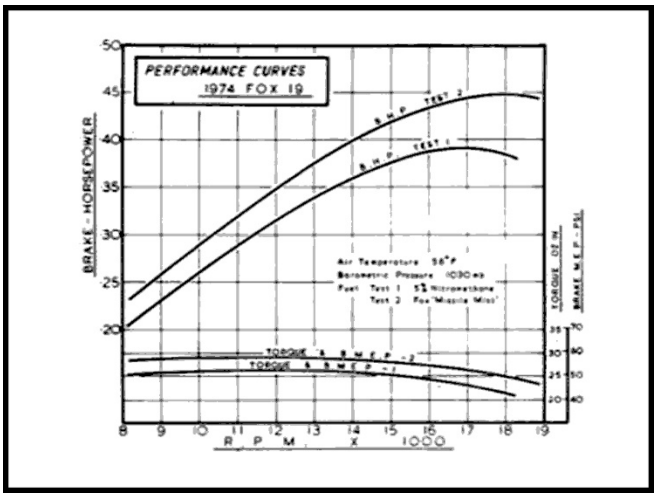
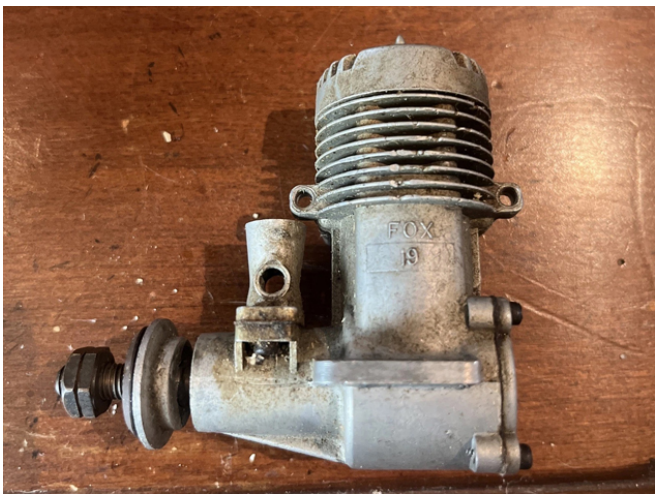
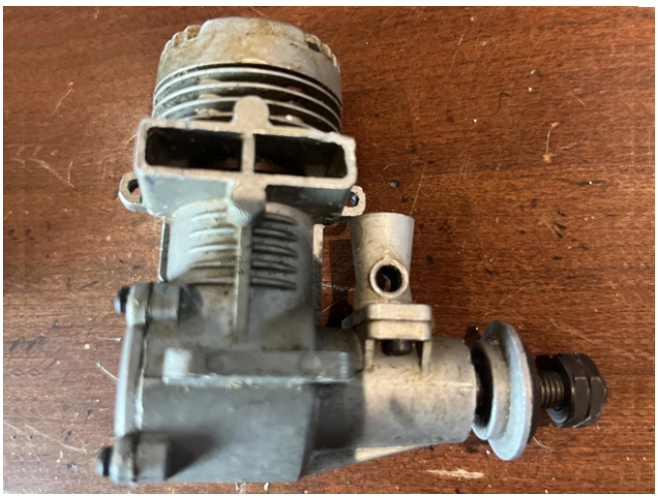
considerable amount of running at speeds of up to 19.000 rpm, the 19 was then stripped and cleaned, as is our normal practice. It was then carefully examined for any signs of premature wear or deterioration but was found to be in excellent condition.

Summary of Data

Type: Single-cylinder two-stroke cycle with bronze-bushed main bearing and crankshaft type rotary-valve. Muffler optional.
Checked Weights: 5.53 oz. (less muffler); 6.98 oz. (with Fox B size open front muffler)
Displacement: 0.1991 cu.in. or 3.263 c.c.
Bore: 0.650 in.
Stroke: 0.600 in.
Stroke/Bore Ratio: 0.923 : 1
Specific Output (less muffler):
1.95 bhp/cu.in. on 5 percent nitro fuel.
2.26 bhp/cu.in. on Missile Mist fuel.
Power/Weight Ratio (less muffler):
1.13 bhp/lb. on 5 percent nitro fuel.
1.30 bhp/lb. on Missile Mist fuel.
Power /Weight Ratio (including Fox B open front muffler):
0.89 bhp/lb. on 5 percent nitro fuel.
1.03 bhp/lb. on Missile Mist Fuel.
Manufacturer: Fox Manufacturing Company. 5305 Towson Avenue. Fort Smith. Arkansas 72901.
List Price: SI5.95.■







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