

Fox 25 R/C

Engine Test

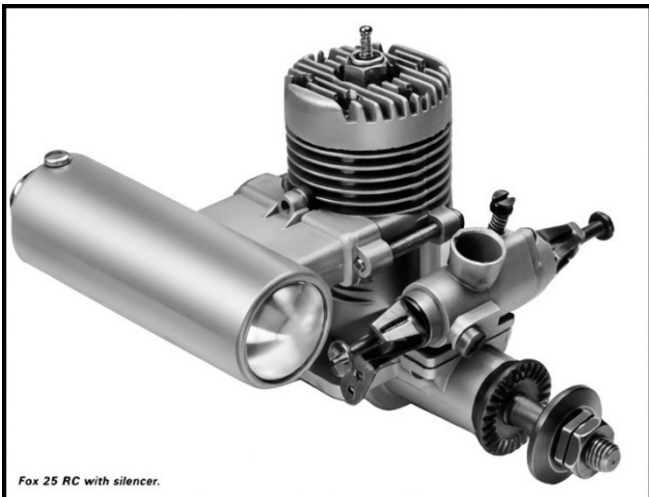
by Peter Chinn

Fox 25 R/C



1982 marks the thirty fifth anniversary of the appearance of the first Fox engine. This was the 9.72cc Fox 'Hi-Torque' .59, a rear rotary-valve twin ball-bearing spark-ignition engine of distinctive design and appearance. In 1949, it was followed by what was to become the most widely used and most successful control-line aerobatics engine of all time: a winner of countless contests and an engine that is still in production today: the Fox Stunt 35.

Since that time, the American Fox company has produced vast numbers of engines of all types, ranging from .049 cu.in (.8cc) beginners' engines, to a big twin cylinder 1.2 cu .in. (20cc) unit. Fox's most popular engines, however, have always been in the middle displacement sizes from .19 cu.in. to .40 cu.in and one such current model is the Fox 25.



Fox 25 RC with silencer.

The first Fox 25 was introduced in 1972 in both standard and throttle equipped versions and the standard version was dealt with in the A M. Engine Test series in the same year. Since that time, the 25 has been steadily improved, culminating in the new 1981 version that is the subject, in its throttle equipped variant, of this report.

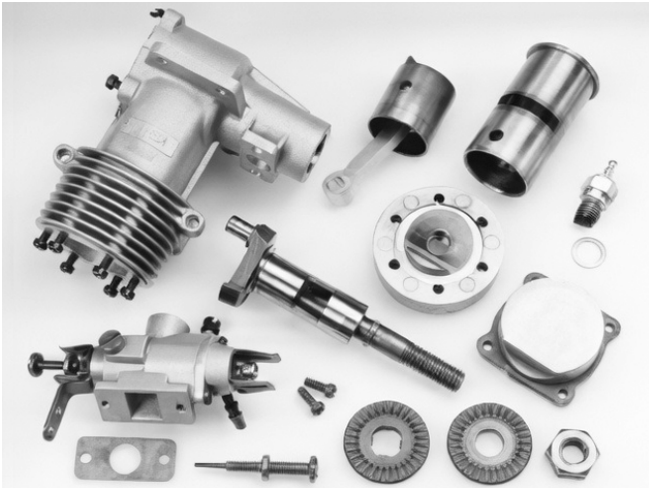
Although, in overall dimensions and general appearance, the 1981 motor is not greatly changed, most of its component parts are new or have been modified in some way and all the changes are for the better, as we shall see in a moment.

For example, the main casting, in the interests of increased durability, has a larger o.d. main bearing housing and a thicker saddle for the distinctive flange-mounted carburettor. Also changed is the method of securing the silencer, which is by means of a pair of lugs, located fore and aft, instead of tapped holes above and below the exhaust duct. A bead blasted matt surface is now used on the casting which, one feels, looks better than the original tumble polished finish.

The crankshaft, counterbalanced, as before, by a crescent counterweight and by cutaway web flanks, now has a 20 per cent larger diameter crankpin and its rectangular valve port uncovers the circular intake port for a lengthened induction period, beginning at 43 degrees after bottom-dead-centre and closing at 52 degrees after top-dead-centre. The prop driver is now of steel instead of aluminum. The cylinder-liner's two unbridged diametrically opposed ports are open, according to our measurements, for 133 degrees (exhaust) and 116 degrees (transfer).

The carburettor is of a new type. In the past, Fox carburettors have invariably been of distinctively different design. They have generally worked well but have called for a different adjustment procedure. As a result, some modellers, used to the sequence of adjustments applicable to the now popular "two needle" type, have found the earlier Fox carbs slightly confusing.

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Parts of the Fox 25R/C Traditional Fox construction: simple and durable.

The new Fox carburetors, therefore, incorporate the basic design principles now used by most other manufacturers. That is to say, a barrel throttle with circular choke is now employed, the barrel moving axially as it is rotated, carrying with it a separate, adjustable, low-speed needle, which reduces fuel flow through the jet tube as the throttle moves towards the idling position. As before, however, the carb has flange mounting, rather than the usual spigot mounting. The effective choke area is just over 14 sq.mm.

As already noted, the method of attaching the silencer is now fore and aft, rather than top and bottom. Also, the silencer itself has a rim that fits around the exhaust duct to make a stronger assembly, much less likely to be damaged in a crash. The silencer has a modest volume of 25 ml and contains a full length radially-slotted machined aluminum tube through which gases escape via a generous 85 sq.mm outlet.

Performance

Most Fox engines, particularly the small and medium sized ones like the 25, are intended for operation on Fox "Missile Mist" fuel. Fox fuels are not obtainable in the U.K. but a British equivalent is available in Model Technics GN-25 fuel, or in a 25 per cent nitromethane content, castor oil lubricated home-brew mix, as quoted in the data table. However, in view of the very high cost of nitromethane outside the United States, the majority of U.K. customers tend to opt for a milder



Improved Fox 'B' silencer features die cast body and machined battle tube.

fuel, commonly a 5 per cent nitro blend. For this report, therefore, tests were carried out on a 5 per cent mixture as well as on the recommended 25 per cent blend.

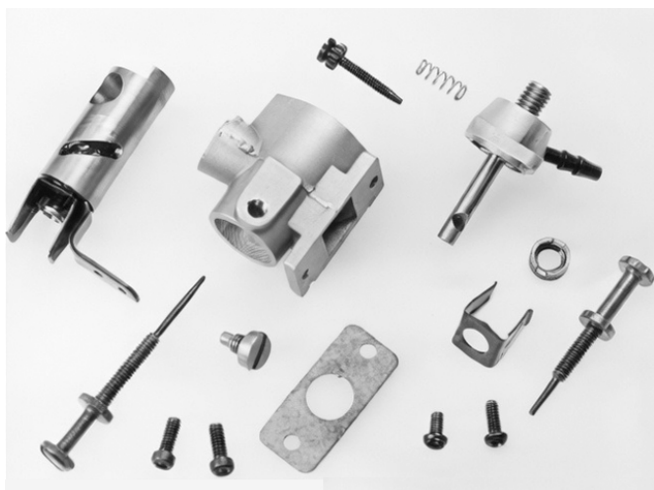
Starting and Running

Fox glow plugs are available in standard or R/C (idle-bar) types and with long or short reaches. They are also made in two ranges: the original type, identified by a plated body, which is now nominally rated at 1.2 volts and is for use with nickel cadmium or dry cells, and the 2 volt type, which has a black body and is for use with the lead-acid cells more commonly used in the U.K. the engine is normally supplied with a 1.2 volt long reach plug. Therefore, if you are intending to employ a 2 volt cell with this plug, make sure that you use long dropping-leads, or a suitable resistance or rheostat so that the applied current is not excessive. Check by removing the plug: the element should glow a reasonably bright red, but not a brilliant yellow orange.

Starting qualities of our test model Fox 25 R/C were good. Before replacing the plug, and having followed the maker's setting-up instructions, the cylinder was primed with a few drops of fuel through the plug hole. This produced an instant first-time cold start. Warm (non-primed) re-starts were also prompt.

The engine was given a total of approximately 90 minutes' running time before test figures were recorded.

Fox 25 R/C



Parts of the new automatic mixture control carburettor as fitted to the latest Fox 25 R/C and 19 R/C engines.

Only about 15 minutes' running were required to reach the point where the 25 R/C, with the silencer fitted, was able to hold a steady full throttle 11.200 rpm on a 10 x 4 Zinger prop. At the end of one hour this figure had risen to 11.500 rpm, but no further improvement was detected during the remaining 30 minutes and the engine was then considered ready for testing.

As regards actual running qualities, the 25 R/C ran quite well on the 5 per cent nitro mix, except when lightly loaded for speeds in excess of 12.500 rpm when there was some unevenness of firing, accompanied by increased needle-valve sensitivity. As most owners will probably be using the engine for R/C trainer or scale models, when a 9 x 5 or 10 x 4 prop would be appropriate i.e. when static rpm is below 12.000 this is unlikely to be a problem.

There is no doubt, however, that this Fox does run better on the higher nitro blends. In addition to providing extra power (reflected in prop rpm increase of 300-400), the 25 per cent nitro mix gave steadier running, greater tolerance to mixture strength variation at the top end and better throttle response.

Power

The Fox silencer is not so quiet as, say, the equivalent O.S. silencer, but does not absorb so much power. In fact, it is only at speeds in excess

of 14.000 rpm that any power loss becomes discernible.

As the performance curves show, a peak power output of 0.44 bhp at 14.600 rpm was determined on 25 per cent nitro with the silencer fitted. Removal of the silencer raised this figure only marginally to approximately 0.455 bhp at 15.500 rpm. These are very good figures and are among the best we have recorded for a plain bearing crossflow-scavenged engine in this capacity group. Switching to the 5 per cent nitro fuel, as expected, lowered torque (mostly by between 6 and 8 per cent) and resulted in a peak bhp of 0.41 at 13.500 rpm.

Typical speeds obtained on maple wood props and using 25 percent nitro, included 10.200 on a 10 x 5 Top Flite, 10.900 on a 9 x 6 Zinger, 11.550 on a 10 x 4 Top Flite, 11.800 on a 10 x 4 Zinger, 11.700 on a 9 x 5 Zinger, 12.200 on a 9 x 5 Top Flite, 12.800 on a 9 x 4 Top Flite, 13.000 on a 9 x 4 Zinger, 13.700 on a 9 x 4 Power Prop and 14.100 on an 8 x 5 Zinger.

Throttling

The new Fox carburettor worked well. The best running setting on 25 per cent nitro with the test engine were main needle 2 turns open, low-speed needle 1½ turns open. These settings allowed a minimum safe idling speed of 2.600 rpm on 10 inch diameter props, rising to 2.800 / 3.000 on 9 x 4 props.

Comment

Fox engines are not found on the shelves of every dealer, some of whom claim that they are not sufficiently "pretty-looking" for their customers. To this, one can only report that Fox motors are well finished where it matters most, i.e. inside, and that overall they have a very good reputation for durability.

Manufacturer: Fox Manufacturing Company, Fort Smith, Arkansas, U.S.A.

U.K. Sales & Service:

- (i) Fox Mfg Co. UK, The Haven, Rixey Park, Chudleigh, Newton Abbot, Devon,
- (ii) Model Aircraft (Bournemouth) Ltd, Norwood Place, Pokes down, Bournemouth, Dorset.

Fox 25 R/C

1981 FOX 25RC

SPECIFICATION

Type: Single-cylinder, glow-plug ignition, crossflow scavenged two-stroke, with shaft rotary-valve and side exhaust. Bushed main bearing.

Throttle type carburettor with adjustable automatic mixture control.

Carburettor interchangeable with plain venturi and needle valve assembly.

Bore: 0.680in. (17.27mm)

Stroke: 0.680in. (17.27mm)

Swept Volume: 0.2470 cu.in. 4.047cc

Stroke/Bore Ratio: 100:1

Nominal Compression Ratio (full stroke): 7.2:1

Checked Weights:

195 grammes - 6.9 oz. (less silencer)

238 grammes - 8.4 oz. (with silencer)

GENERAL STRUCTURAL DATA

Pressure die cast aluminum alloy crankcase / cylinder-casing / front- housing unit with bronze bushed main bearing. Pressure die case aluminum alloy back-plate secured with four Phillips screws. Counter balanced one piece case hardened steel crankshaft with 7/16.in.dia. 7/16.in. dia. main journal, 5/16.in. bore gas passage, 3/16.in. dia. crankpin and 1/4 -28 UNF prop shaft thread. Steel prop driver keyed to shaft by short splines. Drop-in leaded steel cylinder liner located by flange at top. Ground and lapped Meehanite cast-iron piston with straight baffle and 1/8 in. dia. solid gudgeon-pin pressed into tapered hole in rear piston boss. Machined aluminum alloy connecting-rod with plain eyes. Pressure die-cast aluminum alloy cylinder head with wedge pattern combustion chamber and channeled to fit over flange of cylinder liner with .010 in. soft aluminum gasket and secured with six Phillips screws. Flange mounted Fox two needle AMC carburettor with pressure die-cast aluminum alloy body and steel throttle barrel. Fox 'B' size silencer (optional) with pressure die-cast aluminum alloy expansion chamber / entry duct and machine aluminum alloy baffle tube.

TEST CONDITIONS

Running time prior to test: 1½ hours

Fuels used:

(i) 5 per cent nitromethane, 25 per cent castor-oil. .70 per cent methanol, (Running-in-and-Test-1).

(ii) 25 per cent nitromethane, 20 per cent castor-oil, 55 per cent methanol. (Test 2)

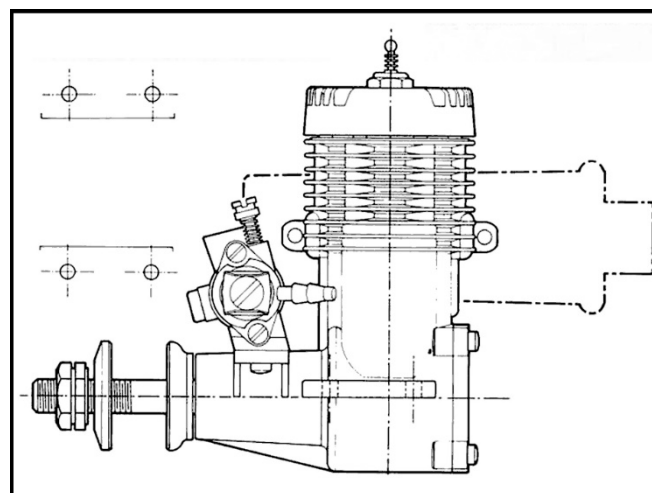
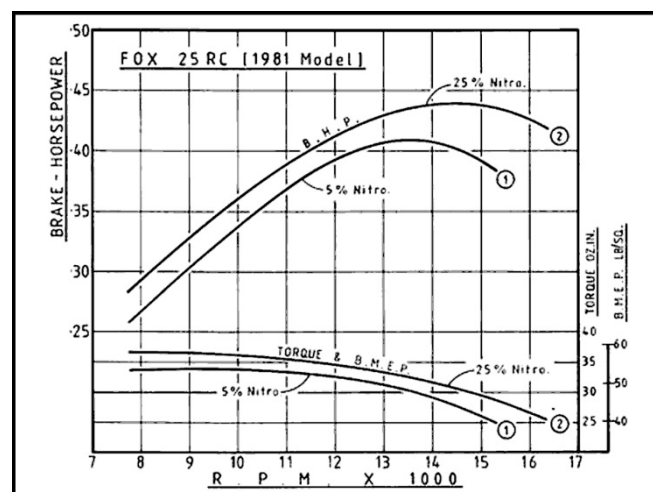
Glow-plug(s) used: Fox 1.2 volt RC long-reach.

Silencer used: Fox Type B, P/N 90222.

Air temperature: 13° (56°F)

Barometric pressure: 756mm (29.76in.) Hg

Relative humidity: 74 per cent.



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