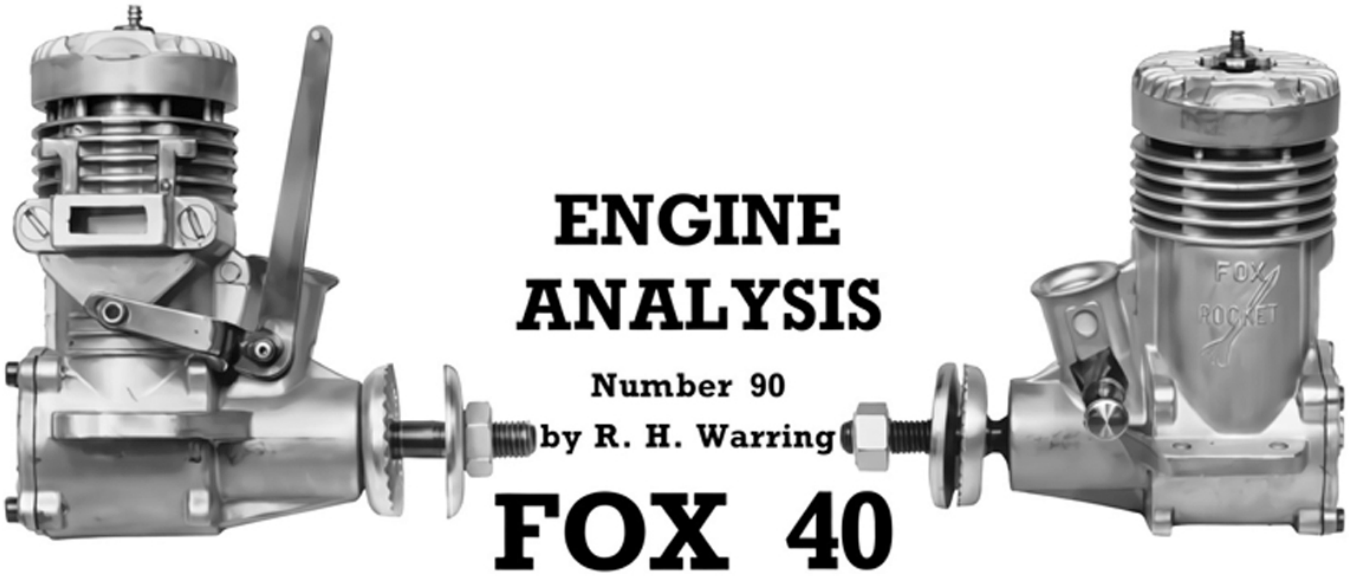
# Fox 40 R/C & STD




DUKE FOX HAS, from time to time, produced engines which have not necessarily been glowing with external glamour despite their obvious potential, but throughout has always maintained standards of workmanship in the best American tradition employing modern machines and techniques and paying particular attention to the internal parts and fits which really matter. The Fox 40 is a specially enlarged engine for control line Rat Racing stunt and combat, of conventional design throughout, well planned and built, rugged and easy to handle. It utilises the same bore as the Fox “35” but with an increased stroke, resulting in an almost square engine.

Considerable running in time was found necessary to case the “40” down to good running fits, initial tightness being a characteristic of most Fox engines. Al no stage, however, was the “40” reluctant to run quite smoothly and starting and handling characteristics proved excellent throughout even outstanding for a high power fairly high compression ratio engine of this type. The cylinder docs, however, tend to get extremely hot and the motor can seize or partially seize if continuous high speed running is attempted too early, or if running in is attempted on too lean a mixture.

Whilst the spray-bar and needle are of conventional pattern the needle tip, incidentally, incorporates the flat “bar” section introduced by Fox on earlier motors to provide a positive support against any possibility of the needle vibrating and affecting the mixture setting.

Needle valve control itself is essentially non critical and the “40” will run well and strongly on rich settings, which is a decided advantage for acrobatic work. The “40” also seems most tolerant as regards fuel tank position, a change in vertical height of the tank position of several inches when bench running having no effect at all on mixture at speeds of 12.000 to 14.000 r.p.m. (Frank Warburton, has been first to recognise these qualities, and speaks highly of its potential for stunt.)

The torque curve as plotted on test showed a more rounded form than usual with very high torque developed in the 11-13.000 r.p.m. range, falling off markedly at lower speeds but being well sustained at the higher speeds. The “40” was not too happy running very slow i.e. with 11 and 12 inch diameter propellers, but extremely consistent in performance at all higher speeds. Peak power as measured on test was just below .6 B.H.P. at 14.000 r.p.m., with maximum torque developed at 12.000 r.p.m. It thus appears well able to handle higher pitch propellers which glow motors even large glow motors do not always like, especially for static running.

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Design and construction is fairly conventional, about the only outstanding features being the large diameter crankshaft and the quite thin cylinder liner employed the former usual, and the latter unusual these days. Crankshaft diameter is a full ½ in., stepping down to a ¾ in. diameter threaded length. Actual journal length is only one inch which does tend to exaggerate the appearance of the large diameter. The intake port in the shaft is rectangular 3/8 in. by 5/16 in., opening into a 11/32 in. diameter hole down the centre of the shaft. These dimensions are more or less consistent with what is becoming standard practice on engines of this size.

The crankweb is cut away and very heavily over balanced, while the 7/32 in. diameter crankpin is long and stepped back so that it can be ground to finish, the shaft also being ground over the bearing length. Fit is quite close and very good in the bronze sleeve in the crankcase casting, forming the main bearing. A hardened steel propeller driver keys onto lugs formed on the shaft. The shaft itself is hardened and then relieved to some considerable degree. We are not entirely happy that the fairly abrupt step-down from the ½ in. major diameter to ¾ in. propeller shaft diameter gives the strongest possible insurance against crash damage, but lacking actual experience as to how the “40” stands up under really rough treatment we can hardly comment further on this point. Certainly the rest of the engine is really rugged and strong without being excessively heavy and seemingly capable of outlasting several airframes.

The crankcase unit is the "Rocket 35” silicon aluminum die casting in light alloy with the crankcase and bore machined out. Transfer passage is cast in. Duplicated lugs on the front face of the crankcase emphasise that this design of casting is also utilised in further designs with detachable front unit, as for example the square intake, needle bearing Combat Specials.

The cylinder liner is of leaded steel, unhardened, and conventional in form. Exhaust ports are cut through the walls over a full 180 degrees, with a small bar providing support at mid length i.e. two separate ports are cut leaving this supporting piece in the liner wall. Depth of these ports is 3/16 in. The single transfer port, whilst not so wide, looks enormous by comparison, having a depth of 5/16 in. The top of the transfer almost completely overlaps the exhaust.

Liner overall diameter is only .874 in. for a bore diameter of .800 in., which means that the walls are very thin. However, the fit in the crankcase unit is quite light, so presumably it is reasonably well supported by the casting. It is located on a flange on top of the liner, clamped in position by six screws through the head. The head is a rather heavy die casting in aluminum alloy. Presumably the large volume of metal in the head and the small effective area of finning on the crankcase unit rather more decorative than effective as cooling fins contribute to the high cylinder temperature achieved when running.

Piston is of meehanite, machined to quite a thin walled section and is light for size. A flat plate deflector is formed on the top. Gudgeon pin is small .155 in. diameter is a floating fit and is hollow with brass eyelet type end pads. To remove the piston it is necessary to withdraw the gudgeon pin through a hole in the back of the cylinder jacket casting as it cannot be reached in any other way. A tight fitting liner is thus necessary in order to ensure that there is no gas leakage through this hole.

Connecting rod is machined from 24 ST aluminum alloy and then tumbled to finish, giving a matt appearance. Big end diameter is .2165 in., both big and little end bearings being plain. The bottom of the connecting rod only just has clearance in the bottom of the crankcase and had, in fact, been reworked to achieve clearance.

Unusual for an American engine, the cylinder liner appeared to have been finished by internal grinding. Certainly the chamfer relief at the bottom of the cylinder had been ground and with a setup to do this it would appear only logical to grind the bore as well. The appearance of the bore after running was too rough to determine the original finish. Normal practice with Fox engines is to employ cross-hatch honing which

does give a roughish appearance an optical illusion, in fact, as far as judging the actual surface finish because of the nature of the marks made by the stones. In this case, however, we would not class the fit or finish as good, even after considerable running time, mainly because there appeared to be non-circularity either on the piston or liner bore. Possibly the liner is a little on the thin side and does warp or distort. Nevertheless the power output of the “40” was too high to suspect much loss through excessive friction in the piston-cylinder assembly, nor were there any signs of undue wear which would shorten the life of the motor.

The back cover is a light alloy pressure die casting, attaching with four screws in the conventional manner and sealing on a gasket. The centre of the cover has a stud extension which could be drilled and tapped if required, to form a pressure feed port.

A turned venturi insert is fitted as standard in the choke tube, located by the spray-bar. The spray-bar is of brass with a steel needle, externally threaded.

Summarising, a sound, rugged engine with excellent starting and handling characteristics. Torque is well maintained up to 14.000 r.p.m., giving the “40“ exceptional pulling power for a glow motor with peak power realised at 14.000 r.p.m. It should be an excellent choice for control line stunt and combat work with the larger sizes of models. The Fox R/C 40 (illustrated opposite) has a combined throttle and spray-bar plus exhaust slide valve. Bradshaw Model Products loaned us this example from their new stock and it exhibits several minor changes.

**PROPELLER - R. P. M. FIGURES**

| **dia x pitch** | | **r.p.m.** |
|---|---|---|
| 11 x 4 | Top Flite | 10.500 |
| 10 x 6 | Top Flite | 11.900 |
| 10 x 3 ½ | Top Flite | 13.400 |
| 9 x 7 | Top Flite | 11.800 |
| 9 x 6 | Top Flite | 12.800 |
| 9 x 7 | Keil Kraft nylon | 11.800 |
| 9 x 6 | Keil Kraft nylon | 12.000 |
| 9 x 4 | Keil Kraft nylon | 15.800 |
| 9 x 6 | Frog nylon | 14.000 |
| 10 x 6 | Frog nylon | 11.700 |
| 11 x 4 | Tornado nylon | 11.200 |
| 11 x 6 | Tornado nylon | 9.000 |

### Summary of Data

**Displacement:** 6.495 c.c. (.3961 cu.in)
**Bore:** .800 in.
**Stroke:** .788 in.
**Bore/Stroke Ratio:** 1.015
**Bare weight:** 7½ ozs.
**Max. Power:** .595 B.H.P. at 14.000 r.p.m.
**Max. torque:** 47 ozs. inches at 11.500 r.p.m.
**Power rating:** .0915 B.H.P. per c.c.
**Power/weight ratio:** .078 B.H.P. per oz.

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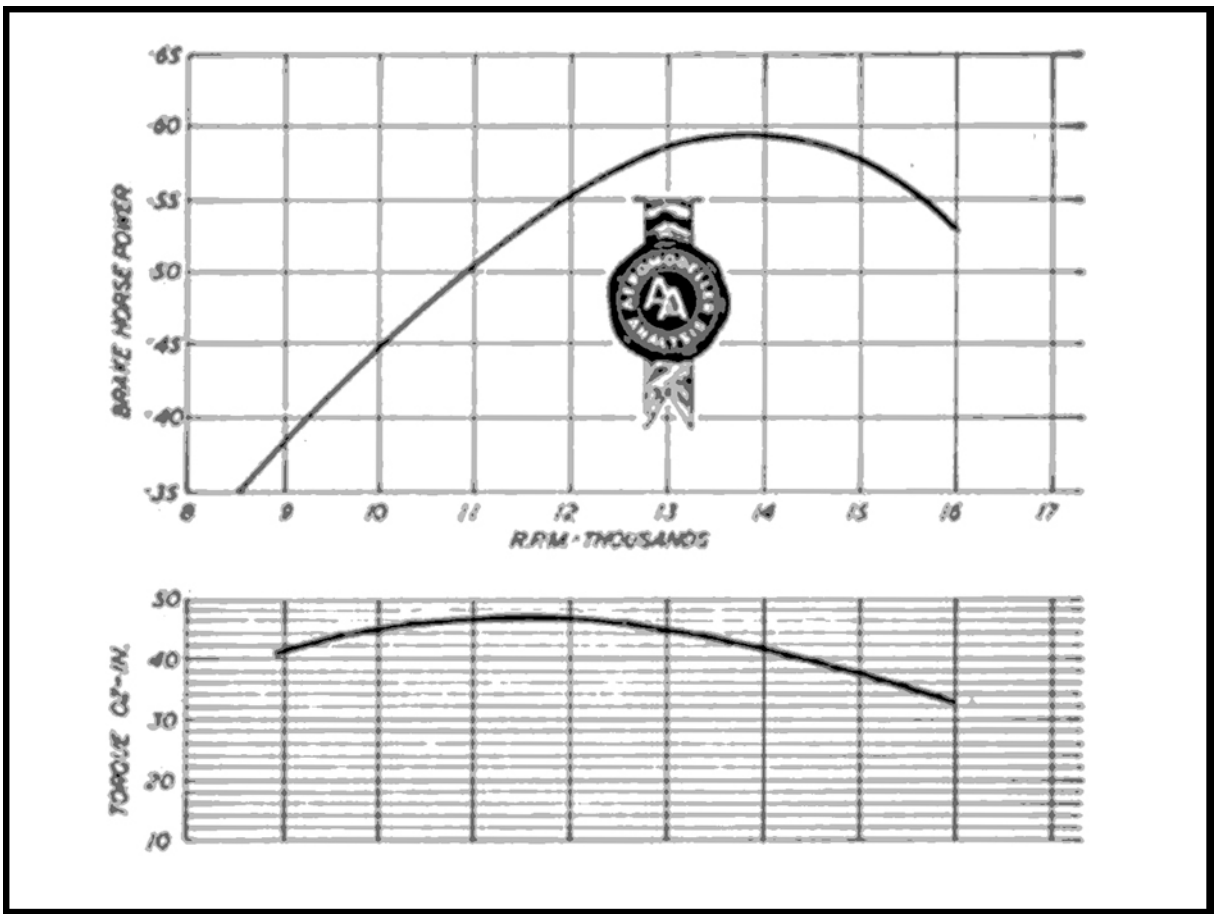


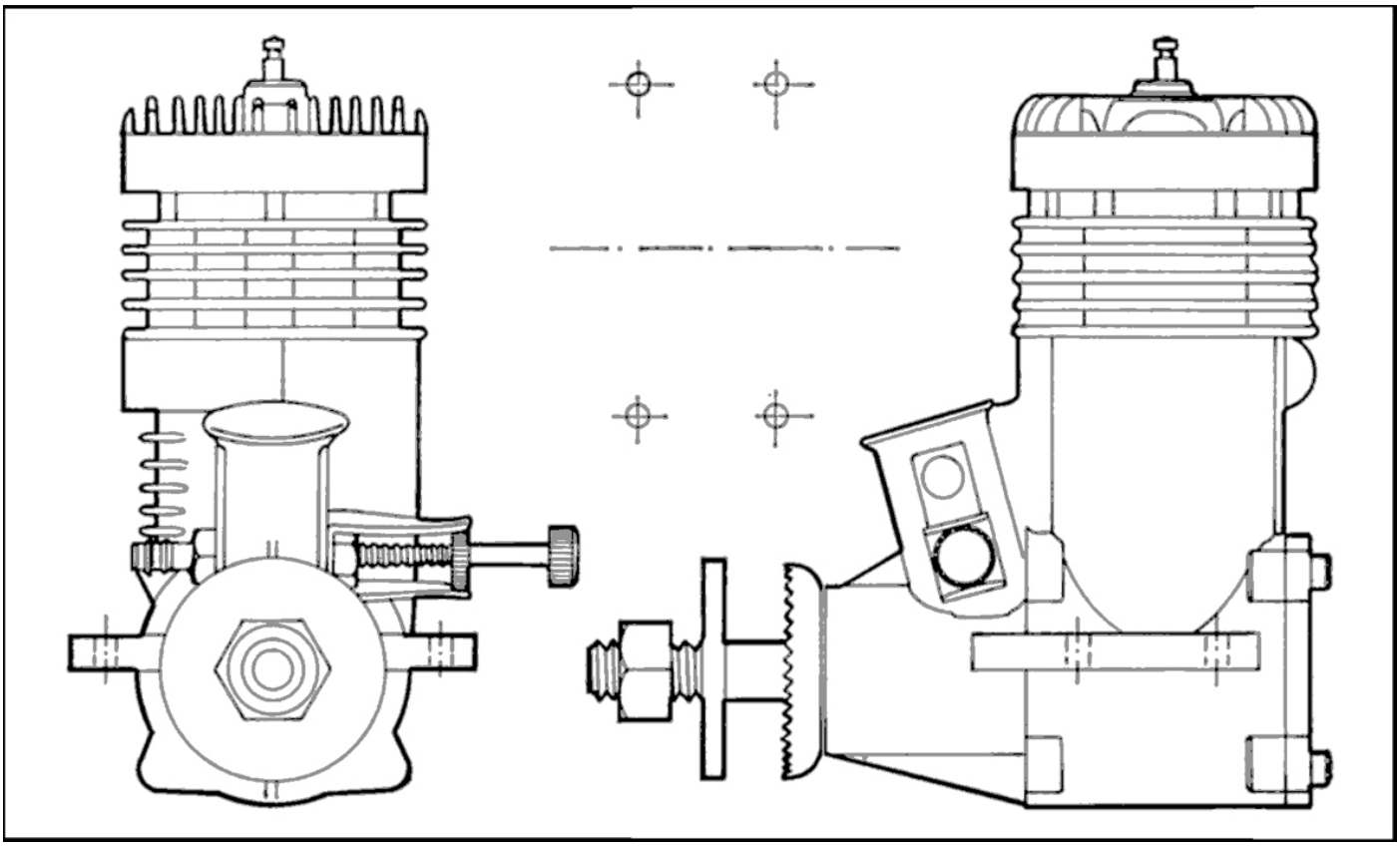

**More:** https://flyinghlsat.com/search.php?search_keywords=Fox-Engines

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