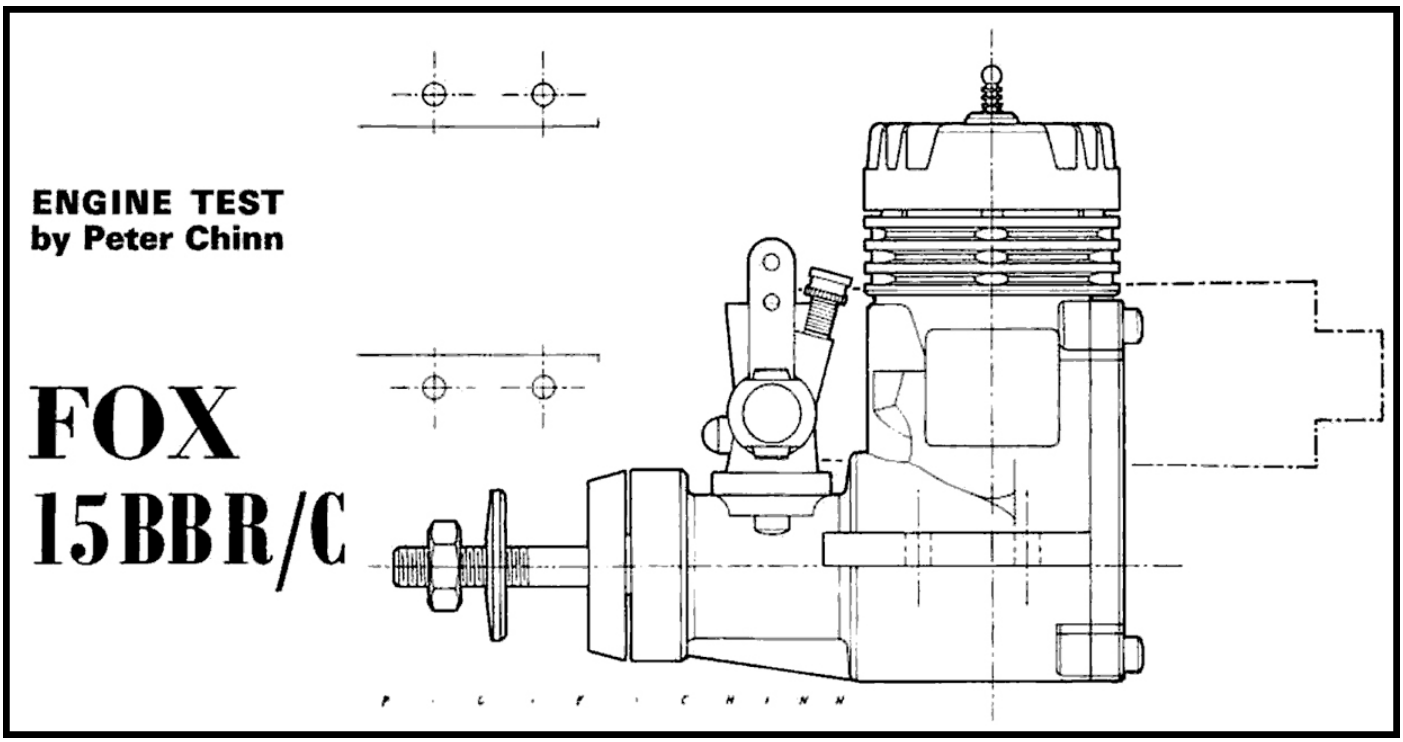
Fox 15 BB R/C



THE FOX MANUFACTURING COMPANY of Fort Smith, Arkansas, USA, introduced this 2.5cc motor last year. Offered in a choice of twin ball-bearing or bushed bearing models, it is the first completely new Fox 15 since 1962, features Schnuerle scavenging and differs considerably from previous Fox 15 models, all of which have been of the crossflow-scavenged type, with plain (bushed) bearings only.

In appearance and general layout, the new Fox 15 is not unlike the current Fox 40 and 45 series engines. Like these larger models, it has a highly unusual ‘back door’ in the main casting which uncovers not only the crankcase but also the rear lower part of the cylinder liner. The rear transfer passage is. in fact, formed in the back plate and this was one of the reasons for adopting this particular form of construction since it eases the problem of coring the casting for the three transfer passages.

Cylinder porting is similar to that of the 10cc Fox Hawk 60. The fore and aft transfer ports are angled to direct fresh gas to the left side of the cylinder (i.e. opposite the exhaust), in the usual Schnuerle manner, and are met by an upward flow from the inclined ‘boost’ port but, instead of using a single port of moderate area here, the 15, like the Hawk, has two elongated ports of very large area. These are open, according to our measurements of the test motor, for 126 deg of crank angle, or about 6 deg less than the fore and aft transfers. The exhaust period is quite long (160 deg) and is reflected in a relatively high nominal compression ratio (12.5:1 measured) since the effective compression stroke is appreciably shortened by the height of the exhaust port.

The shaft type rotary valve is timed to open at 40 deg ABDC and to close at 50 deg ATDC. It is fed from a vertical carburettor which, as with several current Fox engines, is flange mounted to a saddle on the crankcase nose instead of the usual spigot fitting. The engine is available with either a standard suction type C/L intake or throttle type (R/C) carburettor. The motor submitted to us for test had the R/C carb. This has a reasonably generous choke area (approximately 13sq.mm) and we would assume that the suction C/L type intake would not be larger than this. We can therefore assume that the C/L version of the engine would have much the same power as our test motor, but more power should be available with one of the special large choke intakes that are obtainable to special factory order. (These are not included in the Fox 15 spare parts list.)

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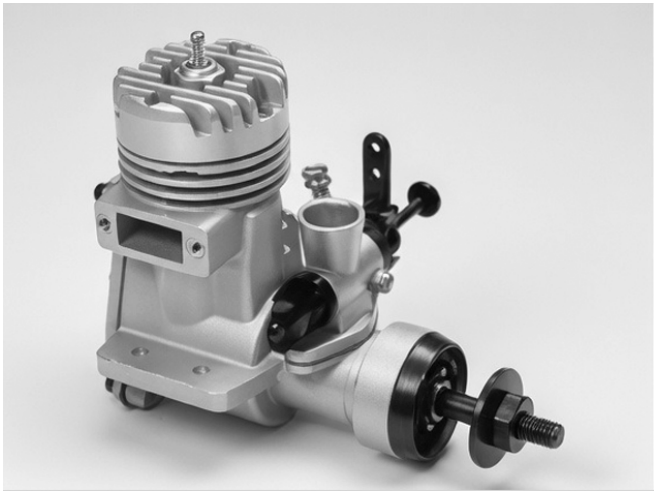

In addition to a choice of main bearings (bushed or BB) and different choke areas, the purchaser of a Fox 15 can also try different compression ratios. The 15 has an insert or ‘button* type head and there is a choice of four inserts: low or medium compression, high compression for use with nitro fuels and high compression for use with straight fuels.

Our test motor was supplied with the optional Fox silencer offered for these engines. This has a die cast body with a machined full length slotted 8mm i.d. tubular insert into which the exhaust gases pass to escape at the rear end. Effective outlet area is 50sq.mm and the silencer, which fits over the engine's exhaust duct, is attached with two hexagon head screws.

Performance

The Fox 15BB is basically a high speed engine and, like the Fox 19, needs to be given its head if its full potential is to be realised. In terms of prop sizes, this means that 8 x 4 and 7 x 5 are about the largest practical sizes because there is not much torque available when the engine is loaded for operation at low rpm. On test, our sample delivered its maximum torque (20oz.in) at around 12.000 rpm, there being a marked drop at lower speeds, yet only a slight decline under lighter loads, especially when running in the open exhaust condition. This allowed the torque curve to remain so flat that the peak of the power curve was not reached until the Fox had exceeded 19.000 rpm, where a figure of 0.33 bhp was indicated.

When the Fox silencer was fitted, this made very little difference to the maximum torque figure, but did, increasingly, affect torque at speeds above 14.000 rpm. When the figures obtained were plotted, it was found that adding the silencer actually caused the power curve to level off at 0.28bhp at just over 16.000rpm.

These figures were obtained on our standard R/C test fuel containing 5% nitromethane. The Fox ran perfectly on this mixture: in fact, it also tolerated a straight methanol/castor-oil mix quite cheerfully. The maker’s instruction leaflet, however, recommends two Fox fuels: 'Duke's Fuel' (10% nitromethane) or Missile Mist (25% nitro) and although neither of these is available in the UK, we also ran a check on the 15 using Missile Mist. This increased the peak power output (less silencer) to 0.37 bhp at over 21.000rpm.

All these figures are a substantial improvement on the performance obtained during our last AeroModeller test of a Fox 15, the 1970 model 15 R/C, which, in the open- exhaust condition (no Fox 15 silencer being available at that time) delivered 0.22 bhp at 12.500 rpm on 5% nitro and 0.29 bhp at 14.500 rpm on 20% nitro, both figures less silencer.

Propeller rpm recorded by the new Fox with silencer included 9.900 rpm on a 9 x 4 Tornado nylon, 10.100 on a 9 x 4 Top Flite nylon, 11.100 on a 9 x 4 Taipan glass fiber nylon, 11.300 on a 8 x 6 Power Prop wood, 12.500 on a 8 x 5 Power Prop wood, 13.200 on a 7 x 6 Taipan glass fiber nylon, 13.500 on an 8 x 4 Power Prop wood,

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13.600 on an 8 x 4 Taipan glass fiber nylon, 16.600 on a 7 x 4 Power Prop wood, 16.600 on a 7 x 4 Taipan glass fiber nylon, 16.800 on a 7½ x 3 3/4 Bartels glass fiber epoxy and 17.700 on a 7 x 3½ Bartels glass fiber epoxy.

The general handling and running qualities of the Fox 15BB were very good indeed. It was very docile and started easily, hot or cold, and with the throttle open or closed. The needle-valve was thought to be a trifle insensitive, so that care was needed to find the best setting for maximum power, but the engine then ran very evenly and very smoothly.

The throttle also worked well. As delivered, without any readjustment, the carburettor provided a safe idle of 2.800 rpm on an 8 x 4 Taipan prop and a steady transition between idle and full power and back again. Incidentally, with each of these engines, there is a copy of Duke Fox's very helpful notes on carburettors and carb adjustments and these are well worth studying, whether or not the reader is a Fox owner.

Examined at the end of the tests the 15BB was found to be in excellent condition. No plugs were burned out either during running-in or testing which, incidentally, included running the engine up to nearly 22.000 rpm.

Power-Weight Ratio (as tested on 5% nitro fuel):
0.63bhp/lb (with silencer)
0.89bhp lb (less silencer)
Specific Output (as tested on 5% nitro fuel):
114bhp/litre (with silencer)
134bhp/litre (less silencer).

SPECIFICATION

Type: Single-cylinder, air-cooled glow plug ignition Schnuerle scavenged two-stroke with crankshaft rotary valve and twin ball bearings. Throttle type carburettor. Silencer extra.
Bore: 0.590in (14.99mm).
Stroke: 0.550in (13.97mm).
Swept Volume: 0.1504cu.in (2.464cc).
Stroke/Bore Ratio: 0.932:1.
Measured Nominal Compression Ratio: 12.5:1.
Checked Weights: 170grammes (6-0oz) (less silencer). 205grammes (7-2oz) (with silencer).

GENERAL STRUCTURAL DATA

Pressure die cast aluminum alloy crankcase/cylinder-casing! main-bearing-housing with large detachable back plate in corporating rear transfer passage as well as crankcase cover. Hardened and ground counterbalanced crankshaft with 10mm o.d. journal, 6.35mm (1/4 in.) i.d. gas passage, 4.7mm (3/16 in.) solid crankpin and running in two 10 x 19mm 9 ball steel caged ball journal bearings. Separate 3/16 in. prop shaft stud. Drop-in steel cylinder-liner. Lightweight lapped Meehanite piston with flat crown and wide skirt port. Light weight tubular gudgeon-pin, 3.9mm (5/32 in.) o.d., retained by wire circlips. Connecting-rod machined from extruded aluminum alloy bar, unbushed. Two-piece cylinder-head consisting of finned pressure die cast outer component and machined central insert carrying conventional short-reach glow plug, the whole being secured to main casting with four Phillips screws. Machined steel prop driver, keyed to shaft with four short splines. Pressure die cast carburettor body flanged at base and secured to cast-in saddle on crankcase nose with 2 screws and gasket. Ground steel throttle valve with separate low-speed and high-speed jets, each with its own adjustment, and throttle arms on both sides.

TEST CONDITIONS

Running time prior to test: Approx 1 hour.
Fuel used: 5 per cent nitromethane, 20 per cent Duckhams Racing Castor-oil, 75 per cent methanol.
Glow plugs used: Fox 1.5 volt short-reach idle-bar type.
Air temperature: 10°C (50°F).
Barometric Pressure: 987mb (29-15in.Hg).
Silencer: Fox baffle-tube type.
Outlet area: 50sq.mm.

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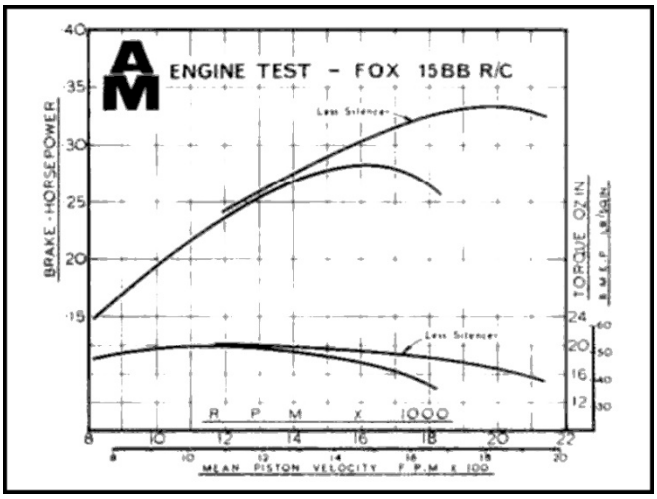

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