

ENGINE REVIEW • FOX .09

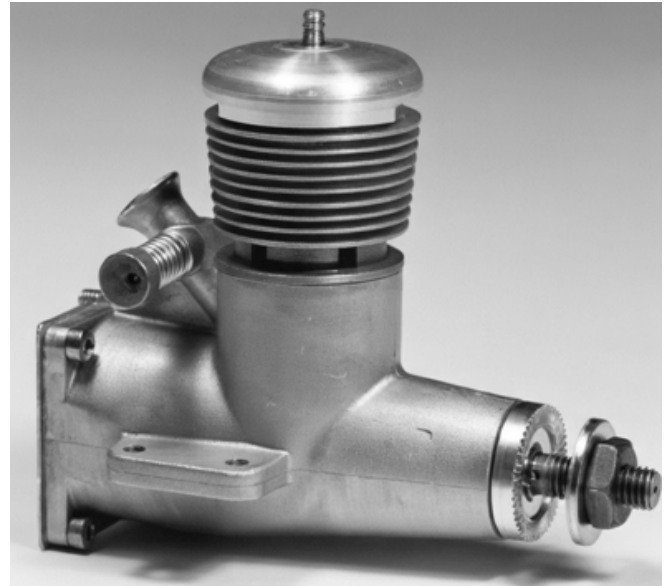
Aimed at the beginner market, for those wanting more than .049's, unique motor is a new approach by this manufacturer.

by P. G. F. CHINN

► Distinctive in appearance, this new model by Duke Fox is aimed at the beginner market and marks a complete breakaway from this manufacturer's previous designs. When, prior to the release of actual engines, illustrations of the .09 appeared, there was much speculation as to what the inclined rear intake meant. Many modelers, preoccupied with rotary-valve engines, assumed that some sort of rear shaft induction system was embodied. In fact, this new Fox revives the old 3 port two-cycle layout in a new guise.

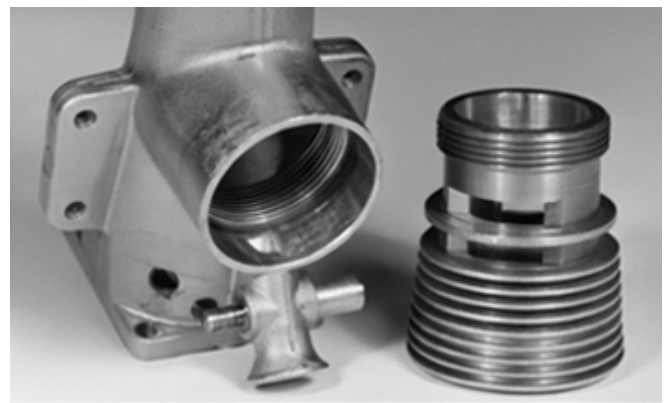
In the 3 port type engine, so called because the cylinder contains the intake, as well as the bypass and exhaust, ports, fresh mixture is drawn into the crankcase via a port uncovered by the piston skirt as it approaches the top of the stroke. It is the system that was employed on most prewar model gas engines and is still widely used by small two-cycle engines of the type fitted to lightweight motorcycles, lawn-mowers, etc. There is nothing "inferior" about the 3-port layout. It is not suitable for ultra-high-power, high-speed engines because it does not allow the intake timing to be sufficiently advanced, but, for a "sport" type motor, and, especially for beginner use, there is a great deal to recommend it. There are, in fact, a few foreign beginners' motors which are of the 3 port type: the Mills Diesel is one and is widely recognized in Europe as having easy-starting characteristics second to none among diesels.

Although it reverts to a basically simpler induction system, however, the Fox .09 is, in all respects, an entirely modern design.



Easy starting and rugged construction are emphasized to make this .09 an ideal beginners' engine. Rear needle always easy to adjust.

Fox has cleverly adapted the 3 port layout to current trends, permitting the use of a reverse-flow scavenged cylinder, with internal bypass flutes and generous exhaust ports. Furthermore, instead of a single in-take port leading direct from the carburetor, the .09 has twin opposed intake ports (positioned directly below the exhaust ports) fed from an annular chamber formed between the cylinder liner and the upper section of the crankcase casting.



Most interesting feature is use of once standard three-port design, here brought up to date. A venturi, but no shaft induction.

First requirements of a beginner's engine are, unquestionably, easy starting and docile handling characteristics. Our test sample excelled in both respects. We followed the maker's instructions to the letter and it fired on the very first flip of the

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prop. A further half turn of the needle was all that was required to get the .09 running continuously and evenly. Tried on a wide variety of 6 and 7 inch diameter props, there was no deterioration in starting qualities and no tendency for the prop to snap round and chop the operator's fingers.

When restarting the motor warm, we found that a single preliminary flick, with the intake choked, would produce an instant restart usually on the very next flip of the prop.

To obtain the absolute best setting of the needle-valve for maximum power, while the engine was running, fairly careful adjustment was needed, but, inasmuch as the motor would start and run smoothly on openings much wider than the optimum setting, needle valve control was non-critical. Once set, the needle holds its adjustment firmly.

The location of the needle control knob is a trifle close to the exhaust, but not so as to cause scorched fingers unless prolonged "fiddling" is indulged in. Its position, well back from the prop, is a safety feature especially noteworthy in a beginner's engine.

Since is-port motors, like reed-valve engines, will run in either direction with equal facility, there is an occasional tendency, with the Fox .09, to start in the opposite from the intended rotation. This is usually most marked on small props. If you experience this bother, there is a simple remedy that works well with the Fox: just flip the prop the other way!



Choice of beam or radial mounting, with or without using tank.

Structurally, the .09 is an interesting departure from orthodox practice. A single, cleanly proportioned pressure casting forms the crankcase, main-bearing housing and fuel tank and also embodies the conveniently inclined rear intake, plus both beam and radial mounting lugs. A screw-in rear cover separates the crank chamber from the fuel-tank section. When the integral tank is used, it is sealed by means of a stamped aluminum plate, with a cork insertion gasket. Four Phillips head screws and nuts are provided to secure this plate by means of the radial mount holes. The tank does not leak and holds a useful supply of fuel about ¼ oz.

The hardened crankshaft is of the crescent counterbalanced pattern and is ground on working diameters. Journal is ¼ in. dia. and runs direct in the crankcase material. A 1/8 in. dia. oil hole leads into the main bearing from just below the cylinder skirt. The cylinder is machined from leaded steel, with integral fins and is threaded to the crankcase. It is topped by a screw-in aluminum head with integral 1.5 volt glow filament. Soft aluminum gaskets are used to make head and cylinder joints.

The piston and machined steel conrod are a ball-jointed assembly, the socket being formed on the underside of the piston head. The piston has a hardened, ground and lapped skirt and a flat crown.

Other details include a pressed-in, brass spray bar with one-piece steel needle and control knob and coil-spring friction device. An alloy prop drive washer is keyed to the shaft by three splines. Threaded portion of the shaft is 3/16 in. dia.

A welcome feature is that a lengthy break-in (which has become one of the less desirable features of modern glow engines of the larger type), is not necessary with the Fox .09. Before our tests, however, we gave the .09 a series of runs totalling one hour's duration. Well within this time, it proved capable of holding a lean run on the recommended fuel without overheating or loss of power.

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The maker's recommended prop size for the .09 is a 7 x 3 or 6 x 4. Our test findings indicated that it will easily reach its peaking speed (14.000 rpm) in flight on a 7 x 3 and will go substantially beyond its peak on most 6 x 4 props.

Actual brake horsepower figures obtained were as follows:

At	9.000	rpm	.081	bhp
	10.000	"	.092	"
	11.000	"	.100	"
	12.000	"	.106	"
	13.000	"	.109	"
	14.000	"	.111	"
	15.000	"	.109	"
	16.000	"	.105	*
	17.000	"	.099	"

The .09 ran particularly smoothly and consistently at the higher speeds of around 14.000 to 17.000 rpm, although it will be noted that, at the latter speed, the box is turning well above its peaking speed and, to achieve maximum power, it would be preferable to avoid props which allow static rpm to exceed about 14.000. Incidentally, it may be mentioned that this peaking speed is, so far as we know, the highest ever recorded with a 3 port engine.

Summary of Data

Type: Reverse-flow scavenged three-port two-cycle.

Weight: 3.1 oz. including integral fuel tank.

Displacement: .0974 cu. in. or 1.596 c.c.

Bore: 0.527 in.

Stroke: 0.450 in.

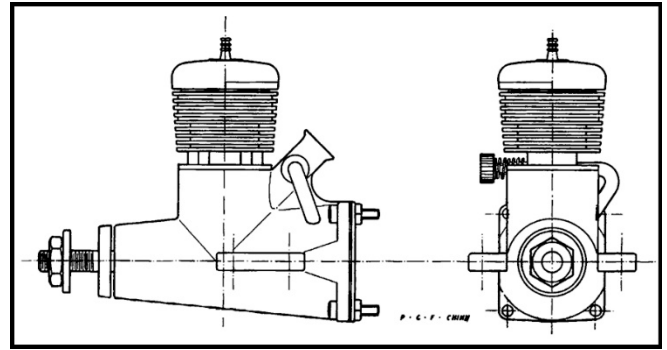
Stroke/Bore Ratio: 0.854:1.

Specific Output (as tested): 1.14 bhp/cu.in.

Power/Weight Ratio (as tested): 0.50 bhp/lb.

Price: \$4.95.

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



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