

Fox 35 Stunt



ENGINE TEST

by Peter Chinn

FOX 35 STUNT

*Perennial favourite of
control-line aerobatic flyers
all over the World*

Of all the model aircraft engines manufactured at the present time, none has been so closely identified with a specialised class, and for so many years, as the American Fox Stunt 35. In the world of control line acrobatics, the Fox 35 is the automatic choice of the majority of American modellers while, in any international contest. Fox 35s can be expected to power more models than any other make of engine.

The first Fox 35 actually appeared in 1949. Within a couple of years it had been adopted by most of the top American stunt flyers and, since that time, its popularity for C/L aerobatic work has never been seriously threatened. There are now other good C/L stunt motors but modellers have learned to trust the Fox 35. It is not the most powerful stunt 35, nor is it the most well finished, but it is light, reliable and has proved, conclusively, its suitability for the job in hand.

The engine on which we are reporting here is the current 1967 model. Few, if any, of the original Fox parts have remained unaltered in some way since the original version was introduced eighteen years ago, but the basic design of the engine has, nevertheless, remained much the same. Essentially, it is a very simple design and, excluding assembly screws and gaskets, it contains only sixteen parts.

The main component is the pressure die-cast body unit which comprises the crankcase, the finned cylinder casing and the main bearing housing with its integral bronze bushing. The bearing length is quite short and the intake to

the shaft type rotary valve is close to the crankcase. The induction passage through the shaft is thereby kept short and so helps to keep the volume of the primary compression chamber small. As a very large diameter induction passage is not really necessary in a stunt engine, a 7/16 in. crankshaft journal diameter is quite adequate. The moderate area valve port is timed to open at 45 deg. ABDC and to close at 45 deg. ATDC. The shaft has a full disc web with crescent counterbalance.

The cast iron piston is typical of medium size Fox engines. It is quite light, with a flat crown and straight baffle, a small diameter gudgeon-pin and an internal annular rib above the bosses. The machined connecting rod has an offset shank to clear the crankshaft counter weight. Strangely, however, the crankcase back plate clears the crankpin by about 1/16 in. more than it needs to do, which clearly contradicts one's initial impression that efforts have been made to maintain maximum primary compression. The back plate itself is attached to three lugs on the crankcase, spaced at 120 degrees which provide a means of radially mounting the engine should this be preferred.

The leaded steel cylinder liner is a slip fit in the main casting and is located in the usual way by a flange at the top, where it is clamped in position by the cylinder head which is secured with six screws. The head is a shallow wedge pattern with a glow plug boss protruding slightly below the head surface. The liner contains one exhaust port and one transfer port, of moderate area, the

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transfer occupying only about 100 degrees of the cylinder circumference. The ports arc timed to remain open for 132 degrees (exhaust) and 118 degrees (transfer).

The short air intake has a 9/32 in. throat diameter, no separate venturi insert being used. The needle valve assembly is of the spray bar type, the latter having a diameter of 0.130 in. A heavy, plated steel prop driver is employed. This engages four lands on the prop shaft length just in front of the main journal. A substantial steel retaining washer and a hexagon nut complete the prop shaft assembly.



Essentially simple basic design of the Fox 35 is easy to see in this photograph of the component parts of the engine.

Performance

One has only to see Fox 35s in the hands of stunt experts to note that generally they are easy starters. Our test model was no exception and responded quickly to the orthodox starting drill of an exhaust prime when cold and a couple of choked preliminary flicks when hot. We were also happy to find that it did not require an unduly lengthy running in period. We gave our motor eight two-ounce tanks of fuel at a rich four stroke, before beginning to lean it out. Within an accumulated running time of one hour it would maintain a steady optimum two-stroke setting without slowing down. A further full hour of running time was then logged before performance tests were started.

We used both our standard test fuel containing 5 per cent nitromethane and the maker's recommended Fox Super fuel which has a similar or slightly lower nitromethane content. There was little or no difference in the recorded power output on these two mixtures. On the popular 10 x 6 size stunt prop, speeds ranged from 9.700 r.p.m. on a Power Prop wood to 10.300 r.p.m. on a Tornado nylon. Other prop speeds included 8.000 on an 11 x 6 Top Flite wood, 9.400 on an 11 x 5 Top Flite wood, 11.000 on an 11 x 3 Top Flite wood and 11.400 on a 10 x 4 Tornado nylon.

On the cradle dynamometer, maximum torque was realised at 7.000 r.p.m., reaching a figure of 46 oz. in., equivalent to a b.m.e.p. of 52 lb/sq. in. which is reasonable for an engine of this type on a fuel of 5 percent nitro rating. The torque curve declined at a very steady rate as load was reduced and resulted in a maximum output of 0.45 b.h.p. at between 11.500 and 12.000 r.p.m.

Running was even and fairly smooth except when the Fox was overloaded (i.e. propped for speeds between 7.000 and 9.000 r.p.m.) which produced more vibration. Under normal conditions, with a 10 x 6 or 10 x 5 prop, the engine ran extremely well. The only fault we had to find with our particular motor, in fact, was that the needle-valve was a bit slack in its threads. Since the Fox needle is not actually a needle form, but is a parallel rod with a chisel flat on one side only, this caused slightly erratic response when it was being adjusted, but the engine ran perfectly steadily once the correct adjustment had been established.

Control line stunt engines are not, of course, rated solely on power output and 0.45 b.h.p. is not exceptional, these days, for a motor of nearly 5.8 cc. However, taking into account the fact that the Fox weighs less than 6J oz. (no more than some .19 class engines) this b.h.p. is actually very good on a power/weight ratio basis.

Power Weight Ratio (as tested): 1.12 b.h.p./lb.

Specific output (as tested): 78 b.h.p./litre.

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SPECIFICATION

Type: Single cylinder, air-cooled, loop-scavenged two-stroke cycle, glow plug Ignition. Crankshaft type rotary valve Induction. Bronze bushed main bearing.

Bore: 0.800 in.

Stroke: 0.700 in.

Swept Volume: 0.3519 cu. in. 5.767 cc.

Stroke/Bore Ratio: 0.875 : 1

Weight: 6.4 oz. (loss silencer)

General Structural Data

Pressure die cast aluminum alloy crankcase/cylinder block/front housing unit with cast-in bronze main bearing bush and drop-in unhardened steel cylinder liner. Detachable pressure die cast aluminum alloy crankcase back plate secured with three screws. Case hardened stool counterbalanced crankshaft with 0.437 in. dia. journal, 0.312 in. bore gas passage and 0.187 in. dia. solid crankpin. Lapped Meehanite piston with baffle and 0.153 in. dia. hardened tubular gudgeon pin with brass pads. Machined duralumin, unbushed connecting rod. Pressure die cast aluminum alloy cylinder head with recessed .010 in. soft aluminum gasket and secured with six screws. Machined steel prop driver. Brass spray bar type needle valve assembly. Beam mounting lugs. Provision for 3 point bulkhead mounting.

TEST CONDITIONS

Running time prior to test: 2 hours.

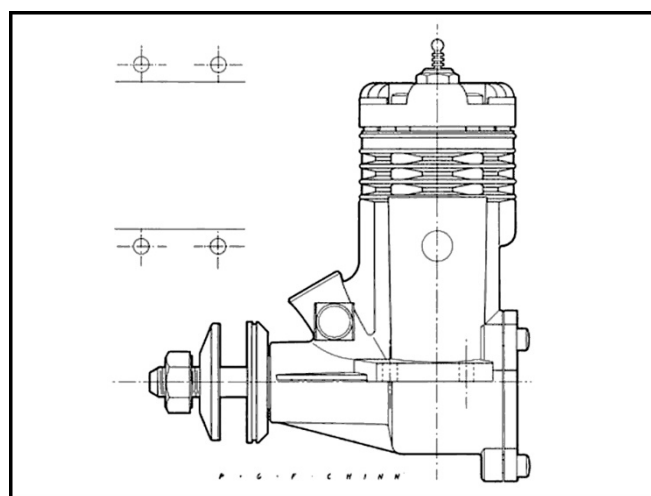
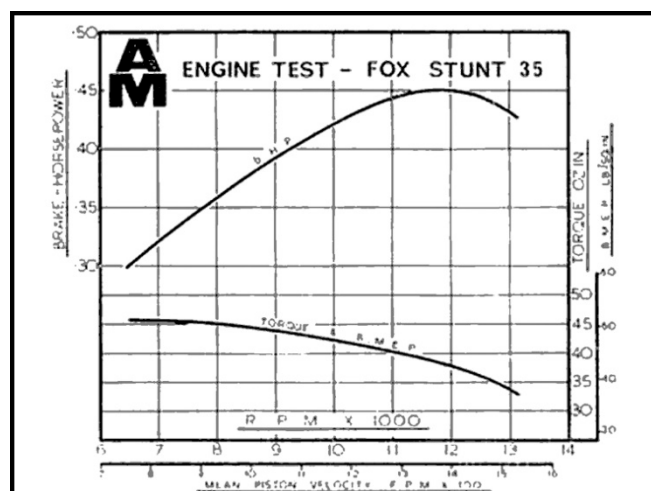
Fuels used: (a) 5 per cent pure nitromethane. 25 per cent Duckham's Racing Castor oil, 70 per cent I.C.I. Methanol. (b) Fox Super Fuel

Glow plug used: Fox "Glow master" long reach, platinum filament, as fitted.

Air temperature: 40 deg. F. (8 deg. C)

Barometer: 29.2 in. Hg.

Silencer type: Nil



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