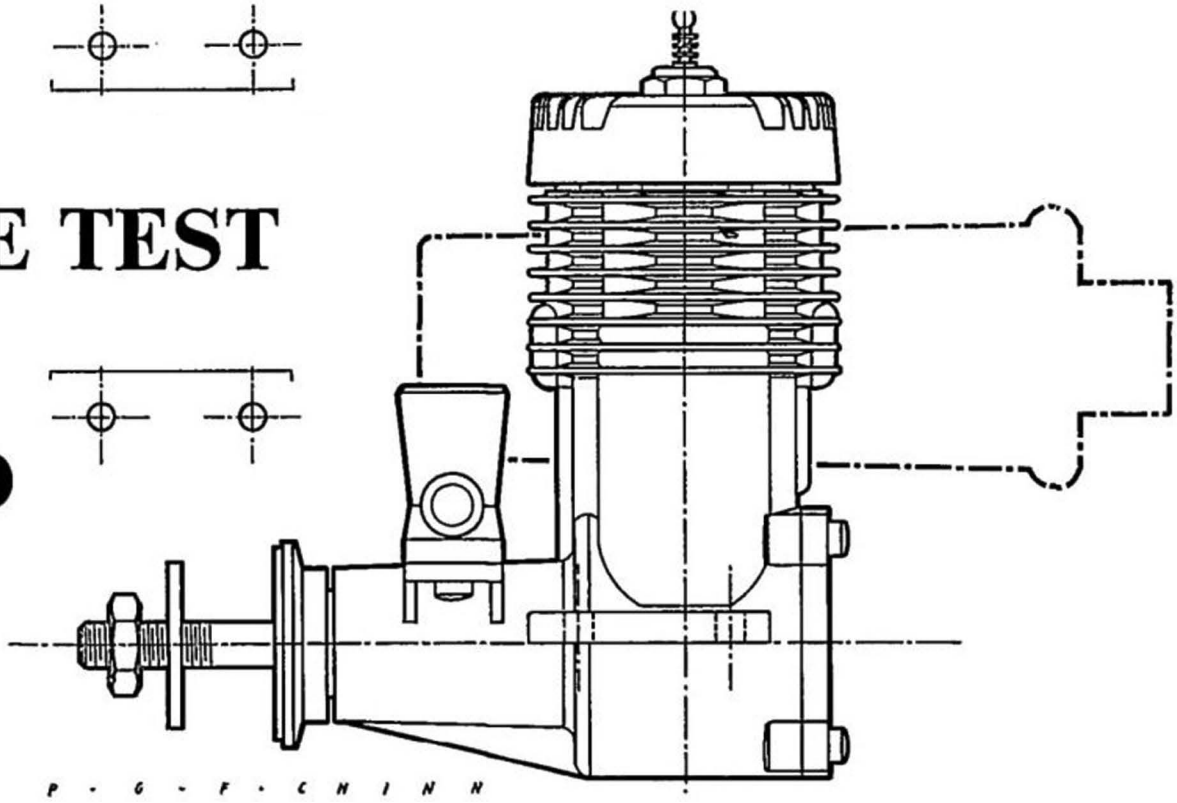
Aero Modeller

ENGINE TEST

FOX 19

by Peter Chinn



FOR MORE THAN a quarter of a century, one of the most widely used model engine sizes has been the '19'. Originating from the former American 'Class A' regulations limiting cylinder swept volume to 0.20 cu. in. (3.277 c.c.), such a size has been offered by many of the leading model engine companies including Enya, K&B, McCoy, O.S., Super-Tigre and Veco, all of which are, or have been, involved in producing a wide variety of engine sizes. The notable omission here is obviously the American Fox Manufacturing Company which, having built just about every other size, from the smallest to the largest, since the late 1940s, including the continuous production of large numbers of engines in the small to medium displacement groups, has not given much attention to the .19 displacement. If we remember correctly, Fox produced some 19 engines in 1954 and again around 1958 but all through the '60s and until recently, Fox 19's were conspicuous by their absence.

The first inkling that Fox would be re-entering the 19 market came when the 1972 Fox catalogue was issued and included the announcement of a new engine of this size scheduled for production in the summer of that year. An illustration showed the engine as closely resembling the current Fox 29 model. In fact, the 19 did not appear until last summer and was then seen to resemble the Fox 25.

It is, of course, common practice for manufacturers to make a single main casting (and sometimes other parts as well) serve two or more engine sizes, provided that capacities are not too far apart, and this was an obvious approach with the Fox 19/25 combination where the bore and stroke are separated by only .03 in. and .08 in. respectively.

At first glance, the 19 does look just like the 25, complete with its unusual flange-base vertical carburettor mounted on a rectangular saddle cast onto the crankcase nose. Closer inspection however, reveals that the engine is lower in overall height, has one less cooling fin on the cylinder casing and has the propshaft portion of the crankshaft shortened and reduced from $\frac{1}{4}$ in. to $\frac{3}{16}$ in. dia.

Internal changes include a 15 thou. increase in the wall thickness of the cylinder-liner (thereby accounting for the engine's smaller bore) and a smaller piston to match. Obviously, the 19 also has a new cylinder-head.

Equally obviously, to take care of the engine's reduced stroke, the crank-throw is shortened. In addition, the shaft has a heavier crankweb and a considerably wider valve port. This latter (from measurements made on the test engine) extends the induction period by a full 20 degrees compared with the Fox 25. The rotary-valve is now open for 195 degrees of crank angle, closing 15 degrees later than the 25 at some 58 degrees after TDC.

The cylinder port timing is also different with both exhaust and transfer periods extended. On the test engine, the exhaust period was six degrees longer at 140 degrees and the transfer period four degrees

SPECIFICATION

Type: Single cylinder, aircooled glow plug ignition two-stroke with crankshaft rotary-valve and bushed main bearing.
Bore: 0.650 in.
Stroke: 0.600 in.
Stroke/Bore Ratio: 0.923:1
Swept Volume: 0.1991 cu. in. (3.263 c.c.)
Checked Weights: 157 grammes – 5.5 oz. (less silencer)
198 grammes – 7.0 oz. (with Fox B size extractor silencer)

GENERAL STRUCTURAL DATA

Pressure diecast aluminium alloy *crankcase/cylinder-casing/front-housing* unit with bronze-bushed main bearing and drop-in steel *cylinder-liner*. Pressure diecast aluminium alloy *crankcase-backplate* secured with four screws. Case-hardened steel counterbalanced *crankshaft* with 0.437 in. dia. journal, 0.315 in. bore gas passage and 0.156 in. dia. crankpin. Lapped Meehanite c.i. *piston* with straight baffle and 0.125 in. dia. solid *gudgeon-pin* pressed into rear piston hole only. Machined aluminium alloy *connecting-rod* with plain eyes. Pressure diecast aluminium alloy finned *cylinder-head* with .015 in. aluminium gasket and secured to cylinder casting with six screws. Pressure diecast aluminium alloy *prop driver*. Pressure diecast aluminium alloy flanged-base *carburettor body* secured to crankcase nose with two screws and reversible for left- or right-hand needle valve control. Brass spray-bar. Beam mounting lugs.

OPTIONAL EXTRAS

(i) Size B open front silencer (Part No. 90211)
(ii) Size B closed front silencer (Part No. 90212)

TEST CONDITIONS

Running time prior to test: Approx. 1 hour
Fuel used (i) 25 per cent Newton-R castor oil, 75 per cent methanol (Running-in)
(ii) 5 per cent pure nitromethane, 25 per cent Newton-R castor-oil, 70 per cent methanol. (Tests)
Glow plugs used: Fox standard platinum-rhodium filament, short reach and long reach.
Air Temperature: 13 deg.C (56 deg.F)
Barometric Pressure: 30.4 in.Hg.
Silencer used: Fox Size B open-front type

longer at 124 degrees. The carburettor is unaltered and has the same effective choke area as the 25: approximately 12.5 sq. mm. which is quite generous for a stock 19 engine.

The weight of the 19 is almost exactly the same as that of the 25 tested earlier in this series: the heavier cylinder-liner and crankweb cancelling out the lighter piston and shaft front-end and shorter casting. (Of course, the latest 25s, if they incorporate certain other small differences now used in the 19, may be slightly heavier.)

Performance

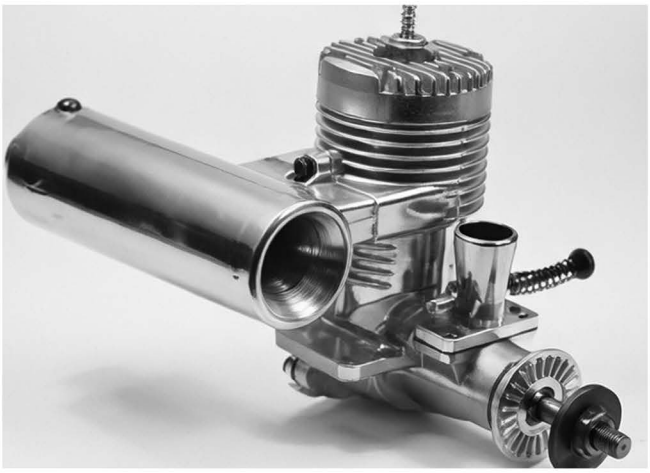
Our test motor came direct from the factory in Arkansas, U.S.A., where all Fox engines are test-run before despatch, a check which not every manufacturer carries out these days. The Fox company admits that this may occasionally result in an engine reaching the customer with a blown plug and, actually, this was the case with our test sample.

However, it needs to be said, straight away that, notwithstanding its simple, unpretentious appearance, the Fox 19 turned out to be one of the most powerful 19 size units that we have tested to date. Perhaps our absolutely stock test unit was an above-average example, but the peak output shown by the power curve of approximately 0.39 b.h.p. at 17,000 r.p.m. on 5 per cent nitromethane fuel (compared with 0.40 b.h.p. at 15,000 r.p.m. for the 25) is outstandingly good for a plain bearing engine of this size.

This performance is a result of the 19's ability to breathe more freely than the 25 at very high revolutions, thanks to its extended port timings, and to the fact that, for a 20 per cent smaller volume, it has the same size gas passages as the 25, e.g. carburettor choke area, shaft passage, etc. Of course, the 19 does not have so much torque as the 25, so its power is substantially less when the engine is heavily loaded.

Clearly, to approach its maximum power output, the 19 must not be overloaded and needs to be used with smaller props than the 25. The instruction leaflet issued with the engine warns against the use of too large a prop and suggests an 8x4 for most purposes. Our motor turned one of the new Australian Taipan glassfibre/nylon props of this size at a steady 15,800 r.p.m. on our standard 5 per cent nitromethane test fuel, which should mean that the engine will easily reach its peak on such a prop in the air.

The only snag to running the engine at much over 16,000, we found, was that it then began to consume glow plugs and it might, therefore, be better to opt for a 'slower' type of 8x4 (the Taipans absorb less power than the average and do, therefore, tend to turn quite



fast) such as a TopFlite or Tornado 8x4. We also tried the Fox on an 8x5 Power Prop, recording 14,400, and on an 8x6 Power (13,200) and a 9x4 TopFlite nylon (11,800). Loaded for speeds below this, the Fox began to run less steadily.

The Fox 19 accepts the Fox 'B' size silencer which is also common to the Fox 25, 29, 35 and 36 and which is available in a choice of closed front or open front types. We chose the latter as this had already been used for the 25. Actually the performance curves were based on the open exhaust performance, but the power loss was nil at all speeds up to about 16,000 r.p.m. and only barely perceptible (100-200 r.p.m.) at the peak. The silencer, with its very large area, doesn't do much to quieten the engine.

As regards handling qualities, the 19 was a bit slow to restart when hot (the manufacturer's instruction leaflet seems to confirm this with the words 'Do not attempt to restart until the motor has cooled off') but cold starting, after priming the cylinder, was prompt.

When it was introduced to the U.K. market last year, the Fox 19 was priced at an astonishingly low £4.92 (at this price it was actually cheaper here than in its native country) but rising costs and the depreciating value of Sterling over the past few months have taken their toll and the price is now £6.95. Even so, the Fox is still one of the cheapest 19s on the market and on a 'power per £' basis, must have the edge on all its competitors.

Power/Weight Ratio (as tested):
1.13 b.h.p./lb, less silencer.
0.87 b.h.p./lb, with silencer.

Specific Output (as tested)
1.96 b.h.p./litre (less silencer).