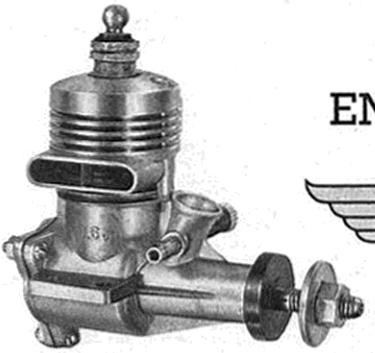


ENGINE ANALYSIS No. 50

O.S. "PET"

Reviewed by R. H. Warring

THIS IS THE SMALLEST engine produced in the by now well-known Japanese "O.S." range, and like the others, a glow plug motor of typically clever crankcase casting design, and outstanding performance. Rated as an "09" or 1·6 c.c. size, the O.S. "Pet" has a power output comparing with the best of 1·5 c.c. diesels, which is rather exceptional for a glow motor.

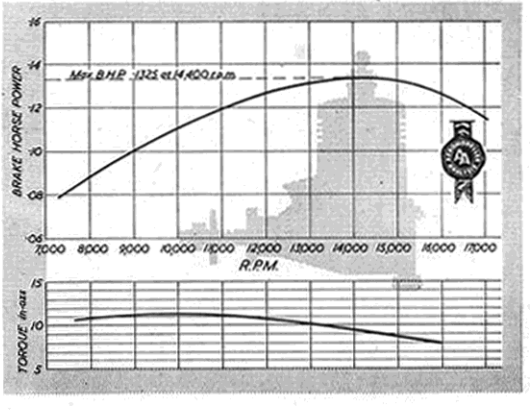
Running was found to be consistently good at all speeds and, again a little unusual, retaining a high torque at the lower end of the speed range. Peak power was ·1325 B.H.P. developed at 14,400 r.p.m., with the actual peak being fairly broad and no sharp fall off. Maximum torque was slightly in excess of 11 ounce-inches, developed at 9,000-10,000 r.p.m.

Designwise, the O.S. "Pet" features a pressure die cast light alloy crankcase of elaborate form, which is machined only for the bearing. The crankcase unit incorporates the lower cylinder complete with exhaust stub and diametrically opposed transfer passage, and lugs for the attachment of the rear cover by small bolts and nuts which can be replaced by longer bolts for alternative radial mounting of the engine.

The only unusual feature is, that the spraybar is a simple brass tube push fitted into the choke tube—and not a very tight fit at that. Since the needle valve is locked with a compression spring, this spring is effectively trying to pull the spraybar out to one side—which it does under engine vibration. As a consequence, the mixture may be affected, causing erratic running, or for readjustment of the needle valve. This, in fact, is about the *only* poor feature of the design and the very slight additional expense of incorporating a flange or K. & B. style knurled fluting on the spraybar to prevent sideways movement should have been obvious. A worthwhile modification to existing engines, would be to solder on a washer on the side of the spraybar opposite to the needle valve.

The cylinder is of hardened steel, ground and honed to finish internally and also ground externally. It seats in the crankcase casting on a very narrow flange with a gasket underneath for seal. The exhaust port is cut in the cylinder wall immediately *above* the flange and the diametrically opposed transfer port in the wall immediately *below* the flange, facing the transfer passage. Thus the cylinder can only be fitted one way round.

The piston is of cast iron with a flat top but stepped on one side to form a deflector. Besides being a simple form of deflector to produce this also has the advantage, that the lower cylinder does not have to match the crankcase since the necessary gas seal is provided by the flange and gasket. Again, of course, the piston must be fitted the right way round to match the cylinder.



SPECIFICATION

Displacement: 1·615 c.c. (·0985 (cu. in.)
Bore: ·529 ins.
Stroke: ·448 ins.
Bore/stroke ratio: 1·18
Bare weight: 2¼ ounces
Max. B.H.P.: ·1325 at 14,400 r.p.m.
Max. Torque: 11·3 ounce-inches at 9,600
Power rating: ·0825 B.H.P. per c.c.
Power/weight ratio: ·048 B.H.P. per ounce

Material specification:

Crankcase unit: light alloy pressure die casting
Cylinder: hardened steel
Piston: cast iron
Cylinder jacket: aluminium
Crankshaft: hardened steel
Connecting rod: light alloy die casting
Main bearing: plain
Big end bearing: brass bush
Spraybar: brass

Manufacturers:
Ogawa Model Mfg. Co., Osaka, Japan

The cylinder is held in place by a substantial jacket, machined from aluminium with a thick solid head, held down by two bolts screwing into lugs cast in the crankcase fore and aft and drilled and tapped. The glow plug is located centrally in the head (on the general arrangement drawing a KLG plug is shown, and used on test, a Japanese plug not being supplied with this particular engine).

The crankshaft is very nicely made and finished, with a main diameter of $\frac{3}{8}$ in. stepping down in a short taper to a 2 B.A. threaded length. It is finished by centreless grinding after being hardened all over. The central hole is drilled out to the port, the latter being rectangular in shape. The crank web is circular, ·669 in. diameter, with a ·156 in. diameter crank pin (70 mm. and 4 mm., respectively, and as with previous "O.S." engines, a mixture of "metric" and English sizes appearing. In particular, the 2 B.A. propeller nut size is unexpected in view of the fact that O.S. engines are obviously made with an eye on the American sales).

The connecting rod is a die casting in light alloy and of fairly small section. The big end is bushed with brass. The little end is plain and takes a ·118 in. (3 mm.) diameter gudgeon pin, which is an easy fit in the piston. Crankcase volume is reduced to a minimum by the very deep cover (again a die casting), which incorporates a passage to avoid blanking off part of the transfer—so again this is a unit which can only be fitted one way.

The main bearing is reamed to size and is an extremely good fit on the crankshaft—even a tight fit by glow motor standards, although it runs quite cool. The propeller driver is a plain, solid disc, tapered on the rear face to fit the shaft taper. Despite the absence of knurling or similar gripping surface on the driver, and the apparent free fit of the driver on the shaft, no trouble was experienced with propellers slipping or coming loose.

Actual production cost of the O.S. "Pet" must be remarkably low, for it sells for a matter of $6·95 in Canada and $4·95 in the United States, and for the equivalent of 33s. in Germany. Yet there is nothing particularly "cheap" in the appearance of the engine, nor any evidence of skimping on the important manufacturing stages. And performance figures speak for themselves, albeit at the expense of a considerable thirst for an engine of this size. The fuel consumption, in fact, rivals that of many larger engines, although this was with doped fuel, which does tend to increase consumption as well as performance. Certainly the "Pet" is a "performance" engine in its own right.

Simplicity of the O.S. Pet is seen in the piston (note transfer step) and cylinder at top. Whole engine is dismantled in lower photo.

PROPELLER—R.P.M. FIGURES

Propeller dia. x pitch	*r.p.m.*
8 x 4 (Stant)	10,800
9 x 4 (Stant)	7,800
6 x 4 (Stant)	14,800
8 x 3 (Trucut)	10,800
7 x 4 (Trucut)	12,800
7 x 3 (Trucut)	15,000
6 x 4 (Trucut)	14,500
6 x 3 (Trucut)	15,500
8 x 3½ (Tiger)	12,000
8 x 4 (Tiger)	11,000
9 x 3 (Tiger)	8,900

Fuel used: 25 per cent. castor, 75 per cent. methanol, 10 per cent. nitro-methane added.