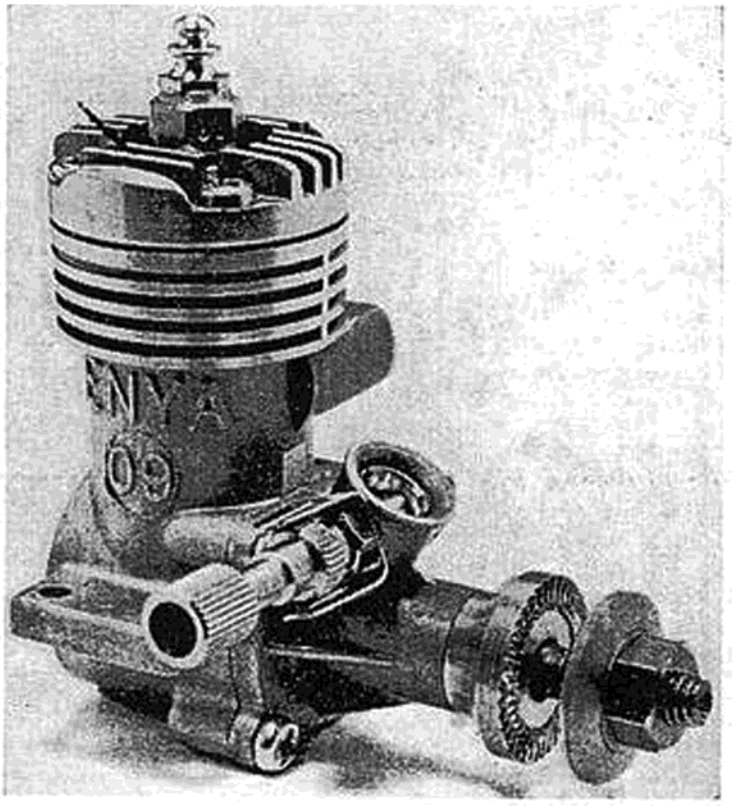


ENGINE TEST

by Peter Chinn

Enya ·09-III

1.6 c.c. Japanese glow plug engine now completely redesigned

THE 1.6 cc Enya 09-III glowplug motor, as its name suggests, is the "Mark III" version of the well-established Enya 09, an engine that appeared in its original version in the early nineteen-fifties, this being succeeded by the 09-II in 1960.

All three models are shaft rotary-valve, loop-scavenged engines, featuring a unit cylinder/crankcase casting with drop-in cylinder-liner and a detachable front housing containing the main bearing and carburettor. Beyond this basic specification, however, each model has differed quite considerably from its predecessor. The development policy of both the leading Japanese engine manufacturers (Enya and O.S.) appear to be quite unhampered by the more commonly accepted practices of model engine production economics, such as the continued use of the same castings through several models and the avoidance of other modifications that would require expensive re-tooling. The 09-III, in fact, contains no parts whatsoever that are common to the 09-II.

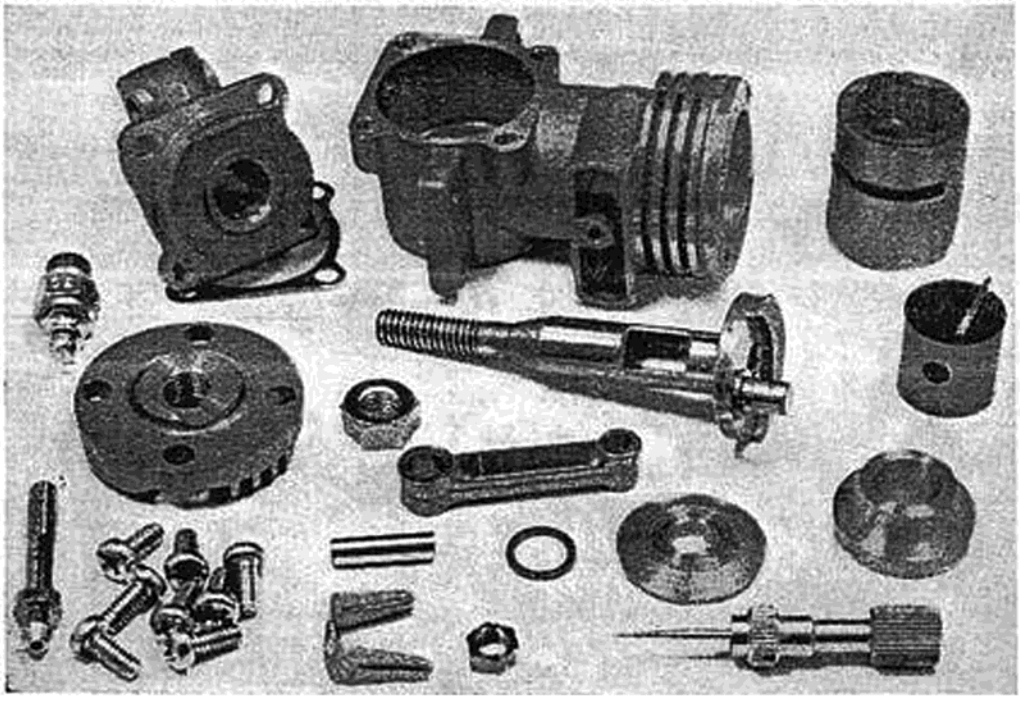
As originally designed, the Enya 09 had the usual arrangement of opposed rectangular cylinder ports with the transfer passage between the liner and casting. In the 09-II, this latter was abandoned in favour of twin transfer flutes formed in the inner wall of a very thick liner. The bore and stroke of the 09-II model remained the same as those for the Mk. I engine and a similar crankshaft was used, but all new castings were used and the engine had a lower cylinder height and a more modern appearance.

Improved Induction System

In the 09-III, the twin internal flute-type transfer system is retained but, as we have already remarked, all component parts are new. This engine is, in effect, a complete redesign of the 09-II and the need for so many new parts is a result of the adoption of a lower stroke/bore ratio and a bigger shaft and improved induction system.

The crankshaft now has a journal diameter of 8 mm. (0.315in.) instead of 7.5 mm. This has permitted a larger valve port and a larger bore gas passage—now 6.2 mm. instead of 5.5 mm., an increase in cross-sectional area of over 27 per cent. The intake aperture through the bearing is still of an elliptical shape (unlike the larger Enya engines it does not feature straight sides for more rapid opening and closing), but is considerably larger. The rotary-valve has been re-timed to close about 5 deg. later at 50 deg. ATDC, the total induction period being approximately 190 deg. of shaft rotation.

A very much bigger bore carburettor intake is also used: 7.0 mm. instead of 5.8 mm. Having regard to the fact that both the old and new intakes are sub-



Parts of the Enya 09-III. Noteworthy are the very thick cylinder liner with internal transfer flutes, robust construction and good finish.

stantially reduced by a 4 mm. diameter spraybar, the actual choke area of the 09-III is more than double that of the 09-II. As supplied, the 09-III is fitted with a sleeve, held in position by the spraybar to restrict the choke area, but a very worthwhile increase in power is evident when this restrictor is removed.

The larger bore cylinder liner is also thicker. Its wall thickness is now a full 2.5 mm., or approximately 1/10 in., and thus very rigid. As before, it is located, not by a flange on the top of the liner, but by an annular seating in the casting. This seating is now widened on the exhaust side and narrowed on the transfer side so that the transfer flutes are in no way restricted. Incidentally, the timing of both the exhaust and transfer ports is quite conservative, the exhaust remaining open for 122 deg. and the transfer ports for only 98 deg. of crank rotation.

Thanks to the shorter stroke and a slightly lower piston height above the gudgeon-pin centre, both the crankcase width and overall height of the engine are slightly reduced. The new crankcase/cylinder casting also has heavier beam mounting lugs, a small lug in the rear of the crankcase which may be drilled and tapped for a pressure nipple (for a crankcase pressurised fuel system) and a tapped lug in the centre of the exhaust duct to which, if the engine is converted to throttle-control, may be attached a coupled exhaust blanking plate.

The engine is well made and nicely finished throughout. Machine finishing is employed on the castings to an extent now more usually absent on modern small engines. Both joint faces of the bearing-housing-to-crankcase joint are, for example, machined, despite the use of a gasket between them. The cylinder head also has a machined surface to make a gas-tight metal-to-metal joint with a raised rim on the cylinder liner.

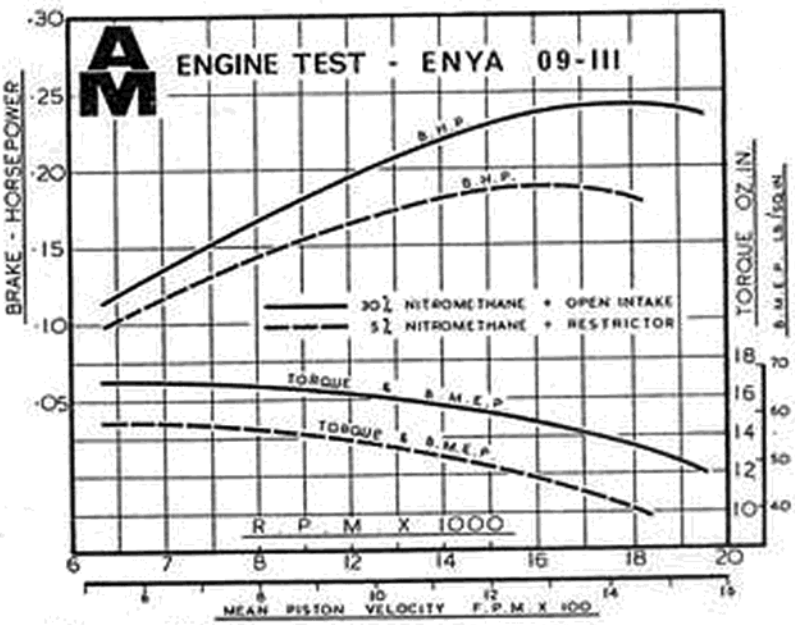
Performance

Received prior to the engine's release in the U.K., our test model Enya 09-III came direct from Saburo Enya, one of the three brothers who run the model engineering business bearing their name. Enya sales in the U.K. are, of course, handled by the KeilKraft organisation. With the engine were two of the new Enya No. 30 platinum filament glowplugs. These have finer filaments than the good, but expensive, No's. 4, 5 and 6 plugs made for the bigger Enya engines and may, therefore, be more reasonably priced on the U.K. market. We used these plugs for our tests of the 09-III and found them very well suited to this motor.

The 09-III was given about one hour of intermittent running-in time and another 30 or 40 minutes was accumulated during preliminary r.p.m. checks on various props using a low nitromethane content (5 per cent) fuel mixture.

From this point onward, it became increasingly apparent that this new Enya was going to emerge as one of the most powerful 09's to date. The nonchalant ease with which it turned quite large props (over 8,000 r.p.m. on a 10 x 3½ Top-Flite wood) left one in no doubt as to its exceptionally high torque at moderate speeds, but speeds of 12,200 on an 8 x 4 Power-Prop and 15,200 on a 7 x 3 Trucut also indicated that this high torque low down was not gained at the expense of top end power. These impressions were, in due course, confirmed by the torque figures obtained at various r.p.m., from which the torque and power curves were plotted.

Starting and handling were, in general, good, but not, we thought, quite so foolproof as with the

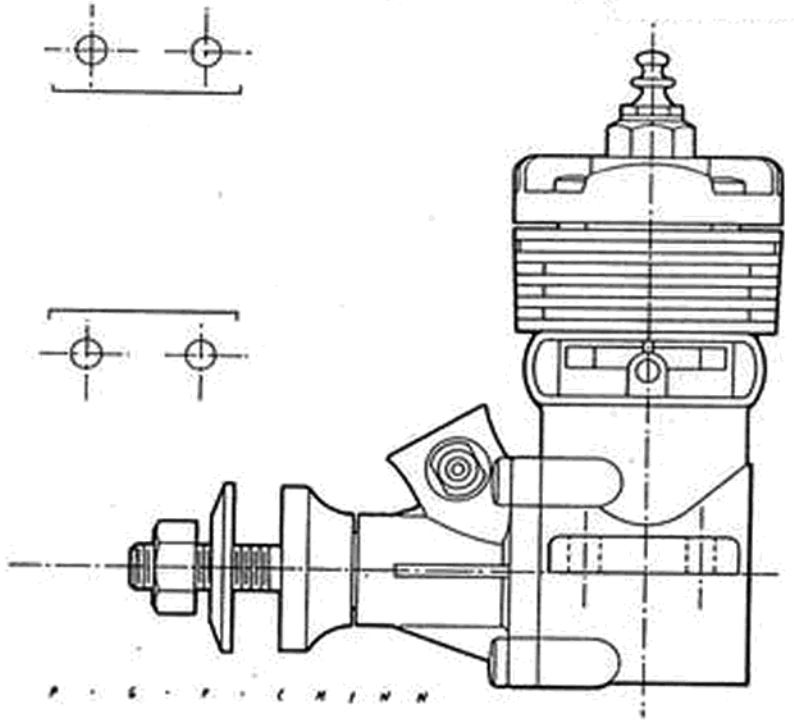


earlier model. When starting from cold, the 09-III was fairly critical to mixture strength. It needed a reasonably rich mixture to fire, but then tended to draw an excess of fuel which could cause it to stop.

Some engines will tolerate an excessively rich mixture and splutter away until they have cleared it. The Enya does not appear to be one of these. Warm re-starts were much easier.

The needle-valve setting for best performance was fairly critical on the 5 per cent nitro fuel used to this point, but became noticeably less so on a substantially hotter fuel. We substituted a "racing" type mixture containing 30 per cent nitromethane (pure nitromethane, not the 70/30 nitro/methanol blend that is the only commercial grade now available). This added 700 r.p.m. to the engine's revs on an 8 x 4 Tornado nylon, 800 on an 8 x 4 Power, 900 on a 7 x 4 Tornado, 1,000 r.p.m. on a 7 x 3 PAW, dropping back to 800 on a 7 x 3 Top-Flite. We then removed the venturi restrictor and ran a further series of tests on 30 per cent nitro fuel. This added another substantial gain, particularly at speeds above 15-16,000 and resulted in the curves shown, including a peak output of just over .24 b.h.p. at 18,000 r.p.m.

(*Continued on page 326*)



This power figure is, in our experience, second only in the "09" category to the Cox Tee-Dee 09 on similar fuel. The maximum torque, registered by the Enya, of 17 oz. in. is the best recorded by any engine in this capacity group. A side-by-side comparison of performance figures recorded under similar conditions for the two engines suggests that the Enya is, in fact, the better of the two up to 14,000 r.p.m., after which the Cox pulls away gradually by virtue of its higher peaking speed of nearly 20,000 r.p.m.

Most noticeable at all times was the very steady running of the Enya. This applied equally with or without the venturi insert despite the fact that, with the open intake, ordinary suction feed was still used. The engine burned out one plug (when running at 17,600 r.p.m. on a 7 x 3 Top-Flite), but the replacement No. 30 plug withstood several successive runs at higher speed on 30 per cent nitro fuel.

No silencer was used during the tests. The existing Enya silencers do not fit the 09-III, but the manufacturer will doubtless be offering a suitable unit for the 09-III in due course.

Power/Weight Ratio

0.82 b.h.p./lb. as tested on 5 per cent nitromethane fuel *with* restrictor

1.04 b.h.p./lb. as tested on 30 per cent nitromethane fuel *less* restrictor

Specific Output

116 b.h.p./litre as tested on 5 per cent nitromethane fuel *with* restrictor

149 b.h.p./litre as tested on 30 per cent nitromethane fuel *less* restrictor

SPECIFICATION

Type: Single-cylinder, air-cooled, loop-scavenged two-stroke cycle glowplug ignition. Shaft type rotary-valve induction.

Bore: 13 mm. (0.5118 in.) **Stroke:** 12.2 mm. (0.4803 in.)

Swept Volume: 1.619 c.c. (0.0988 cu. in.)

Stroke/Bore Ratio: 0.938:1

Weight: 3.7 oz.

General Structural Data

Pressure diecast aluminium alloy *crankcase/cylinder-block* with drop-in steel *cylinder-liner*. Pressure diecast aluminium alloy detachable *front housing* with cast-in phosphor-bronze *main bearing*. Hardened, counterbalanced *crankshaft* with 8 mm. dia. journal, 6.2 mm. bore gas passage and 4.5 mm. dia. crankpin. Lightweight lapped cast-iron *piston* with fence type baffle and fully-floating 3.5 mm. hardened tubular *gudgeon-pin* with brass pads. Pressure diecast aluminium alloy *connecting-rod* with bronze big end bush. Pressure diecast aluminium alloy finned *cylinder-head* with machined joint face and cast-in bronze thread insert for glowplug. No cylinder-head gasket. Machined aluminium alloy *prop-driver* fitted to matching taper on crankshaft. Nickel plated brass *spraybar assembly* with optional venturi insert. Beam mounting lugs.

TEST CONDITIONS

Running time prior to test: Approximately 1½ hours.

Fuels used: (i) 5 per cent pure nitromethane, 25 per cent Duckhams Racing Castor-oil, 70 per cent I.C.I. Methanol. (ii) 30 per cent pure nitromethane, 25 per cent Duckhams Racing Castor-oil, 45 per cent I.C.I. Methanol.

Glowplugs used: Enya No. 30 1.5 volt platinum filament, 3/16 in. reach.

Air Temperature: 52 deg. F.

Barometer: 30.10 in. Hg.

Silencer Type: Nil (see text).