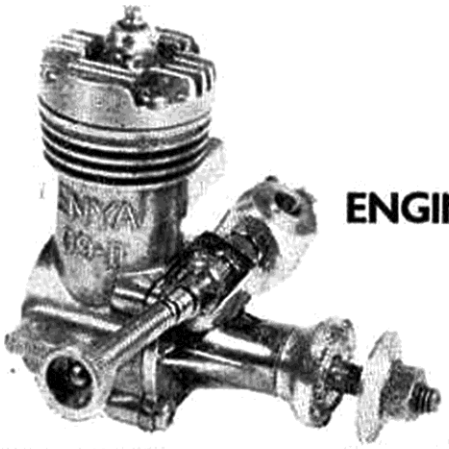


ENGINE ANALYSIS No. 126 by R. H. Warring

ENYA ·09-II

RADIO CONTROL

THE ENYA 09 is an extremely compact, rugged glow motor with a reputation for easy starting and good handling characteristics. The R/C version is a straightforward adaption involving the fitting of a throttle unit directly into the stub air intake of the standard model, where it is located by two screws, one either side, in the holes normally occupied by the spraybar. The throttle is not coupled to an exhaust flap, nor is any provision made for accommodating such a flap. A matching D.A.C. "Spinaflo" silencer unit was, however, fitted to the test engine comprising an exhaust stub adapter/manifold and a silencer unit, attaching to the Enya by means of a strap encircling the cylinder immediately below the fins. This proved to be a neat and effective unit, dropping the revs. by a matter of a few hundred r.p.m. only whilst reducing the noise level to a very low order. If anything, the silencer somewhat smoothed the throttle response although, due to lack of noise, it did make fine adjustment of the needle for peak r.p.m. a little more difficult.

The throttle is of the usual barrel type, with a brass barrel rotating in a dural body. The barrel is trapped in position by a screw on the left hand side of the body and rotates independent of the fuel feed which enters from the opposite side. This comprises an intake tube with a 'tee' for attaching the fuel pipe, which thus lies conveniently at right angles to the needle assembly. The needle meters the passage opening at the bottom of the tee and is extended by a massive flexible arm. Although lying quite close to the propeller disc, the needle is quite easy to manipulate and positively locked by the double ratchet spring.

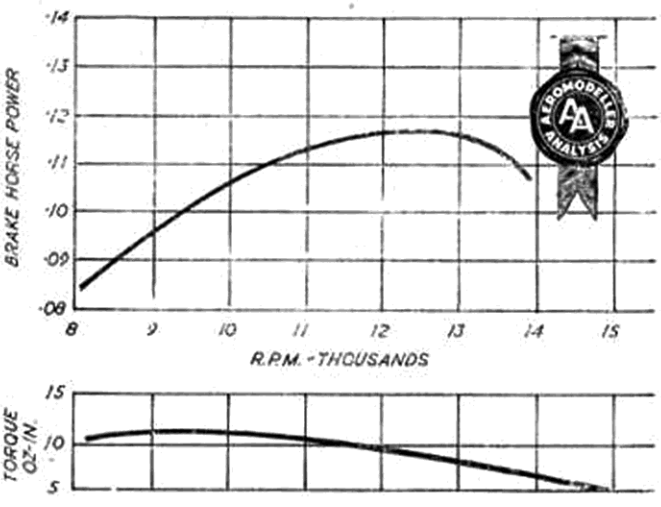
Barrel movement is controlled by a soft wire arm secured in the extending boss of the barrel by a single grub screw. Full 360 deg. rotation is possible and a fairly positive linkage system would be essential to establish correct throttle movement in a model installation. The throttle is mainly effective as a 'two-speed' device — fast or slow — and the engine will run with the barrel opening fully closed apparently shutting off the air supply completely, except for that drawn round the rather loose fitting barrel. Whilst this produces very low speed running (i.e., 2,500 r.p.m. from about 10,000 r.p.m.) an excessively rich mixture is built up in the engine and there is considerable delay in 'sorting out' the mixture again when the throttle is opened. For reasonably rapid response, with excessive richening, the barrel movement has to be stopped with an air passage still remaining. This corresponds to a 'safe' adjustment of about 3,500 r.p.m. for slow running. Adjusting for slower speed seems to produce richening and delays the pick-up.

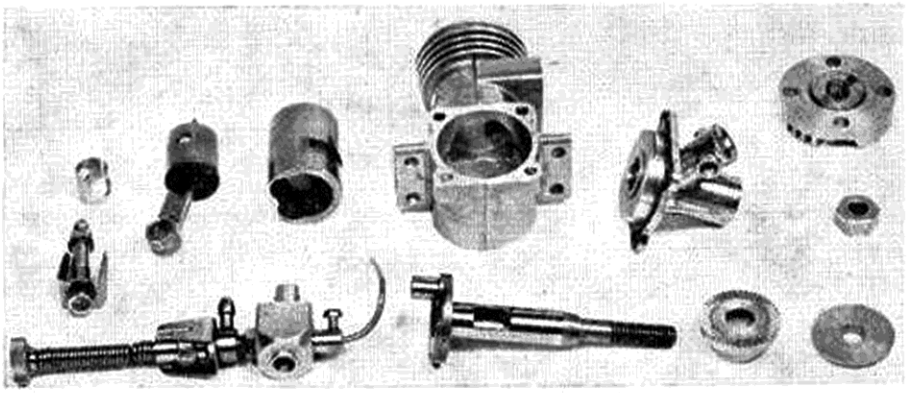
Apart from general neatness of the design, the Enya impressed by the quality of its workmanship and really sturdy construction whilst retaining compact external dimensions. The soft steel cylinder liner, for example, has a wall thickness of over $\frac{3}{32}$ in. A single rectangular exhaust port is cut in the walls whilst diametrically opposite two arc-shaped transfer passages are cut on the inside of the walls, terminating square and almost completely overlapping the exhaust opening.

The piston, by comparison, is a very lightweight assembly machined from cast iron with very thin walls and a narrow rectangular deflector on the flat top. The connecting rod is a light alloy forging and the fully floating gudgeon pin is of silver steel, .137 in. diameter. Piston-cylinder fit is extremely good, virtually to 'diesel' standards in fact with a pronounced taper relief at the bottom and some initial tightness at the top of the bore. This feature, with the thick-walled liner, should produce a long-life cylinder which is very useful for R/C work where engines are called upon to run continuously for fairly long periods. As a consequence we would expect the Enya to outlast many of its 09 R/C counterparts and maintain rather than gradually lose performance.

General construction follows typical glow motor pattern, with a robust light alloy die cast crankcase unit incorporating cylinder jacket and fins. The liner is an easy sliding fit in the casting and seats on a narrow ridge at the bottom produced by boring out the casting to the liner o/d. The front bearing unit is detachable and secured with four screws. This is another light alloy die casting with a moulded in bronze bush for the main bearing which has been reamed and apparently honed to finished size. Bearing length is only $\frac{15}{16}$ in. but this appears adequate, with a relatively loose shaft fit.

The crankshaft itself is of hardened steel, .294 in. diameter stepping down to a .192 in. diameter threaded length via a taper section on which the prop. driver locates. Intake port is rectangular, approximately $\frac{5}{16}$ in. x $\frac{3}{16}$ in. opening into a $\frac{3}{16}$ in. diameter hole in the shaft. The crank web is circular but machined away on the rear face to produce a crescent shaped counterweight. The shaft is finished by grinding over the journal length and





Propeller — R.P.M. Figures

Top Flite	6 x 4	14,300
	7 x 4	11,700
	7 x 6	10,200
	8 x 4	10,500
	8 x 6	8,500
D-C nylon	8 x 4	10,200
K-K nylon	7 x 6	10,200
	7 x 4	11,600

All figures are with throttle fitted.
Fuel used: Mercury 45.

Specification

Displacement: 1.60 c.c. (.0978 cu. in.).
Bore: .500 in.
Stroke: .498 in.
Weight: 5 oz.
Max. power: .118 B.H.P. at 12,750 r.p.m.
Max. torque: 11.5 oz.-in. at 9,500 r.p.m.
Power rating: .074 B.H.P. per c.c.
Power/weight ratio: .023 B.H.P. per oz.

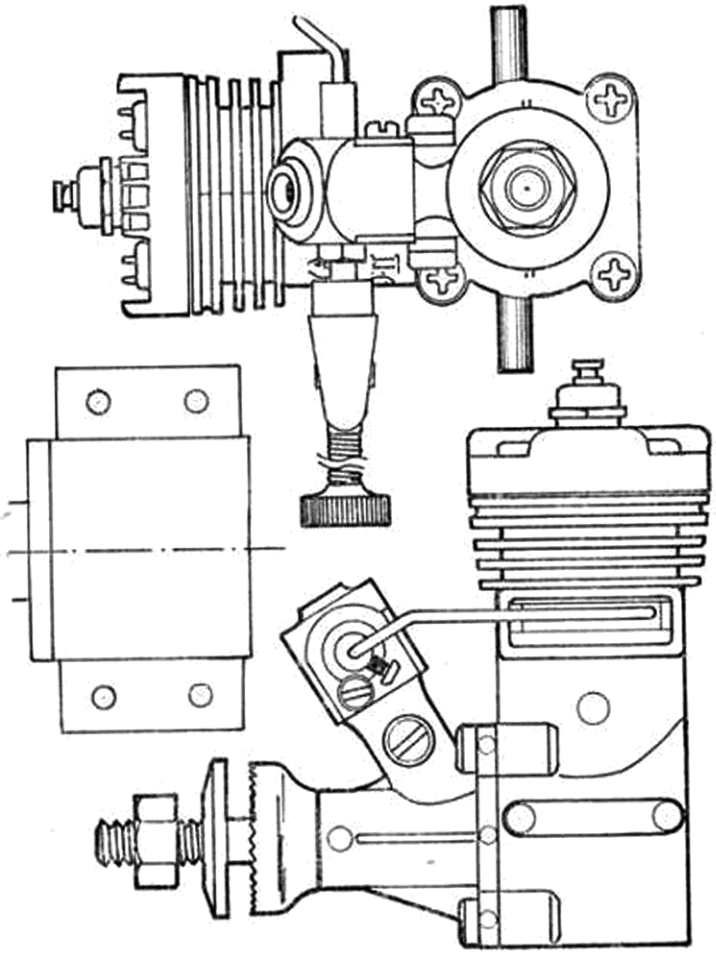
Material specification

Crankcase unit: light alloy pressure die casting.
Cylinder liner: leaded steel (unhardened).
Piston: cast iron.
Con. rod: light alloy forging.
Crankshaft: hardened steel.
Main bearing: plain, bronze bush.
Front bearing unit: light alloy pressure die casting.
Cylinder head: light alloy pressure die casting.
Throttle unit: brass barrel in light alloy body.
Needle valve assembly: nickel plated brass.
Prop. driver: light alloy.
Propeller shaft thread: .192 in. diameter.

crankpin, but with some evidence of chatter marks. The fit is loose enough, however, for these to have negligible effects.

The head is another very neat alloy die casting with integral fins and a centrally located glow plug, fitted as supplied with two washers which brings the bottom of the plug flush with the bottom of the head.

Any standard (¼ in. reach) plug fitted as a replacement would also appear to need two washers to prevent the bottom of the plug fouling the deflector on the piston at top dead centre. Another interesting point is that a brass bushing is cast integral with the head and drilled and tapped for the glow plug thread, rather than the plug screwing into a tapped hole in the head casting and so risk of stripped threads is removed.



The prop. driver is of conventional type, machined from light alloy and secured merely by tightening up on the shaft taper. The facing washer is of sensible proportions, as is the prop. retaining nut itself. A gasket is used as a seal between the front bearing assembly and the crankcase but there is no gasket under the head which attaches via four Phillips head screws.

Altogether we consider the Enya 09 a most likeable little R/C engine for models requiring moderate power, with speed control via a simple throttle unit. Whilst a good 1 c.c. diesel could beat it for power output, the Enya will score by having a reliable throttle and should last as long as most diesels. The only thing missing for an R/C power plant is positive adjustment of the throttle 'high' and 'low' positions, which would have to be provided on the actuator linkage with provision to adjust the low speed setting to suit particular requirements.

An 8 x 4 prop would seem a logical size to use for R/C work and the engine is most easy and tractable to handle on this diameter size. Starting characteristics are, as we mentioned earlier, excellent and hand-starting on a 6 in. diameter prop. is equally easy, but peak power is developed just below 13,000 r.p.m. and so there is no advantage in aiming at a high operating r.p.m. Without throttle, the .09 revs. on a 7 x 4 are 14,000.

The Enya runs quite well on straight fuel up to about 12-13,000 r.p.m., but is a little smoother at the top end with 7.5 to 10 per cent nitro. The throttle is also a little inconsistent when the engine is absolutely new and improves with running time. About an hour's running-in should suffice, unless the piston feels a bit stiff to start with. If the fits on the sample engine are typical then only the piston-cylinder fit needs running-in, during which period performance will improve slightly. Altogether an engine to heartily recommend to the sports flier for long life and reliability.