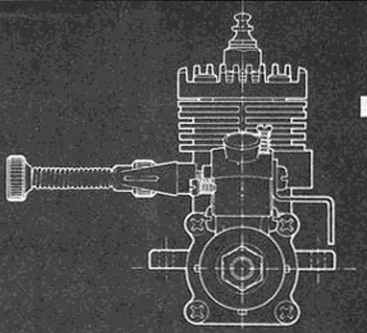
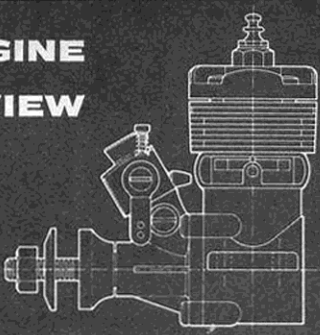
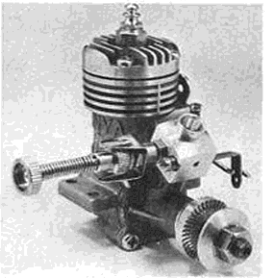
ENGINE REVIEW

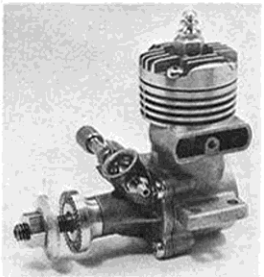




Versatile small engine, convertible to radio-control use, sturdily made and with above average performance. Radio-control version offers exhaust as well as intake restrictor.



Very good pulling power on useful propeller sizes shown by the .09-III TV unit on test.



Power of the latest Series Enya .09 is comparable with the best in the present .09 engines.

ENYA .09 III And .09 III TV

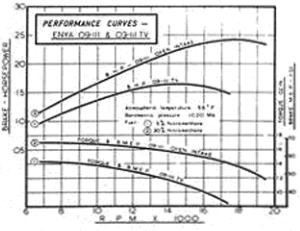
By PETER CHINN

► Some foreign engines win acclaim by their success in national and international events. To do so they must, in the first place, be of a displacement and type that fit such events. The .09 cu.in. class is not a size that coincides with specific contest requirements, so it is not surprising that any mention of the name "Enya 09" fails to conjure up visions of rocketing free-flights or sizzling speed jobs. In a way this is a pity because, for a dozen years, through three distinct models, the Enya 09 has remained one of the better examples of the 09 class.

The first Enya 09 was put into production in May 1954 and was superseded in 1960 by the 09-II, a model subsequently distributed in the U.S. by the present importers, the MRC-Enya Company Incorporated of Brooklyn, N.Y. Now, another six years later, the 09-II has, itself, been replaced by the 09-III.

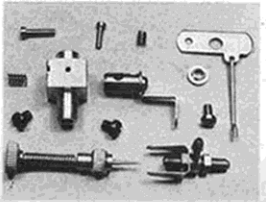
The basic layout of the Enya 09 has remained the same during its twelve years of production: it is still a shaft rotary-valve, loop-scavenged lapped-piston glow engine with drop-in liner in a one-piece crankcase/cylinder casting and a detachable, bronze-bushed front housing. Each succeeding version, however, has been a distinctly different model, with new parts throughout.

In its original form, the Enya 09 had the orthodox arrangement of a rectangular bypass port opposite the exhaust port, with the bypass passage between the cylinder sleeve and the casting. On the 09-II, this was dropped in favor of twin flute type bypass passages formed in the inner wall of a very thick sleeve. The bore and stroke remained the same and a similar crankshaft was used, but all the castings (*Continued on page 55*)



Parts show good finish and machining throughout. Note thick liner with bypass flutes.

TV model has a well-designed throttle type carburetor. Exhaust baffle shown is optional equip.



were new and the engine had a lower and more modern appearance. It also had a better power output. This model, too, became available in a R/C version, or, as Enya calls it, the "TV" or "Throttle-Valve" model. The only difference here was the addition of a simple barrel throttle-type carburetor without idling stop or mixture adjustment—although this was later replaced by an improved carburetor on models sold in the U.S.

A still more extensive re-design is apparent in the latest model, the 09-III. The twin internal flute type bypass system is retained, but the former "square" bore and stroke combination has been modified to a short-stroke configuration, using an even thicker cyliner sleeve. The hardened, counter-balanced crankshaft has a bigger, 8 mm. (0.315 in.), journal diameter which has allowed the shaft to be bored out to 6.2 mm. (0.244 in.) an increase in gas passage cross-sectional area of some 27 percent. The rotary-valve has also been retimed to close 5 degrees later at 50 deg. ATDC, for a total intake period of 190 degrees.

Exhaust and bypass timing is quite conservative: 61-61 degrees exhaust and 49-49 degrees bypass. As on the 09-II model, the cylinder sleeve is located at its base by an annular seat in the casting instead of by the more usual top flange. This seating is now narrowed on the bypass side so that the bypass flute entry is unobstructed. At the top, the sleeve has a raised rim which makes a gas-tight joint with the machined surface of the cylinder head, unaided by a head gasket.

The new front housing has a substantially larger bore intake (0.276 in, instead of 0.228 in.), which, allowing for the 4 mm. diameter spraybar, means an increase in choke area of over 100 percent compared with the 09-II. As supplied, the 09-III is equipped with an intake restrictor, but even with this removed, there is still sufficient fuel lift to permit the engine to be run on normal suction feed.

In the 09-III TV version, the restrictor and spraybar are replaced by a complete throttle type intake assembly. This is the only difference between the 09-III and 09-III TV and switching intake assemblies converts one model to the other. The carburetor body is of machined aluminum with a ground steel throttle barrel. The barrel is retained in the usual way, by an idling adjustment screw. In the front of the carburetor there is an airbleed hole which comes into effect between the half-throttle and idle position and whose effective area is adjustable by means of the usual idling mixture screw. The throttle barrel with actuating arm, is inserted into the carburetor body from the left hand side. On the other side of the carburetor is mounted the needle-valve assembly, complete with tee-fitting fuel inlet. This assembly is screwed into the carburetor body and is locked by a hexagon nut. Normally it is installed so that the jet is positioned approximately centrally in the choke, but it can be screwed in or out to vary the choke area and thereby increase fuel suction or power as required.

The 09-II TV, like all other earlier Enya R/C engines, did not have a coupled exhaust baffle or restrictor. The more recently introduced Eyna 60-II TV, however, has a coupled exhaust baffle, and conversion parts are now available whereby certain other Enya R/C engines can have this feature added. On the 09-III TV, exhaust restriction is optional. Our test 09-III TV, submitted direct by the manufacturer did not have an exhaust restrictor fitted, but one was supplied as a separately packaged item. Incidentally, although Enya mufflers are available for most of the other Enya engines. one has not, so far, been announced for the 09-III.

In view of the fact that the 09-III can be converted so easily to 09-III TV specification and vice-versa, we ran tests on both models. We used Enya's own No. 30 glowplug and ran each engine for one hour of intermittent break-in time before testing commenced. Initial tests consisted of prop/rpm checks, followed by throttle tests (on the 09-III TV) and finally torque tests to determine power output.

Tests were on the 09-III TV first.

Our first impression was that cold starting, compared with that of the previous Enya 09s tested, was just a trifle more critical. This is not to say that starting was in the least difficult; it was merely that whereas the previous models would splutter away on an excessively rich mixture until they had cleared it, the 09-III TV tended to cut out again if too much raw fuel had been allowed to enter the crankcase before an actual start had been obtained. In contrast to this, when the engine was warm, a single choked preliminary flick of the prop was usually enough to ensure a quick start and continued running and this also applied when the engine was started with the throttle in the idling position. Unlike some small R/C engines, the Enya re-started easily with the throttle at idle and would then pick up instantly when the throttle was moved to the full open position.

Throttle control was, in fact, much better than one normally encounters with motors of this size. Using a mild (5 percent nitromethane) R/C blend of fuel, we obtained the following maximum/minimum rpm on various props: 8100/2600 on a 10x3½ Top-Flite wood, 8400/2700 on a 9x4 Top-Flite nylon, 10,250/2900 on an 8x5 Power-Prop, 10,400/3000 on an 8x4 Tornado nylon, 12,000/3300 on an 8x4 Power-Prop and 12,600/3600 on a 7x4 Tornado nylon. We also tested the engine on smaller props but there is little point in using these on the 09-III TV since this engine will then be running beyond the peak of its power curve in the air.

Most impressive was the ease with which the 09-III TV turned quite large props, such as the 10x3½ Top-Flite mentioned above. This, of course, is a product of the engine's uncommonly good low-speed torque, which, however, is not achieved at the expense of top end performance. In fact, the 09-III TV's peak output of over 0.16 bhp at approximately 14,500 rpm,

again on our standard 5 percent nitro test fuel, is in excess of anything we have obtained to date with any R/C motor of similar displacement.

Such a high level of performance obviously suggested an even more impressive output from the standard 09-III. A series of prop/r.p.m. tests were first undertaken on the same fuel, and with the standard venturi restrictor installed, for purposes of comparison. There was little difference between the two engines up to 12,000 rpm, whereas the 09-III was 200 rpm faster, but this rose to 600 rpm faster at 16,000 rpm. An all round improvement came with the substitution of a 30 percent nitromethane fuel with gains of 700-1000 rpm, but the peak bhp was reached at no higher speed (approximatly 16,000 rpm) and our next step, therefore, was to literally pull all the stops out by removing the intake restrictor, still using a 30 percent pure nitromethane content in the fuel.

This produced the torque and power curves as shown on our performance graph, indicating a maximum torque of 17 oz.in. and a peak bhp of 0.24 at 18,000 rpm. Compared with the prop rpm figures obtained on the same fuel with the restrictor in position, speed was up by 300 on an 8x4 Tornado and by 1,000 on a 7x3 Top-Flite wood.

This unquestionably puts the 09-III in the top bracket of 09's so far as sheer power is concerned. So far as our personal experience goes, its peak power output is exceeded by only one other 09 (the Cox Tee-Dee 09) which, while developing a lower maximum torque than the Enya, peaks at higher rpm. Propped for speeds of up to 15,000 rpm, we know of no other motor of similar displacement that can beat the Enya 09-III.

In short, both versions of the Enya 09-III seem to be exceptional performers. They are also sturdily made engines of attractive appearance and good finish, competitively priced.

Summary of Data

Type: Loop-scavenged two-stroke cycle with shaft type rotary-valve induction and bronze bushed main bearing. (Throttle type carburetor and optional coupled exhaust restrictor on TV version).

Weight: 3.7 oz. (TV version 4.2 oz.)

Displacement: 1.619 c.c. = 0.0988 cu.in.

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

Stroke/Bore Ratio: 0.938 : 1

Specific Output: (09-III TV, as tested): 1.65 bhp/cu.in. (09-III, as tested, 30 percent pure nitromethane, open intake): 2.40 bhp/cu.in.

Power/Weight Ratio: (09-III TV, as tested): 0.63 bhp/lb. (09-III, as tested, 30 percent pure nitromethane open intake): 1.04 bhp/lb.

Price: $7.95 (09-III), $9.95 (09-III TV)

Manufacturer: Enya Metal Products Company Ltd., Tokyo, Japan. U.S. Distributor: MRC-Enya Company Inc., 5300 21st Avenue, Brooklyn, New York 11204.