

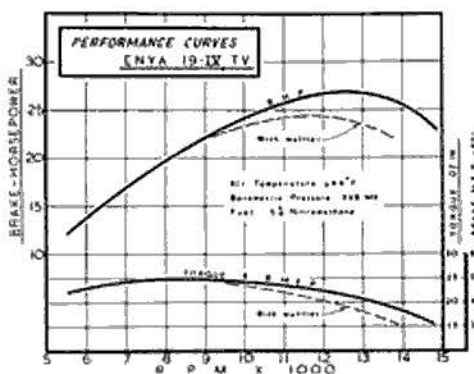
Enya's first 19 was built 18 years ago and 19 IV is result of continuous development program.

Pressure cast aluminum Enya muffer by external strap or by internal screws as shown here.

Enya's .19 IV TV is typical of Enya design. A well-made motor with good power output, sturdy, and at a reasonable price. History of good engine design reason for its qualities.



Parts are sturdy and well-finished. Engine can be converted to opposite rotation by repositioning the front housing at 90 degrees.



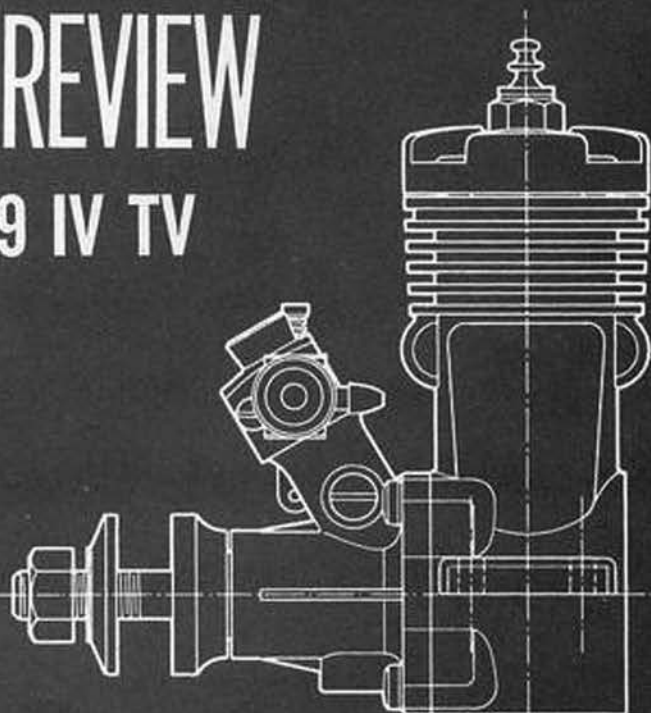
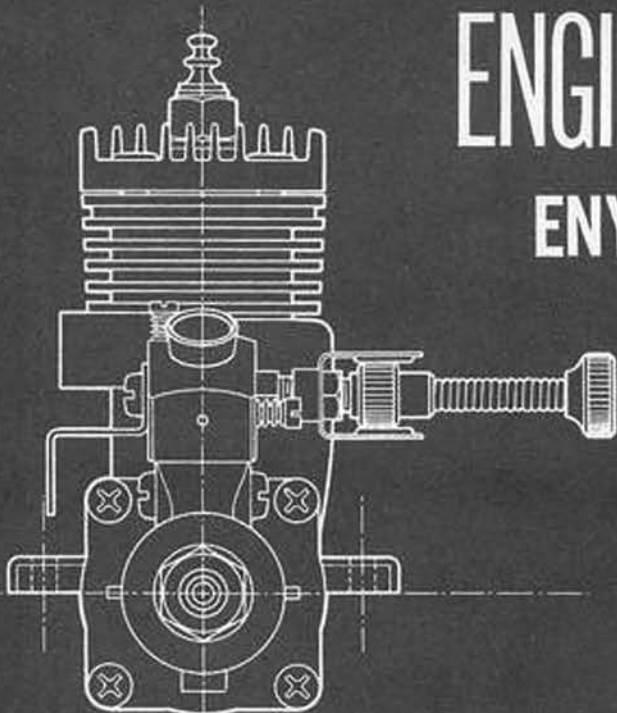
► The very first Japanese Enya engine to come into our possession, back in 1953, was, like the subject of this month's review, a 19. This was a "Model 4002", a diecast version of Enya's original sandcast 19 and the first Enya motor to be put into relatively large scale production. Prior to making these engines, the Enya brothers had built some bigger motors in the shape of the Enya 63, a rugged sandcast engine that later developed into the Enya 60 and remained in production right up until shortly before the now famous and highly successful 60-II was introduced.

That early 19 impressed us with its sound construction and good performance. It was also extremely easy to start. As is still the case with most of the current Enya engines, it featured a one-piece cylinder and crankcase casting with drop-in cylinder liner and a separate front end containing the main bearing. It was a beam mount motor but the back of the crankcase also had four concealed lugs drilled and tapped for a rather neat diecast aluminum radial mounting plate which was supplied as an optional fitting.

Early in 1956, the Model 4002 was replaced by the 4003, otherwise known as the Enya 19-III and this was subsequently offered also in a "TV" (throttle-valve) version for R/C. In 1962, the 19-III and 19-III TV were, in their turn, superseded by the present, further improved, Model 4004 19-IV and 19-IV (Continued on page 63)

ENGINE REVIEW

ENYA .19 IV TV



TV. Over the years, the basic design and construction of these engines has not altered much, but there has been steady development, including the adoption of a larger diameter crankshaft, modified port areas and timing, bigger volume bypass passage, an improved throttle, plus various minor refinements. The optional radial mount, however, is no longer featured in the latest version.

Currently, the Enya model engine range is just about the world's biggest. Counting throttle-equipped R/C versions and water-cooled marine models, the Enya Metal Products Company Ltd. lists no less than 49 different models for 1968. Not all these are exported. Mainly for the Japanese home market, Enya also make several small glow engines from .049 cu. in. upwards, plus three basic diesel models. Some of these are totally different in design and appearance from the MRC-Enya engines with which we are all now familiar. They do not, for example, have the detachable front housing or drop-in cylinder liner used by the other Enyas. Instead, they feature unit crankcase/main bearing castings to which separate cylinder assemblies are attached.

One of the advantages of a detachable front end on a shaft valve engine (a feature not too common these days) is that, in most cases, this can be employed to convert the engine to opposite rotation, such as for a pusher installation or when it may be desirable to use a "handed pair" of engines in a twin motor installation. To do this, simply remove the four screws holding the front housing flange to the crankcase, rotate the complete unit through 90 degrees so that the carburetor is on the right hand side of the engine and reinsert the screws. Where (as in the case of the 19-IV) the intake timing is 45 deg. ABDC to 45 deg. ATDC, the new intake port position will now give exactly correct timing for opposite rotation.

We know of several cases where this has been used to good effect in pusher

installations. No modifications are strictly necessary. Because the 19 is not a ball-bearing engine, thrust will now be taken by the prop driver bearing against the end of the front housing but the normal leakage of surplus oil at this point will usually be sufficient to keep the two surfaces lubricated. Both surfaces have a machined finish but can be carefully polished if the user so wishes. For a deluxe job, add a thin steel washer between the two surfaces to reduce wear and limit rearward movement of the shaft.

Contrasting with the majority of current R/C motors, the Enya 19 has a "square" bore and stroke of 16 mm. x 16 mm., which makes it a little taller than most of its competitors in the 19 group. This is particularly noticeable when it is put alongside a compact short stroke motor like the O.S. Max 19 but, although the Enya is slightly heavier than the O.S., its weight of under 6 ounces still makes it one of the lighter R/C 19's presently available.

The Enya main casting, as already remarked, comprises the crankcase and cylinder block. As with other similar Enya engines, the fin edges are machined to make a pleasing contrast with the matt gray casting finish. The unit includes the usual right hand exhaust stack and this has solid ends which can be drilled and tapped to enable the appropriate Enya muffler to be secured with internal fixing screws. Alternatively, the muffler can be simply attached with the steel strap and external screws provided.

The casting is accurately bored for the steel cylinder sleeve which is located by the usual top flange. The flange, 2 mm. deep, sets into a recess in the casting of slightly larger o.d. and, below the flange, the sleeve o.d. is relieved for a further 2 mm. The actual lapped surface of the bore extends only as far as the upper limit of piston travel. Above this, the i.d. of the liner is opened up approximately .004 in. By these small refinements, the risk of the bore contracting or distorting at the top due to overtightening of the head screws is eliminated, while maintaining intimate contact between the major part of the sleeve and casing for maximum heat transference.

The cylinder ports are located for a 128 degree exhaust duration and a 106 degree bypass period. The cast-iron piston is of orthodox design with a flat head and straight baffle. It is coupled to the aluminum connecting-rod by a fully-floating 4 mm. dia. tubular wrist-pin having brass pads. At the lower end, the conrod is bronze bushed. The cylinder head is deeply finned with a cast-in brass bush for the centrally located glowplug. The joint face of the head has a machined surface and this makes metal-to-metal contact with a raised ground rim on the cylinder flange.

The hardened steel crankshaft has a full disk web and a generous crescent counterbalance. Journal diameter is 11 mm. with an 8 mm. gas passage and crankpin diameter is 6 mm. The shaft runs in a bronze bushing cast into the front housing. The housing has the usual integral intake, the circular bore continuing into the bearing aperture where it is uncovered by a rectangular valve port in the shaft journal.

The TV series carburetor is Enya's usual pattern. The body is of machined bar stock, with a ground steel throttle barrel to which a cranked throttle arm is attached with a single screw to allow for linkage adjustment. There are the usual airbleed and idling screws and the needle-valve assembly, complete with fuel inlet tee, is screwed into the opposite side of the body.

In common with all but the most recent Enya R/C engines, no exhaust baffle is fitted to the 19-IV TV. Instead, the user may equip the engine with an Enya muffler. The appropriate muffler for the 19 is the small type which also fits the 15 engine. The power loss with the muffler is negligible on props bigger than about 9x6 and is not excessive (up to 500 rpm) on the smaller sizes (9x5, 9x4, 8x6) allowing revs to approach the peak output.

Our test unit was given a break-in of approximately two hours accumulated running time, prior to test readings being taken. The engine was a little tight at first but improved after about 30 to 40 minutes. Typical prop rpm figures obtained at this point included 9200 rpm on a 10x4 Tornado nylon, 10,300 on a 9x5 Top-Flite wood, 10,400 on a 10x3½ Top-Flite wood, 10,800 on a 9x4 Top-Flite nylon, 11,500 on an 8x6 Top-Flite nylon and 12,100 on an 8x6 Power-Prop wood.

Starting, we have to confess, was not so foolproof as we expected from past experience of numerous Enyas, the 19-IV TV having a certain reluctance to restart hot especially on the smallest size props. Generally, it was not helpful to suck-in (still less to prime through the port) as a preliminary to hot restarting and we found it better to open the needle-valve slightly before restarting and to then close it down when the engine was running again. This gave just that extra bit of fuel to prevent the engine from cutting but without making the starting mixture too rich for a hot restart. Of course, to the average R/C flyer reasonable cold starting characteristics (which the Enya has) are generally more important than quick hot restarts, since the motor usually has time to cool off between flights anyway. In this connection, we found that there was little risk of the Enya cutting out while the needle-valve was being tuned, i.e. it began to slow down if leaned out too far, giving ample time for one to open up the needle again.

As is often the case with R/C engines, the throttle control improved as the engine became broken-in. By carefully adjusting the air-bleed in conjunction with the idling screw, we obtained idling speeds in the 2,500-3000 rpm bracket, with a figure of 2,800 rpm on a 9x4 Top-Flite nylon. A prop of this size would seem to be about right for extracting the maximum performance from this particular engine. Response to mid-range throttle positions was good.

The maximum power output obtained with our 19-IV TV was nearly 0.27 bhp at 12,500 rpm using an Enya No. 3 glow-plug and our standard R/C test fuel containing five percent pure nitromethane. This is quite good and well up to average for a .19 cu.in. R/C motor. Adding the muffler cut output to just over 0.24 bhp at between 11,500 and 12,000 rpm but with a useful degree of muffling and at a slight reduction in fuel consumption.

Summary of Data

Type: Single cylinder two-stroke cycle with crankshaft rotary-valve and plain bushed main bearing. Throttle type carburetor. Optional muffler.

Weight: 5.9 oz. (7.5 oz with muffler).

Displacement: 3.216 c.c.=0.1962 cu.in.

Bore: 16.0 mm. (0.6299 in.)

Stroke: 16.0 mm. (0.6299 in.)

Stroke/Bore Ratio: 1.00 : 1

Specific Output (as tested, less muffler): 1.37 bhp/cu.in.

Power Weight Ratio (as tested, less muffler): 0.73 bhp/lb.

Price: \$14.50 (Muffler \$2.95 extra)

Manufacturer: Enya Metal Products Co. Ltd., Tokyo, Japan.

U.S. Distributor: MRC-Enya Co. Inc., 5300 21st Avenue, Brooklyn, New York 11204.

