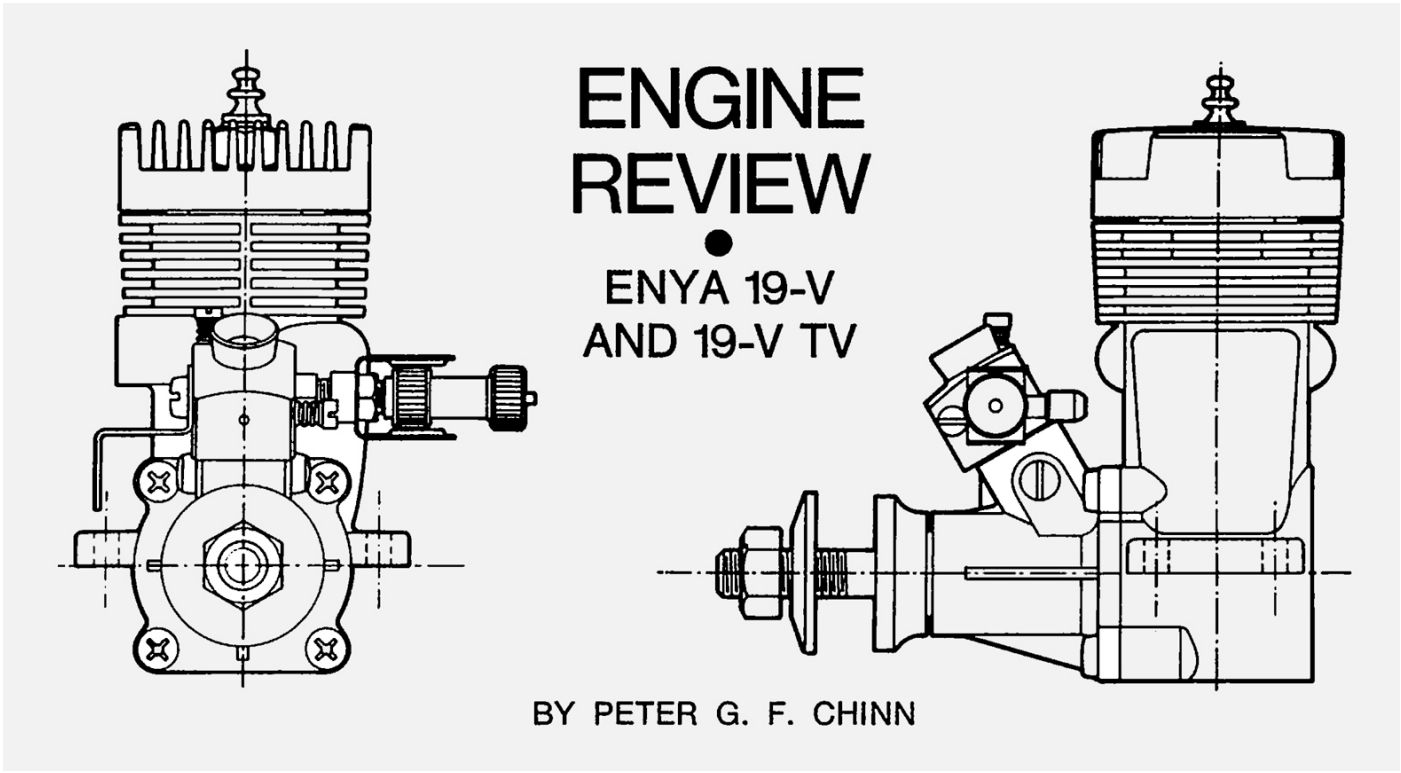
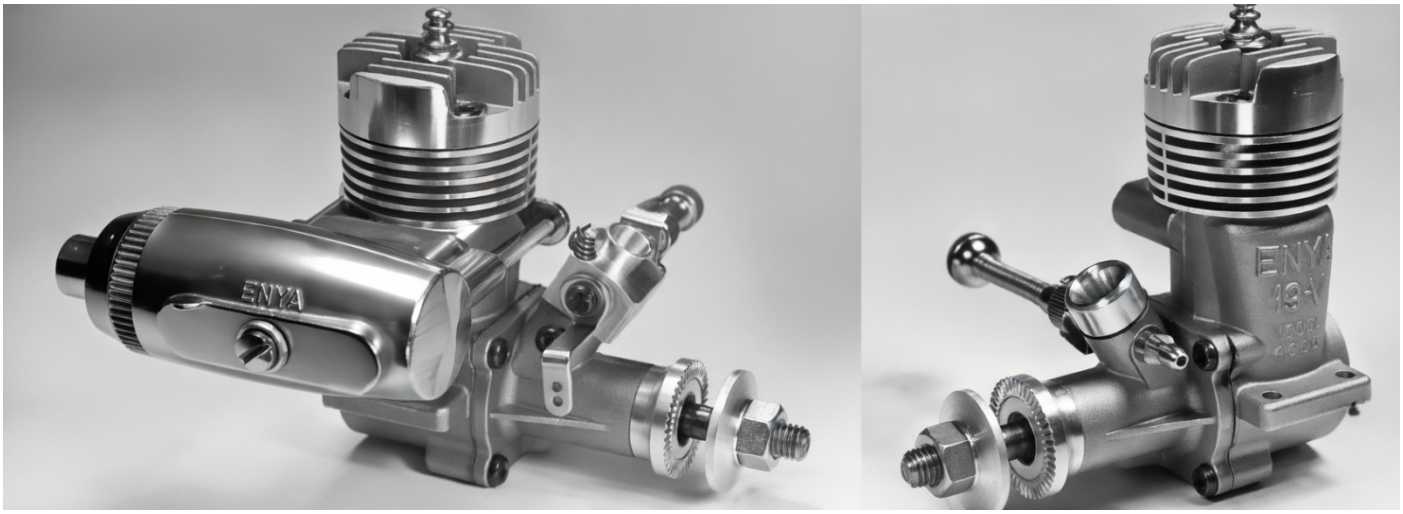
Enya 19-V & 19-V TV





Above: regular for F/F and C/L has standard venturi and spraybar assembly. At right we see typical Enya appearance with matte-finished crankcase.

Fifth series Enya 19 show big improvement in power output over previous models while still keeping established Enya design. Engine offered in R/C as well as standard version.

The Enya 19-V (including its throttle- equipped brother, the 19-V TV) otherwise known under the factory designation "Model 4005," is the fifth and current version of the original Enya that the Japanese factory first put on the market more than 20 years ago.

During this time, the engine's basic layout of shaft-valve intake with open-loop scavenging, one-piece cylinder-block and crankcase, detachable bronze- bushed shaft housing and a lapped piston running in a drop-in cylinder sleeve, has remained unaltered, but, within this framework, the engine has been steadily developed and each succeeding model has embodied new castings and many revised component parts.

Model Airplane News Magazine February 1972 by Hlsat

Enya 19-V & 19-V TV

One thing that all previous Enya 19's have had in common is a "square" bore and stroke of 16 x 16 mm. Most modern engines, of course, use an over-square combination and in the Model 4005, the Enya brothers have brought their 19 into line by reducing the stroke to 15 mm. and increasing the bore to 16.6 mm.

The most immediately obvious result of this change to the S/B ratio has been to give the engine a more compact and up-to date appearance. The shorter crank throw has enabled the crankcase diameter to be reduced from 1.2 in. to 1.1 in. and the width across the mounting lugs is cut from 1.9 to 1.7 in. The reduced stroke has also permitted the use of a shorter connecting- rod and shorter piston, all of which combine to effect a reduction in overall engine height.

The 19-V's lower stroke/bore ratio has produced no less significant changes internally. There has, for example, been a reduction of approximately 18 percent in the volume of the crank chamber, and its actual effective volume is further reduced by the fact that the crankdisk occupies a proportionately larger volume within the crankcase. The connecting-rod, 2 mm. shorter between centers, and the reduced piston height above the wristpin, also mean less dead volume above the crank chamber, all of which adds up to higher crankcase compression for better fuel suction and improved gas transfer. Incidentally, the shorter conrod does not mean increased piston side-thrust: maximum rod angularity is unchanged at approximately 15 ½ degrees since its reduced length is balanced out by the shorter crank throw. Piston weight is also slightly in the new engine's favor at 8.3 grams with wristpin, against 8.7 grams.

In construction, the 19-V is what one might now call "Traditional Enya." As already stated, the cylinder casing is an integral part of the crankcase proper, while the shaft housing is a separate bolt-on unit. There is no back-plate as such: this is cast into the rear of the crankcase and has a center-popped boss at the top for the benefit of anyone who might wish to drill and tap this for a crankcase-pressurized fuel system. The casting is of pressure cast aluminum alloy and includes the usual beam mounting lugs, and a short

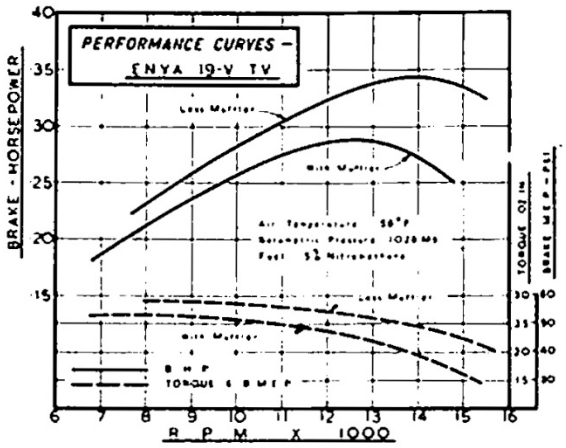
Parts of the 19-V, including TV carburetor. New version has bigger bore, shorter stroke.

exhaust stack on the right side. This latter now has a tapped boss in the center to which (in the case of the throttle-equipped 19-V TV version) a coupled exhaust baffle may be fitted. This is not actually installed the manufacturer simply includes it as an option where the user elects not to use a muffler.

The crankshaft housing has a cast-in bronze bushing and a circular bore intake boss having a 30 degree forward rake into which is fitted a machined aluminum venturi insert (standard 19-V) or throttle-type carburetor (19-V TV version). The standard venturi insert has a throat diameter of 6.6 mm. and is secured by means of a spray-bar type needle-valve assembly. The spray-bar, which is of nickel-plated brass, has a diameter of 4 mm. and results in an effective choke area of 20 sq. mm. This is generous for a Sport or Stunt type 19 and is in marked contrast to the choke area of the R/C carburetor of the 19-V TV model. This carb has a 4 mm. choke which, after allowing for the jet tube that projects into it, gives an effective area of approximately 10 sq. mm. Such an area is typical for an R/C motor in this displacement group.

The 19-V TV carburetor is of the orthodox barrel-throttle pattern with an adjustable airbleed as the means of controlling idling mixture strength. The body is of machined bar stock and the throttle barrel is of ground steel to which a cranked throttle arm is

Enya 19-V & 19-V TV



attached with a single screw to allow for minor linkage adjustments.

As on the previous models, the front housing attaches to the crankcase via a flange and four screws spaced at 90 degree intervals. A disadvantage of this type of construction is that the mounting lugs cannot be carried forward to brace the front end, but in its favor is the fact that, in many cases, it enables a shaft-valve motor to be converted to opposite rotation, such as may be used for pusher installations (with standard props) or when it may be desirable to use a “handed pair" of engines in a twin motor installation.

To convert to opposite rotation, one simply removes the four flange screws, rotates the complete front end through 90 degrees against the direction of the desired rotation (i.e., so that the carburetor is now on the right hand side of the engine) and replaces the screws. Provided that (as in the case of the Enya) the point at which the rotary-valve is fully open is approximately 45 degrees of crank angle before top dead center, the valve timing will then be correct for opposite rotation. Where (as on the Enya 19) no ball bearings are used, thrust will now be taken by the prop driver bearing against the front of the housing and it is a good idea to smooth and polish these two surfaces, preferably inserting a steel shim washer between them to reduce wear and limit rearward movement of the shaft. The normal leakage of oil at the front of the main bearing will usually be sufficient to keep the two surfaces lubricated.

As with the 19-IV, the hardened crankshaft has an 11 mm. dia. journal and an 8 mm. bore gas passage. A crescent counterbalance is machined into the crank-disk but the 6 mm. dia. hollow crankpin formerly used is replaced by a solid pin of 5 mm. dia. The rectangular valve port is open for a longer intake period, timed, according to measurement of our test motor, to open at 40 deg. ABDC and to close at 48 deg. ATDC.

Cylinder port timing remains conservative, with a 122 degree exhaust period and a 104 degree bypass period. Porting a two- cycle engine, is of course, always a matter of maintaining a balance between the conflicting demands of various design considerations while a relatively short exhaust duration may not be in the best interests of effective scavenging at high speeds, for example, it does offer an increase in effective compression ratio and may help both low speed torque and fuel economy.

To deal quickly with the remaining parts of the 19-V before reporting on its performance, these include a pressure cast and machined cylinder-head of a typical Enya pattern. It has a modified wedge type combustion chamber, cast-in brass bushing for the glow-plug and very deep tapered cooling fins. No head gasket is used. The connecting rod, which has a bronze bushed lower end, has a plain small end bearing of generous width. The 4 mm. dia. tubular wrist-pin is full-floating, with brass pads.

Two test motors were received direct from the factory in Japan, one equipped with the standard venturi and needle-valve and the other with the TV carburetor assembly. Each was given a break-in of one hour of intermittent running, first on straight 3 to 1 methanol and castor-oil, followed by checks on 5 percent and 15 percent nitro fuel. Neither engine showed any tendency to overheat or tighten up when leaned out, even at an early stage in the break-in process, although both had improved to the extent of picking up another 200-300 rpm on a 9x4 prop at the end of the break-in. A quick performance check at this point showed the better of the two as putting out about 10 per cent greater power than the other (in terms of prop revs, about 400 rpm more on a 9x4), and the better one was therefore used for all subsequent performance testing.

Model Airplane News Magazine February 1972 by Hlsat

Enya 19-V & 19-V TV

For these tests we used the recommended Enya No. 3 platinum-rhodium filament glow-plugs and our standard R/C test fuel containing 5 percent pure nitromethane. The maker's instruction leaflet lists three approved mixtures for Enya motors in general: straight methanol/castor- oil, a 5 percent nitro mixture and a 10-20 percent nitro mix. The 5 percent mix was found to give a worthwhile improvement in power over straight fuel in the 19-V but the response to higher nitro percentages was less pronounced and the 5 percent mix was judged to be adequate for all normal purposes and weather conditions.

On the test rig it was soon apparent that the 19-V TV had better than average low- speed torque for a .19, plus substantially higher top end power than the previous (19-IV TV) model tested some years ago. The tests on the older model had been carried out on the same fuel and glow-plug but the curves for the 19-V TV, when plotted, indicated a rise of approximately 16 percent in maximum torque and nearly 30 percent in peak brake-horsepower. Even allowing for the fact that the present test 19-V (having regard to the lower performance of the other test sample) was probably above that of the average off-the-shelf motor, this adds up to a very impressive improvement in power output.

The 19-V TV was then taken through a second series of test readings with the Enya muffler installed. So equipped, the 19-V TV showed a somewhat more severe drop in power output than had been the case with the 19-IV TV. This amounted to a loss of approximately 20 percent in peak bhp. compared with only about 10 percent in the case of the 19-IV TV. Even so, the performance was still well up on that of the older motor.

We then replaced the TV carburetor with the standard 19-V venturi and needle-valve assembly and ran a further series of tests. In spite of the much larger choke area provided by the standard venturi, however, this, somewhat to our surprise, made little difference in the engine's performance. Top end power was improved by a barely measurable amount, while the bottom end was very slightly down. In terms of prop rpm, variations were of the order of no more than 100-200 rpm.

Prop revolutions recorded for the 19-V TV on 5 percent nitro and without the muffler included 9,950 rpm on a 9x6 Top-Flite Super-M, 11,200 on a 10X3 ½ Top-Flite wood, 11,300 on a 9x5 Top-Flite standard, 11,900 on a 9x4 Top-Flite nylon, 13.100 on an 8x6 Power-Prop and 14.000 on an 8x5 Power-Prop. For general R/C work, we would suggest a 10x4 or 10x3 ½ for larger slower models and a 9x5 or 9x4 for faster aerobatic types.

Most Enya engines we have handled over the past few years have been easy to start, so it was a little surprising to find the 19-V and 19-V TV a little less than idiot-proof in this respect. However, on checking back to our notes concerning the 19-IV, we were reminded that this model, too, could be slow to start until one learned to appreciate its particular requirements. Neither engine liked to be too wet and both seemed to be quicker starters without the muffler than with it. The 19-V, however, remained quite docile, showing no propensity to bite one's fingers or kick loose its prop.

The throttle worked well. After slight re-adjustment of the factory settings, the 19-V TV would idle indefinitely at around 2,500 rpm on a 9x5 prop and would then pick up again unhesitatingly to full power when the throttle was re-opened. With the standard venturi and spraybar assembly installed in place of the TV carburetor, the needle-valve was easy to adjust although, as one might expect with the larger choke, the engine was a little more sensitive to variations in fuel level.

All in all, we would rate this the best of the Enya 19's produced to date. Although its starting was not so good as, for example, its smaller brother, the 15-III, the 19-V certainly does not lack power. The 19-V TV version was, in fact, just about the most powerful plain-bearing 19 R/C engine tested to date. Vibration seemed to be slightly above average at the top end, but runing qualities were otherwise good as was the engine's throttle response.

Enya 19-V & 19-V TV

Summary of Data

Type: Single-cylinder two-stroke with bronze bushed main bearing and crankshaft type rotary-valve. Throttle type carburetor interchangeable with standard venturi and spraybar assembly. Optional coupled exhaust restrictor. Optional muffler.

Checked weights:

5.64 oz. (19-V less muffler)
7.15 oz. (19-V with muffler)
6.00 oz. (19-V TV with exhaust restrictor) 7.40 oz. (19-V TV with muffler)
Displacement: 3.246 c.c. — 0.1981 cu. in. Bore: 16.6 mm. (0.6535 in.)
Stroke: 15.0 mm. (0.5905 in.)
Stroke/Bore Ratio: 0.904 : 1
Specific Output (19-V TV as tested):
1.74 bhp/cu. in. (less muffler)
1.45 bhp/cu. in. (with muffler)
Power/Weight Ratio (19-V TV as tested): 0.91 bhp/lb. (with exhaust restrictor) 0.62 bhp/lb. (with muffler)
Manufacturer: Enya Metal Products Company Ltd., Nakanoku, Tokyo, Japan.
U.S. Distributor: Model Rectifier Corporation, 2500 Woodbridge Avenue, Edison, Jersey 08817.