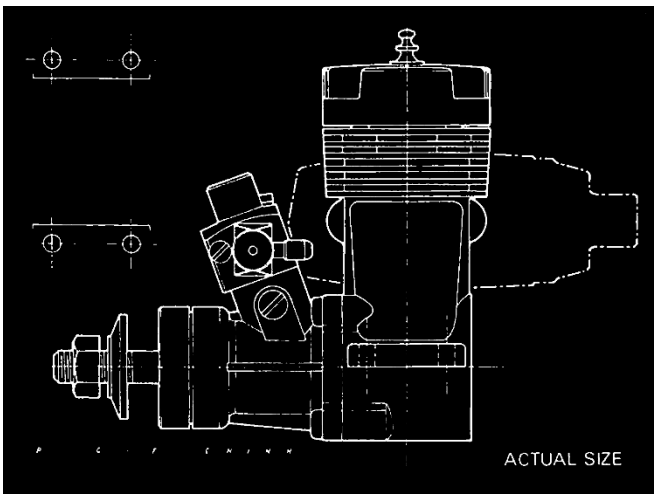
Enya 19-V BB TV



ENGINE REVIEW

By PETER G. F. CHINN

ENYA 19-VBB TV

• It was with a .19 cu.in. motor that the Enya brothers began the quantity production of model engines 24 years ago. Prior to this, they had made sandcast .60 and .63 cu.in. motors and also some sandcast .19 units, but it was the original production Enya 19. followed by the first Enya 29, that set the Enya Metal Products Company Ltd of Tokyo on the road to becoming one of Japan's two major model engine manufacturers.

Enya now produces engines in practically every displacement group from .049 cu. in, to .60 cu.in.. many of them in both standard and R/C versions and including several water-cooled marine engines. In all, their 1976 range runs to 51 models, although not all of these are exported to the U.S. Enya's distributor in the U.S. is the Model Rectifier Corporation (MRC) of Edison, New Jersey.

Over the years, the Enya 19 has progressed through live different models, culminating in the 19-VBB TV model dealt with here. We have had most of these engines through our hands, and it would be lair to say that every one of them has stood up well in comparison with contemporary rival makes of similar displacement, particularly in the areas of general handling and running qualities and in all-round soundness of design and construction.

The Enya company now actually makes two basic 19 models. The First of these, the 19-V, is a plain hearing (bronze-bushed) engine, and the second is the 19-VBB which is a dual ball-bearing unit. The 19-VBB TV model now dealt with is the radio-control version. The "TV" suffix, by the way, has nothing to do with television: it simply means "Throttle Valve."

Design and construction details of the Enya 19-VBB TV are as follows.

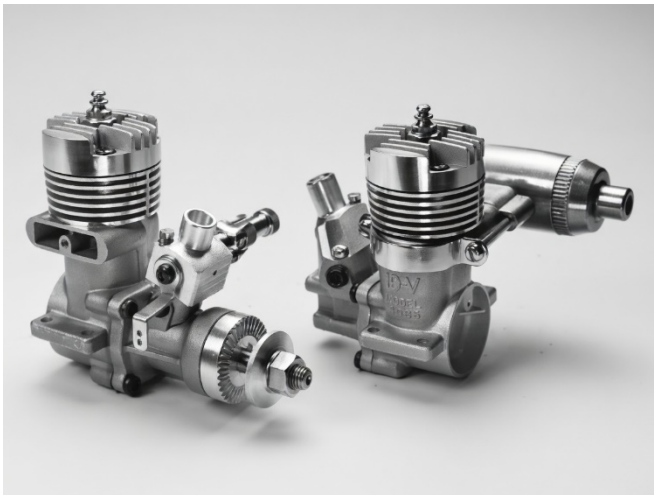
MAIN CASTING. This consists of the crankcase and tinned cylinder casing in pressure-die-cast aluminum alloy, complete with beam mounting lugs and a generously proportioned exhaust duct on the right side. The casting is well finished with a smooth matte surface, a machined joint face for the separate, flange-fitting front housing and polished fin edges. The crankcase is closed at the rear i.e., there is no detachable back-plate.

CYLINDER AND PISTON ASSEMBLY. A drop-in steel cylinder-liner is used. It has a 1.2 mm. (.047") wall thickness and is vertically located in the main casting by a narrow top Range. The rectangular, diametrically opposed bypass and exhaust ports are unbridged and give very conservative timing. The exhaust port, 3 mm. deep, is open for only 116° of crank angle. The bypass port is 5 mm. deep, but its upper edge is lowered to open 10° after the exhaust for a period totaling a mere 96°.

The lapped cast-iron piston is quite orthodox, with a straight baffle on a flat head and a plain, parallel skirt. It has a full-floating 4 mm. o.d. tubular wristpin with brass pads and is coupled to an aluminum conrod having a bronze-bushed lower end. The rod is pressure cast, rather than machined or forged, but adequate strength is ensured by using a thicker shank.

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Traditional Enya appearance with matte grey castings, bright work and a detachable front. Standard muffler is compact, light weight: reduces noise without excessive power loss.

CYLINDER-HEAD. The cylinder-head follows normal Enya practice, being made of pressure- cast aluminum with deep tapered fins and a polished outer edge. It has a curved-wedge- pattern combustion chamber and a central plug hole with a brass thread insert. Four 3 mm. Phillips pattern screws tie the head to the main casting, the head joint being made between the lop edge of the liner and the head without a gasket.

The measured geometric compression ratio of our test sample was approximately 8.5:1. The .engine's relatively short exhaust period means that the effective cylinder volume is greater than would be the case with an engine having an exhaust period of around 140. This means, in turn, that the effective compression ratio is not reduced as much. It also means, of course, that the expanding gases have more time to do useful work during the power stroke, although, conversely, this leaves less time for scavenging the spent gases from the cylinder and recharging it with fresh gas one rarely gets something for nothing in i.e. engine design.

FRONT-END ASSEMBLY. The main features separating the “BB” model from the standard Enya 19-V are its new crankshaft, new front housing, bearings and prop driver in other words, the complete front-end assembly.



Sturdy construction and special rear bearing permit large shaft for future development.

The crankshaft is notable mainly for its generously-dimensioned main journal. This is now 12 mm. outside diameter and 8.5 mm. inside diameter, compared with 11 mm. o.d. by 8.0 mm. i.d. for the bushed-bearing 19-V, In the past, the use of ball-journal bearings has often had the effect of restricting shaft size because of the difficulty in accommodating the o.d. of standard ball bearings within a given crankcase or bearing housing. This difficulty has been overcome in the Enya 19-VBB by the use of a special 12 ball steel caged rear ball bearing of only 21 mm. o.d. which, as we have said, actually allows the shaft size to be increased instead of reduced.

The main objective in using a large diameter main journal with a front rotary valve engine is to enable a larger bore gas passage to be employed without weakening the shaft. An 8.5 mm. bore gives a cross-sectional area of 56.75 sq.mm, which, one might argue, is needlessly large for a sport type of motor of less than 0.20 cu.in. displacement. I here is some justification for such an argument, and comparing the test results we obtained with the hushed bearing 19-V four years ago, it has to IK admitted that the 13% larger gas passage of the 19-VBB does not appear to contribute anything to performance. However, future development, possibly aimed at improving bypass porting and/or using a larger carburetor choke area, could bring out the true benefits of the larger bore shaft passage.

At the front end, the shaft steps down to 'A' dia. and is supported in a standard English size (1/4” x 5/8")

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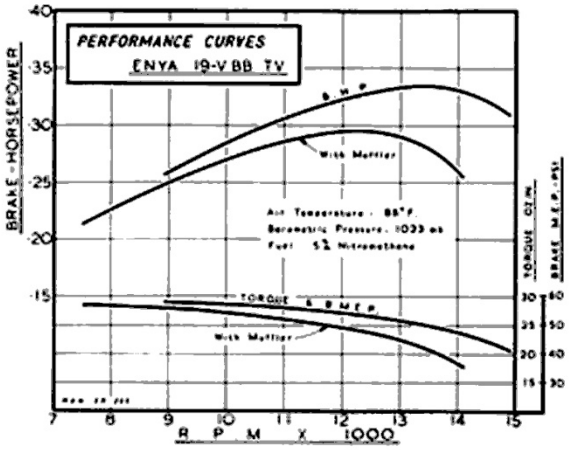
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bearing containing six halls in a steel cage and protected by a steel shield on the outside only. Further protection is provided by the machined prop driver, the periphery of which extends back over the nose of the bearing housing. The prop driver is keyed to the shaft by means of a short 2.5 mm. square sunk key, and the shaft end is threaded for a standard ¼ - 28 UNF prop nut. The crankshaft has an integral 5 mm. dia. solid crankpin, and counterbalancing is by means of web cutaways each side of the crankpin.

The shall and bearings arc contained in a substantial pressure-die-cast aluminum front housing that is secured to the main casting with four 3.5 mm Phillips screws and which, with prop driver, increases frontal overhang by about W. The bearing housing has an enlarged intake boss that is less sharply raked (a 20° forward inclination instead of 30°) and opens into a parallel- sided aperture in the main bearing. The rectangular valve port in the shaft journal uncovers this aperture for approximately 180° of crank angle timed, on our test engine, to open at 48° AB DC and to close at 48° AT DC.

CARBURETOR. The carburetor is of the conventional barrel throttle type with an adjustable air-bleed for controlling idling mixture strength. It has a ground steel barrel rotating in a body machined from aluminum bar stock. In all these respects the 19-VBB TV carburetor resembles that of the earlier throttle-equipped 19 models, but it is, in fact, a new curb of larger overall dimensions with a longer intake and a bigger choke size. The choke i.d. is 4.6 mm., and after allowing for the jet which protrudes slightly into it from the left side, the effective choke area is approximately 13 sq. mm. However, choke area can be varied between about 10 sq. mm. (for maximum fuel draw) and 15 sq. mm. (for maximum power) by screwing the jet in or out.

MUFFLER. This is the familiar, small size Enya expansion chamber. It is of pressure-die-cast aluminum construction and simply butts against the engine's exhaust stack, held in place by a semi-circular steel strap and screws. It has a pivoted plate on the side that gives access to the exhaust port tor priming.



The muffler has a 6 mm. i.d. outlet, giving a total outlet area of 28 sq. mm.

PERFORMANCE. Two engines were submitted for test. Each was given a nominal break-in of 30 minutes and then checked on a Top-Flite 9x4 prop. At this point, one engine was found to be approximately 150 rpm faster than the other, and therefore after further checks this model was chosen for actual testing.

The 19-VBB was easy to start and thoroughly well-mannered al all links. For example, the very first start from new was literally ”first-flip." after a guesstimated needle setting, and hot restarts were only slightly less positive. At all times. I he Enya remained docile with no tendency to “bite." even on props as small as 8x4.

There was some increase in vibration and also a very slight power loss on warming up, when the motor was loaded for speeds below about 10.000 rpm, e.g., on props larger than, say, 10x5, but as such sizes would rarely be needed (except perhaps, in the now-somewhat-rare case of a relatively large slow-flying sport model), this is of no great significance. At speeds in the 11.000-rpm to 12.000-rpm bracket, the Enya became very smooth and under lighter loads gradually picked up speed during the first 20 seconds or so of starting up from cold. Incidentally, we used Enya No. 3 platinum rhodium clement glow plugs. These arc a medium-reach plug matched to the standard Enya plug hole depth and seem to suit the 19- VBB very well. Past experience has indicated that these plugs are very durable, and in fact a single plug was used for breaking-in and all tests.

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On test, the 19-VBB TV reached a maximum torque of 29 oz. in. at 9.000 rpm and a peak power output of nearly 0.34 bhp at approximately 13.500 rpm. Although this is no better than we obtained four years ago with the bronze-bearing 19-V TV model (our test motor on that occasion may have been a bit above average), it is well up to expected levels of performance for a 19 R/C engine running on 5% nitro fuel.

Adding the Enya muffler reduced maximum torque only slightly down to 28 oz. in. at 8.000 rpm. At higher speeds, torque fell off rather more rapidly, resulting in a 12% reduction in the engine's maximum output, to just under 0.30 bhp at approximately 12.300 rpm. In terms of prop revs, this meant the loss of 400 rpm to 500 rpm on a 9x4, but exhaust noise was usefully subdued and the Enya muffler strikes a reasonable balance, at presently acceptable levels of muffling v. power loss.

A check on prop rpm with the muffler fitted gave 9.750 rpm on a 9x6 Top Elite maple, 10.600 on a 10x4 Taipan fiberglass-nylon, 11.000 on a 9x4 Tornado nylon, 11.200 on a 9x4 Top Elite nylon, 12.200 on a 9x4 Taipan fiberglass-nylon, 12.400 on an 8x6 Power Prop wood, 13.000 on an 8x5 Power Prop wood and 13.800 on an 8x4 Power Prop wood. Removing the muffler added 300 rpm with the 10x4 Taipan, 400 with the 9x4 l op Elite, 500 with the 9x4 Taipan, 800 with the 8x5 Power Prop and 1.000 rpm with the 8x4 Power Prop.

It should be noted, however, that on the two latter props, the 19-VBB TV is running over the peak of the power curve in each case. Allowing for the fact that the engine will pick up quite a bit in the air as load is reduced on the prop with forward speed, the 9x4 sizes are particularly well matched to the engine's performance and, fortunately, the 19-VBB TV seems particularly happy on 9x4 props.

Although the 19-VBB TV has a relatively simple carburetor with an air-bleed screw for adjusting idling-mixture strength instead of an automatic fuel-metering device, its throttling ability was more than adequate. As delivered, our two motors idled steadily at 2.500 rpm to 2.700 rpm on a 9x4 Taipan. Experimenting with the test motor at the conclusion of testing, it was found possible, after re-setting the idle stop screw and opening the air-bleed screw slightly, to get the engine to idle quite happily as low as 2.200 rpm, yet with good recovery and progressive midrange control.

All in all, then, the Enya 19-VBB TV came through our examination and test very well. There are one or two rival 19's that can exceed its peak power output, but on the basis of our test findings few can better it for all-round merit.

SUMMARY OF DATA
Type: Single-cylinder, crossflow-scavenged, two-stroke cycle with shaft type rotary-valve and twin ball bearings. Throttle type of carburetor. Optional muffler.
Checked Weights: 6.4 oz. (less muffler) 7.9 oz. (with muffler**)**
Displacement: 3.246 cc. - 0.1981 cu.in. Bore: 16.6 mm. (0.6535")
Stroke: 15.0 mm. (0.5905")
Stroke/Bore Ratio: 0.904 : 1 Measured Nominal
Compression Ratio: 8.5 : 1

Specific Output (as tested):
1.49 bhp/cu.in. (with muffler)
1.69 bhp/cu.in. (less muffler)
Power/ Weight Ratio (as tested):
0.60 bhp/lb (with muffler)
0.84 bhp/lb (less muffler)

Manufacturer: Enya Metal Products Co. Ltd., Nakanoku. Tokyo, Japan.
U.S. Distributor: Model Rectifier Corporation, 2500 Woodbridge Avenue, Edison, New Jersey 08817.

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