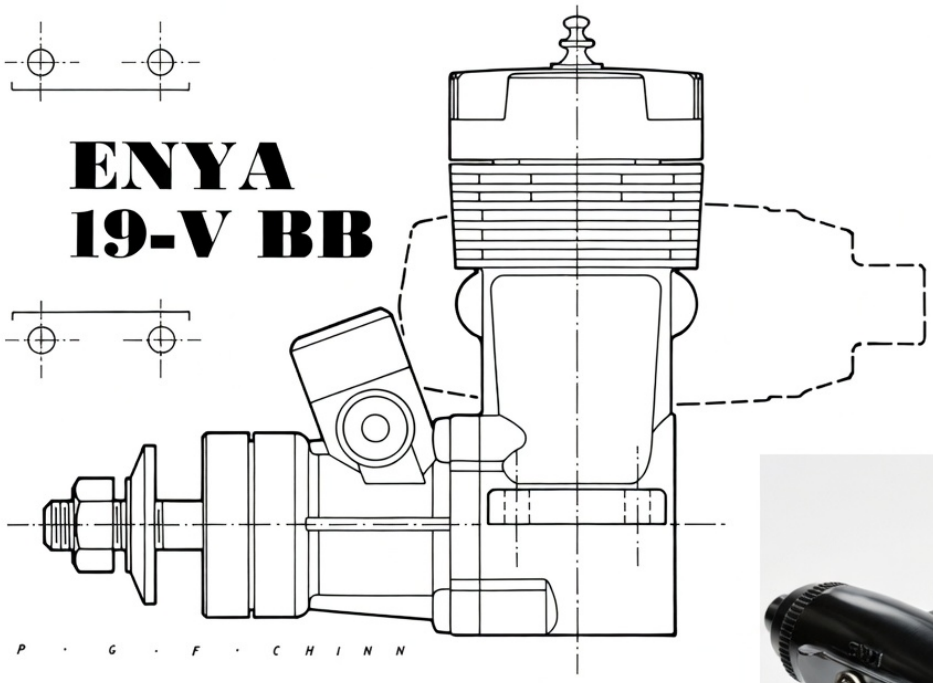
Enya 19-V BB



Of the extensive range of Enya engines imported from Japan by RipMax Ltd., the latest to be seen in the U.K. is the Enya 19-V BB. Basically this is the Enya 19-V or Model 4005 design first seen in 1970, but with certain modifications including a completely new front end incorporating a ball bearing mounted crankshaft.

It was with a .19 cu. in. class engine that the Enya company began the quantity production of model engines in the early nineteen fifties. After producing a sandcast engine in small quantities in 1950, the Enya brothers introduced the Enya 19 Model 4002 which continued in production for five years until succeeded by the Model 4003. In 1962 this in turn was replaced by the Model 4004 which, itself, was in production for some seven years. All these engines followed the familiar Enya layout of shaft rotary-valve induction, crossflow scavenging, a one-piece crankcase/cylinder-casing with drop-in liner and a detachable front end. The most marked change came with the Model 4005, when the 16 x 16 mm. bore and stroke combination that had been used for nearly twenty years, was dropped in favour of more modern ‘oversquare’ dimensions of 16.6 mm. bore by 15.0 mm. stroke.

The main casting, cylinder-liner and piston and connecting-rod assembly are essentially the same as those of the standard plain bearing 19-V, although a side by side comparison of the 19-V BB with the earlier model, revealed that the ball bearing engine had slightly shorter transfer and exhaust periods. It was also noted that the wedge pattern cylinder head was slightly modified.

Whereas, in the past, ball-bearing engines have often had to use smaller diameter crankshafts than plain bearing counterparts, the 19-V BB actually has a larger main journal (12 mm.) than the 19-V (11 mm.), made possible by the use of a special 12-ball rear ball-bearing having an o.d. of only 21 mm. This has enabled the induction passage through the shaft to be increased from 8.0 mm. to 8.5 mm. The rectangular shaft port registers with a round intake aperture to give a measured rotary-valve timing of approximately 49 deg. ABCD to 50 deg. ATDC.

AeroModeller Magazine November 1974 by Hlsat

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At the front, the shaft is carried in a ¼ x 5/8 in. ball-bearing, shielded on its outer side. The bearing is also protected by a new large-diameter machined prop driver that is located by a sunk key. Instead of the metric thread formerly used, the shaft now terminates in a standard ¼ UNF thread.

Necessarily larger, to accommodate the ball-bearing mounted shaft, the front housing is secured with 3.5 mm., instead of 3 mm. screws and extends the engine's frontal overhang by approximately 1/8 in., but total engine weight is increased by less than ½ oz. The larger diameter intake boss is less sharply raked for-ward and there is a choice of 6.8 mm. or 7.3 mm. i.d. intake venturi sizes. These, after allowing for the spraybar, give effective choke areas of approximately 11 sq. mm. and 14 sq. mm. respectively. The engine is also available in a radio-control version, known as the Enya 19-V BB TV and can be easily converted to this type merely by fitting the appropriate Enya throttle type carburettor.

Performance

From the very first, the 19-V BB was found to be easy to start and very free running. It was, nevertheless, given a full sixty minutes of intermittent running to ensure that it was fully run in.

The first series of tests was carried out with the smaller (C/L Stunt size) venturi choke in place and with the standard Enya small size expansion-chamber fitted. This silencer has a 6 mm. outlet and is reasonably effective in muffling the exhaust note but, understandably, at the cost of some top end power. Prop revs recorded at this point, using 5 per cent nitro fuel, included 10,750 r.p.m. on a 10 x 3| Top- Flite wood, 10,900 on a 9 x 4 Tornado nylon, 11,300 on a 9 x 4 TopFlite nylon and 12,100 on an 8 x 6 Power Prop wood. There is no point in propping the engine, under these conditions, for faster speeds since, at 12,000 r.p.m., it has already reached its peak power.

Switching to the larger venturi insert (still with the silencer fitted) had little effect at speeds below 11,000 r.p.m., but flattened the torque curve slightly, raising peak output approximately 5 per cent to just over

0.30 b.h.p. at 12,500 r.p.m., equivalent to an increase in prop speed of about 200 r.p.m. when the engine is propped for around 12,000.

Finally, the 19-V BB's gross b.h.p. on 5 per cent nitro with the large choke venturi was checked by removing the silencer. Again, the increase in maxi¬mum torque was not dramatic but, as expected, con¬siderably greater power was liberated at the top end, b.h.p. being increased to 0.34 at over 14,000 r.p.m. Prop speeds were raised between 300 and 700 r.p.m. in the 11,000-14,000 r.p.m. range.

The performance of the Enya 19-V BB was in line with expected levels for an engine of this class and displacement, running on standard 5 per cent nitro fuel. Admittedly, power output was not markedly better than was achieved earlier with the plain bear¬ing 19-V model, but this is not to say that different results might not have been obtained with two other examples. Our earlier report on the 19-V had shown our test sample to be rather better than another ex¬ample checked out at the same time. We suspect that the present 19-V BB was no more than an average example, so it is reasonable to suppose that the manufacturer's claim, that the 19-V BB is about 10 per cent more powerful than the 19-V could be right.

In all other respects the 19-V BB was more than pleasing. Handling and running qualities were ex-cellent. Hand starting was always quick and reliable and the engine remained docile even on the smallest sized props allowing speeds in excess of 15,000 r.p.m. On both large and small props, the 19-V BB ran

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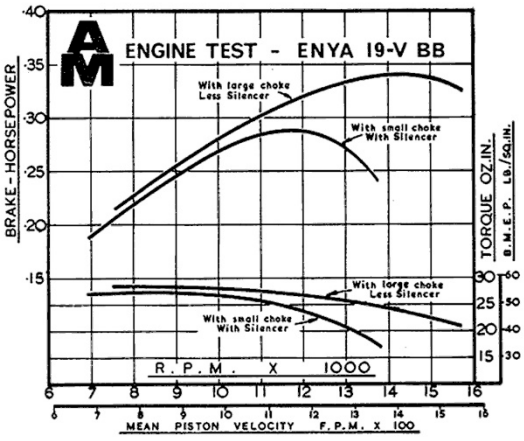
steadily and smoothly. Incidentally, although the average owner is unlikely to need to use anything larger than a 9 x 5, the 19-V BB showed no distress at being loaded down with much larger props; for example 10 x 4, 10 x 5, 11 x 4 or even 11x5, such as a free-flight scale enthusiast might wish to use with a largish model.

Following the conclusion of all tests, the 19-V BB was dismantled and its parts closely examined. These were found to be in excellent condition.

Power-Weight Ratio (as tested on 5 per cent nitro-methane fuel):
0.61 b.h.p./lb. (small choke, with silencer)
0.89 b.h.p./lb. (large choke, less silencer) Specific

Output (as tested on 5 per cent nitromethane fuel):
88 b.h.p./litre (small choke, with silencer)
105 b.h.p./litre (large choke, less silencer)



SPECIFICATION

Type: Single cylinder, air-cooled, glow-plug ignition two-stroke with crankshaft rotary valve and twin ball-bearings.
Bore: 16.6 mm. (0.6535 in.)
Stroke: 15.0 mm. (0.5905 in.)
Swept Volume: 3.246 c.c. (0.1981 cu. in.)
Checked Weights: 172 grammes — 6.1 oz. (less silencer) 215 grammes _ 7.6 oz. (with silencer)

General Structural Data

Pressure diecast aluminium alloy crankcase/cylinder casing with drop-in steel cylinder-liner. Pressure diecast aluminium alloy detachable front housing secured to crankcase with four Phillips screws and containing on 12 x 21 mm. 12-ball steel-caged ball journal bearing at rear and on 1/4 x 5/8 in. 6-ball steel-caged shielded type ball journal bearing at front. Hardened steel counterbalanced crankshaft with 12 mm. main journal, 8.5 mm. gas passage and 5 mm. solid crankpin. Lapped cast-iron piston with straight baffle and fully floating 4 mm. o.d. tubular gudgeon-pin with brass pads. Pressure diecast aluminium alloy connecting-rod with cast-in bronze big-end bush. Pressure diecast aluminium alloy deeply finned cylinder-head with machined joint face and cast-in brass thread insert for glow-plug and secured to cylinder casting with four Phillips screws. No head gasket. Machined aluminium alloy prop driver keyed to shaft with short 2.5 mm. square sunk key. Machined aluminium alloy choke tubes giving choice of 6.8 mm. i.d. or 7.3 mm. i.d. Nickel-plated brass spraybar assembly with flexible needle-valve extension, reversible for left or right hand use. Beam mounting lugs.

OPTIONAL EXTRAS

(i) Enya expansion-chamber type silencer.
(ii) Barrel throttle carburettor (for conversion of engine to 19-V BB TV type).

TEST CONDITIONS

Running time prior to test: 1 hour approx.
Fuel used: 5 per cent pure nitromethane, 20 per cent Newton R castor-oil, 75 per cent methanol.

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Glow-plugs used: Enya No. 3 (medium reach. 1.5 volt, platinum-rhodium filament).
Air temperature: 11 deg. C (51 deg. Fl.
Barometric pressure: 1014 mb. (29.94 in. Hg.).
Silencer used: Enya expansion chamber type (28 sq. mm. outlet area),