

Peter Chinn
tests the ...

ENYA 40X-TV

SEVERAL of the world's leading model engine manufacturers are currently offering their customers a choice of crossflow scavenged or Schnuerle scavenged engines in certain capacity groupings—particularly in the .40cu. in. and .60cu. in. classes. For example, from the U.S., Japan and Europe, there are, respectively, the K & B Torpedo 40 R/C, O.S. Max 40 R/C and Webra Blackhead 40 R/C; all good quality .40cu. in. (6.5 c.c.) twin ball bearing shaft rotary valve engines with conventional crossflow porting. Alter-

natively, if the prospective purchaser requires a higher level of performance and is prepared to pay for it, he can buy the K & B Front Rotor 6.5, the O.S. Max 40F-SR or the Webra Speed-40, all Schnuerle scavenged engines offering more power at the cost of some increase in weight and a greater initial outlay.

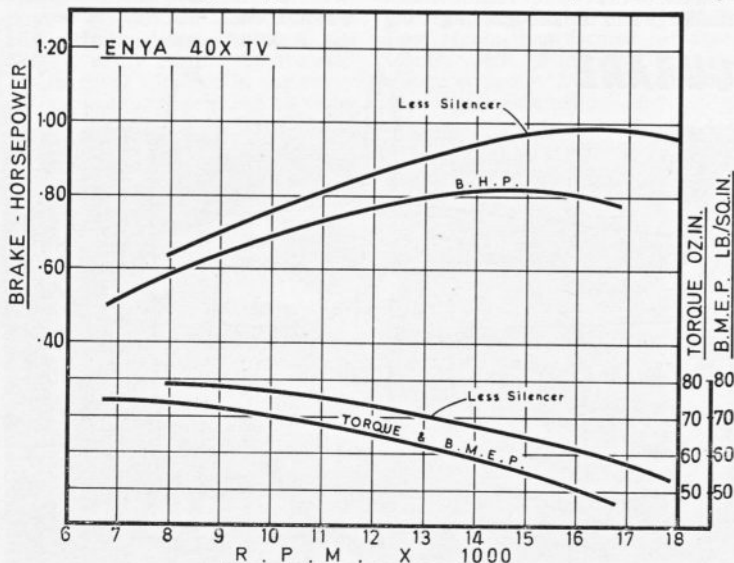
Another major manufacturer now following this line is the Japanese Enya Company which, having introduced a very good 40 R/C engine in 1974 in the shape of their Enya

40-TV "Model 6002," have more recently supplemented it with the Enya 40X-TV "Model 6101," the first examples of which began reaching the U.K. a few months ago. It is the 40X-TV that is the subject of this month's report.

The Enya 40-TV Model 6002 was featured in the RADIO MODELLER Engine Test article for August 1975, when it emerged as one of the most powerful crossflow scavenged .40 R/C engines on the market. On test, the more sophisticated 40X-TV was found to be, on the same fuel, about 14 per cent more powerful than the earlier model and, therefore, will undoubtedly attract those who are primarily interested in power. This difference, however, is slightly less when silencers are used and where cost is more important than the last few hundred revs, the older model is still worth considering.

To the student of model engine design, of course, the 40X-TV is much the more interesting motor. It bears a close resemblance, in both design and construction, to the Enya brothers' first production Schnuerle scavenged engine, the 60XF (RADIO MODELLER, September 1977), the main differences being its one-piece main casting with integral front housing and its use of a ringed piston and hardened ferrous liner, in place of the 60XF's ringless aluminium piston and unorthodox chromed aluminium liner.

Like the 60XF, however, it has



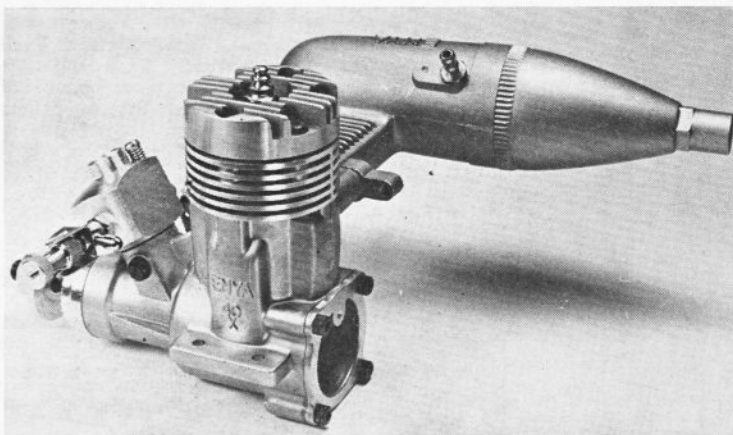
a thick-walled cylinder liner, enabling well angled ports to be used to take maximum advantage of the Schnuerle porting system and, like the 60, it also comes equipped with an Enya "G" Series carburettor incorporating an automatic fuel metering system.

Design and construction

Main casting. This comprises the crankcase, front housing and full length cylinder casing in a single pressure die cast unit. It includes beam mounting lugs, a 13mm. i.d. intake boss and a short exhaust duct on the right side.

Cylinder liner. Hardened steel cylinder liner with 1.75mm. wall thickness, closely fitted to main casting and located by the usual top flange. Centrally bridged exhaust port, timed to open and close at 71 deg. each side of BDC. Two main transfer ports flanking exhaust, angled to direct gas to left side of cylinder and timed to open and close at 59 deg. each side of BDC. Third port diametrically opposite exhaust, chamfered to sweep gas upward and timed to open and close at 59 deg. each side of BDC.

Crankshaft and bearings. Counter-balanced hardened steel crankshaft with 15mm. o.d. main journal, $\frac{3}{8}$ in. front journal and integral solid 6mm. crankpin on 8.2mm. thick crankweb. Rectangular valve port, 15mm. long, timed to open at 37 deg. ABDC and close at 50 deg. ATDC and admitting gas to 11.1mm. i.d. gas passage. Shaft supported in one 15 x 28mm. 10-ball, steel caged, ball journal bearing at rear and one $\frac{3}{8}$ x $\frac{1}{4}$ in. 7-ball steel caged, shielded ball journal bearing at front. Machined aluminium alloy prop driver, recessed to protect front bearing and located on flats on the end of the front journal.



Shaft end threaded M7 x 1.0 for prop nut.

Piston and connecting-rod assembly. Piston machined from low expansion aluminium alloy with bronze bushed bosses. Piston has flat crown, rectangular skirt cutaways front and rear and a Dykes type piston ring, pinned to prevent rotation. The connecting-rod 34.5 mm. between centres, is of forged aluminium alloy and is bronze bushed at both ends, without oil holes. The hardened tubular gudgeon-pin has an o.d. of 5.5mm. and is retained by wire circlips.

Cylinder-head and backplate. Pressure die cast aluminium alloy cylinder head with cast-in thread insert for glowplug. Bowl shaped combustion chamber surrounded by flat 3.5mm. wide squishband. No gasket. Head secured with six M3.5 x 0.6 Allen type cap screws. Deeply recessed pressure die cast aluminium alloy crankcase backplate fitted with paper gasket and secured with four M3.5 x 0.6 Allen cap screws.

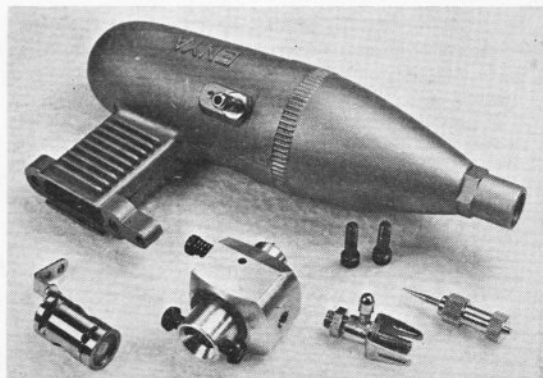
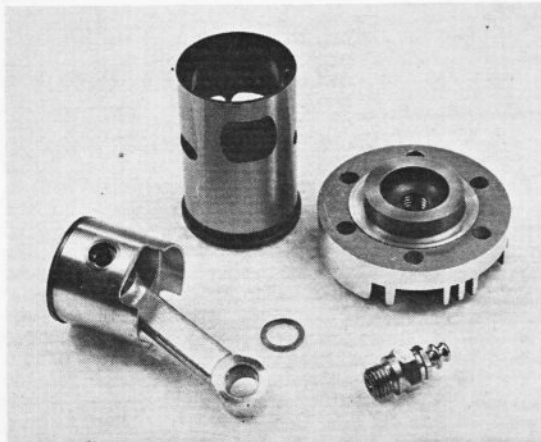
Carburettor. Enya G-Type with

fixed automatic fuel metering. Machined aluminium alloy carburettor body. Ground steel throttle barrel. Needle valve and fuel inlet tee fitted on left side and feeding into shallow chamber adjacent to end of throttle barrel. Fuel conveyed to jet tube in throttle barrel via bypass channel in carb body and tapered grooves in surface of throttle barrel which meter more fuel as throttle is opened. Fine control of idle mixture is by means of manually adjustable airbleed.

The carburettor has a 7.1mm. i.d. choke and, after allowing for the jet tube, an effective choke area of 29sq. mm.

Silencer. The 40X-TV is supplied complete with an Enya expansion chamber type silencer especially designed for it. This attaches directly to two tapped holes in the engine's exhaust duct with two Allen screws, although a U-shaped steel strap is also supplied with which it may be clamped to the cylinder. It has a nipple for pressurising the fuel tank, plus the tradi-

At left, the ringed piston and hardened ferrous cylinder liner, thick walls enabling well angled ports to be used. Below is the specially designed silencer for this unit, together with the Enya 'G' Series auto carburettor.



GENERAL INFORMATION

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

U.K. Distribution and Service: Ripmax Ltd., Ripmax Corner, Green Street, Enfield, Middlesex.

Type: Schnuerle-scavenged, shaft rotary-valve, throttle equipped glowplug engine with twin ball bearings and ringed aluminium piston.

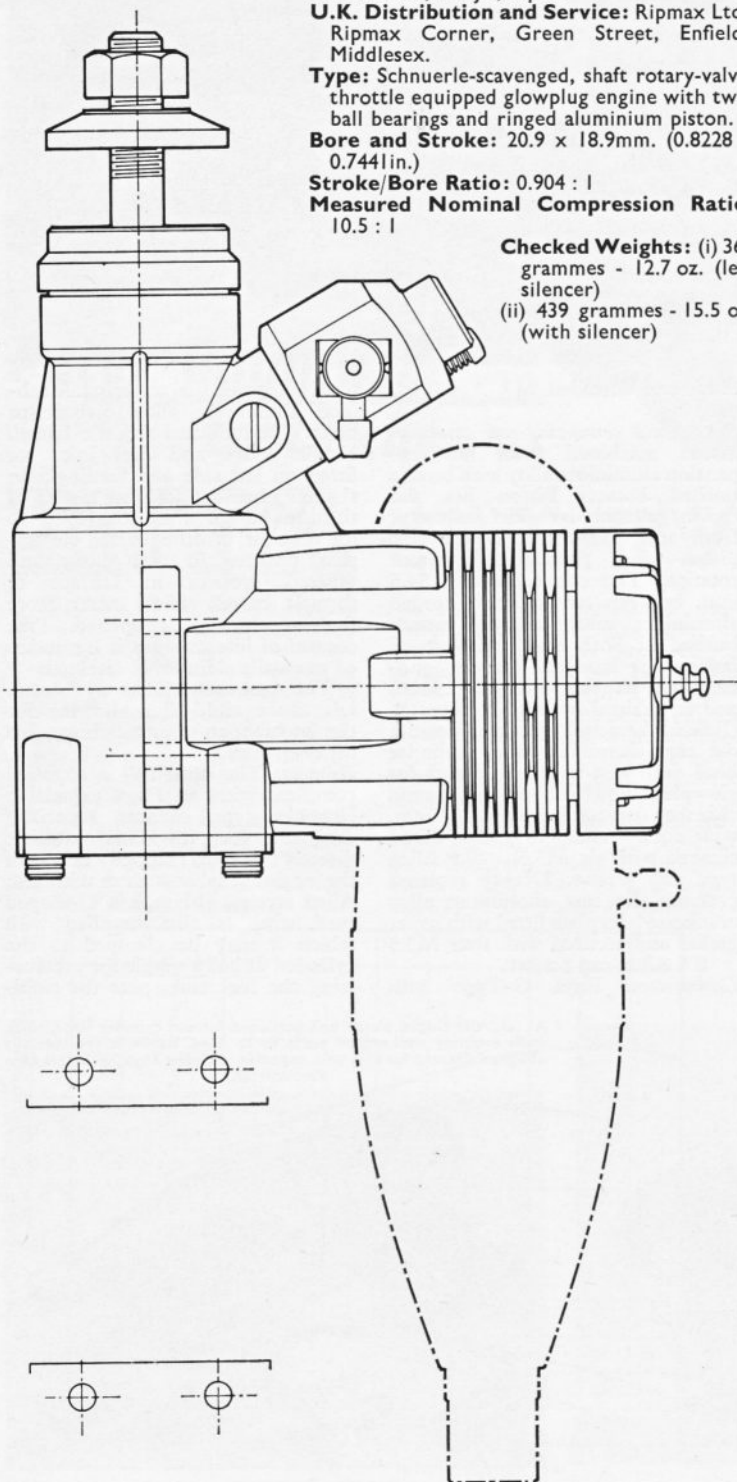
Bore and Stroke: 20.9 x 18.9mm. (0.8228 x 0.7441in.)

Stroke/Bore Ratio: 0.904 : 1

Measured Nominal Compression Ratio: 10.5 : 1

Checked Weights: (i) 360 grammes - 12.7 oz. (less silencer)

(ii) 439 grammes - 15.5 oz. (with silencer)



tional Enya swiveling plate opposite the exhaust for priming access. The silencer has a volume of 78 c.c. and an outlet area of 64sq. mm.

Test performance

The 40X-TV was run-in on straight 75/25 methanol/castor-oil fuel. No problems were encountered and, from the beginning, the engine ran freely with no tendency to overheat and tighten up. However, our usual precaution of a careful running-in procedure was followed. In this instance, running-in consisted of a series of short rich runs totalling 30 minutes, followed by another 30 minutes during which time the mixture was gradually brought up to the peak setting. A switch was then made to standard 5 per cent nitromethane test fuel before the performance tests were undertaken. Atmospheric temperature at the time of testing was 11° C (52° F) and barometric pressure was 1030 mb. (30.4 in. Hg.).

Starting and running. Handling qualities were excellent. Even when the Enya was brand new, before being run-in, piston seal was such that the resulting good compression gave quick hand starting and the motor remained docile and easy to hand start, hot or cold, on a wide variety of props.

Running qualities were also generally very good. Except for a slight unevenness when the motor was loaded for full throttle speeds in the 11,500-13,500rpm band (and which occurred only when the silencer was fitted), the Enya ran steadily and smoothly over the entire rpm range tested, which covered full throttle speeds from 7,000 to 18,000rpm.

Power—less silencer. The 40X-TV's gross output, as indicated in the performance curves, of just on 1.0bhp at approximately 16,500rpm, puts it in the top performance bracket, with such worthy companions as the O.S. Max 40F/SR and Webra Speed 40. As with these latter two models, the high peak output is not gained at the expense of low speed pulling power. A maximum torque of 78oz. in. at 8,000rpm was determined which, in practical terms means that the 40X-TV can, if necessary, be used to turn quite large diameter, fine pitch props where these may be required to fly a scale model.

Power—with silencer. Adding the silencer lowered peak output to 0.82bhp at around 15,000 rpm, a reduction of 16 per cent but one which still leaves the 40X-TV with

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very satisfactory performance capabilities.

Typical prop revs recorded with the silencer—still on 5 per cent nitro of course—included 9,200 rpm on a 12 × 6 Top-Flite maple prop, 10,400 on a 12 × 5 Top-Flite standard, 10,900 on an 11 × 6 Top-Flite maple, 11,400 on an 11 × 6 Power Prop maple, 11,500 on an 11 × 5 Top-Flite standard, 12,000 on an 11 × 5 Power-Prop standard, 12,400 on a 10 × 6 Top-Flite maple, 13,000 on a 10 × 6 Taipan glassfibre-nylon and 13,800 on a 9 × 6 Top-Flite maple.

Throttling. The relatively large choke area of the G-Type carburettor means that an exhaust pressurised fuel system is essential for aerobatic work and, using the silencer nipple for this purpose, the carb worked very well, with good idling, reliable mid-range operation and rapid response to abrupt throttle movement. On the larger prop sizes

(i.e. 12in. dia.) we were able to persuade the Enya to idle as low as 1,800rpm on the bench, but for safe in-flight operation on 10 or 11in. props, it is probably best to set the throttle stop for not less than 2,500rpm. The manufacturer sensibly quotes a safe idling range of 2,500-3,000.

Comment

Well designed, strongly constructed and finely finished engine. Fairly expensive, but should offer better than average servicability. Easy to handle. Excellent low speed torque for turning larger props as well as high top end for fast aerobatic models. Very good throttle.

