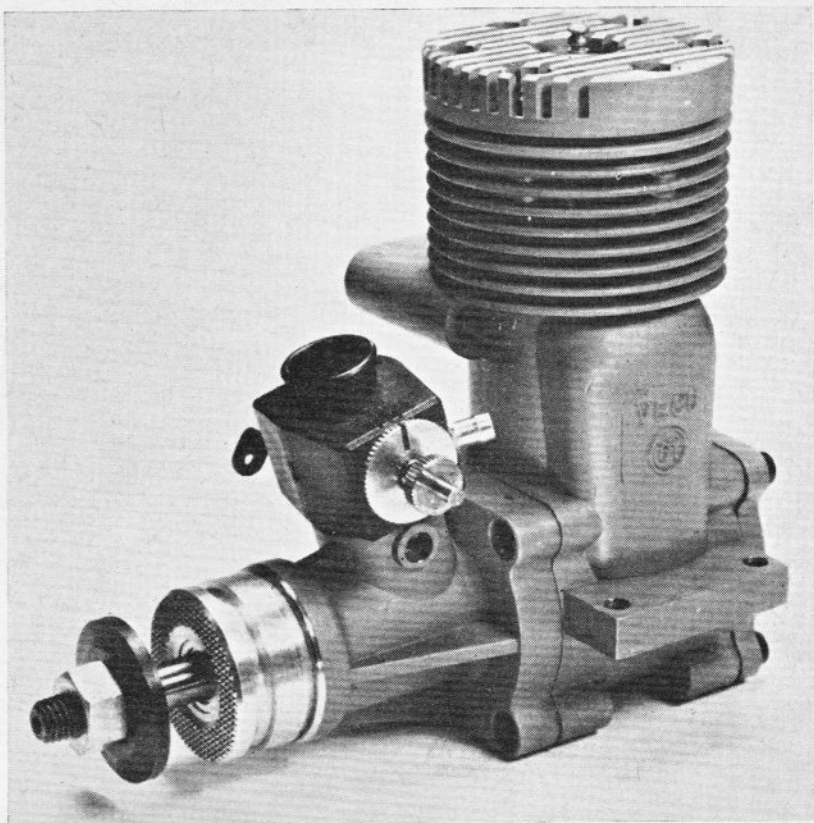


Peter Chinn tests the VECO 61

“...exceptionally
high maximum
torque...”



THE West German firm of Helmut Bernhardt is, by arrangement with the American K & B company, currently engaged in introducing, to the European market, German-built versions of the K & B-Veco model engines.

In the case of the Veco 19 model, the European version will be based on castings supplied from the United States but Bernhardt's first production model, namely the "Europe Series" Veco 61, is not entirely of American origin. Designed before the agreement was finally concluded with K & B, the Bernhardt 61, like the K & B, has a Perry carburettor and a Dykes type piston ring but, otherwise, is quite different and, in fact, bears more than a faint resemblance to the most successful German engine of all time, the Webra Blackhead 61.

The Bernhardt Veco engines are being distributed on the Continent by the Schuco company of Nuremberg but in Great Britain they will be handled by Irvine Engines of New Barnet who, of course, are the sole U.K. agents for the U.S. K & B

and Veco products. Powerful, yet very competitively priced here, the Bernhardt Veco 61 could, if its flying field performance lives up to the promise of our test sample, become one of the most popular 10 c.c. R/C engines, during the next year or two.

Design and construction summary

Main Casting. This comprises the crankcase barrel and full length cylinder casing in pressure diecast aluminium alloy. It includes substantial beam mounting lugs and a wide exhaust duct, the ends of which are drilled and counterbored for the silencer fixing screws.

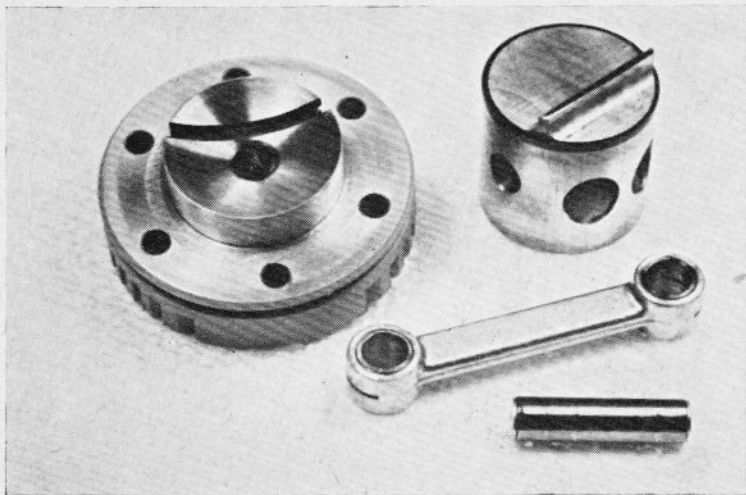
Cylinder. Integral part of main casting with drop-in chromed-bore sleeve. Five exhaust ports timed to open and close $68\frac{1}{2}$ deg. each side of BDC. Four transfer ports timed to open and close $57\frac{1}{2}$ deg. each side of BDC. Two 7.8×11.0 mm. skirt ports.

Crankshaft and Prop Drive Assembly. Counterbalanced crank-

shaft having 15 mm. dia. main journal, 8 mm. dia. front journal and 6 mm. dia. pressed-in hardened crankpin. Rectangular valve port timed to open at 45 deg. after BDC and close at 48 deg. after TDC, admitting gas to 11 mm. bore gas passage through main journal. Machined aluminium prop driver fitted to brass split taper collet on front journal.

Front Housing and Backplate. Pressure diecast aluminium alloy bearing housing with 13.5 mm. i.d. intake boss for carburettor and containing one 15×32 mm. 9-ball (rear) and one 7-ball shielded (front) brass-caged ball journal bearings. Housing aligned in crankcase by o.d. of rear ball-bearing and attached with four 3.5 mm. screws. Pressure diecast aluminium alloy crankcase backplate attached with four 3.5 mm. screws. Front and back units interchangeable to enable exhaust to be located on left or right side of engine. Paper gaskets.

Continued overleaf



Piston and Connecting-Rod Assembly. Piston machined from aluminium alloy bar with flat crown, straight baffle and two 7.9×8.3 mm. oval skirt ports. Single Dykes type piston ring. Forged aluminium alloy connecting-rod with bronze bushes and oil-slits at both ends. Fully floating 6 mm. dia. tubular gudgeon-pin with aluminium end pads.

Cylinder-Head. Machined aluminium alloy, finned and attached with six screws, without gasket. Shallow hemispherical combustion-chamber, slotted for piston baffle clearance but without squish area. Centrally located glowplug.

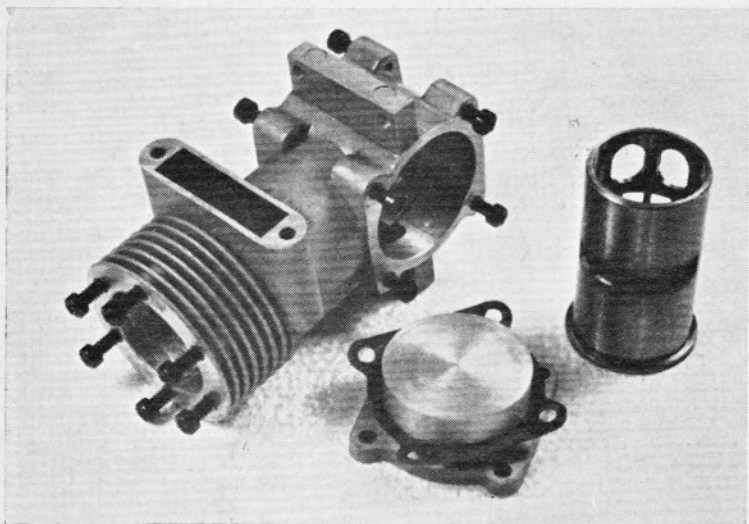
Carburettor. Perry carburettor with barrel type throttle and adjustable automatic fuel metering. Carburettor body of special heat-resistant plastic material. Ground steel throttle barrel with brass jet tube. Effective choke area 30 sq. mm. High-speed mixture adjustment by means of needle-valve screw. Low-speed mixture adjustment by means of large diameter "idle mixture disc." Throttle arm on right side.

Silencer. This is of the air-scavenged type with a 12 mm. dia. intake and a 9 mm. dia. outlet, giving a total effective escape area of 177 sq. mm. The silencer is of pressure diecast aluminium alloy with integral duct that attaches to the engine by means of two long screws. It is fitted with a screw-in nipple for pressurising the fuel tank.

Test performance

Our test unit was submitted by the factory in Germany and, as received, bore evidence of having been run only briefly. It was run-in carefully, using a straight 3 to 1 mixture of methanol and castor-oil. Approximately two hours' running time were accumulated before tests were undertaken. For the performance tests, our standard R/C test fuel containing 5 per cent pure nitromethane was substituted. Glow-plugs used were the K & B long-reach bar type as recommended. Atmospheric temperature at the time of testing was 59 deg. F. (15 deg. C.) and barometric pressure was 30.10 in. of mercury. The engine was fitted with the maker's silencer.

Starting and Running. The Bernhardt-Veco had good piston seal even when new and we experienced little trouble in starting it hot or cold. It was quite pleasant to



handle and we were able to hand start it on everything from a 17 x 4 Punctilio prop down to a 9 x 6 Top-Flite maple without losing any fingers in the process.

Running on straight fuel, the engine needed a few moments to pick up to full power after starting but a switch to 5 per cent nitro-methane substantially reduced this delay. The use of nitro did not, however, make very much difference to power output. On a prop matched to the peak of the power curve, there was a gain of only about 100-150 rpm when 5 per cent nitro was used and it needed 15 per cent nitro to gain another 150-200 r.p.m.

Power. This new engine is (if our test sample may be taken as typical) outstanding as regards low-speed torque. In fact, thanks to the negligible power-absorption of the Bernhardt silencer, the engine developed the highest torque of any silencer-equipped 10 c.c. engine tested to date in this series.

The manufacturer states that the engine and its silencer were designed to deliver maximum performance as a unit and that, if the silencer is removed, the engine will not run any faster. On test, it was confirmed that the increase in r.p.m. obtained when the silencer was removed amounted to only about 1 per cent. Without the silencer, the peak brake-horsepower of the Bernhardt-Veco was not quite as high as has been recorded with one or two other 10 c.c. R/C engines as tested without silencers (H.P.61, O.S. Gold Head 60 and Webra Blackhead 61) due to the fact that torque fell off more rapidly as load was reduced. Suspecting that this might be due to late ignition under the existing test conditions, we propped the engine for 13,000 r.p.m. (11 x 6 Power Prop) and then tried a variety of hotter plugs but this made a barely measurable (50 r.p.m.) difference. Switching to 15 per cent pure nitro-methane fuel helped a little more (150-200 r.p.m.).

The important point, however, is that the Bernhardt-Veco had the power where it really matters—i.e. at around the 12,000-12,500 r.p.m. mark, giving it an ability to turn an 11 x 8 prop as fast as some of its contemporaries will turn an 11 x 7 or 11 x 7½. Still more impressive was its performance on bigger diameters: e.g. 11,000 r.p.m. on a 12 x 6 Top-Flite maple, 10,600 on a 13 x 5½ Top-Flite, 9,100 on a 14 x 6 Top-Flite maple and 7,800 on a 15 x 6 Punctilio.

GENERAL INFORMATION

Manufacturer: Helmut Bernhardt Feinmechanik, Berchtesgaden and Metten, West Germany.

U.K. Distribution & Service: Irvine Engines, 31 The Fairway, New Barnet, Herts.

Type: Throttle-equipped shaft rotary-valve glow-plug engine with two ball-bearings and ringed aluminium piston.

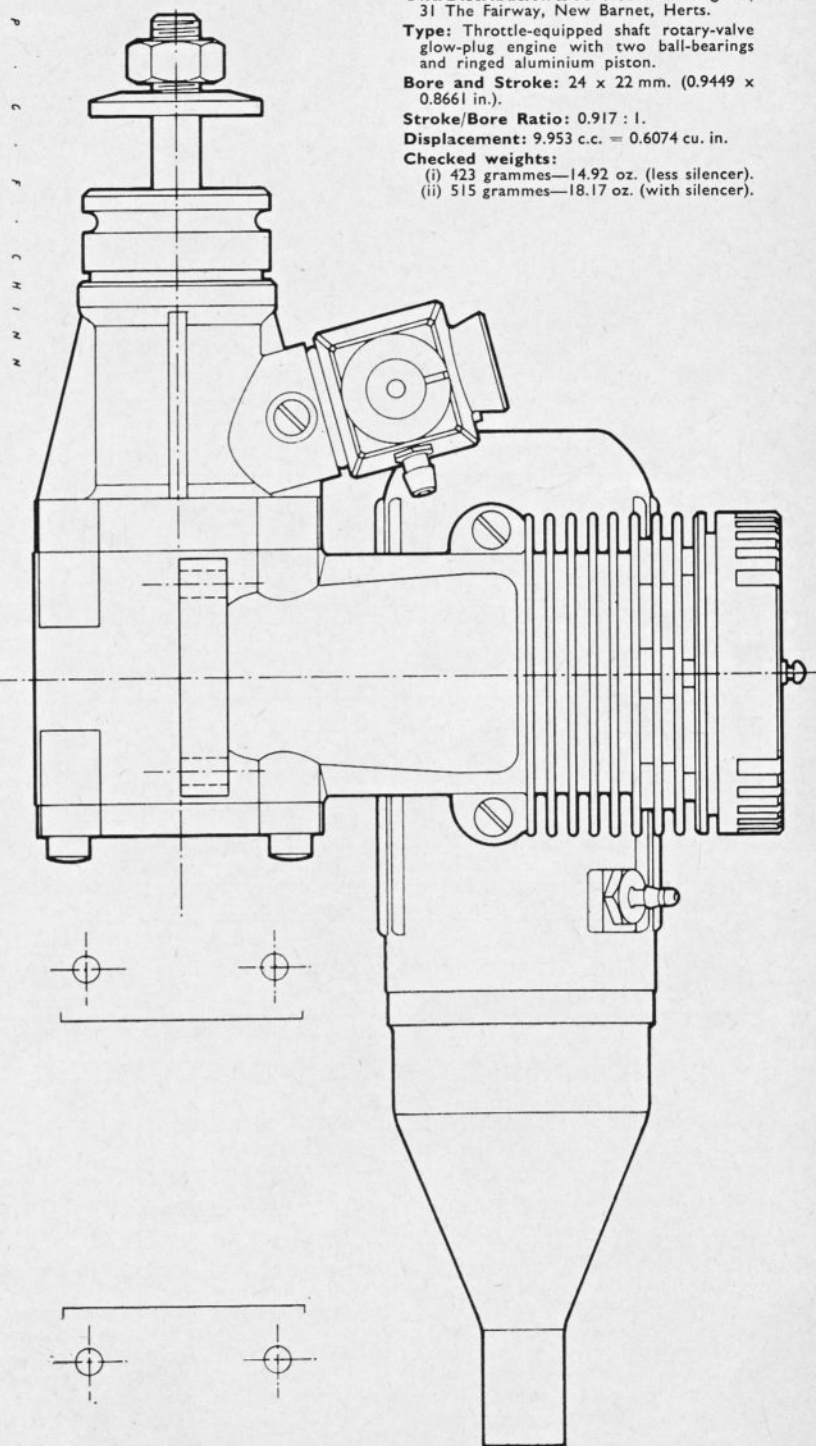
Bore and Stroke: 24 x 22 mm. (0.9449 x 0.8661 in.).

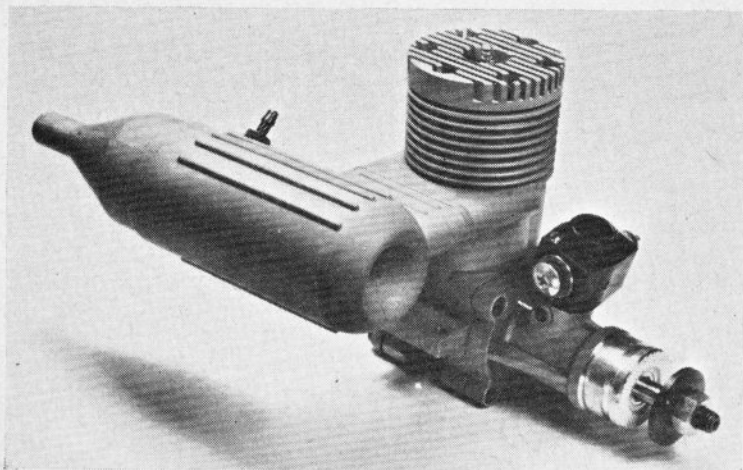
Stroke/Bore Ratio: 0.917 : 1.

Displacement: 9.953 c.c. = 0.6074 cu. in.

Checked weights:

- (i) 423 grammes—14.92 oz. (less silencer).
- (ii) 515 grammes—18.17 oz. (with silencer).





The impressive Veco 61 shown here with the Bernhardt silencer.

Throttling. The Perry carburetor appears to suit this engine very well. As received from the factory, our test motor had the mixture control accurately pre-set for a low idling speed and good recovery to full power. The engine would idle continuously on the bench as low as 2,000 r.p.m. on a big prop (14 x 6) and 2,400 r.p.m. on an 11 x 8 or 11 x 7. Just how low it may be safely idled in a model would, of course, best be determined by flight tests.

Incidentally, the effective choke area of the Perry carburetor fitted to this engine is appreciably larger than that of the American made Veco 61 and one would therefore expect the Bernhardt motor to be a little more critical to variation in fuel head through manoeuvres. The maker's insistence on the importance of keeping the fuel tank short, of locating it as close as possible to the engine and with its centre-line in line with the needle-valve (good advice with any engine installation) is therefore worth remembering.

Comment

Powerful, well made engine that should be particularly well suited to larger types of models (including scale types) requiring bigger diameter props, due to its exceptionally high maximum torque. Good throttle. Negligible power loss on Bernhardt silencer supplied. Very good value.

