

Peter Chinn tests the **K&B** **40 R/C** Series 70 F

THE K & B Torpedo 40 has been with us now for almost five years, during which time it has progressed through six r/c versions. Five of them have been aimed at the pylon-racing enthusiast and since pylon racing rules do not call for true throttle control, none of these engines has been suitable in standard trim for regular r/c work. The exception is the latest front-induction model, the "Series 70F." This has been redesigned for "pattern" (i.e. aerobatic) R/C flying, leaving the pylon racing class exclusively to the rear induction "70R" version.

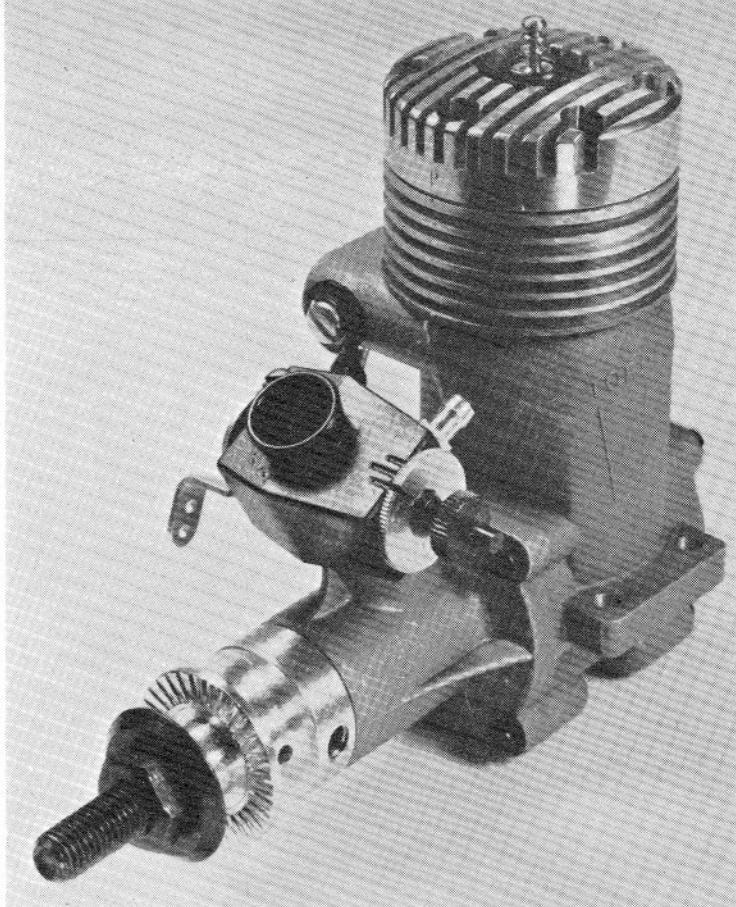
Many of the parts of the 70F are the same as those of the pylon-racing model, but a number of significant changes have been made. The most obvious of these is the adoption of a "Perry" carburettor having a smaller choke and an automatic mixture control device and coupled to a semi-rotary exhaust valve in an extended exhaust duct. A narrower transfer passage and a different cylinder head are also used.

It is with this model that the following report deals.

Design and construction summary

Main Casting. This comprises the crankcase and full-length finned cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs and an exhaust duct on the right side. (The engine can be dismantled and reassembled with the exhaust on the left side if required, especially if the coupled exhaust restrictor is being discarded in favour of a silencer.)

Cylinder Liner. Slip fit in main casting. Five exhaust ports, timed to open and close 70 degrees each



side of BDC. Four transfer ports timed to open and close 61 degrees each side of BDC.

Crankshaft and prop drive assembly. Internally counterbalanced discweb crankshaft with 0.500in. dia. main journal, 0.250in. dia. front journal and 0.218in. dia. pressed-in crankpin. Counterbalancing slots sealed off by shrunk-on aluminium rim. Rectangular valve port timed to open at 30 degrees after BDC and to close at 45 degrees after TDC and admitting gas to 0.344in. bore gas passage. Machined aluminium alloy prop driver fixed to crankshaft with rolled pin. Removable $\frac{1}{4}$ in. dia. steel prop stud with steel washer and hexagon nut.

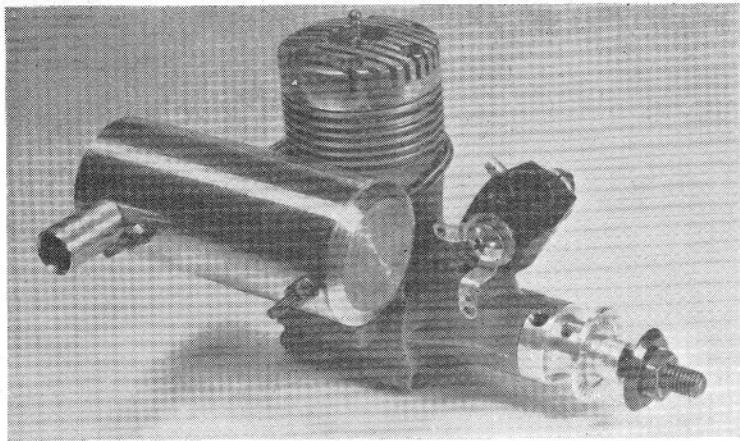
Piston and connecting-rod assembly. Machined aluminium alloy piston with flat crown, straight baffle and single low-pressure Dykes type piston ring. Forged aluminium alloy connecting-rod with unbushed eyes and lubrication slit at lower end. Fully floating 0.179in. dia. hardened tubular gudgeon pin with PTFE end-pads.

Cylinder-head. Machined aluminium alloy, finned and attached

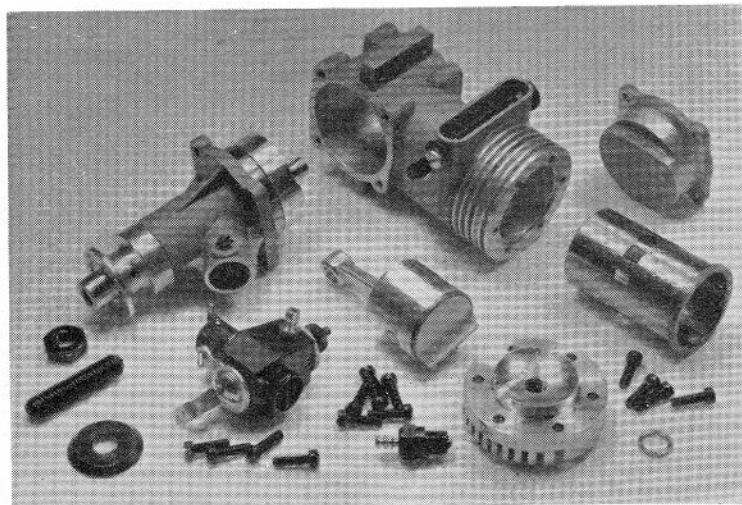
to main casting with six screws. No gasket: machined face makes metal-to-metal joint with rim of cylinder-liner. Shallow hemispherical shaped combustion chamber (no squish-band) interrupted by slot for piston baffle clearance. Long-reach bar type glowplug located centrally in head.

Front and rear housings. Pressure diecast aluminium alloy front housing embodying intake boss and containing one $\frac{1}{4} \times \frac{5}{8}$ in. front ball journal bearing and one $\frac{1}{2} \times 1\frac{1}{8}$ in. rear ball journal bearing and attached to crankcase with four screws. Pressure diecast aluminium alloy backplate, attached to crankcase with four screws. No gaskets used.

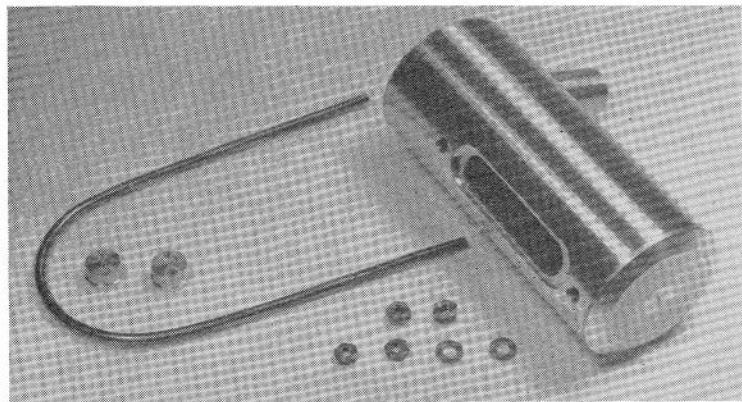
Carburettor. Perry carburettor with barrel type throttle and adjustable automatic fuel metering. Carburettor body of special heat resistant plastic material. Ground steel throttle barrel with brass jet tube. Effective choke area 21.5 sq. mm. High-speed mixture adjustment by means of needle-valve screw. Low-speed mixture adjustment by means of large diameter "idle mixture disc." Throttle arm on right side.



The silencer can be installed as shown above, or relocated with outlet at front to reduce rear overhang.



Above: the component parts of the K & B 40. Below: the Irvine silencer. Note alloy plugs for sealing off holes in exhaust duct after removal of coupled exhaust valve.



Silencer. As supplied, the Series 70F Torpedo 40 R/C is equipped with a semi rotary exhaust baffle that is supplied to the throttle arm. In order to comply with SMAE regulations, however, the U.K. distributor manufactures an expansion chamber type silencer for the K &

B 40. This butts directly against the exhaust outlet and is held in place by a U-bolt around the cylinder casting. It requires removal of the exhaust baffle but two alloy plugs are supplied for sealing off the vacant holes in each end of the exhaust duct.

Test conditions

Tests were carried out on a stock production unit supplied by the manufacturer. The engine was first given a running-in period (less silencer) totalling one hour in short runs, using straight 3 to 1 methanol and castor-oil fuel. Like most American engines, however, the K & B prefers a doped fuel and even with our relatively mild standard r/c test fuel containing 5 percent pure nitromethane, there was quite a marked improvement in power compared with straight fuel.

After some testing without a silencer and also with a Super-Tigre air-scavenged type silencer, the engine was fitted with the Irvine silencer for the present series of tests. At this point, the K & B had accumulated about five hours of running time. Atmospheric temperature was 61 deg. F. (16 deg. C.) and barometric pressure was 29.90in. of mercury.

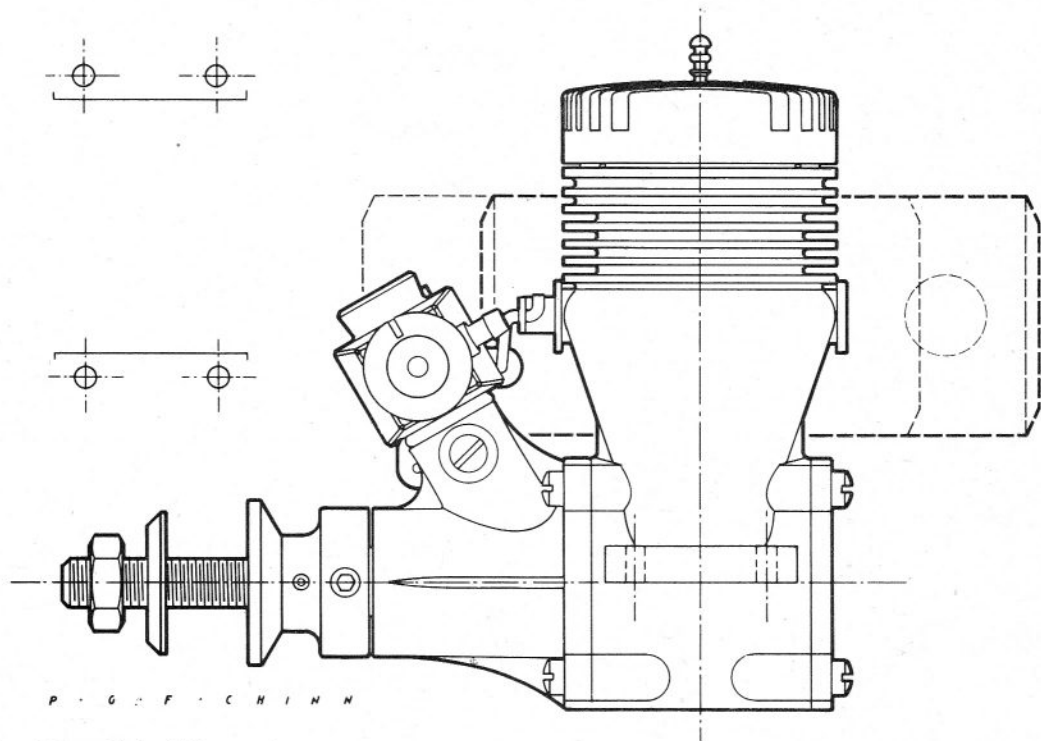
Starting and running

Cold starting was generally good at all times but, when new, the 40 lacked compression when hot and was somewhat reluctant to restart without the aid of a starter. This is not an uncommon occurrence with brand-new ringed engines but the Series 70F seemed to take rather longer than usual to ensure quick restarting.

Through all its many versions, the K & B 40 has, we have found, always had one of the lowest vibration levels in its class and the present model was no exception. The 40 R/C Series 70F also maintained very steady running speeds on a wide range of prop sizes. This contrasted somewhat with the large intake rear induction versions (69R, 70R) which, when operated on mild fuels, tended to run unsteadily if loaded for speeds below twelve thousand rpm. (Normally, of course, this is unimportant with these particular versions as they are intended for pylon racing on props giving in-flight speeds well in excess of 16,000 rpm.)

Power

The ability of the 40 R/C Series 70F to turn quite large props at very respectable speeds, a function of its high torque at low to medium rpm, was soon evident. A 12 x 6 Top-Flite maple prop was turned at 8,800 rpm, an 11 x 7 Top-Flite maple at 9,700 and a 12 x 4 PAW Trucut at 10,200 rpm. Further up the scale, an 11 x 6 Power Prop maple was turned at 11,000 rpm, an 11 x 5 Power Prop at 11,700



GENERAL INFORMATION

Manufacturer: K&B Manufacturing Division, Aurora Plastics Corporation, 12152 South Woodruff Avenue, Downey, California 90241, U.S.A.

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

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

Bore & Stroke: 0.840 in. x 0.720 in.

Stroke/Bore Ratio: 0.857 : 1

Displacement: 0.3990 cu. in. = 6.539 c.c.

Checked Weights:

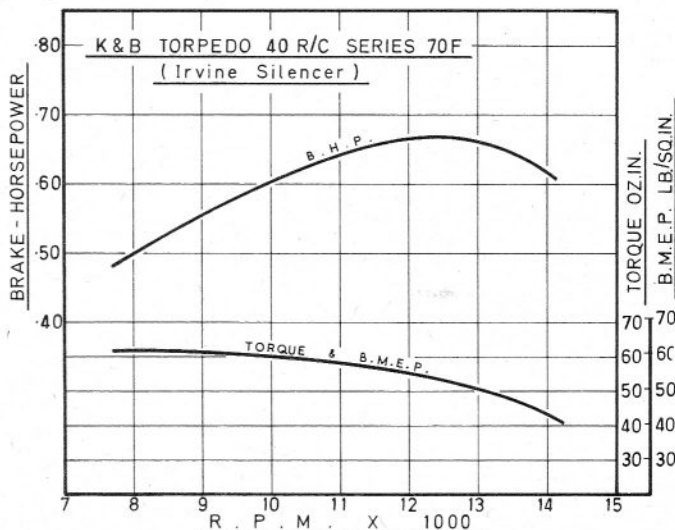
- (i) 264 grammes—9.31 oz. (with exhaust baffle, less silencer).
- (ii) 306 grammes—10.80 oz. (less exhaust baffle, with Irvine silencer).

and a 10 x 6 Top Flite maple at 12,000 rpm. All these figures were obtained with the Irvine silencer installed. The power loss with the silencer was the equivalent of only about 200 rpm on a 12 x 6 and 300 rpm on an 11 x 6, but increased rather more rapidly on smaller prop loads so that the peak of the power curve occurred much earlier (something like 2,500 rpm earlier, in fact) at around 12,500 rpm. This is no disadvantage with an engine intended for non-racing purposes: such a peaking speed is well matched to the sort of props appropriate to general r/c work with this size of engine.

Throttling

The effective choke area of the Perry carburettor fitted to the Series 70F K & B Torpedo 40 is quite large for a 6.5c.c. engine—in fact it is almost as large as that of the Perry carb used by the 10c.c. K & B Veco 61—and this must be partly responsible for the engine's good power output. One would not, in these circumstances, expect throttle performance to be up to the very best r/c engine standards and this appeared to be confirmed by our test findings. We found that the idling adjustment was more critical than, for instance, with the Perry

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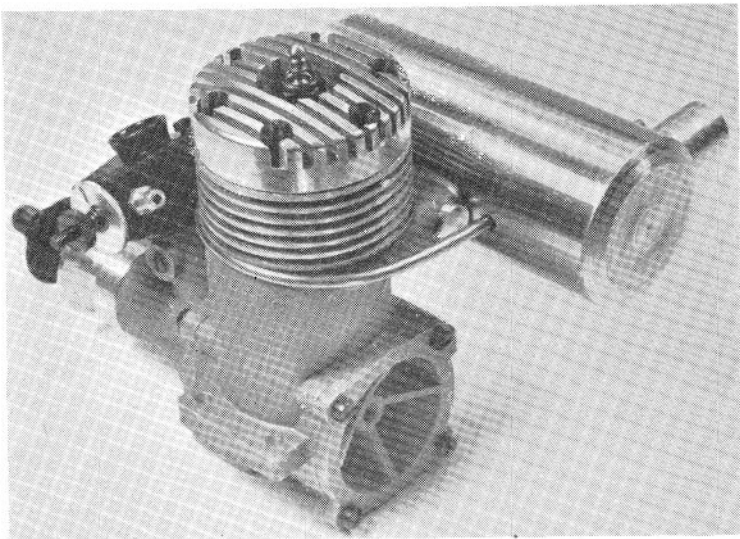
ENGINE TEST

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equipped Veco 61. The best idle mixture setting on test was with the notch (on the disc) on the rich side of the mid point—i.e. almost halfway between the middle reference mark and the rich reference mark. The disc adjustment tended to be rather stiff and spongy, making it a little difficult to establish the exact setting. The engine does, however, have immensely better throttle response than any previous K & B 40 and is the first one we have found capable of a reasonably low idling speed e.g. 2,700 rpm on an 11 × 6 Power-Prop when using the Irvine silencer.

Comment

Most K & B 40 virtues retained, plus much improved idling capabilities. High power. Smooth running. Irvine silencer quite effective; does not cause overheating and



power loss is only significant at top end—i.e. beyond load speeds normally used for non-racing r/c

work. Worthy companion to highly successful rear-induction 70R racing version.