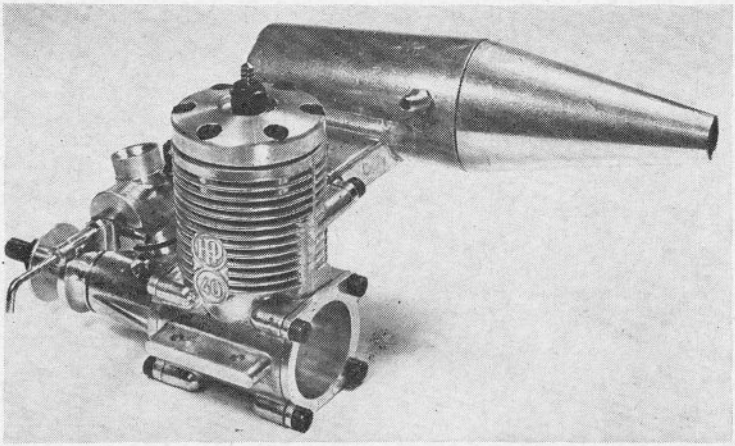
Peter Chinn tests the HP 40F

"more than competitive"



THE HIRTENBERGER HP 40 is, perhaps, best known in its rear-induction 40R-PR racing version where, particularly in the U.K., it has enjoyed considerable popularity for FAI class pylon racing. However, the front induction 40F version, with which we are dealing here, is intended for wider application, including R/C aerobatics. Although its peak output is lower, it offers the advantage of higher maximum torque for improved performance on the prop sizes (e.g. 10 × 6 and larger) required for such models. Also, in contrast with the "full speed or stop" capability of the 40R-PR with its racing type carburettor, the 40F has a "proper" R/C carburettor offering a low idling speed and excellent intermediate speed control.

Like the rear induction model, the 40F uses a Schnuerle loop scavenged cylinder. In fact, the main casting, cylinder-liner, head and piston assembly are similar to those of the 40R, but the 40F has a completely different front end and its shaft type rotary-valve has much more conservative timing, closing about 20 degrees earlier than the 40R's disc valve as befits its lower peak rpm.

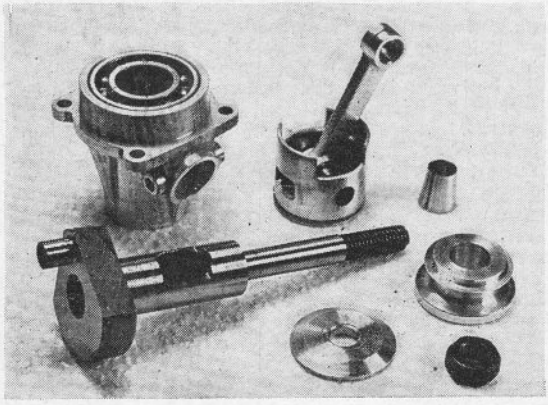
Design and Construction Summary

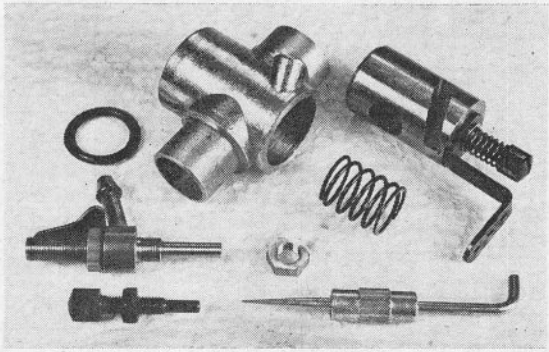
Main Casting. This comprises the crankcase barrel and full length finned cylinder casing in pressure diecast aluminium alloy. It includes beam mounting lugs, transfer channels and a short exhaust duct with drilled and tapped lugs for silencer attachment.

Cylinder. Hardened steel liner closely fitted to cylinder casing and located by flange at top. Centrally bridged exhaust port on right side timed to open and close at 70 deg. each side of BDC. Two main transfer ports angled to direct gas to left side of cylinder and timed to open and close at 60 deg. each side of BDC. Rectangular third port diametrically opposite exhaust port, steeply inclined to sweep gas upward and timed to open and close at 54 deg. each side of BDC.

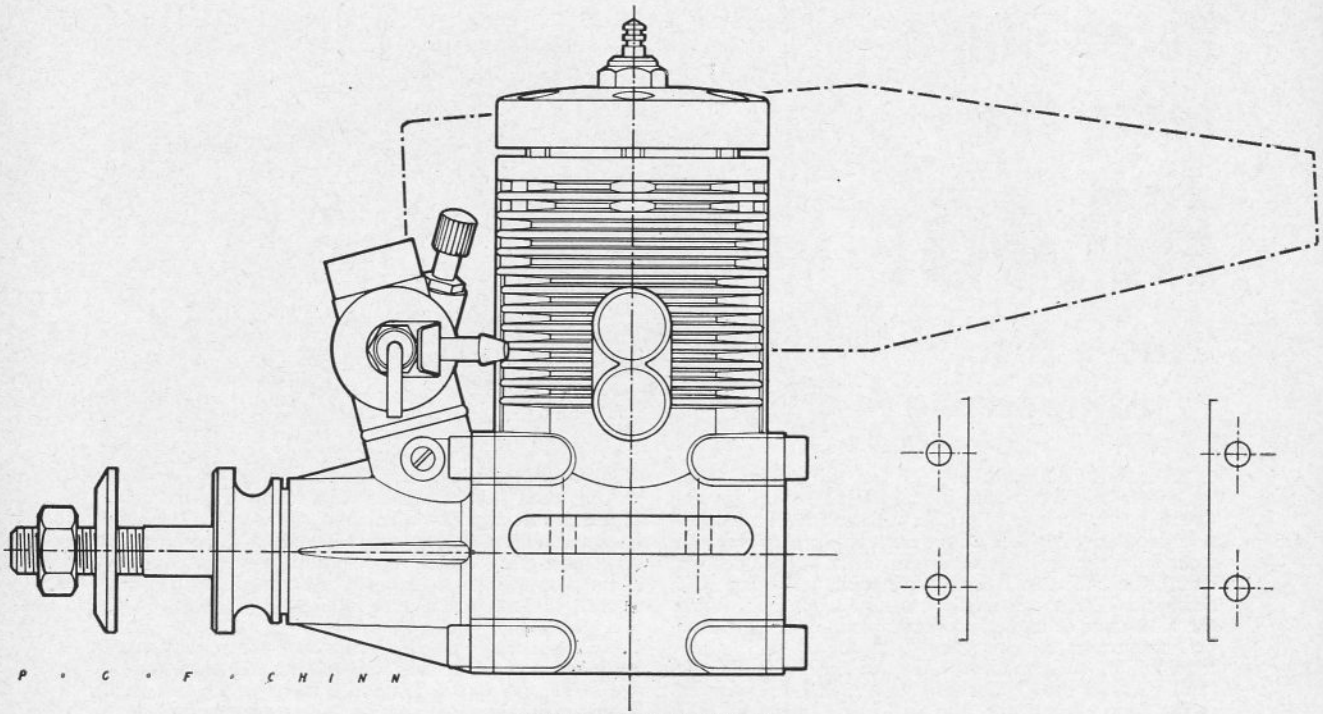
Crankshaft and Front-End Assembly. Counterbalanced hardened steel crankshaft with 12 mm. o.d. main journal and ¼ in. dia. front journal. Integral 5.5 mm. o.d. hollow crankpin. Rectangular valve port timed to open at 44 deg. ABCD and close at 43 deg. ATDC and admitting gas to 8.1 mm. bore gas passage. Shaft supported in one 12 × 24 mm. 10-ball steel caged ball journal bearing at rear and one ¼ × ⅜ in. 8-ball steel caged ball journal bearing at front. Pressure diecast aluminium alloy bearing housing with 11 mm. i.d. intake boss, secured to crankcase barrel with four Allen type cap screws. Paper gasket. Machined aluminium alloy prop driver on brass split tapered collet.

Piston and Connecting-Rod Assembly. Flat crown deflectorless aluminium alloy piston with single pinned compression-ring and rectangular third port window. Piston has deep skirt cutaways which register with similar cutaways in cylinder liner to prevent masking the entry to the two main transfer channels. Forged aluminium alloy connecting-rod with bronze bushes and lubrication slits at both ends. Tubular 5 mm. o.d. gudgeon-pin retained by wire circlips in piston bosses.





Parts of the HP 40F, dissembled for inspection. The carburettor, above, is secret of this motor's low idling speed and excellent intermediate speed control.

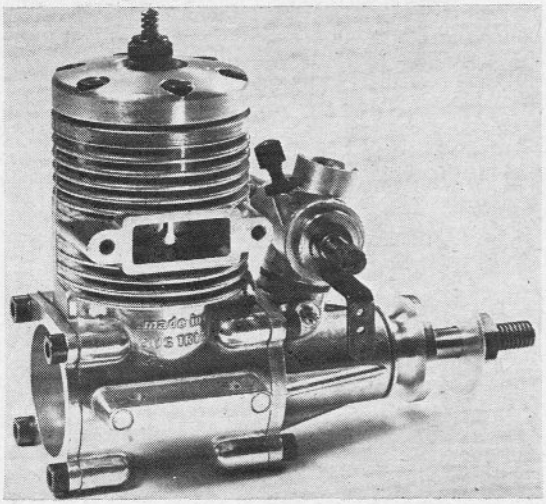


GENERAL INFORMATION

Manufacturer: Hirtenberger Patronen-, Zundhutchen- und Metallwarenfabrik, AG., A.2552 Hirtenberg, Austria.
U.K. Distribution: Ripmax Ltd., Green Street, Enfield, Middlesex.
Type: Schnuerle loop scavenged, shaft rotary-valve, throttle equipped glowplug engine with twin ball-bearings and ringed aluminium piston.
Bore and Stroke: 21,0 × 18.6 mm. (0.8268 × 0.7323 in.)
Stroke/Bore Ratio: 0.886:1.
Displacement: 6.442 c.c.0=.3931 cu.in.
Checked Weights: (i) 272 grammes—9.6 oz., less silencer.
(ii) 328 grammes—11.6 oz., with silencer.
Recommended Retail Prices:
£24.40 less silencer.
£27.75 with silencer.

Cylinder-Head. Plain, non-finned machined aluminium alloy with shallow bowl-shaped combustion chamber surrounded by 3.6 mm. wide squish band. Head secured to cylinder casing with six Allen type cap screws.

Carburettor. HP two-needle automatic mixture control type. Pressure diecast aluminium alloy body containing ground steel throttle barrel. Idling mixture needle mounted in outer end of throttle barrel. Throttle barrel moves sideways as it is rotated so that idle needle tip enters main jet as throttle is closed thereby reducing fuel flow. Low speed mixture strength adjustable by screwing idling needle in or out. Main mixture control via orthodox needle-valve assembly installed in opposite end of throttle housing. Choke bore 6.5 mm. Effective choke area 23 sq. mm. approx.



Backplate. Pressure diecast aluminium alloy secured to crankcase with four Allen type cap screws. Paper gasket.

Silencer. HP open-front extractor type with 10 mm. i.d. vent tube and 10.2 mm. rear outlet. Total escape area 160 sq. mm. Pressure diecast aluminium alloy construction with brass right-angled priming nozzle and brass outlet nipple for fuel pressurisation system.

Test Performance

Our test sample came directly from the manufacturer but had not been run-in. Running-in was carried out on a 75/25 mixture of methanol and castor-oil and followed our usual procedure of a series of short (approximately 2 minute) runs with cooling-off periods between each, starting off rich and then, towards the end of the series, leaning out to full power. A 10×6 prop was used for running-in. HP engines are supplied without glowplugs and British Taylor plugs were used for our tests.

All performance tests were carried out on our standard R/C test fuel containing 5 percent pure nitromethane, 20 percent castor-oil and 75 percent methanol. In-

cidentally, the addition of 5 percent nitromethane did not make a significant difference to the HP's performance, the speed on a 10×6 being increased by only about a hundred revs.

Atmospheric temperature at the time of testing was 18 deg.C (65 deg.F) and barometric pressure was 1016 mb (30.00 in.Hg.)

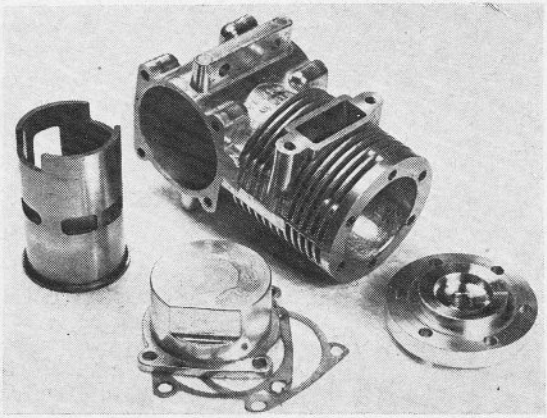
Starting and Running. There are some extremely good .40cu.in. class R/C engines on the market nowadays and starting problems are rare. The HP 40F is certainly one of the easiest engines to handle. We found hand-starting to be very good indeed, hot or cold, on all usable prop sizes. Running qualities were also very good: the 40F ran very steadily and with a rather lower than average level of vibration.

Power—Less Silencer. A gross output of 0.88bhp at 16,500rpm was determined for the HP 40F which is very close to the manufacturer's claim of 0.90bhp and is outstandingly good for a non-racing type 40 equipped with a normal R/C carburettor capable of operating on suction feed and providing fully effective throttle control.

This high power output was not achieved at the expense of low speed torque. The 40F indicated a high maximum torque of over 700z.in. and, as a result, the speeds recorded on a wide range of prop sizes were considerably better than average. For example, it pulled an 11×6 Power-Prop maple at 11,600rpm, an 11×6 Super nylon-glassfibre at 11,001pm and a 12×4 Power Prop standard at 10,900. One of the most useful sizes with this engine for R/C aerobatic work is a 10×6 and the 40F turned two Top Flite maples of this size at 12,600 and 12,800. An 11×5 Power Prop was checked at 12,400, an 11×4 Top Flite at 13,000 and a 10×5 Super nylon-glassfibre at 13,200. A 9×6 Top Flite maple was turned at 14,200 rpm.

Power—With Silencer. The open front silencer made by Hirtenberger for this engine caused no measurable loss of power over the normal operational speed range. Only when the engine was so lightly loaded as to run beyond its bhp peak, was a slight power loss recorded. As one has come to expect, however, the negligible effect on power output has to be paid for in terms of extremely poor noise suppression. One cannot honestly call this HP device a "silencer" in even the broadest sense of the term, although, as with other units of this type, it is entitled to be regarded as such for the purpose of satisfying the present totally inadequate silencer regulations.

Throttling. If the HP silencer is ineffective, one cannot say the same for the HP carburettor. This works extremely well, providing safe idling at no more than



2,400rpm on a 10×6 (and still lower speeds on larger props) with safe recovery to full speed and excellent part-throttle response, whether or not a pressurised fuel system is used.

Comment

Examined at the conclusion of our tests, the test HP 40F was found to have developed some liberty in conrod bearings but was otherwise in good condition. The performance, compared with other shaft-valve R/C 40 motors, is more than competitive, as are its handling, running and throttling qualities.