

Peter Chinn's

RADIO MOTOR

COMMENTARY

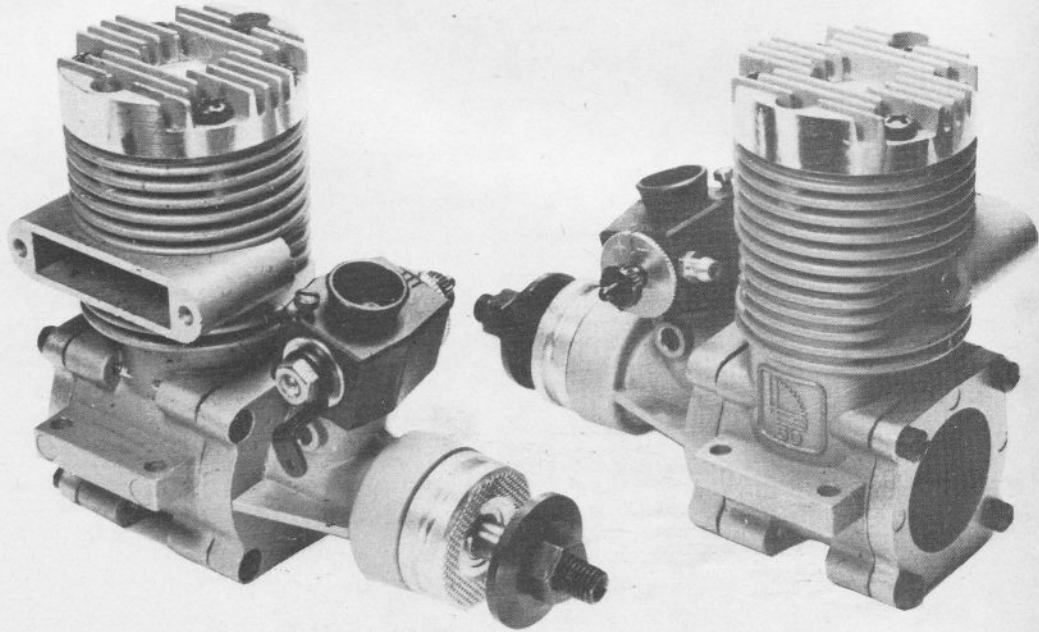
HB 40 and HB 50

Although they were announced a year ago, the German made Helmut Bernhardt HB 40 and HB 50 engines have only recently become available. Supplies are now reaching the U.K., however, and Ripmax Ltd. were kind enough to send along an example of each model for examination. Outwardly these two motors are identical in size and appearance, the only obvious distinguishing mark being the figures '.40' and '.50' embossed on their crankcases.

Where a single set of basic parts is used to serve two or more different cylinder capacities, one generally finds that the designer takes one size as the norm and adapts the other to it, rather than attempting to compromise on both models. So far as the HB is concerned, it is fairly obvious that the 50 is the primary model and that the 40 is, in effect, a sleeved down version of it.

This is apparent in the overall size and weights of the two engines and is also indicated by the bore and stroke dimensions chosen. Both engines use a 20.6 mm. stroke and, in the HB 50, this is combined with a 22.4 mm. bore to give a swept volume of 8.118 c.c. or 0.4954 cu.in. and a 'normal' stroke/bore ratio of 0.92:1, whereas in the 40 model, the 20.6 mm. stroke has meant reducing the bore to 20 mm. and a somewhat unfashionably high stroke/bore ratio of 1.03:1. Length of stroke, of course, largely dictates the overall dimensions of any engine since a long stroke calls for a longer crank-throw and thus a larger diameter crankcase, as well as a taller cylinder. The HB stroke of 20.6 mm is by no means short for a .50 cu.in. motor: for example, both the Super-Tigre ST 51 and O.S. Max 50, popular 50 size engines in the past, each used a 20 mm. stroke in conjunction with a 23 mm. bore.

The outside dimensions of the HB 50 are, in fact, very similar to those of the O.S. 50 and ST 51 and all three engines scale around 12½ oz. bare. However, neither the O.S. 50 nor the ST 51 have been used as the basis for any of the O.S. or ST .40 cu.in. models. This means, of course, that the HB 40 is rather bigger and



heavier than other .40 cu.in. front-induction motors on the market. At 362 grammes (12.8 oz.) it is, in fact, slightly heavier (by about 6g.) than the HB 50, due, mainly, to the smaller i.d. of its cylinder casing, which leaves a thicker wall.

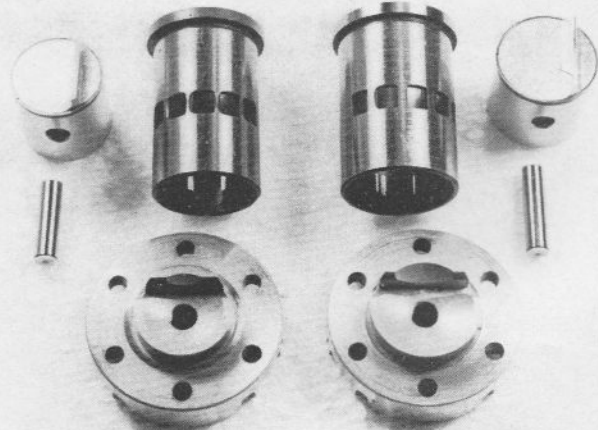
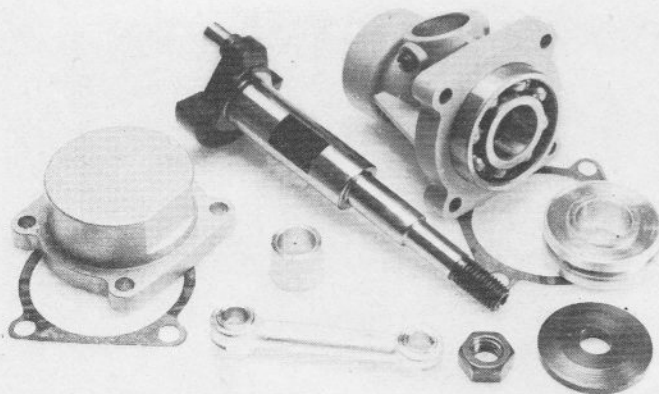
On the face of things, it would appear that the 50 may well be a more useful buy than the 40. The output claimed for the 40 by the manufacturer is 0.80 bhp at 13,000 rpm, a figure that is equalled by several other 40 R/C motors and bettered by some, whereas the claimed figure for the 50 is 0.95 at 13,000 rpm for the same overall size and fractionally less weight. Both engines are packaged less glowplug but with an HB Type 75 expansion chamber silencer. This latter is the same as that currently

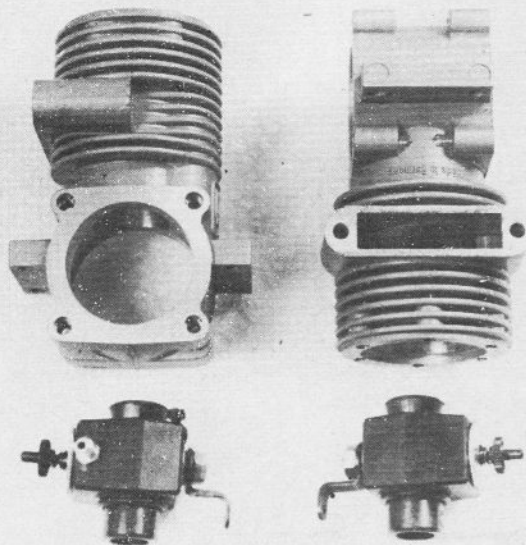
Below: the new HB 40 and HB 50 engines from the Helmut Bernhardt factory in West Germany are identical in external size and appearance.

supplied with the HB 61 and imposes a further weight penalty on the 40, pushing the overall weight up to nearly 17 oz.

In general design and construction these two new HB motors are strictly orthodox and very similar to the HB 61. They are twin ball bearing engines breathing through Perry carburettors

Below left: these HB parts, comprising the entire front end assembly plus control and backplate, are common to both the .40 and .50 cu. in. models. Below: the only difference between the HB 40 and HB50 is the size of the cylinder bore. HB40 cylinder-liner, head piston and gudgeon-pin on left. Equivalent 50 parts on right.





HB 40 and 50 use same main casting and Perry carburettor, but 50 casting and throttle choke are bored to larger internal diameter.

and crankshaft rotary-valves and with Dykes ringed pistons running in conventionally ported hardened steel cylinder liners.

The complete front end assembly is common to both the 40 and 50. The crankshaft has a 12 mm. o.d. main journal, an 8 mm. dia. front journal and a 5 mm. dia. solid crankpin. The gas passage through the shaft is a fairly generous 9.5 mm., which means that the shaft wall is only 1.25 mm. thick but, presumably, this is considered quite adequate. The shaft is counterbalanced by means of a semi-circular counterweight, augmented by cutaways each side of the crankpin. It runs in a 12 x 28 mm. 8-ball steel caged ball journal bearing at the rear and the o.d. of this projects from the bearing housing to align the complete assembly in the crankcase barrel. At the front end, the shaft is carried in an 8 x 22 mm. shielded bearing, beyond which a machined aluminium alloy prop driver is mounted on a brass split taper collet. The end of the shaft has a standard 1/4 in. 28 tpi Unified thread.

Other parts common to both engines include the crankcase backplate and the connecting-rod, the latter having a bronze bush and a large oil slit at each end. The same main casting is used for both engines, the only differences being in the external embossed figures already mentioned and the fact that the i.d. of the cylinder casing is bored larger on the 50. Cylinder heads are produced from the same die, the only differences here being in the machining of the combustion chamber. Both have bowl shaped chambers with narrow squish bands interrupted by a slot for the piston baffle.

Pistons are machined from bar stock and

have straight baffles radiussed at the root. Gudgeon-pins are fully floating, 5.0 mm. o.d. and fitted with PTFE pads. The low pressure Dykes type piston rings are not pinned since ample guidance is provided by the multiple bridged ports. The exhaust is divided into five ports and the transfer into four. Both engines are equipped with standard Perry carburetors but the throttle barrel of the 40 has a 6.7 mm. i.d. choke instead of 7.0 mm.

We hope to be able to run a full test on at least one of these two new Bernhardt engines in due course.

OPS 40SPP-RCB

It appears that the OPS 40 range has been rationalised somewhat. When it was first announced in 1973, the range included sixteen models, the result of using various combinations of parts enabling versions to be assembled with front or rear induction, side or rear exhaust, a choice of carburetors and with standard or tuned pipe port timing. However, in the latest catalogue sheets received from the OPS factory in Italy, the 40 range is reduced to six models. Should anyone wish to do so, it is still possible, with the aid of spare parts, to convert these to include most, if not all, the original options, but it seems probable that, in the present six models, OPS are covering the requirements of most of their customers. The six consist of the 40SLA-RCA (side exhaust, front induction R/C aircraft engine with Perry carburettor); the 40SLP-PYL (side exhaust, rear induction pylon racing engine); the 40SLP-RCB (side exhaust, rear induction R/C engine with flywheel for boats); the 40SPP-

PYL (rear exhaust version of 40SLP-PYL); the 40SPP-VAE (tuned pipe equipped version of 40SPP-PYL for speed work) and 40SPP-RCB (rear exhaust, rear induction tuned-pipe equipped engine for high-performance racing boats).

This latter model is shown in two of our photographs. Like all OPS motors, it has a ringless aluminium piston running in a chromed brass cylinder liner with Schnuerle porting. The main casting is turned through 180 degrees to bring the exhaust outlet above the flywheel and thus conveniently facing aft when the engine is installed in the normal direct-drive position in a hull. Induction is through a disc rotary-valve of Tufnol type material and the engine submitted for examination had a large bore OPS carburettor without the automatic mixture control of the earlier versions. This carb has a brass throttle barrel of 9 mm. i.d. and, after allowing for the short jet tube protruding into it, an effective choke area of approximately 54 sq.mm.

As on all the OPS 40 engines, bore and stroke are 21.6 x 17.8 mm., giving a swept volume of 6.523 c.c. or 0.3980 cu.in. The crankshaft has a 3/8 in. dia. main journal and, of course, is supported in two ball journal bearings. Complete with flywheel and universal coupling, the 40SPP-RCB checked out at 522 g. (18.4 oz.).

OPS 29-RCB

A development of the OPS 40 range that has had some notable success in both control-line speed aircraft and racing boats, is the OPS 29 'Speed' engine. This is available in a control-line aircraft version with plain venturi intake, rear exhaust, tuned pipe and integral spinner assembly, or in the version illustrated with flywheel, large bore OPS carburettor and a muffled tuned pipe.

This motor uses the same crankshaft, bearings, disc-valve, front and rear housings and carburettor as the 40. It is the same height, length and width as the 40 but has a revised main casting with a smaller diameter cylinder casing and a smaller cylinder head o.d. Cylinder bore is reduced to 18.8 mm. to bring the engine's swept volume to within the 5 c.c. limit at 4.941 c.c. or 0.3015 cu.in.

Checked weight of the 29-RCB examined was 508 g. (17.9 oz.) complete with flywheel and U/J coupling. The special tuned expansion chamber exhaust pipe adds a further 69 g. (2.4 oz.) to this. The pipe, of welded aluminium

Below left: new Bernhardt accessory is this small silencer for the smaller HB engines (12, 15, 20 and 25) and intended for use in scale type installations. Below: yet another Bernhardt accessory item for the HB 61 engine is this radial mount backplate. Weight 2.0 oz. including mounting bolts and nuts.

