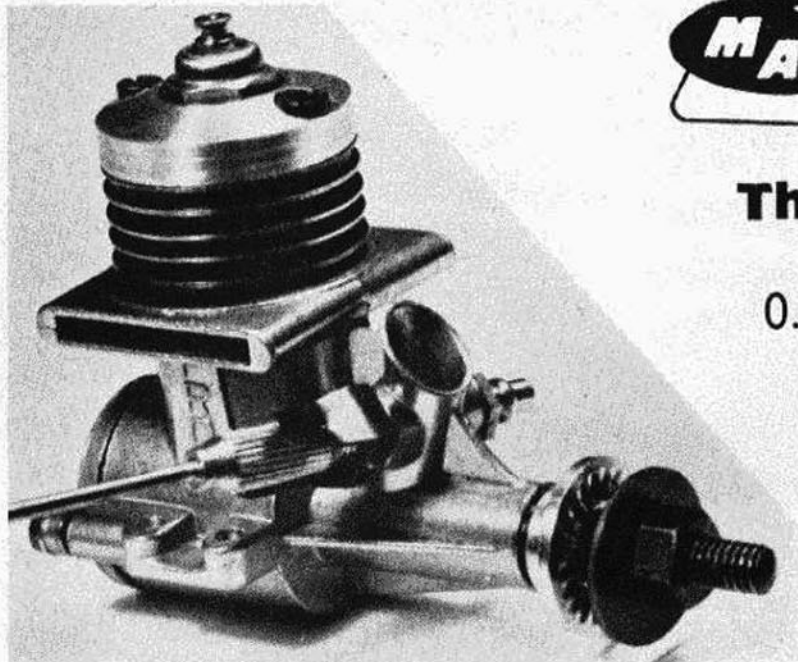




The FROG 049

0.8 c.c. Glo-plug motor

"...first of the new British "baby" glo-plug engines to reach the market."



THE Frog 049 is the first of the new British-made glowplug engines to the popular American "Half-A" size (maximum swept displacement volume 0.05 cu. in.) to reach the market.

This new model closely resembles the well-known Frog 80 diesel model (introduced nearly three years ago) and retains the 80's bore and stroke—0.400 in. × 0.392 in.—which give a swept volume of 0.0493 cu. in. or 0.807 c.c. Many of the 80 components are, in fact, identical with those of the 049 and the two engines are only outwardly different above the exhaust ducts.

The neat crankcase casting of the 80, with its integral main bearing and twin exhaust ducts, is used for the 049, as is the rear cover, crankshaft, conrod, prop drive assembly and needle-valve assembly. That the same crankshaft should be used is, perhaps, a little surprising, since it is more usual to employ a somewhat larger valve port with glow engines. Compared with the original 80, as tested in M.A. in March 1957, the 049 crankshaft valve port is, in fact, a trifle smaller—i.e. $\frac{1}{8}$ in. dia. instead of $\frac{9}{64}$ in.

A reverse-flow scavenged cylinder, featuring twin-opposed exhaust ports with fore and aft transfers, is retained. However, port design and timing are somewhat modified by comparison with the 80. Instead of slot type transfer ports, placed entirely below the level of the exhausts, dual, inclined, drilled ports are now used, which enter the combustion chamber between the exhaust ports. The exhaust ports are much larger than on the 80, being both deeper and wider, while the piston has an appreciably higher crown as well as a very slightly longer skirt. The effect of these changes on port timing is to very slightly reduce the exhaust period while

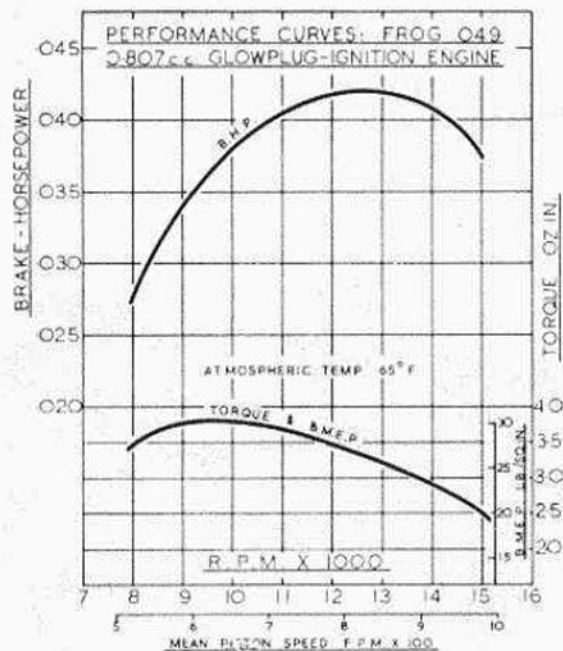
very slightly increasing the transfer period.

The cylinder of the 049 is somewhat lighter than that of the 80, having a reduced wall thickness, shorter skirt length and fewer and thinner cooling fins. Incidentally, both the main steel components—cylinder and shaft—have (evidently as a safeguard against the possible corrosive effects of some glow fuels) a blued finish instead of the plain case-hardened finish of the 80 parts.

An increasing number of small engines—especially glowplug types—are now being supplied with starting devices as a means of simplifying starting procedure for the beginner. These range from simple coil springs, which are hooked around the prop blade, to elaborate, enclosed "automatic" units with built-in clutch devices. On the Frog, the starting is of the simple pull-cord type and comprises a machined, pulley type spinner-nut (which can be fitted in place of the regular hexagon prop-nut and washer) and around which a braided cord is wound.

Pulley and cord starting on some earlier types of engines—particularly diesels—was not always encouraging. Often the starter pulleys were too small in diameter and too narrow, and cords would bind or slip or threaten to pull the engine clean out of the model. No such criticism can be levelled against the Frog 049, however. A wide, knurled section is provided for the cord and up to ten turns can be accommodated. A smart pull of the cord spins the motor over easily and with no undue strain on its mounting.

Overall dimensions of the 049 are the same as those for the 80, except for a slightly reduced cylinder height. With the standard prop nut and washer, it is also very slightly lighter



than the 80. General finish throughout is good and appearance pleasing.

Specification

Type: Single-cylinder, air-cooled, reverse-flow scavenged two-stroke cycle, glowplug ignition. Shaft-type rotary-valve induction.

Bore: 0.400 in. Stroke: 0.392 in. Swept Volume: 0.0493 cu. in. = 0.807 c.c.

Stroke/Bore Ratio: 0.98 : 1.

Weight: 1.9 oz.

General Structural Data

Tumbled pressure diecast LAC.112A aluminium alloy crankcase and unbushed main bearing with integral intake, exhaust ducts, etc. Non-counterbalanced disc-web crankshaft with $\frac{1}{4}$ in. dia. journal, $\frac{9}{64}$ in. dia. crankpin and splined prop driver fitting. Lapped, cast-iron, flat crown piston with full-floating $\frac{1}{8}$ in. dia. gudgeon-pin and forged duralumin connecting-rod. One-piece steel cylinder with integral cooling fins. Machined alloy cylinder head. Paper gaskets used to make cylinder-head and cylinder-to-crankcase joints. Entire cylinder assembly secured by two long screws from cylinder head to crankcase. Brass spraybar type needle valve assembly, inclined backward and upward. Beam mounting lugs. Provision for bulkhead mounting via two backplate screws. Dural prop drive hub. Steel hexagon prop retaining nut and washer or dural spinner type starting pulley.

Test Engine Data

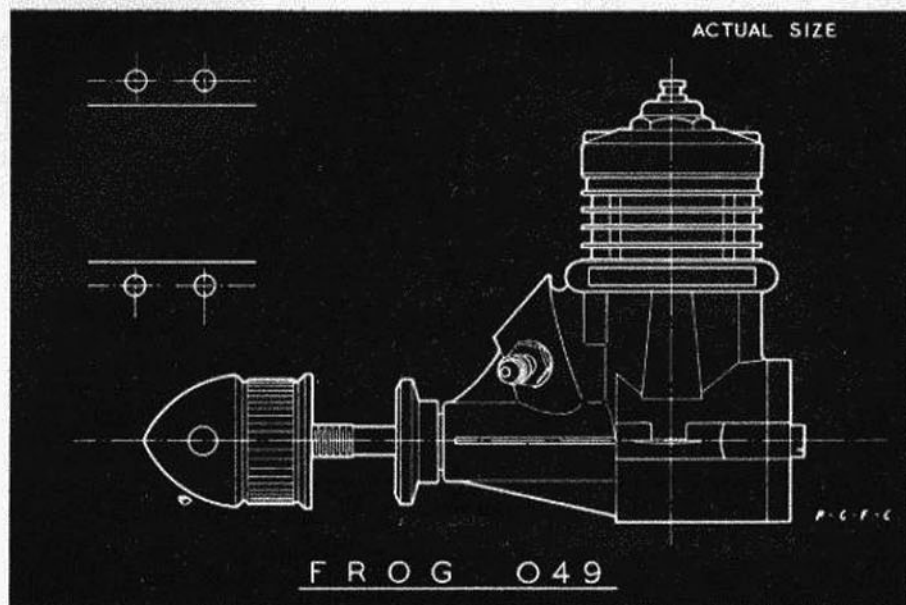
Running time prior to test: $1\frac{1}{2}$ hours.

Fuel used: Shell Red-Glow Plus.

Glowplug used: K.L.G. Miniglow-X short reach.

Performance

Starting the Frog 049 was easy, if



not particularly rapid. After priming, an initial start from cold usually required half-a-minute or so of prop flicking, using heavy duty $1\frac{1}{2}$ -volt cells. With a 2-volt accumulator (and a suitable lead length) to give a slightly brighter glow at the plug, starting appeared to be a little quicker. This, incidentally, is where the starting pulley may be of help to the beginner. Four or five pulls of the cord were usually enough to get the motor going.

Docile behaviour is clearly one of the most essential characteristics in a beginner's engine. An engine which, when the prop is flicked, rewards its owner with a cut finger, is unlikely to endear itself to the younger enthusiast. In this respect, the 049's character is blameless. Even on the smallest available commercial prop (5×3) no viciousness was encountered and attempts to provoke this condition, by deliberate clueless handling, left the 049 quite unruffled.

Although, in small engines, the shaft-valve layout usually brings the needle-valve control uncomfortably close to the prop, this is not the case with the Frog. The spraybar is raked backward at a

fairly sharp angle and this, aided by a fairly long control stream keeps one's fingers at a safe distance from the prop disc. The needle-valve itself was non-critical in operation.

Most beginner type glow 0.049's develop rather less power than diesels of equivalent cylinder capacity and the Frog was no exception to this rule, the maximum power output being 0.042 b.h.p. Bearing in mind the reservation that the performance of the average production Frog 049 may differ slightly from that obtained with a single test example, this is a little more than 30 per cent. less than for the 80 diesel, although peak revolutions were slightly higher.

The level of vibration seemed to be somewhat higher than one would normally expect of a small glow engine, but, otherwise, the motor ran evenly and consistently. At no time was there any tendency for the engine to get excessively hot. There was no loss of performance as the 049 warmed up: on the contrary, as is usually the case with a well-fitted glow motor, after adequate running-in, there was, on the lighter loads, a noticeable build-up of power, during the first 10 or 15 seconds or so after a start from cold.

The Frog 6×4 (nylon or plastic) prop, which is the maker's recommended airscrew, seems to be well suited to the 049. This, or a Trucut 6×3 , should allow revs to build up to within 1,000 r.p.m. of the peak in the air.

Power/Weight Ratio (as tested): 0.35 b.h.p./lb.

Specific Output (as tested): 52 b.h.p./litre.

The "bits and pieces" of the Frog 049

