



ENGINE TESTS

The FROG 80

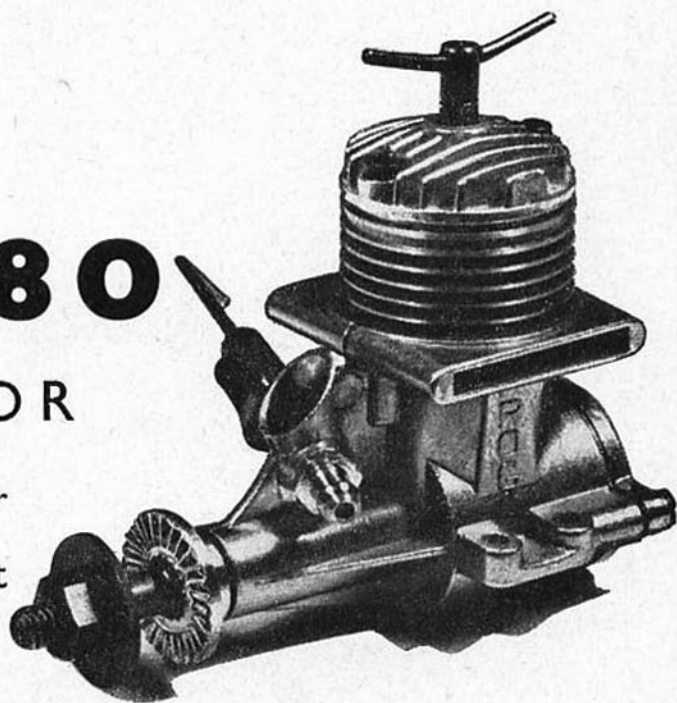
0.8 c.c. DIESEL MOTOR

THE latest entirely new British engine to reach the market is the Frog "80" diesel. This model will replace the well-known "50" model and we have no hesitation in saying that it is a better engine in every respect.

In fairness to the "50," it must be remembered that this engine was introduced at a time when several makes of 0.50 c.c. diesels were being put on the market in the expectation that this would eventually develop into a new and popular small class.

In actual fact, beyond some initial enthusiasm, the reception of the $\frac{1}{2}$ c.c. engine by the modelling fraternity was not encouraging and one of the reasons for this may well have been that $\frac{1}{2}$ c.c. diesels, as a group, are not among the easiest handling small motors and by no means the best choice for a beginner. It is a fact that diesels appear to be most successful between certain limits of capacity—which can be roughly defined as being approximately

"has a number of out-of-the-rut features"



between 0.75 c.c. and 2.5 c.c.

On the basis of power per unit of cylinder capacity, the "50" was a good performer and the "80," size for size, is no detectable improvement on this, but its starting, general behaviour and running qualities are most certainly superior to those of the earlier model.

In appearance the Frog "80" is an attractive little motor of well-balanced proportions and good finish. It is of the conventional shaft-valve, reverse-flow scavenged cylinder layout, but has a number of out-of-the-rut features.

The first of these is the synthetic rubber O-ring fitted to the contra-piston. This makes the "80" the only non-American unit to be so fitted up to the present time. When O-rings first appeared on the American McCoy and Cub diesels, some ill-conceived criticism was directed against them in this country which our personal experience forced us to refute. Now, four years later, we have no reason to change our opinion.

The main reason for the adoption of the O-ringed contra-piston in place of a ground contra-piston, is, of course, economy in manufacture. This, for no apparent reason, appears to have led to the assumption, in some quarters, that the O-ring is an inferior means of achieving the required

compression seal and/or that it wears out quickly. In fact, a well-designed O-ringed contra-piston has as good, or better, compression seal, by comparison with conventional contra-pistons, while the life of the ring is certainly at least as many hours as the most enthusiastic modeller will run his engine in the course of a whole season—added to which the ring is, in any event, a very cheap and simple replacement. In the case of the O-ring used on the Frog, the manufacturers, the Burtonwood Engineering Company, consider that the average life should, in fact, be in excess of 100 hours.

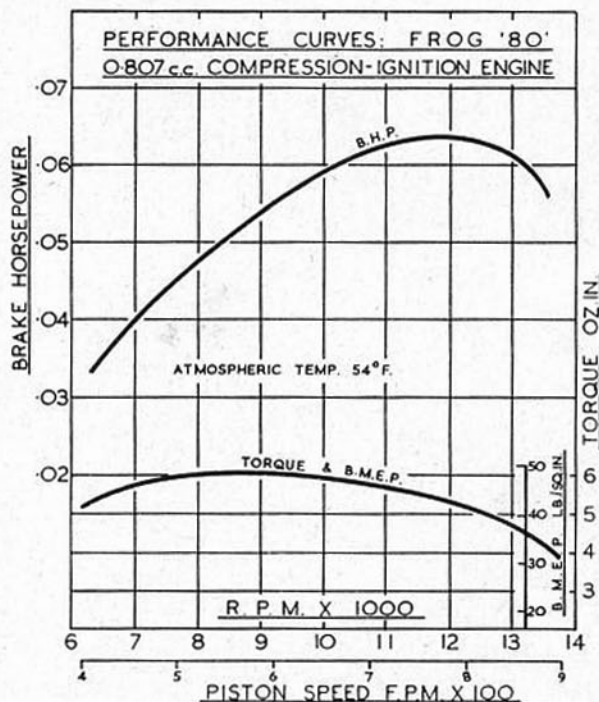
Like the American diesels mentioned, the Frog "80" also uses a non-metallic thread insert in the cylinder head (in this case of nylon) which effectively prevents the compression lever from working back with vibration—an annoying habit with some engines that sometimes results in the lever being jettisoned in flight and lost.

Other features of the motor include the short stub exhausts to aid cowled installations and the angled, right-hand needle-valve assembly. The "80" is for beam mounting, but can be adapted to bulkhead mounting via the threaded lugs which secure the backplate.

Specification

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

Swept Volume : 0.0493 cu. in. (0.807 c.c.).



Bore : 0.400 in. Stroke : 0.392 in.
Stroke/Bore Ratio : 0.98 : 1.
Compression Ratio : Variable.
Weight : 2.0 oz.

General Structural Data

Tumbled pressure-diecast LAC.112A aluminium alloy crankcase and main bearing with integral intake, exhaust ducts, etc. Disc-web crankshaft of Phoenix case-hardening steel, hardened and ground on journal and crankpin and with splined hub fitting. Brico cast-iron piston with full-floating gudgeon pin and forged dural connecting-rod. One-piece cylinder with integral cooling fins, in Phoenix case-hardening steel, hardened, ground and honed. Diecast LAC.112A alloy finned cylinder head with nylon thread insert. Cylinder components retained by two long screws into crankcase lugs. Flanged contra-piston of mild steel with Burtonwood extra-high-duty synthetic rubber O-ring. Spraybar type needle-valve with spring ratchet. Beam mounting lugs.

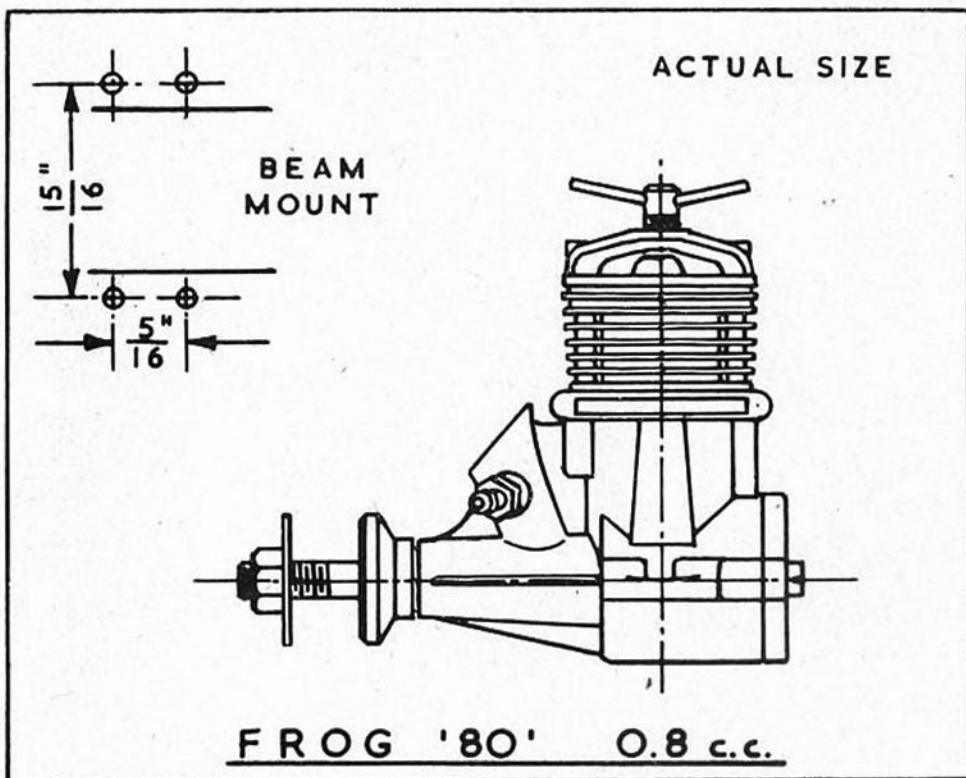
Test Engine Data

Running time prior to test : two hours.

Fuel used : 40 per cent. technical ether BSS.579, 30 per cent. kerosene, 28 per cent. Castrol "M" castor-base oil, 2 per cent. amyl-nitrate.

Performance

Starting characteristics of the "80" are good on practically all suitable prop sizes. Starting up a new engine from cold for the first time may take



a minute or so, but re-starts are quick and with no need of priming through the ports. On small props, permitting speeds up to, and over, the peaking speed, starting is still good and we detected no tendency to "bite" when so loaded.

Unlike many diesels, the "80" is notably smooth running and, after running in, the engine was outstandingly good for the manner in which it held even readings. It was, for example, run continuously for ten minutes at 13,000 r.p.m. with vir-

tually no variation in speed. While no actual consumption tests were carried out, it was also apparent that the "80" is an unusually economical motor.

Torque tests were carried out at between 6,000 and 14,000 r.p.m. and the best torque recorded was at 8,500-9,000 r.p.m. where the equivalent b.m.e.p. was 49 lb./sq. in. Torque dropped off fairly evenly but more abruptly beyond 11,000-12,000 r.p.m. so that the peak of the power curve occurred at about 11,800 r.p.m. where the output was a trifle less than 0.064 b.h.p.

The Frog "80" is, of course, in the American Half-A piston displacement class, which will inevitably invite comparison with the popular 0.049 glowplug models in this group. In such a comparison, the Frog comes out well. As one would expect of a diesel, it is heavier than the average American 0.049, but delivers considerably high maximum torque. It is a slower revving engine than the glow Half-A's, but offers superior power up to its peak r.p.m. Obviously, the "80" will be best on slightly larger props than the usual Half-A sizes. The 6 x 4 can be regarded as the smallest practical size, the preference being for a 7 x 3 or 7 x 4 for most F/F applications.

Power/Weight Ratio (as tested) : 0.51 b.h.p./lb.

Specific Output (as tested) : 79 b.h.p./litre.

