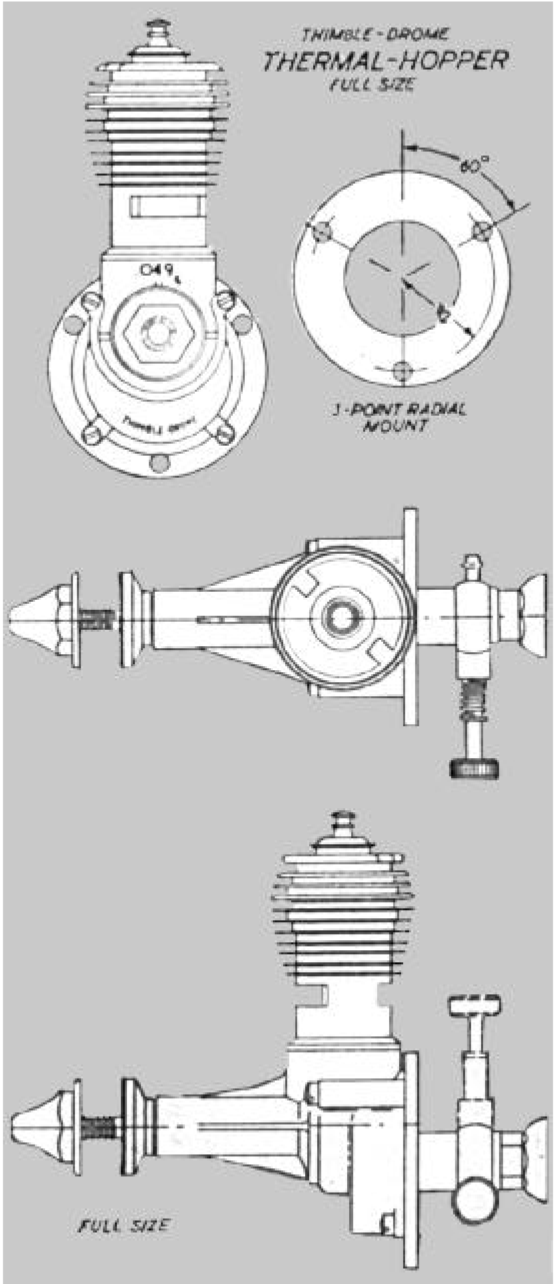
A Review by RON WARRING
Of the First Commercial

REED VALVE MOTOR

THERMAL HOPPER

049 cubic inches (·82 cc's.)



THE Thermal-Hopper came in for test with quite a reputation behind it. In the first place it is a novelty from the design point of view in employing crankcase induction controlled by a reed valve. In the second place quite fantastic r.p.m. figures are claimed by the manufacturers and, thirdly, it is claimed as the fastest starting engine in its class. Like the majority of American production engines it has glow plug ignition.

Now, after handling diesels the absence of "feel" with a typical glow engine is disconcerting. There is often little appreciable compression pulling the cylinder past top dead centre and so starting is usually a case of "it or it doesn't." Diesels are not too fussy about fuel mixtures. Glow motors, on the other hand, often are. In this particular case we used standard British commercial fuels (Mercury Nos. 4, 5 and 7), whereas the manufacturers specifically recommended Thimble Drome fuel.

This preamble is all leading up to the fact that we first found the Thermal Hopper a little horror to start—on dry batteries. We exhausted one U 14 cell in the process without getting any consistency in starting—1.5 volts did not produce a hot enough element for the British fuels used.

Lacking time—and patience—at this stage, we changed over to an accumulator for a booster battery and we had, believe it or not, "the fastest starting glow motor in ist class." Just that simple difference in technique, but what a change it produced.

Unfortunately the 1.5 volt glowplug just will not stand up to 2 volt loading and so, as has happened several times before, the plug burnt out in the middle of the tests. In the Thermal-Hopper the element is made as part of the detachable head.—not in the form of a conventional glow plug, and so a burnt-out element means a replacement head—cost to an American modeller 65 cents, or about four shillings. It means, however, that a British modeller operating the Thermal-Hopper cannot replace an American glow plug with a British type designed to take 2 volts.

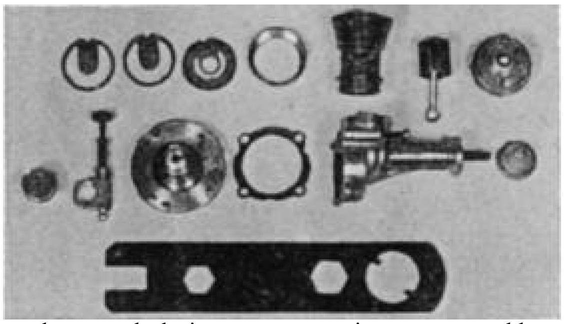
Actually it is quite a simple matter to „drop" half a volt between an accumulator and 1.5 volt glow plug. The Thermal-Hopper element actually takes a fraction under 3 amps. of current. To "drop" 0.5

volts from a 2 volt battery requires a resistance in series between battery and plug of 16 ohms, which can be done by using leads from the battery of the right size and length to give this resistance, or incorporating a resistance coil of this value in one of a pair of short, low resistance leads.

Having so far had little but certain criticism of the Thermal-Hopper, now to offer words of praise. It is a really first-class production job, light and compact. Furthermore there is no doubt at all that the extremely high r.p.m. figures claimed by the manufacturers can be achieved. Our own test figures produced rather low values because only the one size of American propeller was available (6 x 3) and the fuels used did not, obviously, approach the ideal for this particular motor, which has a particularly high compression ratio. Stant propellers used for the other test. runs have blades appreciably thicker (and thus higher drag), than those of the American counterpart. It was noteworthy that the engine did not run so well with oversize propellers, i.e. at lower speeds.

The fact that the Thermal-Hopper is such a high speed engine introduces other problems. The engine itself appears nicely balanced, with a lightweight piston and "floating" ball and socket little end bearing. A crescent shaped balance is machined onto the crankshaft disc. this disc also being tapered in thickness, presumably again to assist high speed running. Unless an accurately balanced propeller is used, however, vibration is very bad. Suitable propellers must, obviously, be individually balanced on knife edges before use—a point which is stressed in the manufacturer's leaflet—and the small propeller shaft size (1/8 in. diameter) really demands that suitable Propellers must have this size hole drilled through the hub—and not a larger one—as a' starting point.

The most interesting design feature of the Thermal-Hopper is undoubtedly the reed valve system employed for induction. This assembly is contained in a 0.7 inch diameter housing—of appreciable larger diameter than the crankshaft disc and thus accounting for the swelling at the rear end of the crankcase. The principle employed is extremely simple. The intake tube finishes as a hole in the centre of the crankcase backplate whilst the metal reeds are held over this hole, acting as a spring loaded flap valve, opening on internal suction to allow fuel mixture to enter the

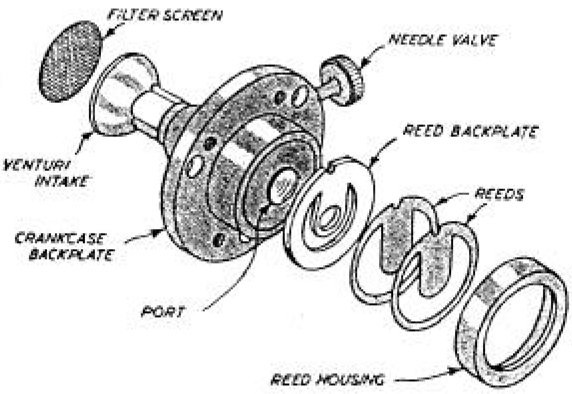


crankcase and closing on compression to prevent blow back and produce the necessary crankcase compression to transfer the inducted mixture to the cylinder head.

Needless to say the reed valve assembly is a critical part of the engine. Being so simple there is little that can go wrong with it, except perhaps a spot of dirt or grit getting under the reeds and preventing them closing properly. The risk of this happening is minimised by a filter screen fitted to the open, venturi-shaped end of the intake tube.

Like most modern American motors, radial mounting is employed on the *Thermal-Hopper*, mounting flange diameter being quite generous and with just. enough material to ream out the three mounting holes to take British size 6 BA screws. As mounted, however, the intake tube projects beyond the mounting flange, hence necessitating an open compartment behind the bulkhead or former acting as the mount to reach the needle valve and the end of the intake tube.

One very welcome feature of the *Thermal-Hopper* is the fact that it requires little or no running-in period. One – minute's rich running is adequate, say the manufacturers, which undoubtedly will appeal to those modellers who like to mount a new engine straight into a model. This characteristic is achieved by producing to extremely close tolerances, with precise fitting and fine finishes on all wearing surfaces. In other words the necessity for running-in is eliminated by the production technique involved. The proof of this lies in the fact that new engines will speed up to revs. in excess of 16,000 r.p.p. right away—which can be considered as a very real tribute to a most interesting small motor design.



Speed Tests

6x3 American Wood Propeller, Mercury No. 5 Fuel—16,250.

Stant Wooden Propeller—Mercury No. 5 Fuel as below.

6"x3"	6"x4"	6"x5"	6"x6"
15,500	14,700	12,600	inconsistent

Specification

Displacement:	.0499 cu. in. (.82 c.c.)
Bore:	.406 in.
Stroke:	.386 in.
Bore/Stroke Ratio:	1.05
Bare Weight:	1.35 ounces
Manufacturers:	L. M. Cox Manufacturing Co., Inc., Poinsettia P.O. Box 476, Santa Ana, California, U.S.A.