

# The Cox TEE-DEE .049

.8 c.c. Glowplug motor

"... the quite  
phenomenal b.h.p.  
of 0.145 at  
21,000 r.p.m."



**S**ELDOM has one manufacturer introduced, simultaneously, a range of so many interesting new motors as did the Cox Manufacturing Company when they announced their new "Tee-Dee" line of 0.010, 0.020, 0.049 and 0.15 cu. in. motors earlier this year. The incomparable .010 (M.A. Engine Tests, June 1961) captured the imagination of all modellers by its tiny size and fantastic operating speed; the .15 (M.A., September 1961) has been the immediate choice of a larger number of F/F contest modellers from far and wide and one of them won this year's F/F World Championships in Germany. The .049, the subject of our present report, is no less an achievement by the Cox design staff and is already well on the way towards putting the "Cox name back in the forefront of "Half-A" contest flying.

The .049 should be of particular interest to British F/F enthusiasts at the present time, in view of the increasing attention now being given to "Half-A" contests. British "Half-A" rules allow engines of up to 0.85 c.c. and it is worth noting here that this will also permit the use of the Cox .049's new companion model of 0.051 cu. in. (0.835 c.c.). The .051 is a slightly over-bored (0.004 in.) version of the .049 and was introduced to enable, by means of interchangeable engines, a single model, or model design, to be used in American class "A" as well as "Half-A" contests.

Just how far the Tee-Dee .049 is ahead of average 0.8 c.c. engine performance is seen in our performance curves. For those who find prop r.p.m. figures easier to understand,

however, it is perhaps, worth quoting a few r.p.m. figures that were obtained with a typical "sport" type 3, for comparison, on the same props, after the T-D .049 tests. These were as follows: 7 x 4 Power-Prop 8,500 (Tee-Dee 11,500); 7 x 3 P.A.W. 9,250 (Tee-Dee 12,400); 7 x 3 Top-Flite 9,850 (Tee-Dee 13,000); 6 x 4 Top-Flite 11,700 (Tee-Dee 16,000); 6 x 3 Top-Flite 14,000 (Tee-Dee 18,300); 5 1/2 x 3 Tornado 14,600 (Tee-Dee 19,800); 5 x 3 KK Nylon 15,000 (Tee-Dee 21,900). Just for the record, it is worth remembering that to obtain the 4,300, 5,200 and 6,900 r.p.m. increases represented in the three last pairs of figures requires h.p. increases of approximately 122 per cent., 148 per cent. and 211 per cent. Fantastic as it may sound, this is hard fact.

The general design of the Tee-Dee .049 closely follows that of the Tee-Dee 15 and, of course, is unlike previous Cox contest .049's in that it employs shaft induction instead of the reed-valve system used with so much success on the Cox "Hopper" series and widely copied elsewhere. In order, therefore, not to repeat, in detail, a description of the basic design which

applies to the other Tee-Dee models already described in MODEL AIRCRAFT, we will recapitulate only the main points and then note the details and dimensions applying specifically to the .049.

Briefly, the Tee-Dee is distinguished by an unconventional design of shaft induction with a very large rectangular valve aperture and shaft port and a large accumulator chamber between the carburetor and induction valve. The carburettor has triple peripheral jets and includes a well designed needle-valve, the adjusting knob of which can be located in several different positions, left or right, to suit individual model installation. The cylinder is typically Cox with twin opposed exhaust ports and two internal transfer flutes positioned between them, giving well advanced transfer timing.

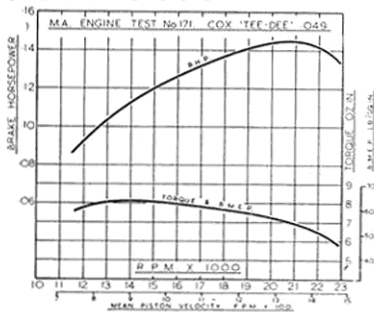
While the cylinder components of the Tee-Dee .049 closely resemble those of the previous Thermal Hopper and Space-Hopper .049 engines, there are a number of changes. The transfer flutes have been slightly enlarged and the former hemispherical type cylinder head has been replaced by one with the curvature reversed—in other words it is now a "belled" conical shape.

Reverting to the all important induction system, the crankshaft has a diameter of 9/32 in., permitting a 3/16 in. gas passage and the crankshaft port, 11/32 in. long, is the largest to date on a "Half-A" motor. This latter, registering with a 3/8 in. wide intake aperture in the plain main bearing gives a valve timing of 50 deg. ABDC to 45 deg. ATDC.

Like other current Cox engines, the Tee-Dee .049 uses no castings, all metal parts being machined. These engines are, of course, manufactured by highly advanced production techniques and the accuracy and finish of individual parts are to extremely high standards.

## Specification

Type: Single-cylinder, air-cooled, reverse-flow scavenged two-stroke cycle, glowplug ignition. Crankshaft type





rotary valve induction with sub-piston supplementary air induction. Provision for rotary-valve timed pressurised fuel system.

Bore: 0.406 in. Stroke: 0.386 in.  
Swept Volume: 0.499 cu in.—0.817 c.c. Stroke/Bore Ratio: 0.951:1.  
Weight: 1.5 oz.

#### General Structural Data

Crankcase and main bearing sleeve machined from extruded aluminium alloy bar with screw-in rear cover. Hardened and ground steel crankshaft with crescent counterbalance, 9/32 in. dia. divided main journal and 7/64 in. dia. crankpin. Shaft end knurled for pressed-on gold anodised alloy prop driver and tapped for prop retaining screw. One-piece non-hardened steel cylinder, blued on external surfaces and screwed into crankcase. Lightweight steel piston with ball and socket joint to hardened steel connecting-rod. Screw-in alloy cylinder head with integral glow filament and seating on soft copper gasket. Moulded front housing and carburettor boss secured with alloy lock ring. Screw-in carburettor intake with gold anodised reversible needle-valve body having steel thread insert for blued steel needle. Beam mounting lugs.

#### Test Conditions

Running time prior to test: 1 hour.  
Fuel used: KK Record Super-

#### The parts of the Cox Tee-Dee .049.

Nitrex (30 per cent. nitromethane).  
Air temperature: 67 deg. F.  
Barometer: 29.7 in Hg.

#### Performance

The Tee-Dee .049 was very definitely much happier when allowed its head—in other words, when permitted to turn at least 17,000 r.p.m. This is not to say that the engine lacks power when loaded for lower speeds. One of the remarkable features of the .049's performance is its ability to turn comparatively large props (e.g. 7 × 4, 7 × 3) faster than any other engine of similar capacity. However, it is apt to become a trifle uneven and for r.p.m. to wander slightly on such props, whereas it smooths out at above 17,000 and is absolutely rock steady at speeds around the b.h.p. peaking speed of 21,000 r.p.m. The fastest we had the .049 turning was 23,000 and it seemed quite prepared to go on at this speed indefinitely.

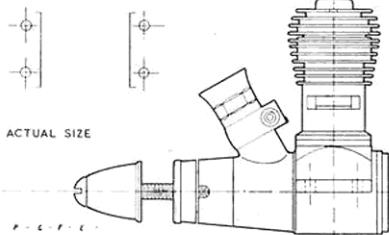
Starting, we thought, was not quite as foolproof as with the reed-valve Space-Hopper but was, nevertheless, good, irrespective of prop size. Port priming was used for cold starts but the Tee-Dee re-started readily even on the smallest props, when warm, following intake choking only. The needle-valve was positive in operation, easy to adjust and its sensible ratchet device held all settings firmly.

The actual torque developed by the Tee-Dee .049 was the highest yet recorded in this series for a 0.8 c.c. engine and reached a maximum of 8.1 oz. in. at around 14,000 r.p.m., equivalent to a brake mean effective pressure of approximately 64 lb./sq. in.—a figure which, a few years ago, would have seemed impossible with a Half-A glow engine. The decline of the torque curve was at an almost constant ratio up to 20,000 r.p.m. and resulted in the quite phenomenal b.h.p. of .145 at 21,000.

All these figures were obtained on Record Super Nitrex fuel which, containing 30 per cent. nitromethane, gives similar performance to the maker's own recommended blend, TD Racing Fuel. Power is, of course, quite appreciably reduced on ordinary low-nitro, or "straight" glow fuels.

Power/Weight Ratio (as tested): 1.55 b.h.p./lb. Specific Output (as tested): 177 b.h.p./litre.

#### COX TEE-DEE .049



## LATEST ENGINE NEWS

Continued from page 383

pressure feed, bigger intake passages and, sometimes, raised compression ratios) the differences between combat and stunt versions of the Super-Tigre C.35 mark quite a different approach.

In the C.35 combat the entire induction system is exactly the same as the stunt engine—the main casting is unaltered, the same venturi insert with its moderate 4.5 mm. bore, the same crankshaft—all are retained. Instead, a new cylinder liner, piston and cylinder head are used. In place of the conventionally ported cylinder and deflector

piston of the stunt engine, a porting system similar to the revolutionary Super-Tigre G.20 Jubilee with flat crown piston is employed, the only difference being that the exhaust opening does have a slight lead over the transfer instead of being symmetrical as in the G.20. The cylinder head, on the other hand, is different from both the G.20 and the C.35 stunt and is of the squish-band type, rare in model engines.

This is interesting because, for the first time, it gives us the chance to compare, performance-wise, a conventional baffle piston, normally ported cylinder with the unique porting system (admittedly slightly varied) which has

been so successful in the G.20 Jubilee. We hope to offer some results of comparative tests in due course.

*Pocket test reports:* Fox Rocket .35, 1961-62 version: only slightly more power than original Rocket but more docile. Fox 40: exceeded expectations, thirty per cent. more power than the above for thirteen per cent. greater capacity. Dynamic 049: peppiest diesel .8 to date, if not the easiest starting. K. & B. 35C: a good engine and a hot one, score three plugs. O.S. Max 29X: another hot one, score: 1 shattered 9 × 4 wood prop.