

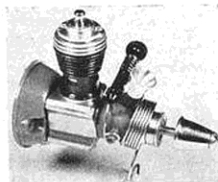
# The COX TEE-DEE .010

## 0.16 c.c. Glowplug motor

"... not just a novelty, but strictly practical power unit of outstanding design and beautifully made"



The photo below shows the motor approximately life size!



THE new Cox "Tee-Dee" .010 is the smallest internal combustion engine at present in production anywhere in the world. With a piston displacement of 0.0097 cu. in. or 0.1633 c.c. it is only half the size of Cox's previous baby engine, the "Wee-Wee," or one-fifteenth of the capacity of the popular 2.5 c.c. international class engine.

There have been engines of similar small capacity in the past. Over 15 years ago, Allouchery in France made a few examples of a small three-port diesel having a bore and stroke of 5 mm. x 8 mm. (0.157 c.c.) and in 1954, Davies-Charlton introduced the 0.154 c.c. Bambi diesel, since discontinued. The smallest available British engine at the present time, is the hand-made Dragonfly diesel of 0.15 c.c. The Tee-Dee .010 is certainly the smallest-ever production glow engine, however, and, so far as weight and overall size is concerned, can also justly claim to be the world's smallest, irrespective of type, ever produced.

As supplied, the Tee-Dee .010 comes complete with bulkhead mounting fuel tank unit, which can be replaced, if desired, with a smaller diameter radial

mount (also supplied), with a 3 in. x 1 1/2 in. prop. spring starter and a combination spanner which fits the glowhead, cylinder, carburetor venturi and front housing locking ring.

The design of this new Cox model is interesting in that it closely follows that of the larger Tee-Dee series motors. It is, in fact, almost identical in design and construction, to the new Tee-Dee .15 contest engine, despite the immense difference in size. It is seldom that a common basic design is equally successful in both large and small sizes but the Tee-Dee is a most notable exception.

Construction is based on a typical Cox type all-machined crankcase unit that starts life as a piece of special section extruded bar stock aluminium alloy. This has a nose section forming the main bearing in which the induction aperture for the shaft type rotary valve is produced by a milled cut straight across the top. Connection between this and the carburetor is effected by means of a special moulding which forms a collar completely encasing the bearing. This has a threaded boss into which the carburetor venturi is screwed and is retained by a locking ring screwed on the front end of the bearing.

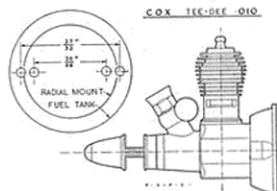
By virtue of this highly original design, an accumulator chamber is formed between the carburetor and rotary valve to aid rapid and unrestricted induction through the generous rectangular crankshaft port.

Big diameter crankshaft journals are a feature of these new Tee-Dee series front-induction Cox engines, allowing very large bore intake passages.

Multiple peripheral jet carburation has been a feature of Cox engines for a number of years and, notwithstanding the diminutive size of its carburetor intake, the .010 continues this tradition. The carburetor has three tiny jets, spaced at 120 deg. intervals, leading into the venturi throat and drawing fuel from a channel on the outside. This channel is fed from a collar surrounding it, which is an integral part of the needle-valve body. The only difference between this and previous Cox engines using the same system, is that the needle-valve body is all steel instead of alloy with a steel thread insert.

The cylinder and piston assembly is typically Cox and is produced by this manufacturer's highly developed techniques, in which tolerances are held to within a few millionths of an inch, under strictly controlled working temperatures. The cylinder, with opposed exhaust ports and twin internal transfer flutes, screws into the top of the crankcase. It is topped by an alloy head with cone shaped combustion chamber and built-in glow filament. The piston has a hardened skirt and couples to a hardened connecting-rod via a ball joint.

The crankcase backplate and radial mounting unit is a moulding of unspecified material. This is more rigid than nylon and is presumably of one of the new American high-strength materials that are completely inert to all fuels, of very high tensile strength and able to withstand considerable heat without distortion or deterioration. Similar material is used for the front casing and the fuel tank. The backplate has a central boss which plugs into the rear of the crankcase and is secured by four screws. The alternative mount, with integral fuel tank, resembles a lengthened version of the back-plate mount, has filler, vent and delivery pipes



Actual Size.

moulded in and is sealed by a moulded rear cover secured with a single central screw. Incidentally, the front casing has a pressure nipple moulded in, as on the larger Tee-Dee models, for provision for a high pressure fuel system. As supplied, however, this is not drilled out and merely serves as an anchor for the starter spring.

#### Specification

Type: Single-cylinder, air-cooled, reverse-flow scavenged two-stroke cycle, glowplug ignition. Crankshaft type rotary-valve induction. No sub-piston supplementary air induction. Provision for high pressure fuel pressurisation system via rotary valve.

Bore: 0.237 in. Stroke: 0.226 in. Swept Volume: 0.009967 cu. in. or 0.1633 c.c. Stroke/Bore Ratio: 0.954 : 1. Weight: 0.5 oz. including starter but less fuel tank (0.6 oz. with tank).

#### General Structural Data

Crankcase and main bearing machined from extruded aluminium alloy bar and colour anodised gold. Counter-balanced, hardened steel crankshaft with divided 0.162 in. dia. main journal and  $\frac{1}{16}$  in. dia. crankpin. Shaft end knurled for pressed-in prop driver and tapped for prop retaining screw. One-piece, non-hardened steel cylinder with integral cooling fins blued on non-working surfaces and screwed into crankcase. Steel flat crown piston with hardened skirt and socket joint to hardened steel connecting-rod. Screw-in alloy cylinder head seating on soft copper gasket and with integral glow filament. Moulded main bearing housing and carburettor boss secured with alloy lock ring. Screw-in alloy carburettor intake with blued steel needle-valve body and needle. Coil spring tension device on needle-valve. Interchangeable moulded radial mount and tank mount units. Starter spring fitted as standard.

#### Test Engine Data

Running time prior to test: 15 min. Fuel used: Record "Super Nitrex" (50 per cent. nitromethane).

#### Performance

We had expected the Tee-Dee .010 to be somewhat sensitive to starting technique—if not a trifle tricky. In

fact, it proved remarkably easy. Port priming from a cold start was accomplished by dribbling some fuel onto the fins with the piston raised. The quantity of fuel that found its way into the cylinder as the ports were opened was just about right and use of the starter spring soon brought the .010 to life. Like all Cox engines, practically no running in is necessary before the engine can be allowed maximum revs.

The Tee-Dee .010 is unquestionably the world's fastest revving piston engine in terms of normal operating speed. With the 3 in. prop supplied, the makers quote a speed of 27,000 as being obtainable on Cox Racing Fuel. On the day of our test, our .010 maintained a steady 26,400 r.p.m. using Super-Nitrex, but has, on other occasions, reached nearly 28,000 on the same prop and fuel. The fastest speed at which we have run the engine (with reduced load) is in excess of 30,000 r.p.m.

Such speeds can be measured quite satisfactorily with a suitable and accurate stroboscope or frequency meter. Measuring torque, for the purpose of determining torque and b.h.p. curves, however, is more of a problem with such a tiny engine—one really needs to build a

special miniature dynamometer for the job! An indication of the course of the torque curve was obtained with our normal equipment but the engine was using such a tiny section of the torque scale that it was decided to abandon the attempt to determine true performance curves. It was observed, however, that maximum torque was developed at a speed in excess of 20,000 r.p.m. and indications were that the Tee-Dee .010 does, in fact, deliver its peak horsepower in the region of the speed at which the standard prop is turned. It was also clear that on a basis of power per unit of piston displacement, the .010 is on a par with its larger contest brothers.

All other commercial props currently available are, of course, too big for the .010 but our test model was checked on a 4 in. Bambi metal prop and on a 4½ in. metal prop supplied for the Dragonfly. Respective speeds were 13,400 and 17,500 r.p.m. Running qualities were without fault. At all speeds from about 12,000 r.p.m. upwards, the Tee-Dee .010 ran smoothly and steadily. There was no tendency for r.p.m. to wander and the exhaust note was crisp and clear.

Prolonged tests were carried out on the .010 and it is obvious that this is not just a novelty item but is a strictly practical power unit of outstanding design and beautifully made.

Cox engines are distributed in Great Britain by E. Keil & Co., and A. A. Hales Ltd.

## CONTEST CALENDAR

June 24-25th	F/F TRIALS, FAI Rubber/Glider/Power. Centralised.	Aug. 20th	Devon Rally, Woodbury Com. Open R/G/P, "J-A" Power, Combat.
July 2nd	Northern Heights Gala, Milton.	.. 27th	I.R.C.M.S. Annual R/C Contest, Wellesbourne. Single, Multi and Scale.
.. 9th	C/L SPEED. Centralised.	Sept. 1-3rd	WORLD CHAMPIONSHIPS, F.F. Germany.
.. 15-16th	F/F TRIALS, FAI Rubber/Glider/Power. Centralised.	.. 10th	NORTHERN GALA GLIDER. U/R Glider. HAMLEY TROPHY, U/R Power. CATON TROPHY, U/R Rubber. RIMAX TROPHY, R/C Rubber only.
.. 23rd	Ashford C/L Rally, Victoria Park, Ashford, Kent. Combat and FAI, T/R.	.. 17th	Croydon Gala, Chobham Common, R/G/P/J/A.P.
Aug. 7th	INDOOR WORLD CHAMPIONSHIPS, R.A.F. Cardington.	.. 24th	"KEIL TROPHY (PLUGGE), U/R Team Power. Area.
.. 13th	SPEED. Centralised.	.. "	"FROG JUNIOR TROPHY, U/R Rubber/Glider, Area.
.. "	Novocastria M.A.S. Rush Trophy Gala. Open R/G/P, "J-A" Power, Combat.	.. "	SPEED. Centralised.
.. "	St. Albans Gala, Chobham Common, R/G/P, "J-A" Power. Slope Soaring, R/C single spot landing.	Oct. 1st	15th Coast Gala. Venue to be announced.
.. 20th	SCOTTISH GALA. U.K. CHALLENGE MATCH, Abbotsinch. KLM TROPHY, U/R Power. CMA TROPHY, U/R Rubber.	.. 8th	"J-A" Power.
.. "	GLIDER, U/R Glider. TAPLIN TROPHY, R/C Rubber only. TEAM RACING, Class "A" and "B".	.. "	"FARROW SHIELD, U/R Team Rubber, Area.
.. "	T.C. M. ROBERTS CUP for Flying Boats, Dartford Heath. Full details from I. Bittle, 3, Spring Vale, Bexleyheath, Kent.	.. 15th	TEAM RACING, Class "J-A" "A" and "B".
		.. 22nd	AREA CHAMPIONSHIPS.
		.. 22nd	FROG SENIOR CUP, U/R Power. Decentralised.
		.. "	CMA CUP, U/R Glider. Decentralised.
			15MAE sanctioned contests. SMAE events in capitals. *Plugge Cup events