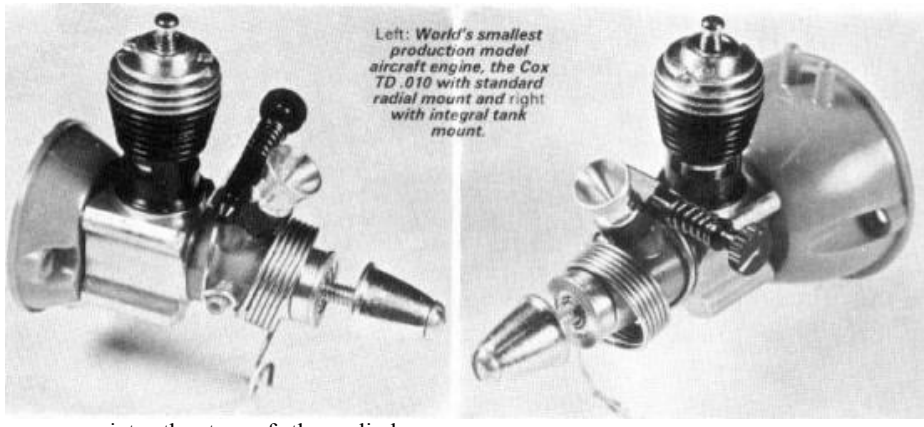
COX TEE-DEE .010

Country of Origin: USA.
Type: Glowplug ignition, shaft rotary-valve with plain bearing. Fuel tank included.
Bore: 0.237in (6.02mm).
Stroke: 0.226in (5.74mm).
Swept Volume: 0.00997cu in (0.1634cc).
Weight: 13 grammes-0.46 oz (less tank); 15.3 grammes - 0.54 oz (with tank).



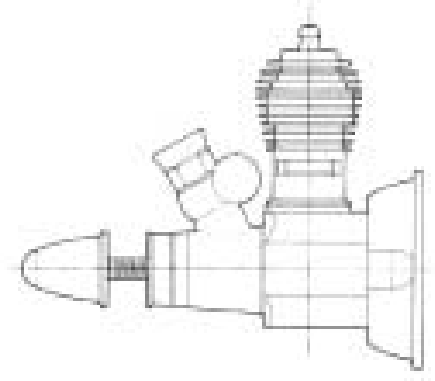
The first full report on this engine was published in Model Aircraft July 1961 issue. The Cox .010 has the distinction of being the world's smallest production internal combustion engine at the present time. As supplied, it comes complete with a bulkhead mounting fuel tank and also with a smaller diameter radial mount which can be used instead if a separate fuel tank is to be fitted. Also supplied is coil-spring starter device and a special 3 x $1^1/_4$in moulded prop.

The design and construction of the engine closely follows the other current shaft-valve Cox engines: TD .020, .049, .051 and .09. The crankcase is machined from extruded aluminium alloy bar, complete with a nose section that forms the unbushed main bearing. The latter is encased in a moulded plastic housing that includes the intake boss into which is screwed a machined aluminium alloy intake venturi and steel needle-valve assembly. The case-hardened counter-balanced crankshaft has a large rectangular valve port which registers with an equally large rectangular intake port.

The one-piece machined steel cylinder screws into the crankcase, has two diametrically opposed exhaust ports and, between them, two internal flute type transfer ports. The flat-crowned steel piston is case hardened on its outer skirt surface only and is coupled to a hardened steel connecting-rod. by means of a ball and socket joint. The cylinder-head is of the "glow-head" type, containing an integral glow element (rather than a separate glowplug) and screws into the top of the cylinder, seating on a soft copper gasket.

Very small engines can sometimes be very tricky to operate, but this is certainly not the case with the TD .010, provided that one uses a little common sense. One could, for example, very easily flood the engine simply by trying to prime through the exhaust port for a cold start. We found it best, therefore, to dribble some fuel onto the outside of the cylinder with the piston closing off the exhaust ports. Just about enough fuel then found its way through the ports, when the piston was lowered, to secure a quick start with the aid of the integral starter spring. The starter spring, incidentally, does give more positive results than simply flicking the prop.

Dynamometer tests were not undertaken with the .010, since it was just a trifle too small for really precise torque measurements to be determined with our standard equipment, which is calibrated for various sizes of engines from approximately 0.5cc upwards. No problems were encountered in measuring the .010's prop speeds, however. Using a fuel containing 30 percent nitromethane (a fairly high nitro content is necessary) our test motor achieved 27,400 r.p.m. on the Cox 3 x $1^1/_4$in prop supplied and this appears to be quite well matched to the engine's peak output. Few, if any, other commercial props are suitable for the little .010. For example, the engine was found to be capable of turning a $4^1/_2$in x 3 TopFlite wood prop but this loaded it down to a mere 10,800 r.p.m. The .010 is obviously at its best when lightly loaded for speeds in excess of 20,000 and we found it to be capable of running smoothly and steadily at over 30,000 r.p.m.



The TD .010 is not an engine that we would recommend to a raw beginner because of its tiny dimensions, it could all too easily suffer damage at the hands of a totally inexperienced user, but it is, nevertheless, a completely practical miniature power unit and a fascinating example of the model engine designer's art.