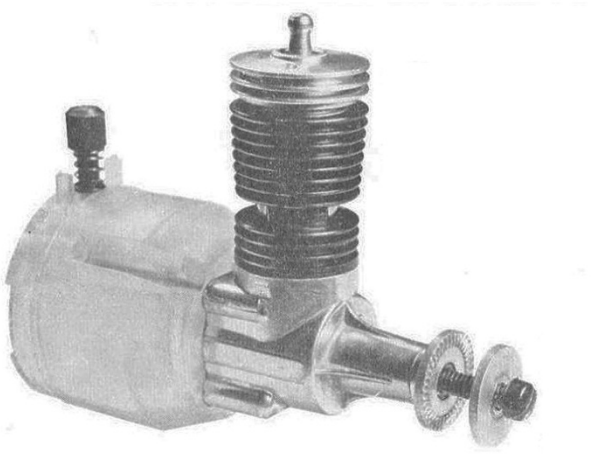
K&B Tornedo .049



As near to the ideal beginner's engine as anything yet offered……

From time to time, an engine is received for test which, in some particular way, proves outstanding, perhaps to the extent of setting a new standard for subsequent comparison.

Such an engine was the K & B Tornado 049, for, out of the hundreds of model engines which we have handled, we have never encountered one which is simpler to start than this American 0.8 c.c. glow motor. In fact, we are sorely tempted to suggest that this engine could justly claim to be the world's easiest flick-starting model engine to date. Certainly it is just as quick starting as the better starter-equipped beginners' engines.

Only by reason of its inherent easy starting qualities, in fact, did the Tornado 049 gel into production at all. The engine was designed, not for the general model market, but to a rigid specification laid down by the Aurora Plastics Corporation, who wanted an engine for their then impending entry into the ready-to-fly toy field: an engine that could be guaranteed to respond to totally inexpert handling without the aid of slat ling devices. It was only after the engine had been built in several tens of thousands for these plastic models and after the K & B Allyn Company had become the K & B Manufacturing Corporation and a subsidiary of the Aurora Plastics Corporation, that the Tornado O49 was released as a separately available item for the model market at the end of April last year.

One may ask, at this point, what is the particular brand of magic that makes this such an easy starter. Obviously there are several factors which are conducive to easy starting in any model engine: good piston seal, suitable cylinder port design, etc., but if any one feature of the Tornado 049 requires special mention, it is the system of intake valving used. This known as "Flex-O-Valve" is a variation on the reed-valve principle and, like the reed-valve, is operated by crankcase depression and compression as the piston reciprocates. Construction, however, is quite different.

As on a number of small Aim., glow engines produced during recent years, notably the Cox " Pee-Wee " and " Bee " and more lately, certain revised Herkimer Cub models, a self- contained furl unit is employed, comprising tank, carburettor, induction ink and admission valve. In the Tornado, the body of the unit it moulded in two parts front a special material, too per rent, inert to all fuels, similar in appearance to nylon but having a higher tensile strength, and better resistance to heat. The rear part, or backplate, carries the needle-valve in an inserted brass bush. This is joined to the front, or tank section which carries an induction tube through its center, emerging in a central boss at the front which plugs into the rear of the engine crankcase. This boss carries the valve parts, consisting of a perforated aluminium turn disc, the valve diaphragm and a keeper. The disc forms the valve scat and has five 1/16in. dia. ports spared around a shallow cone in the center. The valve diaphragm is of a plastic material, 3 thou, thick, with an aluminium rim and has a 7/64 in. dia. hole in its center. I his hole is scaled by the conical center of the valve scat when crankcase pressure is positive, the diaphragm sealing off the live small ports al the same time. When crankcase depression draws the diaphragm away from the scat, fuel mixture is admitted through the ports in the valve scat and thence through the hole in the center of the diaphragm.

The remaining parts of the engine arc fairly representative of modern U.S. small engine practice and are detailed below.

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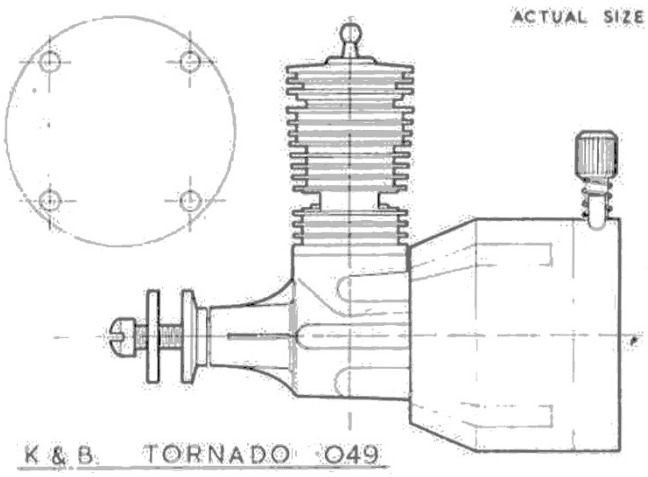

Parts of the Tornado motor note the huge, by general standards, integral fuel tank with the induction valve parts.

Specification:

Type: Single-cylinder, air-cooled, re-verse-flow scavenged, two-stroke cycle, glowplug ignition. Automatic diaphragm valve induction. Flat crown piston.

Bore: 0.400 in. Stroke: 0.394 in.
Swept Volume: 0.0495 cu. in. = 0.818 c.c.
Stroke/Bore Ratio: 0.985 : 1.
Weight: 1.7 oz. including integral fuel tank.

General Structural Data.

Pressure diecast aluminium alloy crankcase with plain unbushed main bearing. Hardened, counterbalanced pattern crankshaft, with two 7/32 in. dia. journals, 7/64 in. dia. crankpin and splined and internally threaded at front to receive alloy prop driver and prop retaining screw. Hardened steel connecting-rod, ball-jointed to hardened skirt piston via swaged socket in underside of piston head. Blued steel cylinder with integral fins, twin opposed exhaust ports and single internal transfer flute and screwed into crankcase. Alloy screw-in cylinder head with integral glow filament. Translucent, large capacity moulded fuel tank and backplate unit with integral carburettor unit and intake valve assembly and secured to crankcase with four screws. Four-point bulkhead type mounting via fuel tank.

Test Engine Data.

Running time prior to test: 1 hour.
Fuel used: KK-Record Super-Nitrex (30 per cent, nitromethane).

Performance.

Some indication of the remarkable starting qualities of the Tornado will be apparent when we mention that, after selling up this engine for the first time, priming it and connecting the batten leads, it started on the very first flick of the prop. This ease of starting continued throughout the following tests. For hot restarts it was not even necessary to choke the intake (which, incidentally, is fortunate, since it is not too easy to seal off the narrow intake channel in the backplate), a single flick being all that was necessary to get the motor into its stride again.

On some props it was found that, if the needle was closed down too far, the motor would begin to slow, then cut abruptly before the needle could be opened up again. On props best matched to the engine output however, such as the Top Flite 6x4, this did not occur. The only other slight bother experienced (one common to most non-rotary valve engines especially on light loads) was a tendency to start in the reverse direction, 'this could be counteracted by stopping the motor and flicking the prop the other way.

Torque tests of the Tornado revealed an output appreciably exceeding that generally associated with beginner class Half-A models and a maximum of just under 0.065 b.h.p. at 14,000 r.p.m. was recorded

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using Record Super Nitrex. A high nitromethane content fuel is specified for the engine and Super Nitrex was chosen as being the nearest British equivalent to the K & B Supersonic toot) recommended. This, of course, gives a slightly flatireing comparison with the performance of recently tested British 049's using medium nitro content fuels. Brief checks of the Tornado indicated that, on these latter fuels, the Tornado's output would drop to about 0.058 b.h.p. which, however, is still above average.

To sum up, we would rate this as near to the ideal beginner's engine as anything yet offered anywhere and wonderful value at its U.S. price of $3.95.

Power/Weight Ratio (as tested): 0.61 b.h.p. / lb.

Specific Output (as tested): 80 b.h.p. / litre.