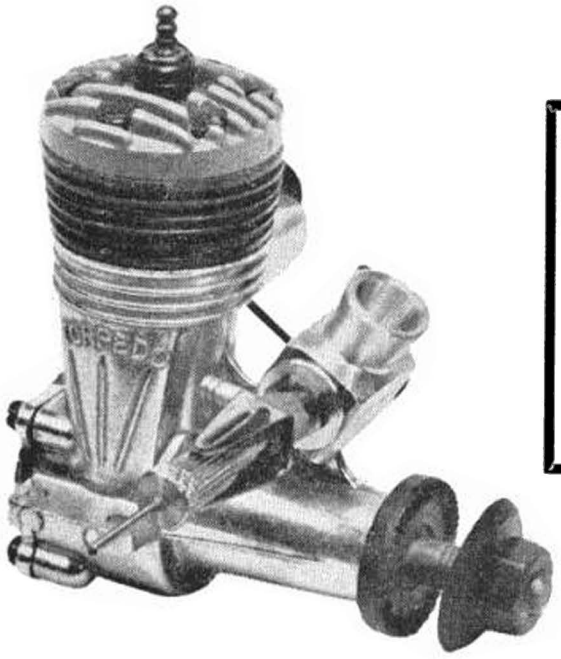


Specification

Displacement: 3.31 c.c. (.201 cu. in.)
Bore: .641 in.
Stroke: .620 in.
Bare weight: 6¼ oz.
Max. power: .317 b.h.p. at 13,400 r.p.m.
Max. torque: 29 oz.-in. at 9,000 r.p.m.
Power rating: .096 b.h.p. per c.c.
Power/weight ratio: .048 b.h.p. per oz.

Material specification :
Crankcase: light alloy pressure die casting.
Cylinder: mild steel.
Piston: cast iron.
Cylinder head: light alloy pressure die casting.
Crankshaft: hardened steel.
Main bearing: bronze bush.
Connecting rod: light alloy forging.
Propeller driver: steel.
Throttle unit: aluminium body with steel barrel ; steel throttle arm and exhaust flap.
Spraybar assembly: brass.
Crankcase rear cover: light alloy pressure die casting.

K & B ·19 R/C

ENGINE ANALYSIS No. 128 by R. H. Warring

"K & B" IS A TIME-HONOURED name in model engines, and the "Torpedo" range well known to old-time as well as present day modellers typifies the best in orthodox plain bearing glow engine layout, scaled up and down to cover a number of popular sizes. Virtually everything about it is proven by long experience. It is a particularly easy engine to handle, yet remains equally impressive in performance in what remains, basically, the standard layout in the "19" "29" and "35" sizes.

Most Torpedos tend to be relatively fussy about fuel mixture, where optimum performance is the aim. The "19" is tailored to a fairly high nitro content for maximum performance, when the makers claim a peak b.h.p. of .41 at 13,500 r.p.m. Whilst not particularly happy on a straight fuel, we found that 5 per cent nitro or equivalent doping was adequate for smooth performance.

Performance figures extracted on test on a low nitro fuel probably do not do full credit to the possibilities of the 19 R/C, and in any case the specimen run was already well used, having already put in many hours of flying time on the Aeromodeller "Tauri". Data was also extracted on torque measurement with non fan-type loads, which may show a rather higher peak r.p.m. than propeller-type loads. In other words, 13,500 r.p.m. is rather a low "peak" to achieve the manufacturer's figure of .41 b.h.p. and one would expect a running speed several thousand r.p.m. higher to reach such a figure with an engine of this type and size.

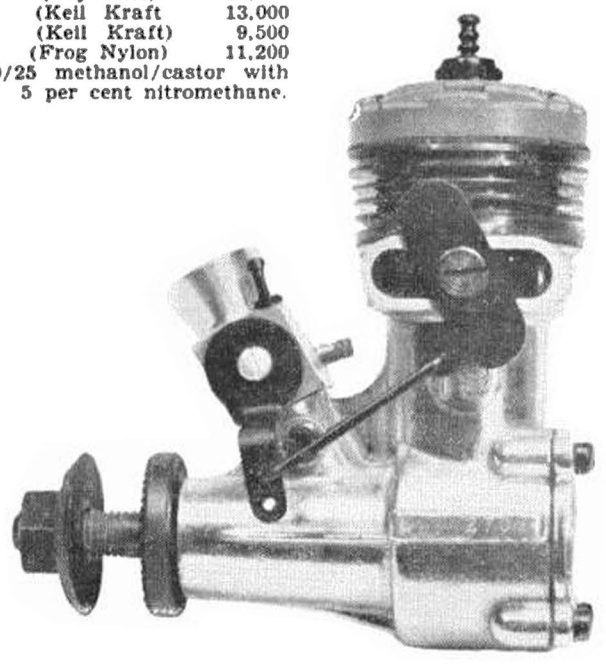
Structurally, the Torpedo "19" embodies a light pressure die cast crankcase unit embracing crankcase, front bearing housing, stub intake and lower cylinder up to, and including, a stub exhaust. This is virtually a minimum size casting as regards external dimensions, although there is an appreciable thickening of the metal from front to rear on the bearing length. The main bearing itself is formed by a substantial bronze sleeve inserted in the casting and reamed and honed to finished size. A large transfer passage is incorporated in the right hand side of the lower cylinder and left "as cast". This actually extends as a trough right up to the top of the casting or well above the transfer port position in the liner and relies for a seal, on the gasket under the lower fins on the liner being compressed by the cylinder holding down screws.

The liner itself is of soft steel only .7175 in. o/d on the plain bottom length, giving very thin walls (approximately 1/32 in. thick). The top length comprises two very thick large diameter fins at the top and approximately one-third down the length with two thin intermediate fins with the o/d between again taken down to .7175 in. Ports are rectangular in shape with semi-circular ends, cut directly in the liner walls. Transfer and exhaust ports are of approximately equal area, but the exhaust port is wider and slightly shallower. Transfer opening

Propeller — R.P.M. Figures

10 x 3½	(Top Flite)	10,800
9 x 4	(Top Flite)	12,500
9 x 6	(Top Flite)	10,200
8 x 6	(Top Flite)	12,200
9 x 4	(Keil Kraft	13,000
9 x 6	(Keil Kraft)	9,500
9 x 6	(Frog Nylon)	11,200

Fuel: 70/25 methanol/castor with 5 per cent nitromethane.



overlaps the exhaust by some 80 per cent. The liner bore is well finished, with a slight amount of taper towards the bottom end. Even after the considerable running time achieved with this engine the fit was still tighter than one normally expects with a standard production glow engine.

The piston is machined from cast iron with a flat top and filleted deflector. The piston is relatively long and slightly relieved in diameter below the gudgeon pin position. Connecting rod is a light alloy forging with plain bearings at each end. The big end bearing is drilled for an oilway. The gudgeon pin is .155 in. diameter, drilled through and fitted with brass end pads. It appears to be made of ordinary steel and is a fully floating fit in the piston.

The crankshaft is of hardened steel, .373 in. diameter over the bearing length stepping down to a ¼ in. diameter threaded length for a conventional propeller nut fitting. The circular web is machined away to provide a crescent shaped counterweight, the degree of counterweighting achieved corresponding to a little less than the con-rod weight. The intake port for front rotary induction is ¼ in. x $\frac{3}{16}$ in., with the centre hole in the shaft ¼ in. diameter. A shallow stepped length on the shaft immediately in front of the bearing is keyed to take a soft steel propeller driver approximately ⅛ in. thick and nicely knurled on the front face.

The cylinder head is a pressure die casting incorporating a "solid" section some $\frac{3}{32}$ in. thick surmounted by thick fins. The portion plugging into the cylinder liner is quite shallow and indeed the shaping necessary to clear the deflector on the piston is cut back slightly into the head itself. The head seats on a thick gasket and is held down by four long screws extending through the liner fins into the crankcase and two shorted screws terminating in the upper fin of the liner. The four main fixing screws are located "fore and aft" and it is possible to replace the liner the wrong way round. (The plug is centrally mounted in the head.) For R/C work a plug with an idle bar is recommended, although this may not be strictly necessary. It is possible to adjust the slow running position of the throttle for a relatively lean mixture by keeping the idling speed fairly high, when plug wetting does not appear to be a particular problem. However, adjusting for slower idling speed there is a tendency for an over-rich mixture to collect. If excessive this can "douse" a conventional plug and/or delay pick up when the throttle is opened again.

The throttle unit is of conventional glow engine pattern embracing a barrel throttle linked to an exhaust flap. The throttle body is machined from aluminium and consists of the usual "cube and stem" with a tapered venturi intake entry. The "stem" fits into the stub intake tube in the crankcase unit, where it is held by two short grub screws, one each side. The barrel valve itself is machined from steel and held in the body by the same screw which serves as the (adjustable) slow speed "stop"—this screw locating in a groove in the barrel body. A steel lever arm screwed up against the side of the barrel provides the necessary mechanical linkage for barrel movement. This screw is quite short and relies purely on being tight to maintain a friction grip. Personally, we would be inclined to Araldite it in place permanently.

Summarising, the K & B 19 R/C is a most likeable engine, easy to handle with a good throttle response and with power enough to take a "Tauri" size model through a good range of manoeuvres on rudder, elevator and throttle control. It is also an extremely compact and light engine—its weight is only 6⅝ oz. —but beefed up enough where it usually matters most, i.e., the main bearing. Whilst the cylinder liner is extremely thin walled, this is more or less standard K & B practice and they have enough experience in this type of production to avoid introducing unbalancing stresses during machining. All running fits were good, with the crankshaft fit somewhat on the loose side and tending to run on both ends.

In the case of a brand new engine some 45 minutes minimum running-in time is specified before fitting into a model, which would indicate that initial fits as manufactured are fairly tight—which in turn should mean a reasonably long life. The .19 R/C does, in fact, give the impression of being longer lasting than many other glow engines of similar size.