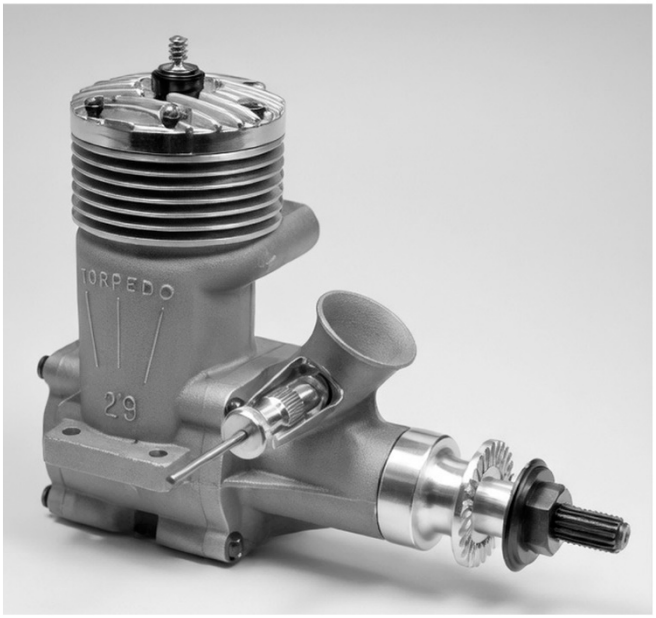
Piper PA 18 Super Cub



ENGINE TEST by Peter Chinn

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K&B Torpedo 29F

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To Mark K&B's 20th Anniversary as an Engine Manufacturer, we present this report on the Modern Successor to the Original Torpedo 29.

K&B stands for Kading and Brodbeck, the partners in the original K&B Manufacturing Company which began operations as a very small sub-contractor to the American aircraft industry during the latter part of World War II. Immediately after the war, the company first turned to the production of a lawn sprinkler, but, as a successful free-flight power modeller from pre-war days, Johnny Brodbeck's interests, not unnaturally, lay in the direction of model engine manufacture and, late in 1946, the company entered the model motor field with their first engine, the original Torpedo 29.

At that time, there was an unprecedented demand for model engines and innumerable small concerns were springing up all over the United States (and to a lesser extent in the U.K. and Europe as well) and plunging into the model engine manufacturing business. There were a lot of average engines, some thoroughly bad ones and a few very good ones. The Torpedo 29 was one of the latter and, largely as a result of this, and a continuing policy of producing sound designs, K&B are today, one of the four or five American makes, only, that have survived from those early post war years.

K&B are, in fact, one of the most firmly established manufacturers in the model engine business. Now a subsidiary of the Aurora Plastics Corporation, with John Brodbeck as vice-president, K&B make a large range of model aircraft engines of all types fuels and-accessories, and are also engaged in the booming slot-car business. In charge of the engine division is Bill Wisniewski, speed winner at the last two FAI World C/L Championships, who has been responsible for the design of K&B's line of ball-bearing contest engines that first began appearing in 1961.

The Original K&B Torpedo 29 was a spark- ignition engine with shaft rotary-valve and plain bearing. Later, when glow-plugs became popular, it appeared in a suitably modified version called the "Glo-Torp". K&B still list a plain bearing 29 but, as representative of the latest K&B design trends, we have chosen, instead, the current 29F ball-bearing model, for this report.

The 29F is one of two 5 cc. motors produced in K&B's "Series 64" range of high performance contest motors.
The other one, the 29R, is intended as a C/L speed motor and has rear induction via a rotary disc type valve.
The shaft-valve 29F was introduced primarily for contest free-flight work, although it is obviously well suited to many other types of installations.

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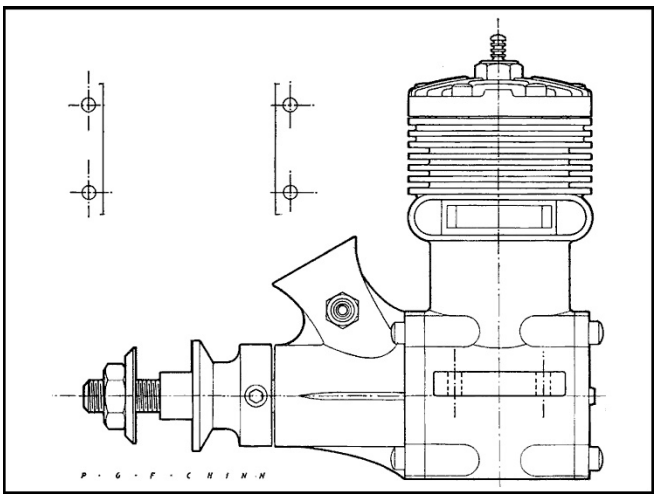

Parts of the Torpedo 29F. Noteworthy are the special crankshaft with concealed counterbalancing and the separate front housing with large diameter ball-bearing. The engine is for operation on pressure feed only.

The 29F is not simply a shaft-valve version of the 29R. Although its piston displacement is similar (actually a trifle smaller) it has a different bore and stroke, producing a much nearer to "square" bore and stroke combination than the low (0.900/1) stroke/bore ratio of the 29R, a wedge type (instead of hemispherical) combustion chamber, and none of its components are interchangeable with those of the 29R. It does, however, have certain design and structural features common to all the Series 64 engines.

Notable among these are the special Wisniewski 3-piece crankshaft design, the general characteristics of which were described in our report on the K&B 15R in the August issue. The main journal of the 29F shaft is ½ in. dia. and has a 0.345 in. bore gas passage. The crankweb, into which the hardened crankpin is pressed, is a generous 0.300 in. thick. The large rotary-valve port is timed to open at 28 degrees ABDC and to close at 48 degrees ATDC (our measurements).

A much improved method of securing the prop drive assembly to the end of the crankshaft was adopted with the Series 64, 29 and 35 models. On the 15R and all the Series 61 engines, the drive hub was both keyed and secured to the shaft with an Allen grub screw engaging a flat on the shaft. This was not entirely satisfactory. The improved assembly uses a 0.125 in. dia. steel ball inserted in a hemispherical depression in the shaft and engaging a U-section keyway in the hub. The latter is firmly keyed to the shaft in this manner and the grub-screw now serves only to retain it.

The structural layout of the 29R is a little different from most other current 5 cc. engines. The crankcase and cylinder barrel are a monobloc unit, but both the front bearing housing and the crankcase back-plate are separate and arc each attached to the crankcase with four screws. At the front, the 1.125 in. o.d. ball-bearing serves to locate the front housing in the crankcase. The engine is set up to operate on a pressurised fuel supply and the recessed back-plate has a central boss into which one can screw a brass nipple for pressurising a rigid tank, or, alternatively, a blanking screw can be fitted where it is desired to use a bladder tank.

The cylinder barrel is sleeved with a short, thick-walled drop-in iron liner located, in the usual way, by a flange at the top. It has orthodox rectangular ports timed to open and close at 70 degrees (exhaust) and 62.5 degrees (transfer) each side of BDC. Unlike the Series 61 engines, which featured a hard-chromed piston, the Series 64 models use a hardened iron piston. This has an annular rib above the gudgeon-pin bosses to maintain piston roundness and has a relieved skirt diameter below the gudgeon-pin. The piston crown is flat with a straight baffle radiussed on both sides. The cylinder head contours form a squish area on the transfer side and a wedge shaped combustion chamber on the exhaust side.

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The long reach K&B glow-plug is located centrally in the head. In external dimensions, the 29F is identical with the Series 64 and Series 61 Torpedo 35 engines and mounting details of all three models are the same. By tradition, and unlike most other loop-scavenged engines, all K&B Torpedo's have had the exhaust duct on the left side, and the 29F is no exception. K&B do not, as yet, offer silencers for their engines and our performance figures for the 29F are the result of tests on the engine in its unsilenced state.

Exceptionally high torque

For these tests, we used the back-plate pressure fitting in conjunction with a Veco T-31 pressure tank. Initial running-in was done on a straight fuel mixture of 75 per cent methanol and 25 per cent castor oil. The 29F did not need an excessively long running-in period and, within an accumulated running time of one hour, the engine held a steady speed, with the needle set for maximum r.p.m. on both straight fuel and on the somewhat hotter Supersonic-1000 blend.

Recorded for a 5 cc. engine and the corresponding performance was the extremely high maximum torque developed and the resultant high performance on relatively large props. Our test model registered some 54 oz. in. torque at around 10,000 r.p.m. on straight fuel and over 60 oz. in. on Supersonic-1000. Both these are the highest we have recorded for a 5 cc. engine and the corresponding b.m.e.p. figures are just about as good as anything achieved to date. In both respects the 29F bettered the Series 64 disc-valve 29R despite the fact that the 29R, by peaking 3,000 or so r.p.m. faster than the 29F, was able to show a maximum b.h.p. 10-25 per cent higher depending on fuel used.

As the performance graph shows, the maximum power developed by the 29F was just under 0.70 b.h.p. at 15,000 r.p.m. on straight fuel and almost 0.80 b.h.p. at a little over 16,000 r.p.m. on Super¬sonic-1000, both of which are outstandingly good. Typical static prop r.p.m. included 10,300 on a 12x4 Trucut, 11,700 on an 11x5 Top-Flite (both of which are far above the usual speeds with 5 cc. engines), 15,000 on a 10x3) Top-Flite and 15,500 on a 9x5 Top-Flite.

The general handling qualities of the 29F were extremely good. We found is easy to hand start at all times. For such a powerful engine, it was uncommonly docile, only demanding that it be treated with little more respect when prop diameter was reduced to 8 inches. The needle-valve was a bit sensitive when running on straight fuel, but quite normal on Supersonic-1000 fuel. The 29F also ran very steadily and with little vibration at practically all speeds tested. Incidentally, the 29F does not, despite is high performance, appear to be excessively hard on glow-plugs.

The Torpedo 29F is not a cheap engine, but it is unquestionably a very worthy descendant of its famous ancestor of 20 years ago.

Power/Weight Ratio (as tested on straight fuel): 1.25 b.h.p./lb. (As tested on Supersonic-1000): 1.45 b.h.p./lb.

Specific Output (as tested on straight fuel): 142 b.h.p./litre. (As tested on Supersonic-1000): 163 b.h.p./litre.

SPECIFICATION

Type: Single cylinder, air-cooled, loop-scavenged two-stroke cycle glow-plug ignition with ball-bearing crankshaft Shaft type rotary-valve induction.
Bore: 0.725 in.
Stroke: 0.720 in.
Swept Volume: 0.2972 cu. in. (4.870 c.c.)
Stroke/Bore Ratio: 0.993 :1 Weight: 8.8 oz.

General Structure Data

Pressure die-cast aluminium alloy crank casel cylinder-block unit with drop-in cylinder-liner. Pressure die-cast aluminium alloy main bearing housing secured with four screws and containing one ¼ x 5/8 in. front and one ½ x 1 1/8 in. rear Fafnir ball journal bearings. Counterbalanced, non-hardened crankshaft of "Stressproof" steel with pressed-in hardened .219 in. dia. tubular crankpin. Cast-iron lapped piston with baffle and internal annular stiffening rib.

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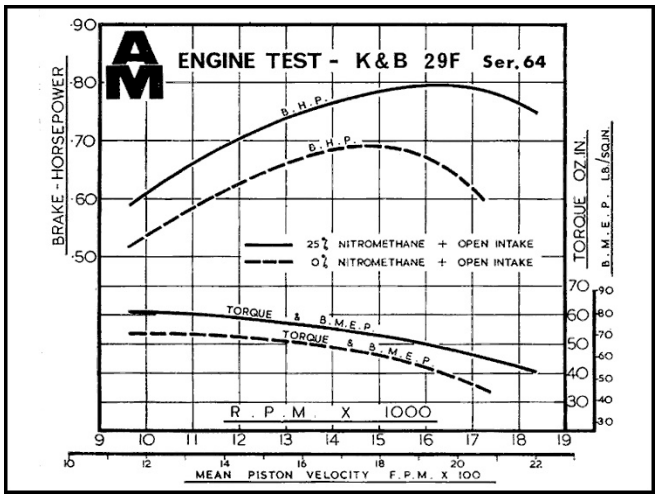
Forged Alcoa 2014 aluminium alloy connecting-rod, unbushed, with single lubrication hole at lower end. Hardened, 0.178 in dia. tubular gudgeon-pin with aluminium end pads. Pressure die-cast aluminium alloy cylinder-head secured to cylinder casting with six screws. Pressure die-cast aluminium alloy crankcase back-plate, with provision for fuel tank pressurisation and secured with four screws. Machined aluminium alloy drive hub, keyed to crankshaft and fitted with ¼ in. dia. stud, steel washer and hexagon nut for propeller attachment. Brass spray-bar type needle-valve assembly. No gaskets metal to metal joints throughout. Beam mounting lugs.

TEST CONDITIONS

Running time prior to test: 1 ½ —2 hours.
Fuels used: Test 1: Straight 3/1 methanol/castor-oil. Test 2: K&B Supersonic-1000 (approx. 25 per cent nitromethane).
Fuel system: Open intake (0.375 in. dia. choke) with spray-bar. Pressurised fuel feed.
Glow-plugs used: K&B/KB-IL 1.5 volt platinum filament, long reach, as supplied.
Air Temperature: 42 deg. F. Barometer: 30.45 in. Hg.
Silencer Type: Nil (see text)



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