

The K. & B. Allyn Torpedo 0.09

The K. & B. Torpedo engines need no introduction to MODEL AIRCRAFT readers. Previously, in the M.A. Engine Tests, we have dealt with three of the most successful in this famous American range: the 15, 19, and 35.

The 09, the smallest model of the group, is also the most recent and is almost certainly the most powerful

under 0.10 cu. in. glowplug engine yet designed. As tested on a medium nitro content fuel, its specific output of around 100 b.h.p./litre closely approximates that of the record-breaking 19 which reached 125 b.h.p./litre on test in 1953.

Glowplug 0.09 cu. in. engines fall roughly into the same class in the U.S. as 1.5 c.c. diesels in Europe, being favoured mainly for general purpose F/F, C/L and, to a lesser extent, small radio-controlled models. The diesels, for the past few years, have tended to have an edge over the glowplug models in power output, but the Torpedo 09 restores the balance and, incidentally, also provides a further strong argument for the loop-scavenged engine after years of domination by reverse-flow scavenged motors in the smaller displacement sizes.

In both design and construction the Torpedo 09 closely resembles its bigger brothers. It is built around a pressure cast crankcase/mainbearing unit, the cylinder being a one-piece component with integral fins and attached with two screws fore and aft. Impregnated gaskets are used to seal the cylinder-to-crankcase and head-to-cylinder joints and, for the benefit of new Torpedo 09 owners, it is worth mentioning that these become

bonded to the metal with heat and it is, therefore, unwise to dismantle the motor unless replacement gaskets are to hand. This, of course, applies equally to the larger Torpedo models and to many other glowplug engines of similar design. The usual paper gasket is used to seal the rear cover, but, rather surprisingly, the crankcase joint face is machined off instead of being left as cast in the manner now usual with such assemblies. The crankcase casting of our test Torpedo 09 did, in fact, bear evidence of a degree of extra finishing not normally found in other engines of similar design.

A $\frac{1}{16}$ in. crankshaft, blued against corrosion, and having a $\frac{7}{32}$ in. dia. gas passage and the usual rectangular valve port, is employed. It has a disc web with a machined-in crescent counterweight to balance rotating mass. Unlike many modern American engines, the shaft is hardened. It runs direct in the crankcase material. A hard piston running in a mild cylinder is used. The cylinder has a blued external finish and features radiused ports. The latter are not over-large in area, the emphasis being on the large and unrestricted transfer passage.

The entire engine, which is of neat appearance, compact dimensions and modest weight, gives an impression of sound design, good execution and crisp efficiency that is entirely borne out by performance tests.

Specification

Type: Single-cylinder, air-cooled, loop-scavenged two-stroke cycle glowplug ignition. Crankshaft type rotary valve induction. No sub-piston supplementary air induction. Baffle piston. Central ignition plug.

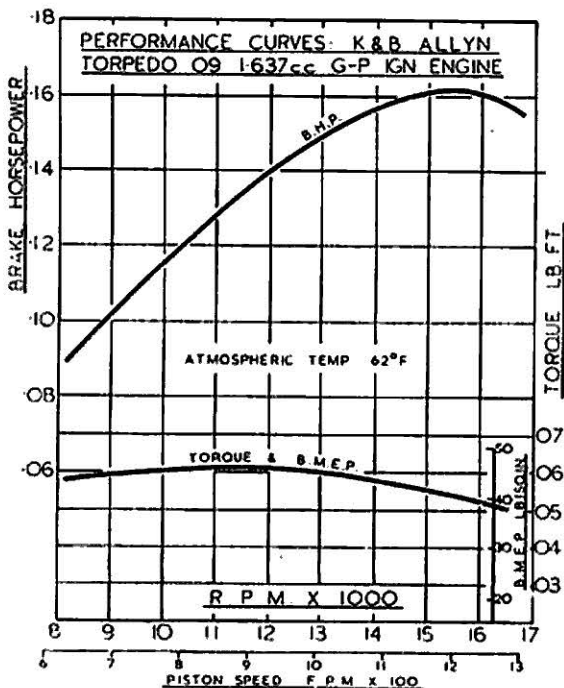
Bore: 0.521 in. Stroke: 0.465 in. Swept Volume: 0.0999 cu. in. (1.637 c.c.).

Stroke/Bore Ratio: 0.892/1.

Weight: 2.8 oz.

General Structural Data

Pressure diecast aluminium alloy crankcase unit, tumble finished, with plain main bearing. Hardened steel counterbalanced crankshaft with $\frac{1}{16}$ in. dia. journal and $\frac{5}{32}$ in. solid crankpin. Blued steel drive washer, taper fitted to shaft. One-piece cylinder with integral fins and blued corrosion-resistant external finish. Pressure diecast aluminium alloy cylinder head, enamelled green and secured with four screws, two of which pass through cylinder fins to



tie complete cylinder assembly to crankcase. Hardened piston with filleted baffle and skirt relieved below gudgeon-pin centres. Fully-floating solid gudgeon pin with domed and polished ends. Forged alloy connecting rod with plain eyes and oil hole at lower end. Pressed-in spray-bar type needle-valve assembly. Beam mounting lugs, plus provision for bulkhead mounting via special alloy radial mounting ring available as an extra.

Test Engine Data

Running time prior to test: 1½ hours.

Fuel used: 12 per cent. B.D.H. Nitromethane, 60 per cent. I.C.I. Blending Methanol, 28 per cent. Duckham's Racing Castor Oil.

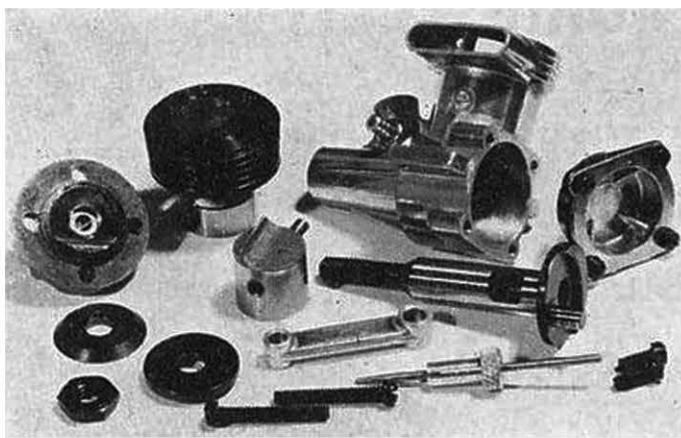
Ignition plug used: K. & B. Torpedo standard short reach as fitted; 1.5 volts used to start.

Performance

All the Torpedo engines we have tested in the past have had pleasantly uncomplicated handling characteristics and the 09 is no exception. It is very easy starting and its smaller size and docile behaviour makes it the sort of engine which a beginner can approach with complete confidence.

As is widely known, the power output of any glowplug engine, unlike that of a diesel, is influenced to an appreciable extent by the composition of the fuel employed. Atmospheric and other conditions permitting, a mixture containing a relatively high nitroparaffin content (e.g., 30 per cent. nitromethane) may be expected to boost the output quite considerably beyond that obtainable on a plain methanol and castor oil blend. Except for speed work, however, it is unusual to employ heavily nitrated mixtures with most present day glow engines. Typical U.S. commercial glowplug fuels for general purpose use contain around 5 per cent. nitromethane. Many manufacturers also offer a "hot" blend, containing, perhaps, 20-25 per cent. nitro which can be used when conditions permit, or can be blended with the standard mixture to improve performance. For our test of the Torpedo 09 we chose, therefore, a medium mixture containing 12 per cent. nitromethane. It is necessary to make this clear in order to show that the performance figures recorded are such as might be obtained under fairly normal conditions. They are a little better than one would get on a straight

A disassembled view showing the component parts of the K. & B.



alcohol-castor mixture, but can, undoubtedly, be improved on for all-out contest performance, given a well run-in motor and suitable weather conditions, with a hot racing fuel.

Generally, glowplug engines of under 2.5 c.c. develop less torque than diesels, the specific torque declining as capacity is reduced. Expressed in b.m.e.p., this is usually under, rather than over, 50 lb./sq. in. and, in developing better than 46 lb./sq. in. at between 11,000 and 12,000 r.p.m., the 1.6 c.c. Torpedo 09 shows up very well. The torque/b.m.e.p. curve of the engine is extremely flat over the wide range of speeds, and on our test, this resulted in the peak of the power curve occurring at approximately 15,500 r.p.m. At this speed a figure of 0.162 b.h.p. was recorded, which is the highest output for a 0.09 class

glowplug engine yet realised in this series.

Running qualities throughout the tests were excellent. The engine is very smooth running and especially so at 12,000 r.p.m. and upwards. Our only criticism concerned the needle-valve which tended to vary its setting slightly when the engine was running, but this trouble was soon cured by squeezing up the needle thimble to give a tighter grip on the threads.

The maker's recommendations as regards prop sizes (7/4 for F/F and 7/5 for C/L) are very suitable and should allow the 09 to approach 14,000 r.p.m. in the air and thus make good use of its excellent high speed performance.

Power/Weight Ratio (as tested): 0.926 b.h.p./lb.

Specific Output (as tested): 99 b.h.p./litre.



CONTEST CALENDAR

- | | | | |
|------------|---|------------|--|
| Aug. 3/5th | WORLD CHAMPIONSHIPS
POWER & RUBBER. | Sept. 14th | Croydon Gala. Chobham
Common, F/F all classes. |
| " 17th | Devon Rally, Woodbury Com-
mon, F/F, R/C, Combat. | " 21st | GUTTERIDGE TROPHY. Wake-
field. Area.
*MODEL ENGINEER CUP. Team
Glider. Area. |
| " 23rd | U.K. CHALLENGE MATCH. | " 28th | TEAM RACING. "A," "A,"
and "B" Area. |
| " 24th | SCOTTISH GALA
CATON TROPHY, U/R RUBBER,
U/R GLIDER,
U/R POWER.
TAPLIN TROPHY. R/C Rudder
Control, Stunt. (Simplified
schedule.)
TEAM RACING. "A" and "B." | " 28th | C. H. ROBERTS CUP (flying
boats) Danson Park, Bexley-
heath, Kent. |
| " 24th | South Midland Area Rally. Cran-
field. | " 28th | Southern Area Rally. Open
R/G/P; T/R "A," "A,"
"B"; Combat; Stunt, Radio. |
| Sept. 7th | NORTHERN GALA
U/R RUBBER.
U/R GLIDER.
U/R POWER.
AEROMODELLER R/C TROPHY.
R/C Multi-Control. (Full R/C
schedule, course and aerobic
flying.)
TEAM RACING. "A" and "B"
P.A.A. LOAD. (Int. Class.) | Oct. 5th | Bill White Cup. Chobham. |
| " 7th | Dagenham C/L Gala. Central
Park, Dagenham. Stunt, Com-
bat, T/R "A. & B., " Speed (?) | " 12th | *FARROW SHIELD. Team Rubber.
S.M.A.E. CUP. A/2 Glider. Area. |
| | | " 19th | South Coast Gala, Ashdown
Forest. |
| | | " 26th | HAMLEY TROPHY. U/R Power.
De-centralised.
FROG JUNIOR CUP. U/R
Rubber, Glider, De-centralised. |
| | | Nov 2nd | St. Albans Slope Soaring Rally.
Ivinghoe Beacon.
*Plugge Cup events.
All S.M.A.E. competitions in capitals. |