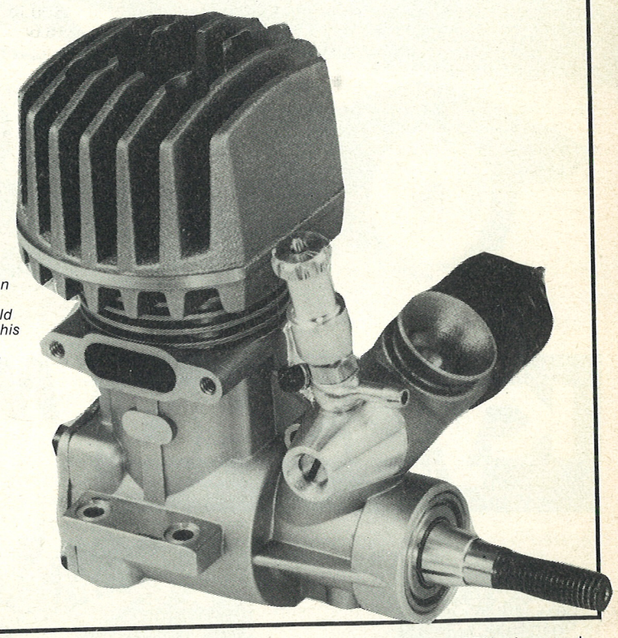
Engine Test No. 18

by Mike Billinton

OPS 3.5cc Buggy motor.

Mike Billinton assesses the powerful OPS answer to Off-Road racing

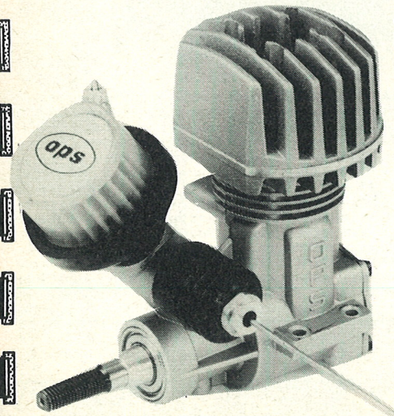


The OPS reputation for quality and performance should combine to make this Buggy motor a popular choice for many Off Road racers.

CONTINUING ITALIAN dynamism threatens to engulf car engine users with a proliferation of new or revamped models in most categories of 2-stroke motors. Fortunately for this writer the *OPS* Car and Buggy section has now become clearer with, in effect, just 3 models — Buggy Sport, Buggy Competition, Car Competition.

The very recent addtion of 'Professional' versions of their 2 Competition engines strictly does nothing for performance, but rather, adds a measure of running reliability because the central feature is a new and much larger oil-filled air cleaner. This in turn has necessitated a taller cylinder head to ensure adequate cooling when in-line engine mounting is used as in certain 4-wheel drive set-ups.

Reasons for power differences between the various OPS engines listed here are more a consequence of the fuel and rpm levels chosen:



Left: this Buggy motor and in fact all OPS 3.5 engines are supplied with either 8mm or 9mm bore size standard design carburettors.

OPS Ref. no. 8781 — Buggy Sport — Methanol/Tuned pipe — 1.3bhp at 27,000 rpm.

8831 — Buggy Comp. — 25% nitro/Tuned pipe — 1.52bhp at 28,500rpm.

8832 — Buggy Pro. — 25% nitro/Tuned pipe — 1.52bhp at 28,500rpm.

8750 — Car Comp. — 25% nitro/Tuned pipe — 1.52bhp at 28,500rpm.

8751 — Car Pro — 50% nitro/Tuned pipe — 1.93bhp at 29,500rpm.

It will be noted that the 2bhp mark is definitely on the manufacturers horizon. (*Rossi* also claiming 1.95bhp).

The associated equipment of 50% nitromethane and tuned pipe has been the norm during the tests of top 3.5cc Car engines in this series. For the testing of Buggy engines however, it is felt more appropriate to pitch test bench operations at a less demanding level and one having a wider band-width area . . . hence the use of 5% nitromethane fuel and minipipe.

Not to confuse the matter further, the engine tested here is the 2nd in the above list, and which in its early 1985 guise at least is quoted by *OPS* as producing 1.52bhp on 25% nitro and tuned pipe. The 1.11bhp reached during this test on 5% Nitro and the much less 'pushy' minipipe is therefore quite in keeping.

Mechanical Details

In most respects there is little change to report compared with the earlier 1981 SLA engine: for instance, the **Crankcase** remains the reliable, smooth die-cast finish side exhaust casing familiar to *OPS* 3.5cc users for some 8 years. The brass **Liner** timing is largely unchanged, though transfer ports are now angled up some 20° in common with the exhaust port. Again, the **Crankshaft** layout and timing are similar to the earlier SLA model, although the crankweb counterweight appears now to be increased slightly in weight. **Cylinder head** and **Rear cover** from the 1982 Rear Exhaust Car engine have here been matched to the Buggy engine, and the head especially is advantageous by virtue of the rougher-cast and improved heat-dissipating finish. The wider spaced fine geometry is a decided improvement over the earlier SLA model. The rear cover appears better able to resist wear from connecting rod side thrusts than was the earlier smooth die-cast cover.

The **Combustion chamber** insert has a narrower squish band than previously and, being set at a large .022in piston clearance, reveals the continuing experimentation being undertaken by *OPS*. The new 1984 slide-valve **Carburettor** is now a single design to suit all the Car and Buggy engines, and is available in either 8mm or 9mm bore sizes. It is now fitted with a servo rod giving a sprung 'override' facility when the brass throttle slide is fully closed against throttle stop. To ensure total reliability of Idle settings **OPS** indicate a method of sealing up the adjustable Idle jet by use of Teflon tape.

Performance

Test 1: *Open Exhaust/5% Nitromethane and 15% Castor/8mm Carburettor/ OPS 250 plug.*

In view of the apparent lack of obvious design changes in this 1985 Buggy engine, the initial strong rpm figures on standard propellers would have been quite a surprise were it not realised that performance improvements can often emanate from small accumulated changes. Here these have resulted in an Open exhaust performance not far short of the 1983 *OPS* rear exhaust top car engine. (Reported in 'Model Cars' June 1984).

Certainly the first torque readings indicated a very strong low-speed 'punch' as being available from 12,000 rpm onwards, and which should be of considerable value in the Off-Road Buggy classes. Conversely though, the high rpm end showed a slightly swifter falling off in torque such that operation past 30,000 rpm is

Dimensions & Weights:

Capacity — .2116cu.in. (3.468cc)
Bore — .654in. (16.6mm)
Stroke — .630in. (16.0mm)
Stroke/bore ratio — .963/1
Timing periods:
Exhaust — 160°
Transfer — 128°
Boost — 120°
Induction:
Opens — 35° ABDC
Closes — 50° ATDC
Total opening — 195°
Exhaust port height — .210in.
Combustion chamber volume — .34cc
Compression ratios — Effective — 7.8/1
Geometric — 11.2/1
Cylinder head squish — .022in. (.56mm)
Squish band angle — 0°
Squish band width — .10in. (2.54mm)
Crankshaft dia. — .722in. (12mm)
Crankpin dia. — .1965in. (5mm)
Crank bore — .355in. (9mm)
Crank nose thread — .245in. x 28 tpi (¼ UNF)
Gudgeon pin dia. — .1572in. (4mm)
Con-rod centres — 30mm
Carburettor bore — 8mm
Weight overall (with carb. and filter) — 10.5ozs. (.29 Kilo)
Width between bearers — 1.19in.
Mounting holes — 16 x 36mm with 3mm holes.
Width — 1.71in. (across lugs)
Length — 2.3in. (to front bearing)
Height — 3.6in.
Frontal area — 5.12sq.ins.

Performance:

Max. BHP — 1.11 at 25,770 rpm (PB Minipipe and 5% Nitro)
1.03 at 27,220 rpm (open Ex. and 5% Nitro)
Max Torque — 48oz.ins. at 18,950 rpm (PB Minipipe and 5% Nitro)
48oz.ins. at 18,650 rpm (Open Ex. and 5% Nitro)
R.P.M. Standard propellers:

	Open Ex.	PB Minipipe
10 x 4 Zinger	12,390	10,520
10 x 4 Taipan	12,990	—
9 x 4 Zinger	16,020	—
8 x 6 Zinger	16,320	15,650
7 x 6 Taipan	18,920	19,100
7 x 4 Taipan	23,800	24,240

Performance Equivalents:

BHP/Cu.in. — 5.24
BHP/cc — .32
Oz.in./cu.in. — 226
Oz. in./cc — 13.8
Gm. metre/cc — 9.8
BHP/lb. — 1.69
BHP/Kilo — 3.72
BHP/sq.in. frontal area — .216

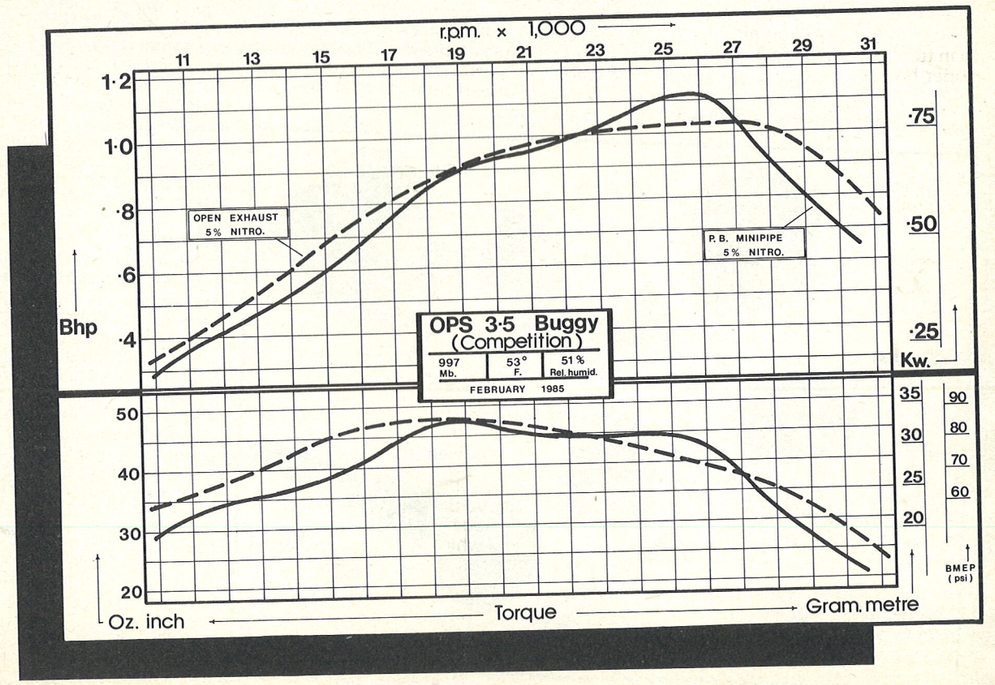
Manufacturer:

OPS, Monza, Italy.

UK Distributor:

MacGregor Industries Ltd., Slough, Berkshire.

OPS 3.5 Buggy results table and power graph



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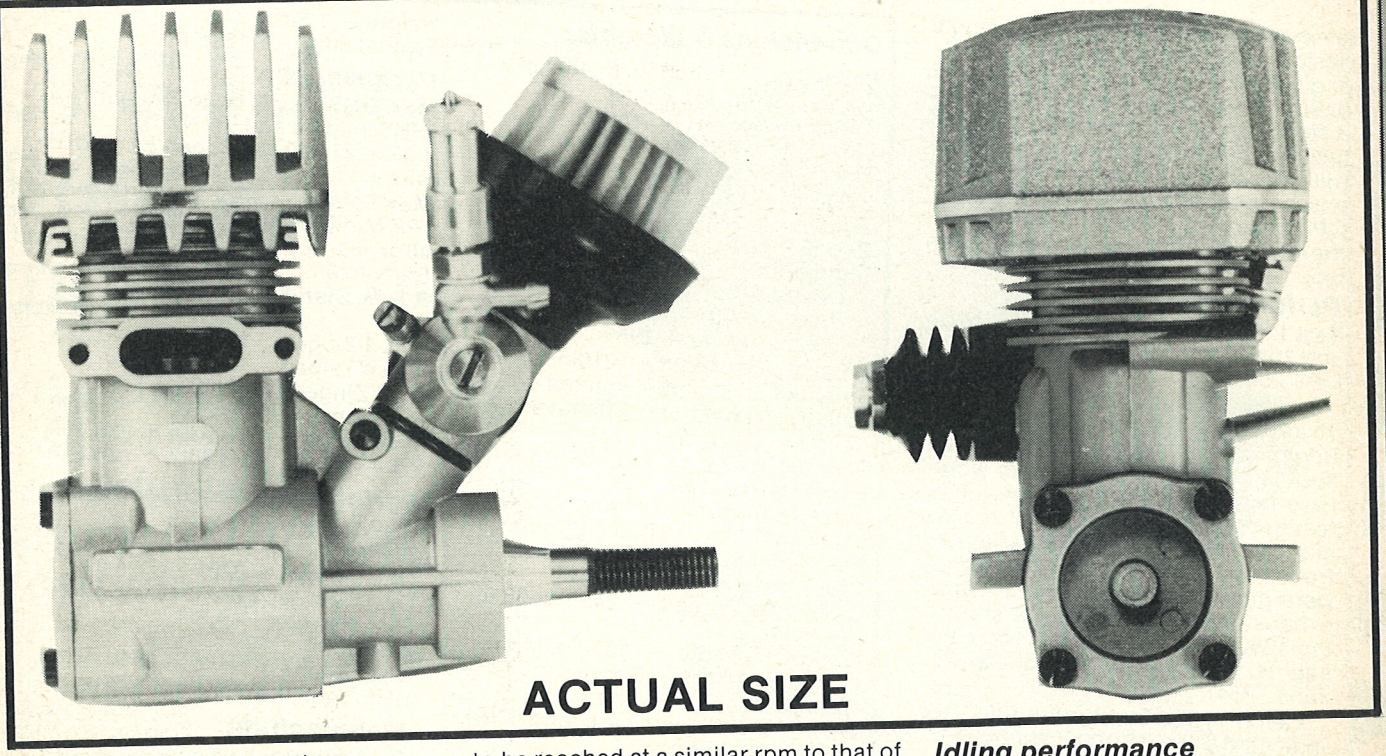


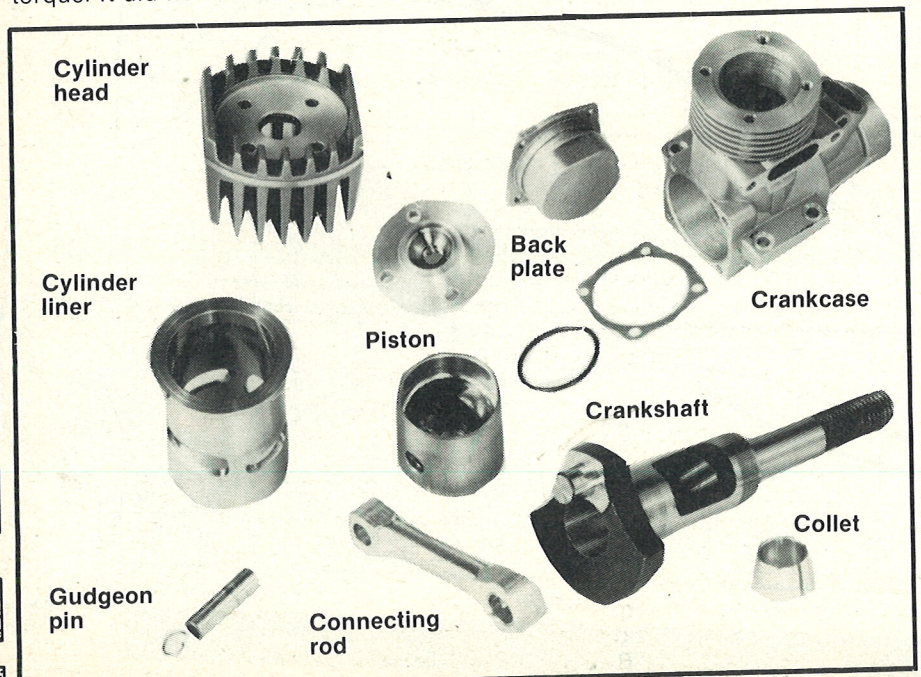
ACTUAL SIZE

relatively counter-productive compared with that 1983 Rear Exhaust engine.

Test 2: *PB minipipe/Other equipment as test 1.*

To provide some similarity with the *Picco* Buggy engine tested recently, the minipipe was again fixed at 5¾in. length from piston face to end of minipipe within the silencing can. The graph shows that performance increase was not that significant in this particular case, and moreover it can be surmised that, as fixed at this length, the minipipe actually harms low-speed torque. It did however allow peak bhp to be reached at a similar rpm to that of the open exhaust operation.

Depending on the particular need for low-speed pulling power (as opposed to high power at elevated rpm's), it would seem sensible to operate this minipipe at a longer length — say around 6½in. Though this was not tried during the test, the likelihood is that torque figures around 50oz. in. from 16,000 rpm upwards would then be possible. The consequence of this will of course mean a definite restriction (even collapse) of performance past say 25,000 rpm.



Left: the components of the OPS Buggy motor as described in the text.

Idling performance

Once a correct fuel level was arrived at (around ½in. below fuel jet), rpm's down to 3,000 were achieved with good clean pickup, though slight excess richness at mid-throttle was apparent — a frequent finding with model engine carburettors.

To explain the fuel height situation — during dynamometer testing it is usually the practice to use gravity feed because the lack of pressure feed when operating in Open Exhaust format often means a lack of fuel-draw if using the normal suction feed with large bore carbs. A gravity feed has no adverse effect on constant speed wide-open throttle running (as required for Torque tests), but will cause problems with low-speed and intermittent running.

Summary

Once again an *OPS* engine impresses by solid reliable performance — almost generating the impression in the operator that nothing can go wrong.

For sure though, other manufacturers also are reaching up to this sure-footed style of performance — it does seem that only the most active of manufacturers can hope to maintain contact with the 'top runners' — and one sees little sign as yet that *OPS* are becoming any less active. □