

Parra Wasp 1

Maris Dislers investigates the glow version of this quality .09ci engine

Traditionally, 1.5cc engines made good sense for ages, as the whole bundle was clear of the rather dinky 049 stuff, but cheaper than equivalent 2.5cc or big-block equipment. Just as good, providing it wasn't particularly windy and you didn't mind the smaller control line flight hemisphere.

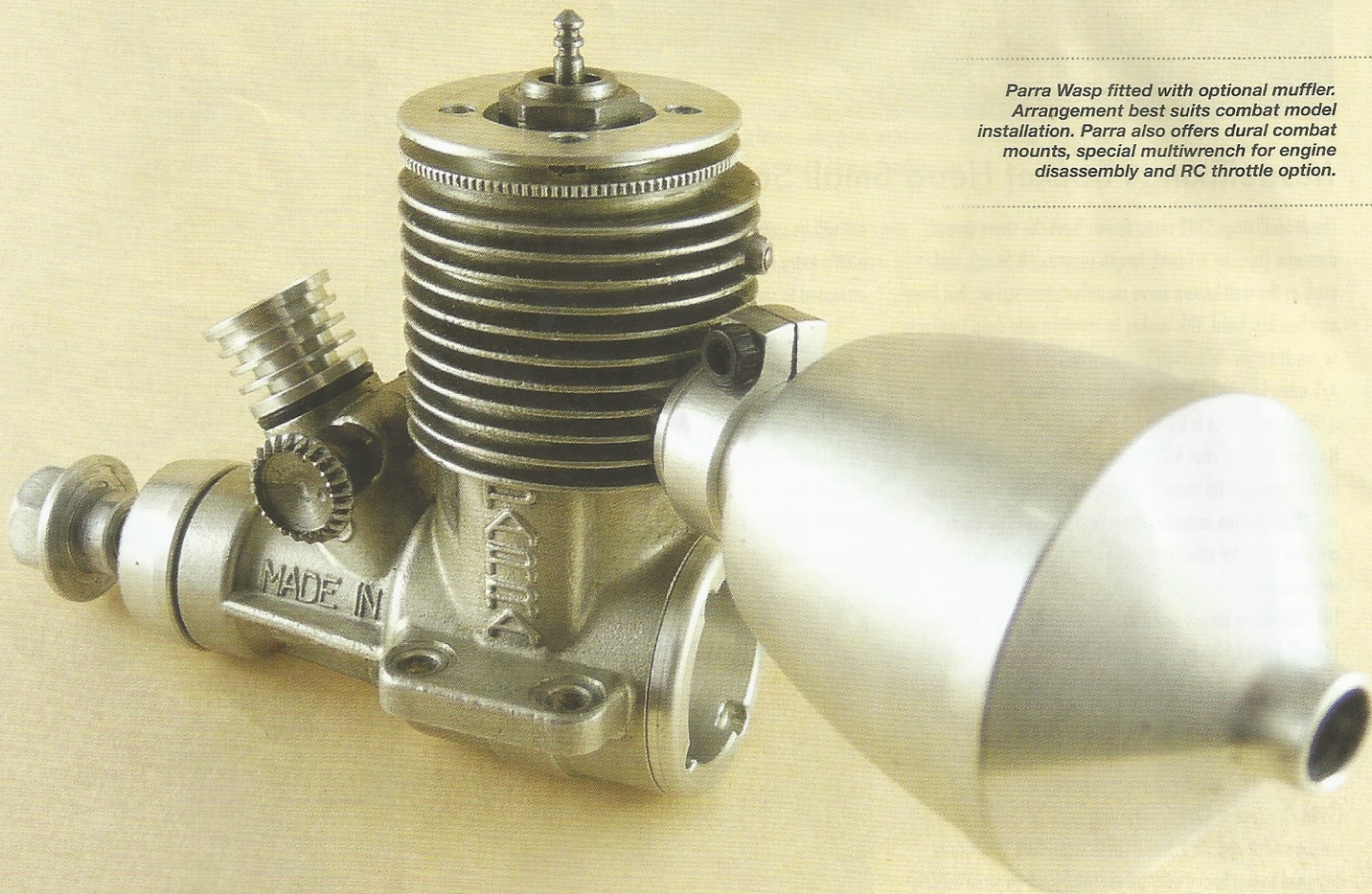
Of course, progress led to more horsepower and the F.A.I. seriously considered dropping engine size from 2.5cc to 1.5cc around 1980. That was defeated and perhaps it's a good thing. Considering what has happened in the

"simple" F1J class where quite unexpected amounts of horsepower are extracted from 1cc engines squealing like stuck pigs at fantastic RPM. For now at least, there remains a more comfortable place for 1.5cc engines at Club level. Particularly in control line combat, with spirited F2D-like performance, but easier to operate and the models survive "unintentional landings" surprisingly well. And mini racing classes provide an outlet for the young at heart flyer who is happy with the lighter side.

One of the best 1.5's available is the Parra Wasp and readers might recall our previous test of the diesel version in

AeroModeller No. 919 Jan/Feb 2013. It seems they got it right from the start, as no significant changes have been found necessary since its introduction. Our Wasp diesel delivered between 0.3 BHP and almost 0.4 BHP depending on carburettor insert choke area, putting it among the best of the modern one-point-fives.

The Wasp is a versatile design, with two crankcase options (differing in exhaust port orientation) and choice between diesel and glowplug ignition. Even an RC throttle option. This time we'll look at the glowplug version and so that direct comparison can be made with the diesel, we've converted



Parra Wasp fitted with optional muffler. Arrangement best suits combat model installation. Parra also offers dural combat mounts, special multiwrench for engine disassembly and RC throttle option.

.5cc Glow



Switching between glow or diesel modes is easily done by selecting the desired head insert.



Piston and cylinder remain in top shape after plenty of use. As they say "You don't get zip, if it ain't got that nip".

our original test engine. Simply by swapping glowplug head in place of diesel head. A one-minute chameleon trick.

Construction

Briefly, for folk who missed our earlier review, the Wasp is a modern high performance front rotary induction type. Based on an investment cast monobloc crankcase that needs no assembly screws, which also helps to keep overall weight down. Of course, you'll need Parra's multi-tool for disassembly – this tool also fits prop nut, compression screw and glow plug. Alternative crankcase options place the exhaust at 30 degrees upwards for combat, or 30 degrees downwards for racing applications. Transfer porting is the usual Schnuerle plus boost and single exhaust, cut into a drop-in ABC (Aluminium piston, Brass Chrome-plated cylinder) or AAC (Aluminium, Aluminium Chrome) cylinder. Our test engine is AAC, so a few grams lighter. The glow head insert, taking a Nelson style plug, with its threaded clamp ring completes the top end.

The crankshaft rides in 10mm I.D. rear and 5mm I.D. front bearings. It has generous front rotary intake port and 6.5mm gas passage for good "breathing" at higher speeds. Parra offers four venturi choke size options to tailor the degree of "suction" to the intended use. Of peripheral jet type, they are easily changed after removing the needle valve assembly.

On the Bench

The glow combustion chamber has a wide squish band with 5 degree conical angle and central dome. We measured 0.10 cc volume and added 0.35mm total shims (plus the 0.2mm head to piston clearance at TDC) to give an initial geometric compression ratio of 10:1, using Parra's 0.1 mm brass and .05mm copper shims. With the 10% nitro mix, we found no gain even after removing three 0.1mm shims, leaving only one 0.05 mm shim to ensure a good seal, for the highest achievable compression ratio of 12.5:1. However, on 40% nitro, there was an extra 800 RPM (when loaded to around 22,000 RPM) at

12.5:1 versus 10:1 CR. Our reported results are from the engine set in this manner.

We ran four tests;

Test 1 – 10% nitro fuel (FAI F2D mix) using 3mm venturi

Test 2 – 40% nitro (with 20% castor oil, 40% methanol) using 3mm venturi

Test 3 – 10% nitro fuel using 3.5mm venturi

Test 4 – 40% nitro using 3.5 mm venturi

Hand starting is easy after one or two choked turns to prime the crankcase, without kick-back or tendency to "bite". The fine-thread needle gave about a half-turn range at peak before running became evidently rich or too lean. The test engine's Nelson HD glow plug element and the combustion chamber remained as new after testing.

The muffler (shared with Parra 2.5 engine) has a 6mm outlet diameter and an adapter sleeve for the Wasp's exhaust stub. A neat clamp ring holds it securely, without necessarily needing

Bore	12.5 mm (.492 in)
Stroke	11.8 mm (.465 in)
Swept Volume	1.45 cc (.089 cu in)
Weight (without muffler, AAC version)	89 g (3.14 oz)
Crankcase width at bearers	24 mm (.945 in)
Mounting bolt pattern	13 mm x 30 mm (.512 in x 1.18 in)
Length (prop mounting face to back plate)	54.7 mm (2.15 in)
Height (mounting face to top of head)	45.3 mm (1.78 in)
Intake opens	25 degrees ABDC
Intake closes	46 degrees ATDC
Intake duration	201 degrees
Exhaust duration	146 degrees
Transfer/boost port duration	130 degrees
Effective choke area	Variable, depending on selected venturi insert. Tested with 3 mm dia. (7.07 sq mm) and 3.5 mm dia. (9.62 sq mm)



Muffler is shared with larger Parra 2.5cc Mk 2 engine. With adapter ring in place, it neatly claps onto exhaust stub. Weighs 6.9g, trading good noise reduction for 400 RPM drop.

Propeller	Test 1 RPM	Test 2 RPM	Test 3 RPM	Test 4 RPM
APC 7x6	13000	14800	13800	15200
APC 7x5	14700	15800	15000	16500
APC 7x4	15900	17000	16800	18000
APC 7x3	19700	20800	20500	21300
APC 6x3	23800	24900	24800	26500
APC 6.3x4		20900		
APC 6.5x3.7		20500		
APC 6.5x5 trimmed to 150mm			19200	19700

respective best torque and power points are close, and at quite similar speeds. Up nitro to 40% with either venturi and the glow takes the lead. Also noteworthy is the glow's ability to maintain the fizz well after the peak BHP figure.

Flight Tests

We tried the Wasp glow in a modern 1/2A combat model. A stock, full 7x4 prop is handy, but a bit too much load for best performance. We switched to our trimmed and reworked Taipan nylon 7x4 turning almost 19,700 RPM flat out on the ground with 10 % nitro test fuel & 3mm venturi. APC 6.3 x 4 or 6.5 x 3.7 are good off-the-shelf options. Modern F2D props will have it over-revving in the air. Vibration is low, but we noticed slight fuel cavitation, leading to air bubbles in the fuel line when running with some propellers in the 20,000 to 22,000 RPM bracket. The engine coped well enough for it to be ignored. Lap times a little under 2.6 seconds (42 feet line length) at a practical setting that would hold during manoeuvres. If pushed hard towards the end of the tank, we could induce "going lean", but recovery was swift once levelled out.

The rules for our local 1/2A Profile Proto

a rear mounting bracket. It loses 400 RPM with APC 7x3 propeller, but noise reduction was very impressive, dropping from 97 dB A at 3 metres open exhaust to 85 dB A with muffler. The added back pressure smoothed out running and slightly improved fuel economy.

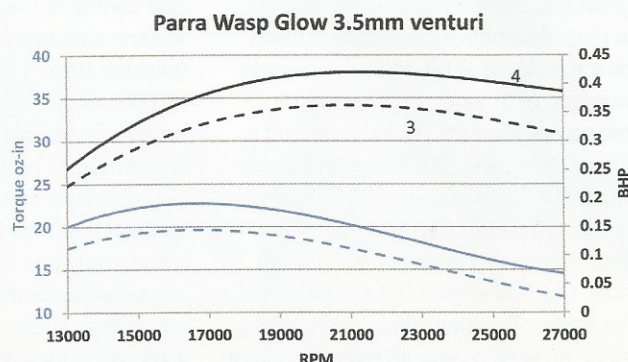
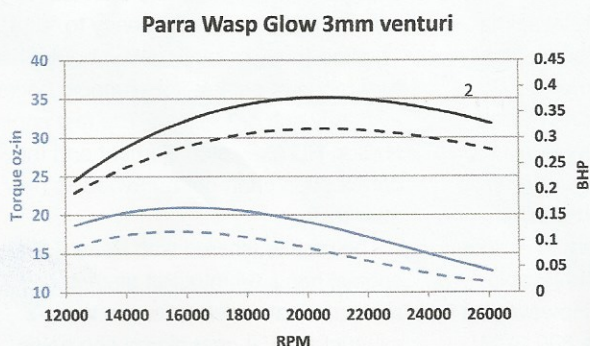
Performance Appraisal

With the 3mm venturi, a likely candidate for Half-A Combat application, and 10% nitro fuel, the broad power curve exceeds 0.3 BHP between 18,000 and 24,000 RPM, reaching full song at 0.32 BHP between 20,000 and 22,000 RPM. Maximum torque of 17.5 oz-in spans 14,000 to 16,000 RPM. Flight trials might show the smaller 2.8mm size to be a better choice in some instances, but the difference in

power output would be quite small. Unlike going for the 2.5mm venturi, which drops around 1,000 RPM in exchange for super consistency in tight turns. Upping nitro to 40% boosts output, making it a 19 oz-in .375 BHP engine.

Our second set of performance curves shows the effect of increasing effective choke area by 36% with the largest 3.5mm venturi intended for racing. Torque and power rise significantly with both fuels, essentially moving the curves up the scale, without greatly affecting their shape or respective peaking RPM. With 40% nitro, maximum 22 oz-in torque between 16,000 and 17,000 RPM and 0.425 BHP in the 20,000 – 22,000 RPM region are indicated.

The Wasp diesel has an edge over the glow version running on 10% nitro. The





External bulges mimic internal transfer passage profiles. Generous pathway over rear bearing area compliments large rotary intake valve for free breathing potential. Yet the Wasp doesn't need to run at fantastic RPM to deliver good performance.



Parra's Ukrainian made Wasp is a quality product at a fair price. Easy to operate and good power output.

Speed class mandate suction feed and limit glows to F2D Combat fuel (10% nitro methane content), putting them about even with the diesels. With Wasp sporting 3.5mm venturi, we achieved an average 137 KPH (85.2 MPH) for the standing one kilometre on its first outing, turning a trimmed APC 6.5 x 5 prop. Not far off the current 141 KPH (87.8 MPH) record held by the same model and a very lusty CTAH 1.5cc diesel. And this time we were taking off from grass, not concrete. Seeking more urge, we later tried a larger 4mm ID venturi and noted only a few hundred RPM gain.

Long-Run Appraisal

Before conversion to glow plug for these tests, our engine had earned its keep as a diesel for several seasons running flat out in 1/2A Combat. Reporting on how it fared mechanically, the ball races, crankpin, piston/cylinder fit remain in

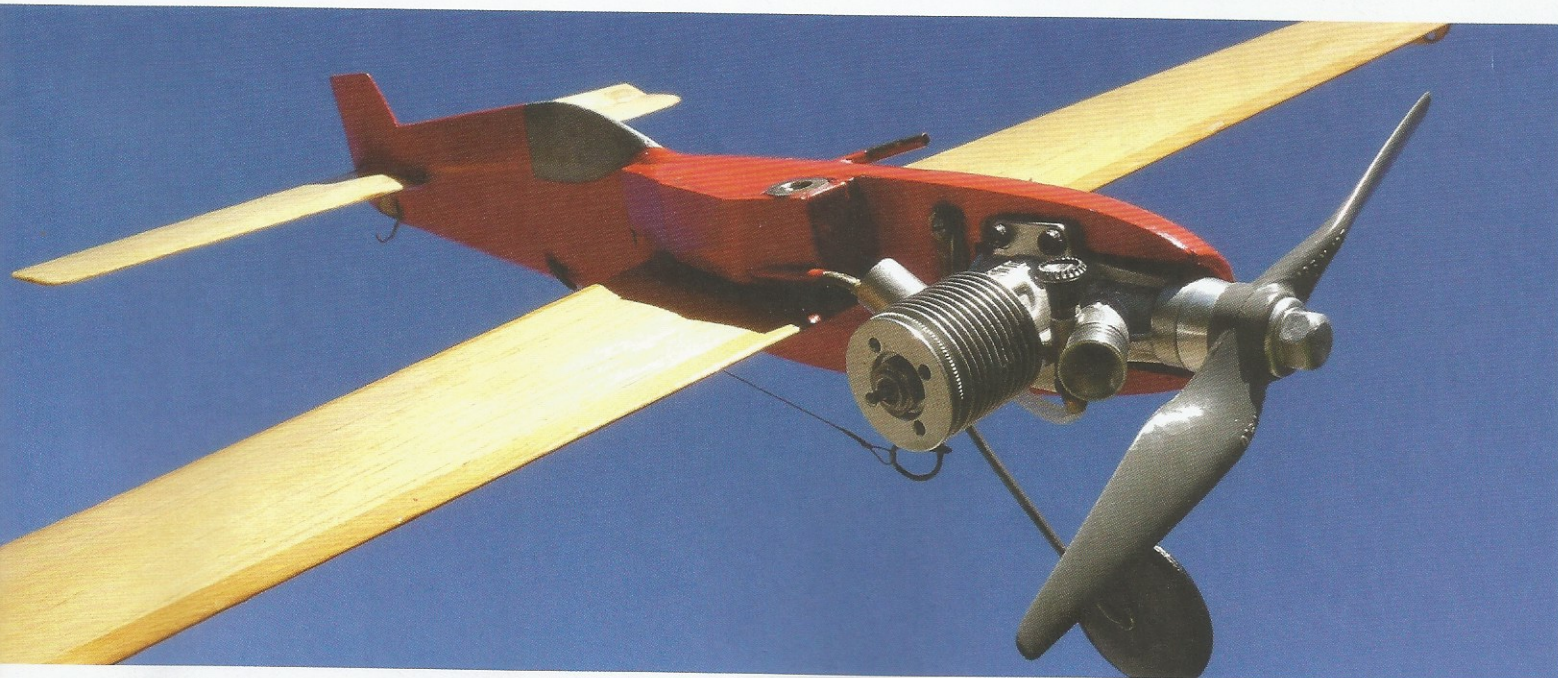
perfect condition. However, in that time, we noted excessive wear in the conrod little end bearing. A fresh conrod went in and we then increased the oil content in fuel from 15% to 20% as a precaution against a recurrence. Interestingly, after bench and flight testing for this review, we found that the big end bush in the replacement conrod had at some stage rotated somewhat, obscuring the two lubrication holes. Probably back when operating as a diesel. No harm done and it's the only time this has happened to one of our Parra engines. Since drilling the bush through the two conrod lubricating hole positions, the Wasp now turns 21,300 – 21,600 RPM with 4mm venturi and APC 7x3 propeller (a good "single test prop" indicator for peak power). I'd say at least 500 RPM gain from restoring the intended lubrication path to the conrod big end, meaning overall performance is slightly up on our reported,

Info:

Parra Wasp diesel or glow engines are available from EX2CL Control Line Equipment ext2cl@gmail.com Currently priced at Euro €130 for ABC and Euro €140 for AAC version. RC versions are Euro €10 extra.

very impressive test figures. With 4mm venturi fitted, just between you and me, subsequent timed flights at our secret test facility have put that Speed record in peril. Providing the Wasp is fitted with a higher pitch propeller that slows initial acceleration enough to avoid leaving the fuel behind, but picks up lost time once up to full speed.

Overall, a very satisfactory result for the Wasp. Anyone still thinking 1.5's are relative weaklings would be in for a surprise when they see a Wasp perform. Glow or diesel, the differences are not so great, unlike the days of yore when there were two different design paths. Reminds me somewhat of that final scene in the movie Babe. Where a piglet reared by farm dogs and believing he can do their work, perfectly rounds up the sheep at the dog trials - to the amazement of all. And the astute old farmer with knowing pride says "That'll do pig, that'll do." ●



Wasp does 1/2A Profile Proto Speed duty. Simple model. Simple set-up. Lap times around 2.1 seconds are not too quick for a novice getting the hang of flying with a pylon.