

# NovaRossi R 21 car

The alternative "Italian Job" tested by Mike Billinton.

IN REVIEWING THIS 'alternative' Rossi Open Car 3.5cc engine it is tempting to see conflict and personal idiosyncrasy in every detail design difference.

What strong convictions, for example, lie behind Ugo Rossi's continuing preference for the single Boost port, whilst Cesare found it necessary to build his 'own' Rossi with twin Boosts to pursue the point? Beyond that the differences abound. The temptation also is to arrive at a Solomon-like judgement in the unique and human dilemma of the Rossi split.

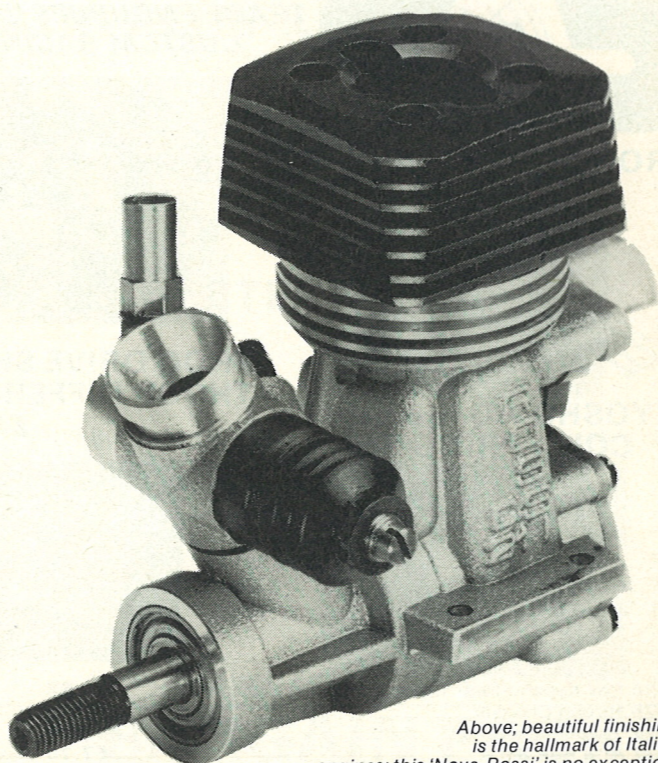
However, trying to maintain a grasp on the near-reality that engines are 'just' mechanical devices, the 'NovaRossi 21' has several interesting features which, taken together with the good performance figures, will make the coming season's car competitions that much more an 'open' and varied affair. The entry last year of the 'Rossi 21' (oil-cooled) would of itself have ensured that, but now there are two quite different Rossi's — with all the complications of loyalties and sympathies implicit in that situation.

Right; the internal components of the NovaRossi.

Overall, the 'NovaRossi' reverts to a more orthodox layout, whilst maintaining the high quality fit and finish which is a Rossi hallmark.

The one-piece **Crankcase** continues with the relieved area in the crank bore (opposite the induction opening), a feature which now has three separate suggested reasons to justify the extra production work involved:

1. It provides a lubrication reservoir to ensure a good oil seal of the Induction opening.
  2. Reduces wear at the vital timing edges of port in crankshaft.
  3. If the crankcase or shaft bends, the case cannot be 'gouged-out' at that point by the sharp edge of the crank port.
- The **Crankshaft** itself is an unusually large 13mm O.D. item (normal maximum size in this engine class is 12mm) and this has necessitated a special main bearing size to accommodate it. This has a high-speed plastic cage though the front race retains a standard brass cage.



Above; beautiful finishing is the hallmark of Italian engines: this 'Nova-Rossi' is no exception.

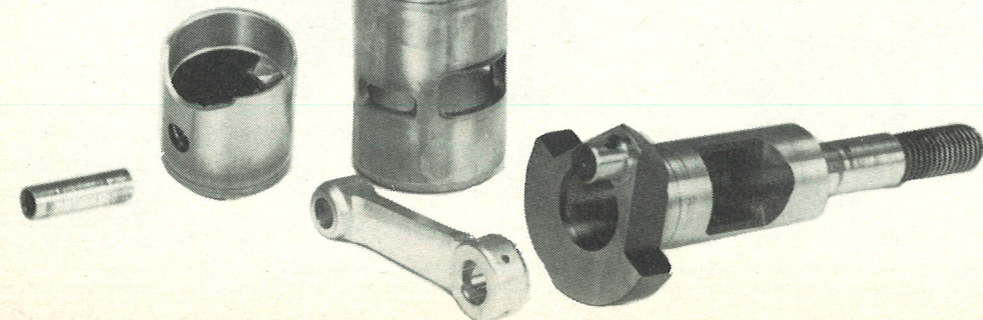
The **Crankpin** is diagonally drilled to allow oil to pass centrifugally from the Induction bore to big-end bearing.

The **Crankshaft bore** is now the largest yet, 9.6mm (i.e. equivalent to the largest current carburettor bores).

The **Slide carburettor** is actually 9mm bore, though the largish adjustable secondary needle and protruding jet then reduces the effective cross-section area by 10sq.mm to provide an unobstructed 8.2mm bore carburettor. The main jet adjustment is by screwdriver only, which on this test at least, was made easier by fixing a 1in. length of rubber tubing over the brass needle body to prevent motor vibrations throwing screwdriver off — a problem unlikely to occur in car operation.

The **bore and stroke** measurements are unusual in being almost identical... the 'square' engine; and the fine judgements required to arrive so close to the 3.5cc mark means that we now have a better idea of what causes Rossi engines to often skirt so near to class capacity limits. Any capacity checking on a very hot day might be a little 'tricky'. The aluminium alloy **connecting-rod** in this 'competition' version has received extra shaping and polishing for greater fatigue resistance. Two lubrication holes are provided at each rod end, with a phosphor-bronze bushing in the big-end only. Timing of the chromed brass **Cylinder** is not high at 164°, and so for car use this must be a conscious decision to forego the ultimate pipe HP at elevated RPM's in favour of higher torque at lower, more reliable, more useable RPM's.

There are rumours of HP claims for the 'NovaRossi' of 2.05 (RPM unknown) and it is possible that this could be for a 'Marine' version (which frequently employs higher exhaust timings leading often to higher HP) or else the 'Redhead' competition model. However, tied in with this is the fact that the



question of which tuned pipe design would lead to superior results on the 'NovaRossi' was unresolved during this test.

The matt-black finish aluminium alloy **Cylinder head** is a distinctive squat angular heat-sink design. It is sensibly milled away to allow any cooling air access to the glow-plug area. This particular engine arrived with a moderate **squish clearance** of .013in. but a high effective compression ratio of 9.7/1. On the top power/high nitromethane test runs this was probably the cause of some erosion of the combustion chamber and piston crown. It is understood that more recently the squish clearance is being increased to around .020in.

The deep, plug-in, aluminium **backplate** relies on an 'O' ring for sealing.

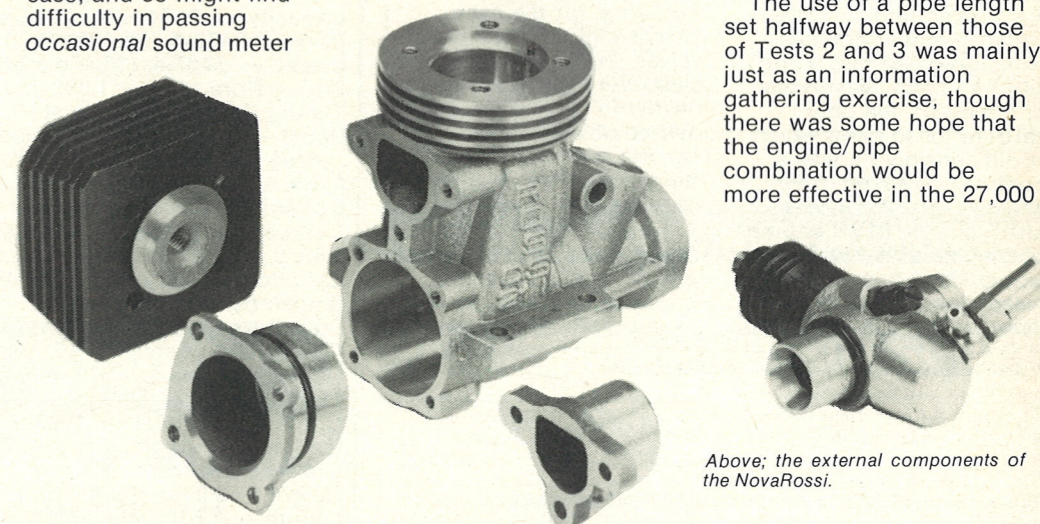
**Power Test 1:** Open exhaust/5% nitro. 10% castor & 6% ML70 synthetic oils/'NovaRossi' plug/9mm carburettor.

In this undemanding test format (used as much as anything as a familiarisation and running-in period prior to the later, high-power runs), the 'NovaRossi' produced the highest torque figure of this

test series, and a virtually equal top BHP), i.e. 50oz.ins. and 1.23 BHP.

**Test 2:** 50% nitro/OPS pipe set at 295mm from the end of rubber can to plug/Carburettor and glowplug as Test 1.

The difficulty of obtaining a 'NovaRossi' tuned pipe enforced the use of the 'standard equipment' OPS car pipe — no bad thing for comparative reasons, though it can leave unanswered questions. The 'Nova' pipe is understood to be a little noisy in any case, and so might find difficulty in passing occasional sound meter



Above; the external components of the NovaRossi.

scrutiny at race meetings. At the relatively long OPS pipe length chosen here, the resultant torque figure was again the highest recorded in this series (67oz.in.) with a final HP figure of 1.70.

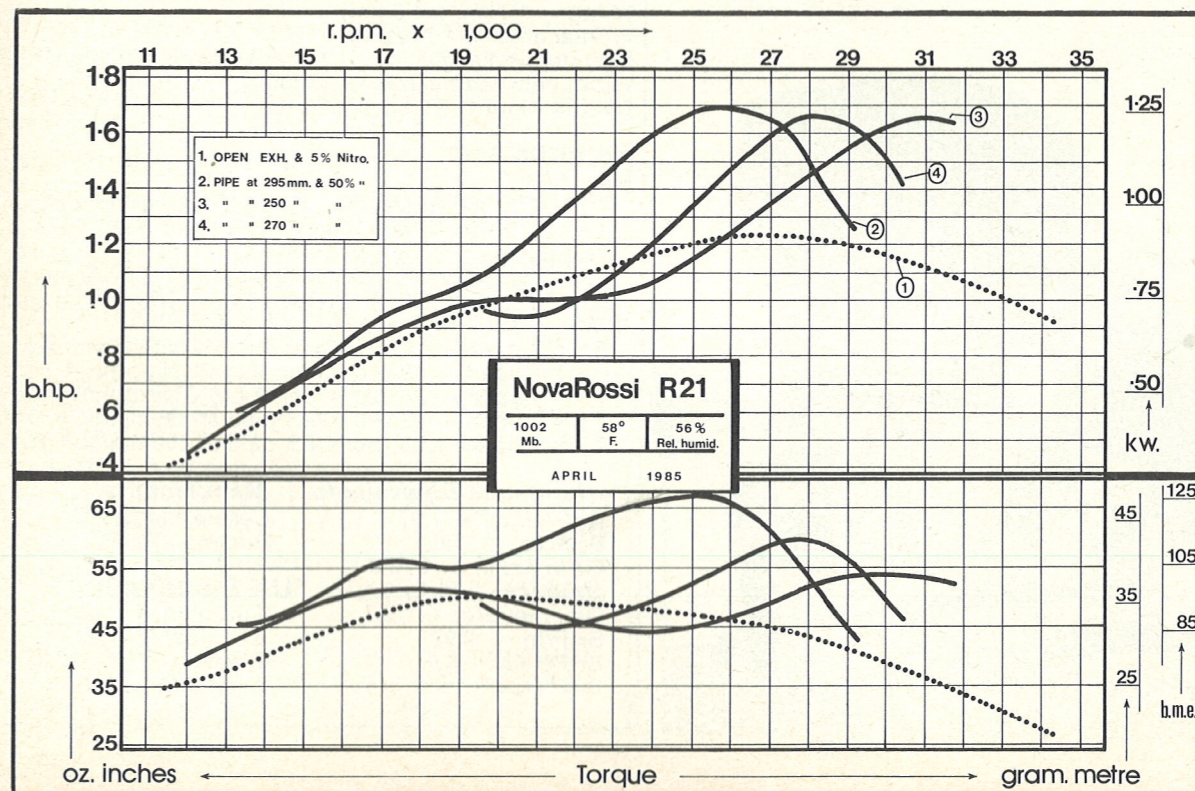
**Test 3:** Pipe length now shortened to 250mm. Rest of equipment as Test 2.

This change of pipe length was in the usual pursuit of maximum HP by the raising of RPM levels. Contrary to all expectations (and certainly unlike the oil-cooled 'Rossi 21' tested

recently), this did not result in an automatic HP rise, and furthermore caused a large decline in torque just in the most needed area of 19,000 to 25,000 RPM. The low exhaust timing of 164° may well be inhibiting such a result, though it must be said against this that the 'other' 'Rossi 21's' even lower 157° exhaust period did allow power to maximise at just past 31,000 RPM, using a pipe length of 250mm.

**Test 4:** Pipe length now fixed at 270mm. Rest of equipment as Test 2.

The use of a pipe length set halfway between those of Tests 2 and 3 was mainly just as an information gathering exercise, though there was some hope that the engine/pipe combination would be more effective in the 27,000



# Engine Test No. 19

to 28,000 RPM area. The graph indicates a lack of success, and if anything suggests that a pipe length even longer than the longest used in Test 2 (say around 305mm), might well provide interesting results. Unfortunately lack of time prevented this.

## Carburettor size change

Eagle-eyed readers will have noted that the customary large bore 9.5mm *Bailey* carburettor was not used throughout this test (due to mounting difficulties). Of course this raised the further question of whether the power levels were being fairly equated between earlier engines (which did use that 9.5mm item) and this 'NovaRossi'. In the event, the only carburettor to hand which could sensibly fit, was a control-line speed, open choke, O.S. 12mm bore unit from the 61VR engine, and which at the very least would show how much of a restriction the 'NovaRossi' 9mm carburettor had been.

As used briefly at the end of Test 4, and in retracing RPM steps from 20,000 to 29,150, it revealed virtually no change to the torque or RPM figures on given loads.

So, the implication seems to be that the 'Nova-Rossi's' standard carburettor and large crankshaft bore are already at some kind of optimum sizing. Of greater interest was that the lock-nut needle valve style gave much more precise control of fuel settings, and served to confirm to this writer that the majority of car engine carburettors continue to extract some price in rigidity in exchange for the easy accessibility of their needle valves. In the 'Nova-Rossi's' case, were the main fuel needle to receive the same degree of 'engineering' as has the secondary needle there would be absolutely nothing to comment on.

In other respects the slide carburettor was most effective, with smooth progressive idling, and just as importantly, remained a

good tight fit in the crankcase at maximum power points.

## Summary

Under trying circumstances Cesare Rossi has produced a fine engine, and its future on the car circuits will be watched, almost with bated

breath, by those who hold that human motivations are a very important aspect of I.C. engine development. On the solely technical side, no failures occurred, nor were any threatened — so reliability appears high, and helping towards this, one is happy to note again the continuing high quality of construction. □

## NovaRossi R21 Car. ABC Glowplug 2-stroke

### Dimensions & Weights:

Capacity — .2134cu.in. (3.497cc)  
Bore — .6472in. (16.44mm)  
Stroke — .6487in. (16.47mm)  
Stroke/Bore ratio — 1.002/1  
Timing Periods — Exhaust — 164°; Transfer — 126°; Boost — 126°; Front Induction — Opens 35° ABDC; Closes 62° ATDC; Total 207°.  
Exhaust port height — .230in. (5.84mm)  
Combustion chamber volume — .26cc  
Compression ratios — Geometric — 14.45/1 — Effective — 9.68/1  
Cylinder head squish — .0124in. (.31mm)  
Squish band angle — 4°  
Squish band width — .13in. (3.3mm)  
Crankshaft diameter — .5114in. (13mm)  
Crankshaft bore — .378in. (9.6mm)  
Crankshaft Nose thread — .248in. x 28 TPI (¼ UNF)  
Crankpin diameter — .1963in. (5mm)  
Gudgeon pin diameter — .1576in. (4mm)  
Con-rod centres — 30mm  
Height — 3.37in. (85.7mm)  
Length — 2.51in. (63.7mm) — (Backplate to front bearing)  
Width — 1.77in. (44.9mm)  
Frontal area — 4.71sq.in.  
Mounting hole spacing — 21mm x 37mm with 3mm holes.  
Width between bearers — 30mm  
Overall weight — 9.3ozs. (.26 Kilo)

### Performance:

#### Max. BHP

1.70 at 25,330 RPM. (OPS pipe/50% Nitro/9mm carb.)  
1.23 at 26,600 RPM (Open Ex./5% Nitro/9mm Carb.)

#### Max Torque

67 oz.ins. at 25,330 RPM (OPS pipe/50% Nitro/9mm carb.)  
50 oz.ins. at 19,020 RPM (Open Ex./5% Nitro/9mm carb.)

#### RPM on standard propellers:

8 x 6 Zinger — 15,850 (Open Ex./5% Nitro/9mm carb.)  
7 x 6 Taipan — 18,850 (Open Ex./5% Nitro/9mm carb.)  
7 x 4 Taipan — 24,120 (Open Ex./5% Nitro/9mm carb.)  
7 x 4 Taipan — 25,990 (OPS pipe at 295mm/50% Nitro)  
7 x 4 Taipan — 23,750 (OPS pipe at 250mm/50% Nitro)

#### Performance Equivalents

BHP/cu.in. — 7.97  
BHP/cc — .486  
Oz.in./cu.in. — 313.9  
Oz.in./cc — 19.16  
Gm. metre/cc — 13.7  
BHP/lb. — 2.92  
BHP/Kilo — 6.54  
BHP/sq.in. frontal area — .36

#### Manufacturer:

Cesare Rossi & Co.  
Rodengo Saiano, Italy.

#### UK Distributor:

Turbofan,  
5 St. John's Road,  
Clevedon,  
Avon. BS21 7TG.

Below; the NovaRossi sporting distinctive black anodised square cylinder head.

