

Lancia Group S Rally Car



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Sonic supercar



Rallying's equivalent of Star Wars was unveiled in Bologna at the weekend when Lancia's Group S project made an unexpected appearance during the Memorial Bettega event. The totally carbon fibre machine (from wheel rims to roof) has already

been tested in secret and the Turin engineers were greatly impressed with their latest creation.

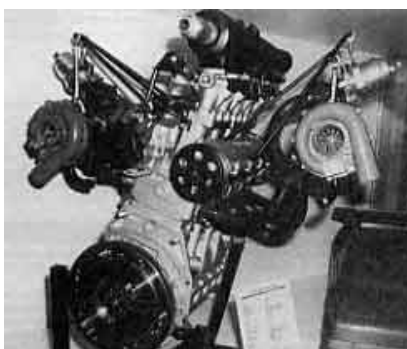
Twin turbochargers provide 600bhp and a completely new engine has been designed to replace the supercharged/turbo-charged unit in the now defunct Group B Delta S4. Officially, Group S is no more, dropped after the May tragedies, but while some parties reflect on what might have been had the exciting category been allowed to continue, others give knowing looks as they cover the supercar once more. Maybe there is a future after all ...

There can be little doubt that the new Lancia would have been stunning. It is one of those cars that looks like a winner, even if it is standing still. Officially, it is designated the Fiat Experimental Composite Vehicle (ECV), but it is no secret that it is the Group S project from Turin.

Designed, as was the Delta S4 and the new Group A Delta Turbo, by Claudio Lombardi, the car is a radical change from the challengers that it would have replaced. Composite materials (Kevlar and carbon fibre) have been used extensively to strengthen and lighten the car. The wheel rims and drive shafts are now also made of the new materials and the weight saving has been considerable. Only the regulations for rallying would have pegged the weight at 930kgs, but the new components represent a saving of up to 40 per cent in some areas.

The car's overall dimensions are largely the same as the Delta S4, but the main difference in performance will be measured in an increase of 150bhp and a further 15mKg of torque for the same revolutions per minute. And these are taken from the official starting figures, already well below the current figures being attained by the rally car ...

The body comprises a carbon fibre monocoque with Kevlar formed into a honeycomb structure. This entire tub is similar to that of the Ford RS200 and should be much stronger than that of the Delta S4. The monocoque is now an integral part of the load bearing structure of the car, designed by the latest CAD/CAM techniques.



Even the wheels are made of the latest materials. Speedline have manufactured the rims in a special project with Abarth, Enichem and IdC, aimed at producing a rim that would withstand the demands of gravel rallying and also be much lighter than the ubiquitous magnesium rims. The finished article is now 40 per cent lighter than those in current use, and apparently more than capable of withstanding the stresses imposed by the power output. The rims are made of carbon fabric impregnated with epoxy resin, with an aluminium honeycomb for the flange. In order to cope with the high temperatures developed by the ventilated Brembo disc brakes, an adhesive film has been used while the edges of the rims have been strengthened with a secret component. The total weight of an 8x16ins gravel rim is a mere 6kgs.

In total, the new car's structure is 20 per cent lighter than the S4 and this saving could be doubled with further development. The interior of the Group S Lancia is typically spartan but the crew would have been grateful for the carbon fibre monocoque that surrounds development.

To power the car, Fiat have patented a brand new cylinder head. As a twin turbocharged engine was being used, Fiat had to revise the layout of the cylinder head to improve the suitability for the set up. Normally, the inlet valves are on one side of the layout, exhaust valves on the other, but this makes a twin turbo engine difficult to produce. On the new unit, the four valves of each cylinder are laid out in a cross pattern with the inlet and exhaust valves alternated on each side of the cylinder head. An exhaust manifold can therefore be placed on each side of the engine with the inlet manifolds entering from the center, either independently or combined into one. The system is known as the double reverse flow and, as the intakes combine into one near the valve, leaving just three gas flows for each cylinder, the head has been christened the Triflux.



The system produces improved heat distribution in the cylinder head to even out the expansions that take place on a turbo unit, also helping to improve engine cooling. It is now possible to link a single central wastegate valve to the two exhaust manifolds and, if the latest variable geometry turbochargers are utilised, the wastegate can be eliminated altogether. The air that leaves the turbochargers is injected into the radiators or intercoolers before being passed on to the induction manifold and thence back into the cycle, while the compactness of the engine allowed the engineers much more

freedom to plan the exhaust system to eliminate resonance problems encountered in more crowded systems. The twin KKK turbochargers can be linked in a modular turbocharging unit, with a single turbo being used at low revs to build up power and then, when the revolutions are right, the second turbo comes into play to take the power even higher. With such a unit, high torque is produced at low revs with no loss of maximum power and greatly reduced turbo lag. It is the logical step forward from the present system of twin power provisions employed by the S4 engine, where the supercharger deals with low revs, the turbo producing the top end performance.

"I hope that we can maybe use the car one day," considered Lombard; in Bologna. "It is already tested and is 'Bene, bene'. Perhaps Group S turn in three or four years but, whatever happens, we have improved our knowledge of the technology and that can only be good for the future. It is possible to learn new things that can help."

LANCIA GROUPS RALLY CAR

Technical specification

Engine Centrally mounted, longitudinal with 4 cyl inline. 1795CC. Bore x stroke, 88.5mm x 71.5mm Triflux' double reverse flow cylinder head with 4 valves/cylinder and twin overhead camshafts. Compression ratio, 7.5:1. 600bhp @ 8000rpm.. 55mKg@5000rpm. Twin KKK (K26 type) turbochargers with individual intercoolers. Weber/Magnettili Marelli injection/ignition with electronically controlled turbocharging level. Dry sump lubrication with pressure and extraction pumps and air/oil radiators.

Transmission Four-wheel drive. Epicyclic train torque converter with viscous coupling and ZF differentials rear. Carbon fibre/Kevlar drive shafts. Provision for locking the central torque distribution (30/70, front/ rear). Twin-plate clutch with metal-ceramic friction gaskets. Five speed gearbox longitudinally mounted at rear.

Bodywork Load-bearing structure made of carbon fibre honeycomb with steel tube screen front structure. Bodywork mostly made of carbon and Kevlar resins, impregnated with epoxy resins.

Suspension Independent struts, coil springs and anti rolls front and rear. Co-axial Bilstein dampers at front, double acting Bilstein dampers at rear.

Brakes Front: Ventilated discs with twin-calipers and two 300mm diameter Brembo cylinders. Rear: Ventilated discs with single calipers and four 300mm diameter Brembo cylinders. Brakes operated through twin hydraulic pumps in parallel with manual balance adjustment.

Steering TRW rack and pinion with power assistance.

Wheels Composite material, Speedline 9ins x 16ins rims at front with light alloy 11 ins x 16ins at rear. Pirelli tyres

230/660-16 (front) and 290/660-16 (rear)

Dimensions

Wheelbase	2440mm
Track F/R	1500/1520mm
Length	4003mm
Width	1880mm
Height	1500mm
Weight	930kg (Group B)
Fuel capacity	25 litres