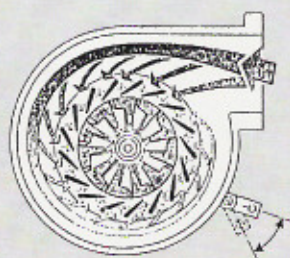


# A glimpse of the future



Lancia may be best known to the general public as a manufacturer of performance and prestige cars, but it has another vital role inside the Fiat Group. For it is, in effect, the research and development division of Fiat Auto, and the main source of innovation and design.

Past Lancia development projects now in full production usage include such things as four-wheel-drive, balancer shafts for the 2.0 litre engines, the 2000ie Turbo's over-boost system, servotronic power steering and the Thema 8.32's electronic damping control.

But what of future Lancia models; what new ideas will they contain? A good insight is given by looking at some of the projects currently under development.

## **Suspension**

A great many manufacturers are looking to suspension systems as one of the next big breakthroughs in development. 'Active suspension' is the goal: in this, hydraulic and electronic systems keep the car body at a constant ground clearance regardless of road surfaces, cornering and so on.

Such ideas are confined to Formula One race cars and specialised concept vehicles at present. But already in service are various 'adaptive suspension' systems in which manual or automatic operation of control devices can adjust the behaviour of conventional suspension – the Thema 8.32's electronic damping is one such system.

A more advanced system under development for future prestige Lancia models is air suspension in which four air springs connected to a compressor pump constantly correct the car's ground clearance in keeping with signals from three trim sensors.

Hence body oscillations can be kept



constant regardless of load. Spring rates can also be adjusted via a secondary chamber which can be connected for softer springing or cut off for stiffer. Damping control can in addition be electronically adjusted.

## **Wheelspin**

Micro-electronics have already made anti-locking braking a reality. Similar systems are now coming onto the market to improve traction by preventing wheelspin.

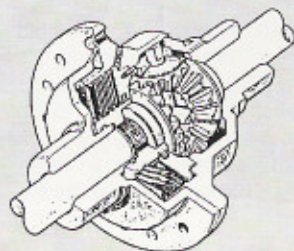
Lancia is at present testing its own variation – Antispin – which is said to be less complicated and therefore less expensive than others available. The principles are broadly similar, however; sensors monitor engine and wheel revs and a central processing unit compares speed differences between the driven and non-driven wheels.

If a significant difference is detected (i.e. the drive wheels are spinning), a step-by-step electric motor adjusts the engine throttle opening to reduce available power until the balance is restored.

## **Steering systems**

Electronics also play a major role in steering developments. Four-wheel-steering is the best known since Japanese manufacturers have hurried 4ws production vehicles onto the market already.

However Lancia has also been looking at 4ws, with mechanical, hydraulic and electric systems under study. These provide op-

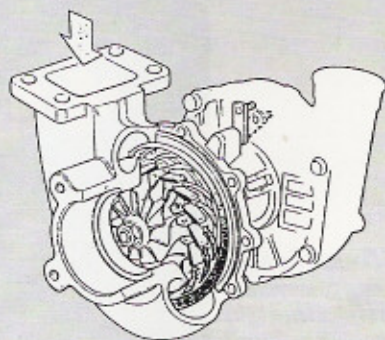


# Lancia has become the centre of innovation and research for the whole of Fiat Auto. Here we have a brief glimpse of some of the many fascinating new ideas under development

*The Lancia ECV2 - Experimental Composite Vehicle*



*Classic combination of sport and technology*



posite way steering for the rear wheels at low speeds and same direction steering at higher speeds. Obvious advantage of 4ws is its tighter turning circle for manoeuvring or parking. However transient stability at higher speeds can also be improved: with all four wheels steering, the car reacts less abruptly to sudden swerves.

A less well publicised steering improvement could be the substitution of electric for hydraulic steering assistance. Electric motor assistance would be proportional to the steering effort required and vehicle speed, using a torque sensor on the steering column to monitor these parameters. In reality the steering would only need assistance during parking or similar driving. Advantages of the electric system are its considerably reduced complexity, reduced energy absorption (the hydraulic motor takes about 3bhp to run and works constantly), steering assistance with the engine switched off and lower noise levels thanks to the absence of hydraulic valve gear.

Many of these new developments will find their way first onto Lancia's competition cars (just look at the technology on the Delta HF integrale, for example) and those that prove themselves here will one day be put into production for the benefit of every Lancia driver.

## **Lancia ECV2**

Lancia's intriguing ECV2 experimental ve-

hicle is a fascinating example of the way the company blends sport and technology in pursuit of engineering progress.

The original ECV (Experimental Composite Vehicle) was first seen in 1986. It was a test-bed for new technologies and materials based on the Delta S4 rally car, with four-wheel-drive and a twin-turbocharger engine. In the latest ECV2 version, the Kevlar and carbon-fibre body has been redesigned with improved aerodynamics: lift is reduced and airflow improved through the passenger cabin, the engine bay and to the brakes.

The centrally mounted, four-cylinder 1759cc engine has a patented 16-valve 'Triflux' cylinder head, with the valves arranged in a cross-like pattern to create three gas streams. This design was devised on ECV to allow 'modular' turbocharging, and this is now included on ECV2.

At low engine speeds all the exhaust gases flow into one turbo-compressor to give quicker response, while at higher speeds the exhaust flow divides and passes to both 'blowers' for maximum boost. The result is faster throttle response and reduced turbo-lag. A re-designed turbo circuit has also been fitted, incorporating water/air rather than air/air intercoolers. ECV2 is, then, both a means to explore possible future rallying ideas and a vehicle for researching the outer limits of turbocharging and aerodynamics.