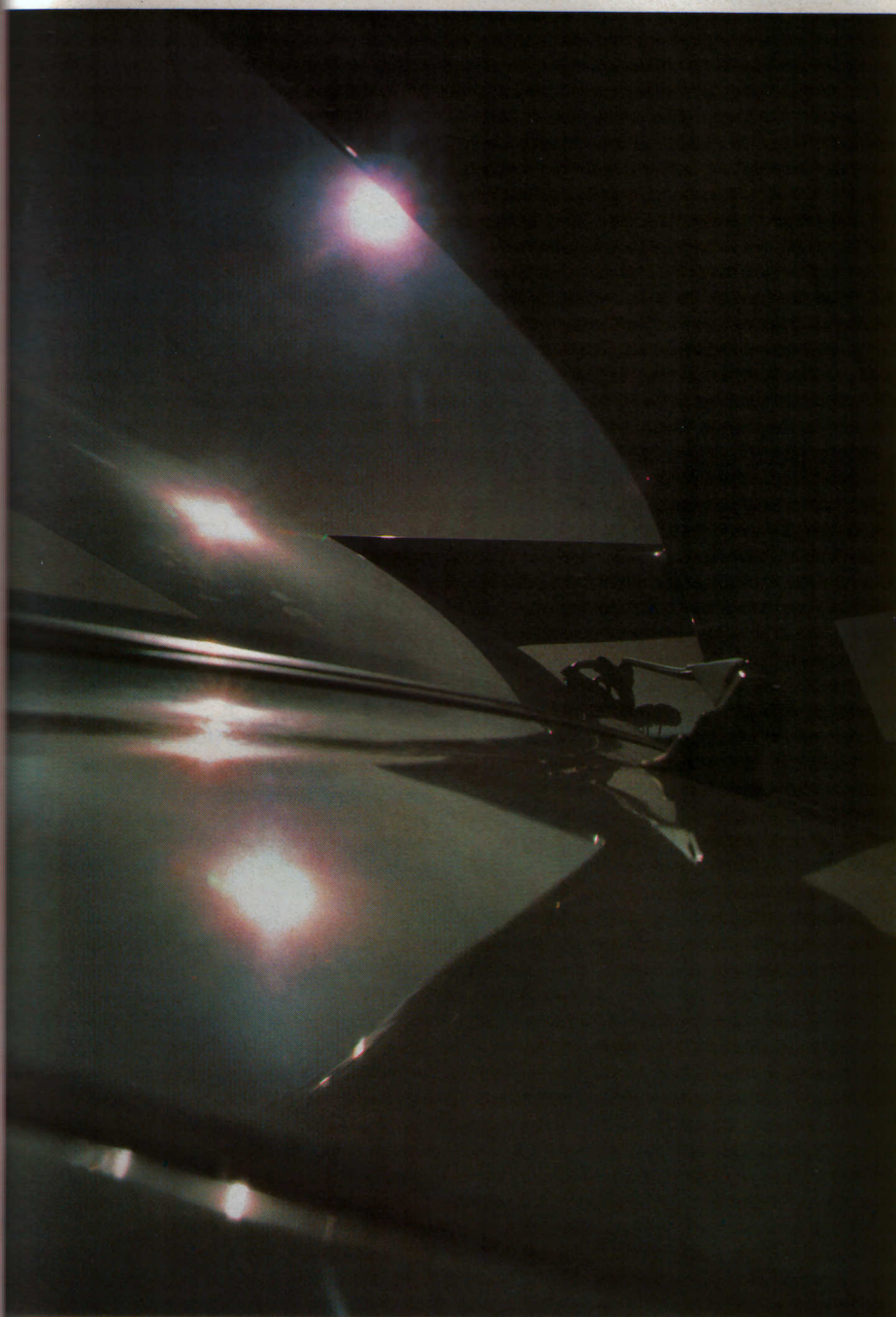


BREAKING



THE NERVOUS, edgy movement of fat, wide-rimmed tyres squirming over bumps and cambers may not be unfamiliar to anyone who has ever driven a single seater racing car. The way they shoulder the car to the side, climbing uneasily over minor ridges demands quick, high-g geared steering and a deft touch on the wheel.

It is the result of the changing shape of the tyre contact patches, those vital footprints that grip fiercely, but then let go as they change from oval to elliptical, or worse still wedge-shaped, on anything less than a billiard-table-smooth track. They need a Lauda-like computer to keep control, sensitive hands and seat-of-the-pants feelings to respond to sudden darts and deviations.

To anyone who has never driven a racing car, the experience can be unwelcome. With 200 horsepower in a 150mph road car, sensitivity like this can be problematical in the real world of cross-winds and potholes, cats eyes and manhole covers, even tramlines and pavé.

In the case of the Ford Sierra RS Cosworth, it might even be a question of breeding. Its chief rivals, the cheaper BMW 325i and the costly Mercedes-Benz 190 16-valve don't wriggle and writhe over every ripple in the road. Perhaps we have reached the stage where if you are going to make a silk purse of a street-legal racer, you shouldn't start with a sow's ear Sierra.

Yet if the BMW and the Mercedes were conceived as nobility and gentry from the start there is still a lot to be said for this *nouveau riche* Sierra which will blow the doors off both by some 20mph and reach 60mph a full second ahead of them. Appropriately enough, the two-litre Cosworth engine that provides the muscle to do it has the traditional red crackle finish on the cam covers like Ferrari's Testarossa. And like the original Testarossa which produced 300bhp from three litres, the RS Sierra produces 200 from two litres, 100bhp per litre both. . .

The twin-cam two-litre turbo with fuel injection and sixteen valves is the heart of probably the best high-performance power

THE JELLY MOULD

With a little help from Cosworth Engineering, the dumpy looking Sierra has been made to spit fire.

Eric Dymock drives Ford's 150mph repmobile

train ever installed in a Ford and one of the best ever installed anywhere. It is hard to believe it is built round a production T88 cast-iron four-cylinder engine block.

It revs magnificently, with hardly a trace of turbo lag, sweeping with a crisp metallic ring to flatten out its power curve around 5,500rpm and deliver its full complement of 204bhp at 6,000. There is no turbo hump, no nervy coming on the cam, just a swiftening of response from around 2,500. Gathering speed is a pure delight as you snick from gear to gear through the close-ratio Borg-Warner box that has a light, yet tough feel of which BMW or Mercedes might be proud. In fact remembering the rather woolly, lifeless change of the 190E-16, Mercedes would be better off with it.

Cosworth's connections with Ford barely need repetition. They have tapped generously on the genius of Keith Duckworth. What a long way they have come from the Cosworth addenda that 'converted' the modest Anglia into something that produced real speed rather than the rival 'conversions' that promised plenty of noise and racy coarseness but little more. There have been 47 engines produced jointly by Ford and Cosworth; one suspects not even Duckworth with his astonishing powers of recall could name them all.

This one satisfies the additional discipline of being able to be built in large numbers – well, large in comparison with any racing engine. Five thousand Sierra Cosworths will be made to qualify for homologation to Group A.

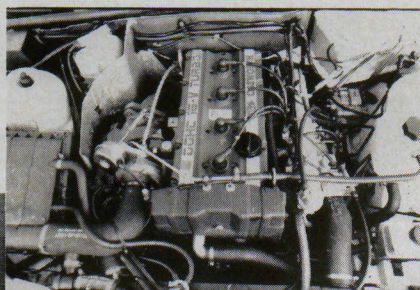
It will be a diffident market that does not absorb the 5,000 every year from the Genk plant where it will be made on a production line, much like many another Sierra, but supplying the range with the glamour and dash any manufacturer would envy. The cars will come in any colour you like so long as it's white, black, or a metallic blue to be known as Moonstone.

The Cosworth Sierra comes from the team that brought you the XR2 Fiesta, the RS Turbo Escort, and the amazingly successful 2.8i Capri. Starring Rod Mansfield, ex saloon car ace, Special Vehicle Engineering fills a number of roles within Ford besides that of creating production-derived specials.

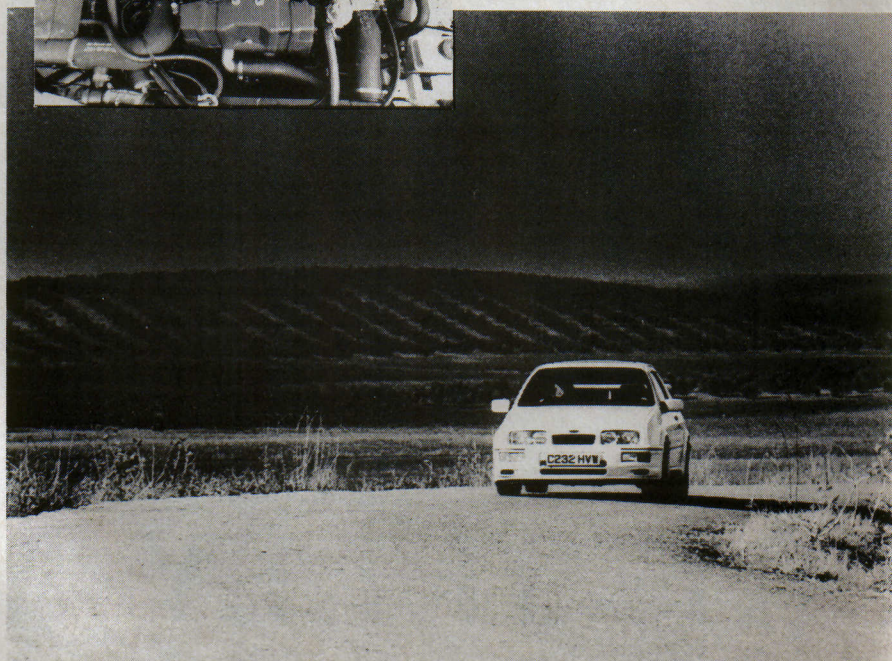
In the case of the Cosworth Sierra it was the basis for a trial run with Weber fuel injection. Providing a possible alternative to Bosch who dominate the market. Engine management is a way of life at Cosworth and it was important to get it right with the new engine.

Weber, anxious to get their joint Weber-Marelli installation into a production car had the capacity to work hard on getting it right, against Bosch to whom it would more likely be just another car. Besides, mainstream Ford wanted to see how it would work without committing themselves to a run of tens of thousands. It can be used on the RS Sierra with limited damage if it proves less than perfect.

In conjunction with a water-cooled Garrett AirResearch T3 turbocharger with air-to-air intercooling it seems to work well so far. The turbo is mounted on a classic exhaust manifold branching four into two into one which never went through the

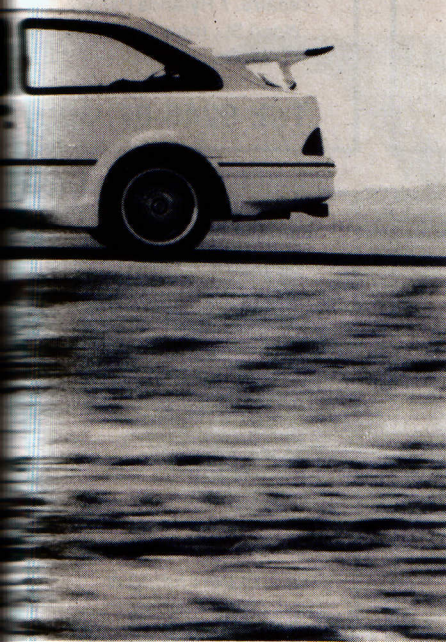


Cosworth 16-valve head, turbocharging and Weber/Marelli engine management adds up to 200bhp plus and minimal lag.



formality of ever being drawn – discouraging news for engineering draughtsmen. Computer graphics did it instead, working out the optimum length and gas-path diameter, then feeding the data to numerically-controlled machinery which made the master core patterns in wood.

There is plenty of extravagant material used in the engine. The exhaust is in cast nickel-iron, the con-rods heat-treated steel forgings, the sump gravity-cast alloy. The cylinder head itself is aluminium, manufactured by Cosworth Castings in Worcester whose selection by Mercedes-Benz to make



end of the engine range. This means the turbo can be set to do its best at low speeds, and diminish its urge at high, when the ECU gradually cuts off fuel to each injector in turn.

It's all nicely orchestrated to provide 80 per cent of maximum torque at only 2,300rpm, remaining above this all the way through to 6,500.

Four valves per cylinder allow short-duration valve openings which have the advantage of minimum overlap. In conjunction with a combustion chamber and piston crown shape aimed at maximum turbulence, that means exhaust gases tend not to recirculate and dilute the approaching intake charge.

The camshafts are driven by a Uniroyal half-round tooth section rubber belt, also responsible for the drive to the oil pump and distributor. Tappets are hydraulic and the shafts run in five bearings. Inlet valves are 35mm in diameter, the exhaust's 31mm and sodium-filling is another reminder of a practice pioneered on exotic racing engines to keep the valves in shape. Another internal cooling ploy is the provision of an oil spray rail along the lower edge of the cylinder bores directing jets to the undersides of the special forged aluminium Mahle pistons on each downward stroke.

The forged steel five-bearing crankshaft implies plenty of capacity for racing. Doubling the power output with more and bigger turbochargers would be quite feasible. "The bottom end is bomb-proof" according to Mansfield whose brief included making the RS competitive with anything yet seen on the European Touring Car Championship. With 350bhp already available, 400 on the cards, and practically anything else you want according to how much you like to turn up the turbo boost, this amazing Ford will need to be taken very seriously indeed.

It is all the more surprising therefore, to discover that even in relatively modest road tune, it is no fire-breathing, raucous, and thirsty half-racing car. It is a tractable, relatively quiet executive saloon that idles evenly and smoothly in traffic, and only lives up to its dramatic appearance when the driver wants it to.

It is instantly identifiable as a high performance show-stealer however. The big rear wing would see to that even if the wheel arch extensions and the deep skirts did not. The bodywork has been made wide enough to accommodate the 11in rims allowed under the regulations for which the RS has so carefully been designed.

The back wing does diminish the view you have of receding traffic. It cuts exactly across the vital part of the field of view, but is designed not merely to reduce lift, as with most cars, but actually create 20kg of downforce for the first time on a production saloon.

Louvers on the bonnet top help circulate air round a fairly crowded engine bay and although some of the sheet metal has been subtly modified and the add-ons do alter the appearance, the car remains strictly Sierra with a touch of 'Coo-er'.

Stripped-out racers are something Ford would prefer to leave to Austin-Rover, whose rally Metro by comparison looks

cobbled up by a back-street tuning shop. Electric windows in a racing car might sound like valet service on a windjammer but this is a luxury production car with cashmere upholstery and seats that give all the support and comfort you expect while applying all the lip-gloss and chic you might not.

Ford are not, so they claim, planning any 4x4 version. But it's worth remembering that when the RS specification was being drawn up, the four-wheel-drive Fords had hardly appeared. It'll be surprising if a 4x4 RS Cosworth is not under development to make the most of all that splendid power.

Anti-lock braking almost goes without saying from the manufacturer who was first to bring it to the world as standard equipment. There is a viscous-coupling limited-slip diff, and the price, when production gets under way in the Spring, will be something between £16,000 and £17,000.

But what about this handling?

Mansfield was quite open at the press sampling in Spain. "These are cars at a late stage of development," he said. "But not too late to change things." One advantage of doing small numbers (relatively small numbers; there are plenty of manufacturers to whom 5,000 cars is still a lot) is that a good deal of fine tuning can be done after ordinary drivers have had a go at the cars. In the case of the motoring hacks some of these drivers are very ordinary indeed, but at least they do point up the problem of having development engineers who are highly skilled, even gifted at the wheel, and on whom this nervous, edgy handling makes few demands.

Certainly, to many enthusiasts it represents a challenge, the feeling of being in a car as close to a racing car as possible, to get the sensations of control that the heroes of the track get is what a sports car is all about.

Yet it does demand constant concentration - no bad thing perhaps - and lots of tiny steering corrections even on a relatively straight road if there are any cambers or bumps that set those contact patches dithering. It is the result of the compromise imposed by the Sierra's semi-trailing arm rear suspension. Mansfield believes the best is obtained by getting the ride height about right, then playing with rear camber angles to achieve a suitable combination of ride, handling, and roadholding.

It is really such a matter of taste from then on that cars can be tuned to suit individuals if necessary. Most of the motoring writers-turned-development-engineers took the view that the turn-in was too quick, and the tracking and tramlining too severe. Special Vehicle Engineering will probably re-set the suspension, locating the rear trailing arms more positively and despairing perhaps of finding drivers good enough to appreciate what they are given, introduce a little sog by dropping the steering ratio from 2.6 to three turns lock to lock.

Either way the racers will probably change it back. But the enthusiastic roadburner will have a car that makes less demand on his skill. And Ford will still have their Instant Classic in any case.

the 16-valve head for their rival engine is about the closest the Germans can get to a Royal, 'By Appointment' warrant.

The turbo, fuel injection and ignition are all part of the ECU or Electronic Control Unit developed by Weber and Marelli which provides the astonishing absence of turbo lag. The way it measures air intake mass by reading engine speed and air density (sensors determine this from air pressure and temperature in the inlet manifold), then compares it with a theoretical ideal in its micro memory, makes you wonder how we managed without it before. We did of course, getting by with those lumpy, uneven engines that wouldn't skin rice pudding below 3,000rpm but set the back tyres alight at 3,250.

It is all carried out by electrical pulses that determine the fuel each injector is allowed, according to what the ECU thinks is good for it. The engine is stiff with more sensors besides that one in the inlet plenum. Throttle position obviously counts; it is fed into the computer by a potentiometer attached to the inlet butterfly. Engine speed is signalled by a trigger on the crankshaft pulley. Together with a phase sensor inside the distributor, the ECU determines the position of each piston on its stroke, enabling it to control the spark advance and start the injection pulse.

That's not all. The ECU also actuates the turbo wastegate which doesn't work like a turn-off tap when the pressure gets too much. It calculates speed and load, and progressively reduces boost at the top