

# ESCORT RS TURBO



# RS

## The Pedigree

The MK II RS 2000, easily the most popular production RS Escort.

Cutaway drawing of the BDA engine, showing the 16-valve layout, and the belt drive to the camshafts.



The new Escort RS Turbo is a thrilling reminder that Ford has been one of the biggest names in motorsport ever since Henry Ford started designing, building and racing his own cars at the turn of the century.

Way back in 1901 — before Ford Motor Company was founded — he defeated the American champion, Alexander Winton, after a thrilling duel on the Grosse Pointe track in Michigan.

Three years later, Henry Ford established a world record for the mile when he was timed at 91.4 mph on the frozen surface of Lake St Clair. His car, dubbed 999 after an exceptionally fast New York Central Railway locomotive, was a stark single-seater with a four cylinder, 18.9-litre engine.

Pioneering feats of that calibre pointed the way for future generations. Fords have since notched literally thousands of victories all over the world, from events organised by local clubs to



the Monte Carlo Rally and four consecutive victories at Le Mans.

In the high-speed, high-technology world of Grand Prix racing, cars powered by the Ford-Cosworth DFV engine won 150 of the 218 events they contested between 1967 and 1982. It provided the speed and reliability to make Graham

Hill, Jackie Stewart, Jochen Rindt, Emerson Fittipaldi, James Hunt, Mario Andretti, Alan Jones, Nelson Piquet and Keke Rosberg rulers of the Grand Prix roost.

Although nobody realised it at the time, one of the most significant landmarks in motorsport's long history was reached towards the end of 1968. That was when Ford

commissioned Keith Duckworth of Cosworth Engineering to design a small 'family' of very special power units.

One was the 1.6-litre BDA. Complete with twin overhead camshafts, four valves per cylinder and a brace of twin-choke Weber carburettors, it was destined to power Ford's first Rallye Sport car — the crisp and charismatic RS1600 Escort.



Like the new Escort RS Turbo, the RS1600 had a split personality. Although very

fast for its day — top speed was about 115 mph — the standard version with 120 bhp on tap at 6500 rpm was essentially a civilised, road-going proposition. It had more performance than many rakish two-seaters, but was quite content to potter down to the supermarket or take the children to school.



But the engine, transmission, suspension and all other critical components could be modified to make the RS1600 a race and rally winner whose blistering pace was blended with an equally essential characteristic. It was reliable.

Launched in 1970, Ford's first RS remained in production for nearly five years and is now cherished by collectors of classic post-war cars. Most were built by Ford's Advanced Vehicle Operation in Aveley, Essex, where guest-of-honour Graham Hill revved the first car off the assembly line.

The RS1600 was still a newcomer when a 1.8-litre,

pushrod-engined Escort won the incredibly gruelling World Cup Rally from London to Mexico City. That tremendous triumph was soon commemorated by the launch of the Escort Mexico in November 1970.

Although not given the RS initials, the Mexico combined Ford's 1.6-litre, 86 bhp engine with the RS1600's reinforced bodyshell, gearbox, back axle, brakes, suspension and instrumentation. Initially priced at £1150 — about 25 per cent less than the RS1600 — the Mexico was an immediate success on the road and in competition.



In broad terms, the Mexico paved the way for the arrival of the first Escort RS2000 in 1973. The high-revving, 16-valve BDA power unit was replaced by Ford's more conventional 2-litre 'Pinto' engine with 100 bhp on tap at only 5750 rpm.

Although considerably more refined than the RS1600 or the Mexico, the newcomer packed a healthy punch.

During an *Autocar* test it bridged the 0-60 mph gap in 9.0 seconds, reached 108 mph and averaged nearly 27 mpg.



Thanks to its popularity, Ford's Advance Vehicle Operation sold more cars in 1974 than in 1973, despite the fuel crisis.

Curvaceous styling gave way to crisper lines when the Mark II Escort made its debut in 1975. Sure enough, the range included two high-performance models — the RS1800 and RS2000 — for enthusiasts seeking family-sized cars with more than their fair share of panache.



The RS1800, powered by a bored-out, alloy-block version of the BDA engine, was immediately praised for its sizzling performance.

excellent handling and refined interior.

Its stablemate had a 110 bhp version of the 'Pinto' engine under the bonnet and was distinguished by a wedge-shaped nose of flexible polyurethane. Together with other aerodynamic aids, it gave the RS2000 a drag coefficient 16 per cent lower than the rest of the range. Rear-end lift was reduced by a dramatic 60 per cent.

The *Autocar* testers extolled the value-for-money RS2000's excellent performance and superbly comfortable front seats while rocketing from zero to 60 mph in just 8.6 seconds.

More recently, the great RS tradition has been maintained by the front-wheel-drive Escort RS1600i. But now comes the most exciting car ever badged with those charismatic initials. Ford's new Escort RS Turbo



# RS

## The Winning Formula

2 Turn the clock back to Mexico City on May 27, 1970. The cheers and champagne are for the indomitable Ford Escort driven by Hannu Mikkola and Gunnar Palm who have won the World Cup Rally forty days and a mind-boggling 16,243 miles after leaving London.

The epic event, the longest rally of all, could only have been won by an exceptionally fast, safe and reliable car crewed by an equally superb two-man team.



Highlights worthy of a Hollywood film script included a South American special stage where they had to average well over 50 mph for nearly 600 miles on rough mountain roads more than 12,000 energy-sapping feet above sea level. Oxygen supplies for crews and their mechanics were just as essential as fuel for the cars.

There was no shortage of top-class opposition from works and works-backed teams, but five of the World Cup Rally's first eight places went to the rugged, hard-charging Escorts. Naturally enough, Ford's trophies included the coveted team prize.

It was probably the greatest of many triumphs for a very special breed of car whose name has become synonymous with victories in rallies, races and other motorsport events all over the world. Escorts developed and built under the RS banner have performed prodigious feats in the hands of headline-hitting world champions. At the all-important grassroots

level, they have also given many young hopefuls their first real taste of competition at club level.



Launched in 1968, when the potent Twin Cam model laid firm foundations for the RS1600, the Escort wasted no time establishing itself as the car to beat. Roger Clark, Bengt Soderstrom, Hannu Mikkola, Gilbert Staepelaere and Yvette Fontaine notched no fewer than eleven major rally victories during that first season. Racing drivers Frank Gardner and Jackie Oliver,

competing in the British Saloon Car and European Touring Car championships, ended the year with ten outright or class wins.

The RS1600's arrival on the scene was just as spectacular. In March 1970, two months before the 16-valve sizzler went on sale to the public, Roger Clark won the Circuit of Ireland Rally. The sure-footed car's tremendous speed and stamina made it perfectly clear that Ford technology had opened a new set of floodgates, unleashing a tidal wave of RS Escorts to sweep the opposition aside.

Two years later, five works Escorts tackled the 3700-mile East African Safari Rally. It was the toughest event in the international calendar — a fast-moving nightmare of mud

and dust — and had never been won by an overseas driver. The pundits were convinced it never would be, because local knowledge was essential, but Stuart Turner, Ford's team manager, was quietly confident in his cars, drivers, mechanics and organisation.

But even the most optimistic Ford fan was keenly aware that the Escorts would have to fight every inch of the way. Their 1.8-litre RS engines developed little more than 200 bhp while the 240Z Datsuns were cranking out in excess of 260 bhp. Sobieslaw Zasada's 911S Porsche was another serious contender in an event which involved averaging a bone-jarring, stomach-churning 75 mph along tracks rarely used by anything faster or more sophisticated than wandering cattle.

Two of the 5 works Escorts entered in the gruelling 1972 East African Safari Rally.



and spectators alike. Rivals came and went, but the Fords kept on winning. More than four years have passed since the switch to front-wheel-drive, but the Mark I and Mark II RS models are still taking the victor's laurels in club events.

The rally was won and lost in remote areas where even the strongest cars were certain to be damaged. Ford alleviated that problem by perfecting a ground-to-air link between the cars and an aircraft laden with mechanics, tools and spares.

The strategy worked. Recovering from early setbacks, Mikkola and Palm stormed into the lead, beat Zasada by 28 minutes and shattered the deep-rooted Safari myth. Other members of the team hammered home the Escort message by finishing third, fifth and eighth.

Mikkola's famous victory — one of the brightest feathers in the Escort's cap — was not just a flash in the East African pan. Five years later, the Silver Jubilee Safari — nicknamed the "Noah's Ark Safari" because it was lashed by tropical storms — fell to the Ford of Bjorn Waldegard and Hans Thorszelius. Battling through floods, they vanquished works entries from Fiat, Peugeot, Datsun and Lancia.

Coincidentally, 1977 was also the year when Jody Scheckter and his Wolf gave the 3-litre Ford-Cosworth DFV engine its 100th Grand Prix victory.

Closer to home, Escorts ranging from near-standard to super-tuned were a dominant force in motorsport throughout the 1970s, delighting drivers

Few world-class events punish man and machine more than Britain's annual RAC Rally, where very high average speeds must be maintained on Forestry Commission tracks surfaced with nothing more than gravel. The classic had not been won by a British driver for more than a decade until Roger Clark, navigated by Tony Mason, turned the tide with his 2-litre RS Escort in 1972. It was the perfect end to a season in which Clark became the British National Champion by adding the RAC trophy to first places in the Mintex, Granite City, Welsh, Jim Clark Memorial, Burmah-Castrol and Manx International rallies.

Incredibly enough, Clark's great drive was the first of eight consecutive RAC Rally wins for the RS Escorts. Timo Makinen completed an unprecedented hat-trick in 1975 and Clark won again in 1976. Waldegard maintained Ford's stranglehold in 1977 before Mikkola completed the sequence in 1978 and 1979.



During that period, Escorts also proved their pedigree on snow and ice while winning class and team prizes in the tough, prestigious Monte Carlo Rally.

The glory years of the 1970s were made additionally memorable by literally hundreds of victories on race tracks in Britain, Germany, Belgium, Holland, Spain, Italy, Finland and elsewhere. Nothing if not versatile, Escorts also won ice-racing events and clinched the British and European rallycross championships.

But the Escorts were not the decade's only RS-badged Fords. Spectacular RS2600 and RS3100 Capris were raced by such famous drivers as Jackie Stewart, Graham Hill, Niki Lauda, John Surtees and Emerson Fittipaldi. In 1972, RS2600s finished first, second and third in the 24-hour race at Spa in Belgium. The winning car, driven by Hans Stuck and Jochen Mass, ran as smoothly as a high-speed train to cover 2793 miles at 116.4 mph.

Escorts came within an ace of winning the World Rally Championship in 1977 and 1978, but champagne corks were popped the following year. Powered by 2-litre BDA engines developed to deliver



a reliable 240 bhp, the Fords came first in Portugal, Greece, New Zealand, Canada and Britain.



Waldegard would almost certainly have added the Monte Carlo round to the list had spectators not rolled rocks into the road on one of the last stages. As it was, he finished just six tantalising seconds behind the winner.

Although the RS designation went into cold storage when the current, front-wheel-drive Escort arrived in 1980, the 'old' model was still perfectly capable of beating the best in the world.



That was proved in 1981 when 29-year-old Ari Vatanen — the latest in Ford's long line of flying Finns — became the World Champion rally driver in his Rothmans-backed, 260 bhp RS Escort.

It was as if King Arthur and his Knights of the Round Table had returned to fight and win one last great battle.



Roger Clark's RS1600 hurtling clouds of dust on his way to first place in the 1975 Scottish Rally.

# ESCORT RS TURBO

White Hot

Like its illustrious predecessors, Ford's spine-tingling new Escort RS Turbo combines a sophisticated family car's space, versatility, comfort and driveability with all the nitty-gritty potential to win rallies and races.

It has been carefully developed by Ford's talented Special Vehicle Engineering team whose other resounding successes include the Capri 2.8 Injection and Special, Escort XR3i, Escort Cabriolet and Fiesta XR2.

They are confident that the eye-catching Escort, with its blend of advanced technology

and traditional RS reliability, will set new standards in Group N and Group A events. It is now the car to beat — just like the rear-wheel-drive RS Escorts which made such a tremendous impact on motorsport in the 1970s.

Ford is building at least 5000 RS Turbos — the minimum number required for homologation in Group A — and they are being sold only by official Rallye Sport dealers.

It is the first volume production turbocharged car to be manufactured in Europe by Ford and also the first front-wheel-drive car in the world to be fitted with a limited-slip differential as standard equipment.

The 1.6-litre, fuel-injected power unit develops an adrenalin-pumping 132 PS at 6000 rpm, but is designed to be 'street flexible' as well as potent. Peak power and torque figures are

respectively 26 per cent and 30 per cent higher than the XR3i's.

One of the great advantages of the turbocharger concept is that it gives you power with tractability and also the potential to extend the power ceiling for competition use.

But even a completely standard Escort RS Turbo bullets from zero to 60 mph in a breathtaking 8.2 seconds as you whip through the five-speed gearbox. Top speed is

125 mph and effortless 70 mph cruising keeps the tachometer needle just under the 3500 rpm mark\*.

An aerodynamically efficient shape complements the powertrain and makes the RS Turbo surprisingly economical for such a potent performer. It does an official 35.3 mpg at 56 mph and a commendable 30.7 mpg at 75 mph\*\*.

Sports suspension similar in concept to the RS1600i provides a comfortable ride plus razor-sharp handling and huge reserves of grip from the wide, ultra-low-profile tyres.

The ability to maintain consistently high speeds over everything from grippy tarmac to slippery, rib-rattling special stages is the stuff of which champions are made. Such driving makes efficient brakes just as important as a potent engine and sure-footed roadholding, so the RS Turbo's system includes ventilated discs for the front wheels.

Despite being the ideal basis for a front-running competition car, the Escort cossets driver and passengers alike. Standard equipment includes Recaro

seats and an all-stereo audio system.

Like all previous Special Vehicle Engineering cars, the new RS Turbo is available only as a complete package. It has been developed from the popular XR3i using experience gained by Escort competitors in national championships throughout Britain and Europe.

The design incorporates many of the Rally Sport parts which form the basis of cars competing in the very successful Ford Escort Turbo Rally Championship.

\*Ford test figures.

\*\*For Government fuel consumption test figures, see Specifications.



# ESCORT RS TURBO

The Driving Position



The turbocharged Escort has not sacrificed comfort for its rally pedigree, fully-adjustable Recaro seats are standard up front.



6 The traditional sports car made you pay for your pleasure. It was noisy. Comfort and convenience were sacrificed for acceleration, top speed, handling and cornering. Luggage was no problem as long as you travelled with nothing more bulky than a telescopic toothbrush.

The new Escort RS Turbo is completely different.

Its superb, bred-for-competition power unit, transmission, steering, suspension and brakes are matched by a spacious and sophisticated interior with all the versatility you expect to find in a three-door hatchback. Such qualities are a reminder that the RS is based on the world's best-selling car.

The soft-feel, three-spoke steering wheel gives a clear view of the fast-moving Ford's neat binnacle — thoughtfully glazed to prevent reflections — whose clearly calibrated instruments are electronically stabilised to give very accurate readings. Pride of place naturally goes to the speedometer and its matching tachometer.

The warning lights include a special 'clean hands' display with micro-processor to monitor brake-pad wear, fuel, coolant, oil and screenwasher levels. All can be checked from the driver's seat.

The stubby, slick-shifting gear lever is perfectly located. So are the pedals.

Back-seat travellers have not been overlooked, because the RS Turbo's specification includes three seat belts for the roomy rear compartment.

If the standard car is not sufficiently lavish, the special RS Custom Pack puts icing on the cake with a slide-or-tilt glass sunroof, central locking and electrically-operated front windows. Ford's advanced ECU1 all-stereo system is a further option.

# TURBO

## The Powerful Solution



The turbo installation on the Escort RS features an air-to-air intercooler and revised inlet porting to increase power output.

8 Ford's mile-eating new Escort RS Turbo is based on the delightfully potent XR3i, but has a lot more muscle thanks to the smooth efficiency of a Garrett AiResearch T3 turbocharger.

Although flexible and free from temperament, the 1.6-litre turbocharged engine punches out 26 per cent more power than its naturally-aspirated counterpart. Torque is increased by a massive 30 per cent to provide vivid acceleration without dropping down through the five-speed gearbox.

Why does the turbocharger make such a dramatic difference?

An internal combustion engine is very like an athlete. In both cases, efficiency depends on how much energy-giving air can be inhaled and then put to the best possible use. The T3 turbocharger, a remarkable piece of precision engineering designed to spin at more than 100,000 rpm, harnesses gas that would otherwise vanish through the exhaust system. It drives a turbine, directly connected to a compressor in the intake system, which increases the pressure of air entering the engine.

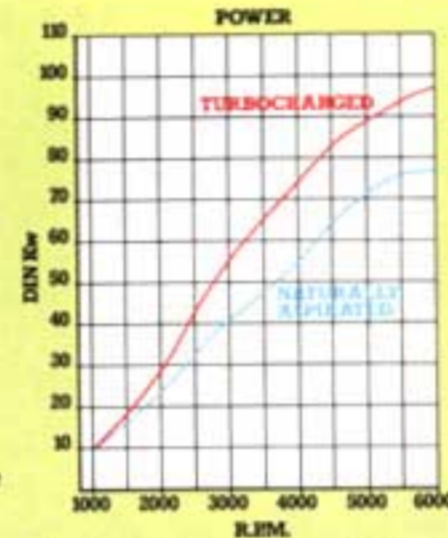
But there is obviously a limit to how much boost even the strongest engine can take. The turbocharger therefore has an integral wastegate — basically a special type of safety valve — which limits the engine's maximum boost to 0.25-0.50 bar, depending on operating conditions.

A simple experiment with a bicycle pump reveals just how hot air becomes when subjected to even a modest amount of pressure. Temperatures are therefore reduced by passing pressurised air through an air-to-air intercooler mounted alongside the radiator.

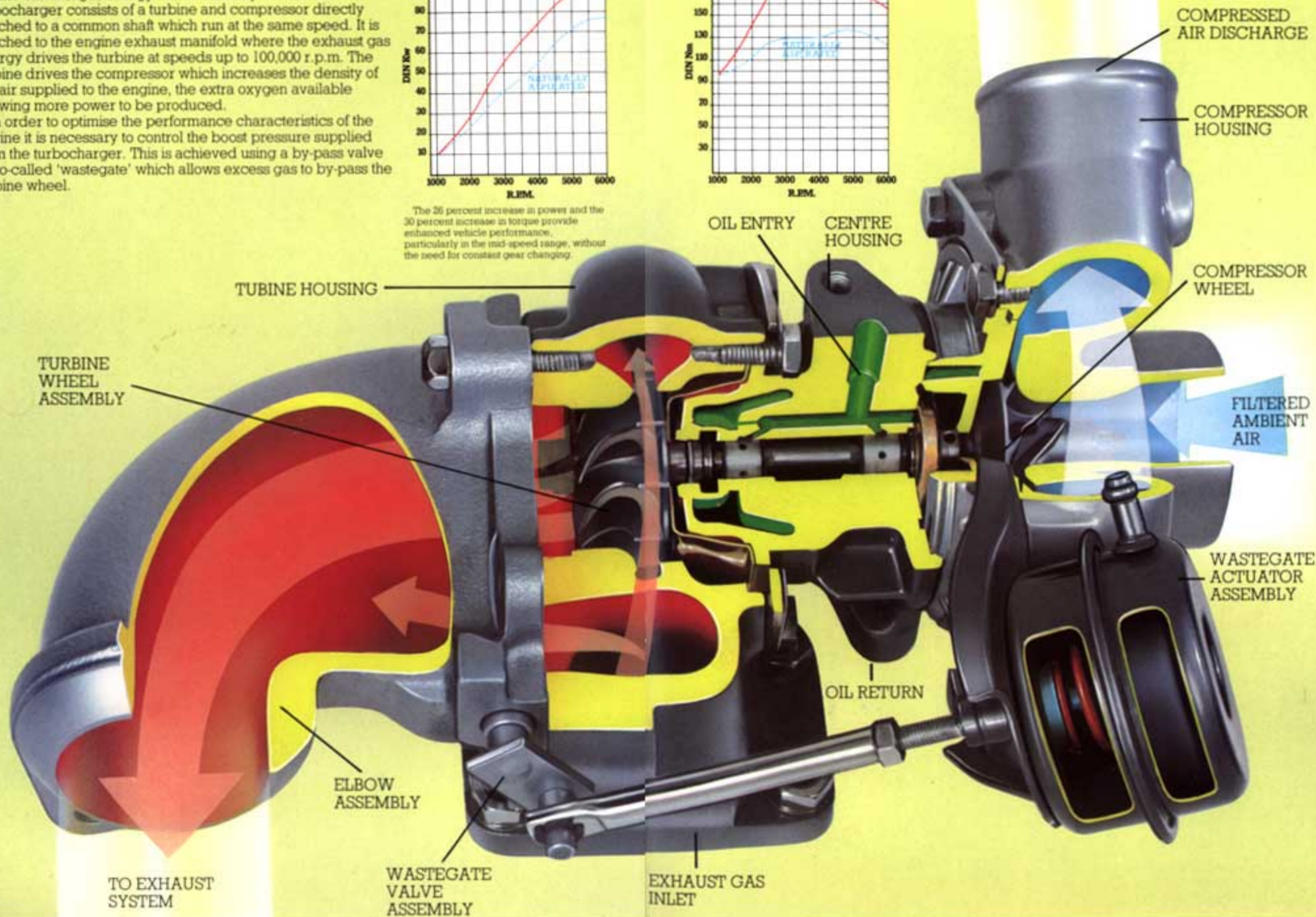
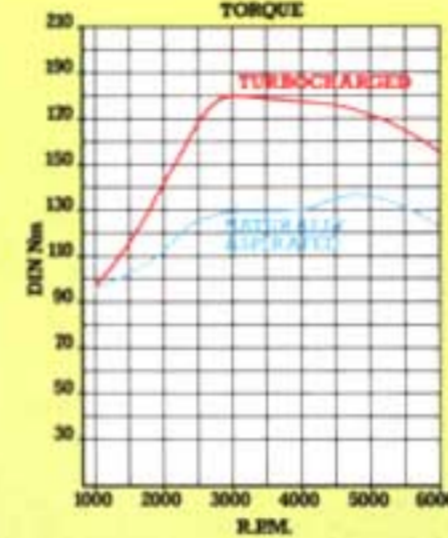
What is a turbocharger and how does it provide such a significant gain in engine performance?

A turbocharger is a compressor which is driven by the engine exhaust gas energy that is normally wasted. The turbocharger consists of a turbine and compressor directly attached to a common shaft which run at the same speed. It is attached to the engine exhaust manifold where the exhaust gas energy drives the turbine at speeds up to 100,000 r.p.m. The turbine drives the compressor which increases the density of the air supplied to the engine, the extra oxygen available allowing more power to be produced.

In order to optimise the performance characteristics of the engine it is necessary to control the boost pressure supplied from the turbocharger. This is achieved using a by-pass valve or so-called 'wastegate' which allows excess gas to by-pass the turbine wheel.



The 26 percent increase in power and the 30 percent increase in torque provide enhanced vehicle performance, particularly in the mid-speed range, without the need for constant gear changing.



Intercooling also increases the engine's overall efficiency, because a cool "charge" is significantly denser therefore containing more power-generating oxygen than a hot one.

Precise control of the RS Turbo's air-to-fuel ratio is handled by a new, electronically-controlled Bosch KE-Jetronic fuel-injection system at boost pressures up to a maximum of 0.5 bar.

Ford's CVH or Compound Valve Hemispherical Head engine has a single, belt-driven overhead camshaft and new pistons — appropriately strengthened and reprofiled — which lower the compression ratio from 9.5:1 to 8.3:1.

The robust pistons also have tapered second rings — they increase oil flow to the upper cylinder bores — and are joined to their connecting rods by thicker gudgeon pins.

To cope with the Turbo's extra power, the big ends have heavy-duty, copper-lead bearing shells in place of the XR3i's aluminium-tin components.

But the XR3i's main bearings proved completely adequate during extended durability testing which included the equivalent of more than 37,000 miles at the Escort RS Turbo's 125 mph maximum speed\*.

Sodium-filled exhaust valves and revised, fully-machined inlet and exhaust porting are other important features.

Thanks to revised valve timing, and extensive development work in other critical areas, the 1.6 CVH has an exceptionally 'flat' torque curve for a turbocharged car. Boost is detectable right down at 2000 rpm. Torque climbs to 180 Nm at 3000 rpm while the power curve's 132 PS peak is reached at exactly twice that crankshaft speed.

\*Ford test figures.

# TURBO

Power on the road

10 Many facets of the RS Turbo's scintillating character recall Ford's long-term role in the USA's space programme.

The electronic ignition system works in conjunction with a micro-processor which offers full electronic control of the ignition advance. Stored digitally in the micro-processor is a three-dimensional "map" containing 256 pre-set timing points determined by exhaustive dynamometer testing. It makes sure that each spark plug is fired at its optimum ignition timing for any combination of engine speed, load and boost.

The micro-processor also provides electronic control for the turbocharger system by tailoring its boost to a wide range of operating conditions and incorporating several safety features. For instance, if the inlet manifold temperature exceeds 65 degrees Centigrade, maximum boost is reduced to 0.25 bar and held at that level until the temperature drops.

The risk of over-revving this lively engine is removed by a

fuel cut-off triggered at 6400 rpm and an ignition cut-out set to operate at 6800 rpm.

Standard XR3i gear ratios are used in the five-speed, transmission, but the heavy-duty clutch is uprated to cope with the extra power.

Wheel spin is reduced and handling enhanced by a new type of limited-slip differential — the first ever fitted to a

front-wheel-drive car. A viscous coupling using a silicone fluid locks the differential progressively as the wheel spins faster. This advanced system eliminates the snatch and noise typical of most mechanical alternatives while significantly improving handling, traction and the life of the front tyres.

The Escort RS Turbo's

refined, competition-bred suspension features front wheels located by two longitudinal tie-bars like those used on the RS1600i. Escort XR3i front struts with Girling Monitube dampers are fitted in conjunction with stiffer springs while the rear suspension benefits from the addition of an anti-roll bar.

Up front, ventilated disc brakes additionally cooled by ducts in the deep spoiler are



balanced by drum brakes at the rear. The picture is completed by RS-type light-alloy wheels with 6" rims for the Escort RS Turbo's ultra-

low-profile Michelin MXV 195/50 VR15 tyres.

The thoroughbred Turbo's sporting pedigree is proclaimed by body-coloured mouldings for the bumpers,

aerodynamic aids and radiator grille. The rear spoiler also matches the bodywork — and that's the view most people are likely to get of the new fast Ford.



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