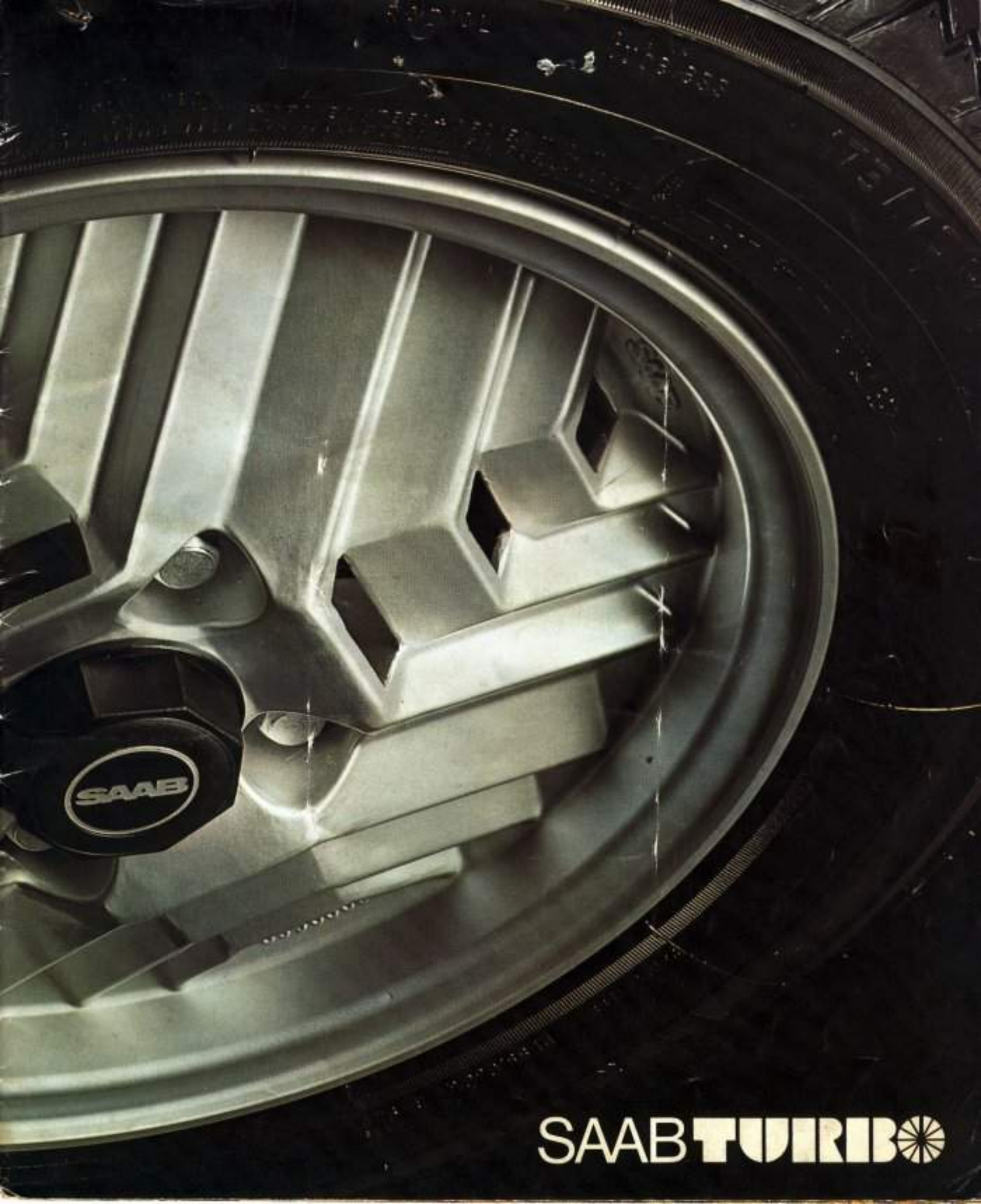

SAAB TURBO


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Now that the world's motoring press has had its say, it's your turn to experience the SaabTurbo.

The SaabTurbo was presented to the world in September 1977 at the International Motor Show in Frankfurt. The motoring journalists of leading newspapers and motoring periodicals converge on the Frankfurt Show every year. And this year, the Saab stand was virtually swamped by motoring experts who wished to make the acquaintance of the sensation from Saab of Sweden.

What they saw was the first-ever truly roomy and comfortable family car powered by a flexible turbocharged engine—the first turbocharged car to be matched to everyday realities, whilst having a massive reserve of power for use whenever it's needed.

To motorists who make strict demands on their cars, the SaabTurbo is good news.

Are you interested in a car which has a proven record of almost unbeatable road safety? Are you interested in a comfortable ride? Do you need a roomy, practical car? And do you still want performance very close to that of a fast sport car? But do you insist on a reasonable fuel consumption? If your answer to the above questions is yes, the SaabTurbo will fit you like a glove.

But let the SaabTurbo speak for itself on the road.

There is no shortage of fast cars. But hardly any are as safe in overtaking as the Saab Turbo.

A top speed of 195 km/h and from rest to 100 km/h in 8.9 seconds. These are impressive figures, although perhaps slightly theoretical. After all, we hardly ever use the power resources in this way, not even on the German Autobahn.

The true strength of the Saab Turbo is its acceleration and verve in the range of speeds between 60 and 160 km/h— the range where overtaking is safer since it is quicker.

The turbocharger begins to deliver extra power at engine speeds as low as 1500 r/min. And at 3000 r/min, the torque is up to 24 kgf m, i.e. 45% higher than when the turbo-charger is not in operation.

Sparkling acceleration. Front-wheel drive and exceptional road-holding. And lavish space and comfort as well. What else would you wish for perfect joy of driving?

Four-cylinder, 2-litre turbocharged fuel injection engine. Peak DIN output: 107 kW (145 hp) at 5000 r/min.

Comprehensive instrumentation, including tachometer and pressure gauge for the turbocharger.

Rear springs combined with Bilstein gas shock absorbers. Pivot-mounted front springs.

The rear spoiler raises the top speed, improves the stability and reduces the fuel consumption at high speeds.

Powerful disc brakes, equipped with the newly-developed semi-metallic linings at the most exposed points in the system.

The SaabTurbo has robbed sports car drivers of their exclusive right to fast cars with turbocharged engines.

Turbocharged engines have traditionally been reserved for powering very fast and expensive sports cars. Cars which were usually outside the reach of the average motorist.

But we have changed all that. The SaabTurbo is the first conventional family car to be powered by a turbocharged petrol engine developed along entirely new principles.

A turbocharged engine matched to a new energy approach.

The turbocharging of engines has been known for many years. The first turbocharged engine—a diesel engine for stationary applications—appeared during the 1930's. By the 1950's, turbocharging had matured sufficiently to be introduced on trucks and buses.
The first turbocharged car was not launched until 1961. The primary aim in the turbocharging of car engines was to attain as high a top speed as possible. The aim on trucks was to raise the tractive effort to a maximum.

The aim in the development of the Saab Turbo was entirely different. Our primary goal was to match the turbocharged engine to present-day demands for better fuel economy, better environment on the roads by lowering the exhaust gas emission, and reduced noise. But without compromise on the performance. High performance is obviously important for safe overtaking—and for the joy of driving, which is the ultimate proof of the general quality of the car.

A further goal was to attain a high level of power even at low engine speeds —to improve further the excellent low-speed performance of the conventional fuel injection engine. This aspect is extremely valuable to the everyday motorist. In addition, we considered it important to restrict the weight of the car as far as possible.

Our many years of development work has resulted in a unique turbocharged engine. The turbocharger of the Saab Turbo runs only when it is needed— such as when accelerating, when overtaking and on uphill gradients. When accelerating in top gear, the surge of power can be experienced at road speeds down to 60 km/h. But in lower gears, it obviously starts appreciably earlier. Under normal conditions—during 80–85% of the time on the road —the turbocharger is inactive. The engine then runs as the conventional fuel injection engine—at its acknowledged low fuel consumption.

1. The "brain" of the Turbo engine—the charging pressure valve or waste gate as it is sometimes known—is designed to control the charging pressure and by-pass excess exhaust gases across the turbine.

2. A small, light, exhaust gas driven turbo-charger which comes into operation smoothly and provides a true surge of power.

The Saab Turbo represents an entirely new approach in turbocharging.

We have long searched for new ways for increasing the performance of the conventional fuel injection engine. But we were not prepared to accept the disadvantages of the traditional approach.

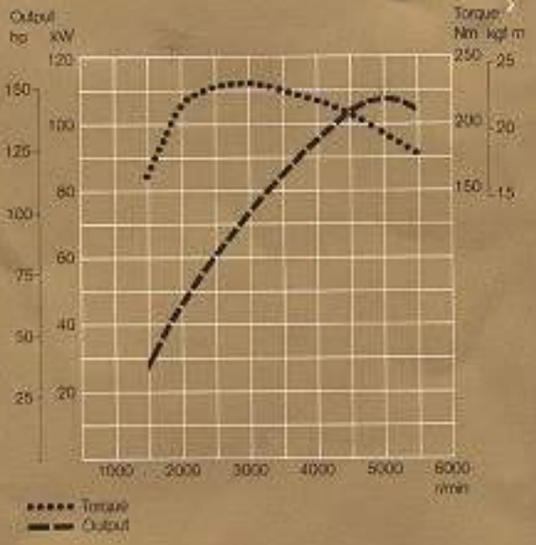
If the output of an engine is raised by increasing the number of cylinders or the swept volume, the weight of the engine will increase and the efficiency at part-throttle will be reduced. The fuel consumption of a six-cylinder or eight-cylinder engine is thus high under all conditions. After all, the additional pistons are always running and consuming fuel, regardless of the actual power demand.

"Tuning" is another common means of increasing the performance of an engine. But tuning usually raises the peak engine speed and thus causes in-

creased wear. A higher compression ratio, optimised valve timing, etc. improve the peak performance. But our main aim was to produce an engine with a high torque at low engine speeds, since this offers an appreciably improved acceleration and, in our opinion, is a more sensible approach than increasing the number of cylinders or tuning.

This is how a traditional turbocharger works: The turbocharger consists of a turbine and a compressor, mounted on a common shaft. The turbine is driven by the exhaust gases from the engine. The larger the throttle opening and the higher the engine speed, the larger will be the flow of exhaust gases and the turbine will rotate at increasing speed.

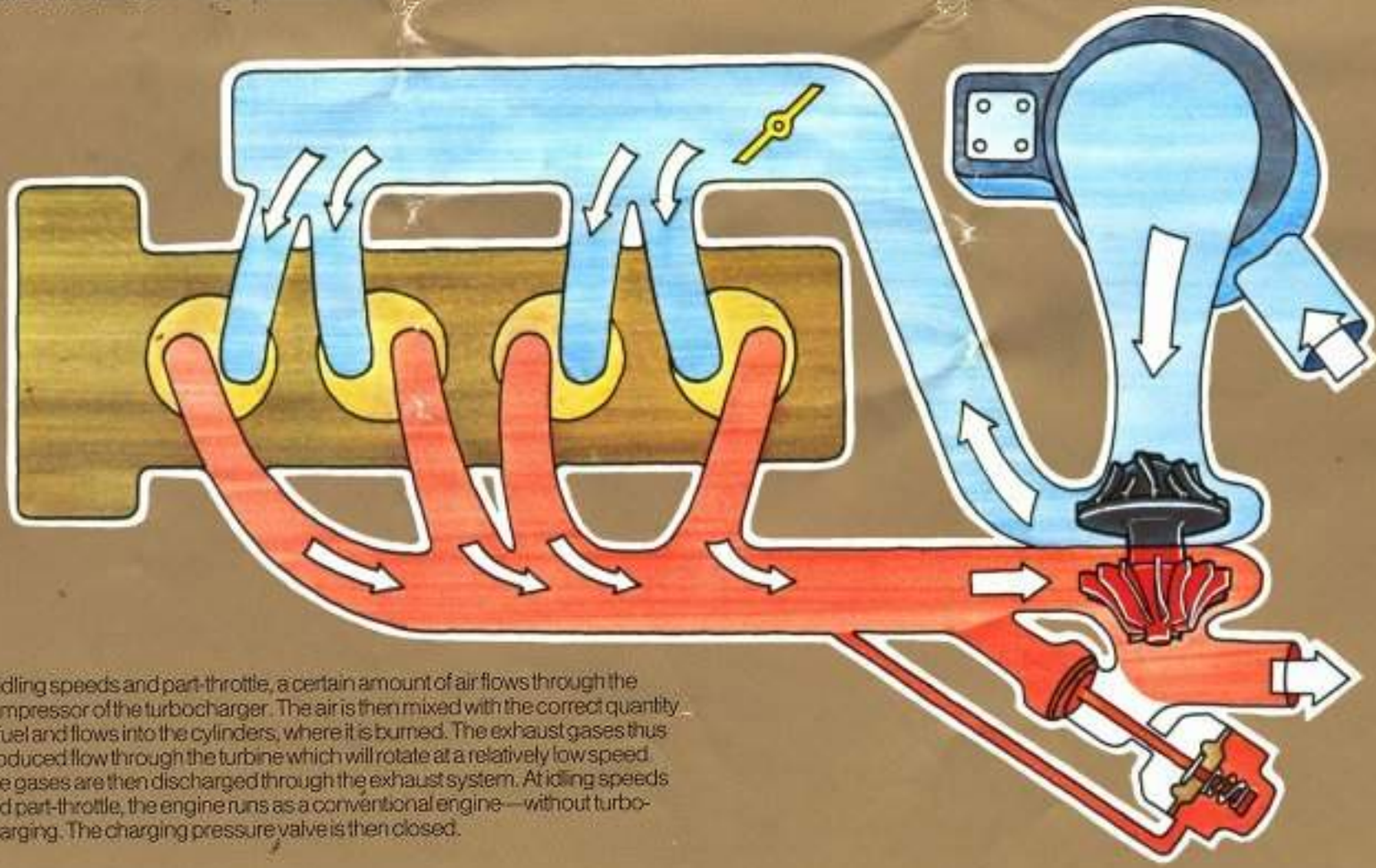
At exactly the same rate, the compressor delivers fresh fuel/air mixture to the cylinders at a higher pressure than normally. The quantity of air is thus larger than when the engine draws the air itself. This extra air and



a suitably matched additional fuel supply liberate more energy during every piston stroke. The torque will be higher and this, in turn, results in a higher pulling power.

We have matched the turbocharged engine to everyday needs—ahead of all other car manufacturers. We owe this primarily to the sturdiness of the standard Saab engine. Since its basic components already incorporate extra reserves of strength, turbocharging involved relatively modest modifications.

How does the engine of the SaabTurbo differ from other turbocharged engines? On high-performance sports cars, a high output at high engine speeds is most important. Our aim was instead to achieve a high torque even at low engine speeds. In other words, we aimed at making turbocharging effective in the range of road speeds where extra power is particularly important, especially from the safety aspect. Our turbocharger therefore comes into operation at engine speeds around 1500–2000 r/min.



At idling speeds and part-throttle, a certain amount of air flows through the compressor of the turbocharger. The air is then mixed with the correct quantity of fuel and flows into the cylinders, where it is burned. The exhaust gases thus produced flow through the turbine which will rotate at a relatively low speed. The gases are then discharged through the exhaust system. At idling speeds and part-throttle, the engine runs as a conventional engine—without turbocharging. The charging pressure valve is then closed.

The fact that the Saab turbocharger comes into operation at such low engine speeds is due to its size. Our turbine is small and needs a relatively low gas flow to accelerate up to its normal running speed. So it is able to provide a boost already at low engine speeds.

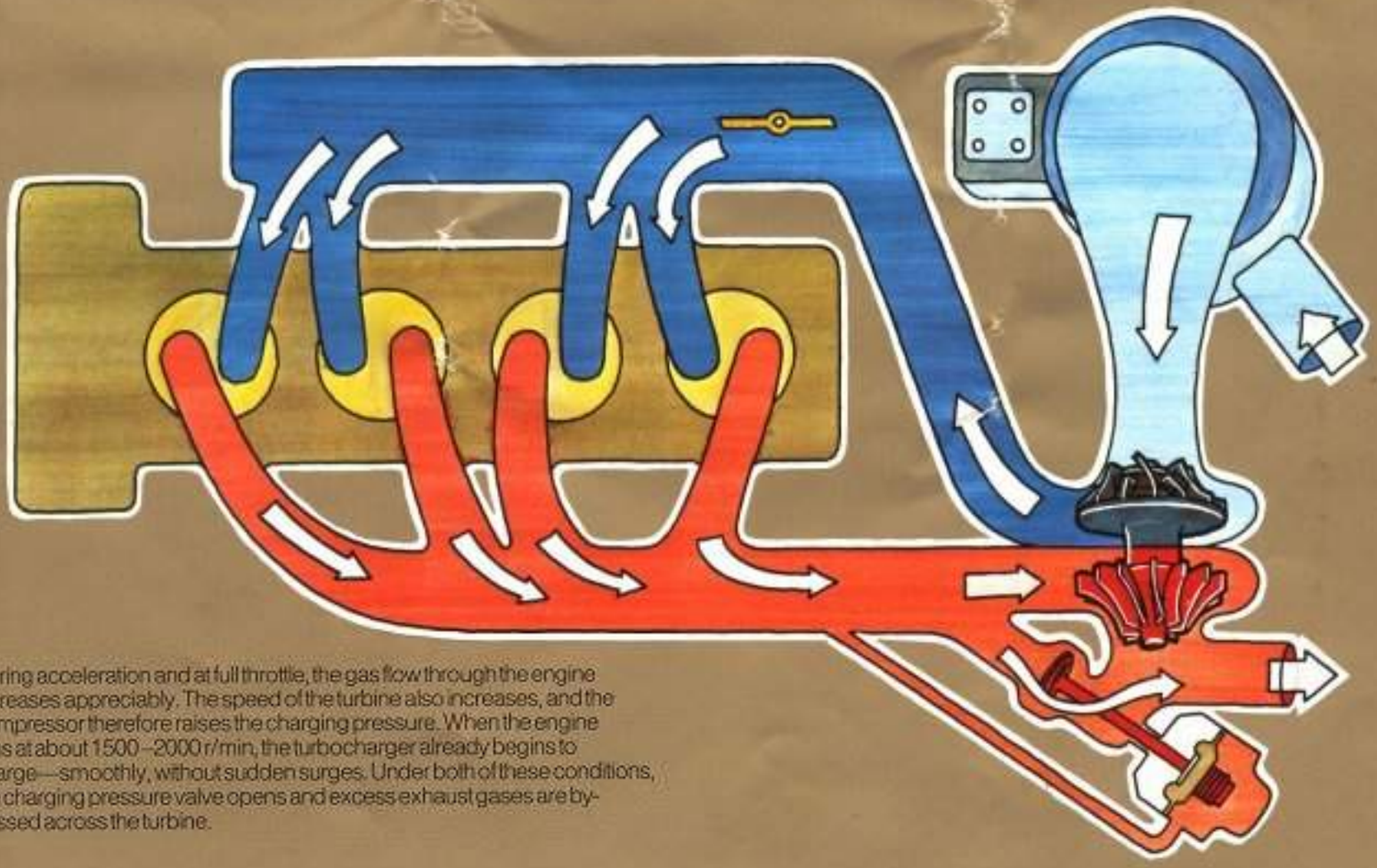
A turbocharger usually runs at 70,000–80,000 r/min at peak engine torque. On our unit, the corresponding figure is lower, and this is advantageous from the reliability viewpoint.

The turbocharger raises the peak engine torque from 17 kgf m at 3700 r/min to no less than 24 kgf m at 3000 r/min. So the torque or pulling power is increased by an impressive 45%.

The charging pressure valve has an important function. On a turbocharged engine, the charging pressure must be carefully controlled. If the charging pressure is too high, the combustion temperature may also be too high, and this may result in pre-ignition and damage to the engine. The SaabTurbo is therefore equipped with an ingenious charging pressure valve which effectively controls the charging pressure. When the charging pressure valve is open, excess exhaust gases are by-passed across the turbine. This ensures that the charging pressure will be maintained at the correct level throughout the engine speed and load range.

The charging pressure valve is thus the "brain" of the Turbo engine. All turbocharged engines are equipped with charging pressure valves. But no other charging pressure valve works in exactly the same manner as that of the SaabTurbo. This difference stems from our original goal—to attain a high torque at low engine speeds. On sports and competition cars, the aim is instead to achieve high peak outputs, and no importance is attached to high torque at low engine speeds.

The special nature of the charging pressure valve has enabled us to achieve our goal—to produce a turbocharged car which can really be used by the average motorist for his everyday needs.



During acceleration and at full throttle, the gas flow through the engine increases appreciably. The speed of the turbine also increases, and the compressor therefore raises the charging pressure. When the engine runs at about 1500–2000 r/min, the turbocharger already begins to charge—smoothly, without sudden surges. Under both of these conditions, the charging pressure valve opens and excess exhaust gases are by-passed across the turbine.

A unique combination: Big car comfort and sports car performance.

The SaabTurbo has much more to offer in terms of comfort than other cars. An interior that gives all occupants ample opportunity for adjusting their own seating attitude. Which is well-insulated and silent, even at high speeds. Front seats which are amongst the most comfortable available today. And with extra adjustments for the driver's seat. A back seat which is extra comfortable and broad—with an elbow room of no less than 153 cm. A heating and ventilation system with extra capacity. A luggage compartment with a capacity of 350 dm³ SAE, and which can easily be converted to a "cargo space" of 1500 dm³.

Add to this the sports car performance and a top speed of 195 km/h—and you have a car which is unique and pace-setting.

In this environment, the coordination of the driver and car comes naturally.

Headrests and armrests are obvious features of the standard equipment.

On certain markets, the Saab Turbo incorporates a cassette-type sunroof as standard. Roof lining of moulded, impact absorbing glass fibre.

With the back seat folded down: A 182 cm long load carrying area. With ample space for skis or other bulky luggage.

Saab turbocharging is backed by more than five years of development work and testing.

Our first attempts at turbocharging date back to the early 1970's. But our development work was not intensified until after the 1974 oil crisis, when moderate fuel consumption became an important consideration even on high-performance cars.

The Scania Division of Saab-Scania AB—one of the major, internationally acknowledged pioneers in the field of turbocharging—has assisted in the development work on the SaabTurbo. The Scania Division manufactures heavy diesel-engined vehicles and this experience has now been successfully utilised on our engines.

Since the technical solution had been determined at an early stage, we have had ample opportunity to refine the system and carry out a tough and extensive series of tests.

Bench tests in a sophisticated engine laboratory. We have obtained ample proof that the mechanical stresses have not been significantly increased by turbocharging. On the contrary, the turbocharged engine has become more reliable, due to the reduced compression ratio and the engine speed limiter.

High-speed tests in Germany. The characteristics of the engine have also been tested under the conditions often prevailing on the European Continent. Some of the tests have been run by the Swedish rally drivers Stig Blomqvist and Per Eklund, who covered a total of 120,000 km at speeds around 160–180 km/h.

Winter tests in Canada. One of our test cars has been driven during a 14-day period at White River, at temperatures below –40°C. The tests were focused mainly on the behaviour on the road, starting, performance of the crankcase ventilation and the air preheating.

Turbo engines have been run for about 5000 hours on the test bench in the up-to-date Saab-Scania engine laboratory. This corresponds to a car being driven about 600,000 km.

The group of test drivers comprised in the "broad-based test" includes the Finnish state police and the mobile police in Switzerland.

High-temperature tests in Death Valley in the USA. We chose Death Valley —one of the hottest places in the USA— to run our high-temperature tests to check the cooling equipment and test the general performance of the engine under extremely hot conditions. The series included testing the SaabTurbo on mountain passes at an altitude of about 2000 metres—while towing a caravan and while fully laden. In other words, under extremely difficult conditions.

High-altitude tests in the Rocky Mountains. Tests at very high altitudes in the Rocky Mountains revealed that the loss of power normally occurring at high altitudes is less pronounced on the SaabTurbo, mainly due to its massive reserves of power.

General tests on the road. Our testing has not been confined to high-speed tests on fast motorways. We have also run long-term tests on particularly difficult roads in Sweden. Test cars powered by turbocharged engines have covered a total distance of about 1,500,000 km. This corresponds to 37.5 times round the world.

Broad tests by 100 test drivers, most of them "private motorists". For a period of six months, 100 private individuals and certain professional categories in Sweden, Finland, Germany, Switzerland and the USA have each been given a SaabTurbo to use. The reactions have been very favourable throughout. Not only as regards the performance of the turbocharged engine, but also the general character of the car.

Impartial, comparative tests have more to tell about the SaabTurbo.

Many of the world's leading motoring periodicals have had their say about the SaabTurbo. Many have also undertaken more comprehensive comparative tests, which reinforce further the image of the SaabTurbo as a very lively, safe, roomy and practical car.

The SaabTurbo has aroused widespread interest of the motoring press, and we are awaiting further interesting test results.

Saab has often been the leader in a straightforward but unconventional approach.

The Saab seats (1) offer superb comfort. The seating is comfortable, mainly owing to the firmness of the padding and the carefully dished seat and backrest. And the seating attitude can easily be varied by different adjustments. The driver can alter the height and slope of his seat. In addition, the seat and also the backrest are electrically heated —an idea which Saab developed long before other car manufacturers.

We were early to appreciate that rack-and-pinion steering (2) is the ideal system for cars with front-wheel drive. Rack-and-pinion steering provides accurate response to the slightest movement of the steering wheel. The steering is safe and free from backlash. As in many other cases in the past, other car manufacturers now follow our example.

Saab was one of the first car manufacturers in the world to produce a split brake system (3). We chose to run the two brake lines diagonally. As a result, if one circuit should fail, braking will still be available on one front wheel and one rear wheel. And the distribution of the braking effort onto the front and rear wheels will still be as favourable as under normal conditions.

Headlamp wipers and washers (4) were introduced on 1971 year models as standard on certain markets. Ahead of all other car manufacturers. At the same time, we introduced our automatic light—switching the headlamps off across the ignition key. In 1973, we changed over to halogen lights. Further proof of the active interest of Saab in the development of lights—the extended dipped beam (5) with the range increased by 50%—was launched on 1976 year models.

When the strength of bumpers was the subject of legislation in the USA in 1972, our impact-absorbing bumper (6) was already on the production line. We were thus the first among the world's car manufacturers to conform with these stringent requirements. Saab bumpers are based on the principle of cellular plastic blocks which are compressed in the event of impact, but then resume their original shape and function.

Technical specification Saab Turbo, 1978.

Engine.

General description. Four-cylinder, liquid-cooled, in-line engine with overhead camshaft. Longitudinally arranged in the engine compartment. Integrated with the clutch, gearbox and differential. The engine block slopes at 45°. The engine block is made of alloy cast iron. The cylinder head is made of light alloy. The crankshaft and camshaft are both mounted in five bearings. Camshaft and pistons of special type. Turbo-compressor. Sodium-cooled exhaust valves.

Dimensions and performance. Displacement 1985 cm^3. Cylinder bore 90 mm. Piston stroke 78 mm. Compression ratio 7.2:1. Max. DIN output 107 kW (145 hp) at 5000 r/min. Peak DIN torque 235 Nm (24 kgf m) at 3000 r/min. Weight/power ratio 8.8 kg/hp. Top speed, with the rear spoiler fitted, 195 km/h. Acceleration from 0 to 100 km/h in 8.9 seconds.

Fuel system. Mechanically controlled, Bosch CI fuel injection. Recommended octane number 97 RON. Capacity of fuel tank 55 litres. Fuel consumption according to DIN 11.0 litres.

Turbocharging system. Turbo-compressor of Garret manufacture. Charging pressure regulator with diaphragm-controlled, spring-loaded valve. Safety system with pressure switch. Maximum charging pressure: 0.70±0.05 bar.

Electrical system. 12 V/60 Ah maintenance-free battery. Alternator with max. output of 840 W, 14 V/65 A. Breakerless, electronic ignition system. 0.8 kW (1.1 hp) starter motor.

Cooling system. Of pressurised type. Uprated cross-flow radiator and separate expansion tank. Liquid capacity of 8 litres. Electrically driven, thermostatically controlled cooling fan. Thermostatically controlled, air-cooled oil cooler for the engine oil.

Power transmission.

General description. Manual gearbox. Hydraulically operated dry plate clutch. Clutch and primary reduction located at the front of the engine. The gearbox and differential are below the engine. Primary chain drive. Two permanently lubricated drive shaft universal joints for each front wheel.

Reduction ratios. Engine/drive shaft: Bottom gear 12.0:1, second gear 7.3:1, third gear 4.9:1, top gear 3.5:1, reverse gear 13.2:1. Primary reduction 0.9:1. Final drive ratio 3.89:1.

Chassis.

Brakes. Disc brakes all round. Brake pad area 228 cm^2 (swept area 2527 cm^2). Diagonally split, dual circuit hydraulic foot brake system, with 9-inch vacuum servo. Self-adjusting foot brake and handbrake. Handbrake acting on the front discs. Outer front brake linings of semi-metallic type.

Wheel suspension springing. Lateral wishbones and pivot-mounted, progressive action coil springs at the front. Lightweight, straight and one-piece rear axle, guided by two forward links and two rearward links and a side stay. Double-acting, gas shock absorbers of Bilstein manufacture all round.

Steering. Rack-and-pinion steering. 4.1 steering wheel turns lock-to-lock. Jointed and telescopic steering column. Turning circle diameter 10.5 m.

Wheels and tyres. Light alloy wheels of special design.[1] Wheels: 5 1/2 Jx15" H2. Tyres: 175/70 HR 15, Pirelli CN 36, steel cord.

Dimensions and weights.

Overall length	4530 mm	Max. length of luggage compartment with back seat folded down	1821 mm
Overall width	1690 mm	Ordinary luggage compartment, SAE	350 dm^3
Height, unladen	1440 mm	– with parcel shelf removed	435 dm^3
Wheelbase	2473 mm	Max. capacity of load-carrying area	1500 dm^3
Track, front	1410 mm	Kerb weight, approx.	1210 kg
Track, rear	1430 mm	Max. total weight	1660 kg

Equipment.

Light alloy wheels.[1] Front spoiler. Rear spoiler.[2] Sun roof.[3] Effective bumpers—"self-repairing" following a low-speed collision. Large, well-arranged and anti-dazzle treated rear-view mirrors. Halogen lamps with high light intensity and long useful life. Headlamp wipers. Reversing lights. Windscreen wipers with intermittent operation relay. Tinted glass windows. Reflector on driver's side door edge. Tow lugs front and rear.

Padded, three-spoke sports steering wheel. Dimmable, greenish instrument lighting. Comprehensive set of warning and indicating lamps. Tachometer. Turbocharger pressure gauge. Trip meter. Controls with illuminated symbols. Console for radio/tape recorder. Stereo loudspeakers in the doors. Dipping inner rear-view mirror with collapsible mounting. Tough shield below the dashboard to protect the knees. Roof lining of moulded glass fibre.

Seats with integral lumbar support and head restraints. Bordeaux red plush upholstery. Electrically heated driver's seat. Inertia reel belts. Grab handle above the passenger door. Folding armrest at the rear. High-capacity heating and ventilation system with 12 air outlets. Electrically heated rear window.

Non-dazzle interior lighting. Map-reading lamp. Glove compartment lighting. Luggage compartment lighting. Courtesy light switches in all doors. Automatic light control—the headlamps and combined light fittings are switched off across the ignition key.

Adjustable luggage compartment. Extra luggage space under a hatch at the rear. Easily accessible spare wheel. Luggage compartment floor fully carpeted. Fabric-covered, removable parcel shelf.

Exterior colours: Cardinal red (metallic) and Black.

[1] Spare wheel of steel.

[2] Not on the first batch cars.

[3] Standard on certain markets only.

- Saab cars can be delivered free of tax to people who qualify for this concession. Further information is available from the local Saab Distributors and Dealers.
- The manufacturer reserves the right to change specifications and equipment without notice.

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Saab-Scania, Saab Car Division · Nyköping, Sweden.