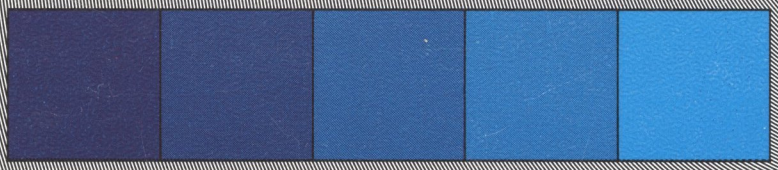
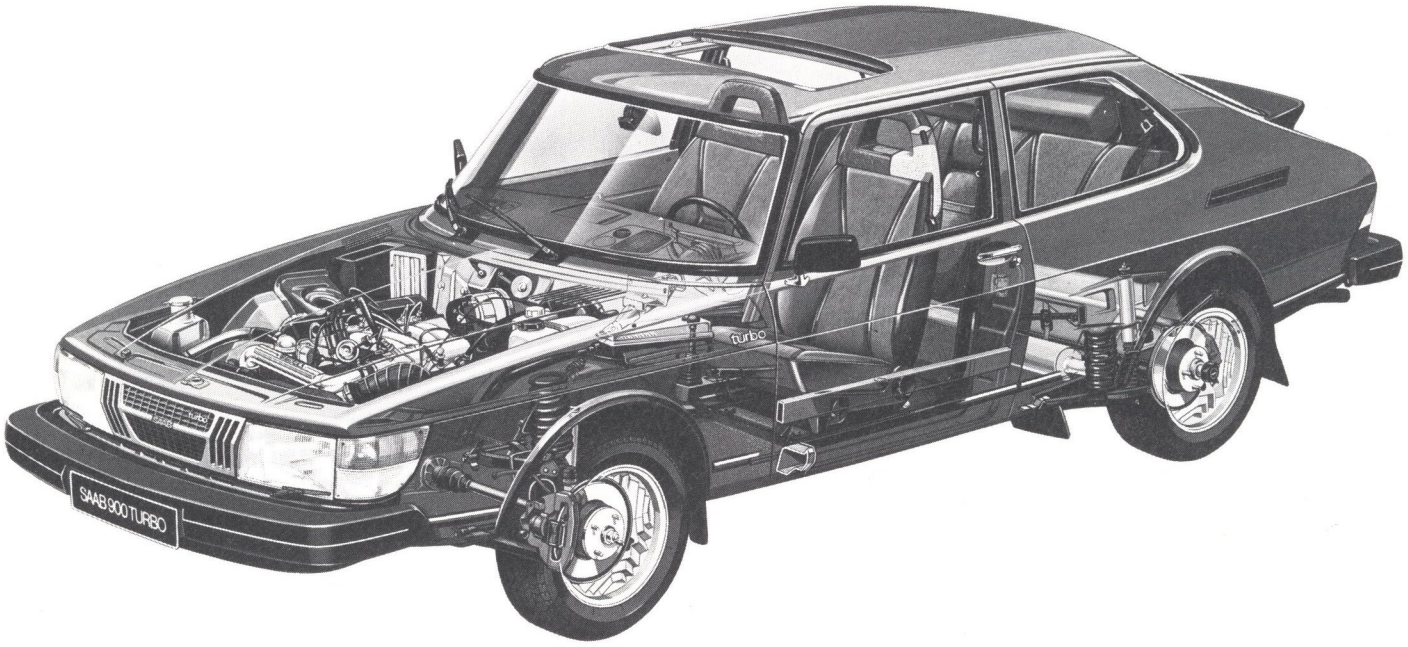
Engi-neering features.



Saab 900

Contents



Saab 900
1979 model range

Saab 900 GLi **3 doors**	2-litre fuel-injected engine developing 115 hp (85 kW) SAE net (110 hp, 81 kW, catalyst equipped) Manual or automatic transmission.
Saab 900 EMS **3 doors**	2-litre fuel-injected engine developing 115 hp (85 kW) SAE net (110 hp, 81 kW, catalyst equipped). Manual or automatic transmission.
Saab 900 GLE **5 doors**	2-litre fuel-injected engine developing 115 hp (85 kW) SAE net (110 hp, 81 kW, catalyst equipped). Manual or automatic transmission.
Saab 900 Turbo **3 doors**	2-litre fuel-injected and turbo-charged engine developing 135 hp (100 kW) SAE net. Manual transmission.
Saab 900 Turbo **5 doors**	2-litre fuel-injected and turbo-charged engine developing 135 hp (100 kW) SAE net. Manual transmission.

The Saab approach — a philosophy with an eye to the future

"Saab doesn't build automobiles — Saab builds Saabs, which are a highly original and highly logical answer to at least one facet of the human transportation problem." (Car and Driver, April 1970).

1

THE SAAB PROFILE

In its basic design, the Saab 96 has much of what characterised the very first Saab car — the Saab 92 — shown for the first time thirty years ago. The ability of a car manufacturer to retain the loyalty of the car-buying public to a substantially unaltered basic design for such a long period of time is unusual and exceptional. It illustrates that a car which is fundamentally "correctly conceived and properly built" can be developed and remain viable for decades. The Saab 96 has acquired the reputation for being a hard-wearing, sturdy and economical car, and it has long been a winner on the world's rally tracks.

The Saab 99 was presented in 1967, after ten years of development work, and it has been developed further through the years, becoming something of a pet of the automotive press. Few cars have received such wide acclaim for behavior and roadholding, safety and comfort — judgements made on the basis of comparative tests and reports from rallies.

The various Saab 900 models and all their new features reflect the Saab policy to the same extent as the model series of the 99 line. As a background to the launching of the 900, it would therefore be appropriate to present a brief outline of how the 99 — which will be manufactured in parallel with the new car — has been developed over the years.

INNUMERABLE RALLY VICTORIES

Various drivers have been exceptionally successful in the Saab 96 and the Saab 99 in the world's toughest rallies, gaining more than a hundred victories over a 25-year period. The RAC Rally, the Monte Carlo Rally, the Scottish Rally, the Acropolis Rally, the Bergslags Rally, the Norwegian Winter Rally, the Finnish Snow Rally, the Rally of a Thousand Lakes, the Hanki Rally and the Swedish Rally are merely a few of the best known. And the Saab drivers have emerged victorious every year — in the standard class, special class or overall — in Swedish, Finnish and Nordic Rally championships.

2

DISTINCTIONS AND TESTS

Although Saab has collected victories on competition tracks throughout the world, the Saab 99 has also emerged victorious in many comparative tests with cars of the same comfort and performance class — in the Nordic countries as well as in Germany, Austria, Great Britain, the U.S.A., etc.

For two years in succession (1972 and 1973), the Saab 99 has won the "Nordtest", run by the motoring periodical Vi Bilägare in competition with the Volvo 142, Volkswagen K70, Opel Record II, Ford Consul, Peugeot 504, Audi 100 LS and others. The final comment on the Saab 99L made by the periodical in 1973 was as follows: "Those who have followed Nordtest could not fail to notice that the Saab was best or almost best, round after round, and that there was very little we could criticise".

The Saab 99 was the winner in an extensive test over a number of stages arranged and presented in 1975 by the Austrian newspaper "Das Kurier". Nine cars were compared — Audi, Alfetta, BMW, Citroen, Ford, Opel, Peugeot, Saab and Volvo. To reduce the effect of subjective opinions to the minimum possible, the test critics were clearly defined beforehand and a computer was used as an aid in the evaluation and summing up.

During 1977, the Danish motoring magazine "Bilen" compared the Saab 99 GL with the Princess 2200 HLS, Renault 20L and Volvo 242 DL. The cars were assessed and classified in relation to each other on no less than 34 points. The Saab 99 gained most first places and the overall victory.

Saab-Scania has also been awarded a number of distinctions for the development of the Saab 99, primarily in the field of safety. During 1972, Saab was awarded the gold medal by the Swedish Automobile Association, the "Oscar" by the German periodical "Hobby" and "The Don Safety Trophy" — Britain's most coveted annual distinction for car safety. In 1972, the Swedish motoring periodical "Teknikens Värld" awarded the Saab 99 the title of "Car of the Year".

In 1978, the originator of the Saab turbocharged engine was presented with the "Golden Gear" — Sweden's foremost award for inventiveness. The prize is awarded anually by the magazine "Veckans Affärer", and the consultancy company Ekonomisk Företagsledning for the most important invention in the technical or economic field and representing a new approach in Swedish commerce and industry.

MUCH PRAISE

The automotive press has also lavished much praise on the Saab 99, with sometimes lyrical test reports. And not in Sweden alone.

"We only wish that more cars were like Saabs. Particularly like their well-planned Combi Coupé . . ."
Wheels (Australia), 1975

"If we were to choose the Car of the Year for 1975, the title would presumably go to the Saab 99 . . ."
Motorsports Weekly, 1975

"Among the sportier family cars in the U.S.A., the 1976 Saab 99 EMS is one of the best".
Car and Driver, 1976

"Hardly any other European car is as refined as the Saab 99 Combi Coupé . . ."
BILD (Germany), 1976

"It would be difficult to imagine a better family car than the Saab 99 Combi Coupé . . ."
Road Test, 1977

Two years in succession — 1976 and 1977 — Motor Trend, with a circulation of 750 000, has included the Saab 99 in the final group of eight cars competing for the title of "Car of the Year" among imported makes. Both times, the Saab was very close to winning. On the eve of the 1978 competition, the periodical has nominated the Saab 900 Turbo as finalist.

3

INNOVATIONS AND NEW APPROACH

A Saab was one of the first car manufacturers to equip its cars as standard with dual-circuit brakes. The system was introduced on the 1964 models, production of which started during the summer of 1963. For improved safety, the Saab brakes are split diagonally instead of fore and aft.

B In 1971, Saab became the world's first make of car to be equipped as standard with an electrically heated driver's seat.

C Towards the end of the 1960's, salting of roads, studded tyres and the increasingly dense traffic started causing visibility problems to motorists — particularly since the headlamps quickly became fouled, thus rendering driving at night more difficult and risky. Saab tackled the problem in the usual innovative way and, in 1970, became the world's first car manufacturer to fit headlamp wipers and washers as standard to its cars sold in Sweden and on a number of export markets (not in the U.S.A. and Canada). The wipers were of Saab's own design. This Saab initiative formed the basis for subsequent legislation in Sweden concerning wiping equipment for the headlamps.

D Saab was also the first on the market to fit its cars with truly energy-absorbing and self-repairing bumpers capable of withstanding barrier collisions at 5 mph in accordance with the 1973 U.S. legal requirements. The Saab 99 was already being fitted with these bumpers in 1971.

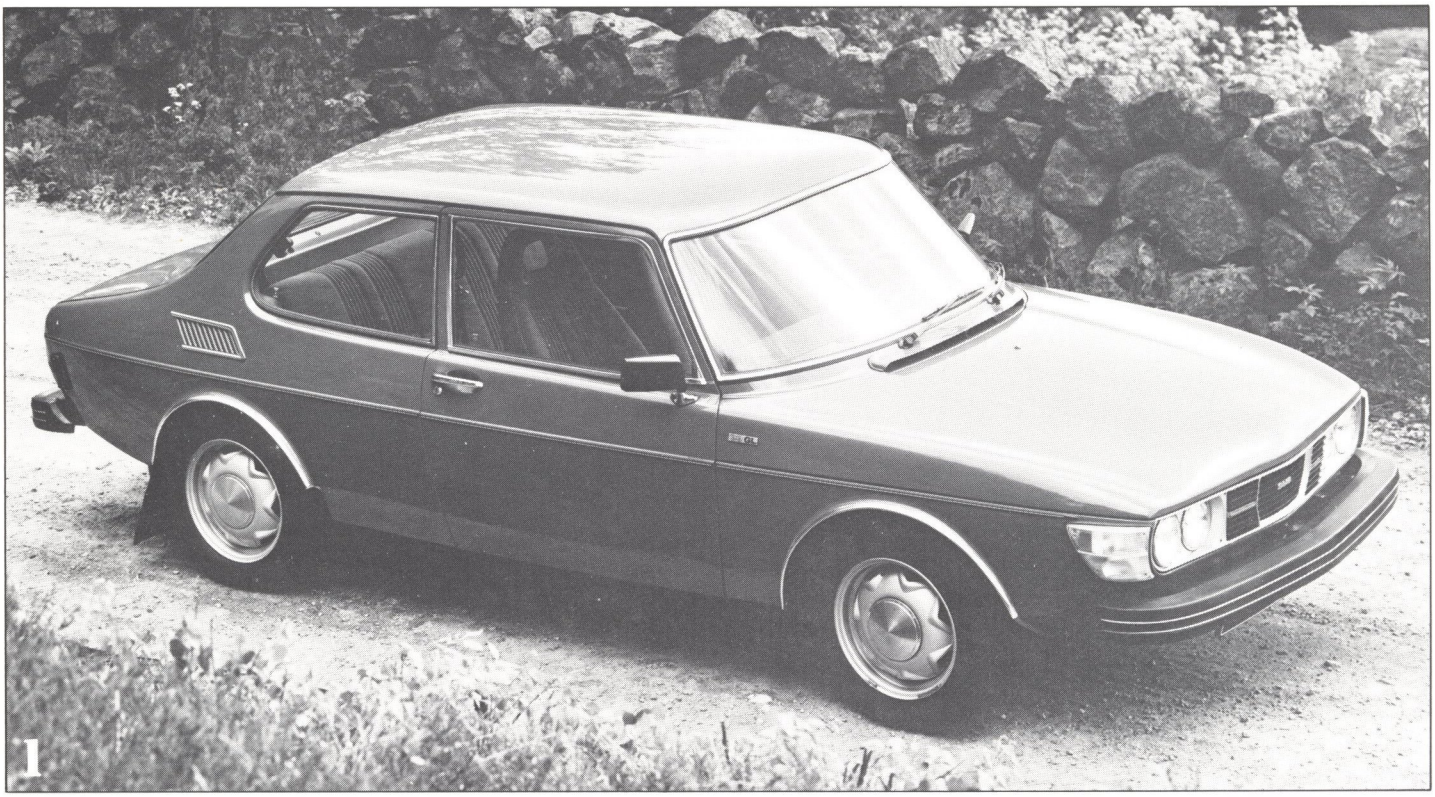
E Another Saab innovation is the roof lining of moulded glass fibre wool. The lining offers excellent impact protection, while at the same time providing effective heat and sound insulation.

F Saab was first to launch the hatchback principle in the practical version which was later adopted by increasing numbers of competitors. That was back in 1973.

G In 1976, Saab was again first on the market. This time it was a redistributed dipped beam which appreciably improved road safety at night. Under certain conditions, the vision on dipped beam is extended by up to 50% (This feature is not available on Saab cars for the U.S.A. and Canada). In 1976, running lights and side reversing lights were also fitted to the Saab 99.

H One of the most widely discussed new features in the field of motoring in 1977 was the new Saab turbocharged engine.

The Saab turbocharged engine is yet another example of how a manufacturer who limits his model range can concentrate his resources to developing cars which are world leaders in terms of automotive inventiveness.



1

2 Some rewards of innovations and new approach. . .

Great Britain

The Don Safety Trophy in 1972

U.S.A.

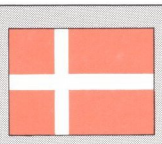
Finalist in the nomination for the title of "Car of the Year" among imported brands in 1976 (Saab 99 EMS) and 1977 (Saab 99 Turbo)

Germany

"Oscar" for car safety (Hobby)

Austria

Overall winner in "Computertest 1975" (Das Kurier)



Denmark

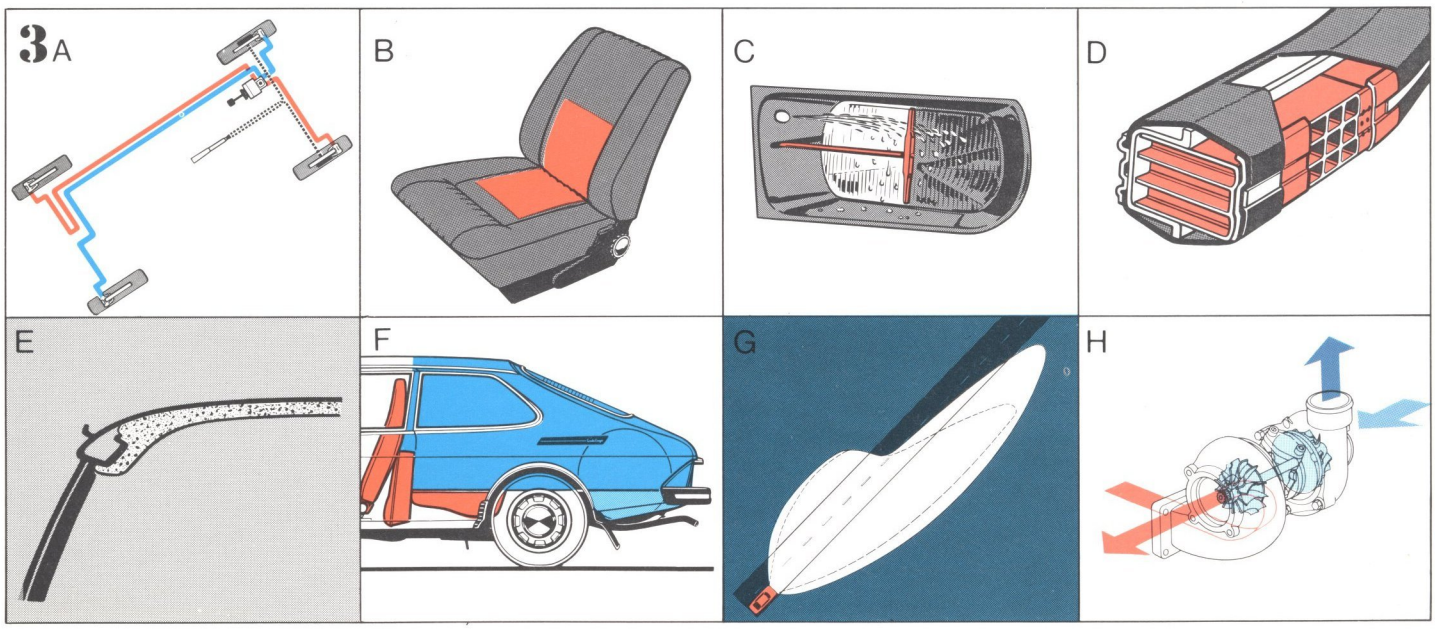
Outright winner in comparative test in 1977 (Bilen)

Sweden

Gold medal for car safety in 1972 (The Swedish Automobile Association)
Car of the Year in 1972 (Teknikens Värld)

Overall winner in "Nordtest" in 1972 and 1973 (Vi Bilägare)

"Golden Gear" in 1978 for the development of the Saab Turbo (Veckans Affärer and Ekonomisk Företagsledning)



Correctly conceived and properly built

Saab 900 is the collective designation for a number of entirely new models forming an extension of the Saab product range, along with the well-known Saab 99. Each of the 900 models satisfies strict demands on safety and road behaviour. They are created and designed on the basis of expected regulations on various markets up to the mid 1980's. And they satisfy with a wide margin the stricter collision safety regulations coming into force in the U.S.A. in the autumn of 1978. But merely keeping pace with the legislators has not been the aim in the development of the Saab 900 models. Closer study will reveal that the cars are the result of innovative work aimed at keeping them ahead of legislative demands and of the competitors.

"Mention, if you can, another car which is so sensibly designed, so sturdily built — in brief, so refined. . . The Saab 900 is a much better car than the Saab 99 — and that says quite a lot. . ."
(Teknik för alla, Sweden)

"The Saab 900 Turbo is almost in a class of its own. Any Swede who enjoys driving should treat himself to a real long trip in the Turbo."
(Expressen, Sweden)

1

MATCHED TO THE ROAD CONDITIONS

Traffic conditions and society place increasingly stringent demands on cars and motorists. This applies to factors such as road safety, the environment and economy. The Saab 900 is built in Sweden to suit the conditions prevailing in Nordic countries. As a result, the Saab 900 is designed to satisfy very strict demands on mobility and good road behavior, even under the worst conceivable winter road condition and at Arctic temperatures.

2

AERODYNAMIC STYLING

The Saab 900 has excellent directional stability — even in blustery cross-winds. The gently rounded shape of the body and the absence of corners which may give rise to turbulence contribute to the low wind noise. The rear of the body is shaped so that it will provide efficient breakaway. The shape of the body counteracts fouling of the rear window, even under extremely dirty road conditions. The favourable aerodynamic design is also an important factor in the low fuel consumption of the Saab 900.

FRONT-WHEEL DRIVE

The Saab has front-wheel drive. All of the weight of the engine and gearbox rests on the front wheels, and this provides the Saab 900 with a very favorable weight distribution — about 60% of the weight is supported by the driving wheels. Owing to the front-wheel drive and the favorable weight distribution (combined with well-matched springing and chassis geometry), the road-holding and road behavior of the Saab 900 are exemplary.

The directional stability of the Saab 900 is excellent, regardless of the speed, road conditions, cross-winds and loading. Since the driven and steered wheels support most of the weight, they are less prone to skid, and this is important in icy, snowy or otherwise difficult road conditions. Owing to the chassis design, the Saab 900 can be said to have a "forgiving" nature — the car will correct minor mistakes the driver may make. There is little risk of skidding and the directional stability is good, even if the driven wheels should spin or when the car is braked hard.

SAFETY BODY

The Saab 900 has a safety body, with barrier-tested deformation zones at the front and rear. The windscreen pillars consist of exceptionally strong steel sections which, together with the roof, floor and sill members, the reinforcing members in the doors and other elements of the body, form a protective cage around the occupants.

JOY OF DRIVING

The driver's behavior forms the basis of safe motoring. The driver's environment has therefore been the focal point of the technical studies associated with the design of the Saab 900. The functional driver's "cockpit" and the excellent road behavior put fun into driving the Saab 900.

HIGH COMFORT

The Saab 900 has a roomy and practical hatchback body. The comfortable, three-passenger back seat can simply and quickly be folded down to provide a flat floor and a load-carrying area with a capacity of 53.0 cu ft. The occupant comfort is lavish. The heating and ventilation system is one of the most advanced of its type. The system is semi-automatic and is equipped with a high-efficiency filter which purifies all of the air admitted into the interior. The air distribution in the interior is regulated by vacuum-controlled dampers. An air conditioning unit is standard equipment on some models and available as an optional extra on others. The climate inside the car is maintained at a high level of comfort, whatever the temperature outside.

PERFORMANCE TO SUIT YOUR NEEDS

The prospective buyer of a Saab 900 has several options available regarding performance. The modern two-liter engine is available in two versions: a 115 hp fuel injection engine and a 135 hp turbocharged fuel injection engine. Both versions offer exellent performance, particularly in terms of fuel consumption.

The turbocharged engine is a unique Saab product. It provides the Saab 900 Turbo with the same acceleration and top speed as many cars with six-cylinder or eight-cylinder engines — although without the disadvantages of these engines, such as high weight, bulk, many moving parts and high fuel consumption. The automotive press has heralded the Saab turbocharged engine as the "engine of the future".

WELL-EQUIPPED

The Saab 900 is a well-equipped car. Items of equipment which many competitors offer as optional extras are standard on the Saab 900.

All Saab 900 models are fitted with seat belts at the front seat, clock, trip meter, cigarette lighter, electrically heated rear window and windscreen wipers with intermittent-operation setting. On cars not equipped with air conditioning, an efficient air filter is incorporated into the heating and ventilation system.

The GLE, EMS and Turbo models are also provided with side guidance reversing lights , folding armrest in the center of the back seat, tinted glass in all windows and an electrically heated driver's seat. Power assisted steering, electrically heated passenger seat, sunroof and electrically operated side-view mirrors are standard equipment on the GLE and five-door Turbo.

The EMS and Turbo models also feature a tachometer, sport steering wheel, gas shock absorbers and light alloy wheels with low-profile tires.

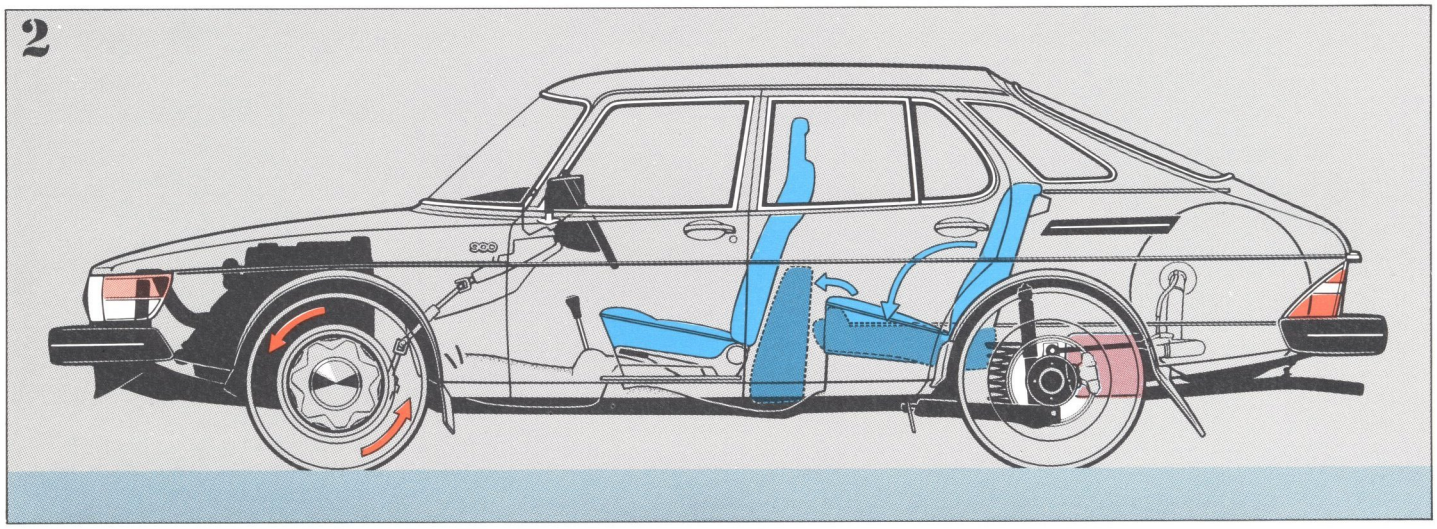
3

EXTENSIVE PILOT STUDIES

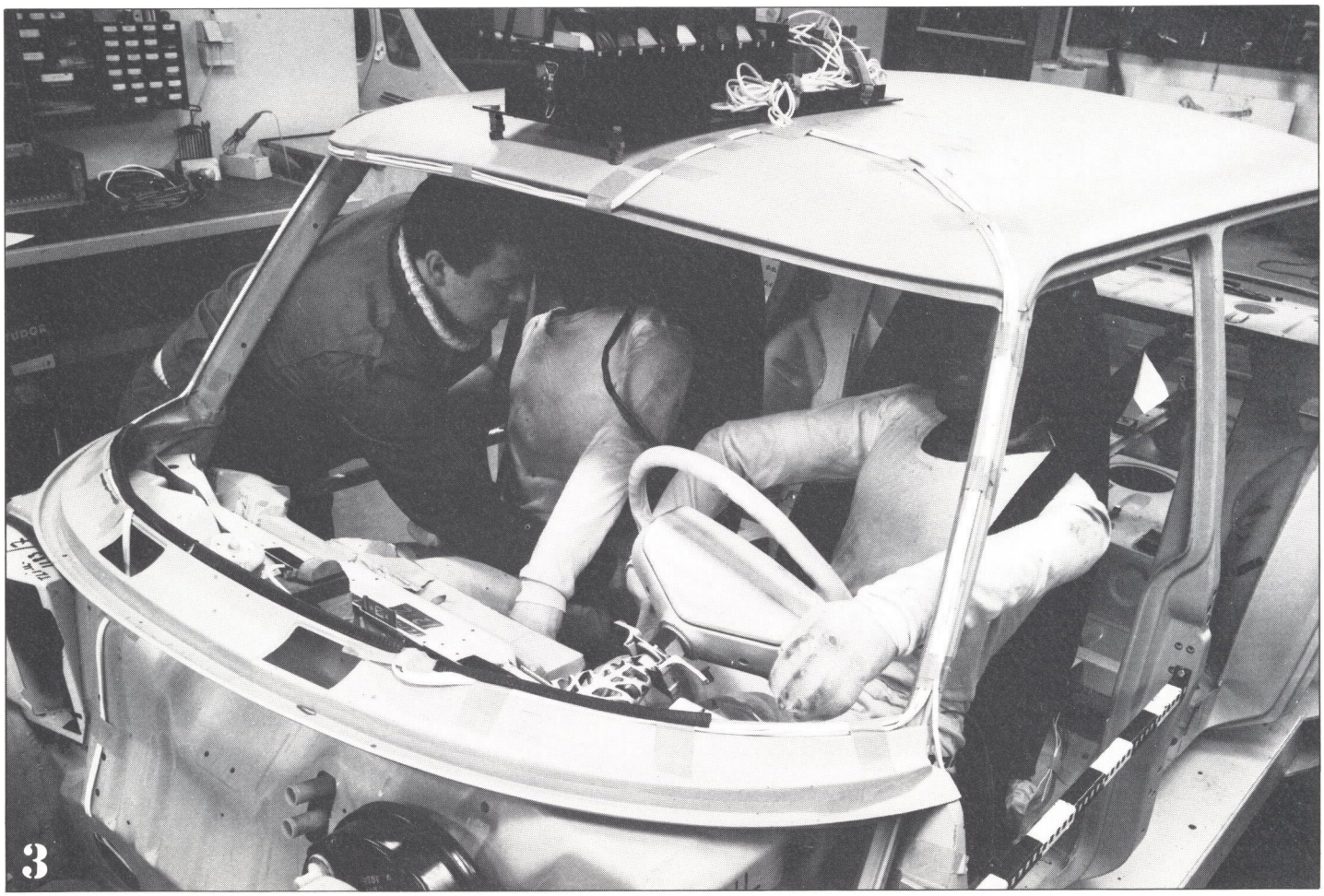
People with widely varying physical characteristics in terms of stature, weight, reach, etc. must have equal opportunities in driving the Saab 900. The design and locations of most of the equipment are based on careful pilot studies and measurements of how the human being behaves as a driver or passenger. To ensure that the interior safety features are correctly designed, we have gone so far as to consider the strength of the human skeleton and compared it with the conceivable loads applied to it in the event of various motoring accidents.

One of the most important functions of a car is to provide the driver with fast and correct information concerning its behavior. Incorrect or delayed information concerning lateral acceleration in the event of a skid may cause the driver to react incorrectly. The human being is very sensitive in this respect — differences of one-hundredth of a second will be immediately perceived. In addition to pursuing its own research, Saab collaborated in this field with the Psychological Institute of Uppsala University, the Road and Traffic Institute and with medical experts.

1



2



3

A streamlined body design saves fuel

Tests on cars of the same size and performance class as the Saab 900 show that the fuel consumption of the car in normal everyday use can be reduced by about 10 % by lowering the drag coefficient (i.e. the air resistance coefficient) from 0.5 to 0.4. The drag coefficient can be regarded as a sort of quality factor for the external form of the car.

On the other hand, the lowest possible air resistance (drag) is not the only aim. Consideration must also be given to the influence of form optimization on the road behaviour and directional stability of the car — in gusty cross-winds, for instance. At high speeds, the air flowing over the body of a car may give rise to an appreciable lifting force on the rear wheels which reduces the road grip. Other areas which must be studied include the ventilation and air conditioning, fouling of the windows, the size and location of the cooling air intake, formation of vortices and the dispersion of the exhaust gases behind the car.

1

DRAG AND POWER DEMAND

The drag coefficient is often used as a sort of quality factor for the form of a car body. The drag coefficient is relatively independent of the size of the car and is between 0.32 and 0.50 on modern cars. The lower the coefficient, the more favourable is the shape.

An interesting observation is that the frontal area of present-day European cars varies very little (the scatter is 4 %), although the aerodynamic differences are many times greater. The average drag of current European cars is about 0.46 and that of modern mass-produced cars for everyday use is hardly below 0.40. On the other hand, the scatter is more than 30 %.

A series of full-scale wind tunnel tests has enabled Saab designers to adjust gradually the basic design of the 900 body by minor detail modifications towards its final optimised form. The final result was a compromise which accommodates most of the demands on comfort, safety, appearance and low drag.

The drag on a car is dependent on a number of factors — form of the body and its projected frontal area, its speed and the atmospheric conditions.

Formula: $W = C_W \times F \times \frac{\varrho}{2} \times V_F^2$

W = Drag

C_W = Drag coefficient

F = Projected front area of the vehicle

ϱ = Density of air

V_F = Speed of the vehicle

The power demand is fairly low as long as the speed of the vehicle is moderate and there is no wind. At 45 mph (70 km/h), for instance, the drag of a normal medium-size car may be of the order of 150 — 200 N, and the corresponding power demand will be 3 — 4 kW (about 5 hp). But at a road speed of 60 mph (100 km/h), the engine must supply a further 7 — 8 kW (10 hp) or thereabouts to the driven wheels in order to overcome the drag. At 93 mph (150 km/h), the engine must develop 35 — 40 kW or 50 expensive horsepower (27 times as much as at a third of this speed or 8 times as much as at half the speed).

The relationship is clear: if a given speed is doubled, the drag will be increased by $2^2 = 4$ times, if the road speed is tripled, the drag will increase by $3^2 = 9$ times, etc.

The power demand increases even more steeply, rising as the cube of the speed instead of the square ($2^3 = 8$, $3^3 = 27$, $4^3 = 64$, etc.). If the power demand at 20 mph (32 km/h) is 0.5 kW the power demand at 80 mph (130 km/h) will be $0.5 \times 4^3 = 32$ kW.

Head winds and, to an even greater extent, cross-winds naturally increase the power demand and the fuel consumption. Measurements have shown that when a car is driven at 70 mph (110 km/h) in a strong cross-wind, the engine must develop an extra 10 — 15 kW (13 — 20 hp) and will consume about 5 litres (1.3 US gallons) more fuel per 60 miles (100 km) as compared to calm conditions. Since far from all of the engine output reaches the driven wheels — transmission losses absorb some of the power — a very large proportion of the engine output is used up for overcoming the drag at high road speeds.

2

LOW DRAG IS MERELY ONE ASPECT

The first aerodynamic test on the Saab 99 in 1964 revealed that the drag coefficient was as low as 0.36. A 1:5 scale model was used for the test. But the 99 has since undergone certain modifications, such as being fitted with new bumpers, and the present-day Saab 99 Sedan therefore has a higher drag coefficient than the original model.

But the lowest possible drag is not the only consideration. The ventilation, the dispersion of the exhaust gases behind the car and many other factors must also be taken into account. When Saab designed the hatchback model, one of the aims, for instance, was to ensure that the rear window will be "self-cleaning". Tests under the worst conceivable road conditions revealed that the results achieved exceeded all expectations. The air flows downwards along the window, without giving rise to appreciable vacuum. The air can be said to form a curtain between the glass and airborne dirt.

3

MORE FAVOURABLE SHAPE

The factors which a car designer can affect are the shape and size of the car body. The fact that the Saab 900 is far larger inside than its exterior would suggest is a tribute to the competence of Saab designers. The remaining factor is, thus, the shape of the car.

Wind tunnel tests on full-scale cars prove that the Saab 900 has an even lower drag coefficient than the corresponding 99 models. The Saab 900 has been designed and styled for optimum directional stability under all conditions — even in gusty cross-winds. The design of the rear window and the luggage compartment lid and the transition between the side surfaces and the rear sections are all of vital importance to the exceptionally good directional stability in windy weather. The deeply-curved windscreen and the absence of sharp corners which often cause turbulence contribute to the exceptionally low wind noise in the car.

4

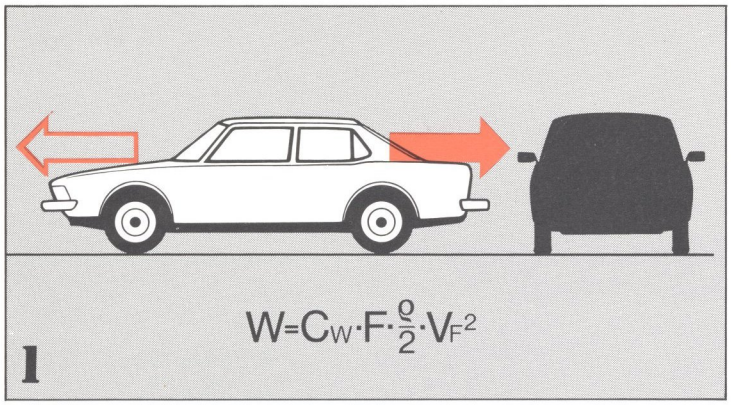
LOW WIND NOISE

A sun roof is fitted on certain models and markets. The wind noise caused by the Saab sun roof is exceptionally low — even at high speeds. This is due to the curved windscreen deflecting part of the air to the sides instead of upwards and to the ideal design of the transverse ridge forward of the sun roof. Many competing cars are not provided with this ridge and the separate wind deflector fitted instead often merely causes more wind noise.

SPOILER AT THE FRONT AND REAR

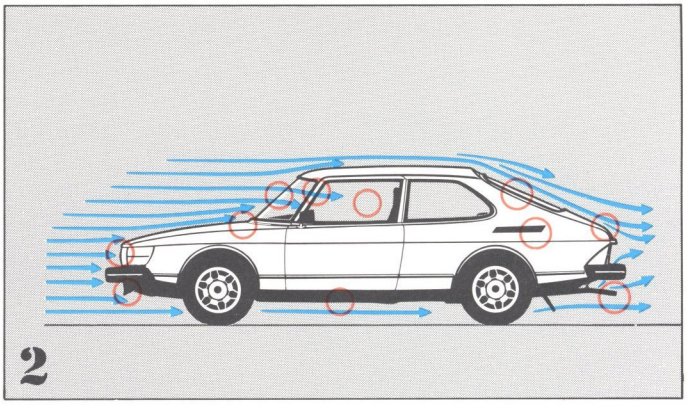
Years ago many car manufacturers started experimenting with spoilers fitted at the front and rear of their competition cars, in order to increase the top speed and improve the road behaviour at high speeds. The spin-off on everyday cars can be seen today. On the Saab 900, the front spoiler is integrated into the body. The spoiler reduces the fuel consumption and increases the directional stability at high speeds. The 3-door Turbo is also fitted with a spoiler at the rear.

The front spoiler is made of black thermoplastic rubber, which is resistant to flying chips and low temperatures, and is pliable and resilient. The spoiler will normally deflect without being damaged if it should strike an obstruction at low speed. So the ample ground clearance is not affected in practice.

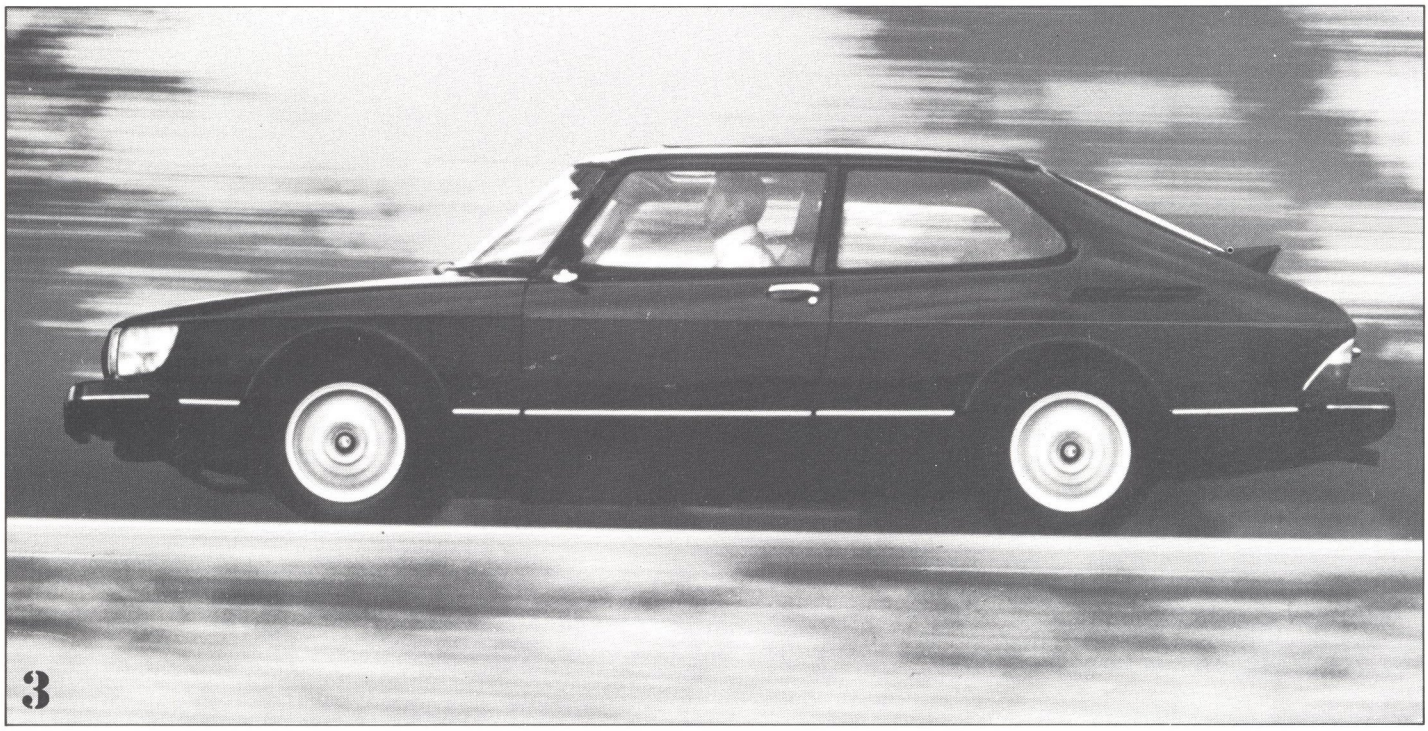


$$W = C_W \cdot F \cdot \frac{\rho}{2} \cdot V_F^2$$

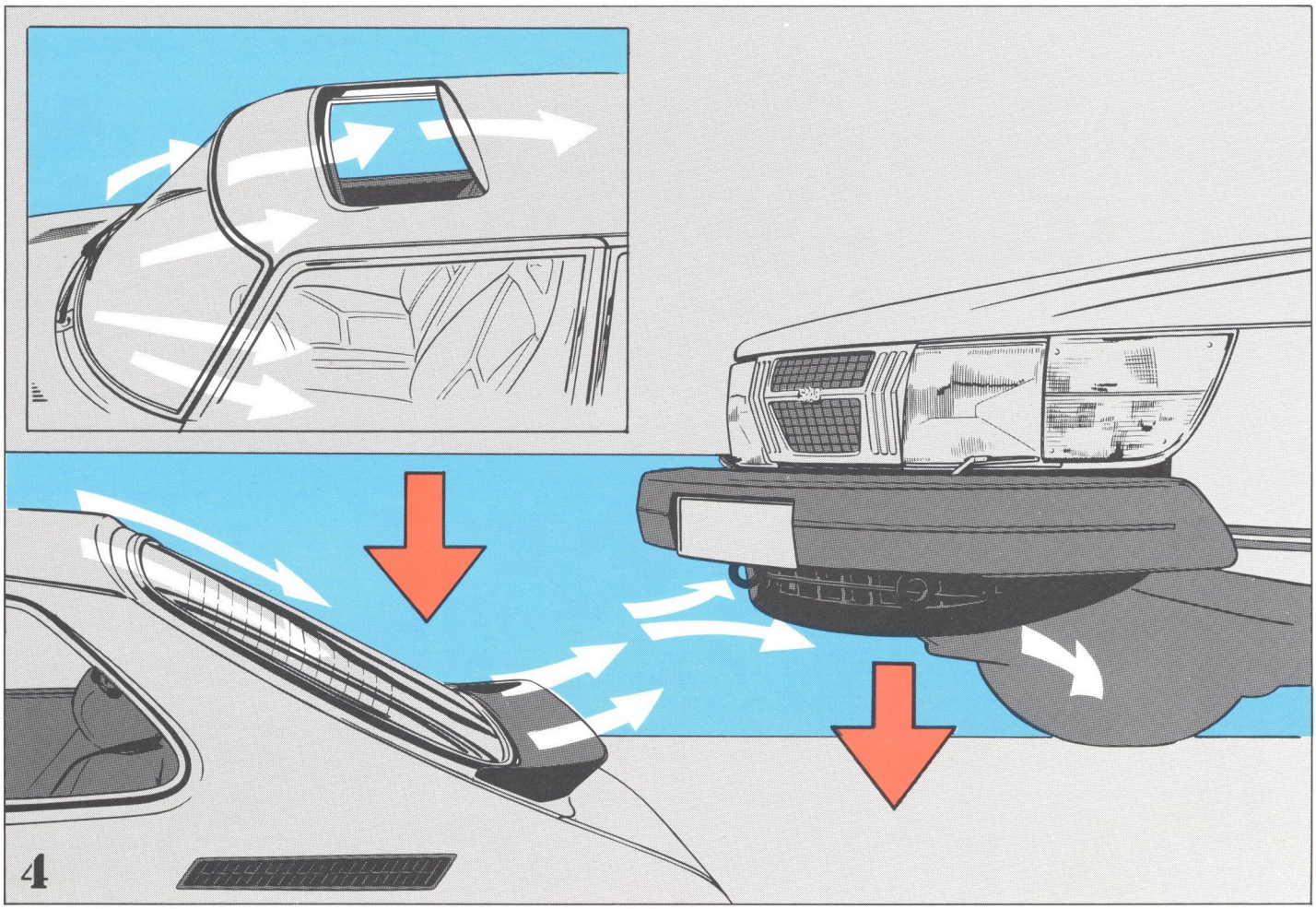
1



2



3



4

The exterior in its entirety and in detail

The ambition of every car designer is obviously to create aesthetically pleasing cars. But a designer must also take into account numerous other factors, many of which may appear to be in conflict. The attractiveness of the final product is largely dependent on the practical virtues of the shape and the "flair" of the designer. The fact that the car is a compromise should preferably not be apparent.

When interviewed, the chief stylist at Saab commented as follows: "Tomorrow's society will suffer from a shortage of energy resources and we are doing our best to take this into account today. The fundamental principle is that our car must be efficient and economical to own and drive. Functional considerations must dictate the design of the body and the interior, rather than the other way round. The body must have no excesses in any respect. A decorative strip, for instance, must protect the body against damage in addition to being decorative. It must not be the starting point for corrosion, and this is why we glue it to the body rather than screwing it in position. This is merely one example".

THE CAR OF THE FUTURE

Extracting and combining the best features of various design ideas has always been one of the main duties of a car designer. Even more so than today, the cars of tomorrow will be the result of compromises aimed at satisfying demands which are hardly mutually compatible in a given car — compact overall dimensions, low weight, ample space, high comfort, good economy, high reliability, good road behavior and good collision protection. Space, comfort and collision safety favor large cars. Traffic congestion, economy and the shortage of raw materials favor the small car.

When the Saab 99 hatchback was introduced in the early 1970's, it justifiably aroused widespread acclaim. Although roomy and as easy to load as a traditional estate car, the hatchback had the styling of a coupé model and the unimpaired comfort of a conventional car.

Saab was among the first to introduce this type of body, but many manufacturers have subsequently adopted the idea. When interviewed by the Swedish magazine "Teknikens Värld", Bill Mitchell, the legendary chief designer and Vice-President of General Motors in the U.S.A., said that "the car of the future will have front-wheel drive and will be of the hatchback type . . ."

1

IMPROVED SAFETY, HIGHER COMFORT

The entire front section of the Saab 900 is of new design. The low, extended front has the character of undated aristocracy. The styling is undated since it is functional. But the most important new features are concealed beneath the elegant exterior. And these new features are so numerous that it is virtually an entirely new car.

The Saab 900 is 31 cm (12.4 in) longer than the Saab 99 Sedan and 21 cm (8.4 in) longer than the 99 hatchback. Some of the benefits of the increase in length are as follows:

— Larger interior space and better comfort.
— More space in the engine compartment. Service work is easier and more space is available for extra equipment such as air conditioning, turbocharger, etc.
— Longer wheelbase and exceptionally good road behavior and roadholding.
— Improved active and passive safety.

As compared to the 1978 Saab 99, the Saab 900 has a total of more than 800 entirely new or redesigned items and components — most of them forward of the windshield pillars.

In many respects, the 900 models are made by an entirely new technique. Several major component blocks, for instance, are finally assembled and inspected before they are fitted into the car. Since the body and interior have been designed for more efficient manufacture and inspection of parts and since automation in production has been expanded, the fit and finish can be maintained at a uniformly high level.

All 900 models have broad, black decorative strips glued along the sides of the car. The side strips are made of black plastic with aluminium inserts.

The window surround molding is of aluminium. On the Turbo models, the window surrounds are black.

2

FUNCTION AND ELEGANCE

The radiator grille is made of impact-resistant plastic, with the decor of chromium or hot-formed, matt paint. The material is non-corroding and will cause no rattles. The grilles of the GL, GLE and EMS are of the same basic design. The Turbo models have a unique, sportier type of grille.

On the new, larger and sturdier Saab bumper, the outer casing is made of thermoplastic rubber which is easy to clean when the car is being washed. The decorative strip, which is made of plastic and aluminium foil, is pressed into a groove in the rubber casing. Replacement of the strip is an easy and inexpensive do-it-yourself job.

3

READILY ACCESSIBLE

Since the hood is integral with the tops of the fenders and opens forward, the engine compartment is easily accessible for inspection and service work. Note that the design of the hood ensures that the front wheel housings are completely devoid of cavities and recesses around the wheels in which corrosion may start. The rear wheel housings are of the same smooth design.

4

LARGE LIGHT FITTINGS AT THE REAR

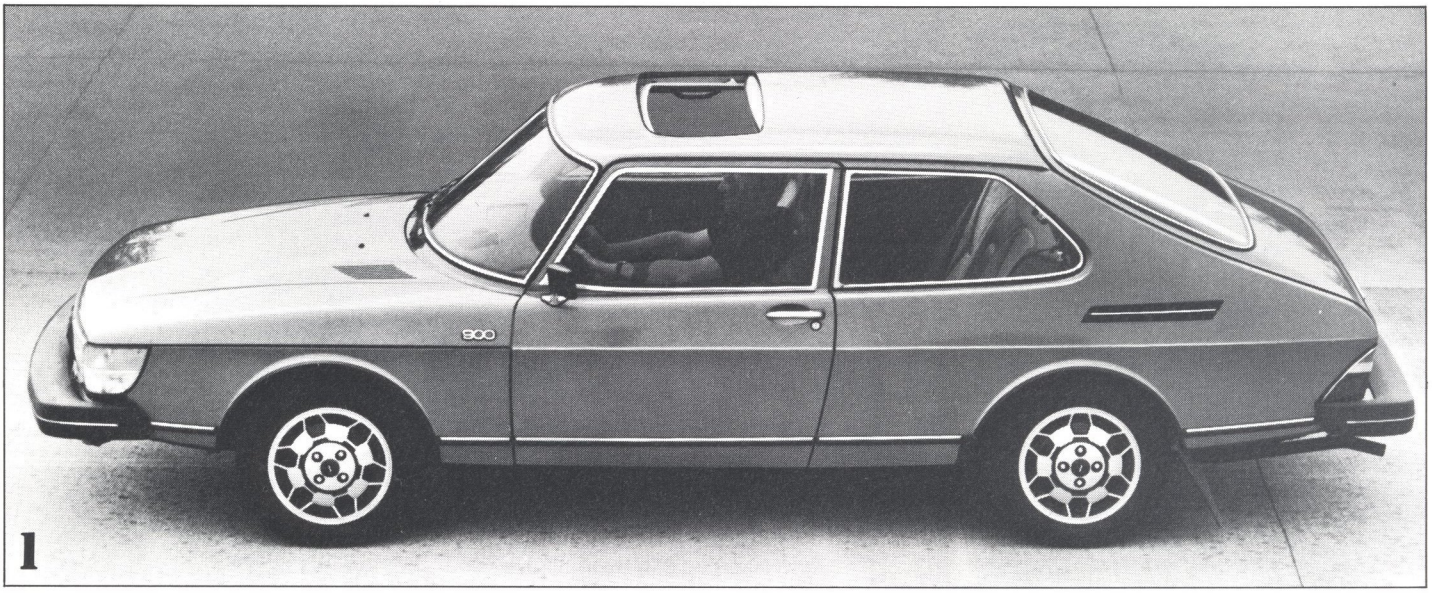
The rear light fittings accommodate the direction indicators, rear lights and reflectors, brake lights, reversing lights and parking lights. The lights are clearly visible, even from the side.

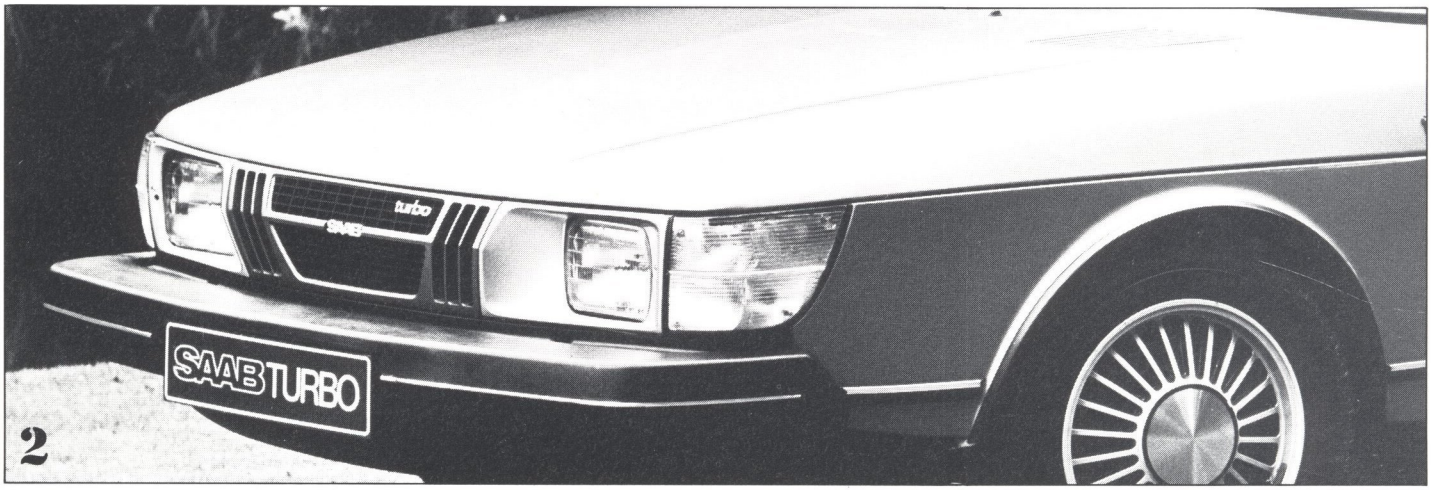
All emblems (except those on the grille) are of brushed aluminium, with the edges painted black. The emblems and decorative strips are glued in position to avoid starting points for corrosion.

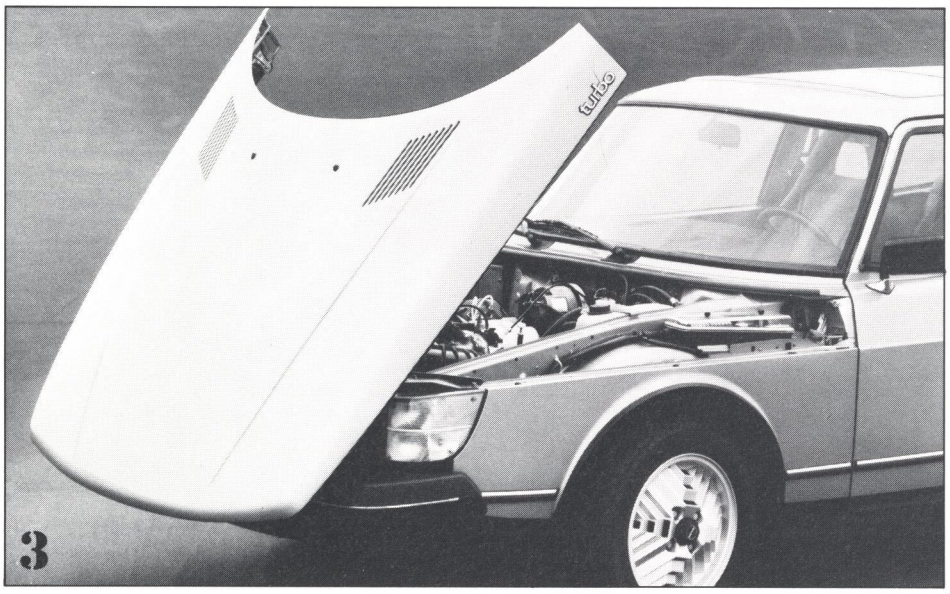
5

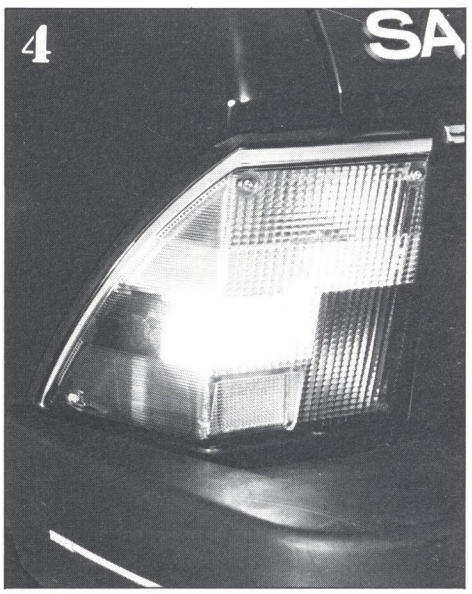
FIVE DIFFERENT TYPES OF WHEELS

Five different types of wheels are used on the 1979 models of the Saab 900. On the GL the trim ring and hub caps are made of stainless steel. On the GLE, a full wheel cover, also of stainless steel, is used. On the EMS and Turbo models, the material used is aluminium. However, the hub cap on the wheel for the five-door Turbo is made of plastic, with a shrunk-on brushed stainless steel plate. The spare wheel on all models is of steel, per the design used on GL models.

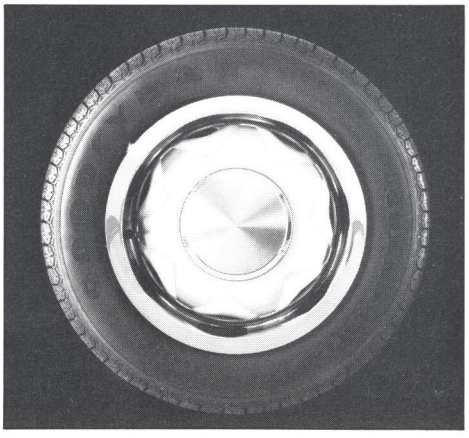

1

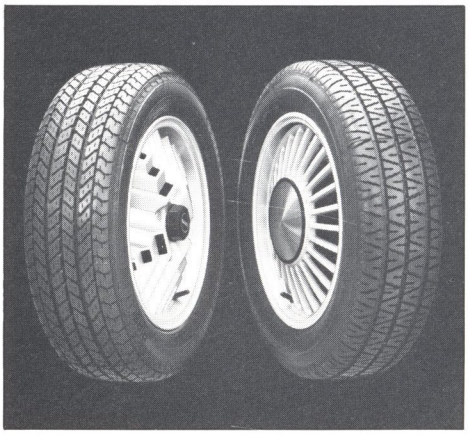

turbo
SAAB TURBO
2


turbo
3


4
SA


5





The Saab safety cage

Passive collision safety and the best possible protection for the occupants are not merely matters for legislation — they also reflect the manufacturer's moral sense of responsibility and his involvement in the well-being of the motorist. Saab is often mentioned as a pioneer in this respect and a good example to other car manufacturers.

1

REINFORCED COLLISION PROTECTION

The sheet metal of the bodywork and the protecting and reinforcing members of Saab cars are often appreciably sturdier than those of most other cars. The stiffness in bending increases as the square of the sheet metal thickness (a 5 % increase in sheet metal thickness gives $1.05^2 = 1.1025$ or 10.25 % higher stiffness in bending). This is one of the reasons that Saab cars are often well within even tomorrow's safety regulations.

The Saab 900 is also one of the longest among European makes of cars in the same comfort and performance class. And the longer the body of a car, the more gently it will absorb the forces occurring in a collision.

The extra room in the front section of the car has provided space for further reinforcement of the collision protection. Certain members of the chassis have been extended and two special "collision beams" (see arrows) have been fitted between the front engine support member and each wheel housing — forward of the front wheels.

The Saab 99 has long had one of the most effective bumpers on the market. The bumper of the Saab 900 can withstand minor collisions even better. To the passengers, this offers the assurance of even more gentle retardation in the event of a collision, whereas to the body, it offers even more effective protection.

2

MORE AMBITIOUS GOALS THAN EVER

Objective observers usually classify the Saab 99 as one of the safest designs on the roads today. The Saab 900 is even more comfortably within the present and planned future safety regulations than the Saab 99. But our designers have also had higher safety goals than ever before. The new features have been subjected to rigorous tests, including barrier collisions at speeds of 30 mph (50 km/h) and at collision angles of 0° and 30°. As an example, after a collision test. . .

— the windows must remain in their mountings
— the doors must be maintained in the closed position by their locks, but must still be easy to open in the usual manner
— the hood must remain in position, even though it may be deformed
— the occupants (test dummies) must be retained within the passenger compartment.

To satisfy these goals, reinforcements as well as and deformation elements have been introduced at strategic points in the body. The body can be said to have been programmed to fail at certain predetermined points if the stresses should exceed a certain definite value.

The striker plates of the locks are equipped with backing plates which prevent jamming of the locks. This, together with the design weaknesses incorporated into the wheel arches, fender flanges, etc., enables the doors to be opened easily following a frontal collision. It is probable that this feature will be the subject of future legislation. But, as mentioned earlier, the ambition of Saab is to be one step ahead in safety matters.

The greater the number of spot welds, the sturdier will be the body. But even more important than the number are the size, quality and locations of the spot welds. Most car manufacturers now employ computers for the chassis and body design. But in addition to computers, Saab applies particularly advanced electronic measuring equipment for inspecting the quality of the welded joints.

The hood is hinged at the front and is latched at the rear, so that it will not blow open on the road if it has inadvertently been left insecurely latched. The bonnet has front and rear reinforcements, a buckling zone in the centre and special arrester reels at the rear edge. All this is designed to prevent it from striking the windshield in the event of a collision.

3

STIFFENING ELEMENTS

An internal stiffener with a gently rounded cross-section runs around the entire roof. The windshield pillars are made of rolled, 0.1 in (2.5 mm) thick sheet steel sections, designed to absorb very effectively any stresses applied to the front, sides and roof.

In a frontal collision, the power unit is thrown forward and, as soon as the front section of the car has been deformed, will be arrested by the obstacle which the car has struck. The engine then forms a rigid "spacer" between the obstacle and the passenger compartment bulkhead. Before the collision energy has been expended, the body continues to apply a force towards the front, and it is important to ensure that further deformation will take place gradually from the front towards the rear. Most of the force is transmitted through the newly designed, robust Z-beams and wheel housings to the windscreen pillars, the bulkhead and its mounting.

The Z-beams in the front section, the windscreen pillars, the sill members, the cross-members in the floor, the passenger compartment bulkhead, the cross-member behind the rear backrest, the gently profiled floor plate, the transverse tunnel below the back seat, the thick and sturdy side panels and the reinforcing members in the door provide effective energy absorption laterally in the event of a collision or the car turning over.

4

PROTECTION AGAINST CORROSION STARTS ON THE DRAWING BOARD

If the safety cage and the energy-absorbing front and rear sections are to maintain their original, calculated strengths, good protection against corrosion must be assured already at the drawing-board stage.

As an example, the sill members are vented towards the interior of the car and the bottom edges of the doors are provided with drain holes. The wheel housings are vented and are separated from the fenders and hood. Neither the wheel sides nor the engine room sides of the wheel housings contain dirt or moisture traps. The outer rear side panels include no welded joints which may involve the risk of corrosion attack.

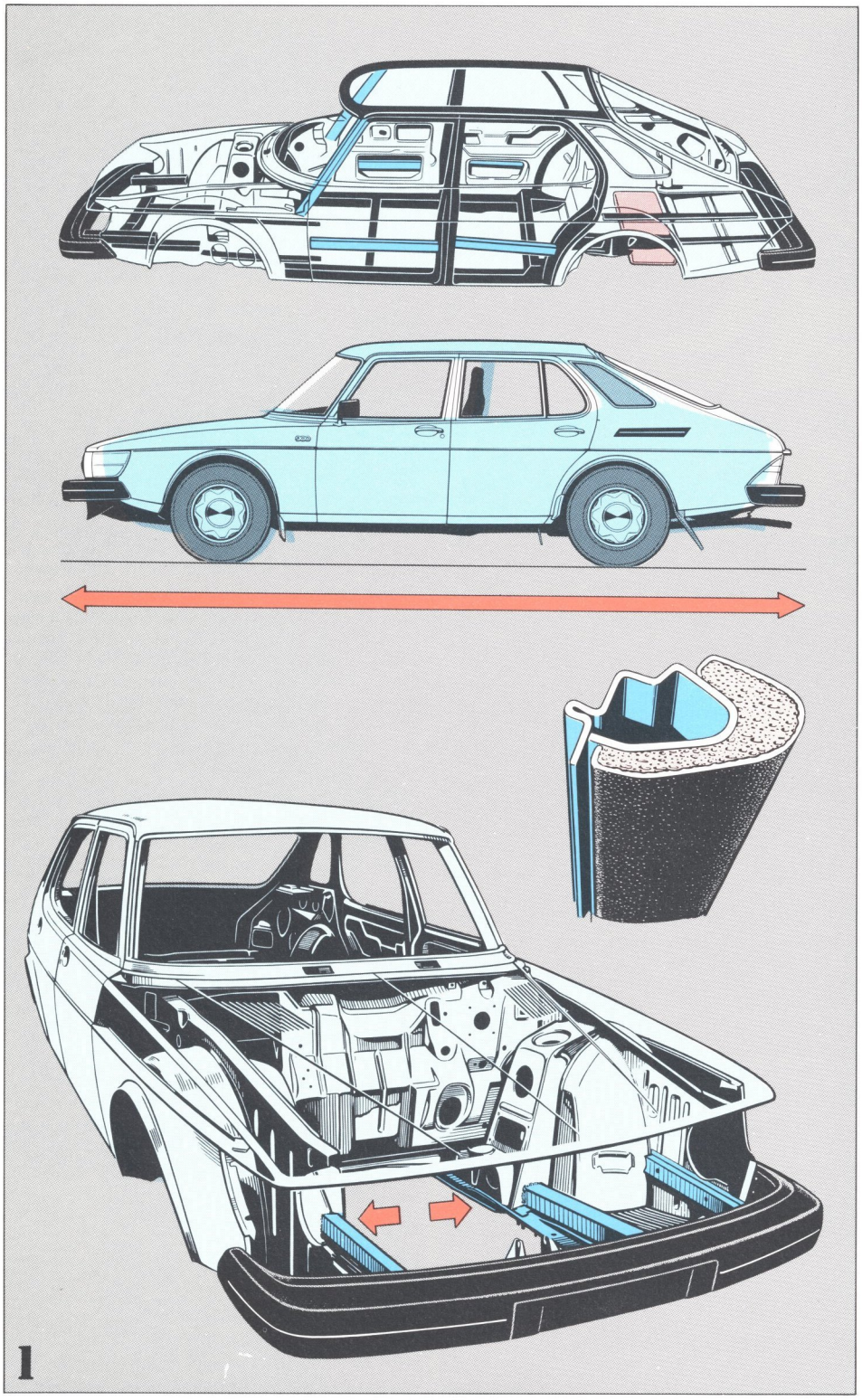
Welded joints are sensitive points from the corrosion aspect. On the Saab 900, all welded joints in every structural component are above the lowest point, i.e. above the point where any moisture could accumulate.

The "rust-resistant" body is subjected to several stages of surface treatment:

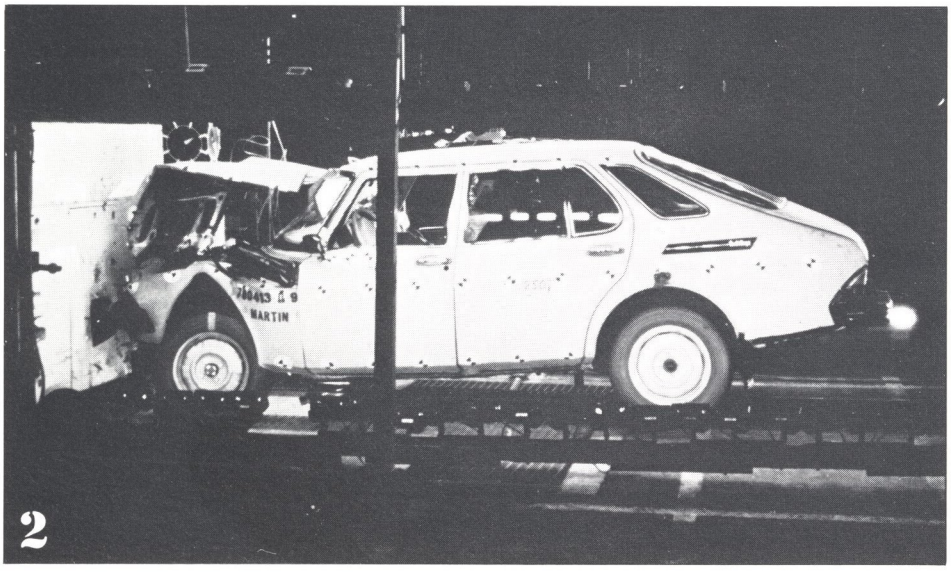
1. Cleaning in an alkaline bath followed by zinc phosphatising, which provides a certain amount of basic protection against corrosion and ensures better adhesion of the primer.
2. The body is immersed in a bath of anti-corrosion primer, and a heavy electric current is applied to ensure that the paint particles will adhere securely to all sheet metal surfaces. The method provides a homogeneous coat of primer of uniform thickness inside and out — even inside tubular members, and on edges, corners and welded joints.
3. The intermediate coat of paint is applied in two stages. A thin coat of polyester-based paint is first sprayed on to increase protection against flying chips.
4. Before this coat has dried, a further coat of epoxy paint is applied to provide excellent corrosion protection and a suitable base for the top coat.
5. The top coat is sprayed on manually and is cured in an oven.
6. The internal priming is supplemented with a thin oil film. Anti-corrosion oil is sprayed into all cavities and joints — in the sills, doors and brackets. The oil is sprayed into a total of 20-odd points in the body.

   Exposed surfaces of the floor plate and wheel housings are sprayed at high pressure with polyester underbody compound which has excellent adhesion and excellent resistance to flying chips. High-pressure spraying provides a homogeneous layer without blisters, thus also reducing the risk of flaking.

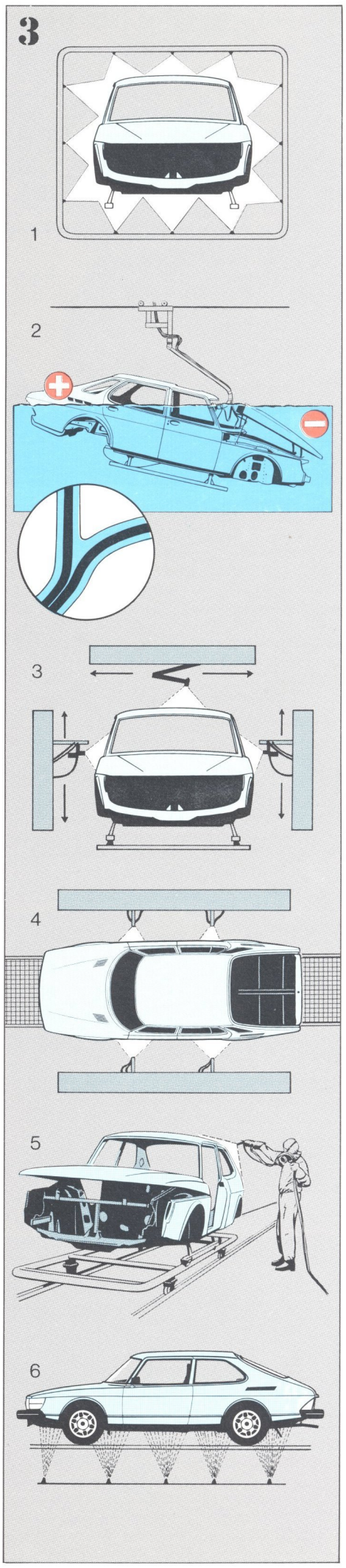
   All joints in the body are sealed with PVC sealing compound, to improve the anti-corrosion treatment further. The final stage consists of spraying anti-corrosion oil onto all underbody surfaces.



1



2



3

Safety of the occupants

For many years, Saab designers have aimed at achieving occupant safety standards set in accordance with moral and ergonomic demands rather than based on current or expected future minimum requirements. Since 1971, a team of specialists — medical practitioners and engineers — has been retained by Saab to pursue road accident research. Saab cars involved in more serious accidents are examined, and the main aim is to establish the basis for improvements to an already well-proven safety design.

The 1979 Saab 900 models therefore satisfy the legal demands expected to come into force during the mid-1980's. And many of these are satisfied with a very comfortable margin.

1

STRICT DEMANDS AND ADVANCED TECHNOLOGY

Different parts of the body have different capacities for withstanding high retardations, and the demands on the energy-absorbing sections of the interior must therefore be designed accordingly. Barrier collisions at various angles, drop tests and skid tests are used by Saab engineers to verify that the demands are satisfied with the widest possible margin. Exceptionally advanced measuring equipment is used during the design and test work — the high technological standards in the Saab aerospace and computer divisions are also put to good use in the Saab Car Division.

2

DESIGNED FOR PROTECTION

The steering of the Saab 900 is a further development of several revolutionary Saab designs. Some of the features are patented, and the Saab 900 incorporates what is probably the world's safest steering wheel and steering column design.

The unique hub pad consists of three box units located inside each other. The innermost unit is made of thin, slotted sheet metal which will deform when subjected to a high stress. The sheet metal unit is covered with a pressure-distributing box unit of strong plastic, and the outside of the pad is covered with soft, resilient plastic.

The steering column consists of two individually deformable sections, connected by a universal joint. The upper section of the steering column is telescopic and is fitted inside a closely perforated sheet steel cage. The lower section consists of a patented sheet metal bellows, which will deflect the steering column when subjected to a load. A rigid shaft and universal joint are fitted between the sheet metal bellows and the steering box.

The steering box is far back in the engine compartment and the front of the car must therefore be very heavily deformed in a collision before the steering column is affected. The sheet metal bellows is the first component of the steering column to give way in the event of a serious frontal collision. When the deformation zone in the front of the car has been crushed and the driver has been thrown forward, his body will strike the undeformed steering wheel and steering wheel mounting. The large steering wheel pad is designed to provide the force absorption when struck by the driver's head, whereas the cage behind the steering wheel is designed to absorb the forces of the entire top part of the driver's body.

3

PROTECTION FOR THE LOWER PART OF THE BODY

The lower part of the instrument panel is specially designed to prevent serious injuries to the knees, thigh bones and hips. When struck by the knees, it will arrest the lower part of the body gently and will distribute the pressure along the entire lower part of the leg instead of concentrating it to one point only. The protective shield below the panel is designed to decelerate so gently that even an occupant whose seat belt is not fastened will be able to withstand impact without thigh bone fracture in a barrier collision at 50 km/h (30 mph). In terms of loads on the thigh bones, the Saab 900 is thus comfortably below the values which will become mandatory in the U.S.A. for cars of this size starting with the 1984 models.

The protection for the lower part of the body consists of a foamed PVC film on the outside and an energy-absorbing section of stiff polyurethane foam. Stiffening inserts are moulded into the polyurethane foam layer.

4

SEAT BELTS AT THE FRONT AND REAR

All Saab 900 models are equipped with inertia reel belts for the front seat occupants and lap belts for rear seat occupants. The seat belt mechanism for the front seat occupants incorporates a warning device wired to a red lamp with the text "Fasten belts" on the panel.

The front seats and the integral head restraints are designed to take into account the back seat passengers. The impact-absorbing padding and the absence of sharp corners and edges are typical examples. Extra soft padding is incorporated at the extreme bottom of the front seats, to protect the ankles of the back-seat passengers.

The location of the ignition key on a special console between the front seats also has a safety background. Many serious injuries have been caused by ignition keys fitted at knee height below the steering wheel. The handbrake lever is also fitted at the most convenient and safest place. In an emergency situation, it can also be used by the front passenger.

5

HEAVY PADDING

The padding on the windshield pillars can absorb even very heavy impact without "bottoming". The windshield is of laminated glass. The curved shape and the large distance between the occupants and the windscreen minimize the risk of the occupants striking the windscreen, provided that their seat belts are fastened. A 10 cm (about 4 in) bubble in the glass surface is usually the only visible sign of moderate impact. If the glass should break, small glass granules will form instead of long, sharp slivers. The remaining windows in the car are of toughened glass.

The compressed glass fibre roof lining is covered with velour and is fire-resistant. This impact-absorbing lining extends over the reinforcing members and the roof edges. Even today, most other cars lack this safety feature.

6

SIDE COLLISION PROTECTION

All models are provided with sturdy, longitudinal members welded into the door sides to provide protection in the event of a collision from the side. In addition, the inner door panel on 3-door models is designed as an impact-absorbing protection for the hips. The door lining is a one-piece polyurethane foam moulding lined with tough vinyl.

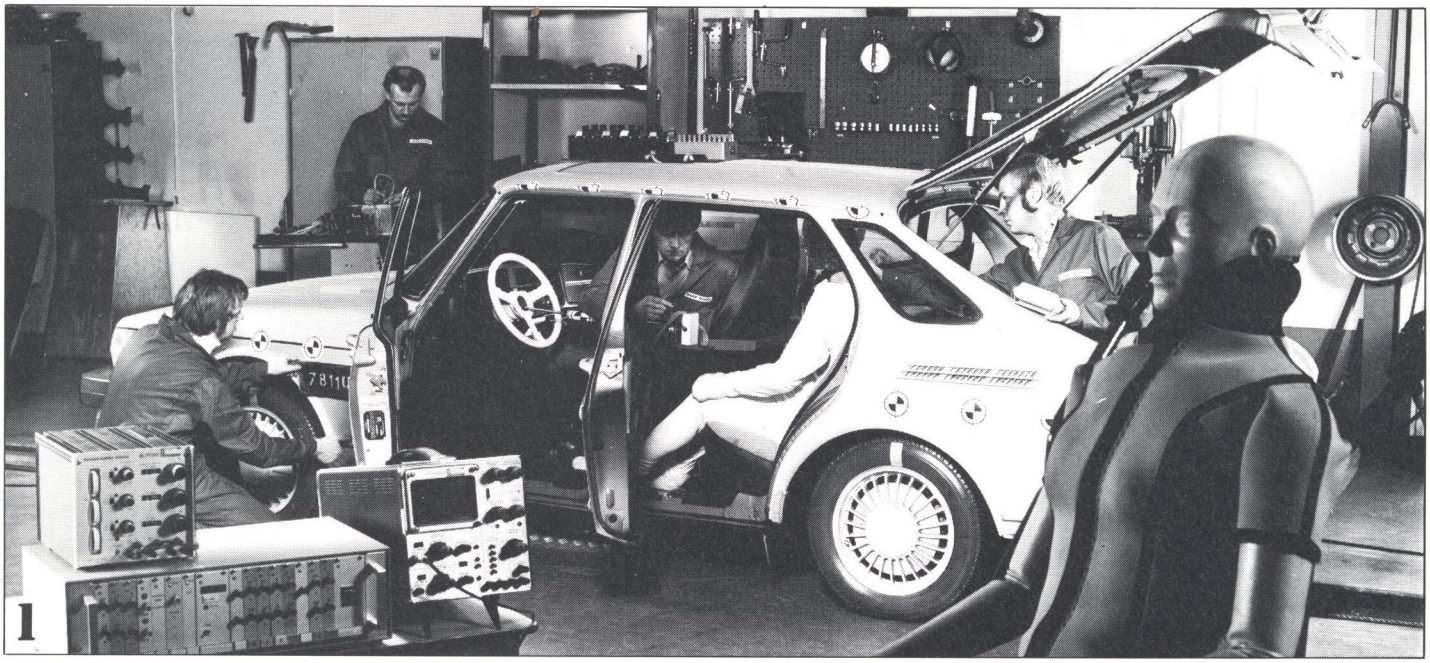
7

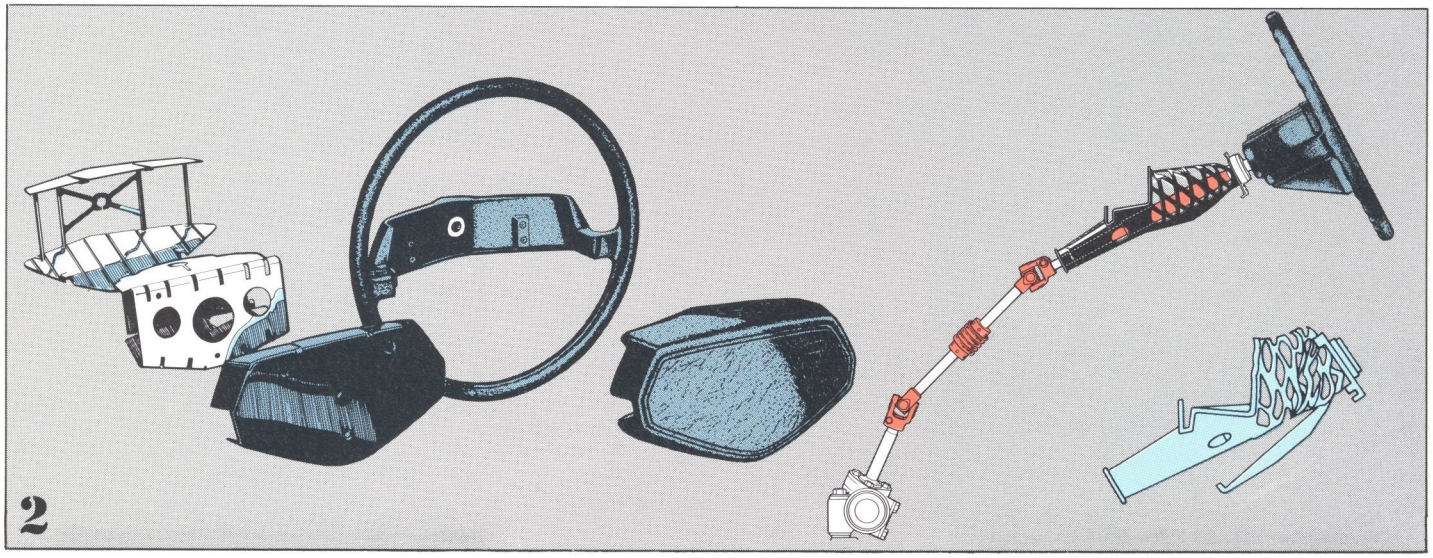
OTHER SAFETY SYSTEMS

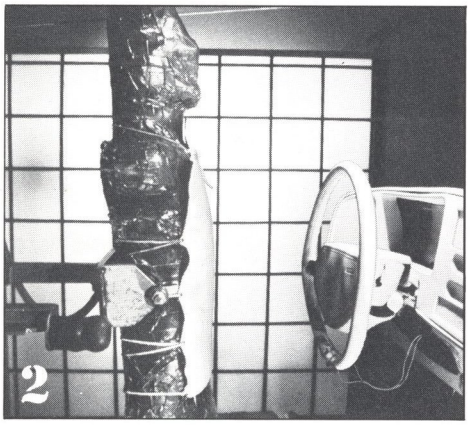
The range of passive safety systems necessarily also includes measures for preventing electrical or gasoline fires. As usual in matters of safety, Saab has satisfied many of these legal requirements at the design stage and by suitable choice of materials, even before the legislation has come into force.

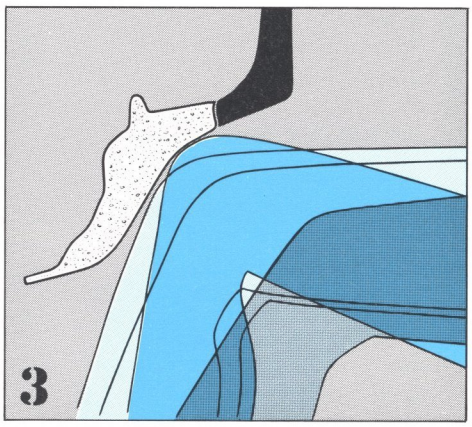
The Saab 900 is fitted with a large number of fuses, special multi-pole connector housings and wiring with few connectors and a few fused lines. The arrangement is safe and easy to service. The electrical insulation conforms with the standards applicable to high-voltage installations. The wiring harnesses and fuel lines are firmly clamped or are fitted with substantial anti-chafe protection.

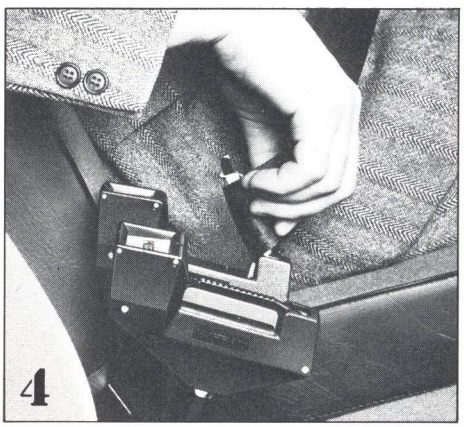
The fuel tank of the Saab 900 is located in the safest conceivable place — between the back wheels. The fuel injection system is provided with a safety relay which will quickly shut off the fuel pump in the event of a collision or if the car should turn over. The fuel tank cap is designed to satisfy the stringent sealing requirements in force in the U. S. A. and all materials used in the interior are fire-resistant or self-extinguishing.

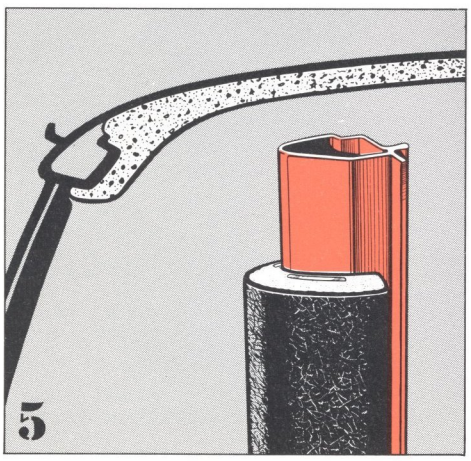

1


2


2


3


4


5


6


7

” . . . one of the most comfortable interiors in any car, anywhere. . .”

Only cars in the luxury class have the combination of comfort features incorporated into the Saab 900 — particularly the EMS, GLE and Turbo models. The interior offers plenty of elbow room and space for the occupants to adopt their individual seating attitudes, even in the center of the back seat.
”. . . one of the most comfortable interiors in any car, anywhere. . .” said the magazine Autoweek in a Saab 99 test report dated April 1975.

1

ENVELOPING COMFORT

The Saab 900 is appreciably bigger inside than its outside would suggest. The total interior length is almost a record in its price, performance and equipment class. And the absence of a high center console between the front seats ensures ample legroom, even to the side.

The headroom in the Saab 900 is equally ample in the front and back seats. This cannot always be said of other makes of hatchback cars, which often have inadequate headroom in the back seat, particularly if equipped with a sun roof.

The interior lighting is provided by two lamps. The lamp above the windshield provides a lateral light beam which will not irritate the driver, and the passenger can thus use it to read a map, for instance. Both lamps light up automatically when a front door is opened. This also applies to the indirect lighting of the ignition key. The extra interior light switch located on the console between the front seats is a practical and convenient feature.

Stereo loudspeakers and defroster outlets are located on each side of the instrument panel. Space has also been reserved adjacent to the ordinary defroster outlet on each side for separate outlets connected to the auxiliary car heater (optional extra). The locations of the loudspeakers provide an exceptionally good stereo effect. Space for a radio and cassette tape player is provided in the center of the instrument panel.

The glove compartment lighting is switched on automatically as soon as the lid is opened and is of a green, anti-dazzle hue. A grab handle is provided below the glove compartment for passenger convenience.

CAPACITY TO SPARE

The heating and ventilation system has capacity to spare. It is thermostatically controlled and provides a uniform air flow at the preset temperature, regardless of any variations in the outside temperature, the engine temperature and the speed of the car. Tests have shown that, when the car has been idle for a long period at an outdoor temperature of −22°F (−30°C), the heating system will deliver air at 120°F (50°C) above the outdoor air temperature within five minutes when set to maximum output.

All of the air admitted into the car through the heating and ventilation system passes through an air filter which arrests dust particles, oil, soot, pollen, etc (not available on cars equipped with air conditioning). The Saab 900 thus provides protection even against contaminated air.

When the fan is set to maximum speed, the air in the interior is changed once every twenty seconds. The number of outlets for warm and cold fresh air and the locations of the outlets are very important from the comfort aspect. If the air velocity should exceed 0.3 m/s at any point around one of the occupants, this will be experienced as a draft. The Saab 900 has at least 12 outlets for warm ventilation air and 2 outlets for cold air. This ensures a gentle but effective air flow, without drafts. About 1500 litres (53 cu ft) of cold fresh air can be supplied and distributed in the interior every minute, even when warm air is supplied at the same time. Warm or cold air can also be supplied to the rear footwells.

2

COMFORT ON A LONG JOURNEY

The seats of the Saab 900 are one of the most comfortable car seats avaliable anywhere and designed to ensure comfort on a long journey. The backrests of the front seats can be steplessly adjusted in rake to provide the optimum individual comfort. The driver's seat can also be adjusted in height with a simple control lever.

The seats are covered with a polyester material — plush or velour — of a texture which does not feel cold in the winter. But the airiness of the material ensures that the seats will not feel "sticky" even in the height of summer. The electrically heated driver's seat is standard on the GLE, EMS and Turbo models. On GLE and 5-door Turbo models the front passenger seat is also electrically heated.

In the models at the top of the Saab 900 range — the EMS, GLE and Turbo — the polyester plush upholstery is of special design. The back-seat backrest is slightly concaved for two persons and incorporates a folding armrest to improve the comfort further. Soft headrest cushions in the rear provide the finishing touch to the comfortable interior on GLE and Turbo models (the headrest cushions are available as optional extras on other 900 models).

LAVISH ELBOW ROOM

When comfortably seated in a car — particularly in the back seat — ample elbow room is an important aspect. And this is where the Saab 900 is wider than most of its competitors in its class — especially the 3-door Saab models. In many cars, the wheel housings encroach on the space available to the outer back-seat passengers and they must therefore sit at an angle. But not in the Saab 900 — not even with three passengers in the back seat. And there is no bulky drive shaft tunnel to occupy valuable legroom and restrict the thickness of the seat padding.

3

QUIETER AT ALL SPEEDS

Tests have shown that the sound level in a Saab 900 is even lower than in the Saab 99 — at all speeds. This is the result of meticulous insulation and various measures adopted to suppress the sound at source. The engine and front assembly mountings have been redesigned. The steering gear is rubber-insulated to prevent road noise from being transmitted to the body.

Other sound-absorbing elements include the glass fiber roof lining, the parcel shelf above the luggage compartment and the side lining of polyurethane foam (three-door models). The engine side of the bulkhead between the engine compartment and the passenger compartment is covered with insulating material enclosed by a thin sheet steel panel. The hood is insulated with self-extinguishing polyester foam (see picture). The surface is fluted to provide maximum sound absorption — particularly of high-frequency sound. Extra insulation is fitted under the front carpet, and this consists of a bitumen layer bonded to fluted polyester foam. The fluting ensures good ventilation and minimum moisture absorption.

4

THE DOORS OPEN INVITINGLY

The unusually large front doors (particularly on 3-door models), the wide angle of opening and the retracted, concealed low sills are truly inviting features when the doors are open. On the five-door models, the rear side-door opening follows the shape of the backrest to make it easy to enter or leave the car.

5

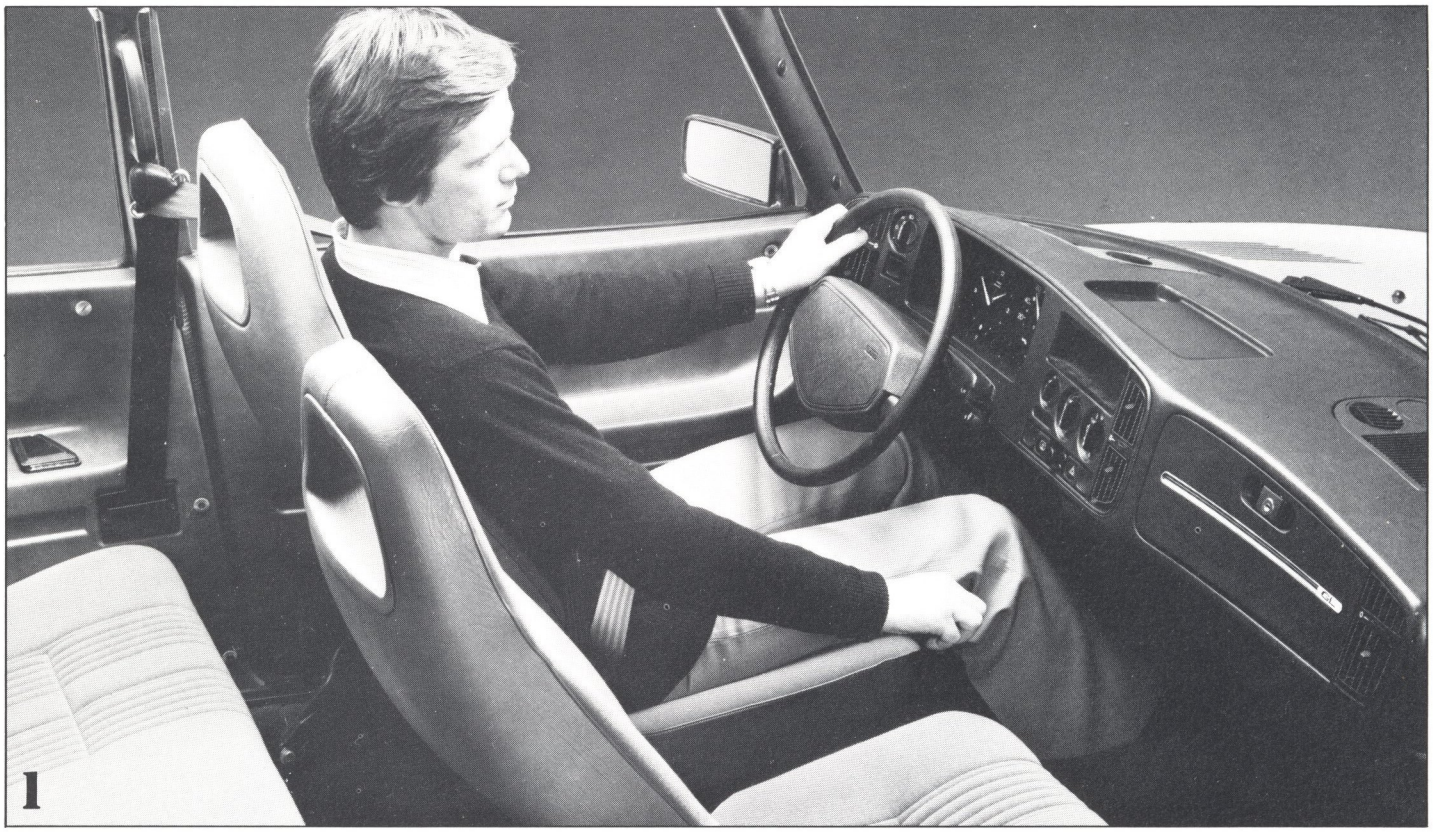
ALWAYS THE RIGHT TEMPERATURE

The large, impact-absorbing sun visors have a sturdy two-point mounting. The visors can be snapped out of one mounting and can be turned towards the side window. The reverse side of the passenger's visor is provided with a vanity mirror.

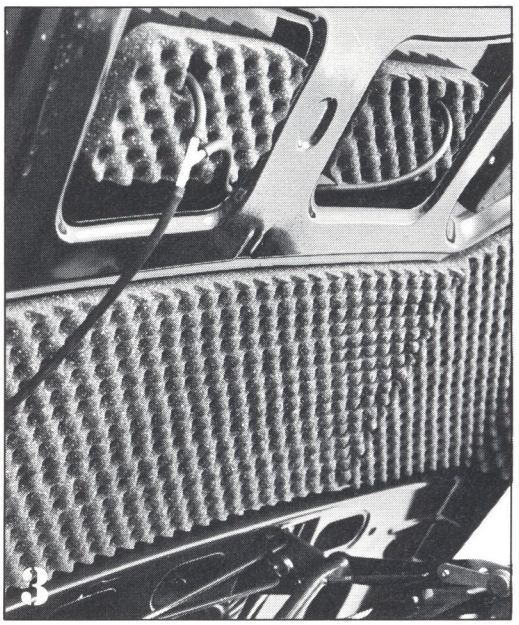
Certain Saab 900 models are equipped as standard with a sliding steel sun roof. The sun roof is simple and easy to open and close.

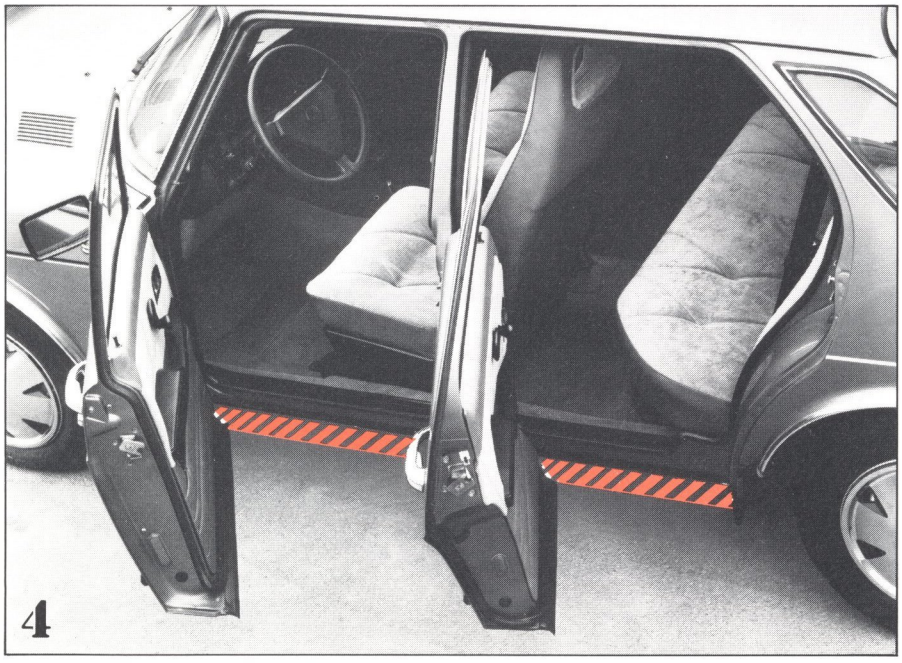
The roof lining of pressed glass fiber prevents heat absorption in strong, summer sunlight and heat loss in the dead of winter.

All Saab 900 models are equipped with tinted glass all round, and three-door models have swing out rear side windows.


1


2


3


4


5

The driver's seat — a workplace

Every driver must have the opportunity to carry out all operations comfortably, safely and quickly — often for long, uninterrupted periods and under varying conditions. Strong sunlight, darkness, bad weather, varying road conditions, dense traffic and confined passages are factors which make heavy demands on the driver and thus also on his "workplace". Saab engineers have therefore collaborated with medical experts in designing a seat which provides an anatomically correct seating attitude for practically any driver. A comfortable driving attitude which provides good visibility and places all controls within easy reach, — together with a comfortable "climate" — assures that a driver will be more relaxed and thus a safer driver.

1

STEPLESS ADJUSTMENTS

The Saab 900 has front bucket seats. The fore-and-aft adjustment is almost 6 in (15 cm). The adjustment is stepless and the seat can easily be moved even from the out-side of the car — to provide easier access to the back seat, for instance. The rake of the backrest is steplessly adjustable down to the reclining attitude. On three-door models, the backrest can quickly be unlatched to fold forward.

FOUR SETTINGS IN HEIGHT

A truly exclusive feature is that the driver's seat cushion is adjustable in height and slope — high or low at the front and high or low at the rear. The setting can be adjusted simply by means of a handle at the front of the seat. The driver's seat can also be removed quickly and simply from the car.

HIGH-CLASS COMFORT AND SAFETY

" It would be hard to find a better place to sit and drive a car than the front seat of the Saab. . ." the Road Test said in a report in August 1977.

Apart from offering a very high level of comfort, the front seats of the Saab 900 also incorporate a number of safety features based on careful analysis of a large number of road accidents.

A The slide rails of the seats are firmly secured to the floor cross-members at four points. The mounting can withstand loads greater than that stipulated by law in the U.S.A. and in EEC countries.

B The seat is built up around a sturdy tubular steel frame which has been subjected to numerous functional tests.

C The head restraint is integral with the backrest and is provided with an opening for optimum visibility. The robust, relatively firm padding effectively distributes the load in the event of impact, and this minimises the risk of head injuries. The head restraint can be fitted with a comfortable cushion (standard on the GLE and five-door Turbo models).

D A plate incorporated between the backrest and the head restraint is designed to support the top of the body. This appreciably reduces the risk of injury to the neck vertebrae — a fairly common injury in collisions.

E The rear of the backrest is gently curved and well padded. It has no hard metal parts or cross-members which could injure the back-seat passengers.

F The rear of the front seat has no hard cross-members either. The soft padding provides protection for the legs of the back-seat passengers.

G The cushion of each front seat is fitted with a load-sensing switch connected to a warning lamp in the instrument panel reminding the front-seat occupants to fasten their seat belts.

H The backrest and seat cushion are dished. The backrest incorporates reinforcements for the lumbar region, the top of the back and along the sides, and these reinforcements are made of a harder material. In addition, special "recesses" are provided for the tips of the shoulder blades.

I The depth of the seat cushion provides most drivers with ample thigh support right up to the knee joint.

J The lumbar support is elastic and, owing to its pressure distribution profile, adapts itself readily to the shape of the back.

K The seats are covered with polyester velour or polyester plush which is airy but insulating and is thus comfortable during the summer and winter alike. The seat covers are provided with zip fasteners and can be removed for washing. All materials used in the interior of the Saab 900 are fire-resistant.

L Automatic electric heating of the driver's seat is a standard feature (on GL models, Canada and Scandinavia only). On the GLE and the five-door Turbo, the front passenger seat is also electrically heated.

M 3-door models. Latch for releasing the front-seat backrest and a lever for releasing the latch. The lever is easily accessible from the outside of the car and from the back seat.

N Handle for resetting the slope of the seat cushion.

O Handle for fore-and-aft adjustment.

P Handwheel for setting the backrest rake.

A COLD DRIVER IS A POORER DRIVER

Winter brings suffering to many people. Rheumatism re-awakens and backaches are common. Medical experts often regard chilling of the lower part of the body as the direct cause of these ailments.

Investigations made by aeronautical and military authorities show that the abilities of the human being to think and act are impaired at low temperatures. Judgement and feeling are impaired and the muscles lack precision. Low temperatures cause mental strain.

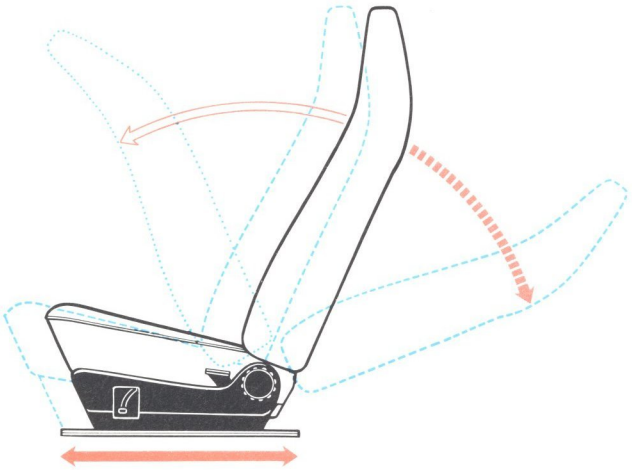
A cold driver is a poorer driver. When the driver seats himself behind the wheel of a thoroughly cold car on a winter day, it may take more than 15 minutes before his body heat can suppress the uncomfortable chill from below. The graph illustrates the skin temperature. Two cars have been left outside for 12 hours at an ambient temperature of + 5°F (− 15°C). The black curve represents the conditions when the seat is unheated, whereas the red curve is for a Saab heated seat.

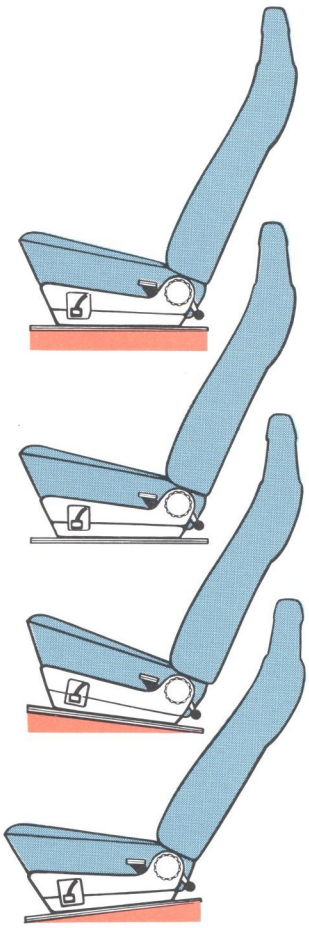
2

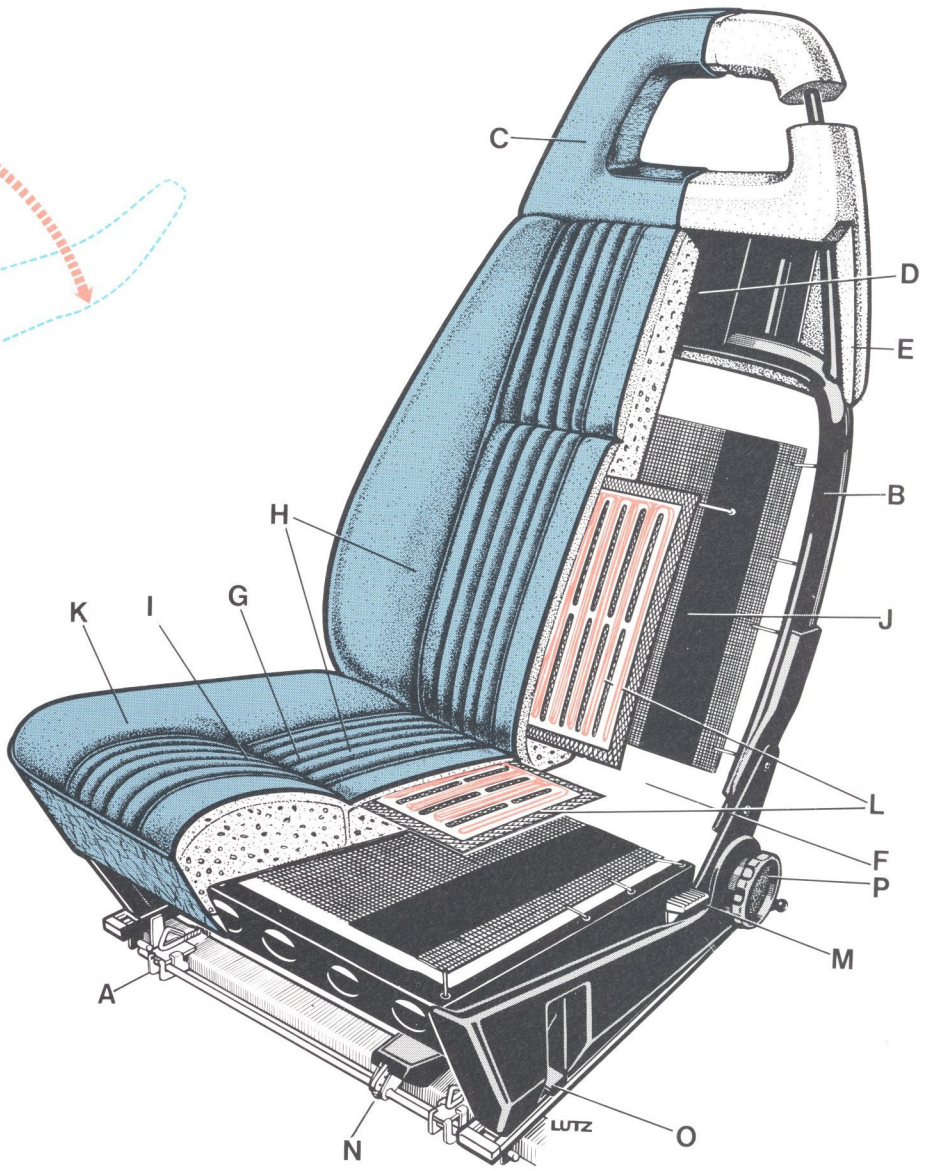
THE SAAB HEATED SEAT

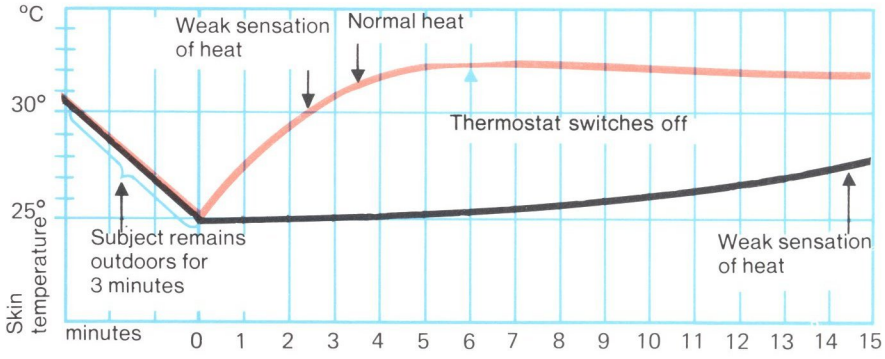
Saab seats with automatic electric heating incorporate heater elements in the seat cushion and the backrest. When the ignition is switched on, power will be supplied to the heater elements if the seat temperature is below + 57°F (+ 12°C). The engine will usually have been started and the alternator will deliver power before any significant amount of energy has been used for heating the seat. So no extra load is applied to the battery. When the seat has attained a temperature of + 82°F (+ 28°C), the power supply to the heater element will be switched off. A thermostat controls the automatic function.

The rating of the heater element has been determined by carrying out tests on various individuals. The heater wires are enclosed in net pockets below the seat covers and rest on aluminium foil which reflects the heat upwards.

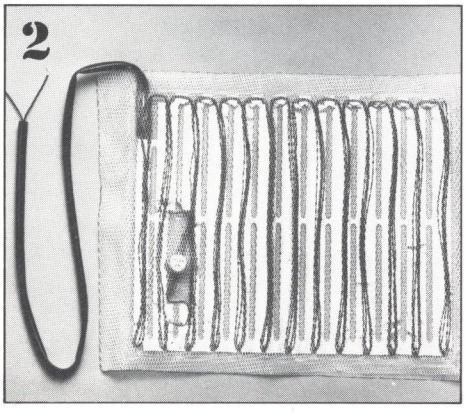




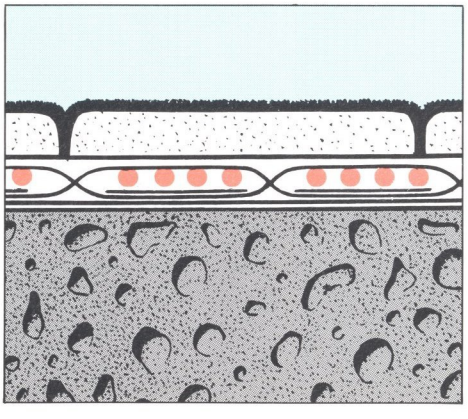

C
D
E
B
H
K
I
G
J
L
F
P
M
A
N
O
LUTZ

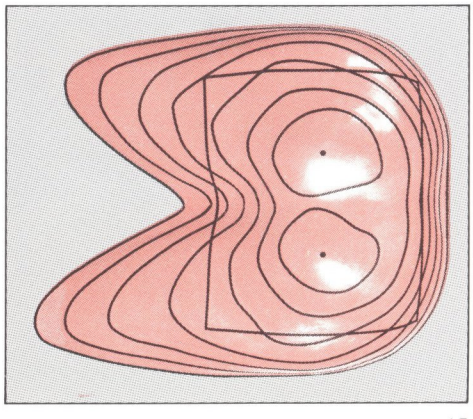

°C
Weak sensation of heat
Normal heat
30°
Thermostat switches off
25°
Subject remains outdoors for 3 minutes
Weak sensation of heat
Skin temperature
minutes
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1



2





Driver's environment

In the design of the Saab 900, the driver's environment was one of the fields to which particular effort has been devoted in the technical studies and research projects launched by Saab in collaboration with the Saab-Scania Aerospace Division, various universities and medical experts.

All these efforts have resulted in a functionally and logically arranged driver's "cockpit" which is of sound ergonomic design and which will offer the hundreds of thousands of people who will drive the Saab 900 equally good opportunities to master the car conveniently and safely. The logical design has appreciably reduced the risk of mistakes in hectic traffic situations.

1

LOGICAL, EASY-TO-REACH, SAFE

The asymmetrically curved instrument panel, the angle of the steering wheel and the locations of the pedals have been determined on the basis of extensive ergonomic studies and measurements. In the Saab 900, the driver can reach all controls without changing his seating attitude and without his eyes leaving the road. The controls and instruments are grouped in the driver's field of vision and the instruments are located at a high level to allow for fast reading.

All light switches are arranged to the left of the steering wheel. Pushbuttons, knobs, etc. for the radio, heating, ventilation, cigarette lighter, electric heating of the rear window and hazard warning lights are to the right of the steering wheel. This pattern of locating the controls will be standardized internationally and reduces the risk of mistakes.

For safety reasons, the light and fan controls are of the rotary type. Other switches are of the push-button type, with illumination of the function symbol from the rear.

The instrument panel is made of vacuum-moulded, impact-absorbing material backed by a deformable sheet steel body. The surface layer is soft. The material is black, in order to prevent irritating reflections. It can withstand temperatures between −40°F (−40°C) and +140°F (+100°C) and 100% relative humidity without being in any way affected. Provision is made for easily installing a radio — and loudspeakers, speaker wiring and antenna leads are already in place.

EASY-TO-READ INSTRUMENTS

The large, round instruments have white symbols and orange-coloured pointers against a black background. This design allows for fast and correct readings under a wide variety of light conditions. Tests have shown that it is easier to observe changes in position of a large pointer quickly and correctly by peripheral vision than it is to observe changes in figures, for instance, in a digital instrument "window".

The instruments are deeply recessed. They are therefore entirely non-reflecting and give minimum reflections in the windows at night. The lighting is green — a colour which has been proved to be best when driving against oncoming traffic and thus using daylight vision in darkness. Red lighting is definitely inadvisable — it would conflict with warning lights in traffic and on the instrument panel.

The warning and indicating lamps are normally not visible — the colours and symbols only appear when the lamps light up. The instruments are of modular design and nine different versions are available. The top picture shows the GL version with clock, speedometer and a combination instrument for fuel level and coolant temperature. The fuel gauge also contains a low fuel level warning lamp.

The speedometer incorporates an electronic pulse transmitter which can be used as input to an automatic speed controller (optional).

The instrument panel includes provision for further reminder functions. In the Saab 900 equipped with the Lambda system and 3-way catalyst, one of these serves as a reminder for emission service after 15,000 miles.

TURBOCHARGER PRESSURE GAUGE

On Turbo cars, the turbocharger pressure gauge is incorporated into the combination instrument together with the coolant temperature gauge and the fuel gauge. The tachometer and the clock are located to the left of the speedometer.

2

SPORTS STEERING WHEEL

The EMS and Turbo models are equipped with a three-spoke sport steering wheel.

3

SENSIBLE LOCATIONS

A sudden change in the situation on the road may call for immediate use of the headlamp flashers, the direction indicators or resetting the wipers and washers to maximum speed. Fumbling for the controls and losing control of the situation must be avoided at all costs. These functions are therefore controlled by means of two stalks located within fingertip reach below the steering wheel. The pattern of operation of both stalks is based on simple, easily comprehensible logic.

For safety and convenience reasons, all "starting controls" have been removed from the instrument panel and are located on the console between the front seats. This applies to the ignition key, handbrake and gear selector lever. The ignition key is combined with a lock for the gear selector. The key cannot be removed before reverse gear has been engaged. This provides an excellent anti-theft safeguard, as illustrated by the car theft statistics distributed for various makes of cars.

Another refinement is that the high beam and dipped beam circuits are connected across the ignition key. The headlamps will therefore be turned off automatically when the ignition is switched off. This eliminates the risk of discharging the battery by forgetting to switch off the headlamps. The parking lights are obviously excluded from this automatic control function.

The handbrake must be close at hand and must be located in a position where it will cause no injury in the event of an accident. In emergency situations, it must also be within reach of the passenger. This is why it is located between the front seats on the Saab 900.

The steering wheel rim offers a firm grip, and the steering wheel angle in relation to the driver's seat has been determined on the basis of exhaustive tests. This also applies to the pedals.

4

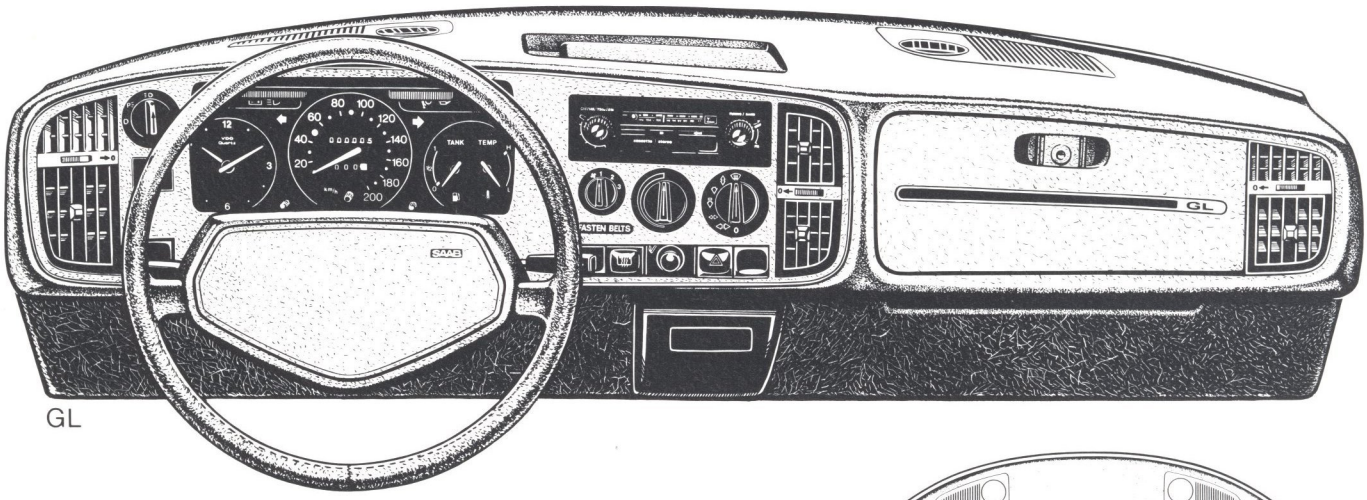
FUNCTIONAL RELIABILITY

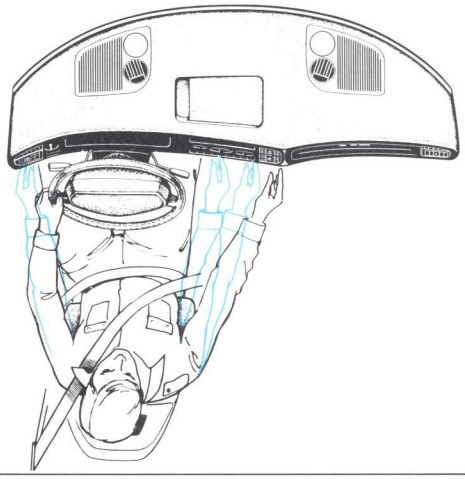
The instrument modules are of an advanced design. A glimpse at the reverse side will reveal printed circuit boards and quick-release connectors.

5

EFFICIENT ASSEMBLY AND TESTING

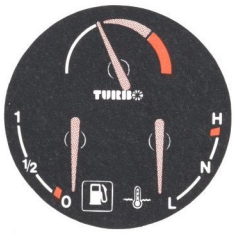
The Saab instrument panel has been designed for efficient fitting. The entire "package" is assembled and tested before being bolted in position in the car. This facilitates assembly and guarantees high quality.





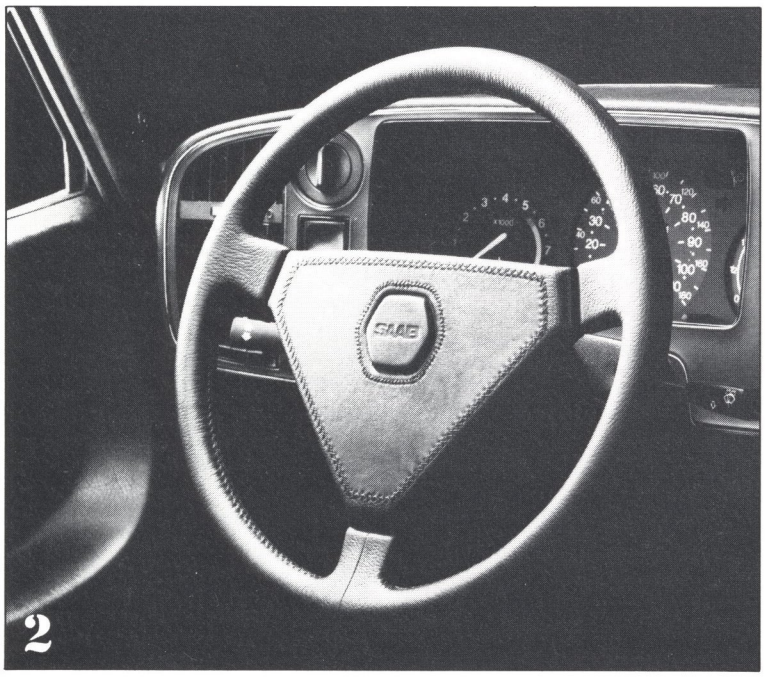
EMS/Turbo

EMS/GLE/Turbo

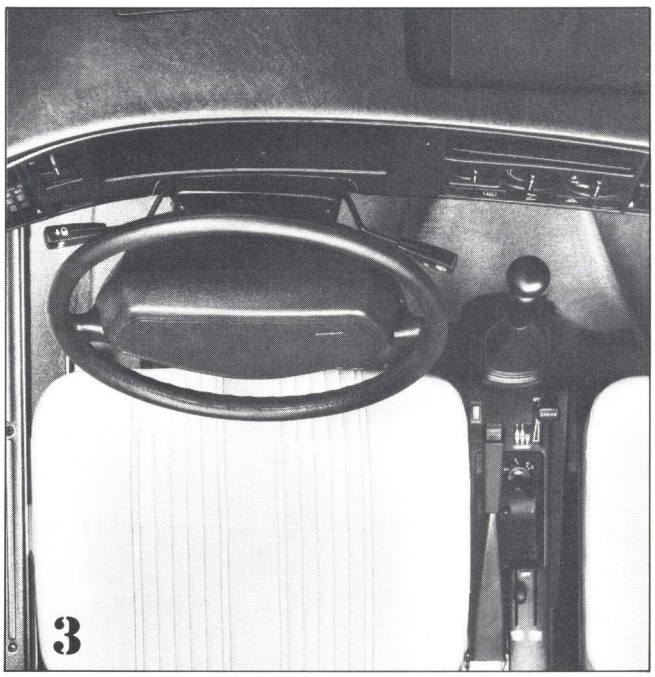


Turbo

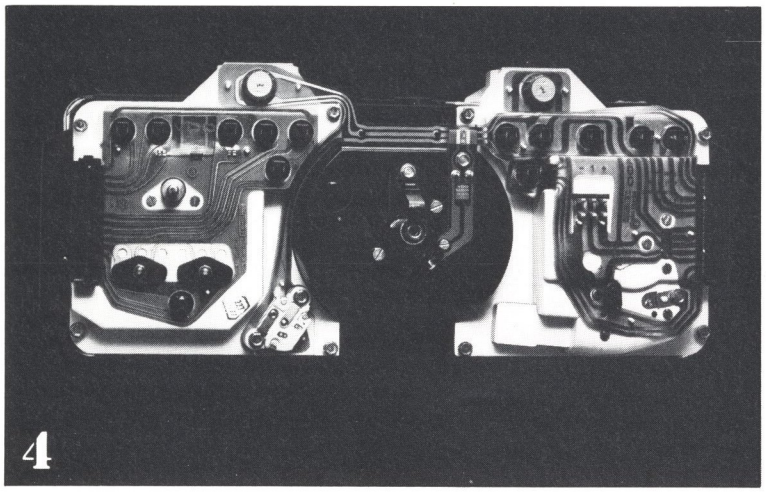
1



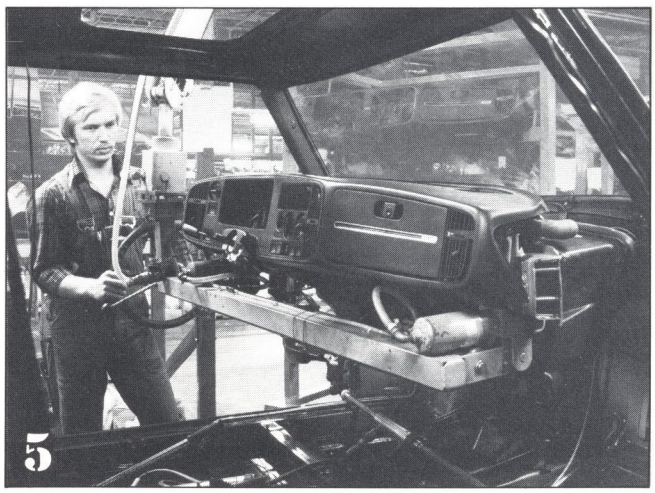
2



3



4



5

Heating and ventilation

In many cars, the heating and ventilation system has serious shortcomings — the symbols may be difficult to understand, and the operation and controls are often illogical. The control accuracy on some systems is so inadequate that the settings must be made by trial and error and this diverts the driver's concentration from the surrounding traffic.

The system in the Saab 900 is easy to understand, is very accurate and is easy to set. The heating and ventilation system is semi-automatic. An ingenious vacuum unit does the thinking for the driver. The rate of air flow through the car is very high and is almost independent of the speed of the car. In fan setting 1, the air in the interior of the car is changed at a rate of 2000 litres/min (71 cu ft/min). At the maximum setting, this rate is increased to 6000 litres/min (212 cu ft/min).

All cars have long been equipped with air filters to protect the engines, although many car manufacturers do not appear to have considered it equally necessary to protect the occupants of the car. The Saab 900 is probably the world's first car to be equipped with a truly efficient filter for the air to the interior of the car. The greatest benefit is obviously that the 10 % of the population who suffer from allergies will not be exposed to pollen or other air contaminants.

One of the fundamental directives to the designers of the Saab 900 was that the car was to have a well-developed heating and ventilation system which would be well-matched to the Scandinavian conditions, have a high capacity and quickly become effective after starting in cold weather. The system has been designed partially along entirely new lines developed by Saab.

The Saab 900 can easily be equipped with an air conditioning unit which is integrated with the standard ducts and controls of the heating and ventilation system. The system has been tested in the climatic chamber at the Aerospace Division of Saab-Scania, as well as under actual conditions — in the extreme cold of northernmost Sweden and in Death Valley, one of the hottest regions of the U.S.A.

1

HIGH CAPACITY, QUICK EFFECT

The Saab 900 has a through-flow system which ensures freedom from drafts. The outlets in the interior are designed to provide the best possible comfort and maximum defrosting effect on the windshield and the front side windows.

Outdoor air is drawn in at high level on the bonnet and flows through an efficient ventilation air filter.

The air is preheated in the heat exchanger. A control system ensures a uniform air temperature, regardless of variations in the outdoor air temperature. Vacuum-controlled dampers distribute warm and cold air through at least twelve suitably arranged outlets in the interior.

The cockpit air is discharged through the openings at the rear of the body. To achieve the highest possible air extraction effect without the risk of exhaust gases being drawn into the car, the locations of the outlets have been determined on the basis of wind-tunnel tests.

2

VACUUM-CONTROLLED SYSTEM

The heating and ventilation controls consists of three knobs. The fan control knob to the left has three speed settings. The fan runs continuously at a minimum of 1/4 speed, unless the air distribution knob is at the "off" setting. The temperature control knob is in the centre. The air distribution knob to the right controls the vacuum unit — the brain of the system. The knob has seven programmed, logically arranged snap settings for distributing warm and cold air in the interior by means of vacuum-controlled dampers. If the car includes air conditioning, additional functions such as drying and recirculation, as well as cooling of the air, are included in the system. The standard controls are also used for the air conditioning unit, and the air is supplied through the same outlets.

The vacuum system is connected to the intake manifold of the engine. The lower picture shows the vacuum selector which controls the air distribution. The vacuum passages are opened and closed by a fluted rubber disc.

3

THE VENTILATION AIR FILTER HAS MANY ADVANTAGES

The air in the Saab 900 is extremely clean. Anybody suffering from allergies is well aware of what discomfort pollen in the air can cause. A sudden attack of hay fever, followed by nasal congestion, runny nose, violent sneezing and often runny eyes. It is not merely a question of comfort — a driver who suffers from allergies or asthma will obviously be seriously impaired under such conditions. The filter has been tested at Linköping University, using pollen from Birch and Timothy. Not a single grain of pollen has passed through the filter. But the Saab ventilation air filter is a revolutionary new feature of benefit to all. It also eliminates the usual road dust on the panel and instruments and the annoying greasy film on the inside of the windows. On cars equipped with the air conditioning unit, the air filter is replaced by an evaporator. In this case the wet cells of the evaporator take over the filtration duty.

The lower picture shows two filter cassettes. One of these is unused and the other has been fitted to a car for a total of 20,000 miles. Large quantities of foreign particles have been arrested by the filter, which consists of a 10 cm (3.9 in) thick block of glass fibre saturated with a special oil. The filter is very efficient. It removes from the ventilation air:

— particles greater than 0.002 mm
— oil and soot
— 100 % of all pollen
— certain bacteria
— certain heavy metals

The filter should normally be replaced at intervals of 15,000 miles. Replacement is very simple and inexpensive.

4

LOGICAL FUNCTION

The picture shows how warm and cold air is automatically distributed at the various settings of the knob. In all settings 1 — 6, the air temperature and rate of air flow can be adjusted by means of the temperature and fan control knobs. The air outlets on the instrument panel can be oriented in the required direction and the rate of air flow can also be varied from zero to maximum by means of a damper. The logical arrangement of the system is illustrated by the following:

1 On cold starting in the winter, the air distribution knob should be set straight up, the temperature knob to maximum and the fan to 3. This provides maximum defrosting action at the windshield and the side windows.

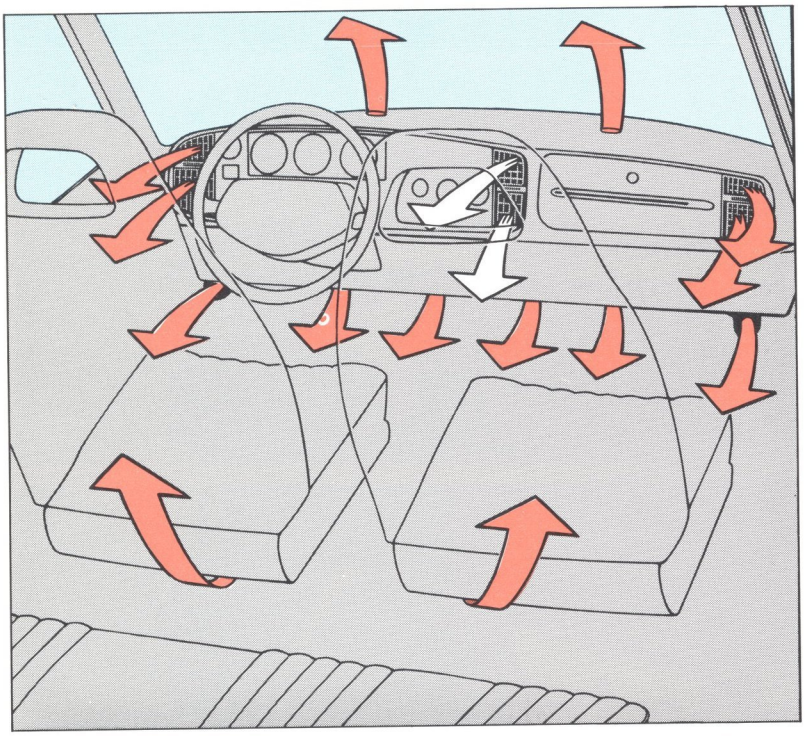
2 After a few minutes, the distribution knob can be turned one snap setting to the left. This provides maximum heat to the interior, and the air is distributed equally onto the windows and towards the floor.

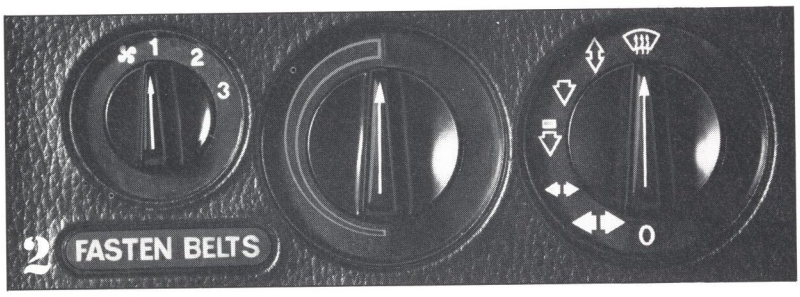
3 The next setting provides maximum heat at the floor. A gentle flow of air is discharged through the defroster outlets to keep the windows clear of mist and ice.

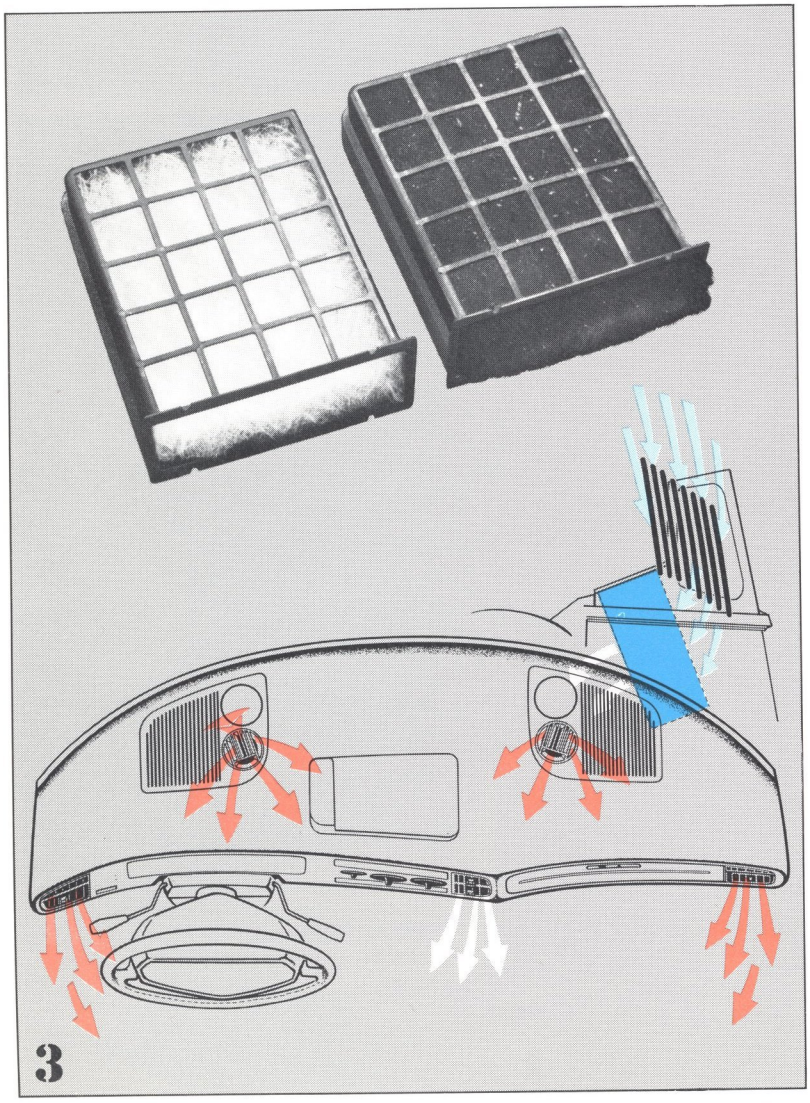
4 Setting 4 provides maximum heat at the floor and, if required, a simultaneous supply of cold, fresh air through the center adjustable outlets of the instrument panel.

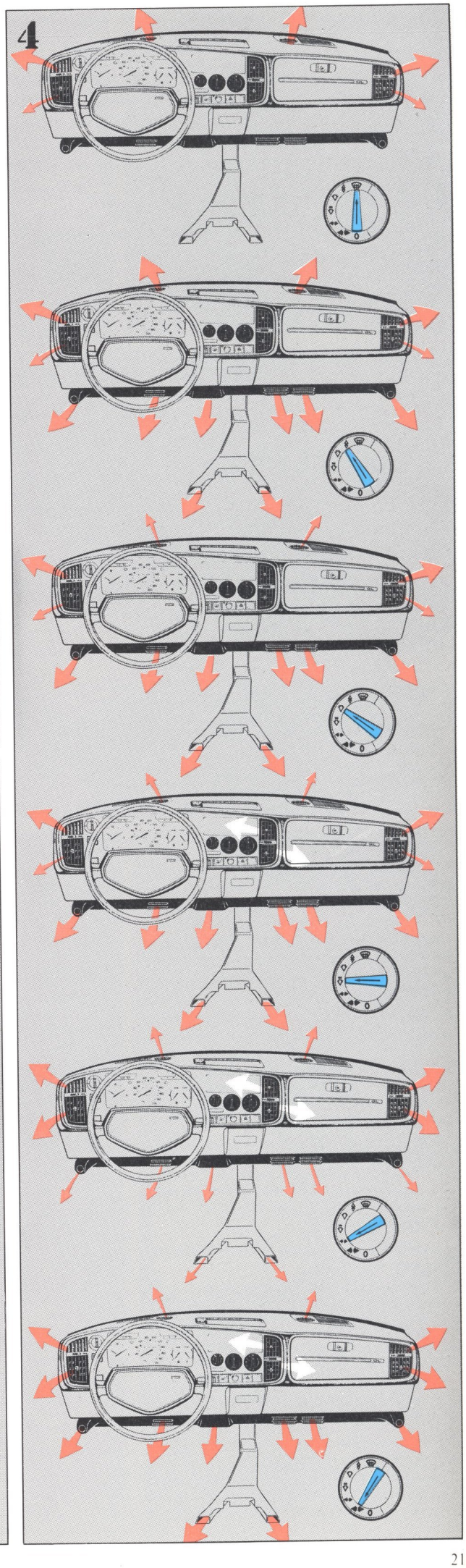
5 Settings 5 and 6 are intended for air
6 conditioning and fresh air distribution in the summer. Setting 5 is known as the comfort setting, whereas setting 6 is the maximum position, in which the fan starts automatically and runs at a higher speed than in fan setting 3, regardless of the position of the fan control knob. The temperature control knob should be set to 0 when the air conditioning settings are employed or if the fresh air supply is not to be preheated.

7 At the 0 setting, all air dampers are closed.




1
2
3
0
2
FASTEN BELTS


3


4

To see and to be seen

Saab has always prided itself in its emphasis on good and efficient lighting systems. For example, in addition to using the latest technology in rectangular sealed beam headlights on the 900, Saab utilizes large modules front and rear incorporating high mounted amber turn signals, turn signal actuated cornering lights (front) and brake lights (rear) that work independently of hazard flashers and turn signals. These lights can easily be seen from the side as well as from the front and rear.

Further, Saab was (to our knowledge) the first and only manufacturer to offer side reversing lights (standard equipment on EMS, GLE, and Turbo models) to illuminate the areas to the side of the car as an aid to backing through narrow spaces at night.

1

GOOD ALL-ROUND VISIBILITY

The large, curved windshield and the retracted windshield pillars provide a broad field of vision forward. The scope for adjusting the driver's seat in height also ensures that even a driver of short stature will have good all-round visibility.

The windshield wipers are of asymmetrical design, since this ensures the greatest possible swept area. The windshield washers spray two jets of water onto the driver's side of the windshield.

Effective air defrosting and the electric heating of the rear window ensure that good all-round visibility will be achieved quickly, even in the dead of winter. Owing to the streamlined design of the body, the visibility through the rear window will not be impaired to any significant extent by road dirt or snow, even under very difficult conditions.

The GLE and Turbo models are equipped with electrically operated external rear-view mirrors.

2

ONE STALK — FOUR FUNCTIONS

The windshield wipers and washers are operated by a common stalk on the right of the steering column. From the "off" position, the settings are as follows:

1. Interval pulse operation of the windshield wipers.
2. Low speed of the windshield wipers.
3. Full speed of the windshield wipers.
4. Washing of the windshield (can also be started independently in settings 0, 1, 2 and 3). When the washers are actuated, the wipers will start automatically for a cleaning cycle of 3 — 5 strokes, if they are not already in continuous operation.

The capacity of the washer container is six litres (6.3 US quarts). The container is transparent and need normally only be topped-up in conjunction with filling-up. The washer pump is located in a recess in the container, well-protected from dirt.

3

CONSISTENTLY GOOD LIGHT

The voltage drop between the source and the headlamps has a serious effect on the light intensity — at a voltage drop of 15 %, no less than half of the light will be lost. Voltage drops occur primarily at the connection points, where oxides gradually increase the contact resistance. On the Saab 900, the voltage drop has been minimised by measures such as reducing the number of joints to the least possible and by employing special dust-tight and water-tight connectors.

The large, clearly visible front side light fittings are "wrapped" around the corner of the car, to ensure that they will be clearly visible from the side. Their high locations slow down the rate of fouling under dirty road conditions, at the same time reducing the risk of damage in the event of minor collisions.

Owing to the high location, the front direction indicators are clearly visible, even from a bus or truck cab. This enhances the road safety, particularly on multi-lane roads and on city streets with intense traffic.

The bottom sector accommodates three functions — parking lights, concerning lights and side guidance reversing lights. All bulbs in the side light fittings of the Saab 900 delivered in the U.S.A. and Canada are long-life bulbs.

The headlamps can be adjusted simply through access holes in the bezels.

4

FACILITATES REVERSING

All 900 models are equipped with side reversing lights as standard. The guidance lights will light up automatically as soon as the reverse gear is engaged. They illuminate areas along the sides of the car, thus facilitating reversing into confined spaces in the garage or in a car park.

5

CONSPICUOUS EVEN BY ITS LIGHTS

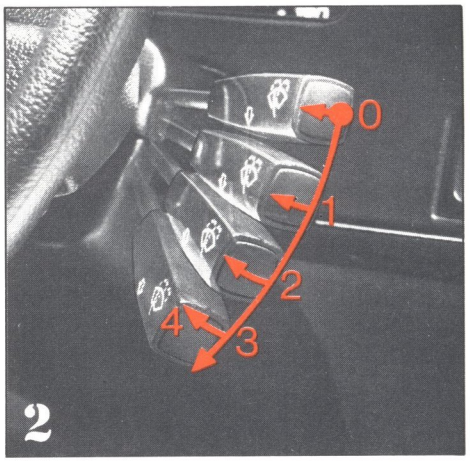
A Each direction indicator light is visible within a very large sector — no less than 235°.

B The Saab 900 delivered to certain markets is equipped with integral cornering lights. A 25W filament provides the running light with an intensity of 400 cd (that of the ordinary parking lights is about 40 cd). On cars delivered in the U.S.A. and Canada, the cornering light will light up automatically as soon as the direction indicator lever is actuated to light the road in the direction of the turn.

Since the lights are concentrated to the corners of the car, they will be seen earlier by oncomming traffic when the car breaks out to overtake, for instance. This is particulary important under foggy or misty conditions. Cornering lights can also, like the side guidance reversing lights be of good use when parking.

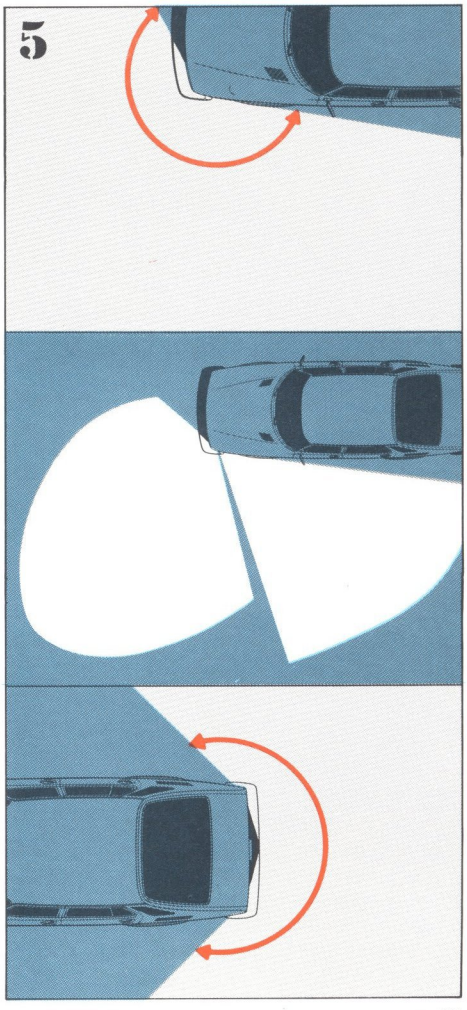
C The rear lights have been designed so that all functions will be clearly visible to others on the road, even diagonally from the side.


1


0
1
2
3
4
2


3


4
SAAB
SZ 830


5

Self-repairing bumpers

The Saab energy-absorbing bumpers are truly worthy of their name. The bumpers effectively prevent damage to the body in the event of collisions at speeds up to 8 km/h (5 mph). And they are "self-repairing", i.e. they resume their original shape and performance after having been moderately compressed.

1

DESIGN

The bumper of the Saab 900 consists of the following components:

a) Sturdy aluminium sections secured to the body by means of heavy mounting brackets.

b) Cellular plastic blocks. In the event of a minor collision, the blocks absorb energy by temporarily deforming longitudinally from both sides.

c) A plastic rail which distributes the pressure onto as many cellular blocks as possible.

d) Outer casing of thermoplastic rubber, which is very durable and easy to clean.

e) Plastic decorative strip pressed into a recess in the outer casing.

SAAB LEADS THE FIELD

In the U.S.A., the authorities specified that all cars from the 1973 models were to be equipped with bumpers which could withstand a head-on collision against a barrier at a speed of 5 mph (8 km/h) without the car sustaining any damage to the controls, headlamps, direction indicators, etc.

At that time, Saab cars had already been fitted, as standard, with such bumpers and Saab was thus the first of the world's car manufacturers to satisfy these stringent demands. But development has forged ahead. The bumpers of the Saab 900, for instance, are 25 % thicker and deeper than the earlier Saab 99 bumpers, and they effectively protect the car in minor collisions with other vehicles — regardless of whether or not the car is fully laden. The redesigned and patented cellular blocks also have better energy-absorbing capacity.

STRICTER DEMANDS

According to the most recent regulations in the U.S.A., the front and rear bumpers must be capable of withstanding two pendulum blows at different heights as well as a barrier collision. The pendulum blows must strike the bumper longitudinally at an impact speed of 5 mph and against the corner at 3 mph (8 km/h and 5 km/h respectively). The barrier test involves a frontal collision at a speed of 5 mph. In all cases, the bumpers must provide full protection for the body against damage. The Saab 900 can withstand the tests with an ample margin.

MORE GENTLE DECELERATION

The Saab 900 bumper decelerates the inertia force more gently than the earlier Saab 99 bumper. This is partially due to the bumper itself being about 25 % larger, although another contributory factor is that the new cellular blocks have better energy-absorption capacity and give rise to a lower force than the earlier type of block.

2

SELF-REPAIRING

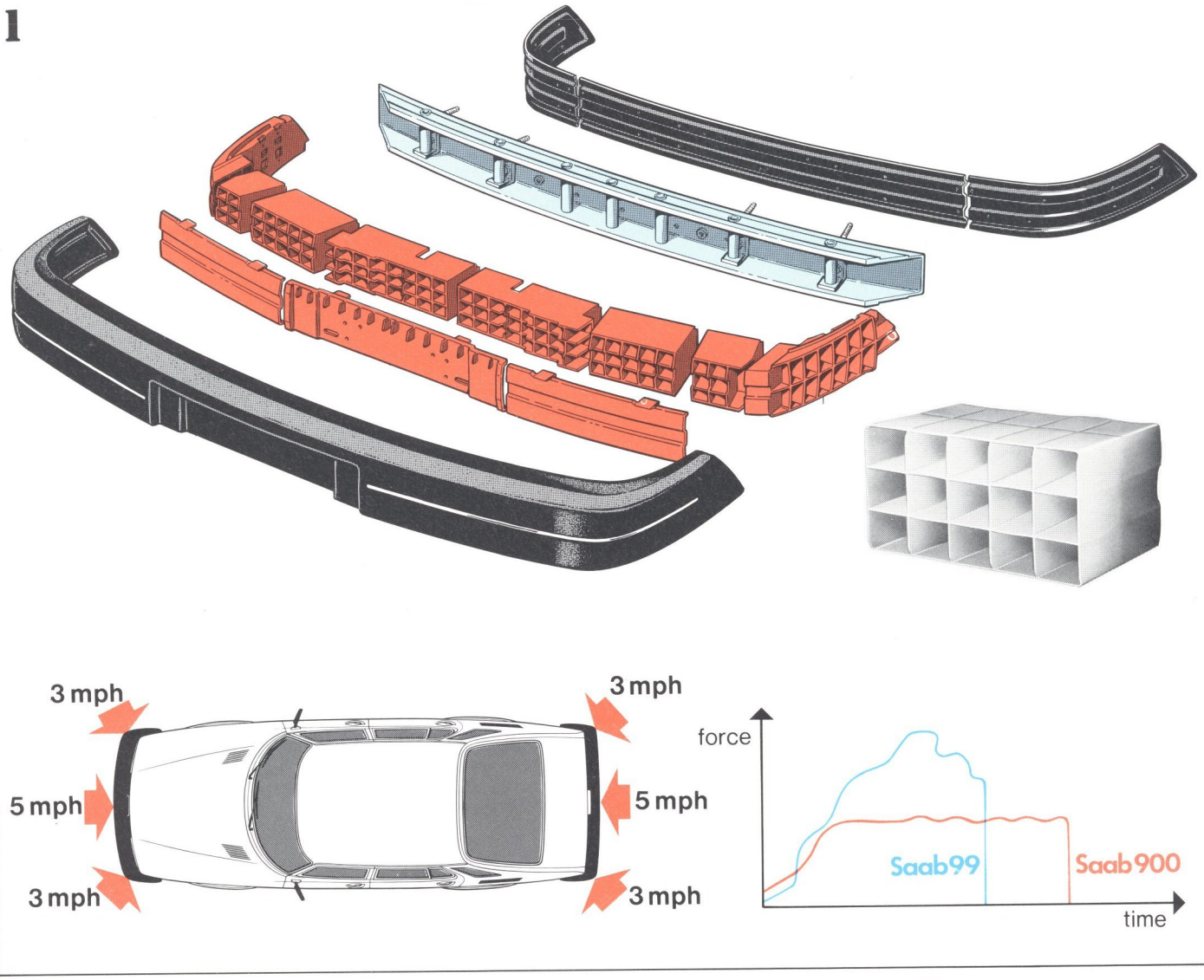
This sequence of pictures shows the result of a Saab 900 being driven into a post. The impact speed was 5mph (8 km/h). The pictures clearly illustrate how the bumper is compressed at the point of impact and how it has resumed its original shape after a few minutes. The body has not sustained any damage whatever.

3

PROVISION FOR EXTRA LIGHTS

The front bumper includes a recess for flush-mounting of the license plate. Holes are also provided for fitting extra lights, if required. This provides a secure mounting without sharp, projecting brackets which could be dangerous to pedestrians or cyclists in the event of an accident.

1


3 mph
3 mph
5 mph
5 mph
3 mph
3 mph
force
Saab99
Saab900
time

2


turbo
SAAB
SAAB TURBO

3

Engine and gearbox

" The 2-litre Saab engine is incredibly flexible and economical. . ."
(Modern Motor, Australia, May 1977)

". . . one of the best four cylinder engines anywhere. . ."
(Road Test, U.S.A, August 1977)

1

All models of the Saab 900 are equipped with a water-cooled four-cylinder in-line engine with an overhead camshaft. The engine block is made of special cast iron and the cylinder head is an aluminium alloy casting. The crankshaft and camshaft are both mounted in five bearings. On cars delivered in the U.S.A. and Canada, the engine is manufactured in three versions with a continuous fuel injection system: a noncatalyst version, a "Lambda control" version with 3-way catalyst, and a turbocharged version.

EFFECTIVE ISOLATION

The engine mountings are of a new type consisting of preloaded rubber elements in metal cases. The design provides effective isolation of engine vibrations and assists in guiding the power unit backwards and downwards in the event of a frontal collision.

FLEXIBLE

The cylinder block is inclined at 45° to the right, and the engine is fitted with the clutch facing forward and the camshaft drive nearest to the bulkhead. The engine is of the cross-flow type, and closed crankcase ventilation is provided. Since the intake and exhaust air ports are on separate sides of the cylinder block, space has been available to design them in an optimised manner to ensure good low-speed performance and satisfactory cooling of the cylinder head at high engine speeds. The coolant pump, oil pump and ignitition distributor are driven by a separate shaft. The piston stroke is only 3.07 in (78 mm), and the engine can therefore run at high speeds without excessive average piston speeds and high inertia forces. However, the piston stroke is not so short as to impair the low-speed performance of the engine. To ensure good fuel economy, the compression ratio is 9.2:1 on the non catalyst version and 8.7:1 on the Lambda version with 3-way catalyst. The compression ratio of the turbocharged engine is 7.2:1.

OVERHEAD CAMSHAFT

The crankshaft is a high-quality steel forging, with hardened and ground journals. It is made to close tolerances and is dynamically balanced. The crank pins and the five main bearings are of heavy-duty design and the diameters overlap each other significantly. As a result, the crankshaft runs exceptionally smoothly. The valve mechanism also contributes to the smooth and vibration-free operation of the engine. Since the camshaft is of overhead design, i.e. is located in the cylinder head, it actuates the valves without the need for push-rods and rocker arms, which would increase the mass of the moving parts and reduce the stiffness of the valve mechanism.

The camshaft is mounted in a cradle which can easily be removed from the cylinder head. The engine has vertical cylinder head bolts to ensure maximum tightness of the cylinder head gasket. The bolts are easily accessible without the need for first dismantling the camshaft and valve mechanism. The camshaft is driven by a duplex chain which is oil lubricated under pressure.

To safeguard efficient lubrication under all conditions, each big-end bearing is supplied with oil from its corresponding main bearing. The clutch, gearbox and differential are integrated with the engine to form a compact unit of minimum weight and bulk. From the clutch, power is transmitted through the primary drive to the gearbox and differential.

The air cleaner has an easily replaceable paper element and also serves as the intake air silencer.

DURABLE AND RELIABLE

The exhaust system runs in a tunnel under the floor of the car and is thus protected from damage on rough roads. The system basically consists of three parts: the front pipe, transverse muffler and rear pipe. The sheet metal in the ends of the muffler is exceptionally thick and is also aluminized. The muffler ends are also of an expanding design, and they are therefore not subjected to the same high thermal stresses as conventional welded joints.

Owing to the ample space in the engine compartment, the Saab 900 is fitted with a larger radiator assembly with two rows of cooling tubes.The cooling system has sufficient capacity to provide satisfactory cooling even when driving in mountainous terrain while towing a travel trailer.To avoid loss of coolant, a separate expansion tank is provided to accept the extra volume when the coolant expands and return it as the system cools down. The coolant pump delivers the coolant at high velocity to the hottest sections of the cylinder head and also circulates it through the passages between the cylinders.

Cooling is controlled by a reliable wax thermostat. Owing to the design of the cooling system, the engine warms up quickly after starting from cold. A contributing factor is that the car has no permanently-driven radiator fan. The fan is driven by an electric motor which is started by a thermostatic switch when the engine requires additional cooling, such as in traffic jams or in other conditions where the air speed is insufficient to provide the necessary air flow through the radiator.

Cars delivered from the factory with an air conditioning unit are equipped with two cooling fans. Provision is also made for simplified installation of the air conditioning system by the dealer for cars not equipped with factory installed air conditioning.

2

FUEL INJECTION ENGINE

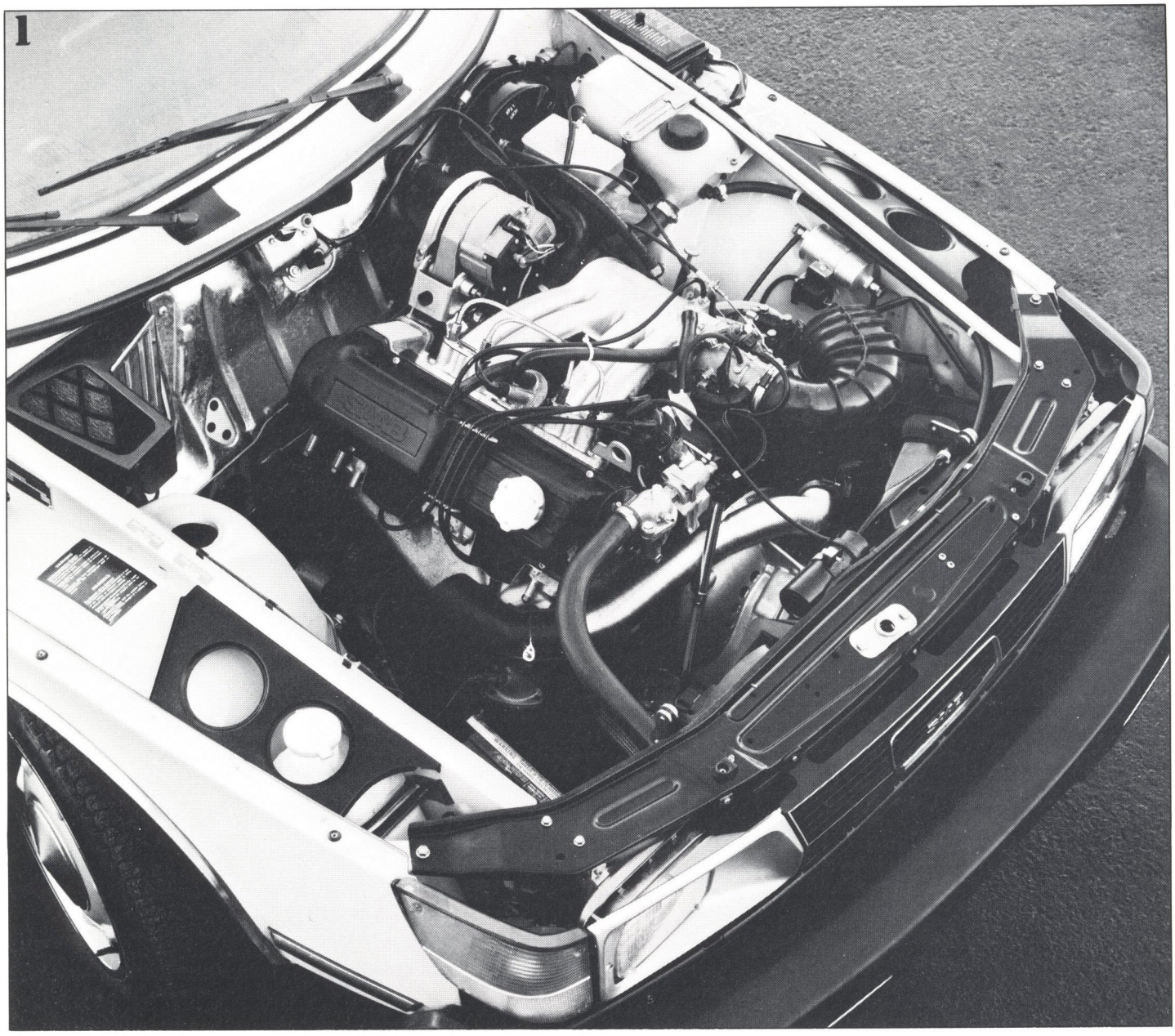
The Saab two-litre engine is equipped with continuous mechanical fuel injection designated the CI (Continuous Injection) system (The turbocharged fuel injection engine is described on pages 30 — 35). The CI system offers more complete combustion of the fuel than that usually attained on a carburettor engine, and this is one of the reasons why it is fitted to cars exported to the U.S.A., where the exhaust gas emission regulations are the world's strictest. This is how the system operates:

The fuel pump (2) pumps the fuel from the tank (1) to a pressure accumulator (3). The fuel then flows through a filter (4) to the fuel distributor (5). A pressure control valve (6) maintains the fuel at constant pressure. The system also includes an air flow measuring unit — a measuring disc (7) — fitted in the conical opening where the air is drawn in. The air flows from below through the cone and the measuring disc assumes a certain level, which is dependent on the intake air flow. The level is determined by the engine speed and the setting of the air damper (8). The height of the measuring disc (7) increases with increasing rate of flow through the conical opening. A link (9) connected to the measuring disc presses against a control piston (10). The higher the position of the measuring disc, the higher will the control piston be lifted, and the fuel flow will increase in direct proportion to the fuel flow.

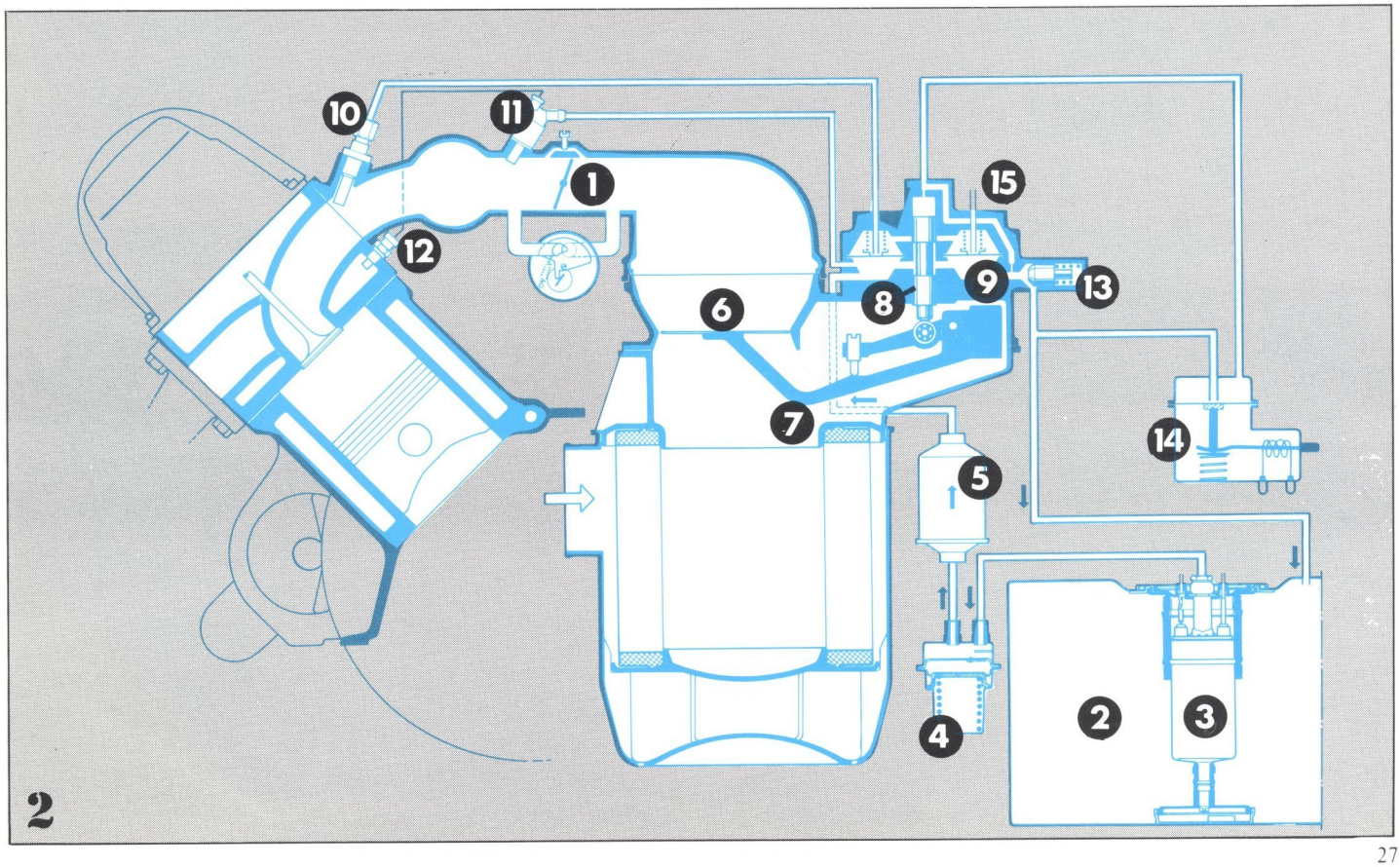
It is thus the air flow which actuates the measuring disc, and the latter determines the vertical height of the control piston. The fuel pressure on the top of the control piston balances out the position of the piston. When the engine is at normal operating temperature, this pressure is maintained constant. The control piston has a vertical slot for each of the engine cylinders. When the control piston is lifted, the slots will be gradually exposed, thus controlling the fuel flow to the cylinders. To ensure that all cylinders are supplied with exactly the correct fuel flow, every slot includes a differential pressure valve (11) which maintains a constant pressure drop across the slots.

From the fuel distributor (5), the fuel flows to the injection valve (12) in each cylinder. Fuel is injected continuously as soon as the spring-loaded valve opens. When the engine is stopped, the pressure in the system will fall, the valve will close and injection will be interruped. The pressure accumulator maintains a pressure of 2 bar in the system for an extended period. This prevents vaporization, and restarting of a warm engine is facilitated. When starting from cold, the cold-starting valve (13) supplies extra fuel. The cold-starting valve is controlled by a thermostatic switch (14). In addition, the control pressure valve (15) lowers the pressure on the top of the control piston, so that it will be lifted more easily and a richer mixture will be obtained. One of the parameters actuating the pressure control valve is the engine temperature, and this valve thus performs the same function as the choke on a carburettor engine.

1



2



3

LAMBDA EMISSION CONTROL

Saab 900 cars for sale in the Western and Rocky Mountain states and all 900 Turbo's are equipped with a new Lambda Control system and a threeway catalyst. This is a dramatic departure from other catalyst systems.

A problem with most catalysts currently used is that they only work to oxidize the carbon monoxide (CO) and the unburned hydrocarbons (HC) thanks to exess oxygen in exhaust. The oxygen is present either from a lean mixture or through secondary air being injected into the exhaust stream before it reaches the catalyst. The exess oxygen, however, does not make it possible to eleminate the pollutant, nitrous oxides (NO_X). To remove NO_X catalytically, a deficiency of oxygen is required. It thus seems that it qould be impossible to remove all three pollutants, CO, HC and NO_X through one catalyst.

But there is one possibility. Within a very narrow range of air-to-fuel ratios the oxidizing reactions for CO and HC and the reducing reactions for NO_X overlap. This narrow range is sometimes called the "three component window".

The design goal is to control the engine's air-to-fuel ratio so precisely during all engine operations so that it remains within this "window", or the "stoichiometric" value — an air-to-fuel ratio of 14.5:1. (The symbol Lambda actyally indicates multiples of 14.5:1).

The Saab Lambda Control system consists of five basic components, which work together as follows:

1. An oxygen sensor which is mounted in the exhaust manifold and which continuously senses the oxygen content of the exhaust.

2. An electronic control unit which receives a continuous signal from the oxygen sensor and then sends a signal to:

3. A modulating valve which contiuously adjusts the pressure in the fuel distributor to maintain the proper air-to-fuel ratio at all times.

4. A full-throttle enrichment switch which can override the oxygen sensor during full throttle acceleration.

5. The three-way catalyst which at the proper air-to-fuel ratio oxidizes hydrocarbones and carbon monoxide and at the same time takes oxygen away from oxides of nitrogen. Traces of platinum and rhodium are used in the catalytic material.

4

ELECTRICAL SYSTEM

The electrical distribution box is located on the left-hand side of the engine compartment. The cables to the interior of the car are not run in the conventional manner through a hole in the bulkhead. On the Saab 900, three multi-pole connectors are used instead, and this provides better protection against corrosion, dirt and mechanical damage. The electrical distribution box can accommodate 22 fuses and 10 relays.

The Saab 900 models for the U.S.A. and Canada have a breakerless electronic ignition system. The ignition setting can be checked and set by means of an electronic instrument connected to special terminals in the electrical distribution box. The equipment has high accuracy and the ignition can be set very quickly. But scope is still available for using a stroboscope lamp.

5

GEARBOX

The advantages and disadvantages of the manual gearbox versus the automatic transmission are the subject of much discussion. Without endeavoring to take sides in the discussion, the following facts can be stated:

- The "normal driver" can achieve better acceleration with an automatic transmission than with a manual gearbox (at a given engine output). However, very experienced drivers can accelerate faster by manual gear-changing, since they can utilize better the maximum output of the engine.
- The top speed of a car with a manual gearbox is 3 — 4 % higher.
- Investigations have shown that the drivers of cars with automatic transmission are more relaxed. This is due primarily to the following factors:
  - — They have fewer manual operations to carry out (they concentrate more on the surrounding traffic)
  - — They have better control of the car (both hands on the steering wheel, simpler operation when "crawling" in dense traffic, starting uphill, driving on a slippery road, etc.)
  - — They can never start the engine with a gear engaged (the cause of many accidents and near-accidents on cars with manual gearbox)
- At a constant road speed, a car with automatic transmission has a fuel consumption which is about 5 % higher than that of a car with a manual gearbox. However, in busy city traffic, the consumption is about the same.
- Owing to the absence of a clutch, the automatic transmission involves lower maintenance costs than the manual gearbox.

MANUAL GEARBOX

The manual gearbox is of sturdy design and has four fully-synchromeshed forward speeds. The gearbox is separated from the engine crankcase, but is integrated with the final drive and differential, to form a separate unit with its own lubrication system. The drive shafts have double universal joints, the outer of which are of the Rzeppa type, to provide smooth steering and an accurate "feel" in the steering wheel, even on fast cornering. The inner and outer universal joints are both permanently lubricated. The power transmission system has combined splash and circulation lubrication. The crown wheel of the final drive pumps oil through an oilway to the gearbox and primary drive. Other oilways return the oil back to the final drive. The gearcase is provided with cooling fins.

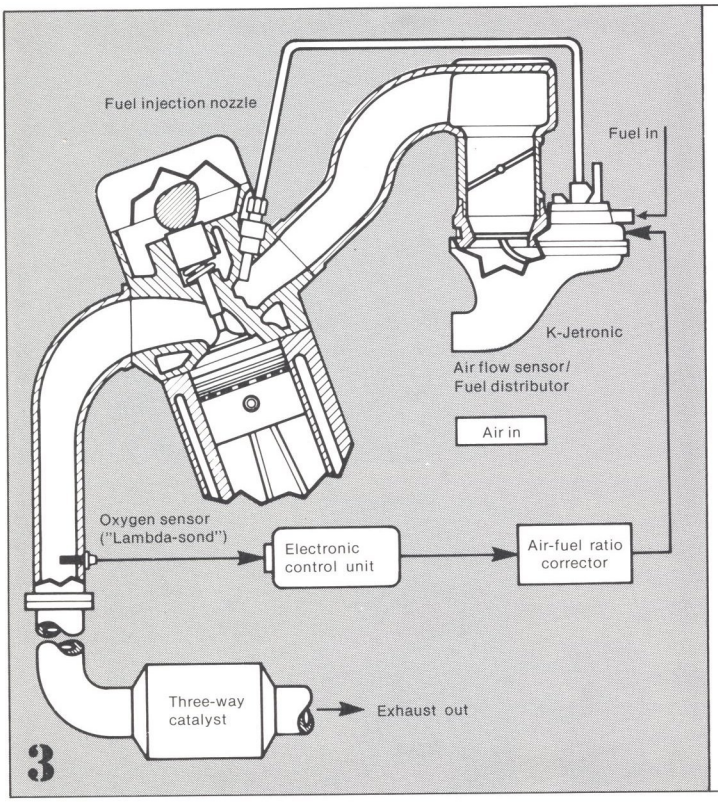
The Saab 900 is equipped with a hydraulically actuated, single dry plate Borg & Beck clutch. The primary drive consists of a duplex chain instead of gears. The advantage is reduced wear and minimized chatter at idle. Since the clutch is fitted at the front of the engine, it is more easily cooled, and this extends the useful life of the friction linings. Service work on the clutch is also facilitated.

AUTOMATIC TRANSMISSION

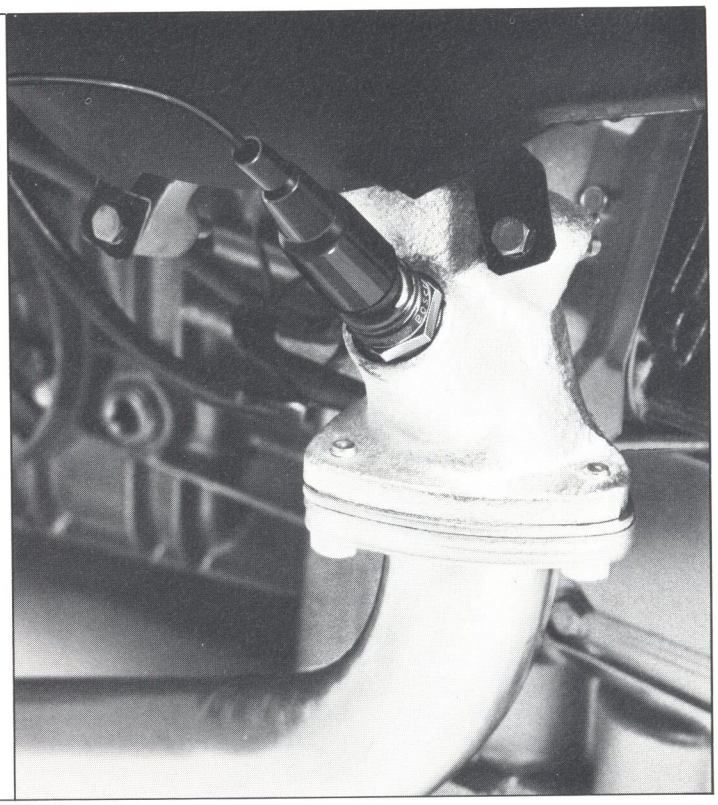
The automatic transmission on the Saab is the well-proven Borg-Warner type 35. It has been specially matched to the demands of the Saab car, and is integrated with the engine.
The torque converter, chain, gearbox and differential are integrated into one unit, and the automatic control equipment of the transmission is incorporated into the front of the gearcase, where it is easily accessible from below.

The torque converter is oil-filled and consists of three components: The pump, the turbine and the stator. The pump impeller is connected to the engine crankshaft, whereas the turbine drives the input shaft of the automatic transmission. The stator is fitted on a freewheel coupling with a fixed hub. The oil delivered by the pump impeller causes the turbine to rotate. When the driving and driven wheels rotate at different speeds, the stator guides the oil back to the pump impeller in such a direction that the torque of the pump impeller increases. The torque amplification may vary from a maximum of about 2.3:1 down to 1:1, and all amplification ceases when the turbine rotates at about 90 % of the pump impeller speed.

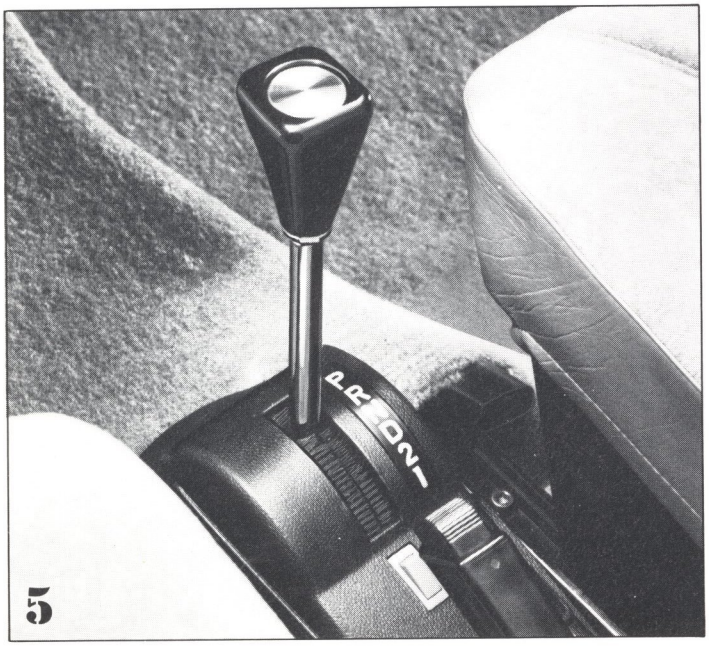
Owing to the torque converter, the car accelerates briskly and smoothly from low speeds, without the need for changing down. The Saab automatic transmission thus has a large amount of "overlap", which eliminates continual changing up and down when driving in city traffic. Gear-changing takes place entirely automatically, since the pump, governor, valves and servo pistons of the hydraulic system actuate the various units in the transmission to suit the road speed and engine speed conditions. Overriding changing down — known as kick-down — is available at speeds up to about 55 mph (85 km/h) by briskly depressing the accelerator pedal to the limits of its travel.



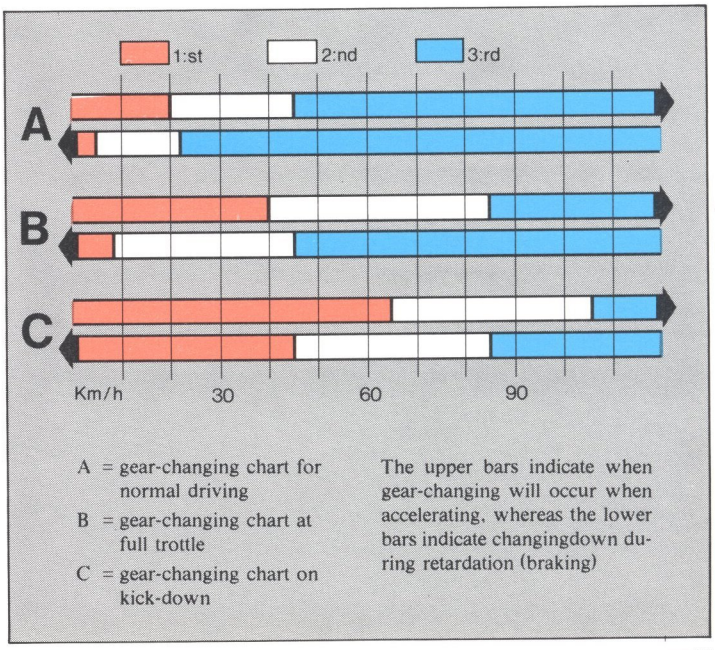
3




4



5



A = gear-changing chart for normal driving

B = gear-changing chart at full trottle

C = gear-changing chart on kick-down

The upper bars indicate when gear-changing will occur when accelerating, whereas the lower bars indicate changingdown during retardation (braking)

Saab Turbo — the car of the future

" There is certainly no other car in the world I can think of right now that is capable of carrying five adults in comfort while matching the performance, ride and handling and fuel economy balance of the Saab Turbo. It's in a class by itself. . . the most exciting sports sedan in America. . ."
(Motorsports Weekly, U.S.A.)

". . . ranks among the best and most exciting automobiles we have ever tested. We were impressed with the Saab Turbo to the point that it will probably become the standard by which all other cars are judged. Need we say more?"
(Autosport, Canada)

"Brilliant, exciting, thrilling. . . The words flowed unabated from our enthusiastic road test staff. . . here is a car which brings a new dimension to motoring. It goes ways beyond our expectations. . ."
(Wheels, Australia)

"It is difficult to put into words the charm and fascination of this remarkable car. As a combination of performance, refinement, and fuel economy, it stands alone, and the integrity of its engineering and the quality of its finish are second to none. If you were to conclude fromthe above that this is just about the best motor car which is at present being made, anywhere, you wouldn't be far wrong."
(Autosport, Gt. Britain)

"Directional stability is fautless, even at high speeds. Cross-winds are hardly noticeable. The car has a slight amount of understeer on cornering. Load variations, even when they are intentional, arebarely perceptible. The brake system (discs all round) is entirely adequate for the increased engine output."
(Auto-Zeitung, Germany)

1

THE UNIQUE SAAB TURBOCHARGED ENGINE

The turbocharging of automotive engines is nothing new, and Saab-Scania has accumulated a wealth of experience from the turbocharging of truck and bus engines. But the Saab Turbo engine is unique by being the world's first to be matched to the wishes and needs of the everyday motorist.

Turbo is the abbreviation for turbocharger, i.e. turbine-driven compressor. In a turbocharged engine, the exhaust gases are routed through a turbine, which is thus induced to rotate at very high speed. The maximum speed is above 100 000 revolutions per minute.

The turbine (A) drives a centrifugal compressor (B) which, when it has attained a sufficiently high speed, pressurises the intake air by a few tenths of a bar. It is this pressure increase which is known as turbocharging (or supercharging). Turbocharging thus supplies more combustion air to the cylinders than the engine would be capable of drawing naturally. More fuel can therefore be injected and burned. As a result, the engine delivers appreciably more energy for every piston stroke and thus has a higher output.

INCREASED LOW SPEED PERFORMANCE

The turbocharging technique applied by Saab differs from that so far employed by some other car manufacturers. The Saab method of turbocharging starts to increase the performance at low engine speeds. The engine delivers maximum torque at 3 000 rpm. This is what makes the Saab Turbo engine unique. It is matched to suit everyday motoring instead of the competition car driver's demand for extremely high top speeds.

The turbocharged fuel injection Saab engine develops 135 hp (100 kW) at 5000 rpm. The performance is comparable to that of appreciably larger engines — such as six-cylinder or eight-cylinder engines — although at an appreciably lower fuel consumption. Larger engines consume more fuel and the massive power resources are of no particular benefit, most of the time, on the road. The performance of a smaller engine is more than adequate during 80 — 85 % of all motoring situations. In the Saab Turbo, the economy of the four-cylinder engine is maintained and the penalty of high fuel consumption is incurred only when the extra power is actually used.

INGENIOUS CHARGING PRESSURE VALVE

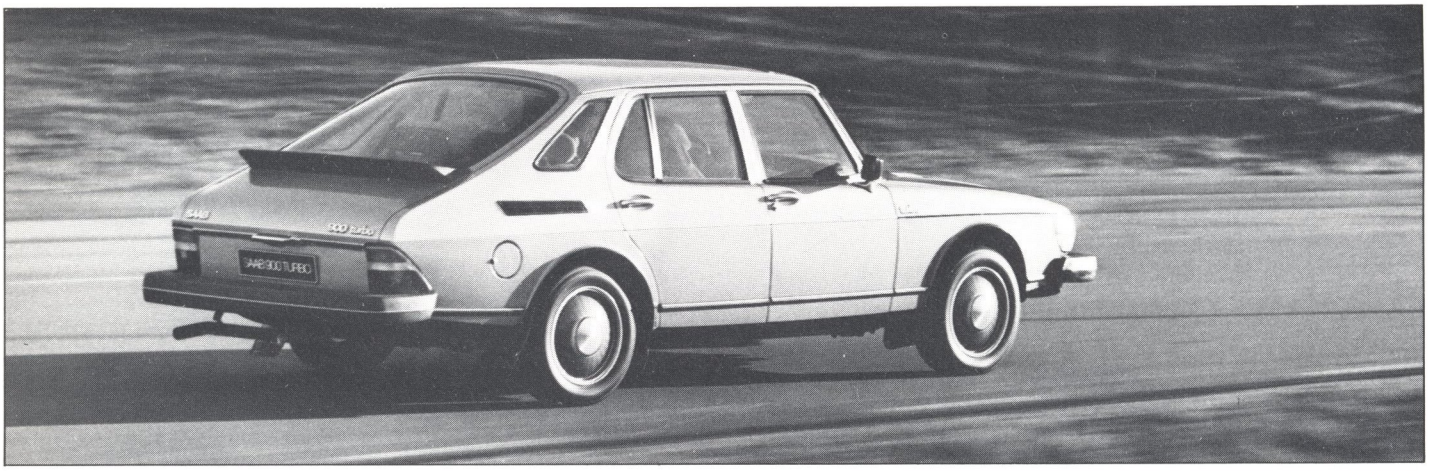
The characteristic feature of the Saab Turbo engine is the exceptionally small turbine which can easily be accelerated to boost the power substantially, even at low engine speeds. The duty of the compressor is to pressurize the combustion air supplied to the engine. But the pressure must not be too high, since it may otherwise cause self-ignition and may damage the engine. A charging pressure valve (C) — sometimes known as the waste gate — continuously maintains the charging pressure at the correct level, regardless of variations in the engine speed. This charging pressure valve is so special that Saab-Scania has submitted patent applications for it. This is how it works under various conditions:

Idling speed or light throttle

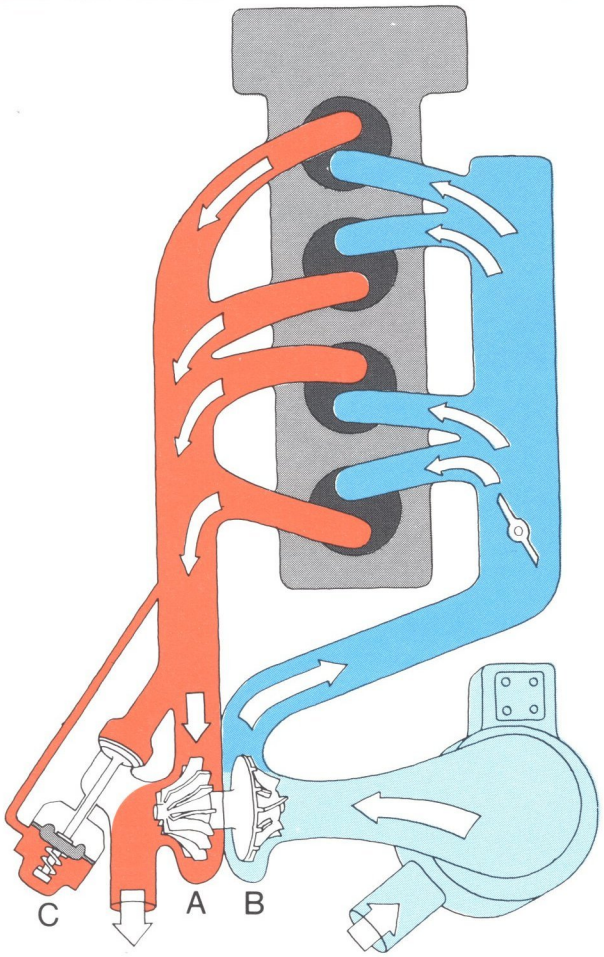
At idling speed or light throttle, the intake air is drawn through the air cleaner to the air flow meter of the fuel injection system and then to the compressor section of the turbocharger. The air then flows through the throttle housing and intake manifold to the combustion chambers. The exhaust gases from the engine flow through the turbine which will rotate without absorbing or delivering power. At idling speed or light throttle, the charging pressure valve is closed and all of the exhaust gases flow through the turbine.

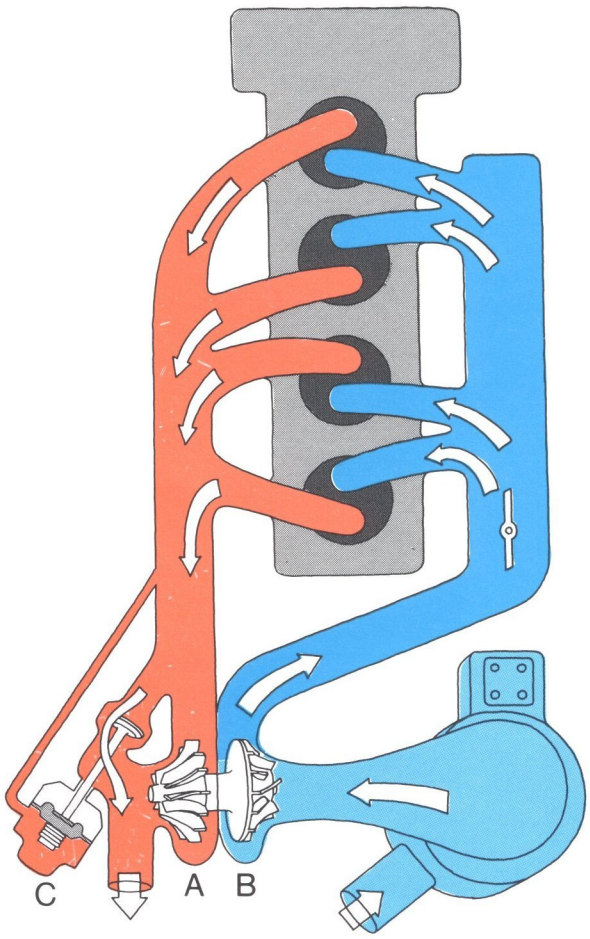
Heavy acceleration or full throttle

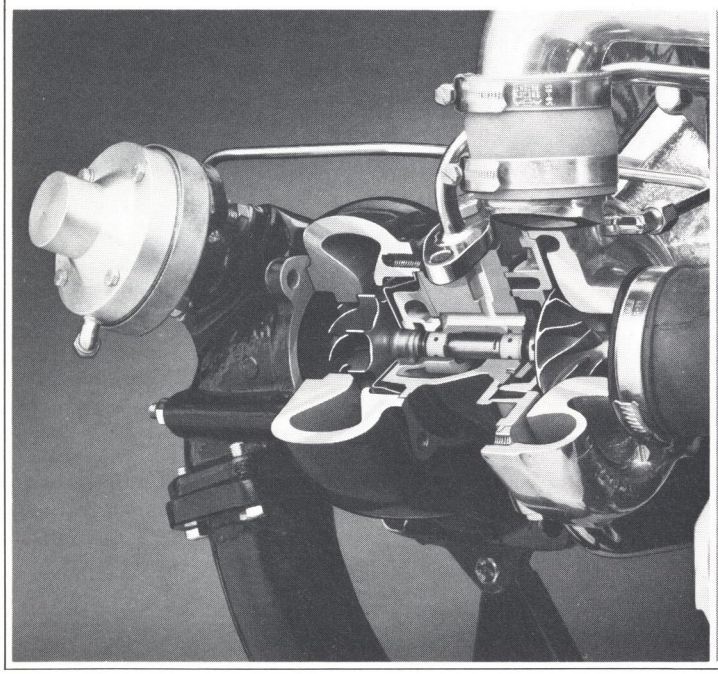
On heavy acceleration or at full throttle, the gas flow through the turbine will increase significantly. This will also cause the turbine to rotate at a higher speed, and the compressor will start supplying combustion air to the engine. In other words, the engine will be supplied with more air and fuel, and its output will increase. If the accelerator pedal is depressed further, the charging pressure valve will open and will by-pass some of the exhaust gases across the turbine, since the pressure would otherwise exceed the maximum permissible value.

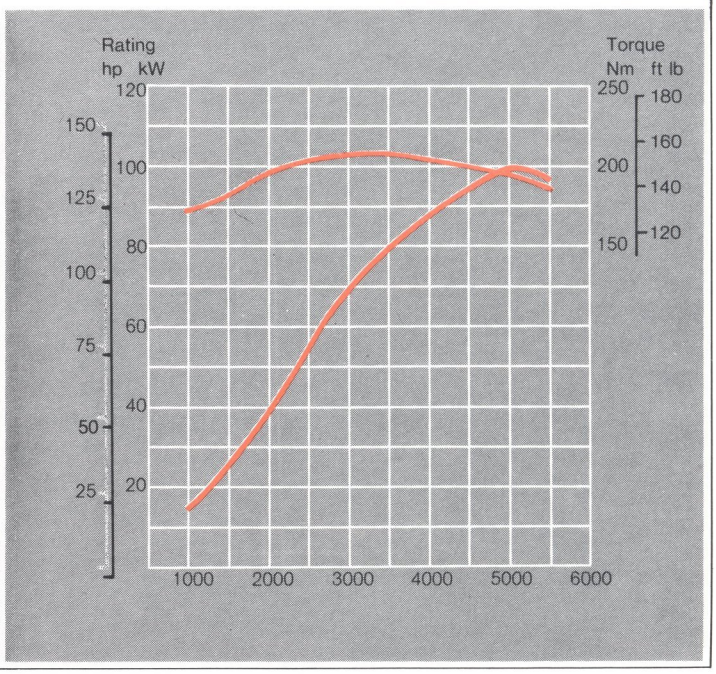


1


C
A
B


C
A
B




Rating
hp kW
120
150
100
125
80
100
60
75
40
50
20
25
Torque
Nm ft lb
250
180
160
200
140
150
120
1000
2000
3000
4000
5000
6000

The "Guldkuggen", (the Golden Cogwheel) is the foremost annual award in Swedish business for innovative thinking in engineering or commerce. The prize-winner is selected by a jury and for 1978 the head of Saab-Scania's Engine Department was presented with this outstanding award "for pioneering efforts in the development of the Saab turbo engine for passenger cars".

2

OVERSPEED AND HIGH PRESSURE PROTECTION — DOUBLE SAFETY

If the charging pressure at the intake manifold should nevertheless exceed the maximum permissible value, a pressure switch will automatically — although temporarily — interrupt the fuel supply to the engine. The car should then, when convenient, be driven to a workshop for service. A pressure gauge on the dashboard indicates at all times the variations in the charging pressure with the output of the engine.

In view of the high reserves of power of the Turbo engine, it would be easy to overspeed it, particularly in low gear. To prevent this, the Turbo engine has been equipped with a safety device which limits the speed to a maximum of 6000 rpm. When the engine speed has risen to 6000 rpm, a relay will interrupt electric current to the fuel pump until the engine speed has fallen back to an acceptable level.

The pictures show the arrangement of the turbocharging system and the locations of the various components in a non catalyst.

1. Turbocharger
2. Charging pressure valve
3. Enrichment switch
4. Deceleration solenoid
5. Pressure switch
6. Control pressure valve
7. Pressure controller
8. Solenoid valve
9. Fuel/air mixture meter
10. Speed limiter (ignition pulse sensing fuel pump relay)

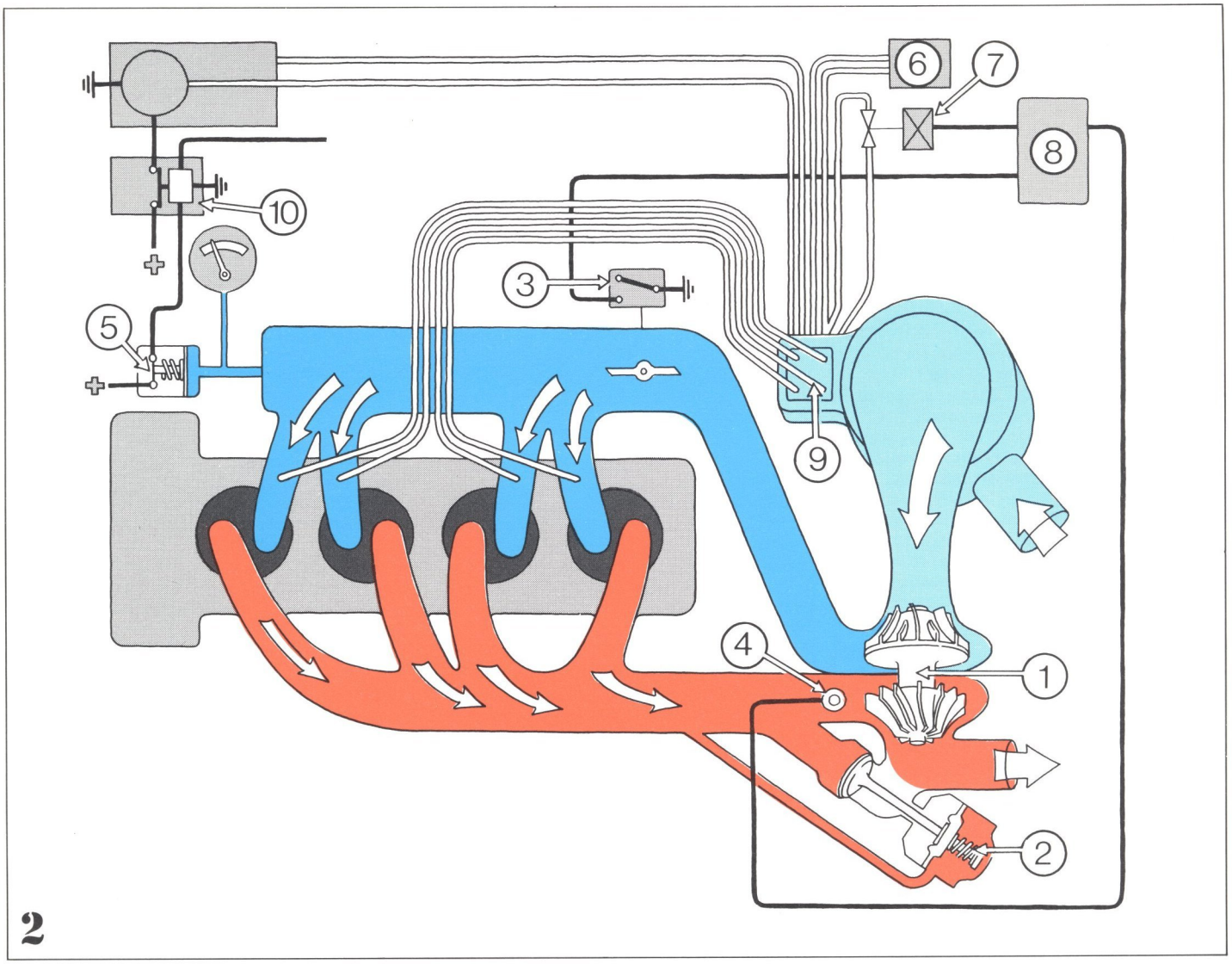
TURBOCHARGING AND TUNING ARE TWO DIFFERENT THINGS

The turbocharging of an engine in accordance with the Saab method is not analogous to tuning in the accepted sense. On the contrary, The turbocharged Saab Turbo engine delivers its maximum torque at a lower speed, and the compression ratio is lower than that of the standard engine.

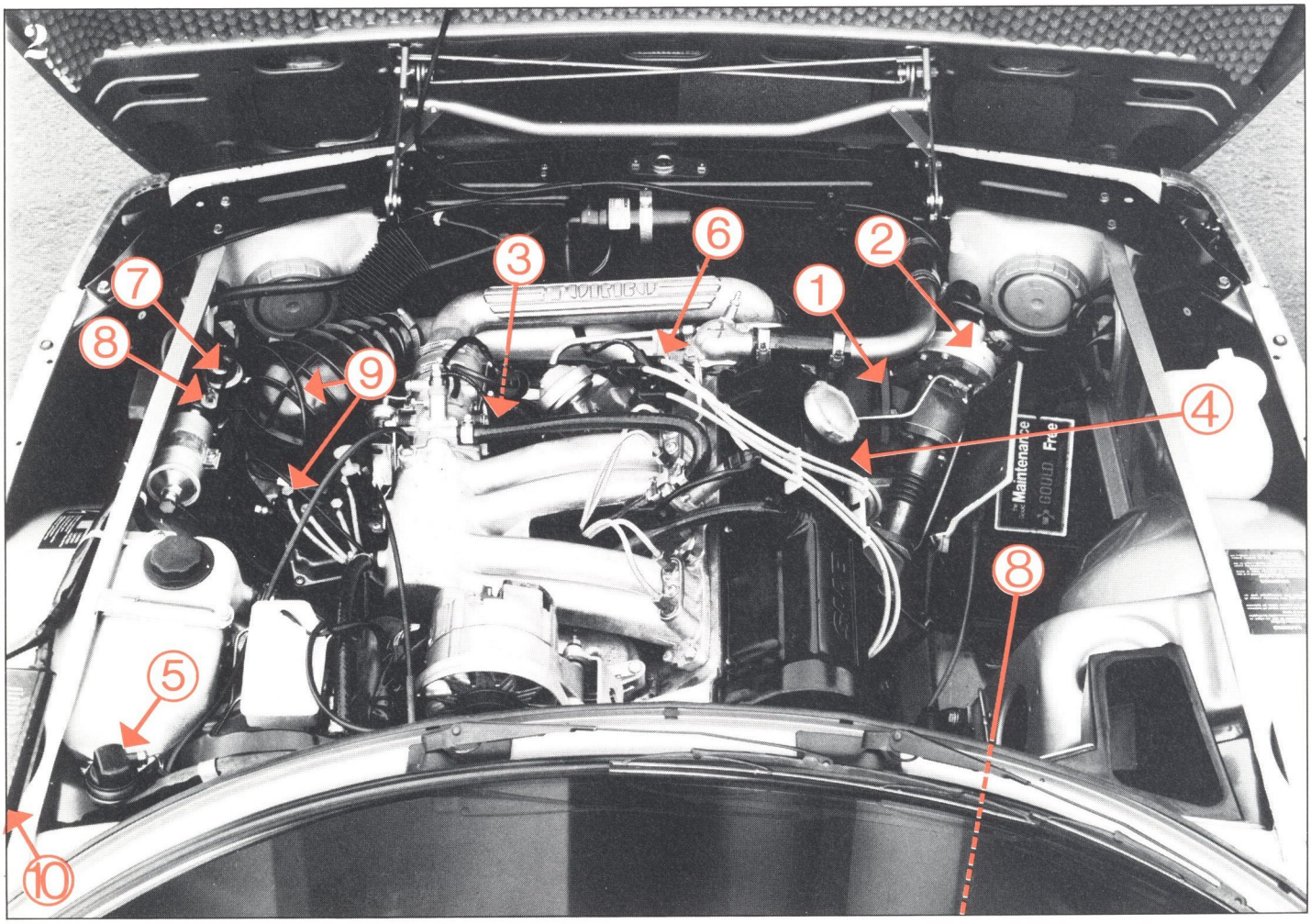
The useful life of an engine is dependent primarily on two types of wear — the speed--dependent wear and the temperature-dependent wear. The speed-dependent wear of the Saab Turbo engine is probably lower than that of the standard engine. This is due to the 6000 rpm rev limiter and to the fact that the overall numerical transmission ratio is 10% lower than that of the standard transmission, and the engine speed is thus correspondingly lower at a given road speed. This higher ratio naturally also reduces the fuel consumption. The moving parts of the engine — the crankshaft, connecting rods, main bearings and valve mechanism — are therefore subjected, in practice, to less wear at a given road speed than those of the conventional fuel injection engine.

The temperature-dependent wear is no higher in the turbocharged version of the engine than in the conventional fuel injection engine. The exhaust gas temperature is approximately the same in both versions, although the exhaust gas flow is appreciably higher in the turbocharged engine. This demands a better cooling capacity and better heat dissipation at certain points. Components exposed to heat are therefore protected, modified or uprated to withstand the extra engine output with a comfortable margin. This applies, for instance, to the cooling systems for water and oil, to the intake and exhaust valves, pistons, piston rings and the exhaust system. The engine requires no special spark plugs. The turbocharged engine therefore has the same good idling and low-speed performance as the conventional fuel injection engine.

The Turbo engine is also equipped with an ignition distributor with a double acting pressure capsule which retards the ignition by five degrees when the turbocharger comes into operation. This reduces the risk of self-ignition ("knock") at high speeds.



2



Road behaviour

Good road behavior has been a characteristic feature of all generations of Saab cars. The joy of driving and road-worthiness are probably the traits which have received the most widespread acclaim of the automotive press over the years. And the praise of the Saab 99 has been particularly lavish. But Saab designers have again excelled themselves, and the road behavior of the Saab 900 can truly be said to be in a class of its own.

Appreciable development effort has been devoted to ensuring that the Saab 900 will behave correctly in all situations, even at high speeds and under extreme conditions. Accidents and near-accidents are often caused by the car not behaving as the driver would expect it to behave in a sudden swerving manoeuver or when the car is carrying an unusual load. Accidents may also be caused by the car conveying insufficient or incorrect information, thus causing the driver to act incorrectly. This is why very strict functional demands have been placed on the new model.

Some of the important aims in the design of the Saab 900 were to produce a car with excellent directional stability and consistent behaviour. . .

— on various types of roads and varying surfaces
— at different loads, including maximum load
— throughout the speed range
— on cornering, regardless of whether the driver eases off the throttle, accelerates or brakes the car.

In many respects, the Saab 900 has an entirely new chassis and a highly refined chassis geometry as compared to its predecessors. But the well-proven basic features still remain . . .

— front-wheel drive
— 60% / 40% weight distribution
— lightweight rear axle
— 15-inch wheels
— rack-and-pinion steering
— pivot-mounted springs

The new and vastly improved features include the rear axle, spring links and wheel bearings. The Saab 900 is also equipped with hub-centerd wheels. Hub centering provides the best possible scope for true circularity of the combination of tire and wheel.

The geometry and the bushings have been adjusted so that the rear axle exerts no effect whatsoever on the steering when lateral forces or braking forces act on the car. Computers and advanced electronic measuring equipment designed by Saab were employed for optimizing the locations of the mounting points and the characteristics of the rubber bushings. Conventional optical wheel geometry measuring equipment was not considered to have sufficient accuracy to satisfy the ambitions of Saab designers.

The front assembly geometry is also new and has been designed to the same level of ambition as the rear axle geometry. The steering gear is also new. It is rubber-mounted and is very easy to fit and remove.

1

SUPERB ROAD BEHAVIOR

The wheelbase of the Saab 900 is longer than that of the Saab 99. Although the Saab 900 is a larger car, it has something of the fast and distinct steering wheel response characteristic of the sports car. The new geometry of the front and rear assemblies has also resulted in the behavior of the car being more neutral and practically entirely independent of the loading. The car has a very sure-footed behavior on sudden swerving manoeuvers. And it is exceptionally responsive to the steering wheel, regardless of the road surface.

The track is wide — 55.9 in (142 cm) at the front and 56.3 in (143) cm at the rear (56.3 and 56.7 in respectively on the Turbo) — and the Saab 900 rolls very little when subjected to lateral forces on hard cornering. Long-term practical tests have led to the springing and shock absorbers being perfectly matched to each other, to provide good road behavior and a superb ride, be it on smooth or bumpy surfaces.

All Saab 900 cars are equipped with 15-inch wheels, with the exception of the five-door Turbo which has special wheels of an even larger diameter, designed for TRX tires.

Over the past five years, the tendency in the automotive industry has been to reduce the wheel and tire sizes from 15 to 14 inches and from 14 to 13 inches. But Saab has remained faithful to the 15-inch wheel, since it provides better ground clearance, a higher level of comfort and better mobility on loose surfaces, such as sand and snow. Larger wheels can also accommodate larger brakes, which are also easier to adjust.

The GL and GLE models are equipped with 165 SR 15 radial-ply tires, whereas the Turbo models of the Saab 900 are fitted with extreme low-profile tires. The three-door Turbo is fitted with 195/60 HR 15 Pirelli P6 tires, whereas the five-door Turbo cars are fitted with 180/65 HR-390 TRX tires. The latter are the new Michelin tire concept and combine good high-speed performance with high comfort. The EMS has 175/70 HR 15 low-profile tires.

The low-profile tire is designed primarily for safe driving under summer conditions. Winter tires, with or without studs, are recommended for icy or snowy conditions.

All 900 models are equipped with a steel spare wheel (GL type) and 165 SR 15, or 175/70 HR 15 tires, depending on the model.

2

FAST, HONEST RESPONSE

The target specification preceding the design work on the Saab 900 stated that the new car was to provide fast response to the steering wheel, good "feel" in the steering wheel and faithful response to lateral acceleration. The human being is very sensitive in this respect — differences of one-hundredth of a second are immediately detected.

Let's take a quick evasive manoeuver as an example. On the upper graph, curve A illustrates how the driver turns the steering wheel. Curve B shows vehicle reaction in the form of angular turn rate as experienced by the eye and curve C the lateral acceleration as experienced by the body. The reaction of the ideal car should coincide with the turning of the steering wheel, at the same time as the experiences of the eyes and the body are the same. In other words, all three curves should be identical.

If the angular turning rate and the lateral acceleration are plotted together in one graph as a function of each other, the curve for an imaginary ideal car will be a very narrow ellipse (black curve in the lower graph)

The blue curve represents a competing car with front-wheel drive and with acknowledged good handling and road holding. The deviation from the ideal curve is relatively large.

The red curve represents the SAAB 900 EMS, whose well balanced chassis provides the car virtually ideal charateristics.

3

MAINTENANCE-FREE

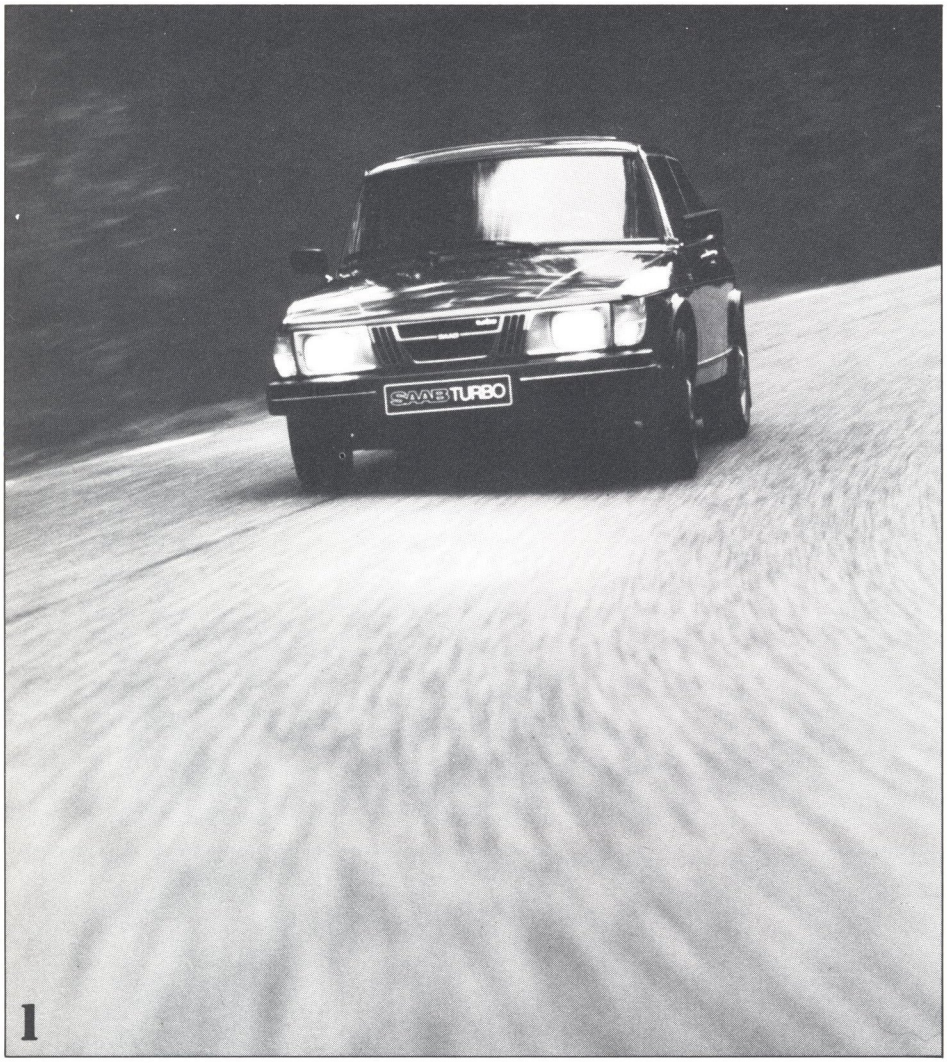
The front wheels are mounted in double wishbones and each supports its part of the front assembly by means of coil springs. The springs have progressive action provided by substantial buffers inside these springs. This reduces the risk of "bottoming" when the car is driven on a very rough surface. The bottom wishbone acts on the shock absorber, whereas the upper wishbone supports the spring. The wishbones are mounted in rubber bushings and the swivel joints are permanently lubricated. The front wheel suspension is thus entirely maintenance-free. The spring travel of the front wheels on the Saab 900 is greater than on the 1978 Saab 99. This ensures even better road adhesion when travelling over a sharp crest or when cornering hard.

The front assembly of the Saab 900 is of an exceptionally sturdy design. Tests on the test bench reveal that the mountings of the wishbones, springs and shock absorbers can withstand the demands normally only made on rally cars.

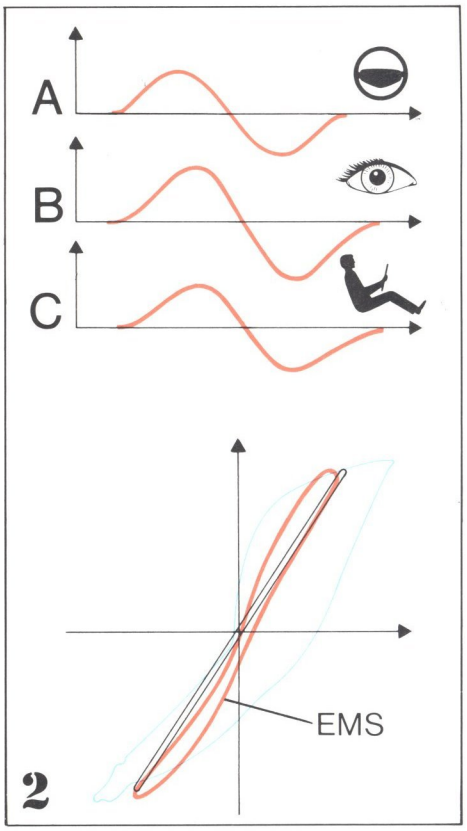
4

PIVOT MOUNTING

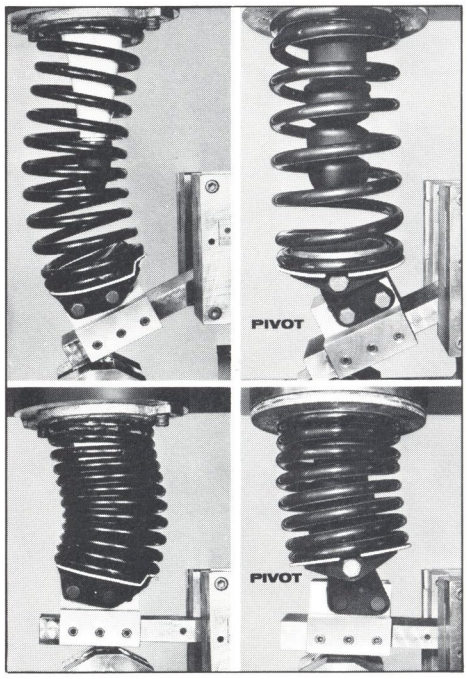
The coil springs of the front wheels are pivot-mounted — a refinement which is fairly unusual on standard cars. Owing to the pivot--mounting, the springs always operate linearily and do not deflect along the longitudinal axis, not even at maximum spring travel.

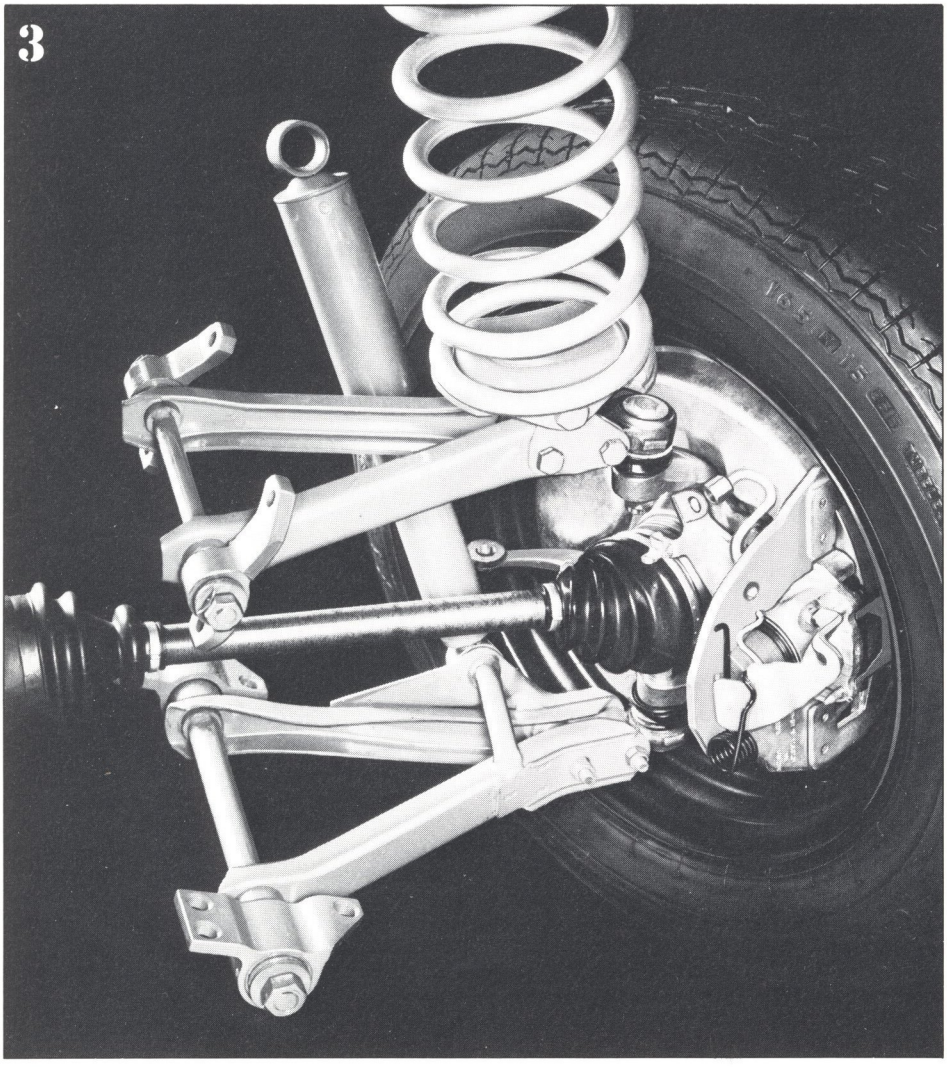


1

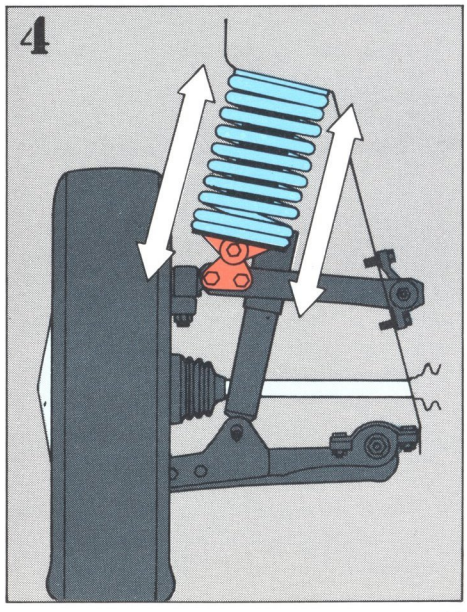


2





3



4

". . . The Saab front suspension — upper and lower control arms with coil springs — is perhaps the best of all front-drive cars currently avaiable. The resultant chassis, with light, well-located components and generous suspension travel, provides one of the best rides you can find. . ."
(Road Test, August 1977)

". . . There's a lot of road holding inherent in the Saab and it is matched by exceptionally tidy handling. . ."
(The British magazine Car, October 1977)

5

LIGHTWEIGHT, STRONG, RIGID

The rear axle is in the form of a lightweight, rigid tube which always maintains the rear wheels parallel to each other. The two links (A) run in parallel with the longitudinal axis of the car and prevent the rear axle from rotating on braking, for instance. Each of the front arms (B) has a spring mounting for the rear coil spring. The shock absorbers are fitted outside the springs and can thus easily be replaced. On cornering, the rear axle tends to move laterally, but is retained in position by a Panhard rod (C). As on the front wheels, all rear axle mountings are rubber-bushed in order to prevent road noise from being transmitted to the body.

The track of the Saab 900 is 0.39 in (10 mm) wider than that of the 1978 Saab 99. The new rear axle is not only longer — it also has a larger diameter. It is therefore stiffer and is better able to prevent the back wheels from "toeing out" on heavy braking.

6

BROAD-SHOULDERED

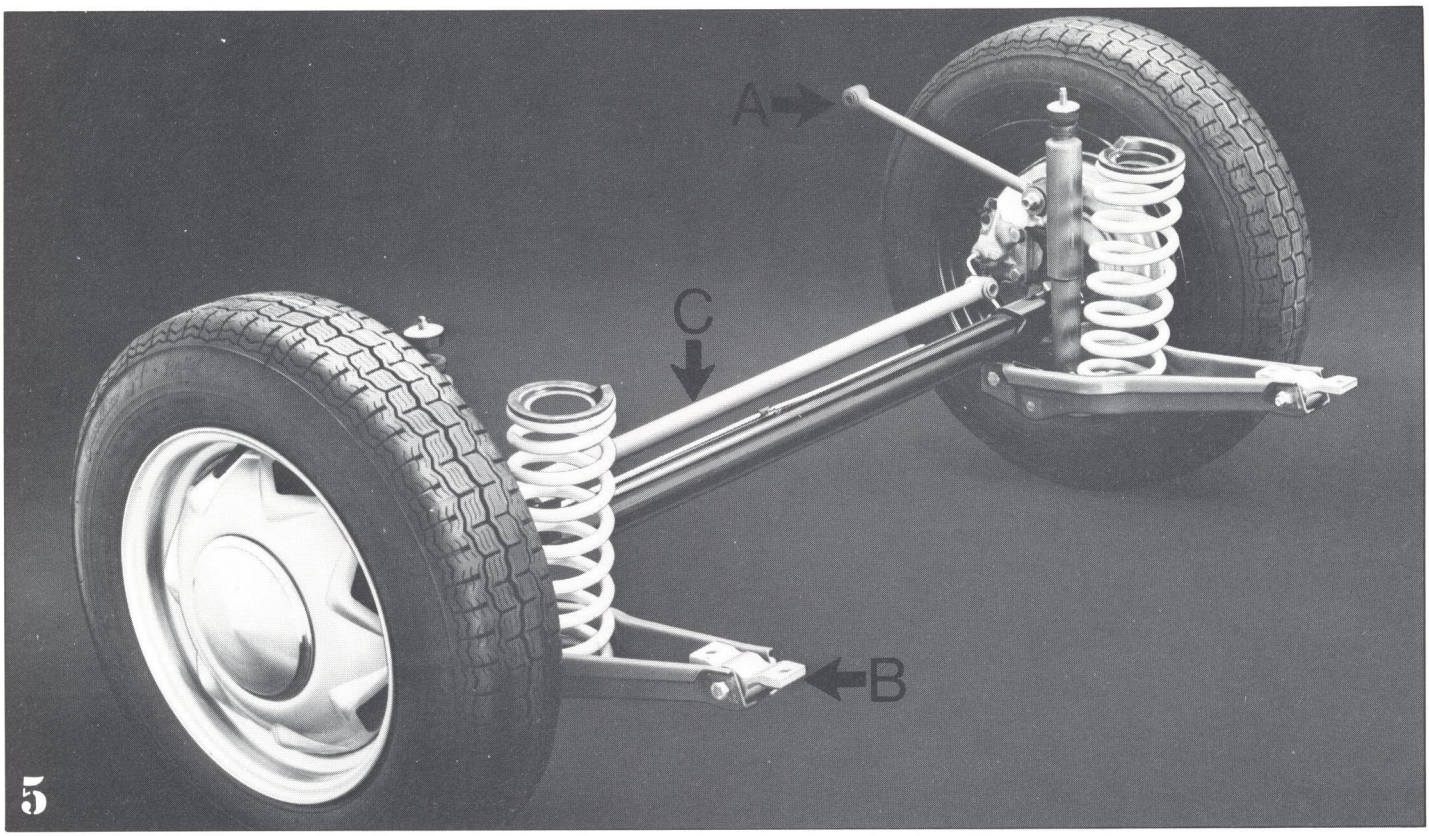
The track at the front of the Saab 900 is 0.79 in (20 mm) greater than on the Saab 99. This has allowed a larger wheel deflection angle to be accommodated, and the turning circle diameter of the Saab 900 is therefore slightly smaller than that of the 99, in spite of the longer wheelbase. The turning circle diameter is 33.8 ft (10.3 m) between curbs.

The steering gear is of rack-and-pinion type and is of very sturdy design. It has practically no backlash and a minimum of resilience. The wheels react quickly and accurately to the slightest movement of the steering wheel. Owing to the location of the drag link, the deflection of the front wheels will alter insignificantly by upward or downward movements of the wheels. This relieves the driver of the need for constantly correcting the course of the car when driving over irregularities in the road surface. For safety reasons, the steering box (A) is located far back in the engine compartment, where it is well protected behind the engine. The steering box is filled with a special grease, known as "fluid grease", which has the consistency of an oil jelly. The steering wheel mounting is firmly secured to a cross-member below the instrument panel. The steering column is jointed and has a deformation zone which prevents the steering wheel from being forced into the interior in the event of a frontal collision. The steering wheel also has an energy-absorbing hub pad to protect the driver.

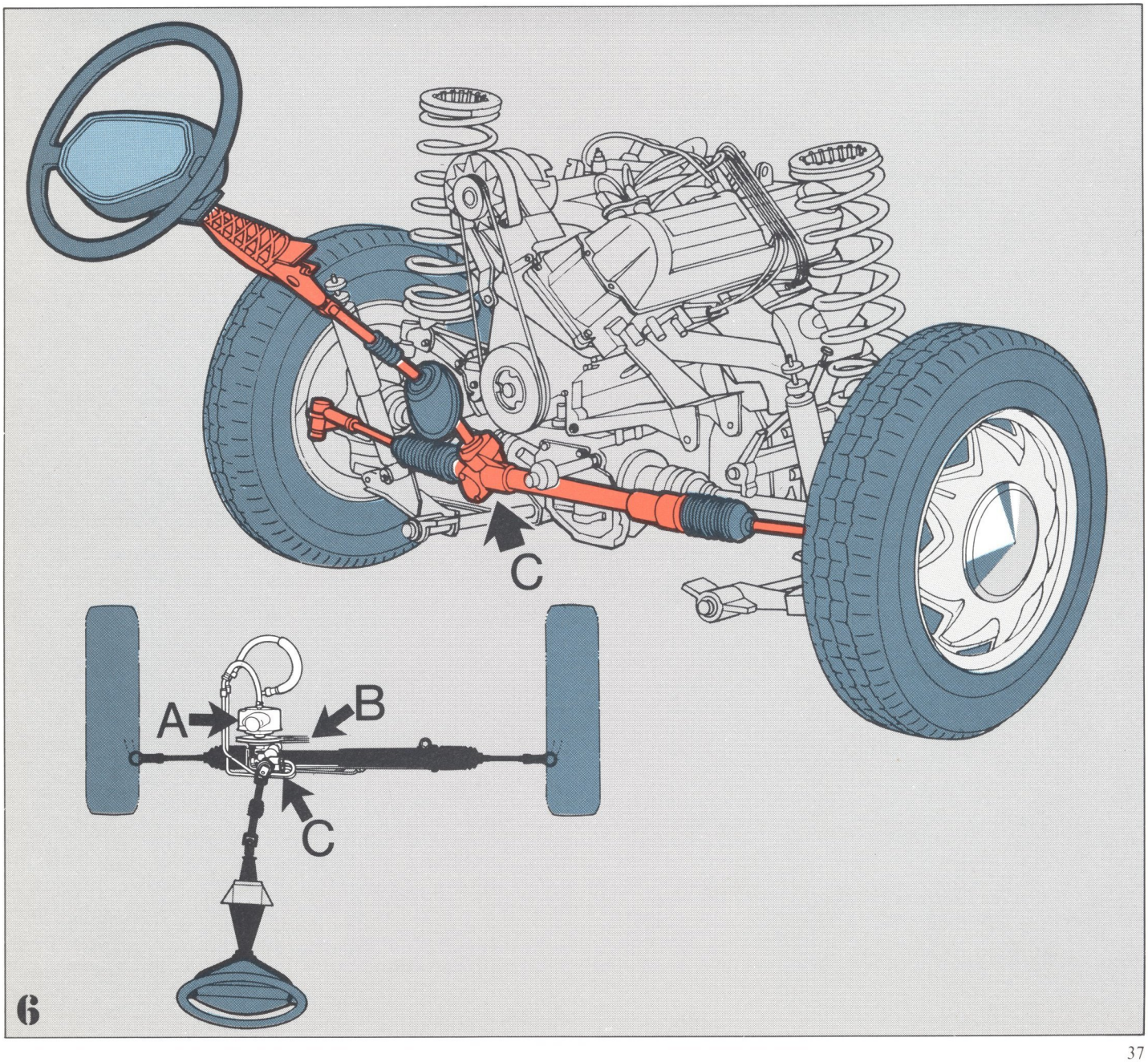
7

REFINED STEERING SERVO

Certain models of the Saab 900 are equipped with power-assisted steering. The power-assisted steering box is new and has been refined to such an extent that it can easily be classified as " better than manual steering in all respects". The picture shows the servo unit, with the hydraulic fluid tank and pump (A), belt drive from the engine crankshaft (B) and rack-and-pinion steering gear (C).



5



6

Roadholding in theory and practice

"The Saab 99 was one of the best cars for winter conditions. But the 900 has an almost 10 cm longer wheelbase and is even steadier. . ."
(Expressen, Sweden)

1

WHY DOES A SKID OCCUR?

A. When a tire runs on the road surface, the rubber at the contact surface at any instant can be regarded as a block resting on the road. As soon as the tire is subjected to driving, braking or lateral forces, frictional forces come into play. F_{max} is the maximum frictional force which the rubber block can withstand without moving.

$F_{max} = \mu \cdot N$
where
μ = Coefficient of friction
N = Normal force (load on the wheel)

To the rubber block, the direction of the force is immaterial — the relationship $F = \mu \cdot N$ is valid regardless of the direction of the force. If the forces acting on the tire should exceed the maximum permissible frictional force, the tire will start to slide on the surface — the wheel will spin or skid sideways.

B. The various forces acting on the tire while the car is travelling can be illustrated graphically by a parallelogram of forces. The circle inscribing the parallelogram can be used to calculate the magnitude of the lateral force which the tire can withstand when subjected to certain driving or braking forces — the radius of the circle represents a yardstick of the resultant force which the tire can withstand. When the maximum braking or driving capacity is utilized, one or several tires may be unable to withstand any lateral forces whatever — one or more tires may therefore start to skid sideways, so that the car is thrown off course.

2

OVERTAKING ON A SLUSHY ROAD

When the road behaviour of a car is discussed, the concepts of understeer, oversteer and neutral steering are often used. If a car takes a corner **at high speed** and the radius it describes is greater than that corresponding exactly to the movement of the steering wheel, the car is said to have understeer. Under the same conditions, if the radius described by the car is smaller than that corresponding to the steering wheel travel, the car is said to have oversteer. Neutral steering describes the behavior of a car which lies between the two behaviors described above.

On a car with **rear-wheel drive** (which is normally characterised by understeer), the ability of the rear wheels to withstand lateral forces is impaired when the car is accelerating. The rear wheels thus have a greater tendency to run off course than the front wheels — in other words, the normal understeer of the car may instead become oversteer when the car is accelerated hard. The car may therefore be difficult to manoeuver on a slippery surface, such as when overtaking on a slushy road or across a mound of snow between the lanes of a road. In the figure. . .

D_1 and D_2 are the driving forces
F_1 is the rolling resistance
F_2 is the rolling resistance + the resistance presented by a mound of slushy snow, for instance.

Since F_2 is greater than F_1, a horizontal turning moment will be applied to the car. If the rear wheels are simultaneously subjected to high driving forces — as is normal on overtaking — a serious risk is involved due to the tires not being capable of withstanding the lateral forces caused by the horizontal turning moment. The car will skid off course.

3

CONSISTENT BEHAVIOR

On a car with front-wheel drive, such as the Saab 900, the rear wheels stabilize the course, since they are not subjected to driving forces. The weight distribution as well as the design of the brakes ensure that the rear wheels can withstand high lateral forces, even during hard braking.

The Saab 900 is normally characterized by understeer which is consistent, even under extremes of acceleration or braking.

DIRECTIONAL STABILITY

A car which is heavy at the front is normally understeered — and understeer is essential for good directional stability at all speeds. By suitable distribution of the weight onto the front and rear wheels, a car can be designed to be fairly unaffected in its road behavior by changes in the loading — throughout the range between its curb weight and the maximum permissible gross weight.

The percentage weight distribution between the front and rear wheels of a car normally changes by 8 — 9 % between the curb weight and the maximum permissible gross weight. A car with a weight distribution of 54 % on the front wheels and 46 % on the rear wheels at its curb weight will thus have an almost reversed weight distribution at its maximum gross weight. The road behavior and characteristics of the car will therefore change — from the original understeer it acquires an oversteer characteristics.

On the Saab 900, the weight distribution is approximately 60 % on the front wheels and 40 % on the rear wheels at the curb weight. If the car is loaded in the usual manner (i.e. four passengers plus luggage) up to the maximum permissible total weight, the weight distribution will change to 51/49 %. The Saab 900 will thus still retain some of its understeer characteristic and will behave in a familiar and stable manner, even up to full load.

Braking hard in a tight curve involves the risk of the rear wheels skidding. But situations still arise in which the risk must be taken. On the other hand, car designers can reduce the risk by suitable design of the brakes.

Brake systems usually employed on cars can be classified into two types:

A. Appreciably larger brakes at the front than at the rear.
B. Somewhat larger brakes at the front than at the rear. The rear brakes are equipped with a pressure-reducing valve.

As on the Saab 99, Saab designers have chosen (A) for the Saab 900. The braking efforts distribution is 80 % on the front wheels and 20 % on the rear wheels. If the car is equipped with brakes in accordance with (B) above, the sizing of the brakes is usually such that the rear wheels will be subjected to very high braking forces when the brakes are applied in a curve. The wheels will therefore lock and the car will start to skid.

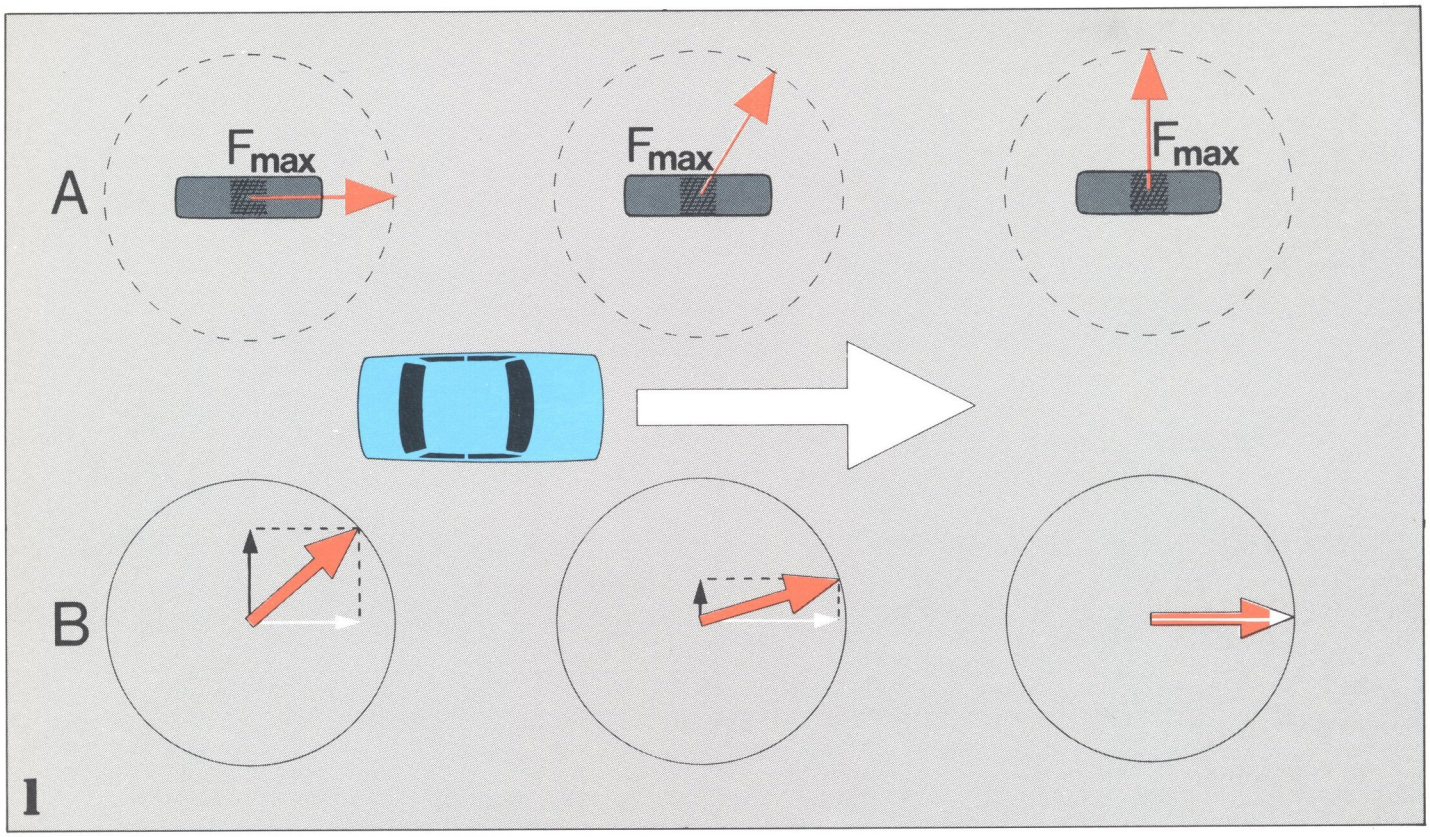
FORGIVING NATURE

"The steering is far too heavy" — this is common objection to cars with front-wheel drive. By altering the caster angle, the steering on a car with front-wheel drive and understeer can be made lighter than in the past. But we have chosen to retain the Saab design philosophy by not abandoning the stabilizing return torque on the steering wheel, which allows the car to "forgive" any inaccuracy or unsteadiness of the driver in turning the steering wheel.

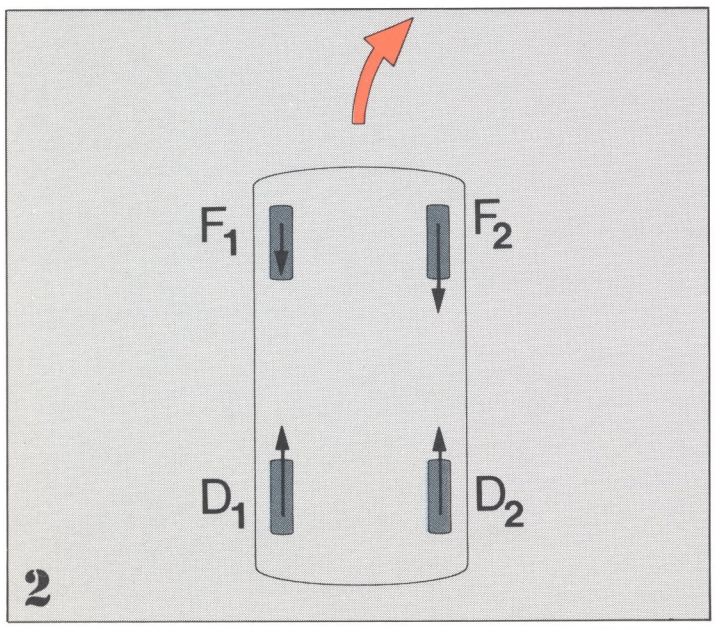
In order to reduce the steering wheel effort, certain manufacturers of cars with front-wheel drive have decided to make the steering more neutral. The car is then undeniably easier to manoeuver in city traffic. But the coin also has its reverse side.

A car with more neutral steering has a less steady behavior, and driving on a long journey at highway speeds will be more tiring. Another disadvantage is that the car behavior will change if the throttle is eased off in a curve — a car with slight understeer will suddenly become oversteered. At Saab, we regard this as a dangerous trait.

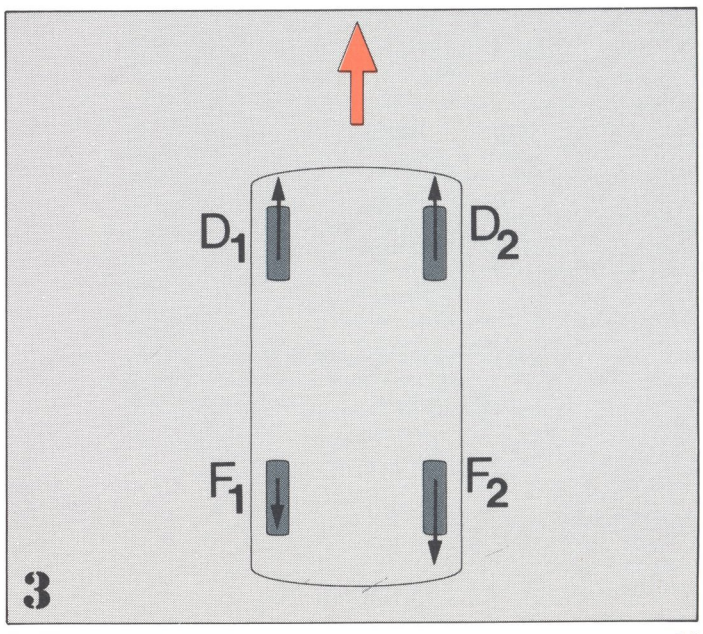
The front-wheel drive on the Saab 900 offers directional stability and good roadholding throughout the speed and load ranges. The driver has the freedom of being less cautious in the use of the accelerator pedal, without incurring the risk of a skid. The Saab 900 has a "forgiving" nature even on this score.



1



2



3

4

FORESIGHT

Different cars have different steering radii. How important is the steering radius? And how does it affect the directional stability and road behavior of the car? We distinguish between positive (A) or negative (B) steering radius or zero point steering (C). Let us consider how the various steering geometries affect the reactions of the car and the driver on braking when one of the brake circuits in a diagonally split system is inoperative or when a front tire is punctured. We have assumed three different reactions of the driver.

A The driver brakes while holding the steering wheel firmly in the same position.

B The driver brakes and releases the steering wheel.

C The driver brakes and reacts spontaneously.

A. **If the driver brakes while gripping the steering wheel firmly in the same position,** i.e. with the front wheels in the "straight ahead" position, all cars will pull to one side, regardless of whether they have positive or negative steering radius or zero point steering. This is due to the fact that the rolling resistance on the left-hand side differs from that on the right-hand side, and this gives rise to a turning moment around the centre of gravity.

B. **If the driver brakes and simultaneously releases the steering wheel,** the car with a positive steering radius will steer in the direction in which the car is pulling. The steering wheel of a car with a negative steering radius will tend to turn in the opposite direction to that in which the car is pulling. In the case of zero point steering, the car will behave in the same manner as when the steering wheel is gripped firmly in its original position.

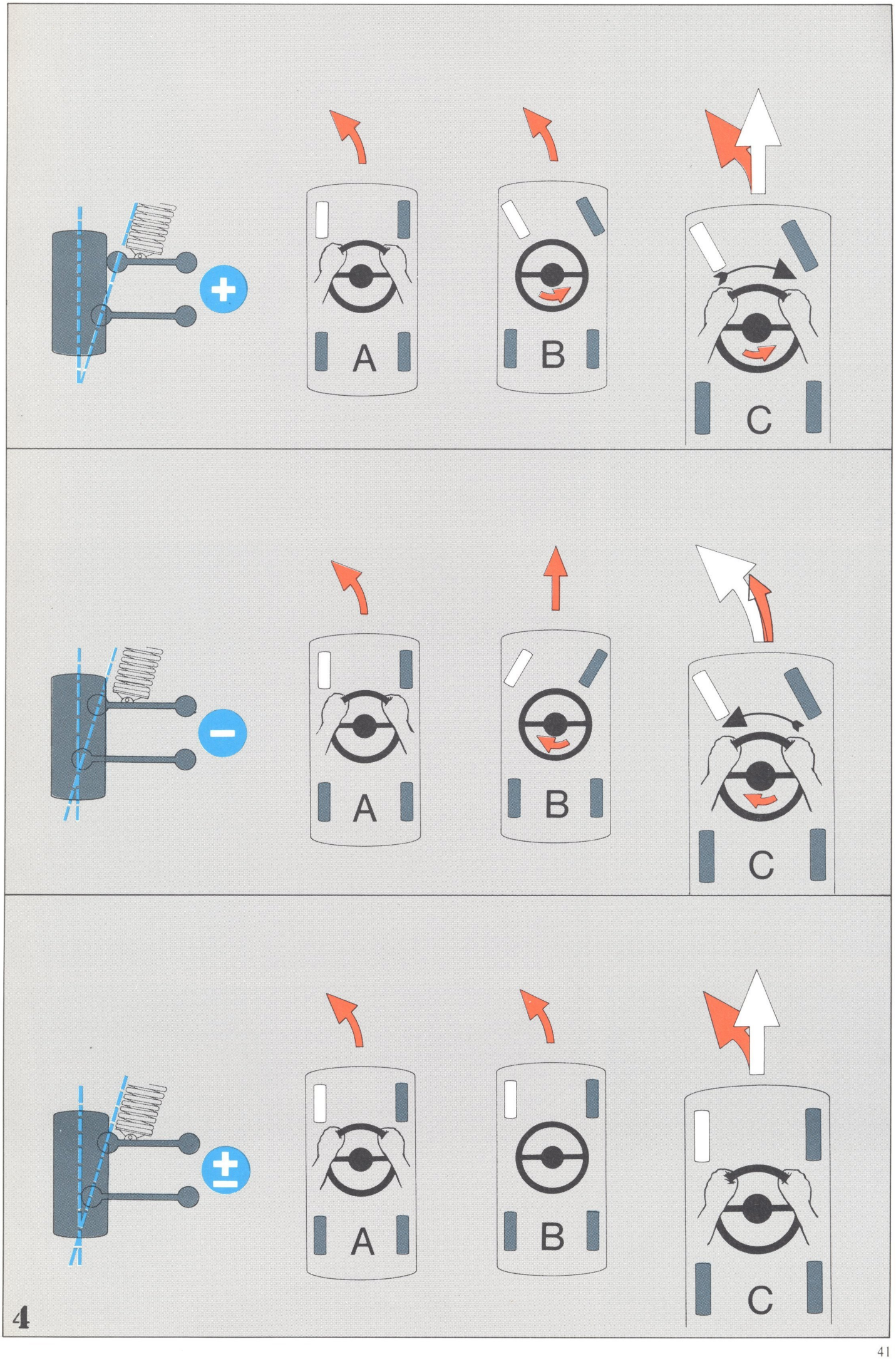
C. **If braking is combined with the driver's spontaneous reactions,** the consequence will be that:

— If the car has a positive steering radius, the steering wheel will tend to turn in the same direction as that in which the car is pulling. The driver will spontaneously try to counteract the movement of the steering wheel and will correct in the right direction.

— If the car has a negative steering radius, the steering wheel will tend to move in the opposite direction as that in which the car is pulling. The driver will spontaneously endeavour to counteract the movement of the steering wheel and will then correct in the same direction as that in which the car is pulling. The driver thus receives conflicting information from the movement of the car and from the steering wheel, and he therefore "assists" the car to move even further out off course.

— Zero point steering provides no information whatever from the steering wheel, although the senses indicate that the car is pulling to one side. The driver therefore turns the steering wheel in the right direction.

The Saab 900 has a slightly positive steering radius. The driver thus receives the correct information, but the torque on the steering wheel is so low that little physical effort is required to correct it.


A
B
C
A
B
C
A
B
C
4

". . .It's the sort of safety margin all cars should have. . ."

Intensive use of a car at high speeds, under variable road conditions, at a changing rhythm of the traffic and under fluctuating weather conditions makes strict demands on the brake system. After all, the brakes are one of the most important safety systems on a car — it is the brakes which are decisive in whether or not a near-accident will be no more than merely a near-accident.

The Saab 900 has a diagonally split, dual-circuit foot brake system. Owing to the fact that they are diagonally split rather than split "fore-and-aft", the car is easier to manoeuvre on hard braking in the event of failure of one of the brake circuits. ". . . the fore and aft brake lines of one circuit were hacked through to simulate breakage and yet the Saab still maintained stable straight line braking under a series of crash stops. It's the sort of safety margin all cars should have." (Quoted from the Australian magazine Modern Motor, May 1977).

The Saab 900 is equipped with semi-metallic brake linings on the outside of the front brake discs. The semi-metallic brake linings are more reliable and durable, and their useful life is many times longer than that of conventional linings made of organic materials.

1

RELIABLE EVEN UNDER EXTREME CONDITIONS

The Saab 900 has disc brakes all around to ensure the best possible braking effect, and the brake performance on all wheels is the same, even under extreme conditions. The front brakes exert about 80 % of the braking effect. The rear wheels, which carry a lighter load, therefore display no tendency towards locking too early in the event of hard braking .

When the brakes are applied, part of the load is transferred from the rear wheels to the front wheels. To utilize the brakes and the road grip of the tires in an optimum manner, a higher braking effect should be applied to the front wheels than to the rear wheels, and this effect should increase as the braking effect increases. The approach used by Saab is therefore to fit larger brakes at the front than at the rear — the braking effect distribution is 80/20. This also offers the benefit of the car retaining its directional stability if the need should arise to apply the brakes in a curve. An alternative would have been to equip the car with brakes of equal sizes at the front and rear and to fit a pressure reducing valve in the hydraulic line to the rear wheels. But the risk would still be such that, when the brakes are applied in a curve, an excessive braking effect would be applied to the rear wheels, thus causing a skid.

The Saab 900 is equipped with large pedals which are located far apart, to provide space for heavy shoes and to reduce the risk of the driver hitting the wrong pedal in a critical situation.

The handbrake is self-adjusting and acts on the front wheel discs. The braking effect of the handbrake is about 50 % of that of the foot brake system. Since the handbrake acts on the front wheels, it can be used as an extra brake, without the risk of the car swerving or skidding. The handbrake actuates the front calipers mechanically and it is therefore effectively "actuated" every time the foot brake is applied. This reduces the risk of seizure of the handbrake.

The brake lines are well protected against physical damage and chemical attack. They are anti-corrosion treated and run in ventilated passages inside the car. A warning lamp will light up on the instrument panel when the handbrake is applied, if a fault should develop in one of the brake circuits or if the brake fluid level is low.

A. The brake discs are 11 in (280 mm) diameter on the front wheels and 10.6 in (270 mm) on the rear wheels.

B. 9-inch diameter brake servo.

C. The system is diagonally split. Each of the circuits acts on one front wheel and the diagonally opposite rear wheel.

D. The handbrake acts on the front wheel discs.

E. Semi-metallic brake linings are fitted to the outside of the front discs, and this ensures the best possible braking effect and optimum resistance to wear.

2

EXTRA DURABLE

In order to combine all the advantages of the disc brake with the minimum service demanded by the drum brake, Saab was the first European car manufacturer to introduce semi-metallic brake linings on the 1978 Saab 99 Turbo. This new generation of linings is standard on all Saab 900 models and is incorporated at the points where the wear is usually heaviest — i.e. at the outer linings of the front brakes. The distance travelled by the car up to the point at which the any of the front brake linings must be replaced is thus increased by more than 50 % . To the average motorist, this represents a distance of more than 20 000 miles.

The semi-metallic linings also offer other benefits:

— They cause less wear on the discs than conventional linings.

— They reduce the sensitivity of the brakes to high temperatures — such as those occurring on heavy and frequent braking on long, downhill gradients.

— They reduce any fading problems.

— They are more silent and do not foul the wheels to the same extent as the earlier, softer linings.

3

SERVO-ASSISTED BRAKES

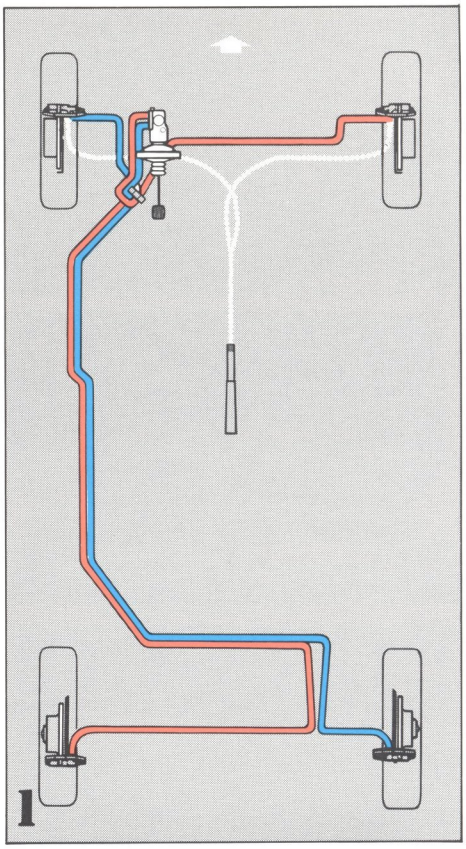
The master cylinder of the foot brake system is equipped with a 9-inch vacuum servo.

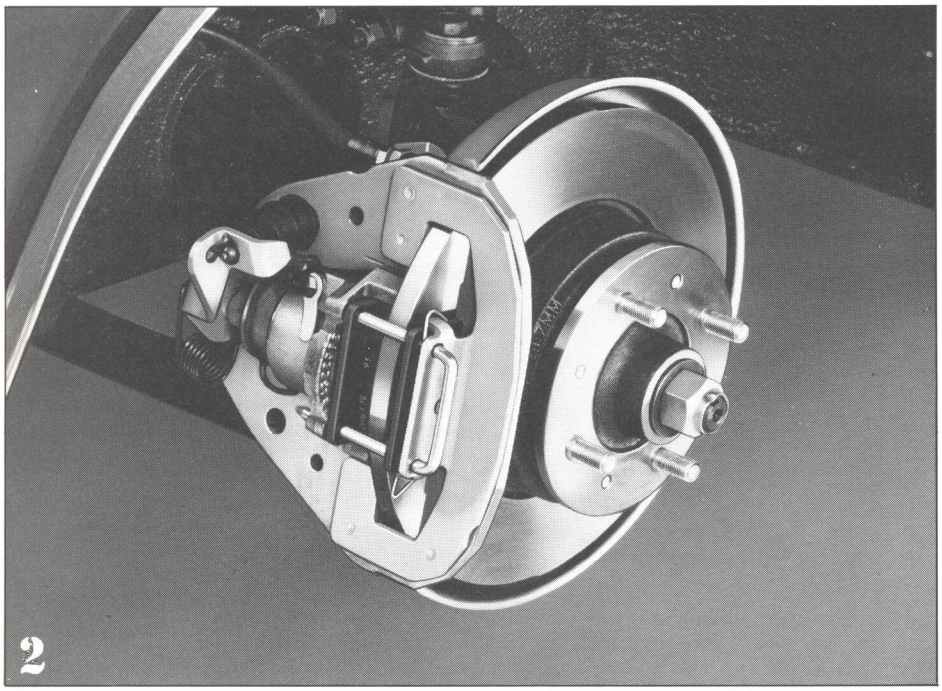
The servo significantly amplifies the pressure in the hydraulic system, and a lower pedal pressure is therefore necessary to achieve a certain braking effect.

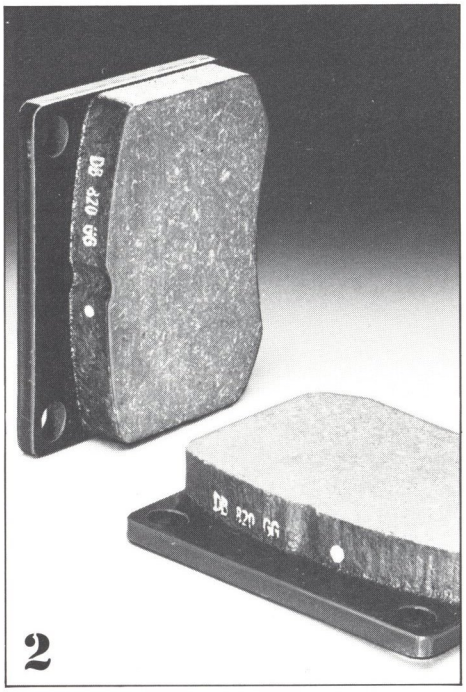
CAUTION. Never switch off the engine in situations such as driving down a slope into a garage or when holding the car steady on a gradient by keeping the brake pedal depressed. As soon as the engine has stopped, the servo pressure will be lost and an appreciably higher pedal pressure will suddenly be required to achieve the same braking effort.

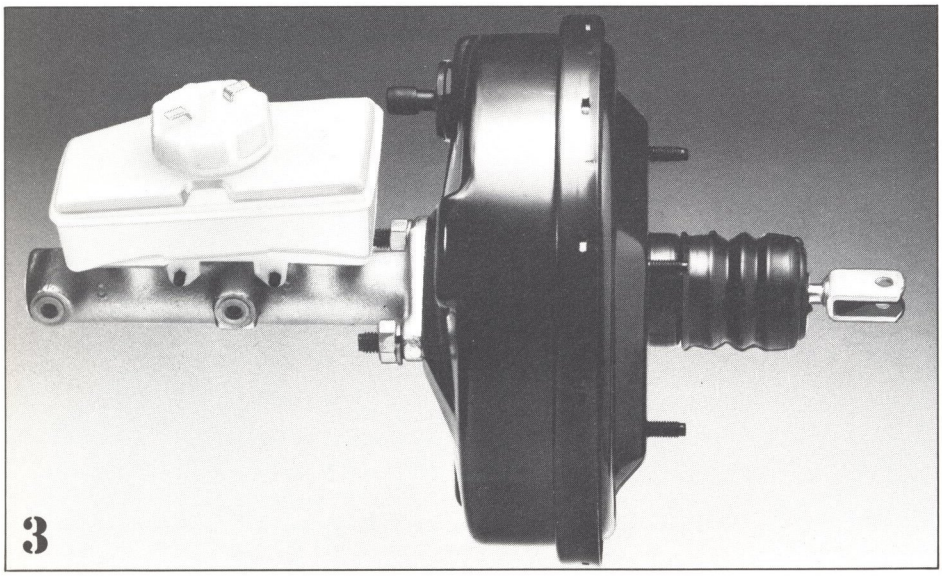
The hydraulic fluid container incorporates a level switch. The switch lights up the red warning lamp on the instrument panel if the hydraulic fluid level should fall below a certain value. The container is common to the brake and clutch fluid, and the warning light thus has a dual function. In the event of oil leakage, the clutch will also become inoperative, and this provides the driver with a further warning — in addition to the warning lamp at the speedometer. The brake master cylinder is designed so that both hydraulic circuits will be actuated simultaneously and at the same pressure. The risk of the car pulling to one side when the brakes are applied is thus reduced, and the wear on the brake linings will be more uniform.

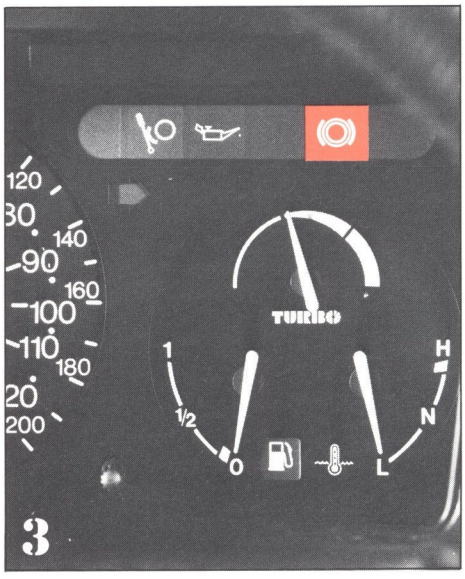
1


1


2


2


3



3

Luggage and stowage spaces

"If there is a sedan with more usable interior space, more places to put things, more room to carry things, more space to haul things, more ways to store things without exposing them to prying eyes, we flat don't know of it. . ."
(Road Test about the Saab 99 Combi Coupé, August 1977)

The Saab 900 has a hatchback body, and Saab was one of the first car manufacturers to launch this very practical type of body in an up-to-date version. The hatchback was an unconventional model which combined the best properties of a conventional sedan, a coupé and a station wagon, without being burdened with any of their disadvantages. As compared to an estate car, for instance, the load-carrying area is of about the same size, although the body styling is much more elegant, the sound level is lower, the rear window tends not to foul, the fuel consumption is lower and space is available for concealing valuable luggage.

1

THREE VERSIONS

The load-carrying area can be converted simply and quickly to three different versions:

— 21.2 cu ft (600 litres) of luggage space, 12.5 cu ft (350 litres) to SAE standards (5 seats, parcel shelf in position)
— 23 cu ft (650 litres) of luggage space, 15.4 cu ft (435 litres) to SAE standards (5 seats, parcel shelf removed)
— 53 cu ft (1 500 litres) station wagon space (2 seats)

A further 3.2 cu ft (90 litres) or 1.1 cu ft (30 litres) to SAE of space is also available below the rear of the luggage compartment floor.

THE PARCEL SHELF CAN BE RAISED OR REMOVED

The ordinary luggage compartment is 44.1 in (112 cm) long at floor level and accommodates 12.5 cu ft (350 litres) by SAE standards — in other words, about this volume of standard luggage units can be accommodated. The parcel shelf can be raised or removed altogether, and the car can then be loaded right up to the roof. The parcel shelf can be placed on the floor. A plastic-covered metal wire net is available as an accessory and can be fitted between the back-seat backrest and the roof.

2

CONVENIENT LOADING

The large rear door ensures convenient loading of bulky goods. The complete absence of a sill allows even heavy luggage to be loaded quickly and simply. The height of lift is no more than 21 in (53 cm).

The space typical of a compact station wagon can be obtained by folding down the back seat and the backrest. The conversion is quick and easy. The load-carrying floor is flat and is covered with an edged carpet made of synthetic fiber. The spare wheel is located to the left and is easily accessible, even when the car is loaded. In the "station wagon mode" the load-carrying floor is 71.7 in (182 cm) long and about 89.6 (215 cm) diagonally.

The rubber-covered bumper can be used as a support and a "ramp" when loading heavy and long items. Since the door is hinged at the roof, the opening is substantial — the vertical height is no less than 31.5 in (80 cm). The maximum width of the door opening is 41.7 in (106 cm). During loading, the parcel shelf can be locked in the raised position by means of a spring-loaded latch.

3

IMPACT-ABSORBING, INSULATING AND FIRE-RESISTANT

The wheel housings and side walls are lined with molded panels made of 0.4 in (10 mm) thick plastic foam material with a surface covering of tough vinyl. The material is impact-absorbing, sound and heat insulating and fire-resistant. It is resistant to oil and is easy to keep clean. The rear door is similarly lined. The door is equipped with an inner handle, so that it can be closed without getting your hands dirty. A well-protected lamp is switched on and off automatically as the rear door is opened and closed.

4

EXTRA SPACE

A 3.2 cu ft (90 litres) compartment is provided below a panel at the extreme rear of the luggage compartment. The floor is covered with a nylon carpet. The compartment provides a practical space for a spare fuel can, warning triangle, tow rope, tools, jack, etc.

5

ILLUMINATED GLOVE COMPARTMENT

The glove compartment can be locked by means of the ignition and door key. When open, the glove compartment lid remains in the horizontal position. It is provided with two recesses on the inside, intended as holders for glasses or mugs, a practical feature when taking a break during a journey. The glove compartment is illuminated.

6

INSTRUMENT PANEL RECESS

A practical recess intended for coins, cigarette packets and other small items which may come in handy during a journey is provided at the top of the instrument panel.

The front doors are provided with roomy pockets.

7

LARGE ASHTRAYS

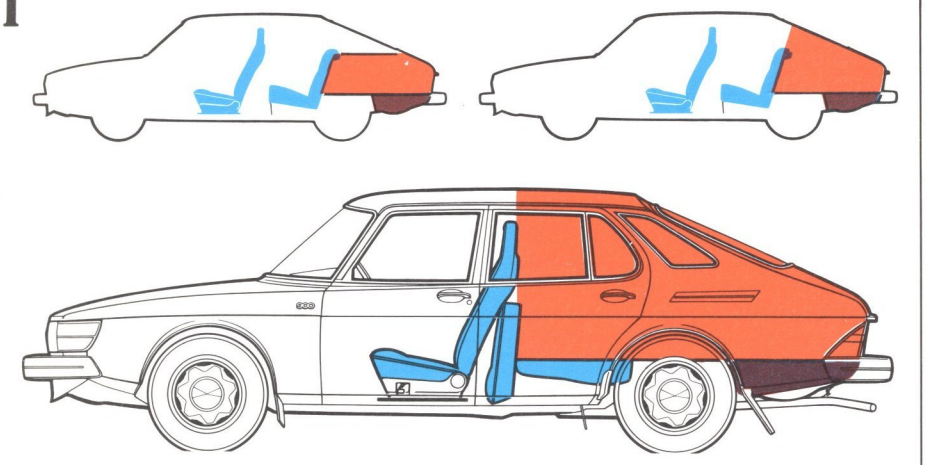
The large ashtray is located at the bottom edge of the instrument panel, with the cigarette lighter above it. Ashtrays are also fitted in both armrests at the back seat.

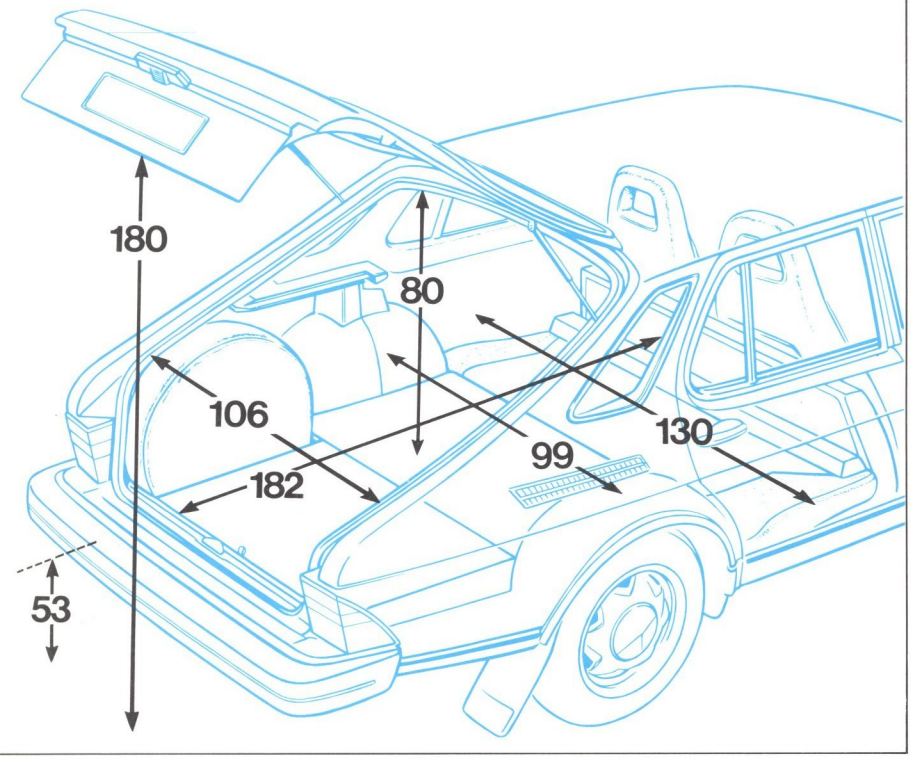
8

FRONT AND REAR TOW LUGS

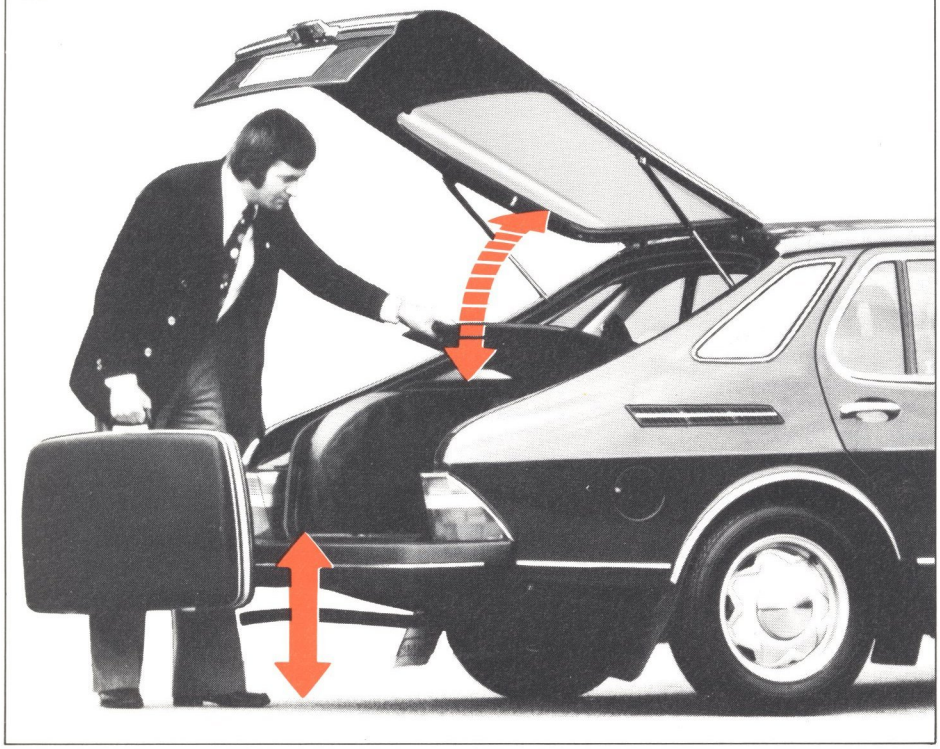
All Saab 900 models include provision for simple fitting of a tow hitch. Tow lugs are provided at the front and rear.

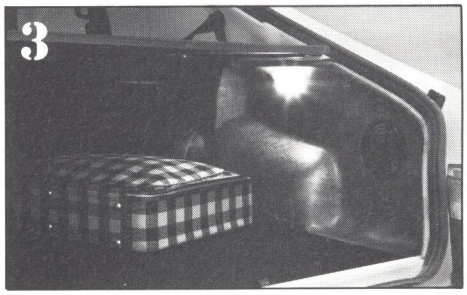
1



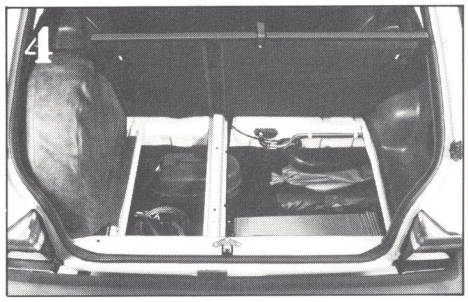


2

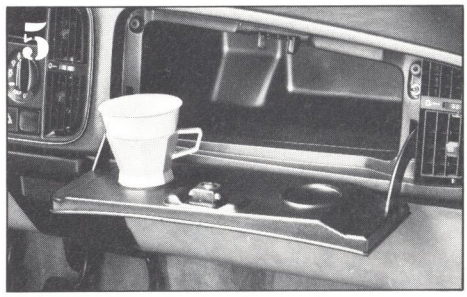




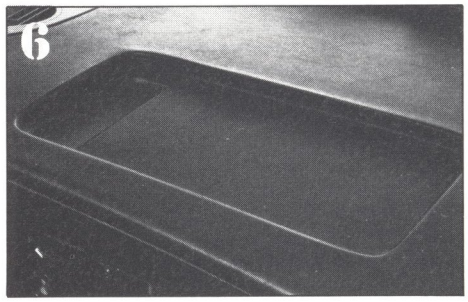
3



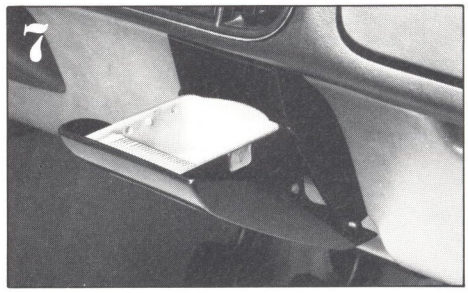
4



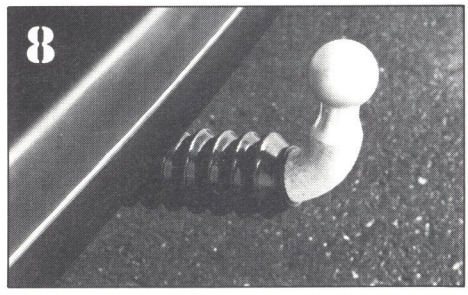
5



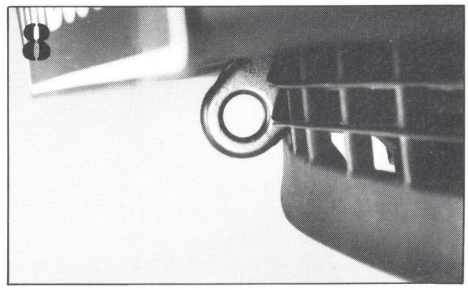
6



7



8



8

Technical specifications
Saab 900, 1979 year models

Dimensions and weights

OUTSIDE DIMENSIONS

Overall length including bumpers	4764 mm	(187.6 in)
Wheelbase	2525 mm	(99.4 in)
Front overhang	1050 mm	(41.3 in)
Rear overhang	1189 mm	(46.8 in)
Overall width	1690 mm	(66.5 in)
Track, front, all except 3-door Turbo	1420 mm	(55.9 in)
Track, front, 3-door Turbo	1430 mm	(56.3 in)
Track, rear, all except 3-door Turbo	1430 mm	(56.3 in)
Track, rear, 3-door Turbo	1440 mm	(56.7 in)
Height (at curb weight)	1420 mm	(55.9 in)
Ground clearance (at curb weight on a flat surface)	150 mm	(5.9 in)
Clearance angle, front	18°	

INSIDE DIMENSIONS

Headroom between front seats and roof lining (SAE H61), cars without sun roof	955 mm	(37.6 in)
Headroom on cars with sun roof	934 mm	(36.7 in)
Headroom between back seat and roof lining (SAE H63) for the outer passengers [2]	956 mm	(37.7 in)
Headroom for the centre passenger [3]	975 mm	(38.4 in)
Width at shoulder height at the front (SAE W3), 3-door models	1328 mm	(52.3 in)
Width on 5-door models	1350 mm	(53.2 in)
Width at shoulder height at the rear (SAE W4), approx.	1355 mm	(53.4 in)
Width at hip height at the front (SAE W5), 3-door models	1233 mm	(48.7 in)
Width on 5-door models	1343 mm	(52.9 in)
Width at hip height at the rear (SAE W6), 3-door models	1296 mm	(51.0 in)
Width on 5-door models	1357 mm	(53.4 in)
Elbow room at the rear, 3-door models	1531 mm	(60.3 in)
Width on 5-door models	1427 mm	(56.2 in)
Max. effective legroom at the front to the accelerator pedal (SAE L34)	1047 mm	(41.3 in)
Effective legroom at the rear to the ankle joint centre (SAE L51)	929 mm	(36.6 in)

[2] The specified dimension applies to GL models. The corresponding dimension on the EMS and 3-door Turbo is 950 mm (37.4 in) and on the GLE and 5-door Turbo, 945 mm (37.2 in).

[3] The specified dimension applies to the 3-door GL. Corresponding dimensions on other models: 970 mm (38.2 in) on the EMS and 3-door Turbo, and 962 mm (37.9 in) on the GLE and 5-door Turbo.

LUGGAGE COMPARTMENT SPACE

Length of luggage compartment floor (SAE L203)	1117 mm	(44.0 in)
Length with the back seat folded down	1821 mm	(71.7 in)
Total volume of the luggage compartment	600 dm³	(21.2 ft³)
Luggage compartment capacity (SAE V1)	350 dm³	(12.4 ft³)
Capacity with the parcel shelf removed	435 dm³	(15.4 ft³)
Total load-carrying volume with back seat folded	1500 dm³	(53 ft³)
Extra space below the luggage compartment floor	90 dm³	(3.2 ft³)
Load volume index (SAE V3), approx.	1550	
Height of the rear door opening (vertical)	795 mm	(31.3 in)
Height from the ground to the bottom edge of the rear door opening, approx.	530 mm	(20.9 in)
Width of luggage compartment floor between wheel housings (SAE W201)	991 mm	(39.0 in)
Width of luggage compartment opening at floor level (SAE W203)	907 mm	(35.7 in)
Width at waist level (SAE W204)	1062 mm	(41.8 in)

WEIGHTS

Curb weights

— 3-door GLi	2685 lb.	(1220 kg)
— 3-door EMS	2730 lb.	(1240 kg)
— 5-door GLE	2775 lb.	(1260 kg)
— 3-door Turbo	2775 lb.	(1260 kg)
— 5-door Turbo	2885 lb.	(1310 kg)

Note: The specified curb weights are applicable to the lightest variants. Add about (44 lb) (20 kg) for sun roof or automatic transmission. The sun roof and automatic transmission together increase the weight by 77 — 88 lb (35 — 40 kg).

Gross vehicle weight rating	3830 lb.	(1740 kg)
Weight distribution, percentage of curb weight resting on the front wheels	57.7 — 60 %	
Recommended maximum weight of load in expanded luggage compartment	480 lb.	(220 kg)

The total load-carrying capacity is always at least 950 lb (430 kg), which corresponds to 5 persons each weighing 150 lb (70 kg) + 175 lb (80 kg) of luggage. For every decrease in the number of passengers in the back seat by 1 person, the load can be increased by 65 lb (30 kg).

Highest permissible weight of trailer without brakes	1000 lb.	(450 kg)
Highest permissible load on the roof	220 lb.	(100 kg)

Motor

ALL VERSIONS

In-line, four-stroke, water-cooled gasoline engine.
Overhead chain-driven camshaft.

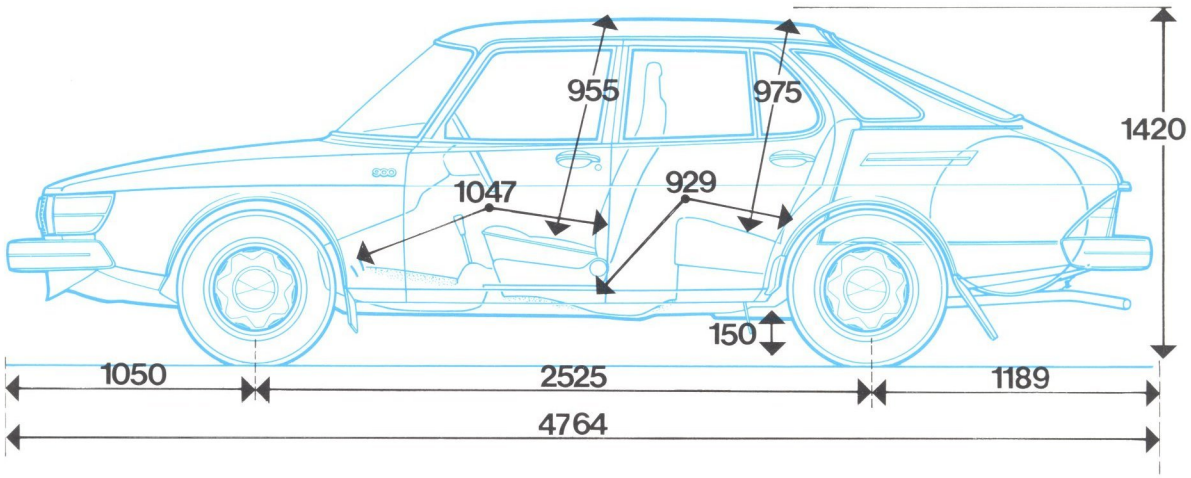
Number of cylinders	4
Cylinder bore	90 mm (3.54 in)
Piston stroke	78 mm (3.07 in)
Displacement	1.985 dm³ (121 cu in)
Mean piston speed at 5000 rpm	13.0 m/s (42.7 ft/sec)

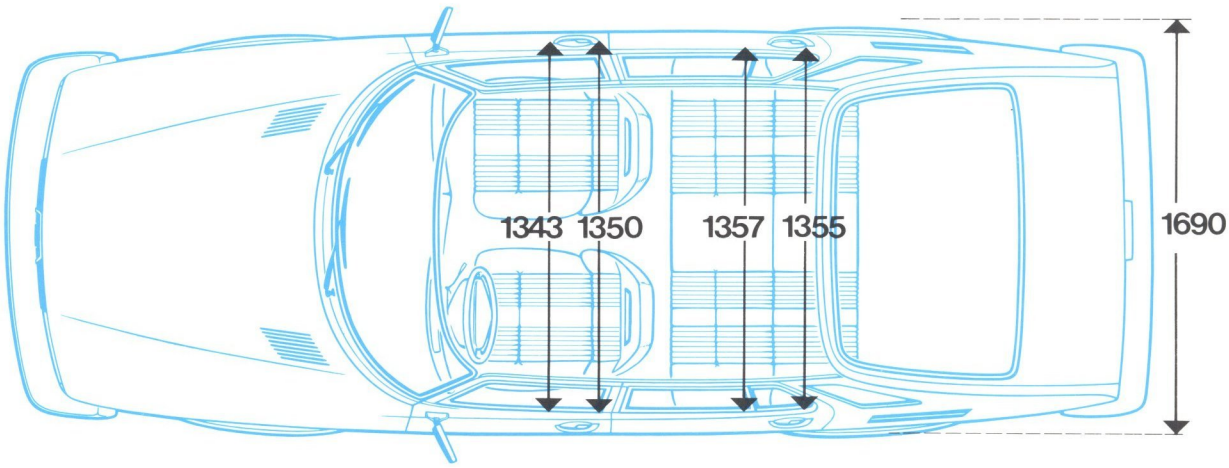
The engine is mounted in the longtitudinal direction of the car, with the clutch end facing forward and the cylinders inclined at 45° to the right. From the clutch, power is transmitted by means of a primary chain drive to the gearbox located below the engine. The cylinder block is made of a special alloy cast iron, whereas the cylinder head is a light alloy casting. The crankshaft is forged and is supported by 5 main bearings with replaceable bearing shells. The camshaft is a special casting and is also supported by 5 bearings.

The intake and exhaust ports in the cylinder head are arranged in a cross-flow pattern. The pistons are made of light alloy.

The crankshaft drives an auxiliaries shaft which, in turn, drives the oil pump, water pump, ignition distributor and, on carburetter engines, also the fuel pump. Lubrication is by oil circulation under pressure and the lubrication system incorporates a full-flow oil filter. Closed-circuit crankcase ventilation.

Lubricating oil capacity, including filter	3.5 l (3.7 U.S. qts)
Lubricating oil capacity, including filter and oil cooler	4.0 l (4.3 U.S. qts)





FUEL INJECTION ENGINES (EXCLUDING THE TURBO)

a) Cars for the U.S.A. federal region

Engine for all models of the 900 GL, EMS and GLE

Compression ratio	9.2:1
Rating, SAE net (approx corresponding to DIN	85 kW (115 hp) at 5500 rpm
Peak torque, DIN	167 Nm (123 ft. lbs.) at 3500 rpm
Fuel injection system	Bosch CI (Continuous Injection)
Recommended octane number	94 RON (Research Octane Number)
Ignition timing	20° before TDC at 2000 rpm
Breakerless ignition system	
Emission control equipment	Vacuum-controlled deceleration valve, two-stage EGR (Exhaust Gas Recirculation) " pulse-air" injection, timing advance delay valve

No cooler for the engine oil

b) Cars for California and certain high altitude areas in the U.S.A

Engine for all Saab 900 models with California specification — excl the Turbo models.

Compression ratio	8.7:1
Rating, SAE net	81 kW (110 hp) at 5500 rpm
Peak torque, SAE net	161 Nm (119 ft. lbs.) at 3500 rpm
Fuel injection system	Bosch CI
Fuel	Lead-free fuel 91 RON
Ignition timing	20° before TDC at 2000 rpm
Breakerless ignition system	
Emission control equipment	Vacuum-controlled deceleration valve, Lambda System and catalyst.

No cooler for the engine oil

c) Cars for the Canadian market

Basic engine for EMS and GLE models to Canada

Compression ratio	9.2:1
Rating, DIN	87 kW (118 hp) at 5500 rpm
Peak torque, DIN	167 Nm (123 ft. lbs.) at 3700 rpm
Top speed, approx.	EMS 176 km/h, GLE 171 km/h
Acceleration 0 → 100 km/h, approx.	EMS 12.2 s, GLE 13.8 s
Fuel injection system	Bosch CI (Continuous Injection)
Recommended octane number	97 RON (Research Octane Number)
Position of piston on firing:	
— Cars with manual gearbox	20° before TDC at 2000 rpm
— Cars with autom. transmission	23° before TDC at 2000 rpm
Exhaust gas emission control equipment:	
— Cars with manual gearbox	Vacuum-controlled deceleration valve, timing advance delay valve
— Cars with autom. transmission	Vacuum-controlled deceleration valve, two-stage EGR (Exhaust Gas Recirculation)

TURBOCHARGED ENGINE WITH FUEL INJECTION

a) Cars delivered to the U.S.A. and Canada

Compression ratio	7.2:1
Rating, SAE net	100 kW (135 hp) at 5000 rpm
Peak torque, SAE net	217 Nm (160 ft. lbs.) at 3500 rpm
Top speed, approx.	111 mph (195 km/h)
Acceleration 0 — 100 km/h, (62 mph) approx.	8.9 s
Charging pressure	0.5 ±0.05 bar at 3000 rpm
Turbocharger manufacturer	Garret AiResearch
Charging pressure controller manufacturer	Saab-Scania AB
Fuel injection system	Bosch CI
Fuel	Lead-free fuel with octane number of 91 RON
Firing point	20° before TDC at 2000 rpm
Emission control equipment	Speed-controlled deceleration valve, Lambda system and catalyst, breakerless ignition system.

Fuel system

For particulars of the fuel injection equipment and fuel recommendations, see the particulars for the appropriate engine.
The fuel tank is located between the rear wheels. Cars with fuel injection engines are equipped with a sheet steel fuel tank with a capacity of 55 dm^3 (14.5 U.S. gal).
A vent line runs from the fuel tank, along the edge of the roof and the left-hand windscreen pillar and down to a point behind the front wheel. On cars for the U.S.A. and Canada, the fuel system is completely closed. The vent line is connected to the engine air intake via a carbon canister. Cars with fuel injection engines are equipped with an electric fuel pump located inside the fuel tank.

U.S. EPA estimated mpg

U.S.A. Federal	
— manual transmission	19
— automatic transmission	17
California/High altitudes	
— manual transmission	21
— automatic transmission	20
900 Turbo	19

The estimated mpg is to be used to compare with other cars. Your own mileage may be poorer depending upon options, driving conditions, your driving habits and your car's operating condition.

Cooling system

Cooling system of pressurised type. Two-row, cross-flow radiator and separate expansion tank. The thermostat opens at 190°F (+ 88°C).
Coolant volume, including heating system: 8.0 dm^3 (14 pints).
Electric motor driven cooling fan. Thermostatically controlled, 150 W motor.
The cooling fan will run for a while after the ignition has been cut if the engine temperature should be high. An extra cooling fan is fitted on cars delivered to hot regions.
On cars with automatic transmission a special thermostat switches off the AC unit providing the coolant temperature should exeed 244°F (118°C).

Power transmission

The gearbox with the final drive and differential is located below the engine and is integrated with the engine. Power is transmitted from the clutch to the gearbox by means of a primary chain drive. The front wheels are driven. The outer drive-shaft universal joints are of the Rzeppa constant-velocity type and all universal joints are permanently lubricated.

MANUAL GEARBOX

Single dry plate clutch with flexible hub, of Borg & Beck manufacture. The clutch is actuated by a hydraulic system. Primary drive by duplex chain.
Ratio of primary drive: 1.00:1 (0.90:1 on the Turbo)
The gearbox is fully synchromesh and has four forward gears.
Oil capacity of the gearbox: 3.0 l (5.2 pints)

Overall ratios between engine and driven wheels:	GLi and EMS	Turbo
— Bottom gear	12.94:1	11.87:1
— 2nd gear	7.80:1	7.16:1
— 3rd gear	5.23:1	4.80:1
— Top gear	3.76:1	3.26:1
— Reverse gear	14.23:1	13.06:1

Ratio of final drive: 3.89:1

Theoretical road speed in top gear at 1000 r/min of the crankshaft:

— GLi	31.3 km/h (19.9 mph)
— GLE	—
— EMS	30.6 km/h (19.0 mph)
— Turbo 3-doors	34.1 km/h (21.2 mph)
— Turbo 5-doors	34.3 km/h (21.3 mph)

AUTOMATIC TRANSMISSION

The engine drives the automatic transmission through a hydraulic torque converter. The torque multiplication varies between 2.3:1 and 1:1.
Chain transmission between the torque converter and the automatic transmission. Ratio: 0.97:1
The automatic transmission is of Borg-Warner manufacture and has three forward ratios.
Selector lever settings: P, R, N, D, 2, 1.
Oil capacity of the automatic transmission: 8 litres

Ratios in the automatic transmission:

— Bottom ratio	2.39:1
— 2nd ratio	1.45:1
— Top ratio	1:1
— Reverse	2.09:1
Ratio of final drive:	3.89:1 (9.35).

Torque multiplication from engine to driven wheels:
— D 17.29 — 3.79
— 2 17.29 — 5.49
— 1 17.29 — 9.04
— R 15.13 — 7.92

Changing up speeds	Bottom → 2nd	2nd → Top
— Full throttle, km/h	approx. 50	approx. 80
— Kick-down, km/h	approx. 65	approx. 110

Changing down speeds	Top → 2nd	2nd → Bottom
— Full throttle, km/h	—	—
— Kick-down, km/h	approx. 95	approx. 45

The contents of this publication are based on the 1979 models of the Saab 900. However, the technical specifications, equipment, etc. may be modified in the course of the model year or when a new annual model is introduced. Current information is available from your nearest Saab dealer.

Brakes

Dual-circuit hydraulic foot brake system with vacuum servo.
The servo unit reduces the necessary pedal effort by an average of about 40 %. The left-hand front wheel and the right-hand rear wheel are actuated by one brake circuit and the diagonally opposite pair of wheels by the other circuit.
Self-adjusting disc brakes all round.
The handbrake and foot brake actuate the same brake pads at the front. The handbrake is mechanical and self-adjusting.
The outer front brake linings are of the semi-metallic type.

Brake disc diameters	
— front wheels	280 mm (11 in)
— rear wheels	270 mm (10.6 in)
Brake pad friction areas	
— front wheels	148 cm^2 (22.9 in^2)
— rear wheels	80 cm^2 (12.4 in^2)
Brake servo diameter:	9"
Braking effort distribution:	approx. 80 % on the front wheels.

Wheel suspension, springing

Transverse wishbones at the front.
Coil springs and hydraulic, telescopic shock absorbers at the front and rear. All shock absorbers are double-acting.
The front springs are pivot-mounted and are located between the upper wishbones and the top locating points in the wheel housings.
The front shock absorbers are accuated by the lower wishbones.
The EMS and Turbo models are equipped with gas shock absorbers all round.
Lightweight, rigid rear axle guided by two forward-facing and two rearward-facing links and a Panhard rod.
The rear springs and shock absorbers are actuated by the forward-facing, low-level links.

Total spring travel	
— at the front	160 mm (6.5 in)
— at the rear	180 mm (7.1 in)
Maximum strokes of the shock absorbers (as fitted)	
— at the front	91 mm (3.6 in)
— at the rear	158 mm (6.2 in)

Steering

Steering gear of the rack-and-pinion type. Nominal ratio: 20:1.
4.21 steering wheel turns lock-to-lock. (3.65 on cars with power-assisted steering).
The EMS has a manual steering gear with 3.51 steering wheel turns lock-to-lock.
Turning circle diameter: 10.3 m (33.8 ft) between curbs.

Wheels and tyres

All Saab 900 models have disc wheels with radial ventilation holes.
The EMS and Turbo models have cast aluminium wheels of special design.

Wheel sizes	
— all models excl. Turbo	5J × 15" FHA
— 3-door Turbo	5 1/2 J × 15" H2
— 5-door Turbo	135 TR × 390 FH

The GL and GLE have tubeless radial-ply 165 SR15 tyres.
The EMS has low-profile 175/70 HR15 tyres.
The 3-door Turbo is equipped with Pirelli P6 low-profile 195/60 HR15 tyres, whereas the 5-door Turbo is fitted with Michelin 180/65 HR-390 TRX tyres.

Electrical system

Battery: 12 V, 60 Ah. Maintenance-free
Alternator with integral voltage regulator.

Maximum charging current/ voltage of the alternator:	70A/14V
Starter motor:	1.1 hp DIN (0.8 kW)
Distributor points gap:	0.4 mm

Breakerless electronic ignition system on all models.
Firing sequence: 1 — 3 — 4 — 2.
Spark plugs with 18 mm thread lengths, M 14 thread and 0.6 — 0.7 mm electrode gap.
Number of fuses:

— 5A	4
— 8A	13
— 16A	4
— 25A	1

Engineering Features
Saab 900, 1979 model range

For internal use only

SAAB-SCANIA

Saab Car Division
Advertising, SP and Training
NYKÖPING, Sweden

202556 awj-tryck Nyköping. 3.79