Saab 99 L, 99 LE and 99 EMS Engineering Features.

Contents

Models and colors for 1973.

The 1973 Saab 99L, LE and EMS models are offered in a total of seven different basic models with varying combinations of engines and transmissions and different body designs for the American market.
All cars are equipped with the new, Swedish-built 2-liter (122 cubic inches) engine, indicated by the "2.0" next to the model designation L, LE, LE Automatic or EMS to the right of the trunk. L indicates "de luxe" and E indicates "electronic fuel injection". The last two letters in the EMS designation mean that the car is provided with a manual transmission and certain special equipment. The V4 models Saab 95, 96 and Sonett III and the basic model "Saab 99" are not described in this brochure.

Models
(Engine power given in SAE net value)

Saab 99 L, 2-door sedan
2.0-liter carburetor engine, 95 hp.
4-speed manual transmission.

Saab 99 L, 4-door sedan
2.0-liter carburetor engine, 95 hp.
4-speed manual transmission.

Saab 99 LE, 2-door sedan
2.0-liter fuel injection engine, 110 hp.
4-speed manual transmission.

Saab 99 LE, 4-door sedan
2.0-liter fuel injection engine, 110 hp.
4-speed manual transmission.

Saab 99 LE Automatic, 2-door sedan
2.0-liter fuel injection engine, 110 hp.
3-speed automatic transmission.

Saab 99 LE Automatic, 4-door sedan
2.0-liter fuel injection engine, 110 hp.
3-speed automatic transmission.

Saab 99 EMS
2.0-liter fuel injection engine, 110 hp.
4-speed manual transmission.

2.0 L
2.0 LE
2.0 LE Automatic

Saab 99 L, 2-door

2.0 L
2.0 LE
2.0 LE Automatic

Saab 99 L, 4-door

2.0 EMS

Saab 99 EMS

Color	Upholstery	99 L, 99 LE 2- and 4-door	99 LE Automatic 2- and 4-door	99 EMS
Polar white	Green	●	●	
Brilliant yellow	Green	●	●	●
Verona green	Green	●	●	
Toreador red	Red	●	●	
Amber yellow	Brown	●	●	
Caroline blue	Brown	●	●	
Black	Brown	●	●	
Sepia metallic	Brown	●	●	
Coral metallic	Brown			●

Brilliant yellow, Caroline blue and Sepia metallic are new for 1973.
Only a limited number of black cars are produced.

Saab 99, from idea to reality.

When guidelines for the Saab 99 project — or Gudmund, as its code name was — were drawn up, the design team had a very clear idea of the characteristics that the new car should possess in order to compete seriously for a prominent position in the market.
No speculation in fashionable or way-out styling was considered at all. This would have been far too chancy and would not give future owners anything of real value. Instead, common sense ruled the day and it was agreed to make the Saab 99 as good a car as possible.
Since Saab had no intention of departing from its fundamental design philosophy, there was no question whatsoever that the car would have front-wheel drive. It was equally certain that the fuel tank would be located between the rear wheels.

One absolute requirement was that the car should perform with a high degree of safety and be designed to cope with severe winter conditions without difficulty. It should also provide a good standard of comfort for the occupants. The lines of the car had to feature low drag coefficient and insensitivity to cross winds. And it should have a roomy interior in spite of compact exterior dimensions. Performance was to be good and roadholding excellent.
Part of the design plan was that the engineers were to take into consideration all factors affecting running costs. The car should be easy to service and economical in operation from every aspect.

Approximately 400,000 man-hours of development work by design engineers had already been put into the new car when it was presented to the public for the first time in November 1967 and assigned the designation Saab 99. By this time the styling of the car had long since been all but finalized. But it was still about one year away from full-scale production. This was because Saab wanted to make absolutely sure that the product came up to all expectations. One of the ways in which this was done was to allow a number of people in various parts of Sweden to have a pre-production Saab 99 for approximately six months on the condition that they advised the factory in Trollhättan of all their opinions and experiences. While the Testing Department collected data from rugged test driving — both on the road and in the laboratory — information was received from motorists with varying driving habits and standards.
When the Saab 99 made its first appearance on the market — after development work that had lasted for ten years — a great deal was expected of it by the motoring public and the press. Much had already been written about the new, larger Saab model and journalists were eager to test it on the road in order to see whether the newcomer was really worth all the acclaim it had already received.

Overall opinion in the press was extremely favorable. The Saab 99 was correctly conceived and properly built. It inspired confidence and had a charm of its own. Points receiving particular mention were its roominess and good roadholding characteristics, seating comfort and the highly developed heating system. Brakes, suspension, controls, directional stability in strong cross winds, low wind noise at high speed and modern engine design were also highly-praised. And all agreed that the Saab 99 must surely be one of the world's most advanced cars from a safety aspect.

A car which has earned more than its share of honors and distinctions

This is how the sub-heading to a Saab 99 test report in the April, 1970 issue of **Car and Driver** magazine read: "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 transport problem".
Quote from the August 21, 1971 issue of the English magazine **Motor:** "Saab obviously thought hard about all the conflicting factors in design and managed to reconcile them all in a pleasing whole."
From the magazine **CAR,** in its November 1971 issue: "Most of the world's manufactures would do well to look at the 99 and take note."
Teknikens Värld, Sweden's largest popular technical magazine, selected the Saab 99 as their "Car of the year" for 1972. In justifying their choice, the jury wrote: "The selection of the Saab 99 as the 1972 "Car of the year" is a way of rewarding the features which place this car in a special class on the world market. An already good quality Swedish car has become even better and provides an example of what can be done if the will exists."
When Great Britain's most coveted annual award for automobile safety — the Don Safety Trophy — was presented for the seventh time in 1972, it went fo the first time to a non-British car — the Saab 99.
The German magazine **Hobby** gave its 1972 "Oscar" for automobile safety (ir the 1.5—2.0 liter class) to the Saab 99.
Popular Science Magazine has selected the Saab 99 and four other cars as "Cars of the future". In giving the reason for their choice, the editors remarked that "each and every one of the chosen cars boasts design features which can be expected to be standard equipment on the cars of the future."

Better and better year by year.

1969 During its first year of production, the Saab 99 was manufactured in only one model — a two-door sedan with a 1.7 liter engine and a manual four-speed transmission. The engine rating was 80 horsepower (SAE, net).
There were six colors to choose between: Hussar Blue, Silver Sand, Sea Green, Toreador Red, Polar White and Black. The interior came in grey, red or black.

1970 The 1970 model offered the choice between a 80 hp carbureted engine with a manual transmission and an 87 hp fuel-injected engine.
In the middle of the year (spring 1970), the Saab 99 4-door sedan was introduced on certain European markets. Hussar Blue was replaced by Medium Blue and Savanna Beige was offered as a seventh choice. The doors had new upholstery. The interior was offered in brown, blue, red or black.
Among the miscellaneous innovations were: new universal joints, new engine mounting, standard clock and cigarette lighter, exhaust system of aluminized sheet, improved rear window defroster, rear-view mirror light, warning light for withdrawn choke control, reflector on the left door, a panel under the dash, switch on the console for interior lighting, new gas tank cap, two rear ashtrays.

1971. The 1.85 liter engine — with 86 hp in the carbureted model and 95 hp in the fuel-injected model — was introduced as an alternative to the 1.7 liter engine.
Headlight wipers and washers were introduced on models with rectangular headlights — another Saab first!
Application of the primer coat is made with Electrodip methods.
A completely new instrument panel.
Improved fresh-air ventilation.
New colors: Silver Mink and Tyrol Green. (Silver Sand and Sea Green were dropped).
Other innovations in brief: More powerful brake power assist, extra air vent under the main grille, new location of the cooling system expansion tank, new defrosting vent for the front side windows, improved evacuation system for air circulation, non-dazzle exterior rear-view mirrors, interior rear-view mirror adjustable to eliminate dazzle, new parking brake lever, attachment for automatic seat belts, tires with depth-of-profile indicators, new interior trim under the side windows, new rear grab handles on the 2-door model.

1972 Saab became the first automobile in the world to come equipped with an electrically heated driver's seat as a standard feature — and the 99 was the first with impact-absorbing bumpers. In addition, the 1972 model came with new wheels (which reduce the risk of getting dirt in the brake system), harder brake linings, heavier-duty springs, more powerful radiator fan motor, radiator moved further forward, improved selector switches for turn signals and windshield wipers/washer and a simplified electrical system.
The colors Silver Mink and Savanna Beige were dropped from the program and replaced by Verona Green and Amber Yellow. The interior came in three colors: green, brown and red.
From the beginning of 1972, the 1.85 liter engine was standard on all 99's.
Soon afterwards, a new manual transmission was introduced.
Automatic seat belts with indicator lights on the top of the instrument panel for the driver and front-seat passenger became standard in 1972.
The 99 EMS was introduced on the European market — a special model with the new Swedish 2 liter 110 hp engine. Electronic fuel injection was standard, as well as metallic finish.

Innovations on the 1973 models

The 1973 models look different from their predecessors because of the new, matte black grille. You can also see the difference in the new model names and numbers and perhaps in the color, since three new shades have been introducced, including one metallic (see page 3).
The range of engines and transmissions has also been changed. The new Swedish 2 liter engine is standard on all 99 models sold in the United States.
A few technical features were altered in the power unit: The generator was moved to a position above the engine, the blades on the radiator fan were lengthened, a new fan housing was introduced, and the gear ratios were changed.
The following innovations were made in the interests of comfort or safety: Strong beams in the doors, easier steering, pivot-mounted front springs, higher-quality windshield wipers, extra padding on windshield posts, side posts and rear corner posts, headliner of molded fiberglass with molded, thicker carpeting, sun visors with black backs, easier-to-read instruments with yellow-orange indicators, child-proof locks on the rear doors of the 4-door model.
Some other new features: The front bumper moved forward about one inch, upholstery of fire-resistant material, new gear ratios in the manual transmission introduced during the model year, new location of the horn, continuously variable instrument illumination (rheostat), new pump and fluid container for the windshield washer, hub caps with new Saab logo.
The Saab 99 EMS comes equipped with steel-belted radial tires, mag-type wheels, a leather-covered padded steering wheel, a tachometer and clock, a special grille, black racing stripes and color-coordinated racing mirrors. Metallic Cooper Coral paint is available as an extra cost option.

The air resistance must not be neglected.

When driven at a steady speed on level roads the power of the car is balanced against rolling resistance (friction) and air resistance. If the throttle opening is reduced its speed will drop. If it is increased, the car will accelerate until the balance is again restored.
As long as speed is moderate and it isn't windy, the power required is quite small. At 40 miles per hour, for instance, air resistance for an average medium-sized car is approximately 30—40 lb, and requires approximately 5 hp to overcome. But at 100 miles per hour it will be found that air resistance absorbs as much as 60 hp. Headwinds, and to an even higher degree cross winds, naturally increase the power required and affect fuel consumption.
Measurements show that between 15 and 20 hp extra, and approximately 1 gallon of fuel more for every 50 miles, are required if strong cross winds are blowing when the car is driven at 70 miles per hour.
Since power at the driving wheels is always appreciably less than that developed by the engine alone — the drive train absorbs a considerable proportion — a very large part of the available horsepower is expended in overcoming air resistance at high road speeds.

Auto manufacturers can alter two things in order to reduce drag: the shape of the car, and its size.
It was already laid down in the initial directive to the designers that the Saab 99 was to be a roomy car. Even if width and height were to be kept close to what from a technical viewpoint was a minimum with regard to the necessary internal dimensions, they could not be especially small. In fact, the Saab 99 is found to be surprisingly spacious by those who ride in it for the first time after only having seen it from the outside. And still it gives the impression of being a wide car.
Then there is the actual styling of the car. Its shape from an aerodynamic point of view.
As a measure of how favorable a particular shape is from the viewpoint of air resistance, its coefficient of drag is often given. This, which is fairly independent of the size of the object (the car), is in the region of between 0.32 and 0.50 for modern cars. (Cars of the twenties had a drag coefficient in the region of 0.7). Total air resistance in the direction of travel — tangential force — can be calculated for any speed if the drag coefficient, the cross sectional area of the car and the density of the air are known. Windless conditions are assumed.

Early areodynamic testing of the Saab 99 showed that the coefficient of drag was as low as 0.36. The model (Fig. B) used in these tests was made to a scale of 1:5 and its shape was practically indentical to the present-day car in volume production.
Certain modifications, naturally, were carried out before production prototypes were built, but not so much that drag was increased to any appreciable extent. A realistic estimate of the coefficient of drag for the current model is approximately 0.37.
To give an example of what this means in reality, the Saab 99 LE or EMS must produce 3.3 hp at the driving wheels in order to overcome air resistance when driven at 40 miles per hour under windless conditions. 11.1 horsepower is required at 60 miles per hour, 26.3 hp at 80 miles per hour and approximately 51.4 hp at 100 miles per hour. If the drag coefficient were 0.45 the corresponding horsepower required would be 4.0, 13.5, 32.0 and 62.5 respectively.

The Saab 99 has been designed and styled to hold its course under all driving conditions — even in gusty cross winds. The so-called yawing moment is small, which is partly due to the fact that the car is nose heavy with a low frontal area but has comparatively large side surface areas at the rear. The total effect of cross winds and aerodynamic forces acting on the car strike it roughly as though directed against a vertical line passing through the center of gravity. The design of the rear window and trunk lid, as well as the transition between side panels and rear sections are of significance for the unusually good directional stability of the car in windy conditions (Fig. E).
During wind tunnel tests it was discovered that lifting forces were extremely small — and negative — when air was directed at the front. Instead of leading to a reduction in wheel pressure on the ground due to low pressure in certain zones, the rear wheels of the Saab 99 models exert slightly more pressure on the road.
Under conditions of cross winds certain lifting forces do arise but these are so small as to be negligible.

Before body shape was finalized, such important things as the dispersion of exhaust gases behind the car at different locations of the exhaust pipe were investigated as well as the extent to which the rear window displayed a tendency to become dirty when alternative design details for the bodywork, bumpers, etc. were employed. The most suitable location of the outlets for the flow-through ventilation system were arrived at after extensive experimentation.

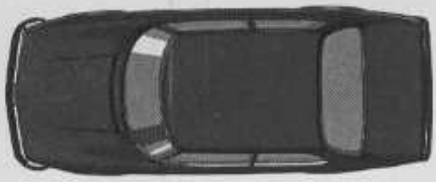
Owing to the steeply curved windscreen and the absence of sharp corners on the body to create turbulence, wind noise in the car is unusually low.

Fig. A. If you look at the Saab 99 LE from above you notice its resemblance to true sport cars.

Fig. B. This 1:5 scale model was one of several body styles tested in wind tunnels.

Fig. C. The diagram shows how the air drag coefficient varies with the resulting angle of speed and cross winds. When the wind hits the car at an angle of 30° (β=30), the coefficient reaches its max. value. The dashed curve indicates another car tested.

A



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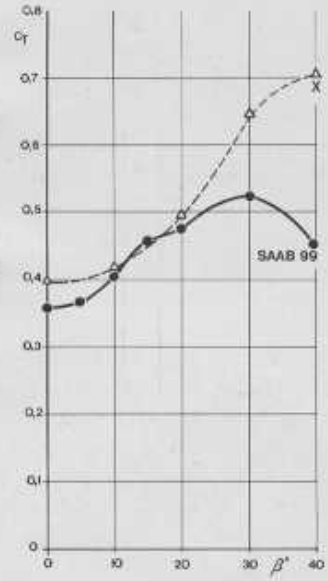
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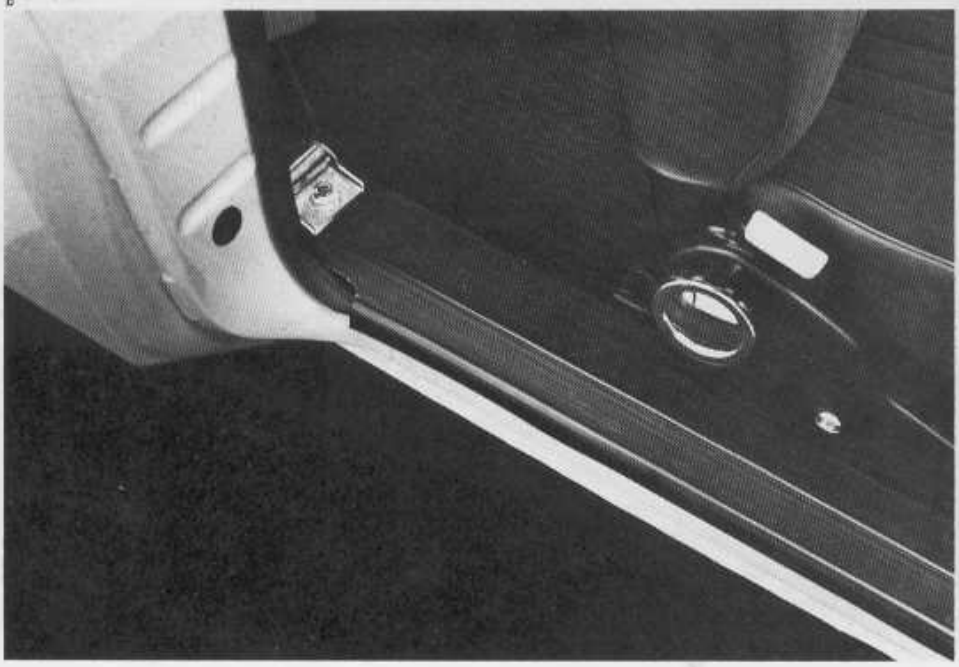
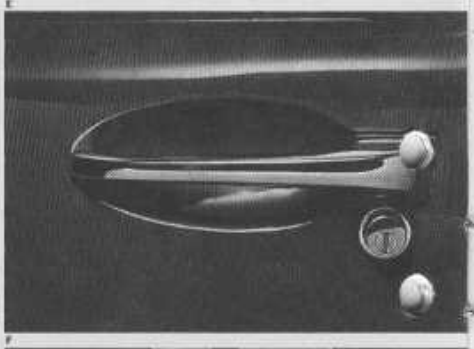
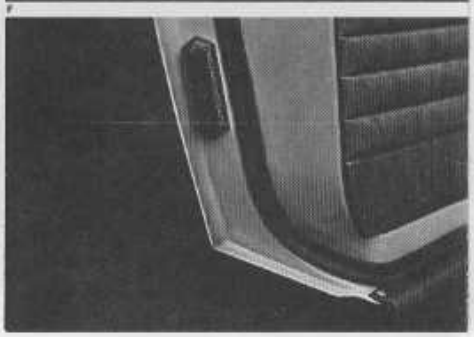






The exterior in close-up.

Merely by looking at the Saab 99 from the outside is it possible to conclude that it is a thoughtful design that must have certain distinctive characteristics. It does not take up a lot of unnecessary space on the road nor in a parking lot although it is roomy, both in the passenger compartment and the trunk. It has no sharp projecting corners, no "empty inches" of extra length just to look impressive or to provide space for a fashionable styling feature or two. The Saab 99 is compact. Look at the rear pillars. They are integral with the side panels — without a distinctive waistline to make the car look narrower at the top. Together with the generous track — 55.1 in. at the rear — it hints at roomy interior dimensions, particularly in the back seat. It goes almost without saying that a wide track also contributes to good roadholding.

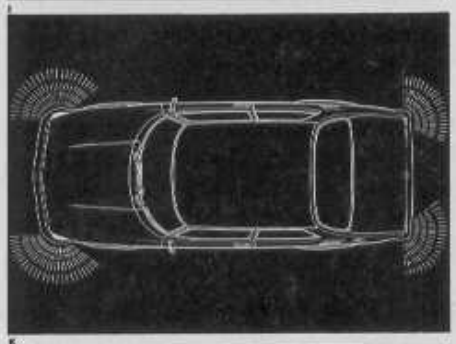
The smooth and clean-lined bodywork makes the car easy to wash and keep clean. The hub caps and other brightwork are all of stainless material. The radiator grille is made of resistant black nylon material. Chromium-plated molding of plastic are fitted round the wheel arches.

Getting in and out of the Saab 99 presents no problem. The door sills are low and located well in from the outside edge of the body-work (Fig. D). Since the sills are protected from splashing they do not dirty the clothes of occupants. The door contour of the four-door model follows the line of the rear seat contour. Comfortable. No sharp or awkward corners to present an obstacle on entry or egress. The outside handles are softly shaped and fitted across depressions in the doors so as not to project more than necessarily (Fig. E). Only one key is used for all locks on the car. Door edges on the left hand side are equipped with reflectors (Fig. F). The windshield of tough laminated glass, is deeply curved for reasons of safety and also to ensure low drag and minimum wind noise. The short and sloping hood affords good close-up forward visibility. Since the windshield pillars are located well back and "edged" towards the driver they appear slim and good side visibility is insured. Contributing to this is also the absence of front vent windows. Following modern practice, the door windows are all in one piece (Fig. B).

Since the hood is a one-piece pressing incorporating the upper part of the front fenders and hinges forward to a vertical position in front of the radiator grille (Fig. C), the engine compartment is readily accessible for service and maintenance. And there is no danger of the fenders getting scratched or oily after a visit to the garage.

Another detail showing how much thought has been given to the design of the car is that the mudflaps at the rear are located and directed so that they cannot be torn off, in the event that they get caught between the wheels and a curbstone, for instance. Regarding splash protection, look at the styling of the wheels. The ventilation holes are directed radially towards the rims so that rain and mud spashed up by other vehicles will not reach the brake discs.

On examining the exterior of the Saab 99 the careful observer cannot avoid noticing the high and clearly visible direction indicator lights and side marker lamps, the sturdy bumpers and the rear light clusters with their large all-in-one housing incorporating a back-up light. The bumpers are described in greater detail in the following pages. However, two things should be pointed out here: retaining holes for auxiliary lamps are located in the front bumper and strong towing hooks are fitted both front and rear (Fig. K, L).



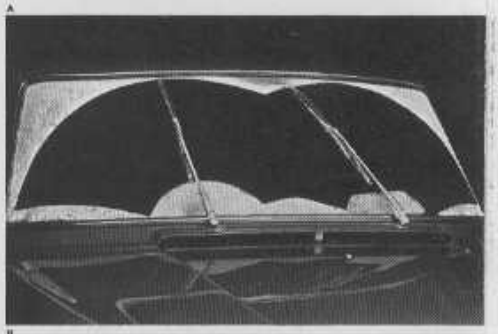
To see and to be seen.

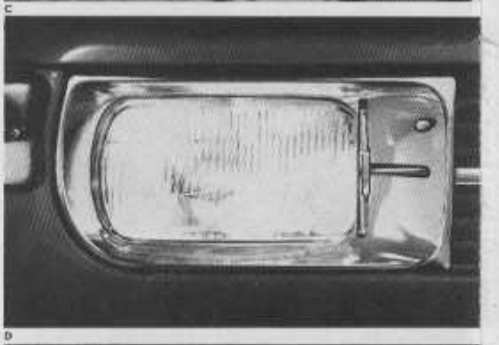
If you drive a Saab, you can see and be seen. Not only during the day and when the weather is beautiful. The car is designed for use in all seasons, in all kinds of weather and on all kinds of roads. Take a look at illustration A on this page. It shows a windshield covered with chalk before the wipers were turned on. As you can see, the wipers sweep over the entire width of the window and even tuch the bottom edge. This means that the windshield is kept clean from rain and snow — an important factor in good visibillity and driving safety.
The windshield wiper has two speeds and is operated simply by means of a lever at the steering wheel (Fig. B). The same lever also controls the washing of the windshield.

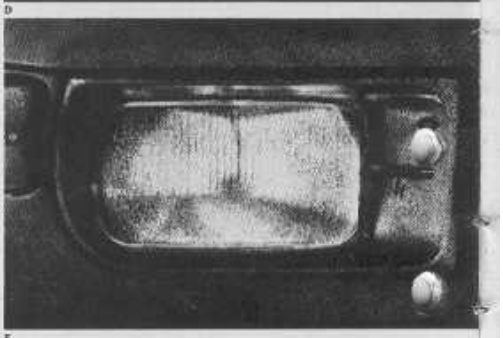
The deep-curve windshield, the lack of front ventilation windows (which impair good visibility) and the location of the windshield posts as far to the rear as possible are factors which contribute to good front and side visibility. The high-level rear-view mirror which can be adjusted to avoid dazzle and the two anti-dazzle treated side-view mirrors provide rear view. The powerful headlights, the high-level and clearly visible blinkers and side lights together with the automatic back-up lights also make it easy to see and to be seen well in traffic.

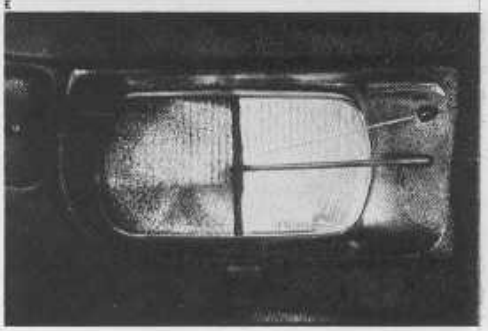
Scientific measurements have shown that light losses of more than 60 % are common after only a comparatively short period of driving in dense traffic and on wet roads. Dirty slush mixed with salt can almost completely obscure headlights. A 90 % loss of light has been recorded after only 5 miles of driving. Even in summer conditions headlights are liable to get dirty. Their light intensity may be reduced by 10 to 20 % during the course of an hour and a half of driving on dry asphalt roads. In an hour and a half on a busy gravel road the headlights may collect a layer of dust so thick that light intensity is reduced by half.

The problem of developing a suitable device for cleaning headlights while the car is in motion was tackeld by Saab engineers early as 1967. They set out to devise a mechanism that could remove wet and dry dirt, icy slush, salt sludge and snow from the headlight glass to such an extent that headlight light intensity would not be less than that prescribed in the UNECE regulations. In addition the wipers would have to last for at least 1.5 million working strokes — equal to approximately 75,000 miles of normal driving — at temperatures between —22°F and +104°F.
The system eventually developed satisfied these requirements completely and as a result Saab was the first manufacturer in the world to have what we call headlight wipers as standard equipment on the 1971 models in many markets. **Because rectangular headlights are not permitted by American law, headlight wipers are unfortunately not available in the United States.**









Impact absorbing bumpers.

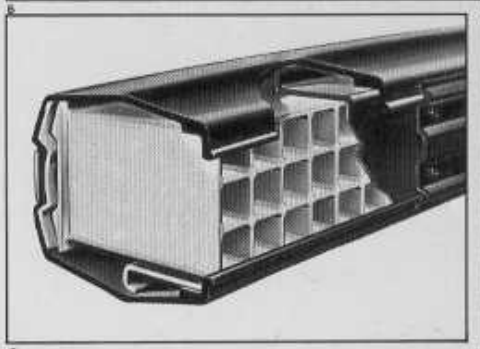
However carefully and considerately you drive you may still be hit by another car in rush-hour traffic. Or skid against another car on an icy road. Or bump against a post in a parking lot. Slight accidents of this kind may occur in many ways. And they often result in costly and annoying dents.

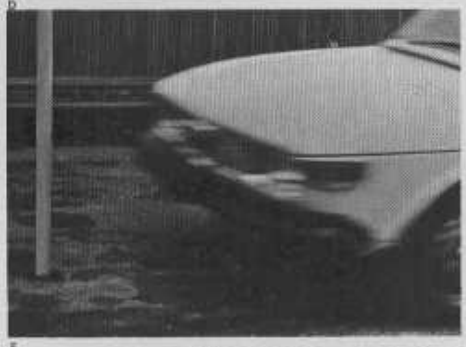
In the United States, where federal authorities and insurance companies have long been calling for better automobile bumpers, regulations have been issued which prescribe that all 1973 model cars sold in the United States should be capable of being driven against a hard barrier at a speed of five miles per hour without sustaining any damage to controls, headlights, direction indicators, etc. When reversing into the barrier the test speed is half, or 2½ miles per hour.

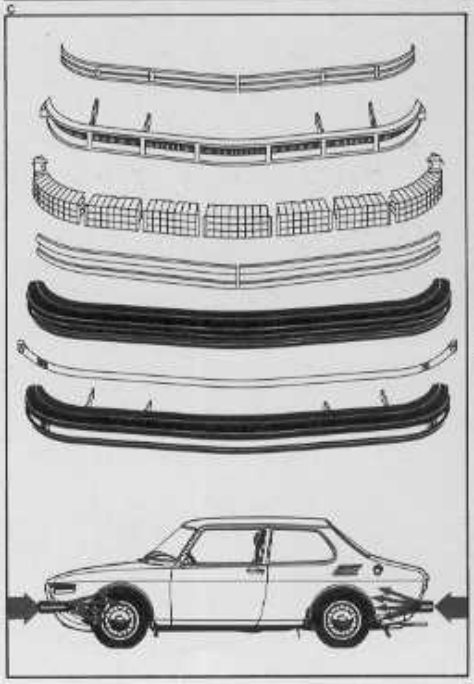
The speed limits may seem somewhat low, but the fact is that an ordinary car of an earlier model than 1973 does not come close to passing the test. In 1971, it would have cost 331 dollars to repair the damage on a normal car in the United States.

But the 1972 Saab 99 and, of course the 1973 99 can take such impacts, as shown by impartial tests conducted at the independent research institute at Cornell Aeronautical Laboratory. Saab's bumpers return to their original shape after an impression. In other words, they are self-repairing. The only thing that might require replacement, if you don't want the slightest mark to show, is the shiny steel rail, and perhaps a plastic block. But that would be simple as well as inexpensive.

Fig. B, C show the construction of the bumper. In front of a heavy-duty U-section steel beam is a compressible cellular block of plastic. When the bumper strikes an object the cellular block absorbs the energy by undergoing temporary deformation. When external pressure is removed, it regains its original shape. Heavy-duty beams and reinforcement in the bodywork ensure that the impact does not damage the car itself.







Interior and interior measurements.

The Saab gives a comfortable ride. The seats provide good lateral support and incorporate just the right degree of firmness in springing and upholstery. Since there is no drive shaft under the rear seat (because of front-wheel drive), the center passenger in the rear is also seated comfortably. The seat cushions are covered in nylon velour, a hard-wearing plush-like material (Fig. H), which is pleasant to the feel. This fabric "breathes" and does not get icy cold in winter nor burning hot in summer.

Seat edges, door sides and rear walls are trimmed with plastic simulated leather (Fig. I), which is color-coordinated with the velour and the new rugged carpet (Fig. K). The interior is offered in three alternative colors (see color chart on page 3).

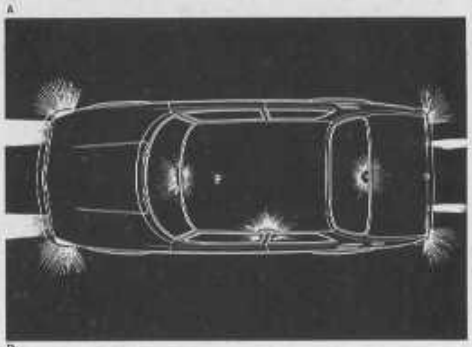
The head lining is new this year. It is made of energy-absorbing material and connects smoothly all around to the beams (Fig. C). It acts as insulation against rapid heating or cooling through the roof, and is upholstered in light, washable polyester velour. Seat belts at front are naturally of lap-and-diagonal type. Retractors for the lap belts are provided. All Saab 99 models are also equipped with two rear seat belts of lap type (retractors) and one rear center belt of lap type.

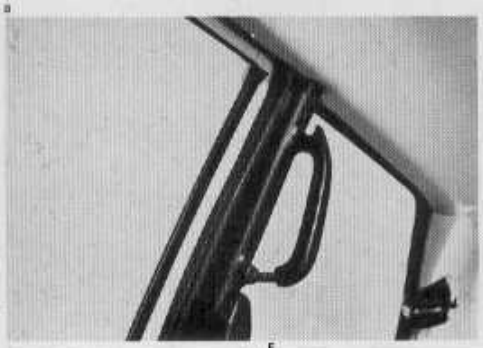
The dashboard consists of impact absorbing material (integral foam) over a frame of comparatively thin sheet metal. Safety padding is fitted to windshield pillars and door posts, around the upper edge of the roof and along the lower edge of the side windows, as well as in the sun visors, on the steering wheel hub and spokes and in the rear of the seat backrests. Armrests and grab handles are also made of resilient, impact-absorbing material.
The rear-view mirror can be dipped to avoid glare when driving at night and has a collapsible retaining bracket. Two interior lamps are fitted in the roof, one on the left and the other above the windshield. Both come on automatically when the door is opened as does the indirect lighting for the ignition lock. If the trunk is open a lamp inside lights up the interior (Fig. A).

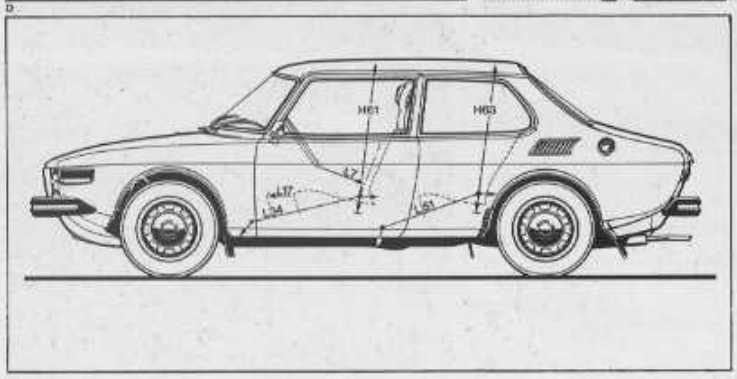
Internal dimensions, according to SAE 662 A measurement standards. Seats in lowest and rearmost position.

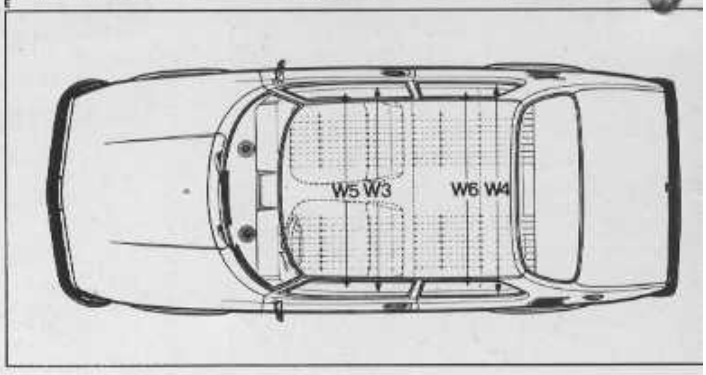
H 61	Effective headroom, front ..	38.4 in.
H 63	Effective headroom, rear ..	37.7 in.
L 34	Maximum effective leg room — accelerator	39.1 in.
L 51	Minimum effective leg room — rear	36.9 in.
L 7	Steering wheel torso clearance	13.1 in.
L 17	Fore and aft adjustment of front seats	6.3 in.
W 5	Hip room, front	51.9 in.
W 3	Shoulder room, front	53.5 in.
W 6	Hip room rear, two door ..	51.4 in.
	Hip room rear, four-door ..	52.4 in.
W 4	Sholder room rear, two-door	55.2 in.
	Shoulder room rear, four-door	52.7 in.

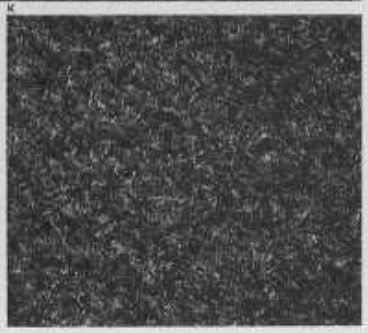
At elbow height the two-door model is 60.8 in. wide at the rear.











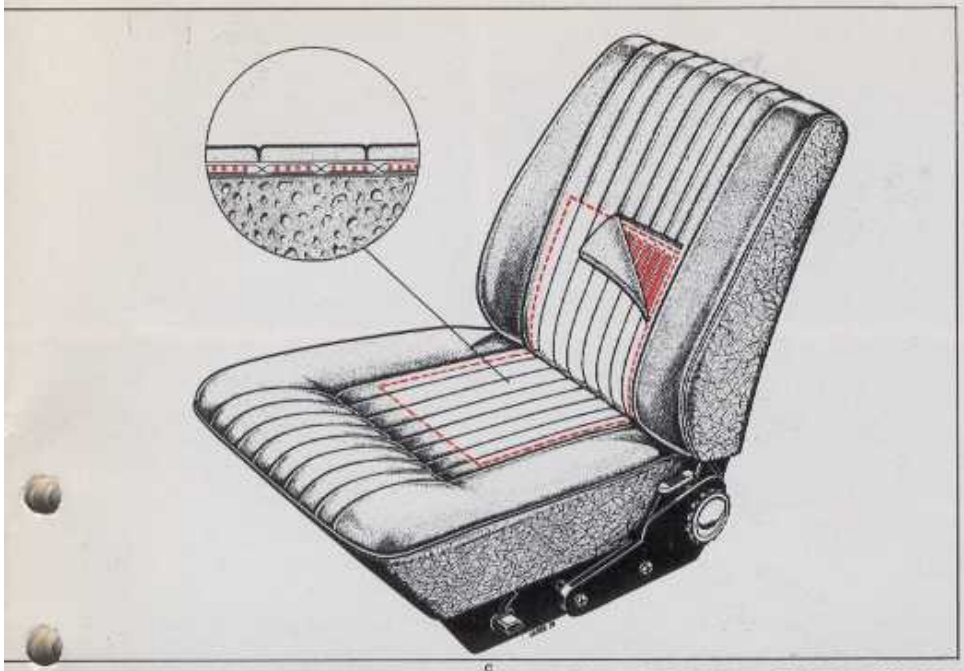
Adjustable seat.

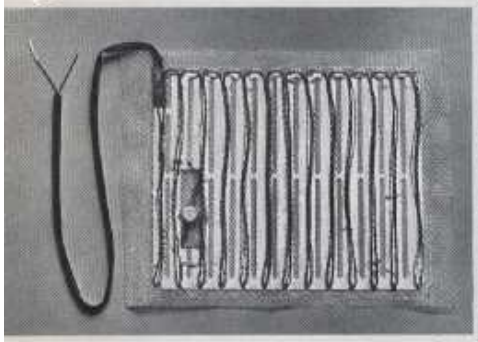
The driver must be able to change gear without obstruction and have complete freedom of movement in the true sense of the word. In addition, the driver should be able to select the seat adjustment suiting him best, regardless of how the front passenger prefers to sit. For this reason the Saab is equipped with separate front bucket seats (Fig. D).

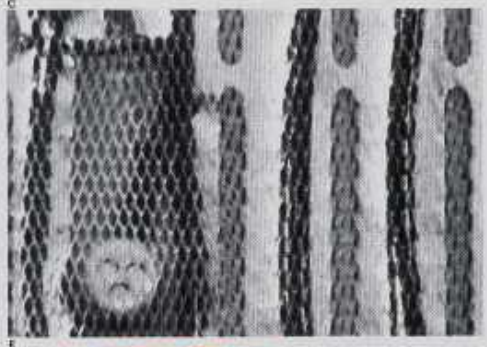
Backrest angle can be varied within two wide ranges. The first range, for driving, is between 17 and 45 degrees while the other, resting range adjusts to angles between 50 and 73 degrees. Adjustment is done by means of a large knob on the side of the seat. The backrest can be fully reclined to rest against the rear seat although not until a button has been depressed to release a catch — which must also be actuated when changing from the driving position to reclining position and vice versa.

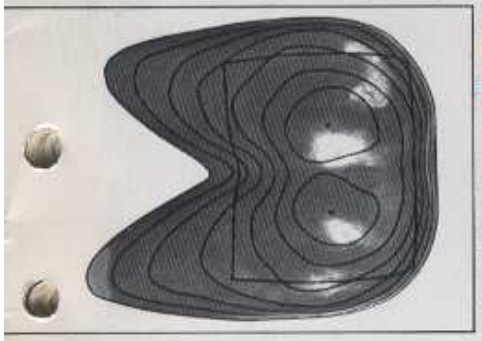
Fully reclining backrests are not an exclusive feature — nor is stepless fore-and-aft adjustment of the seats. On the other hand, the car is truly exclusive in that the driver's seat in the 99 L, LE and EMS can be rasised and lowered. High or low edge adjustment and high or low back edge adjustment (Fig. A) are easy to make.

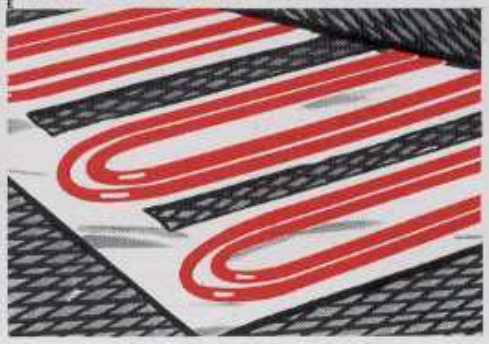
Unique see-through type head restraints (Fig. B) are offered as standard equipment on all 99's sold in the U.S.A. Specially designed cushions (Fig. C) can be inserted in the oval frames.

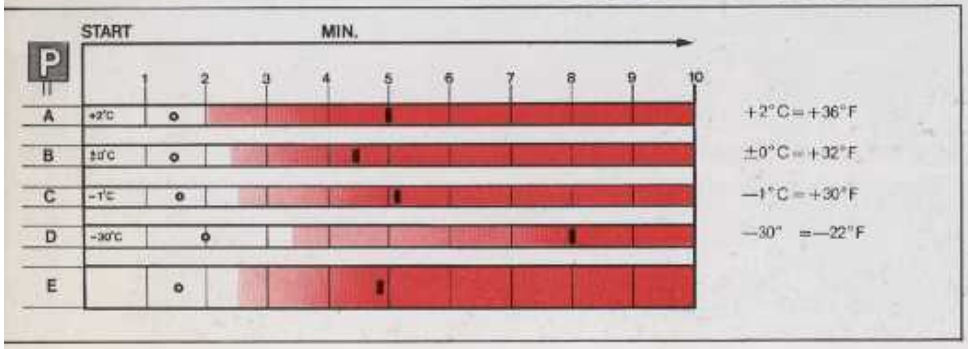












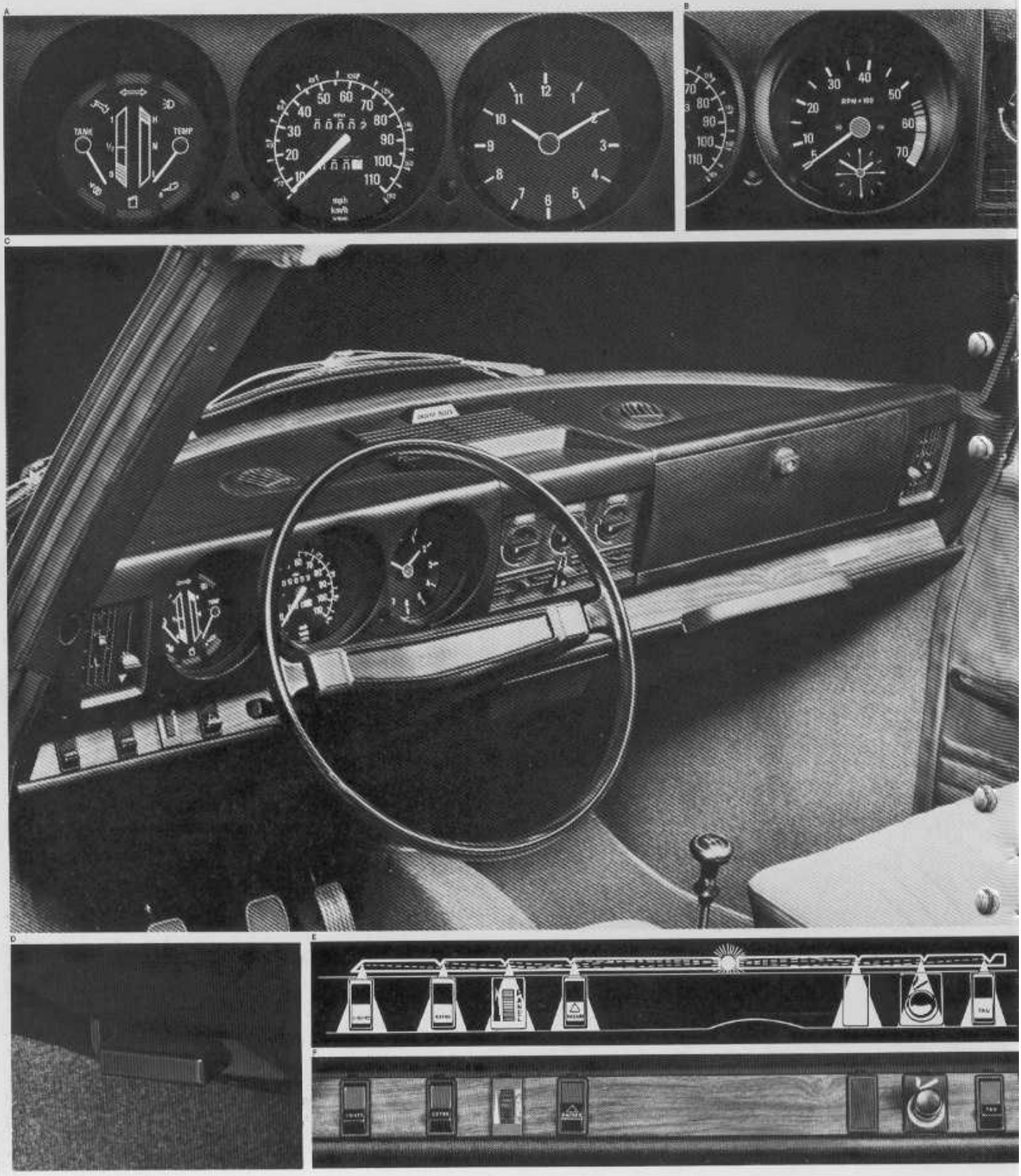
Electrically heated driver's seat.

If you get into a thoroughly cold car on a winter's day it may take more than 15 minutes before the seat ceases to feel unpleasantly frigid. But not if you drive a new Saab! Then it only takes a couple of minutes. Underneath the upholstery of the driver's seat, both in seat cushion and backrest, is an electric heating coil (Fig. A).

Switching on the ignition also switches on the heating coil, if the temperature of the seat cushion is lower than +57°F. As a result the engine has usually started and the alternator begun to work before any appreciable current is used for heating the seat. This saves the battery.
When seat temperature has reached +82°F the heating coil is automatically switched off. A bi-metal thermostat sensitive to body heat ensures than the system functions automatically (Fig. B, C).

The dangers to health of sitting on a cold surface are naturally greatest when the temperature is so low that it has a cooling effect on skin and blood vessels in the lower parts of the body. But discomfort should be avoided even if it does not lead to medical consequences. Cold also causes stress and strain. A driver who is cold drives poorly.
As a rule, a car seat feels cold as soon as its temperature is lower than +57°F. That is why this temperature has been chosen as the highest at which the heating coil in the Saab driver's seat comes into operation.

The heating coil is fitted into mesh pockets under the seat covering and rests on aluminum foil which reflects the heat upwards (Fig. E). The diagram shows the results of some tests. Not even when the temperature of the car interior was as low as —22°F did it take more than a couple of minutes after starting for the seat to cease feeling cold. Slight heat could be felt after 3½ minutes (Fig. F).


A
TANK
TEMP
B
C
D
E
F

Instruments and controls.

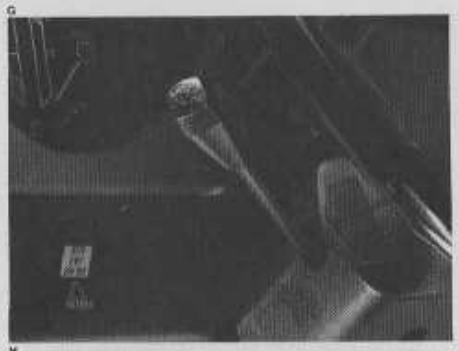
This car is easy to drive. You hold it in the palm of your hand, so to speak. There is a feeling of rightness about it. Roadholding, seating comfort, brakes, visibility — all these factors go towards creating this feeling. But it is also due to the fact that all controls and instruments are conveniently located and precise in operation.

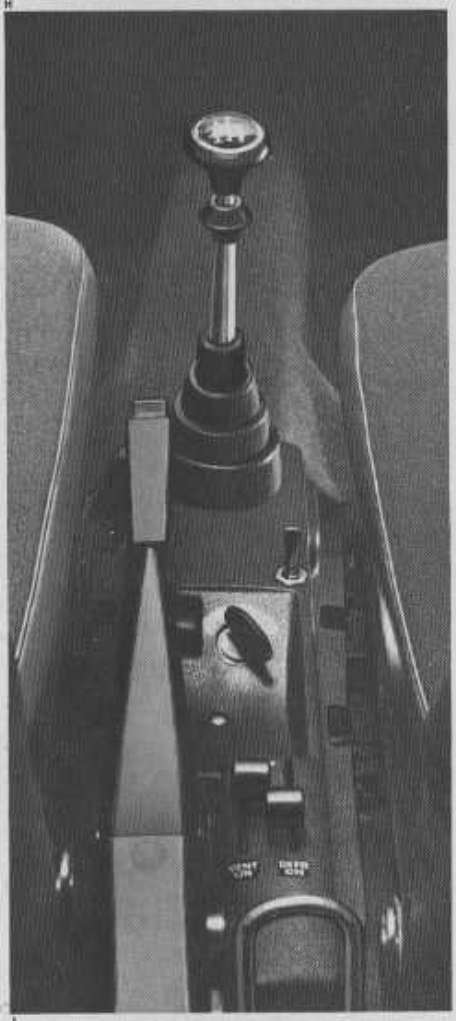
When the Saab is put through its paces by the motoring press — which has happened many times — it usually receives high praise for the instruments and controls, in respect to both safety and practical design. Indicating instruments are large, round, and clearly marked. Located in the center of the group is the speedometer and on the right is a clock. On the left is a combined fuel and water temperature gauge which also incorporates warning and indicating lamps (Fig. A).
The right side of the panel in the Saab 99 EMS is taken up by a tachometer with clock (Fig. B).
To prevent distracting reflections in the windshield the instruments are deeply recessed (Fig. C). Pointers, numerals and symbols are light on a dark background. The pointers are yellow-orange so as to be optimally visible. There is no brightwork to produce dazzling reflections. The rightness of instrument illumination can be continuously varied.

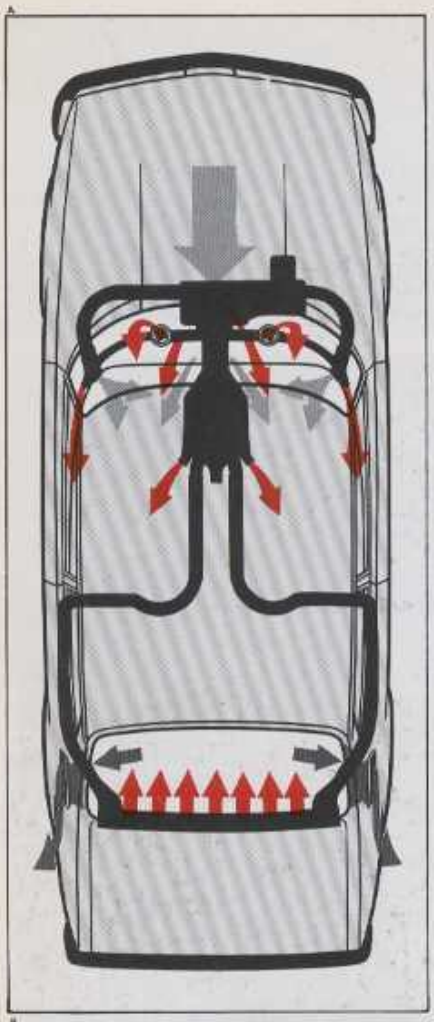
The ignition key is located behind the gear lever on a console between the seats (Fig. H). The ignition lock is combined with an anti-theft gearlever lock. The ignition key cannot be turned to the locked position until reverse gear is engaged. When the ignition key is removed and the car is left unoccupied, the gearlever is locked in reverse — an excellent anti-theft device.
From the viewpoint of safety it is also an advantage that the key — the handle of which is sheathed in rubber — is located where it cannot cause injury to the car occupants in the event of an accident.
Another refinement connected with the ignition lock is that the headlights are automatically switched off when the key is turned to the lock position. There is consequently no danger of a weak battery due to forgetting to switch off the lights. The parking lights can be turned on even when the headlights are "locked".

Together with the rocker switches for the hazard warning system, the main switches for the lights are located on the left of the steering wheel on a narrow, wood-colored panel underneath the dashboard.
The ventilation booster fan switch, with two speed ranges, is located on the same sub-panel, but on the right of the steering wheel (Fig. C, F). The panel is shown without radio and air conditioning installed.
All these switches and controls are marked with easily understood symbols and are in addition indirectly illuminated in an ingenious manner. Light from a single lamp is carried via a perspex tube and prisms to each point that is to be illuminated (Fig. E, F).

To turn on windshield washer and wipers, it's possible to do this instantly — without having to fumble for the right control. This also applies to the direction indicators and headlamp flasher. That is why the levers controlling these functions are located immediately below the steering wheel, right at your fingertips (Fig. G). The headlamp flasher lever on the left and the washer-wipers lever on the right. To sound the horn, depress either of the pushes on the steering wheel spokes. The hand should also fall readily on the handbrake. And in an emergency the front-seat passenger should also be able to use it. That is why the handbrake lever is located between the seats.
To open the hood it is first necessary to release a catch with a handle underneath the left side of the instrument panel (Fig. D).







Heating and ventilation.

As already mentioned, one of the fundamental directives to the designers of the Saab 99 was to the effect that the car be fitted with a fully developed heating and ventilation system suitable for Arctic/Scandinavian conditions. And this is exactly what it has. Even in extremely cold weather the engine starts promptly and requires a surprisingly short time to reach normal working temperature. Nor does it take very long after a cold start for the heating system to begin distributing heated air in the cabin. Temperature of the incoming air is controlled by a knob marked TEMP in the center of the dashboard (Fig. F). A thermostat controlling a water valve on the heater matrix ensures that the selected degree of heat is maintained regardless of changes in air and water temperature. Front and rear seats are provided with hot air outlets at floor level which can be individually regulated. Both are divided so that one stream of air is directed to the left and one to the right. Fresh air at the front is controlled by the knob marked VENT.

On the console between the seats and within convenient reach of the rear seat passengers are two controls (Fig. E). The left-hand lever adjusts the volume of air to the rear seat footwells while the right-hand lever controls the rear window demister.

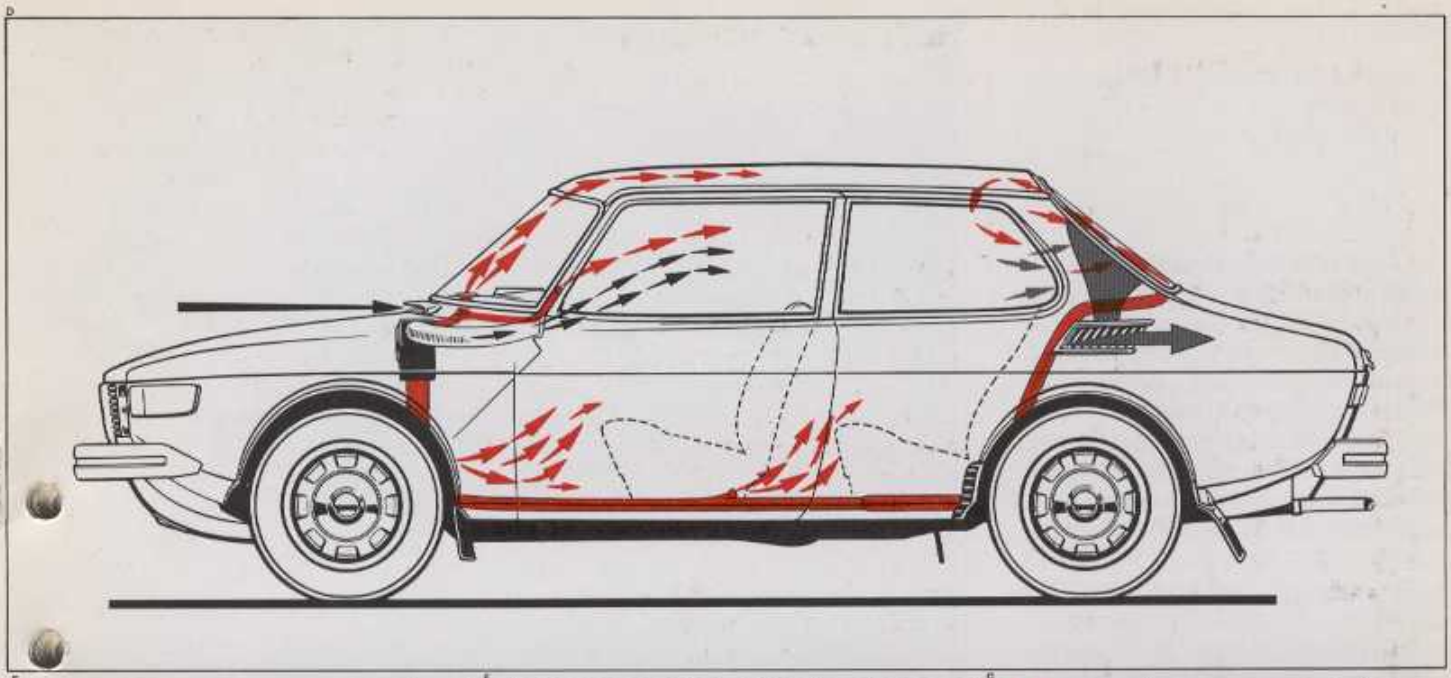
Air — hot or cold — is carried by hoses to a plenum chamber at the lower edge of the rear window from which it emerges via a row of holes to flow against the glass and effectively prevent it from misting up (Fig. K). These hoses are run so as not to be exposed to severe cold (Fig. A). Few cars can match the Saab 99 L, LE or EMS in their ability to keep the rear window clean — inside and out — while on the road.

This advantage is due in part to the favorable aerodynamic styling of the car body. Hot air directed onto the windshield emerges from two large outlets on the top of the dashboard and, like the separate outlets for the side windows (Fig. G), is adjusted by means of the control marked DEFR. To boost the demister effect on windshield and door windows, for instance, the rear window and footwell outlets can be closed and the booster fan set to maximum. Hot air can also be concentrated at one or more of the other outlets. However, the capacity of the heating system is so generous that such measures would only be necessary in exceptional circumstances.

Fresh air vents which only admit cold air — air that has not passed the heater matrix — are located in the center and at each end of the dashboard. These vents have adjustable grilles by means of which the flow of air can be aimed in the desired direction. The volume of cold air admitted can also be regulated, of course (Fig. F, G and H). When the controls are in the upper position the vents are fully closed. Air entering via the two outer inlets can be intensified with the aid of the booster fan.

All fresh air is admitted through the intake grille at the rear of the hood. Airflow through the cabin is continuous and free from drafts. At the rear on each side close to the rear window are openings through which the air passes to the extractor outlets on the sides of the body (Fig. L, I). **Air conditioning is of course available as an extra cost option.**

D



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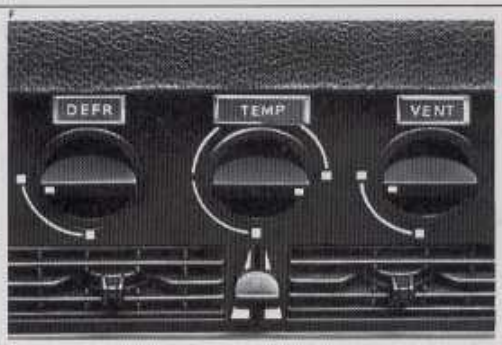

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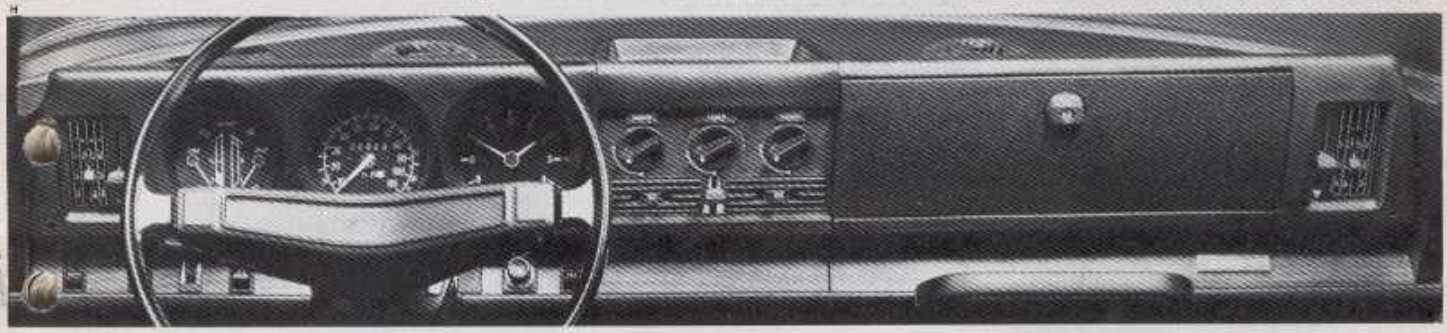

I

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L

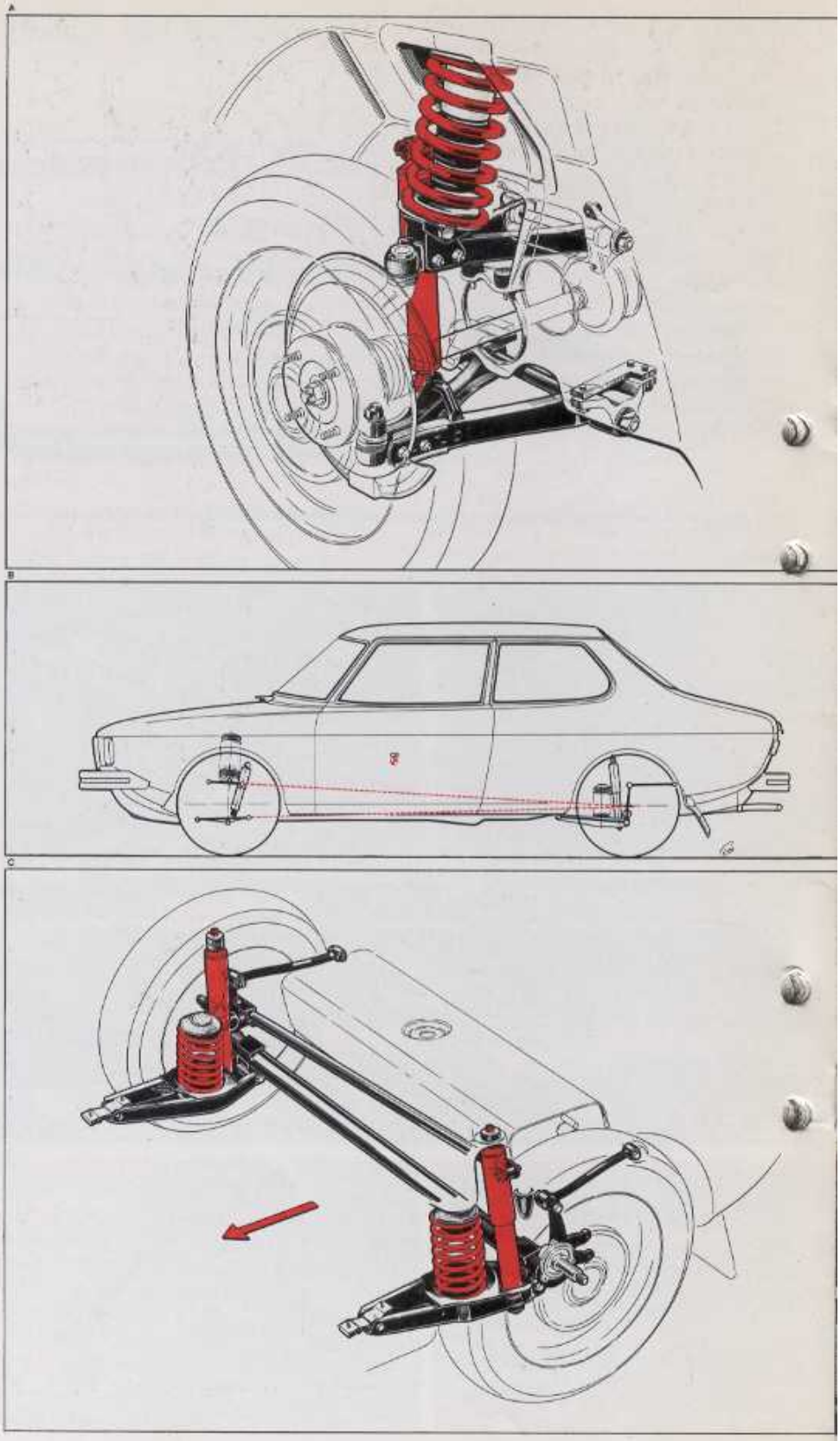
Suspension.

The suspension is extremely well balanced in order to provide a good ride on both bumpy and smooth roads. Because of low unsprung weight, the wheels hug the road even on rough surfaces.
The rear axle, which is completely free from heavy and cumbersome transmission components, is designed as a light, rigid tube which always keeps the wheel parallel and permits no changes in track.
The front springs are pivot-mounted at the bottom (Fig. A) which allows them to work almost completely cylindrically and absorb the shocks on very uneven road surfaces smoothly but firmly.
The progressive action is very good, partly because of the new buffers inside of the springs.
Because of the wide track, the widely separated springs and shock absorbers, and the suspension geometry in general, the distance between the roll axis of the car and its center of gravity is comparatively small. This in turn ensures that the car has commendably little tendency to roll when exposed to lateral forces. A special anti-roll bar is unnecessary.

All 99 models are equipped with 15-inch wheels fitted with radial tires. Dimensions of tires and rims are chosen to prevent jolting on harsh roads and to prevent wandering.

The wishbones are journalled in rubber bushes. The front shock absorbers are attached to the lower wishbones and the springs to the upper wishbones. The absence of an anti-roll bar makes for more resilient suspension and reduces the risk of wheelspin when driving vigorously around sharp corners. The front springs are pivot-mounted and have progressive action (Fig. A).

Lines drawn through the bearing points of the wishbones (Fig. B) converge close to the rear axle — even slightly behind it. This suspension geometry is one of the reasons that the car displays very little tendency to dive when braking. The rear axle is located by a Panhard rod and twin-longitudinal arms arranged to form a Watt linkage (Fig. C).



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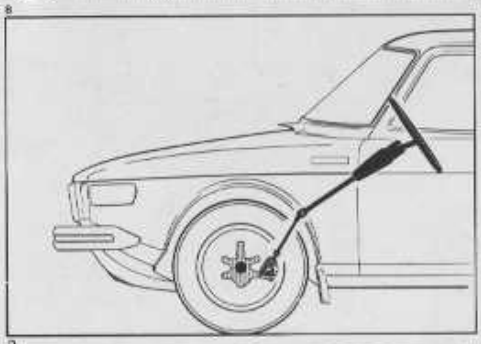

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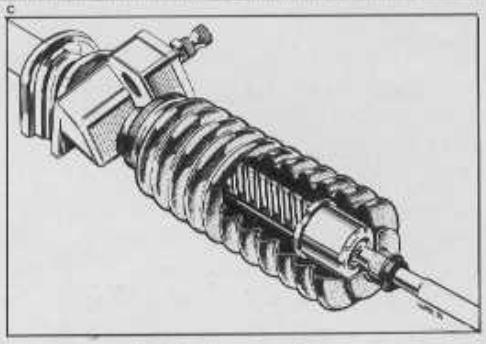

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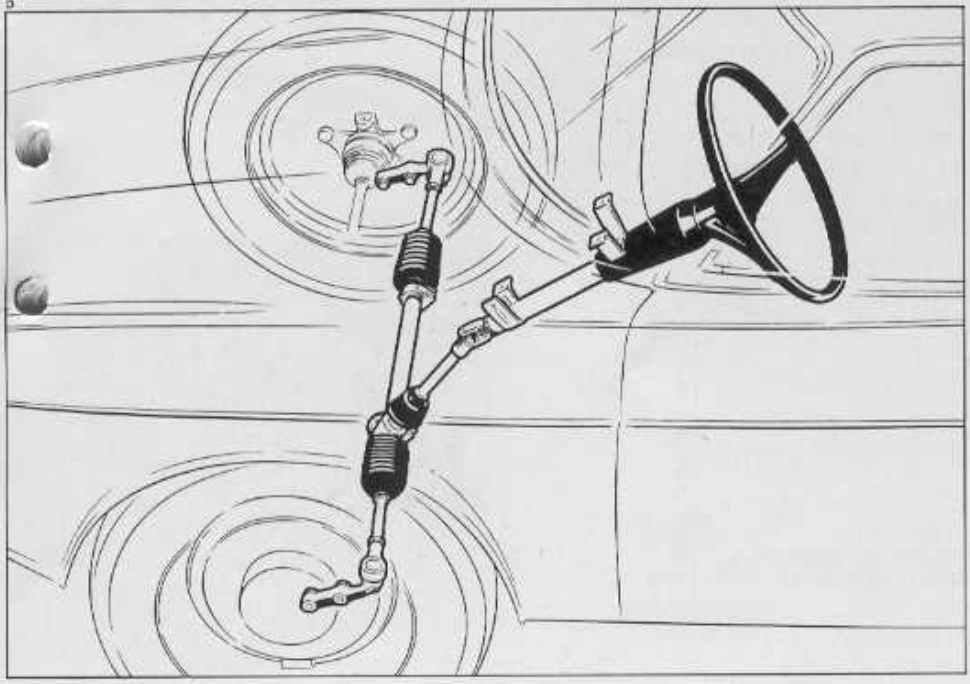


Steering.

The Saab 99 has extremely good directional stability. It is also slightly understeered.
When cornering it takes a slightly wider line than that exactly corresponding to the movement of the wheel. The turning radius increases with the speed unless the driver compensates for this by turning more on the wheel. This characteristic, which is due to the weight distribution of the car, provides good directional stability and reduces the risk of rear-end break-away. It also reduces steering wheel effort under practically all driving conditions. Steering is of rack and pinion type, precise in action and with a minimum of lost motion. The wheels respond accurately to every movement of the steering wheel. The tie rods are located so that the angle of the front wheel is practically unaffected when the wheels move up and down on their springs. As a result, the driver does not have to make corrections with the wheel when the car is driven over uneven road surfaces. Steering geometry is also designed to prevent changes in throttle openings from noticebly affecting the steering. Turning circle is 34 ft and the number of steering wheel turns lock to lock, is 3.7.

The steering box is located at the rear of the engine compartment, well protected by the engine. In consequence, a very severe impact would be required to force it back and displace the steering column. This latter nevertheless consists of two sections connected by a universal joint so that in the event of such an impact occurring it will fold in the middle. It is also telescopic and designed to collaps (Fig. D) if subjected to axial loads above a certain limit. At the same time its attachment to the carbody will give way.
The steering wheel has safety padding over the spokes and the dished hub.

Brakes.

Both front and rear wheels are fitted with disc brakes. Since these have no self-servo action, braking is smooth and braking effort proportional to pedal pressure. All four disc brakes are self-adjusting and equipped with highly heat-resistant pads — which are practically fade-free even after repeated heavy braking.

When the brake pads are worn to such an extent that replacement is necessary, the driver is made aware of this by higher pedal pressures being required. This advance warning is given before the brake pads are worn down so far that they may damage the discs.

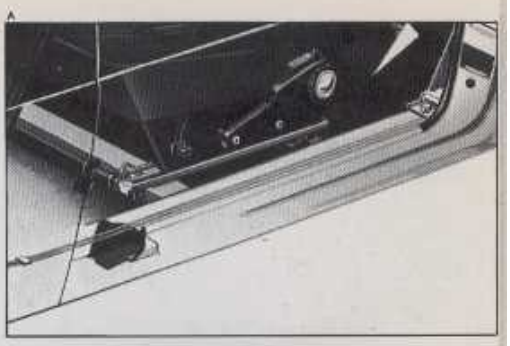
It goes practically without saying that the braking system features dual independent hydraulic circuits: Saab introduced the twin-circuit system as early as 1963 and can consequently be counted among the pioneers of this safety feature which is now fairly common. But the Saab system is still unique. Contrary to usual practice, it is not divided so that one circuit serves the front brakes and the other circuit the rear brakes. Instead, the braking circuits of the Saab are arranged diagonally so that one front wheel and the diagonally opposite rear wheel are served by one circuit and the other two wheels by the other circuit (Fig. G, I). In the event of failure in one circuit there is still always as much as 50 % of normal braking power available. Should it be necessary to use two-wheel braking on slippery or icy roads, it is advantageous to have one front wheel and one rear wheel that cannot lock up but help to keep the car on course instead.

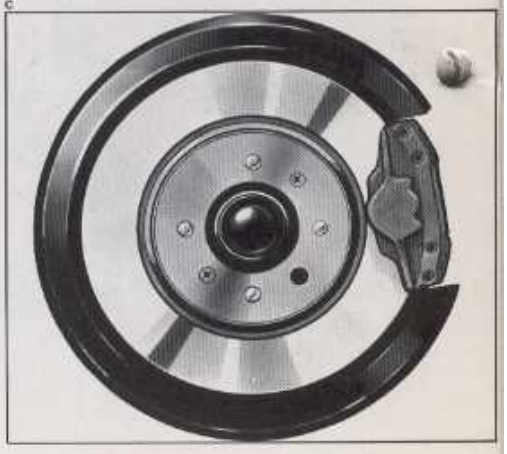
The master cylinder actuates both circuits simultaneously but independently of each other. The risk of a fault occurring in the brake lines has been reduced to a minimum — they are located in such a way as to be protected from mechanical and chemical damage, inside the car on the sill member of one side (Fig. A) underneath a moulding which permits the circulation of air. A red warning lamp in the combination instrument (the lefthand circular instrument on the dashboard) lights up when brake pedal travel is excessive for any reason — if a brake line develops a leak, for instance. This lamp also doubles as a handbrake warning light (Fig. B).

The front wheel brake cylinders are of greater diameter than those of the rear wheels. As a result, slightly more than 80 % of braking power is applied to the front wheels. The rear wheels — which carry a lighter load — show no tendency to lock up too early under heavy braking.

The braking system is equipped with a vacuum power assist which substantially reduces the pedal pressure required for a given braking effect (Fig. F).

The handbrake acts mechanically on the front wheels. Special brake drums at the hubs of the brake discs are actuated by well-protected cables operated by the brake lever, conveniently placed between the front seats (Fig. D, E). Using the handbrake, a braking effect of up to about 50 % of the normal braking system can be attained. As a result, the handbrake makes an effective emergency brake. And since it acts on the front wheels while the rear wheels continue to roll freely, there is no danger of the car running off course and skidding sideways.





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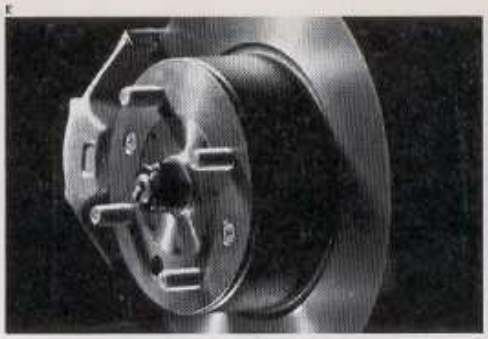

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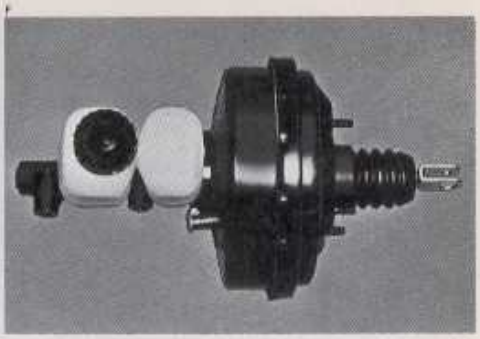

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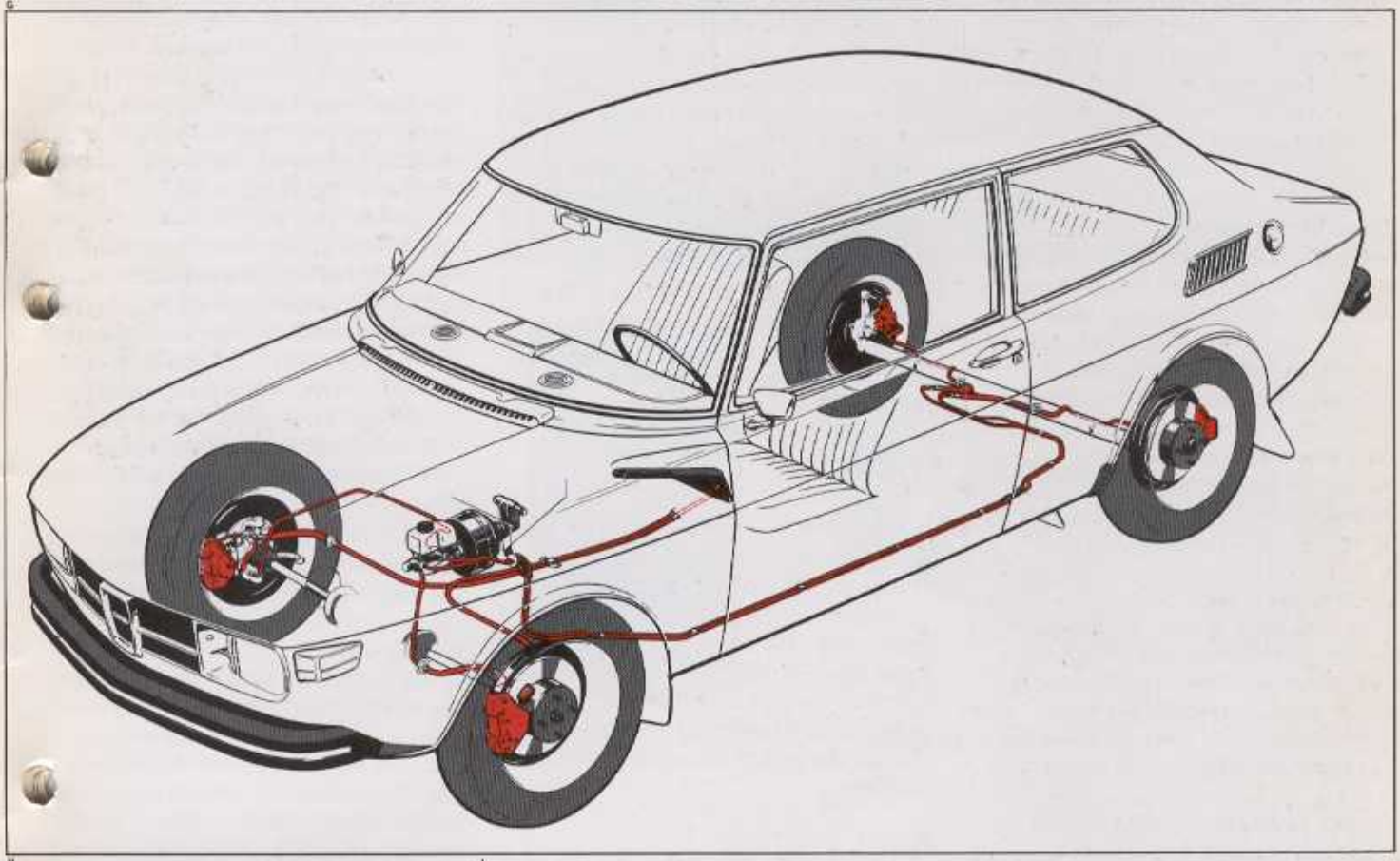

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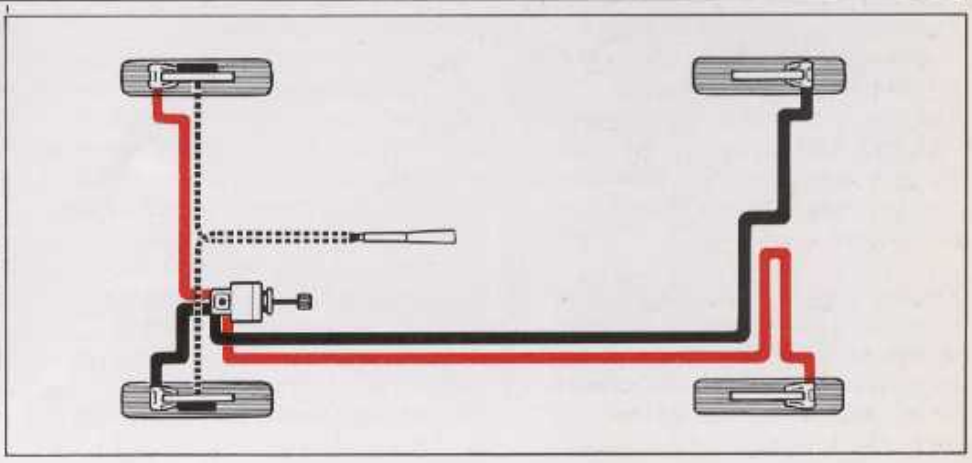


Engine and transmission.

Modern and tough power plant
Saab 99 has a watercooled, four-cylinder straight engine with an overhead camshaft. The engine block is manufactured of special cast iron and the cylinder head of aluminum alloy. The crankshaft and camshaft are mounted in five bearings.

The cylinder block slopes at an angle of 45° to the right (Fig. A) and the engine is located so that it has the end with the clutch turned forwards and the driving mechanism for the camshaft nearest the bulkhead. The cylinders are numbered from back to front.
The engine cooling is of cross flow type and it has a closed crankcase ventilation. The water pump, oil pump and distributor are operated via a special idler shaft. The gearbox is located under the engine and is an integral part of it.

Two different versions
The new Swedish-built 2-liter engine is offered in the E and C versions, i.e. with electronic fuel injection or carburetor. The C engine develops a maximum net horsepower of 95 hp SAE and the E engine develops a net of 110 hp SAE.

Service engine with good hard pull characteristics
The torque curve of the carburetor engine is above the mark for 100 lb ft between 1700 and 4800 rev/min. The max. mark, 116 lb ft is reached at 3500 revs. This implies that the engine has very good hard pull characteristics and that there is no need to shift gears all the time.

The fuel-injected engine is even more powerful. It produces a full 123 lb ft at 3700 rev/min. The torque curves for both engines are very flat, remaining at a high level within a broad range of rev/min.

The engine is not of a highly tuned and sensitive type, but instead a reliable and durable service engine, shown by the fact that the specific output is moderate. It varies from about 47 to 55 hp per liter of cylinder volume. The E engine boasts the highest figure.

Because the inlet and exhaust manifolds are located on each side of the cylinder head it has been possible to make them sufficiently large and to shape them in a way that is more favorable as regards the performance with maximum at low revolutions and free "breathing" at high revs.

Short stroke, vibrationsless, ready to respond in revs.
With a stroke of 3.07 in. the engine has an adequately short stroke so that it will withstand high revolutions without the average piston speed and mass forces attaining unsuitably high values. However, the short stroke is not overemphasized, so that the hard pull deteriorates.

The crankshaft itself is made of forged steel and has ground bearing surfaces; is dynamically balanced and kept within narrow dimensional tolerances. The connecting rod bearings and the five main bearings have such large diameters that they "overlap" one another to a considerable extent, which in turn renders the crankshaft stiff and vibration-free.

Overhead camshaft, long intervals between valve adjustments
It will be noticed by the valve mechanism that the engine is made to work smoothly and free from noise. As the camshaft is overhead, i.e. located in the cylinder head, the valve depressors are activated directly, without pushrods and rocker arms, which would increase the number of moving parts and also create rattle. One major advantage with the valve mechanism is that it allows for longer intervals between the regular valve adjustments. The cylinder head can be dismantled and reassembled without the valve clearance being affected. The camshaft is driven by a double chain.

Adapted to the environment
The 99 engine meets highly placed requirements with regard to what is usually termed as being favorable to environmental conditions. It has low noise level and an unusually high degree of purification of the exhaust fumes. Both the carbureted and the fuel-injected version should be driven on low-octane lead-free gasoline (94 octane).

The crankcase ventilation is made effective by air being taken in through the air filter and via a flame guard and the engine oil filler pipe and led on to the crankcase, from where it flows upwards and through a hose from the camshaft cover is supplied to the intake manifold. The ventilation which is consequently completed is regulated by a Smith valve close to the intake manifold. The exhaust pipe runs through a tunnel beneath the floor of the car and is thus well protected against damages when the vehicle is being driven on rough roads.

Because the metal plating in the rear muffler and pipe is made of aluminum, the exhaust system has great durability.

Easy to start
It was decided from the beginning that the engine should be easy to start. The requirement was absolutely necessary and, not only concerned fine summer days. Even when the vehicle has been standing parked outside in exceedingly cold weather conditions, it must be possible to start it up without any difficulty. Impartial and comparative tests have also proven that the Saab 99 models up to and including the 1972 models are, in this respect, among the best cars made. And there is nothing to say that the 1973 models should not maintain this high standard of quality.

Low fuel consumtion
Saab 99 has made a name for itself because of low fuel consumption. The new 2-liter engine also permits very economic operation. One reason for this

is low air resistance of the car, and another is the efficiency of the engine.

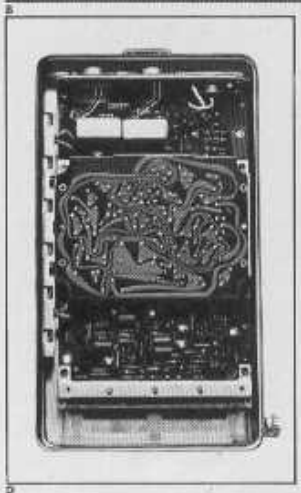
A further factor is that the engine does not require high-test gasoline. Regardless of whether it is carbureted or fuel-injected, it should be driven on 94 octane gasoline.

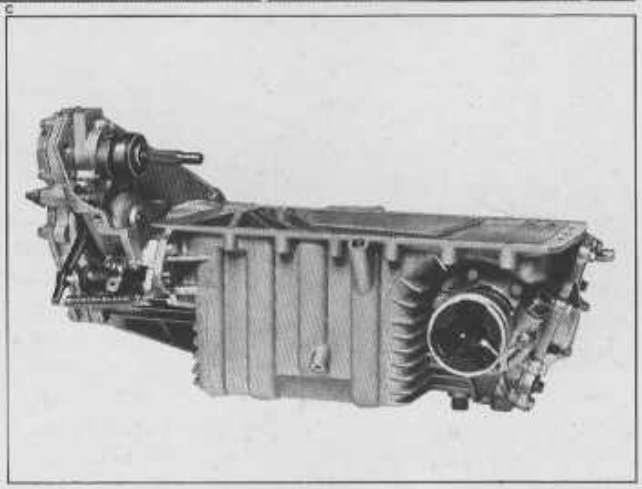
Air preheating, horizontal carburetor

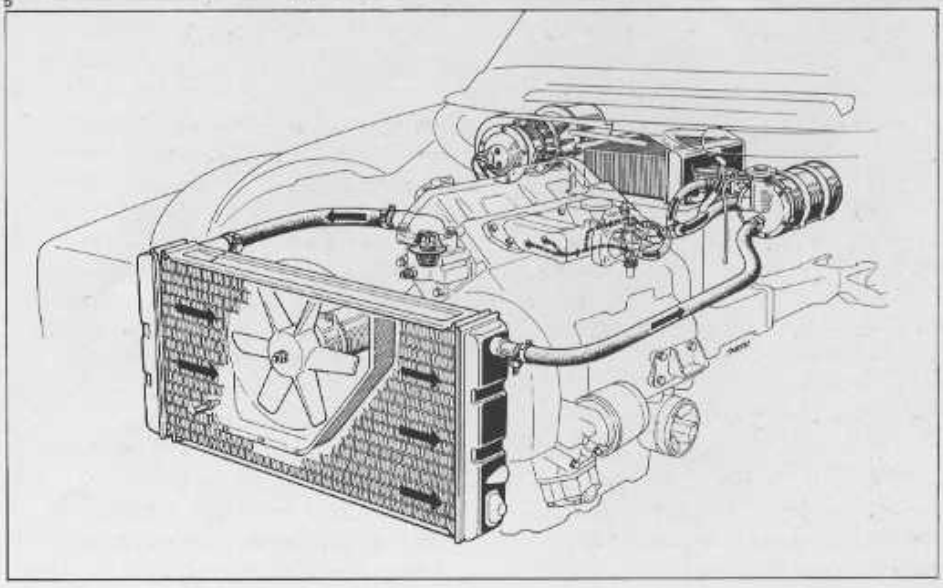
The air cleaner has a paper filter and serves both as intake muffler and cleaner for the intake air. The carburetor engine air intake is provided with a butterfly valve, adjustable in two positions: "Summer" and "Winter". When the outside temperature is constantly lower than +40°F the butterfly valve should be put in "Winter"-position, whereby the air is preheated by being led inside the covering around the exhaust pipe. The carburetor is a horizontal flow type made by Zenith-Stromberg. It has a self-centering fuel needle and lacks a special idling system. Instead of a conventional type choke there is a separate emulsion system for cold starts and quick idling. The carburetor has designation 175 CD-2S, which, among other things, means that it has a diameter of 1 ¾" and functions with constant under-pressure in the nozzle. The fuel pump is mechanical and is operated by a cam on the special idler shaft, which also operates the oil pump, water pump and distributor.

Electronic "brain" knows best

The fuel pump on the E-engine is electric and together with a filter located behind the fuel tank. The filter is easily accessible for cleaning or replacing. The fuel system of the E-engine consists in principle of four injection valves, which are connected to a fuel line in which the pressure aided by a governor is maintained at a determined level. A start valve is also included, which at low temperatures (below approx +40°F) injects additional fuel into the air-collecting pipe when the starter motor is turned on. The electronic control device (Fig. B) is located on the left wheel housing where it receives information from the transmitter on the engine about RPM and loading conditions and







through electrical messages controls the opening time of the injection valves.

When warming up the engine, on acceleration and at full load, a very accurate amount of fuel must be injected. On the other hand, when braking with the engine, the injection must be reduced or completely interrupted. These measures are effected by the "electronic brain" which each moment knows what is required. With such a system, the engine always receives the right amount of fuel, which gives nearly complete combustion, high top output and very clean exhaust fumes.

Effective cooling system, short warming up time, electric-operated fan
The cooling system shall be responsible for making sure that the engine keeps the right operating temperature under all load conditions, regardless of what the weather is.
For this task a radiator is required, which becomes effective when it is needed, but does not divert the heat unnecessarily.

For that reason Saab 99 has a cross flow type radiator (Fig. D) and a reliable thermostat. There is also a fan which only turns on when the coolant temperature tends to get too high, such as during bumper-to-bumper driving in traffic jams. During normal driving, the fan usually remains stationary so it does not steal power unnecessarily and does not cause needless noise. The on-off switch is controlled by a thermostat.

The water pump has large capacity and leads the coolant at considerable speed past the hottest parts of the cylinder block. The parts of the engine that need cooling most, thus receive the most intensive cooling. Water jacket completely surround each cylinder. The coling system is pressurized at the proper working temperature and is provided with an expansion tank which handles excess fluid.

Since the cooling system as a whole including the fresh air heater, does not contain more than 10 U.S. quarts and the thermostat keeps the cooler intake closed until the engine has attained the right working temperature, the period of warming up is unusually short. This is noticed indirectly by the fact that after the car has been standing awhile and becomes thoroughly cold, warm air begins to enter into the cabin within a few minutes after starting the engine. When the car leaves the factory the cooling system is filled with anti-freeze.

Lubrication and oil filter
The engine has a pressure lubrication system and is equipped with an oil filter of full flow type. Each connecting rod bearing has a separate oil-way through the crankshaft from the next main bearing in front. The quantity of oil must not be less than 2.6 U.S. quarts or more than 3.7 U.S. quarts. The oil and filter should be replaced every 6,000 miles or at least twice a year. The oil filter is of the "throw-avaw" type.

Ample volts, amps and watts
Saab 99 has a well dimensioned and functionally safe electrical system. The voltage is 12 V and the capacity of the battery 60 Ah. The starter motor is 1 hp. The maximum charging current of the alternator in cars with carburetor engine is 35 A and in the E-models a full 55 A. The alternator charges already at low engine speeds.
The electrical wires are color coded in order to be easily distinguishable. The connections consist of non-soldered conductor joints. The ignition leads are disturbance eliminated. The electrical system is protected by 12—8 A fuses, of which one is intended for extra equipment. They are easily accessible in a box on top of the left-side wheel housing. It is clearly indicated to what part of the system each fuse belongs.

Gearbox under the engine
The engine is integrally-built with the clutch, gearbox and the differential to form one complete compact unit, which is a saving in both weight and space. (No encroachment in the passenger compartment, no rear drive shaft, no heavy power transmission assemblies at the rear.) The power is gearbox and differential located under the engine. The drive joints are permanently lubricated and normally need no maintenance. Cars with manual gearboxes have hydraulically-operated, single dry disc clutch made by Borg & Beck. The primary gear consists of pinions.

The clutch which is placed at the front of the engine is effectively cooled. This contributes towards long service life for the disc lining, and service work on the clutch is facilitated.
The gearbox, which is of completely new design and robustly dimensioned, is fully synchronized and has four forward gears. It is separated from the engine crankcase by a divding wall, but is integral with the final gear and differential to form a unit with its own lubricating system.

Saab 99 LE Automatic — oil in place of clutch discs
On the Saab 99 LE Automatic the power is transmitted from the engine to a hydrodynamic torque converter and from this via a chain transmission to the automatic gearbox.
The torque converter is filled with oil and has three main assemblies: pump impeller, turbine and stator. The pump impeller is connected to the engine crankshaft, while the turbine operates the driving shaft of gearbox. The stator is mounted on a free wheel coupling with rigid hub. By way of the oil, the pump impeller causes the turbine to rotate. When the driving and driven impellers rotate at different speeds, the stator leads the oil back again to the pump impeller in such direction that the torsional force of the impeller increases. The gain in torque can vary from maximum 1.9:1 down to 1:1 and ceases when the turbine has reached a rotary speed of approx. 90 % of the pump impellers.

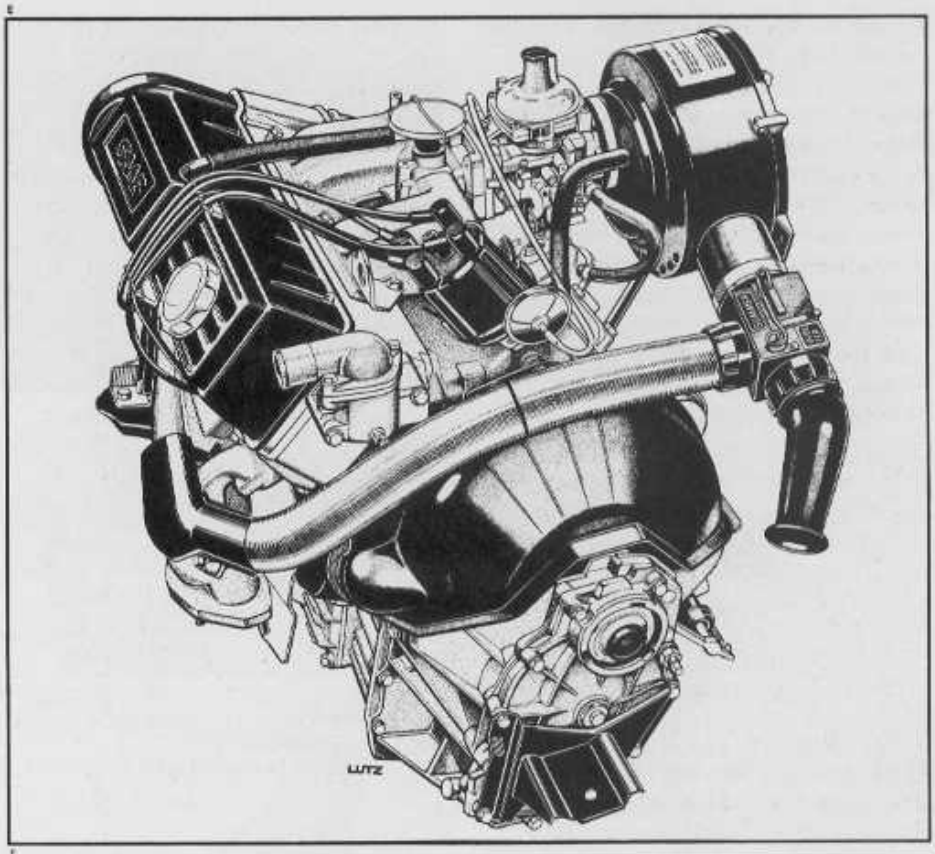
Because of its capacity to increase engine torque, the converter helps give the car good acceleration from low speeds, without downshifts.

Therefore, the power is always transmitted smoothly.

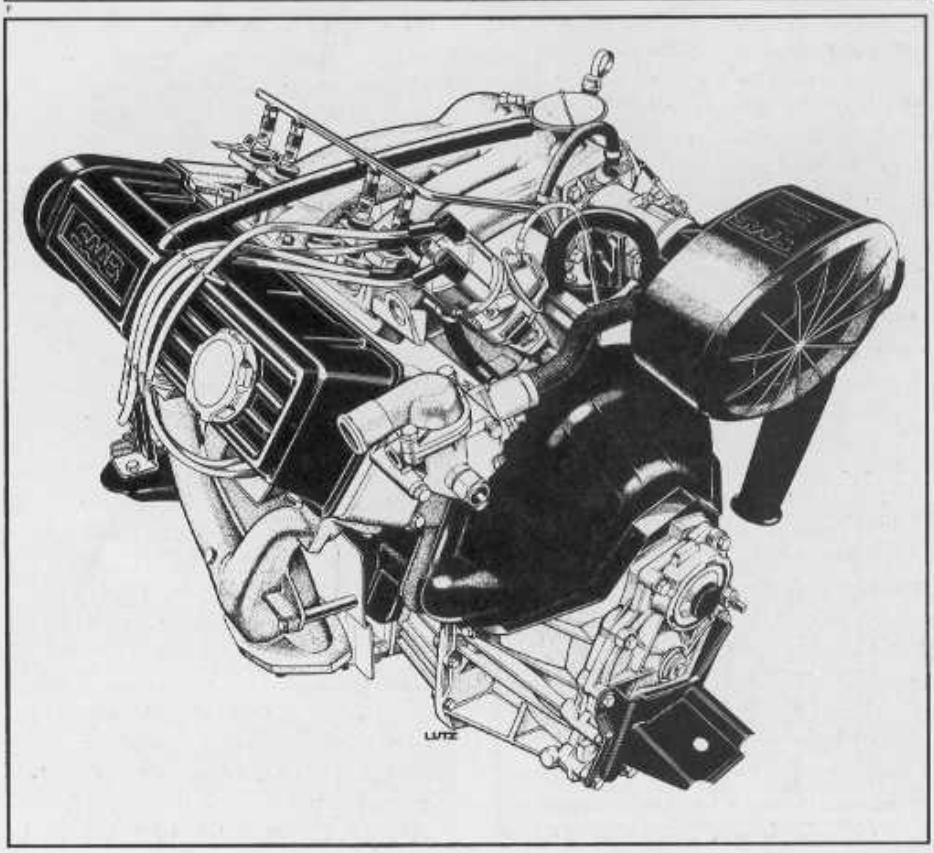
Selector instead of gear shift lever
Gear shifting takes place automatically via a hydraulic system with pump, governor, valves and servo-pistons, which operate the various units in the gearbox according to the position of the selector lever and general operating conditions. Kick-downs can be done at speeds below 50 m.p.h. by depressing the accelerator to the bottom. The selector lever can be put in six positions:
P = Parking. This is engaged so that the ignition key can be turned to L-position and removed. The lever and gearbox are locked.
R = Reverse.
N = Neutral. No power to the driving wheels, the car can roll without hindrance.
D = Drive. This is used for all normal forward driving. Automatic gear shifting through the entire range.
2 = Drive with 3rd gear locked.
1 = Drive, only in low.
This is used up very steep hills and when extra powerful engine braking is needed.

The automatic gearbox is made by Borg-Warner and has given ample proof that it is well suited for Saab 99 LE.

E



F



The engine is assembled with clutch, transmission and differential into a complete and compact power unit. The clutch is mounted on the front of the engine and the transmission lies underneath the engine, separated by a wall. Engine and transmission have separate lubrication systems.
The top illustration shows a 2-liter carbureted engine, while the lower illustration (Fig. F) shows an engine with electronic fuel injection combined with a manual transmission.

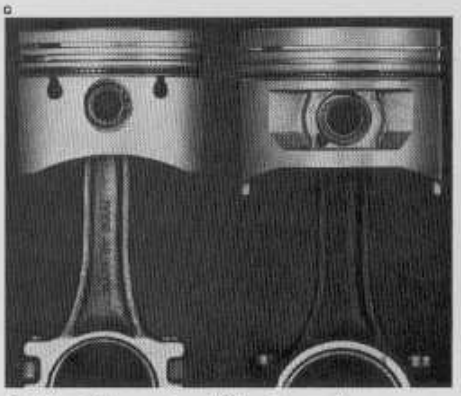
In Europe: Newton-meters and kilowatts instead of kgf m and hp

One horsepower is not the same in all parts of the world. In countries which base most of their units of measurements on the c.g.s. system, 1 hp is defined as 75 kgf m/s, while the corresponding power unit in the USA (1 hp) has a value of 76.04 kgf m/s. The difference is of course due to the fact that it is not possible to arrive at exact agreements between the metric system and the system using "pounds" and "feet" without using inconvenient numerical values.

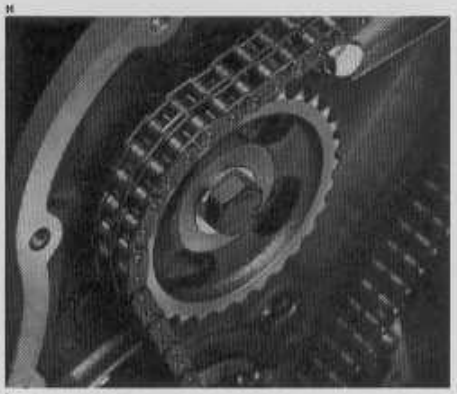
Our present system of units is unsatisfactory in many respects. It is not completely uniform and often requires troublesome conversions between different sorts of units. A new system has therefore been adopted — the SI system (Système International d'Unités) — which covers all branches of physics and engineering with a limited number of units.

The SI unit for force is 1 Newton (1 N), while mass is still measured in kg. The old force unit of 1 kgf corresponds to 9.80665 N. A torque of, for example, 15 kgf m is approx. $15 \times 9.81 = 147$ Nm.

As a unit of power, the SI system employs 1 Nm/s=1 W. 1,000 W=1 kW= 0.735499 hp. 100 metric hp, therefore, equals approx. 73.55 kW.



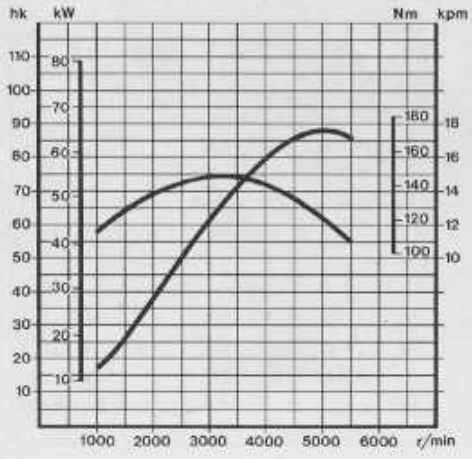
G. The 2-liter engine differs its predecessor in many ways. It has, for example, a somewhat taller engine block which permits the use of longer pistons with more rugged piston pins. The increased distance between the top of the piston and the piston rings results in the rings working at a lower temperature. The 1.85-liter engine piston is on the left, the 2-liter engine piston on the right.



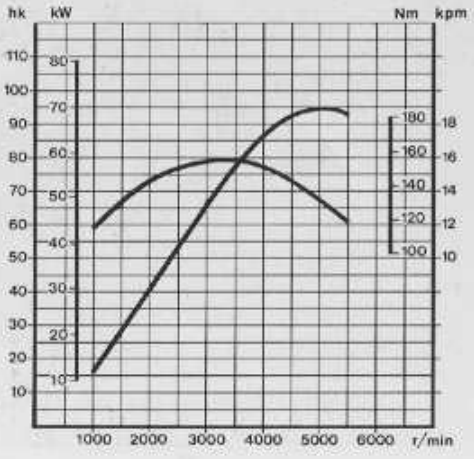
H. The overhead camshaft in the 2-liter engine is driven by a double chain.

I. The new, larger Swedish-built engine has a more rugged valve mechanism and a modified combustion chamber.
The valves move in parallel with the cylinder bores.

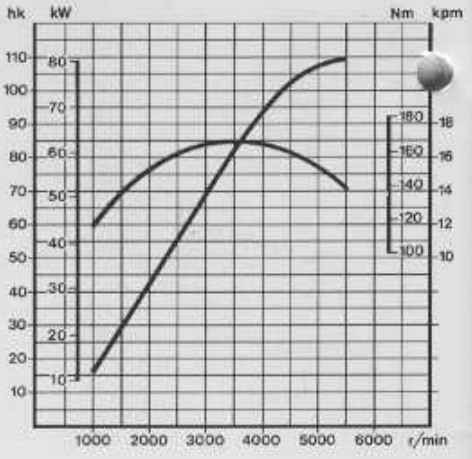
Power and torque
1972 Saab 99
1.85-liter carburetor engine

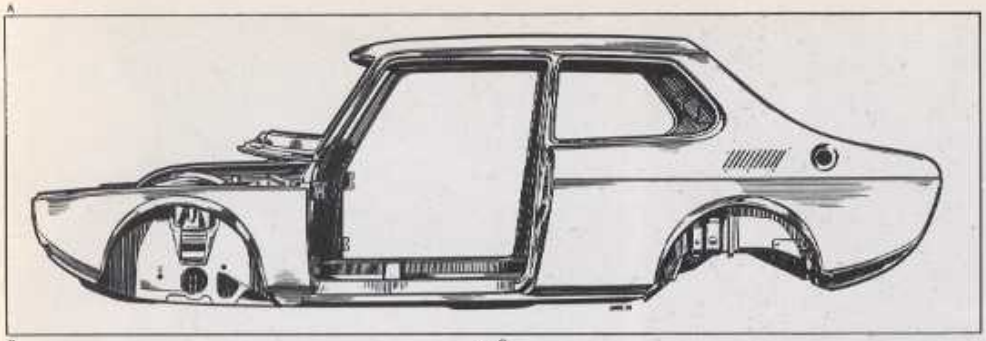


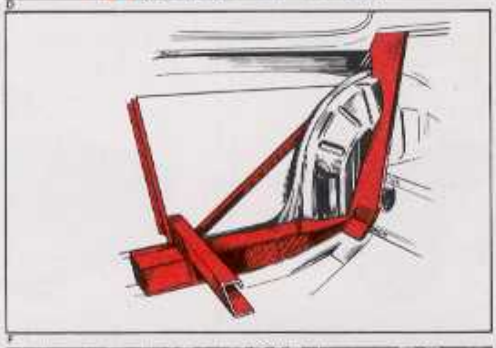
Power and torque
1973 Saab 99 L
2.0-liter carburetor engine

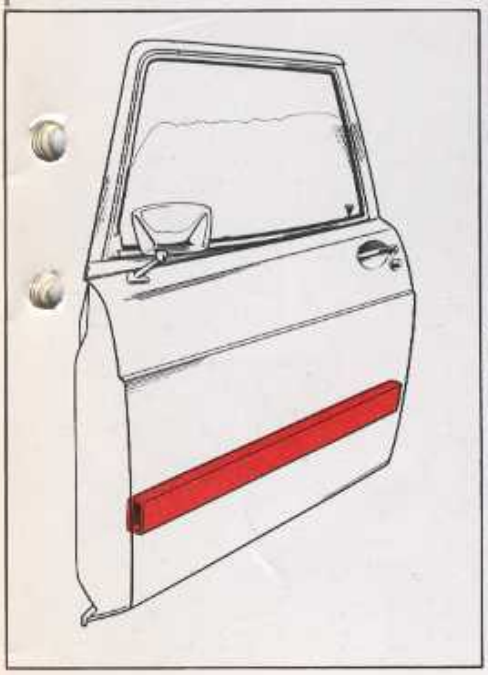


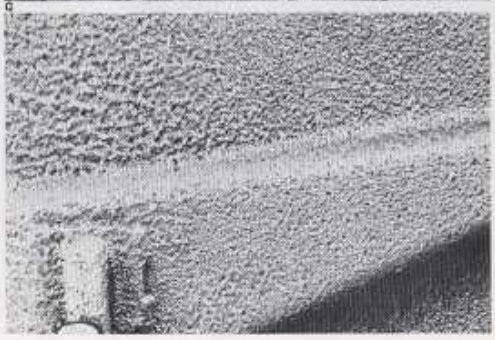
Power and torque
1973 Saab 99 LE and Saab 99 EMS
2.0-liter fuel-injection engine











Safety body.

Saab 99 LE has a self-supporting all-welded steel body (A). In many places the steel is considerably thicker than what is normal in the automative industry. The weight of the complete steel shell is, however, low, bearing in mind the spaciousness of the car.

The passengers are surrounded by strong beams (Fig. B, C, D), while the front and rear portions of the body are designed to prolong the stopping stretch, in the event of a collision, by deforming and absorbing the impact. (With collisions at low speeds the possibilities of the bumper absorbing the impact are much greater. (See page 11).

The windshield beams (Fig. B, C) are constructed of 40 in. long, and very strong, steel profiles, which are welded to the bottom of the wheel housings.

The saddle beams sills and side beams are also extraordinarily strong. Around the roof line there is a reinforcing steel rail. Cross members above the floor contribute to the transversal rigidity (Fig. D). As a protection against buckling under pressure, the doors are reinforced with longitudinal rectangular members of profiled tubular steel (Fig. E).

The shell around the cabin has shown its great impact durability in many tests, for example; An upside down Saab 99 has been dropped onto a concrete floor from a height of 7 feet without the windshield — and side beams being crushed.

The priming is carried out according to the electrocoating method. After the body has been phosphatized it is immersed in a bath of anti-rust primer (Fig. F), where the particles, with the aid of strong electric current effectively adhere to all steel surfaces, and along edges and in cavities. Before the body receives its final coating it is given a protective and sound absorbing layer of undercoating compound underneath and in the wheel housings (Fig. G).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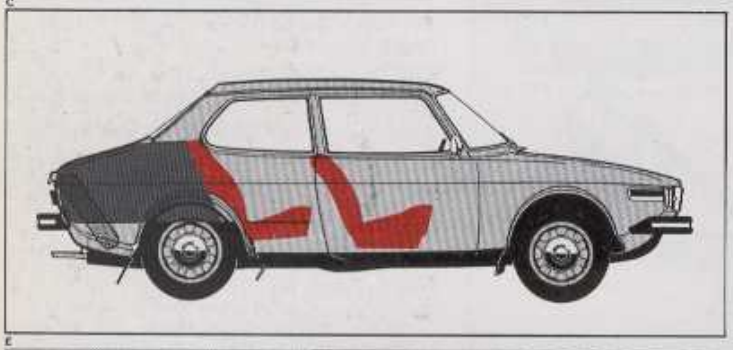
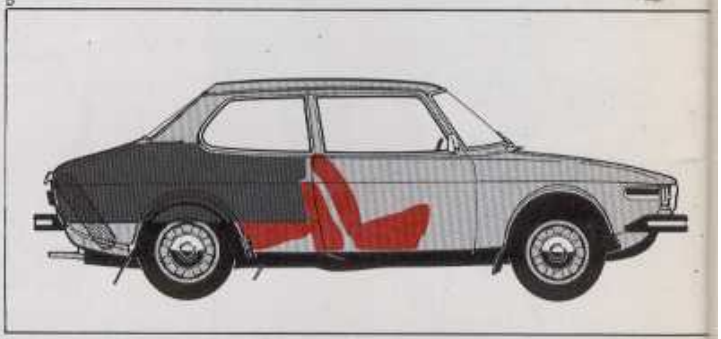
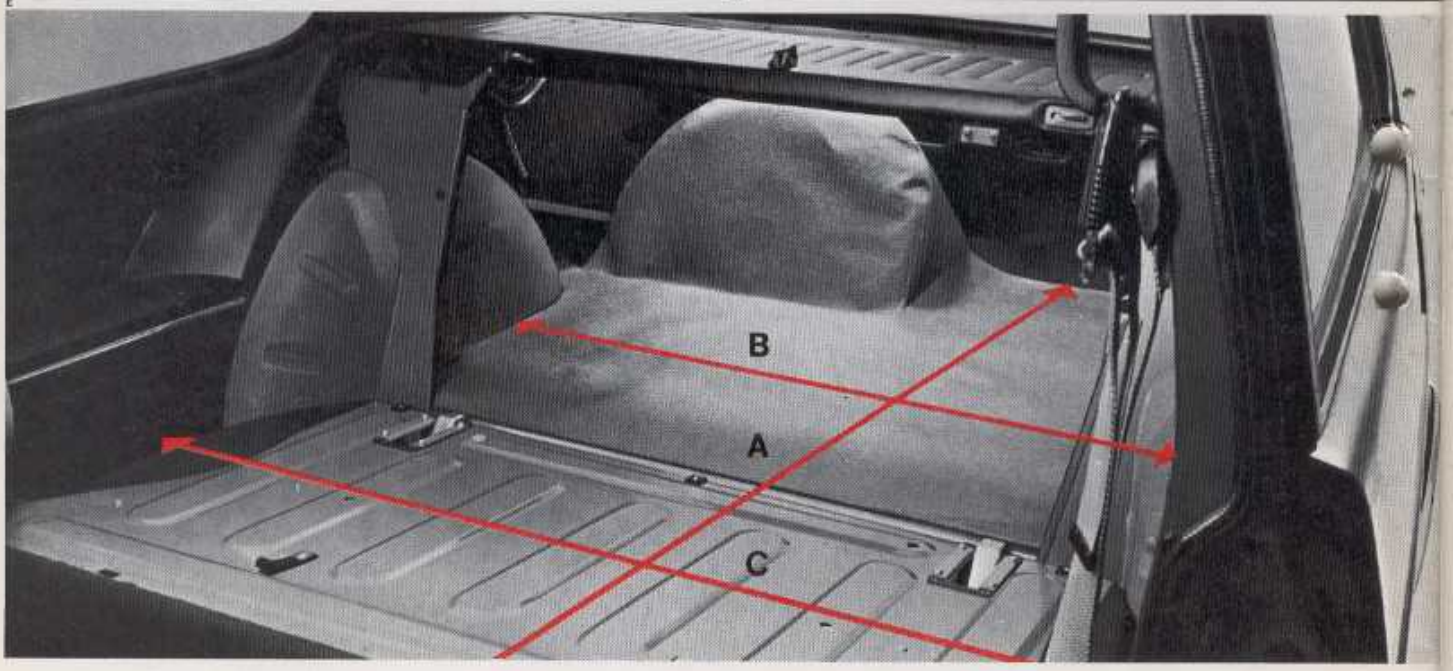





B
A
C

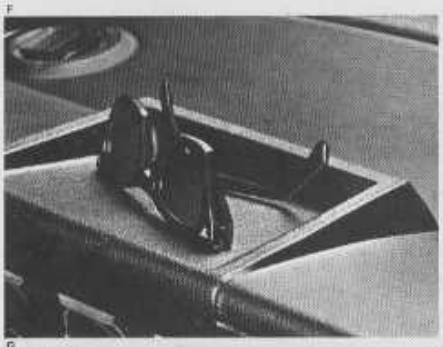
Luggage space and loading capacity.

The Saab 99 EMS and all other two-door 99 models may each weigh up to 3440 lb. If the car is provided with a carbureted engine and manual transmission, it will have a curb weight of between 2480 and 2560 lbs. when the gasoline tank is filled and the car is completely equipped, but without air conditioning. The maximum weight carrying capacity for all 99 models (both 2-door and 4-door) is 900 lbs. without air-conditioning and 850 lbs. with air-conditioning. If the driver and passengers are assumed to weigh, on the average, 150 lbs. each, the car can accommodate 900 — 5× 150=150 lbs. of baggage in addition to the five passengers. The car may also be used for the transport of goods instead of people. The car can then handle a load of 750 lbs. without being excessively loaded.

The trunk has a flat floor and practical form (Fig. B). When the lid is closed it is tightly sealed against dust and dirt. A drain pipe effectively takes care of rain water — also that which runs down from the edge of the lid when it is opened. The spare tire is placed so that it is easily accessible and can be used as a support when loading or unloading heavy articles. A sturdy plastic mat covers both the spare tire and the floor. The lid is spring balanced, so that it opens by itself when the opening button on the lock has been pressed in. There is a lamp at the edge below the rear window, which illuminates the trunk when the lid is open. The trunk capacity is 12.3 cu. ft. according to SAE standards which prescribes the use of a series of travellers' effects of a stipulated size. The actual total volume of the trunk is 23.3 cu. ft.

Sometimes it may be necessary to transport bulky or numerous odds and ends. With a Saab 99 the luggage space can be increased by simply folding the seating pad of the back seat forward to rest on its front edge behind the front seat and folding the back rest forward and downward, thus giving a continuous flat floor from the rear of the luggage compartment up to the up-ended seat pad (Fig. D, E). The back of the back rest is covered with steel. The overall length of the floor capacity measured according to arrow A on the large picture (Fig. E), is 67.7 in. The width between the wheel housings, marked B, is 14.3 in., and the measurement C 51.6 in. In its normal position, the back seat is of course firmly anchored to meet the high safety repuirements.

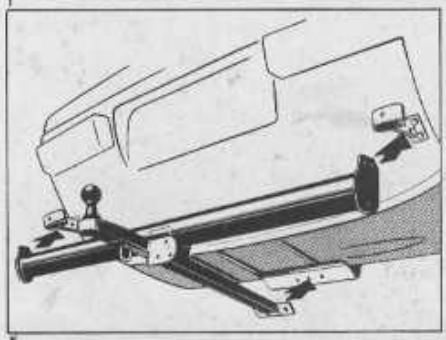
At the far back, beside the spare tire, the car has a practical compartment under an opening in the floor. This extra space (Fig. K) can be used for towing line, emergency signals, washing equipment and other items which one might not want loose in the car.



F. For sunglasses or other items which one might want handy during the journey, there is a framed surface on top of the instrument panel.

G. The lid to the glove compartment remains in a horizontal position when open and has a number of round ring molds which can be used as holders for cups, for eample, during a refreshment stop.

H. The doors have spacious pockets for maps, newspapers, ice scrapers, etc.



I. The car is prepared for the fitting of towing equipment. Highest permissible trailer weight, according to Saab'recommendation, is 1,000 lb. National regulations must however be followed.

K. The jack and the tools are under an opening at the side of the spare tire. The compartment is even large enough to take some luggage.

Technical specifications.

Engine
Straight, four-stroke, water-cooled engine with overhead camshaft.
Number of cylinders: 4.
The engine is placed with the clutch turned forward.
The cylinder slope is angled 45° to the right.
The cylinder block is made of special alloyed cast iron and the cylinder head of aluminum alloy.
The crankshaft is forged with drilled oilways and repaceable bearing shells.
The camshaft is chain driven and manufactured of special castings.
The pistons are of alloy and provided with two compression rings each and one oil scraper ring.
Number of main bearing: 5.
Number of camshaft bearings: 5.
The crankshaft drives a separate idler shaft, which in its turn operates the oil pump, water pump, distributor and on the carburetor engine, the fuel pump as well.
Idling speed: 800—850 rev/min.
Average piston speed at 5,000 rev/min: 13.0 m/sec. (42.7 ft./sec.)
Lubricating system with oil circulation under pressure and oil filter of full flow type.
Quantity of oil, inclusive filter: 3.5 l (3.7 U. S. quarts).

Carbureted engine, 2.0 liter
Piston displacement: 121.1 cu. in. (1985 cm^3)
Bore: 3.54 in. (90 mm)
Stroke: 3.07 in. (78 mm)
Compression ratio: 8.7:1
Max. horsepower, SAE net: 95 at 5200 r/min.
Max. torque: 116 lb. ft. (16 kgf. m) at 3500 r/min.

Fuel-injected engine, 2.0 liter
Piston displacement: 121.1 cu. in. (1985 cm^3)
Bore: 3.54 in. (90 mm)
Stroke: 3.07 in. (78 mm)
Compression ratio: 8.7:1
Max. horsepower, SAE net: 110 at 5500 r/min.
Max. torque: 123 lb. ft. (17 kgf. m) at 3700 r/min.

Fuel System
Carburetor engine
Horizontal carburetor, Zenith-Stromberg 175 CD-2S, with automatic centering fuel needle and separate emulsion system for cold starts and quick idling.
Mechanical fuel pump, AC Delco.
Minimum fuel octane rating: 94 (ROZ).
Fuel tank capacity: 11.9 U. S. gals. (45 l).

Injection engine
Electronic-controlled fuel injection, system Bosch Jetronic.
Electric fuel pump, Bosch.
Minimum fuel octane rating: 94 (ROZ).
Fuel tank capacity: 11.9 U. S. gals. (45 l).

Cooling system
Cooling system of pressure type.
Cross-flow radiator, separate expansion tank.
The thermostat opens at +185°F (+85°C).
Cooling system capacity including heating system: 10 U. S. quarts (9.5 l).
Electrically driven cooling fan. Thermostat controlled, 150 W motor.

Transmission
The gearbox with final drive and differential is located under the engine and integrally-built with this.
The power is transmitted from the clutch to the gearbox by means of a primary gear.
The front wheels are the driving wheels.
The drive joints — the outer of Rzeppa constant-velocity type — are permanently lubricated.

Saab 99 L, LE and EMS with manual gearbox
Single dry disc clutch with resilient hub.
Make Borg & Beck.
The clutch is operated from the pedal via a hydraulic system.
Primary gear ratio: 1:1 (changed from 0.95:1)
The gearbox is fully synchronized and has four forward gears.

Gear ratios, engine to driving wheels:

1 st gear	13.37:1
2nd gear	8.06:1
3rd gear	5.41:1
4th gear	3,89:1
Reverse	14.70:1

Final drive gear ratio: 3.89:1 (9:35) — changed from 4.22:1 (9.38).
Top gear speed at 1000 engine r/min: 48.3 miles per hour (30.0 km/h).
Oil capacity in the gearbox: 6.3 pints (3.0 l).

Saab 99 LE Automatic

Clutch in form of hydraulic torque converter.

Torque converter, primary drive, three speed automatic gearbox and final drive in one compact unit.

The torque ratio varies between 1.91:1 and 1:1.

Chain transmission between torque converter and gearbox, ratio 0.97:1.

Make and type of automatic transmission:

Borg Warner, type 35.

The gear selector positions are: P, R, N, D, 2, 1.

Gear ratios in the gearbox:

1st gear	2.39:1
2nd gear	1.45:1
3rd gear	1:1
Reverse	2.09:1

Final drive gear ratio: 3.89:1 (9:35).

Torque ratio, engine to driving wheels:

D	17.29—3.79
2	17.29—5.49
1	17.29—9.04
R	15.13—7.92

Oil capacity in the automatic gearbox: 8.5 U. S. quarts (8.0 l).

Approx. changing up speeds, m. p. h. (km/h):

	1st—2nd	2nd—3rd
Full gas	28 (45)	47 (75)
"Kick-down"	37 (60)	65 (105)

Approx. changing down speeds, m. p. h. (km/h):

	3rd—2nd	2nd—1st
Full gas	—	—
"Kick-down"	56 (90)	25 (40)

Twin-circuit hydraulic footbrake system with vacuum power assist, make ATE. Left side front wheel and right side rear wheel are activated by one brake circuit, the diagonally opposed wheels by the other circuit. Self-adjusting disc brakes front and rear.

Brake disc diameter, front and rear: 10.6 in. (269.5 mm)

Friction area:

Front wheels 188 sq. in. (1215 cm²)

Rear wheels 170 sq. in. (1095 cm²)

Total 358 sq. in. (2310 cm²)

Main cylinder, diameter: 0.75 in. (19.05 mm).

Wheel cylinder front, diameter: 1.89 in. (48 mm).

Wheel cylinder rear, diameter: 1.06 in. (27 mm).

Brake servo diameter: 7 in. (178 mm).

Brake power distribution: approx. 80 % front.

The handbrake acts mechanically via separate drum brakes on the front wishbones.

Wheel suspension

Idependent front wheel suspension — coil springs and transverse, V-shaped wishbones.

The front springs are pivot-mounted and placed between the upper suspension arms and mountings at the top of the wheel arches.

The front shock absorbers are actuated by the lower suspension arms. All the shock absorbers are double-acting, telescopic.

Light, rigid rear axle guided by two forward and two backward directed arms and a transverse beam. Coil springs.

The rear springs and shock absorbers are actuated by the lower placed and forward-directed arms.

All links and suspension arms are rubber mounted.

Steering

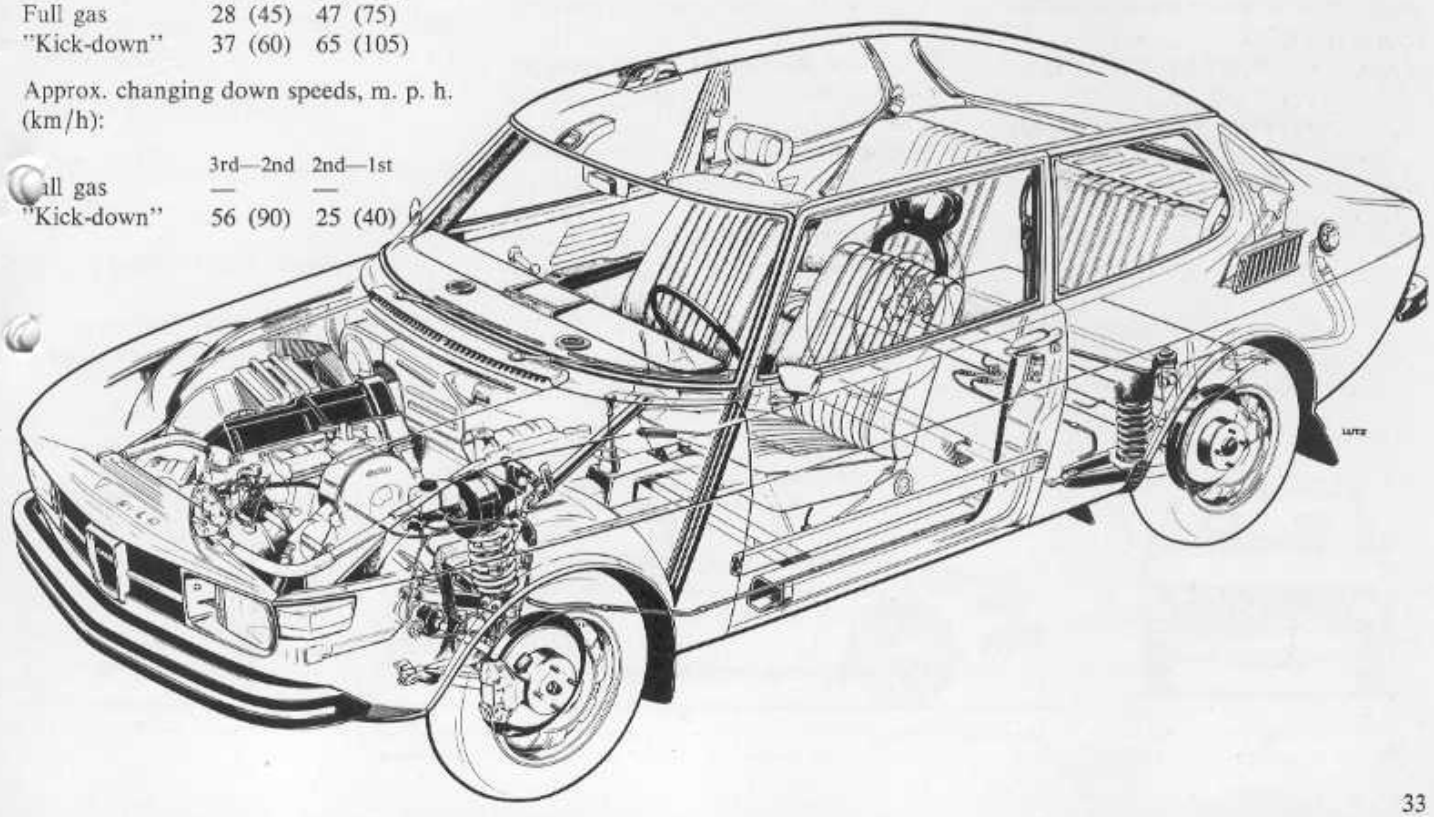
Steering gear of rack and pinion type.

3.7 steering wheel turns from lock to lock.

Turning diameter:

between walls — 36.7 ft. (11.2 m)

between curbs — 34.1 ft. (10.4 m)



Wheels and tires

All Saab 99 L/LE models have pressure molded steel disc wheels with radially directed ventilation holes. The EMS model has cast aluminum wheels of a special design.

Rim sizes:
99 L/LE, 4½ J FHA×15 in
EMS, 5 J FHA×15 in.

Standard equipment on all models includes tubeless radial ply 165 SR 15 tires. The EMS model comes with steel belted tires.

Tire pressure: 27 psi (1.9 kg/cm²) at light load, 30 psi (2.1 kg/cm²) at full load.

Electrical system

Battery: 12 V, 60 Ah.
Alternating current generator — "alternator".
The max. charging current/voltage of the generator:
in cars with carburetor engine 35A/14V,
in cars with injection engine 55A/14V.
The starting motor is 1 hp.
Distributor contact gap: 0.3—0.4 mm (0.012—0.016 in.)
Firing order 1—3—4—2.
Spark plugs with 18 mm (0.71 in.) thread length, M14 thread and 0.6—0.7 mm (0.024—0.028 in.) electrode gap.
Fuses: 12—8A (one of which is carried as spare).

General dimensions and weights

A Overall length: 173.2 in.
B Overall width: 66.5 in.
C Height, unladen: 56.7 in.
D Wheelbase: 97.4 in.
E Track front, 99 L/LE: 54.7 in.
Track front, 99 EMS: 55.1 in.
F Track rear, 99 L/LE: 55.1 in.
Track rear, 99 EMS: 55.5 in.
H Overhang front: 36.9 in.
G Overhang rear: 39.0 in.

Ground clearance, with driver at 155 lb., but without passengers and luggage: 6.9 in.
Free visibility through glass, from the driver's seat and at eye level: Approx. 332° (2-door sedan).

See page 12 for interior measurements

Number of seats, driver and passengers: 5
Trunk capacity according to SAE: 12.3 cu. ft.
Total trunk capacity: 23.3 cu. ft.
Max. roof rack load: 220 lb (Saab's recommendation).

Curb weights [1])

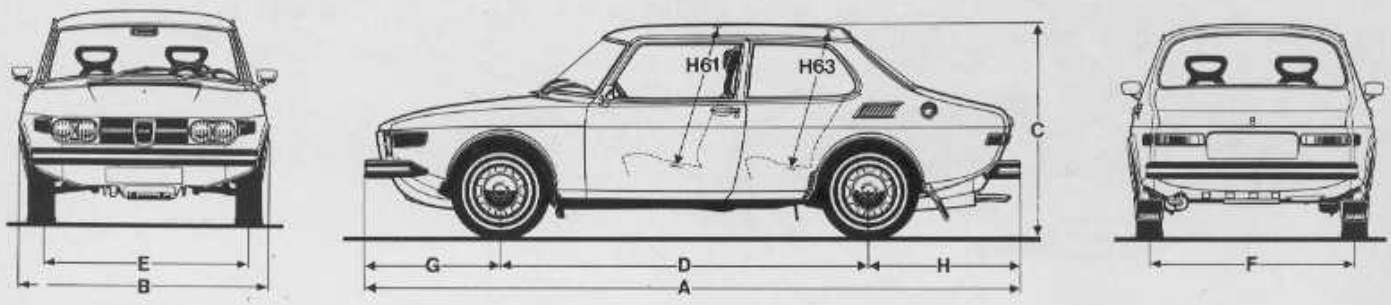
Model		
2.0 L	2-door	2480 lb.
2.0 L	4-door	2540 lb.
2.0 LE	2-door	2500 lb.
2.0 LE	4-door	2560 lb.
2.0 LE	Automatic 2-door	2520 lb.
2.0 LE	Automatic 4-door	2590 lb.
2.0 EMS		2490 lb.

[1]) For factory installed air conditioning, add 70 lb.

Gross vehicle weight rating:

2-door models	3440 lb.
4-door models	3510 lb.

The manufacturer reserves the right to change specifications and equipment without notice.



These are the built-in safety features of the Saab 99 LE and Saab 99 EMS.

Front wheel drive. Firm contact with the road for good traction. Excellent road-holding capability, even on winding and slippery roads.

The front wheels normally carry heavier load than the rear wheels. Good directional stability.

Well-calibrated, self-adjusting disc brakes front and rear.

Parking brake which acts on the front wheels through separate drums.

Wheel design which prevents dirt from getting into the brakes.

Radial ply tires.

Well-protected brake lines.

Sill beams of heavy-gauge steel sheet. Internally protected against corrosion.

Unit construction steel body with high torsional ridigity.

Large wheels — 15 inches.

Heavy longitudinal protective beams in the doors.

Safety catches for the backrest.

Backrest continuously adjustable down to a lying position (max. 73° angle).

Driver's seat cushion adjustable in height and angle.

Automatically electrically heated driver's seat.

Robust built-in steel sections in the windshield and door posts. Reinforcing steel rail around the edge of the roof.

Seat belts front and back.

Standard headrestraints.

Impact-absorbing padding on the top of the instrument panel, on the windshield and door posts, on the back side of the front backrests and on the hub of the steering wheel.

Pedded sun visors with black backs. Rotatable sideways.

All-black instrument panel with recessed dials. The panel is made of integral foam on a resilient frame.

Indirectly illuminated controls with clear markings.

Collapsible interior rear view mirror which is adjustable to eliminate dazzle.

Non-glare outside rear-view mirrors.

Safety locks in the doors.

Reflectors on the edges of the doors on the left side.

Light, rigid rear axle. Low unsprung weight.

Gasoline tank in the safest place — between the rear wheels.

Diagonally split twin-circuit braking system.

Vacuum servo assistance to reduce the necessary brake pedal pressure.

Jointed and telescopically collapsible steering column. Rack and pinion steering mechanism.

Stearing gear located far to the rear in the engine compartment.

Pivot-mounted front springs with progressive action for a smooth ride.

The shape of the car ensures low air resistance, a minimum of wind noise and insensitivity to side winds.

Deep-curved windshield of strong laminated glass.

Defrosters for windshield, front side windows and rear window.

Energy-absorbing and heat insulated roof lining of molded fiber glass.

Efficient heating and ventilation system. Automatic draft-free air flow through the passenger compartment. Thermostatic control of the set temperature level. Cool or heated air is admitted at thirteen points.

Indicator light which goes on when the parking brake is set or in the event of a failure in the brake system.

Windshield wipers with a large sweep area. Two speeds. The control lever is below the steering wheel.

Windshield washer driven by an electric motor. Large fluid container.

Headlight interlock. The headlights are turned off with the ignition key.

Rubber-covered, shock-absorbing bumpers.

The rear section of the exhaust pipe and the muffler are made of aluminized steel for a longer useful life.

Towing lugs front and rear.

High, clearly visible blinkers.

Four-corner flasher warning system.

The front and rear sections are designed to act as energy-absorbing zones.

Back-up lights.