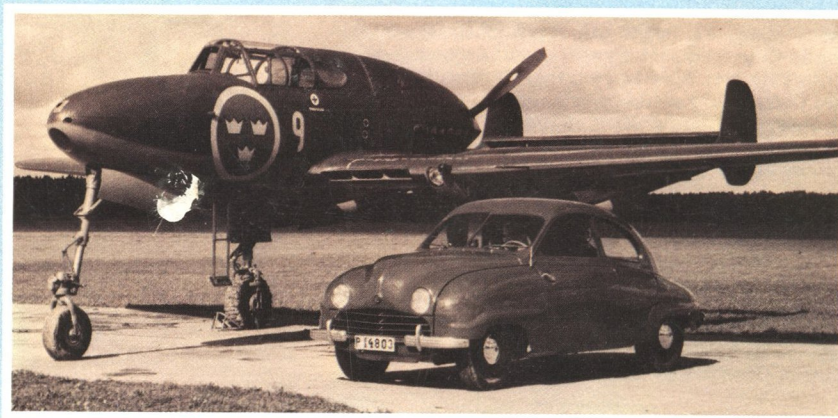


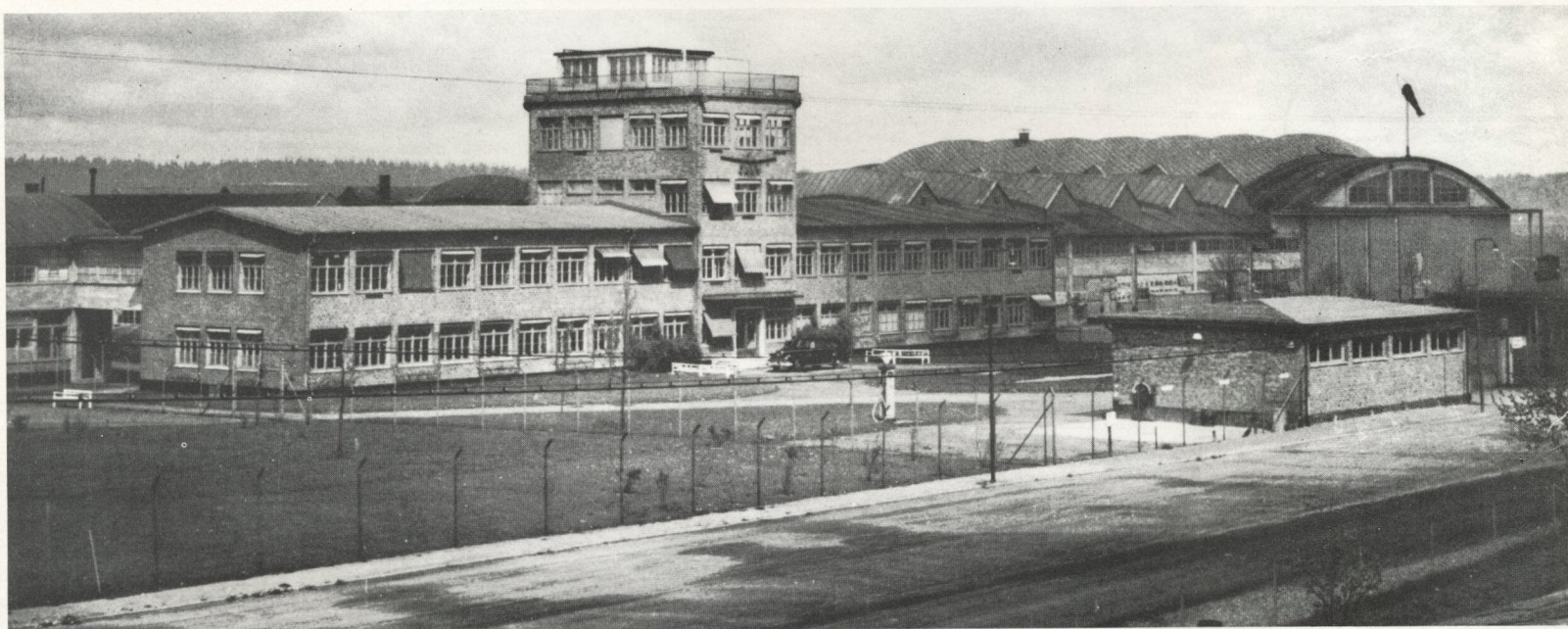
# the saab saga





Cover page : beside the title a Saab 92 prototype and the Saab 21. In the colour photo, the Saab 99 Combi Coupé and the Saab Viggen. A quarter of a century divides the two pictures, 25 years of aeronautical and automotive progress : the Saab saga.

Below : the Trollhättan factory where Saab's activity began in 1937 as it looked in the early '50s when automobile production started. Most of the aircraft activity had been transferred to Linköping ten years before, when Saab took over the aircraft division of a rolling stock factory (ASJA). Initially, the entire production of Saab 92s was concentrated in Trollhättan over an area of only 17,700 sq. meters ; since 1954 the manufacture of engines and transmissions was shifted to a Saab plant in Göteborg.



As World War II drew to an end, it was obvious to **Svenska Aeroplan AB** (SAAB for short) that some form of peace time activity had to be started. Founded in 1937 by private capital, but on Government initiative, to give Sweden a domestic aircraft industry in anticipation of the hostilities to come, Saab had during the war built up the Swedish Air Force from scratch into a powerful outfit. But now, in 1945, Government orders for military aircraft were expected to diminish. Several possible manufacturing projects were discussed by the then managing director Ragnar Wahrgren and the director Sven Otterbäck. Prefab houses, household appliances and other objects were considered, but it was soon clear that Saab should stay in the transport business. Making automobiles has a lot in common with making aeroplanes, much of the existing know-how from aircraft construction and manufacture could be utilized in car making. And above all, automobiles were expected to have a great future. Mass motoring

had just started in Sweden in the last pre-war years. With many of Europe's car factories in ruins, the established manufacturers would have difficulties in meeting the demands of a car hungry post-war world. So it was only natural that Saab project number 92 should become an automobile.

In most industries, the products are created by anonymous teams of men, working on lines layed down by market research and economic calculations. The Saab story is very much a story of a few dedicated and highly individualistic men, who's ideas have made the Saab cars different from any others.

**Gunnar Ljungström**, an engineer by birth and breeding, was put in charge of Project 92. He had no direct previous experience of car design ; but coming from a great family of engineers and inventors, he possessed the kind of all-round technical sense that makes no feat impossible. In the Swedish patent register, the Ljungström family takes up a whole section by themselves. Great grandfather

was a silversmith, grandfather an instrument maker, father and uncle inventors and constructors of great distinction. Of Gunnar's four brothers only one did not become an engineer.

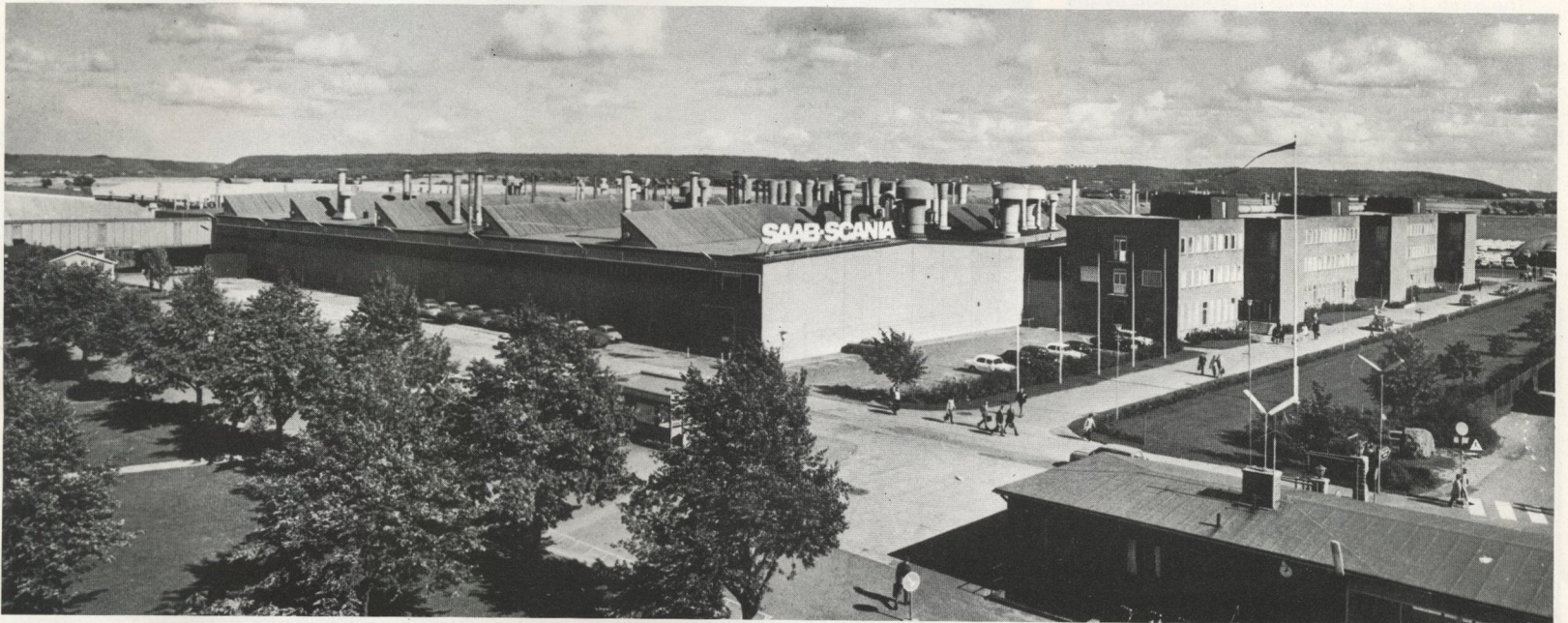
After graduating from technical University in 1932, Gunnar Ljungström went to England to develop an automatic transmission, designed by his father. After four years he returned to Sweden, taking up a job as draftsman in a Trollhättan factory and finally moving to Saab in Linköping in 1939. During the war years he led a 'wing group', specializing in structural design.

#### **Project Saab 92**

With a team of only fifteen draftsmen and engineers, Ljungström started work on Project KP-92. His task was a formidable one. In 1945, those automotive industries that were not in ruins were busy putting war time production back to normal. Steel was scarce and component manufacturers could not deliver sufficient supplies to their old customers, much less take orders from a newcomer like Saab.



On this page: the extension of the Trollhättan factory that became operational around the end of 1959 at a cost of over 10 million dollars, viewed from the tower rising above the older facilities (see previous photo). The body-in-white lines have remained here, serving by underground conveyor the new paint shop and final assembly; the long three storey building at right houses the main administration offices.



Almost every single part in the Saab experimental car had to be locally manufactured or borrowed from used prewar cars.

There were no Motor Shows being held at that time and the normal 'exchange of ideas' in the technical world still suffered from the isolation imposed by the war years. There was very little opportunity to see and study what the competitors were doing.

" Luckily ", Ljungström says today, " there was a car scrap yard near our Linköping office. There we bought pre-war cars, which were used as samples for our preliminary studies ".

In Sweden, a country with long distances, a severe winter climate and at that time, very primitive roads, big American cars were favoured. They were the only ones thought to be able to stand up to the tough conditions. The only existing Swedish car manufacturer, Volvo, worked to that order: producing cars that very much resembled the American.

In the last prewar years however, there

was a marked trend towards an increased popularity for smaller cars. In 1939 Dkw was a best-seller in Sweden and a market research conducted by Saab, showed that this type of car would continue to sell well even after the war. So a small car it should be.

The mechanical simplicity of the Dkw, with its two-stroke engine and front wheel drive that concentrated the power train at the front and left the rest of the car useable to the full for passengers and luggage, appealed to Ljungström. He was less impressed with the sketchy bodywork, the comparatively heavy weight and the poor performance.

To an aircraft engineer the solution was obvious. By using aircraft techniques of monocoque body construction, the car could be rigid, without making it unduly heavy. A small engine with a limited power output was a necessity, but by applying the aircraft experience of aerodynamics, it would be possible to give the car a fair turn of speed.

The use of a two-stroke engine was a

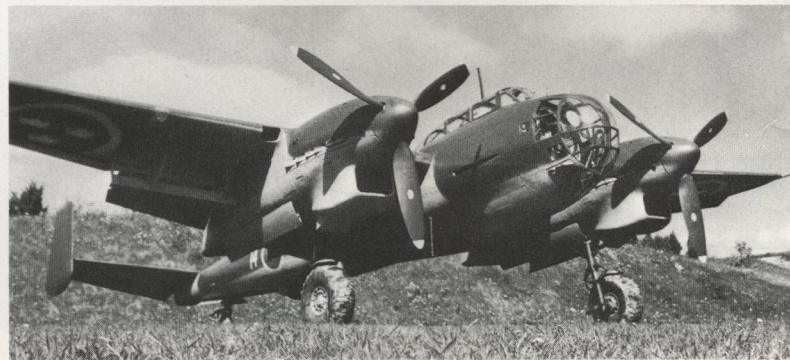
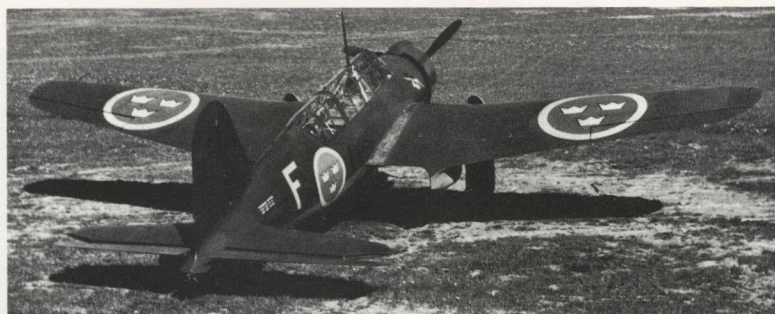
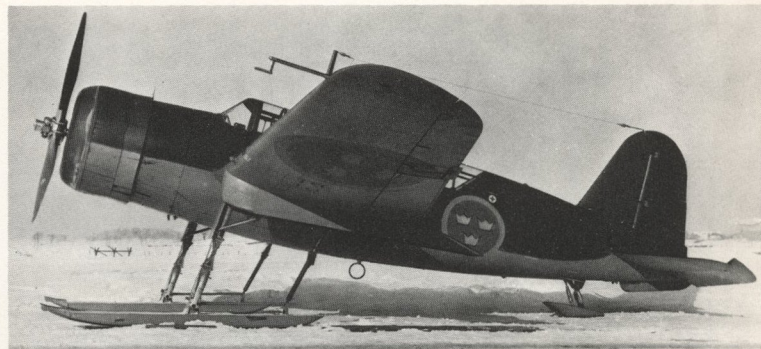
controversial subject, even in those days, and would later prove to be a handicap. But the success of Dkw no doubt influenced the decision. More important however was that a two-stroke would be much easier to manufacture than a four-stroke, it would need less costly factory equipment. Important points indeed, to a factory starting from scratch. Also, in those days, the reliability of small high revving four-stroke engines was not all that one could ask for, especially not under conditions where long distances had to be covered in a short time.

The following document, a ' short justification of construction ' written by Gunnar Ljungström on February 5, 1946 and translated in full, is of great interest to students of the Saab car:

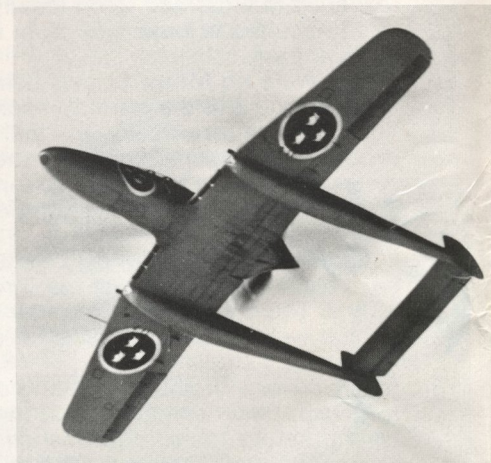
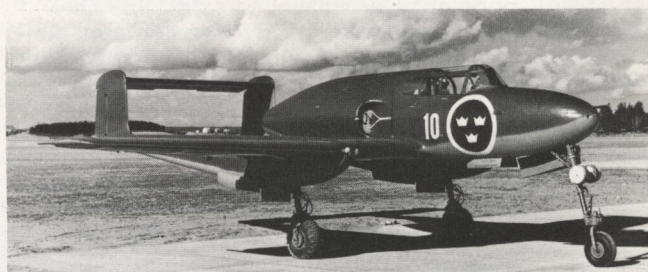
" The vehicle shall in relative price bracket correspond to the pre-war Dkw, Ford's smaller models, Opel Olympia, etc. The chosen design can immediately be characterized as a modernized Dkw. The modernization involves mainly: streamlined body shape (reduced drag),



In the years 1938/39 the first Saab aircraft was being developed while first in Trollhättan and later also in Linköping production under German and American licenses was under way. The **Saab 17** (two pictures above) — an all-metal single-engined two-seater dive bomber and reconnaissance aircraft — made its first flight in the spring of 1940. The characteristic fairing of the main landing gear permitted also the adoption of fully retractable skis. Over a period of four years, 325 units of this aircraft were built in a number of different versions, including a hydro. The Saab 17 was followed in production by the twin-engined **Saab 18** (center, first flight summer 1942) built up to 1949 for a total of 245 aircrafts. This reconnaissance/bomber with leftward offset cockpit had two different types of power plant: the 18A with the Swedish copies of the 1000 hp Pratt & Whitney Twin Wasp (same as the Saab 17) and the 18B with the 1500 hp Daimler Benz, built under license by Svenska Flygmotor AB in Trollhättan. At the time of its operational debut in 1944, it was one of the world's fastest piston-engined all-metal bombers (600 km/h) and remained in active service up to 1959.



The summer of 1943 witnessed the first flight of the single-seater **Saab 21** (below, right) the only aircraft with twin-boom and pusher propeller configuration to be built in quantity (over 300 units since 1944) during World War II. It was one of the very first planes to be fitted with ejection seat. Its 21R version was the first Saab jet aircraft, with a De Havilland Goblin engine. The prototype was flight tested in 1947 and a total of 60 units were produced in 1949/50.

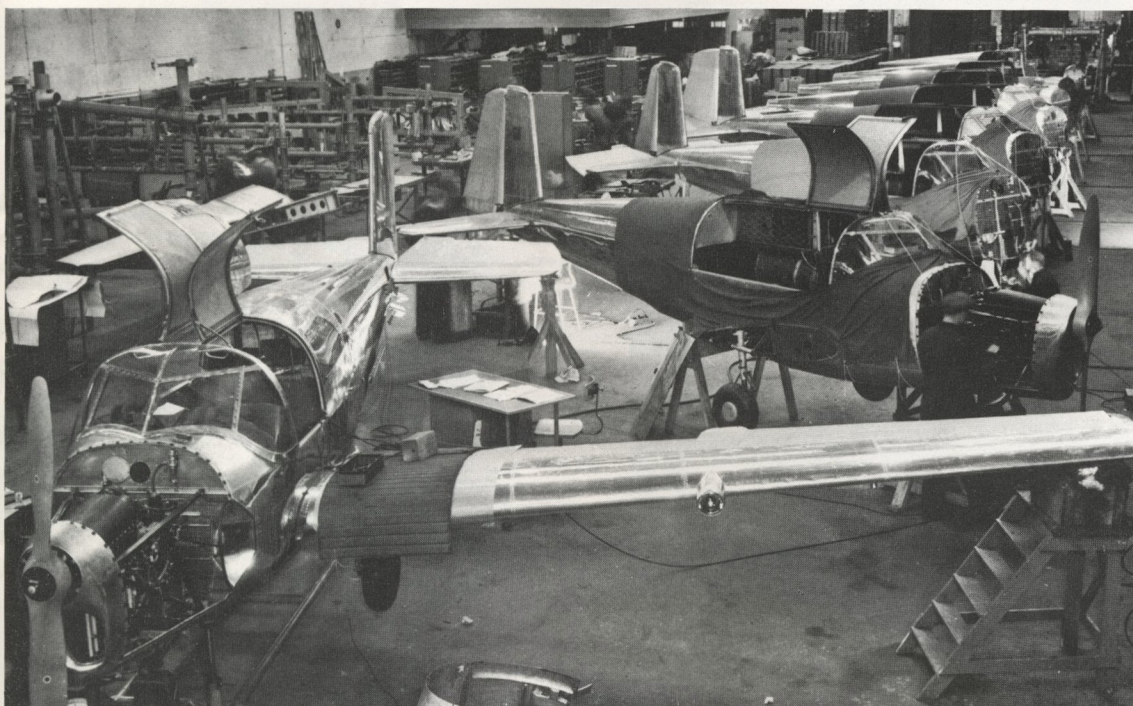




The Saab post-war civil aviation production included the twin-engined airliner Scandia (bottom, previous page) and the all-metal, single-engined tourer and trainer Safir (this page).

The **Saab 90 Scandia**, built from 1949 to '55 in 18 units, had different accommodation arrangements from 24 to 40 seats and remained in service with different Scandinavian and Brazilian airlines until 1965.

The excellent **Saab 91 Safir** flew for the first time in December 1945 and stayed in production (also in Holland) for more than 20 years; units built totalled 323 in four versions with different engines, initially as a three-seater and since 1953 (Saab 91C) as a four-seater. Adopted as a basic trainer by Sweden, Ethiopia, Norway and Finland, it served also for commercial pilot training in the Netherlands and Indonesia as well as Klm, Lufthansa and Air France airlines.



unitized body construction without separate frame (reduced weight), increased engine power (20%), softer springing, lowered centre of gravity with at least comparable ground clearance and headroom.

A streamlined body often brings excessive length and weight. This project, however, reveals a car that is shorter and lighter than Dkw, thanks to the following measures:

The engine is placed in front of the front axle, which has made it possible to place the driver's and front passenger's feet between the front wheels.

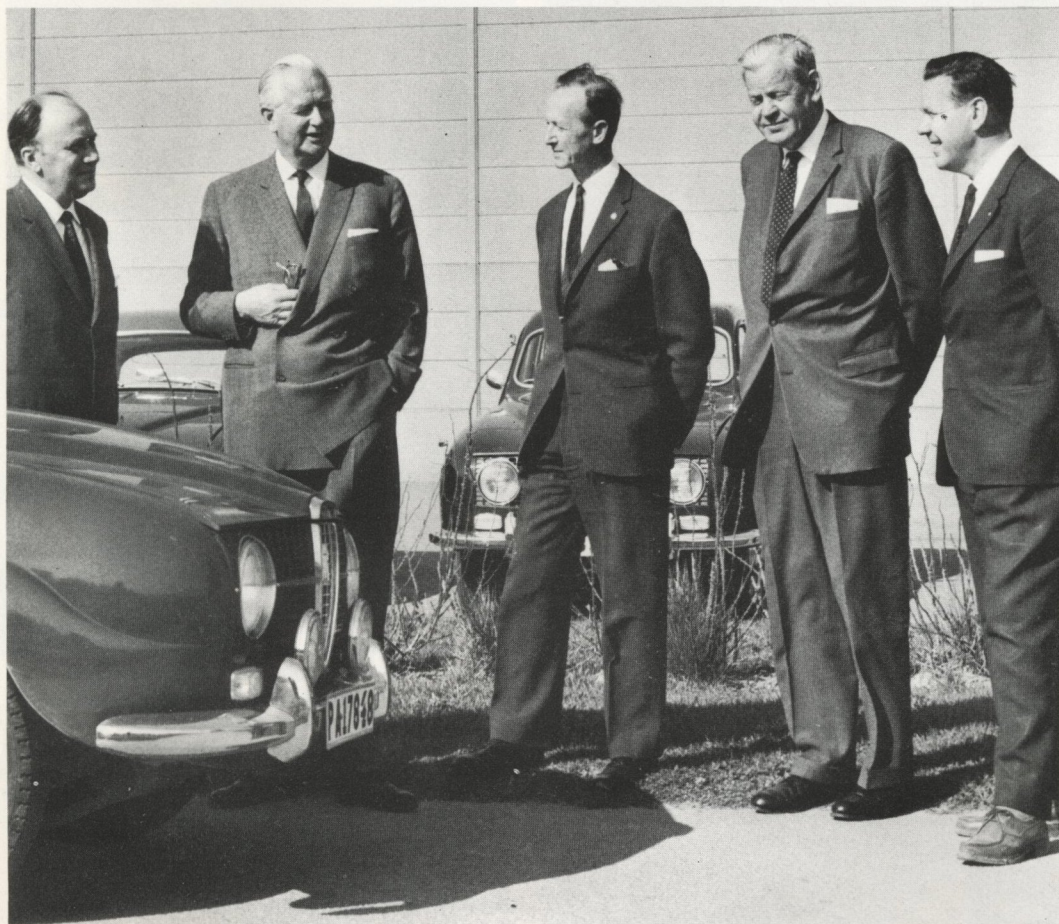


Furthermore, the rear passengers have been placed unusually low, which permits an elegant shape to the rear end of the roof. Weight saving has been achieved, partly by the elimination of the frame, partly by that the great loads from the wheels (in the spring mounts) have been conveyed into the body immediately in front of, respectively behind, the passenger compartment, whereby a minimum of material need be used.

It should be possible to increase the engine power somewhat without increasing the Dkw engine dimensions by the adoption of slide feeding of the crank case (applied in outboard marine engines since several years) and a cylinder head of light alloy. Both measures bring a small cost increase, but need laboratory tests. Also other measures are investigated.

The electric starter motor and the generator are intended to be combined into one unit (dynastart) in the same way as in Dkw. Should it prove impossible to find a manufacturer of this unit, the engine can be made with a conventional starter and generator, which can be bought. This alternative is shown in draft 92.8005. Softer springing can be chosen because, among other things, lighter unsprung parts are being used. Rim construction like Fiat's





This 1965 photo shows five of the leading characters in the Saab saga, repeatedly quoted in the text: from right to left. Rolf Melde, Sixten Sason, Gunnar Ljungström, Tryggve Holm (PdG) and Svante Holm.

Opposite page: some of the more representative design drawings by Sixten Sason; dates are (top down) 1934, 1935, 1937 and 1939 (last two); 1941 for the jet aircraft.

**Gunnar Ljungström** - Born on September 8, 1905, Gunnar Ljungström is a scion of a family that has long been famous in Swedish engineering circles. Following what was almost a family tradition, he studied engineering at Kungliga Tekniska Högskolan (the Royal Institute of Technology) in Stockholm and graduated in 1932

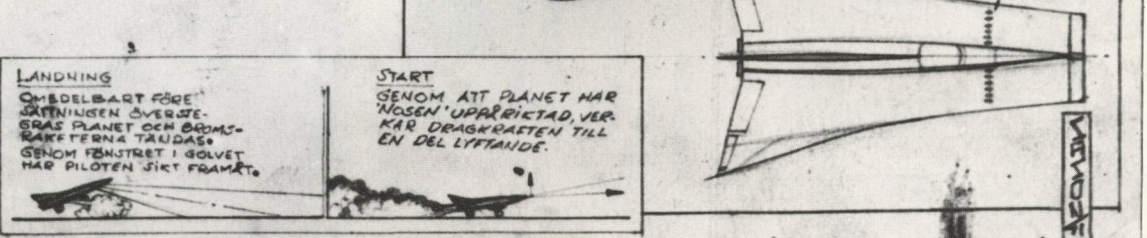
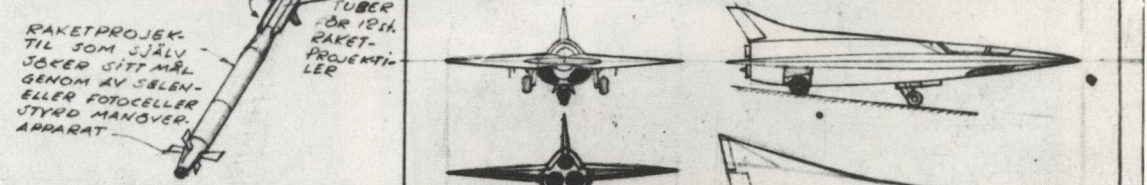
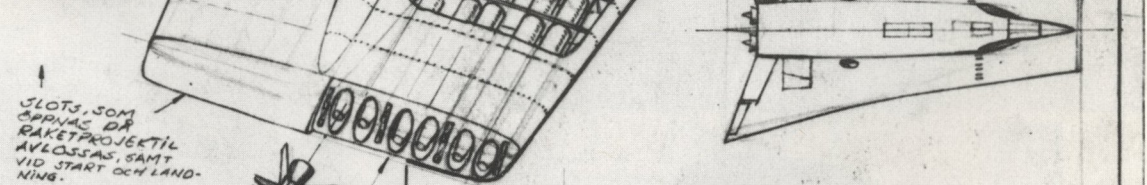
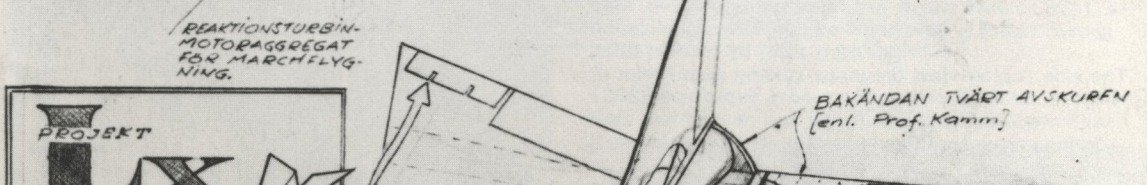
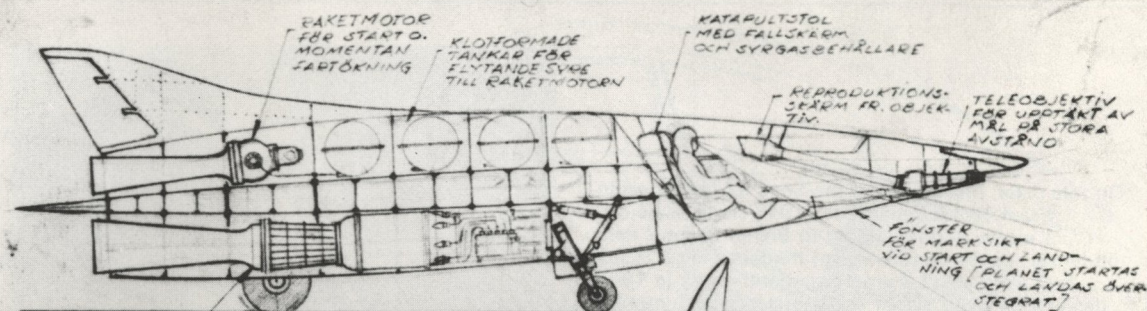
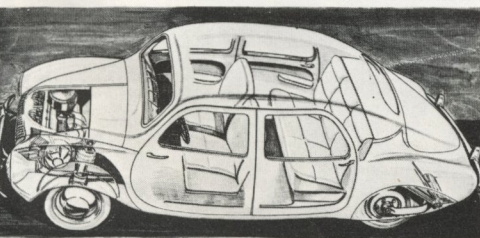
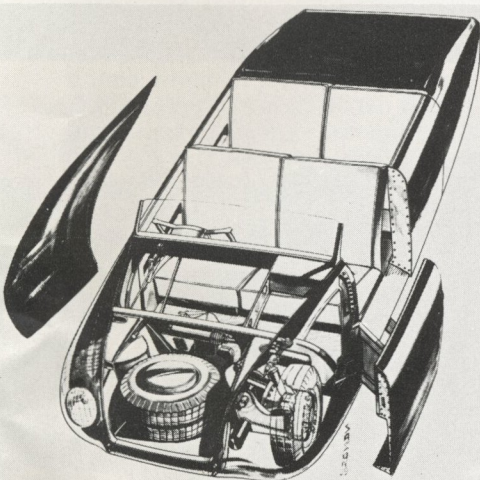
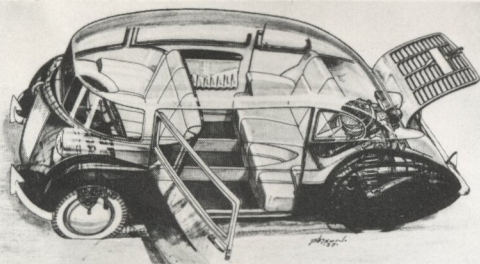
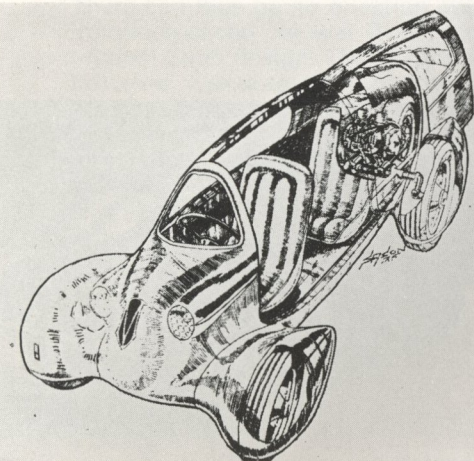
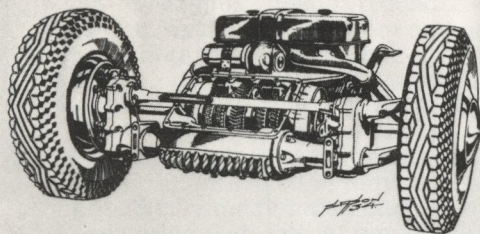
as a Mechanical Engineer. His first job involved the development of a mechanical automatic torque converter designed by his father, Frederik Ljungström. This work was pursued at A.C. Wickman Co. Ltd., Coventry (England) from 1932 to 1936. Back in Sweden, he joined Nohab Flygmotorfabrik in Trollhättan to do design work on engine accessories. In 1937 he joined the newly founded Saab where he was to spend the rest of his working life. From 1937 to 1944 he led the aircraft wing structure design group (Saabs 17, 18 and 21). From 1945 until 1967 he headed the design and testing of the various Saab cars. From 1967 he began transferring this function to Rolf Melde and others, and in 1970 he became a full-time

consultant to the passenger car division for design and engineering questions.

**Sixten Sason** - Born on March 12, 1912 in Skövde, western Sweden. His family name was really Andersson and he derived his artist's name from S A (nders)son, using Sason as the signature on all his work. Sixten Sason's father was a 'bildhuggare', something of a stonemason/sculptor who helps artists and architects in realizing their creations in stone. After completing about 8 years in school, Sason went to Paris on his father's urging to study art and was apprenticed to Swedish artists living there. He returned to Sweden and served as pilot in the Air Force, where he was trained as a pilot. He took employment at the Skövde depot of the Husqvarna company (small-arms and motorbikes). Someone on the staff there saw Sason sketching motorbikes and sent his artworks to headquarters. The engineering department immediately offered Sason a job in their design office.

A crash in a military plane put him in hospital and convalescence for nearly four years. He used this time to study engineering by correspondence, mainly to hold his own when arguing with Husqvarna's engineers. After recovery he continued working for Husqvarna (and other companies) now as a design consultant; and also began free-lancing as an illustrator for motoring journals as well as for 'romance' magazines and religious journals. During the war he joined Saab to make drawings — including complex phantom and exploded views — for aircraft manuals. His drafting skills were used in an unusual way at this time: when a German V-1 rocket overshot its test-target in the Baltic and crashed in Sweden, Sason was called in to draw the fragments and was flown on a special mission to Britain where they were shown to British experts. When the decision to develop a car got underway at Saab, Gunnar Ljungström, well aware of Sason's reputation as a motor illustrator, asked him to submit a design for the front-wheel driven, 4-5 seater they had in mind. His first submitted sketch was accepted. Shortly after the end of the war, Sixten Sason set up on his own again, starting his firm of Sason Design AB. Already recognized as a pioneer of industrial design in Sweden, Sason's services were called upon by Electrolux who asked Saab if they knew anyone who could design in sheet metal. For Electrolux he designed mainly vacuum cleaners. His pre-war client, Husqvarna, now broadened their product range with sewing machines, irons, kitchen equipment and electronic ovens: all done by Sason Design. His firm also did some work for ASJ in designing buses and passenger trains. In 1955 he was consulted by Victor Hasselblad in designing the module system for the SLR Cameras. Sason Design AB was mostly a one-man firm, and over the years he had only two employees: Peter Maddock, an English architect who came to Sweden in the mid-1950s and Björn Envall, an 18-year old student at the Academy of Applied Art (Konstfack) in Stockholm, when he showed Sason his car drawings and was immediately hired. Today Maddock has his own design firm and Envall is head of the design department at Saab in Trollhättan. Sason went on working for Saab as a consultant until his death. It was his ideas, interpreted by Ljungström and Envall, that resulted in the Saab 99. Ironically, he never saw the final fruit of this endeavour. His health was always poor after the air-crash which had left him with a single lung, and on April 1, 1969 he died — only seven months before the Saab 99 was unveiled for the international press.





# PROJEKT **Lx**

ÖVERLJUDSPLÅN  
FRAMDRIVET AV TVÅ  
REAKTIONSTURBINMOTORER,  
SAMT VID START OCH UNDER  
STRID MOMENTANT AV EN  
RAKETMOTOR SOM YTTERRIGARE  
KRAFTKALLA.

PLANET MÅSTE PÅ GRUND  
AV DEN HÖGA FARTEN  
RADIODIRIGERAS FÖR  
MARKEN, SAMT HA MÅL-  
MEDEL SOM GÖR DET MÖJLIGT  
FÖR PILOTEN ATT SE PÅ  
STORA AVSTÅND - EGEN-  
DELVIS EN KIKARE  
SOM PÅVERKAR FOTO-  
CELLER VILKA DÅ EN  
SKÄRM REPRODUSERA  
MÅLET.

AVGASÖPPNINGAR  
FÖR RAKETPROJEK-  
TILERNA.

SLÖTS, SOM  
ÖPPNAS DÅ  
RAKETPROJEKTIL  
AVLOSSAS, SAMT  
VID START OCH LAND-  
NING.

RAKETPROJEK-  
TIL SOM SJÄLV  
JÖKER SITT MÅL  
GENOM AV SELEN-  
ELLER FOTOCELLER  
STYRD MANÖVER-  
APPARAT

TUBER  
FÖR 1200  
RAKET-  
PROJEKTIL-  
LER

LANDNING  
OMGIVELSBART FÖRE  
SÄTTNINGEN ÖVER-  
GRÄS PLANET OCH BRÖMS-  
RAKETTERNA TÄNDAS  
GENOM FÖNSTRETT I GOLVET  
HAR PILOTEN SIKT FRAMÅT.

START  
GENOM ATT PLANET HAR  
'NOSEN' UPPRÄKTAD, VER-  
KAR DRAGKRAFTEN TILL  
EN DEL LYFTANDE.

RAKETMOTOR  
FÖR START O.  
MOMENTAN  
SÄTTNING

KLOTFORMADE  
TÄNKAR FÖR  
FLYTANDE SVAR  
TILL RAKETMOTORN

KATAFULTSTOL  
MED FALLSKJERM  
OCH SYRSGASBEHÄLLARE

REPRODUKTIONS-  
SKÄRM FR. OBJEK-  
TIV.

TELEOBJEKTIV  
FÖR UDSIKT AV  
MÅL OCH STORA  
AVSTÅND

FÖNSTRETT  
FÖR MANÖVER  
VID START OCH LAND-  
NING (PLANET STARTAS  
OCH LANDAS ÖVER  
STEGRAT)

BAKÅRÄNDAN TVÄRT AVSKURFEN  
(enl. Prof. Kamm)

BRÖMSRAKET-  
MOTOR, RIKTAD  
SNETT NEDÅT  
FRAMÅT

INTEGRALTÄNKAR  
FÖR BRÄNSLE TILL  
TURBINERNA OCH  
RAKETMOTORERNA

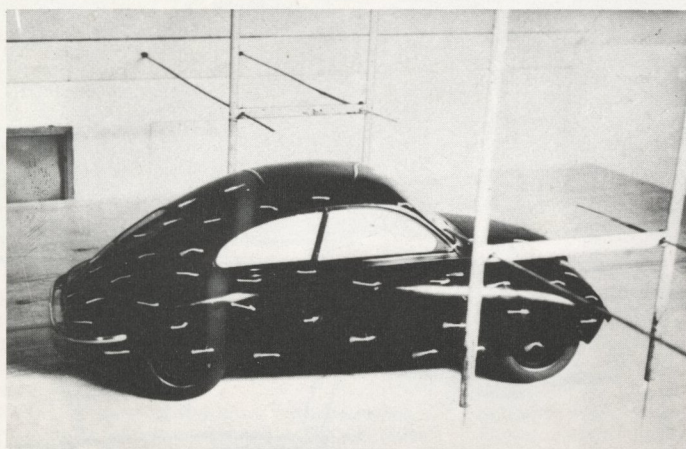
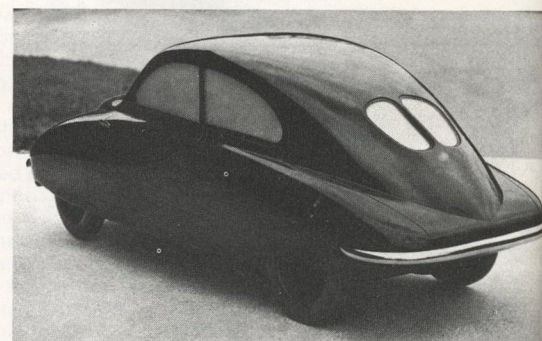
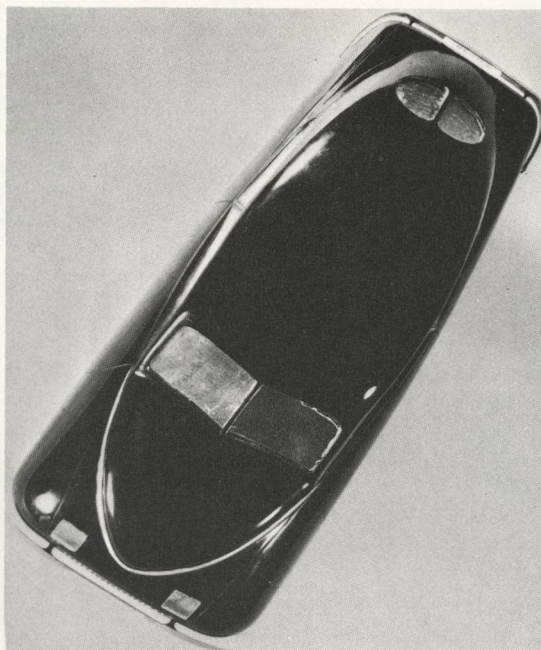
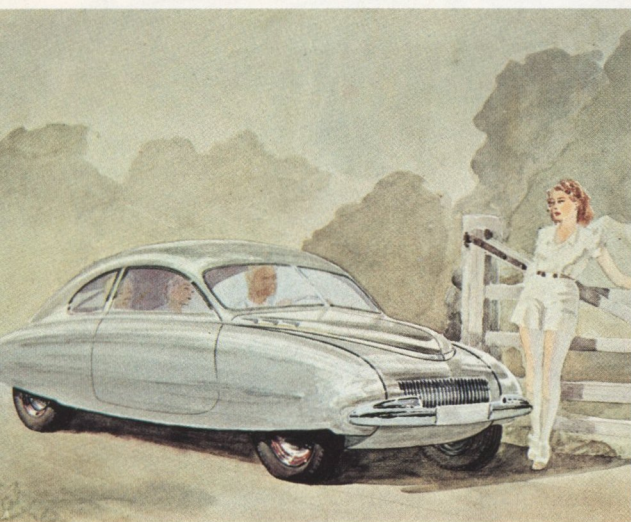
MANÖVER



On this page, first stages of the Saab 92 body design.

From center, clockwise: 1945 small-scale clay model corresponding to Sixten Sason's early rendering; quarter size wooden model called X 9248; first experimental prototype hand-made in 1946, designated Saab 92001 and registered with number E 14783; wind tunnel testing of model X 9248, here shown with 15° yaw angle and air flow visualization (leeward side) by woolen tufts.

The side & plan-view drawings (facing page) refer to the first Saab 92 production model. Prototype 92001 with modified front end (grille and headlamps) after being driven for thousands of miles under the most critical environmental conditions (see photo on following page) is now an exhibit in the Saab museum.

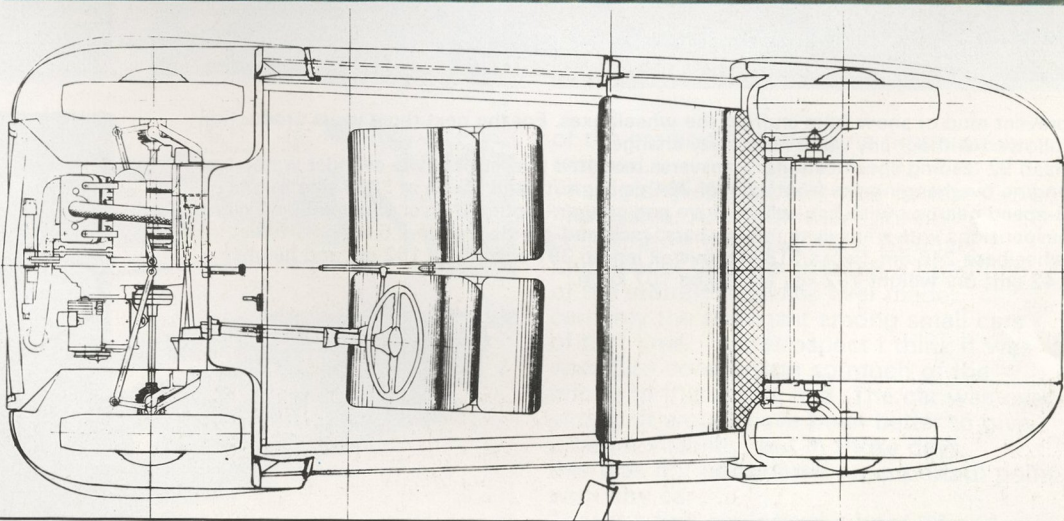
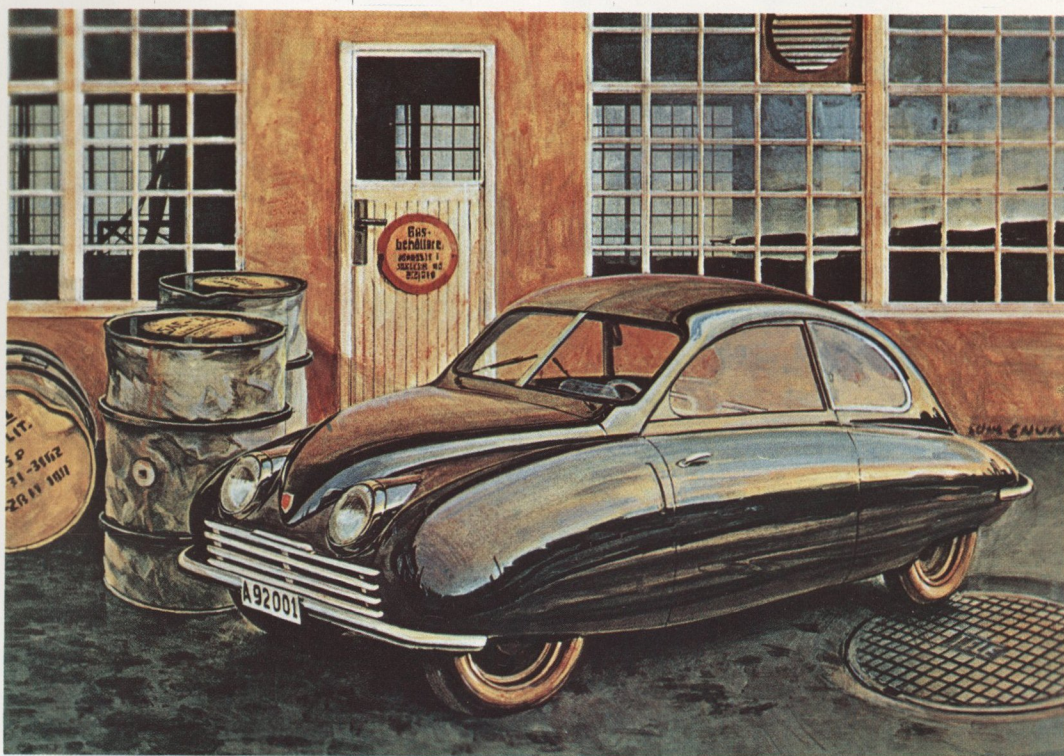
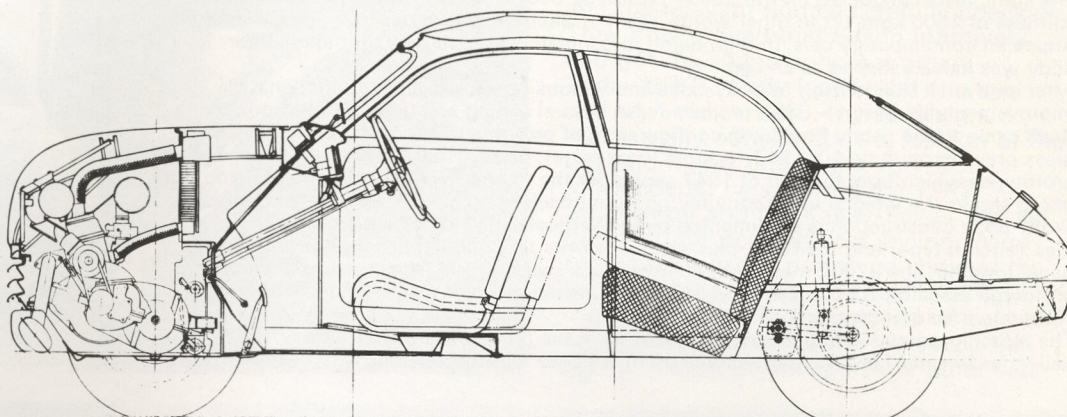




15" rims reduce weight around 2 kg per wheel. Torsion springs front and rear contribute at least as much. Roll in cornering is counteracted by the low centre of gravity (appr. 10 cm lower than Dkw). The centre of gravity has been lowered by placing the passengers in a low position, which in turn is made possible by the floorpan underside concurring with the car ground clearance". There can thus be no question about the influence of the pre-war Dkw in the original Saab design. The bodywork however, was something entirely different, which brings us to the next important person in the Project 92: the late **Sixten Sason**. "He was a genius", Gunnar Ljungström says. "An engineer with an artistic talent, or an artist with an engineering mind. Whatever way you looked upon him, he possessed that rare combination. He would never let a pretty shape stand in the way of function. With his engineering background and common sense approach to styling problems, he was an ideal partner to work with".

During the thirties Sixten Sason was both a designer of motorcycles for Huskvarna and a successful technical illustrator, drawing detailed idea sketches of future cars and aeroplanes for popular technical magazines. In many respects his ideas showed an amazing foresight. In 1934 he drew an engine-gearbox combination that looks remarkably like the transverse engined Mini, 25 years later. In 1941 he published a detailed drawing of a supersonic attack plane of the flying wing type, a design which in some ways is stunningly reminiscent of today's super advanced Saab Draken and Viggen, complete with integral fuel tanks. This at a time when jet planes were hardly known! During World War II, Sixten Sason was employed by Saab, heading their technical illustration department, where he drew aircraft parts for service instructions and manuals.

At an early stage in Project 92 he was called in to supply some styling ideas for the coming car. Here he was able to draw on his experience as a motoring magazine illustrator and his own visions of a fwd car. In view of the aerodynamical and structural efficiency of the finished car — in itself no surprise, coming from an aircraft factory — it is still astonishing to hear Gunnar Ljungström tell how it came about: "Sixten just walked in with a sketch of the car. Everybody liked it, and it was accepted right away. It filled all our demands upon size, interior space and so on, and it looked tremendously smart. We wanted something that resembled an aircraft, not only for functional reasons, but also to make the customers feel the family ties with the aircraft production". Naturally, before the car was actually put

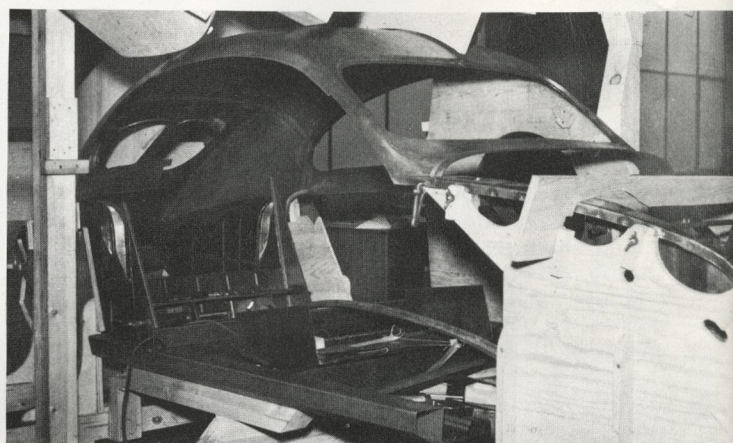
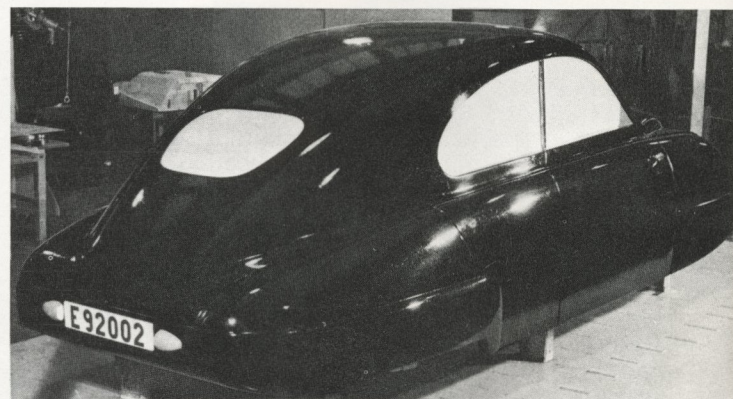
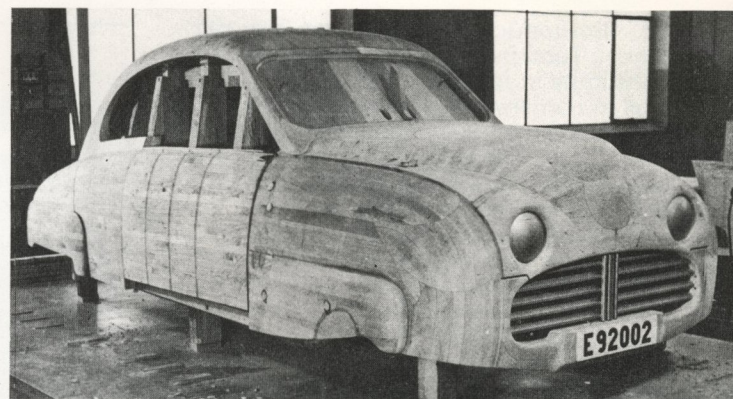




The static tests conducted on the 92001 prototype body have revealed a torsional stiffness of 1600 kgm/1°! In other words, the first Saab 92 was about four times as stiff as American contemporary cars, though being in comparison much narrower and lighter: its body was indeed shaped as an egg.

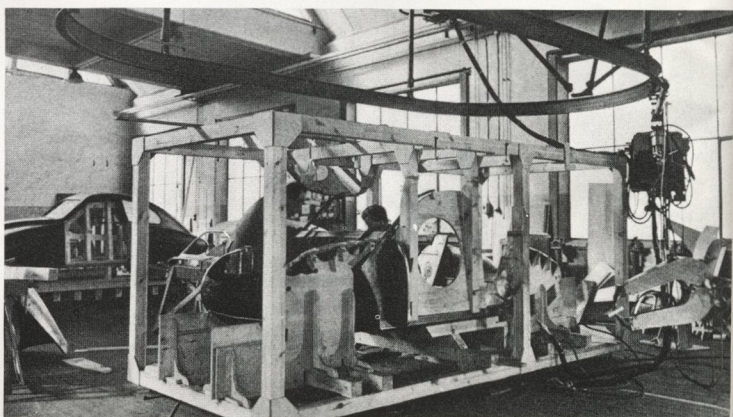
After an overall slenderizing of body sides and various other appearance/functional improvements by Sason — who proposed also several styling solutions for the front end — Saab came to the nearly final body configuration of prototype E 92002, unveiled at a press preview on June 10, 1947 (bottom, next page). The E 15892 is one of the hand-made prototypes which from the end of 1947 served for the final development of the car (top right photo shows the integral underbody fairing from which only the exhaust pipe protrudes). Proto-body construction is documented by the vertical sequence alongside: initially zinc dies (aircraft type) and then iron-plus-steel dies from the wooden jig were used for outer panel forming; the 92002 master-model was black painted and (shoe)polished; the prototype assembly fixture also served as experimental setup of methods and tooling for subsequent volume production.

The more conspicuous modification introduced in the production Saab 92 body (first deliveries in early 1950, center pictures on next page) was the opening of wheelarches to

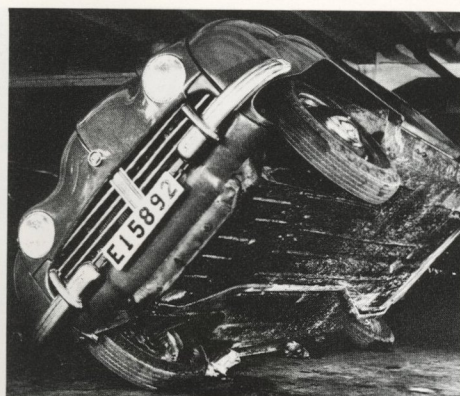
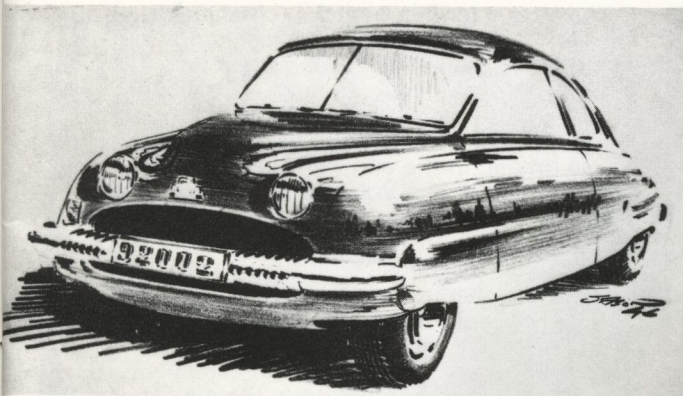


prevent mud or snow from stuffing the wheelboxes. For the next three years production followed without any other noteworthy changes.

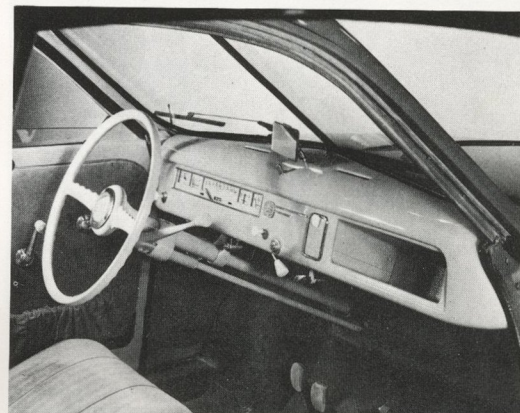
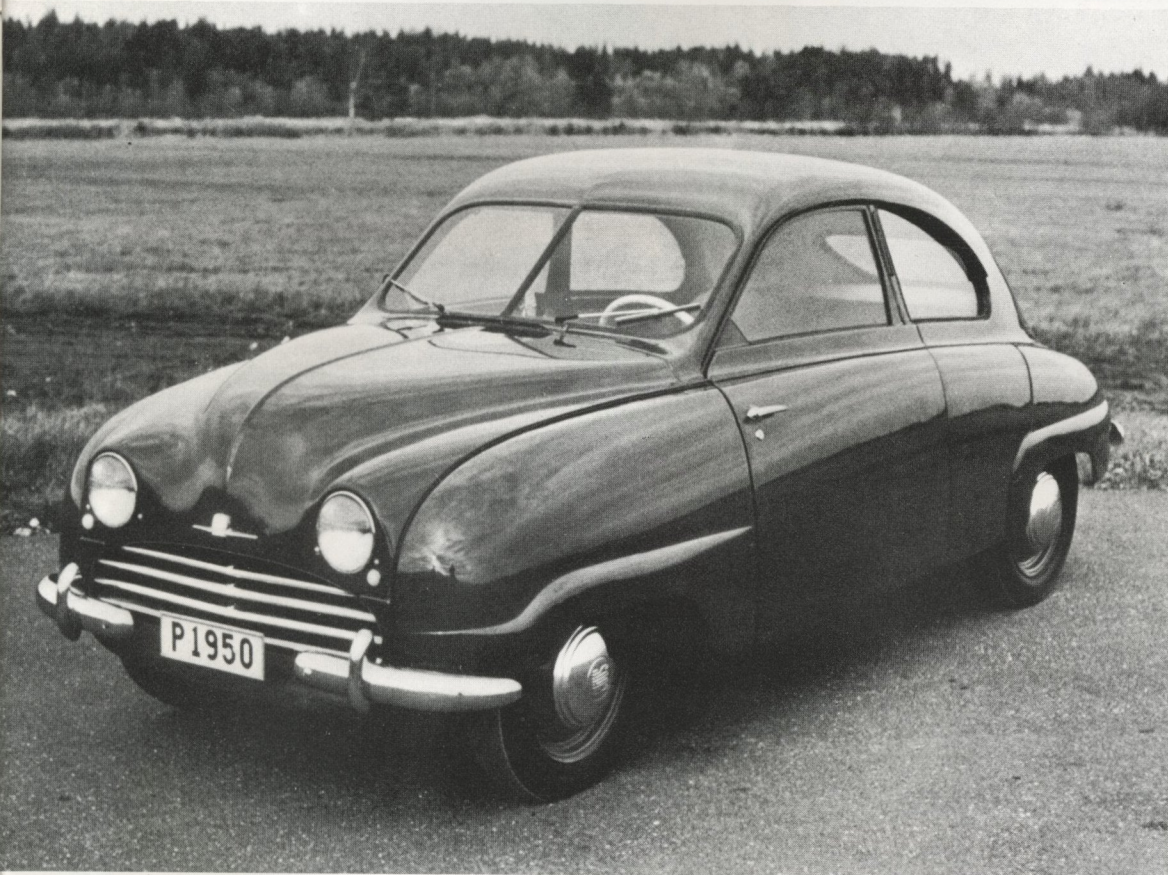
Saab 92 leading specifications: transverse mounted two-stroke two-cylinder water-cooled engine overhanging the front axle, of 764 cc capacity and 25 hp at 3800 rpm output; 3-speed gearbox with free-wheel-drive and column-mounted lever; independent-wheel suspensions with transverse torsion bars; rack-and-pinion steering, 5.00 x 15 tyres; wheelbase 246 cm, tracks 118 cm, overall length 391 cm, width 162 cm and height 142 cm; dry weight 762 kg; top speed 107 km/h.







into production, it was wind-tunnel tested and the relevant figures carefully checked. They only proved that Sason intuitively had got the shape right first time. Today the 92 body looks a bit strange, and so it did in 1946. It was designed without any concern for the fashion of the day and it was one of the very first full-fendered cars, before the 1947 Studebaker and the Kaiser-Frazer had set the trend for post-war car styling. Wind tunnel tests of the prototype showed the remarkably low drag coefficient of 0.32. The abolition of fully enclosed wheels and other detail modifications increased this figure to 0.35, still way below other cars



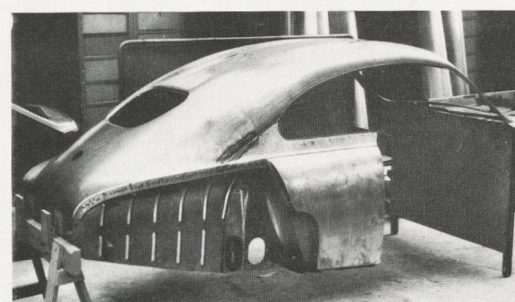
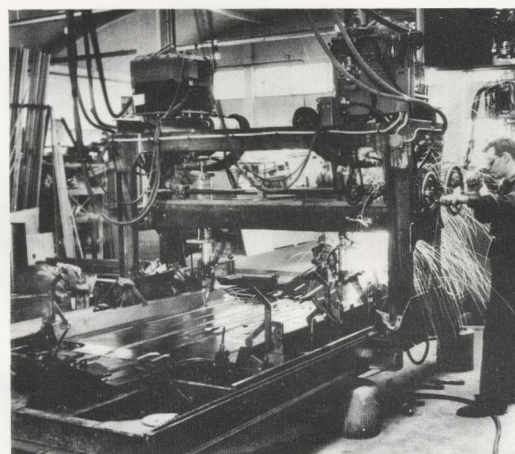
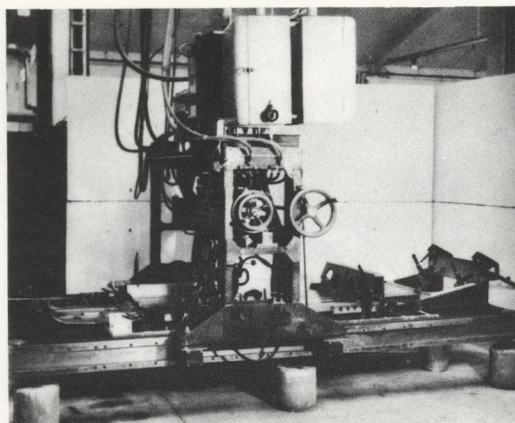
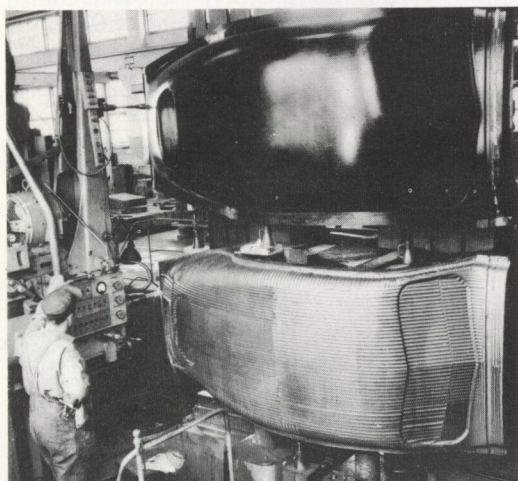
of the era and even today a figure rarely reached.

The rigidity of the body was no less impressive. Although there are no comparative data available, Gunnar Ljungström believes that the 92 had one of the strongest bodies ever made, certainly the strongest among small cars of that time. "In retrospect I think it was wrong to concentrate so much of the efforts to this single end. The car was over strong. It would have been better to give it better visibility, but in those days this was not considered an important point with any car".

That the first car lacked a boot lid and



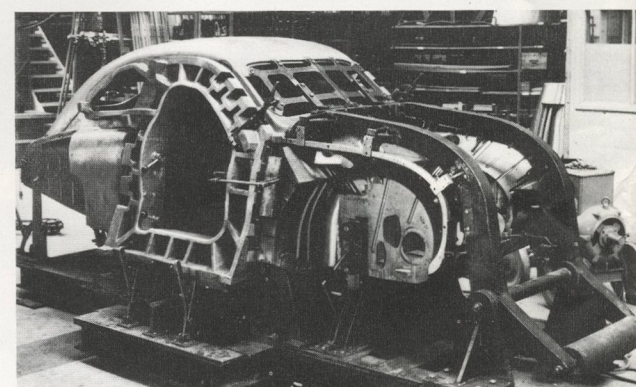
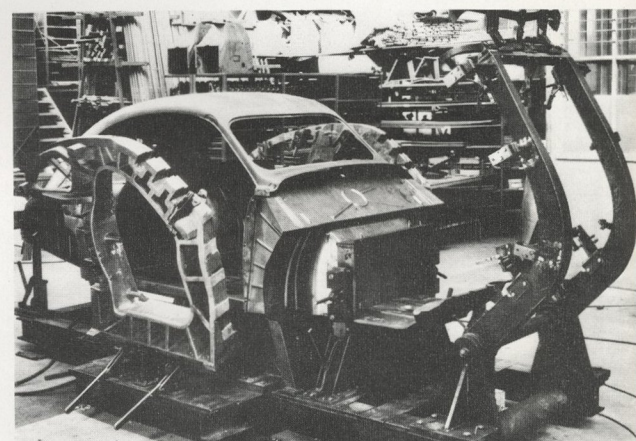
Some of the main stages of Saab 92 early body production (Trollhättan 1950/52) are shown on this page; from the left: roof panel one-piece drawing, underbody multi-spot welding, body assembly in main jig fixture, open and closed. On facing page: three views of welding completion and body-in-white finishing lines; the painted body polishing station; the first Saab 92 that rolled off the assembly line in 1949. Only three cars a day left the factory during the first year of production.



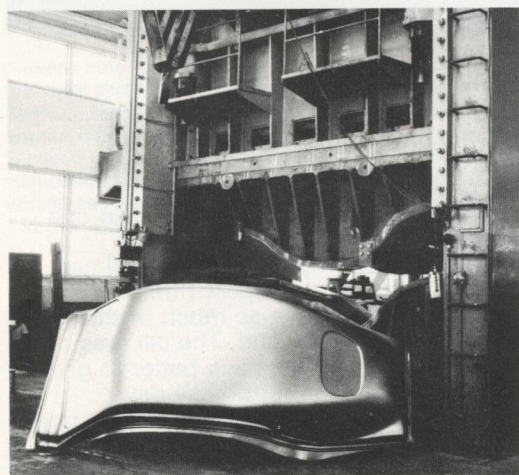
that it had such a small rear window was however not for rigidity reasons. It was purely an economy measure. With the rounded body shape a wider rear window would have to be sharply curved, expensive and difficult to manufacture. At an early stage during the Project 92, Volvo announced that they would make a small car, which would sell at the sensationally low price, of Sw. Cr. 4,400. This came as a shock to the Saab engineers, who, in spite of all kinds of cost cutting measures, came up with a calculated *manufacturing* cost of 4000: almost what the Volvo would sell for to the customers. Naturally the Saab management questioned the abilities of their engineers and ordered all kinds of cost cutting.

"This was a terrible period", Ljungström recalls. "We just could not understand what we had made wrong and had to drop most of the improvements to the car that we had found necessary. The boot lid was a typical detail, but there were many others. In the end, however, it was obvious that it was Volvo that had made a miscalculation, not us. The Volvo became much more expensive than promised, actually more expensive than our car". Converting the Trollhättan aircraft factory for car production involved numerous technical and economical problems. The following notes may serve as an example of the varied tasks thrust upon Svante Holm, the Saab production manager of that time:

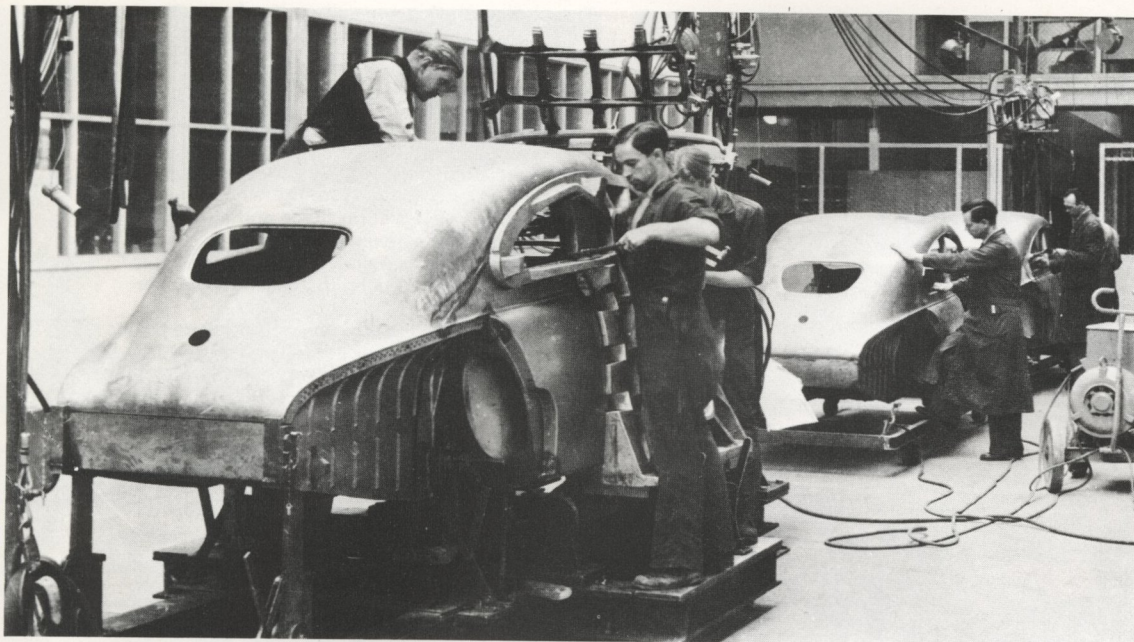
"The post-war shortage of dollars was a major drawback. Any purchase from the United States had to have government approval. An import permit for the huge presses necessary to make the body panels was granted only because they could also be used by the neighbouring



Svenska Flygmotor plant, where jet engines were being made for the Swedish defense department. A government official remarked: "But do you really need presses *that* big to make engines?" All our problems were not over when the presses finally arrived. The crown of the biggest 500-ton press, weighing 90 tons itself,

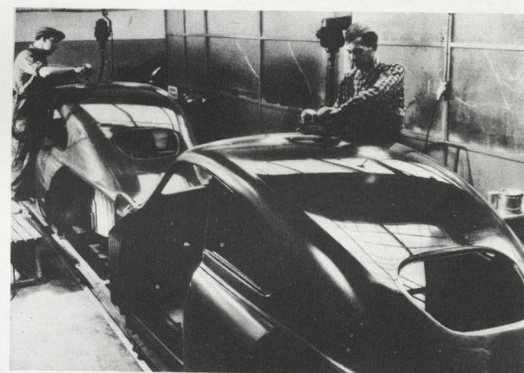
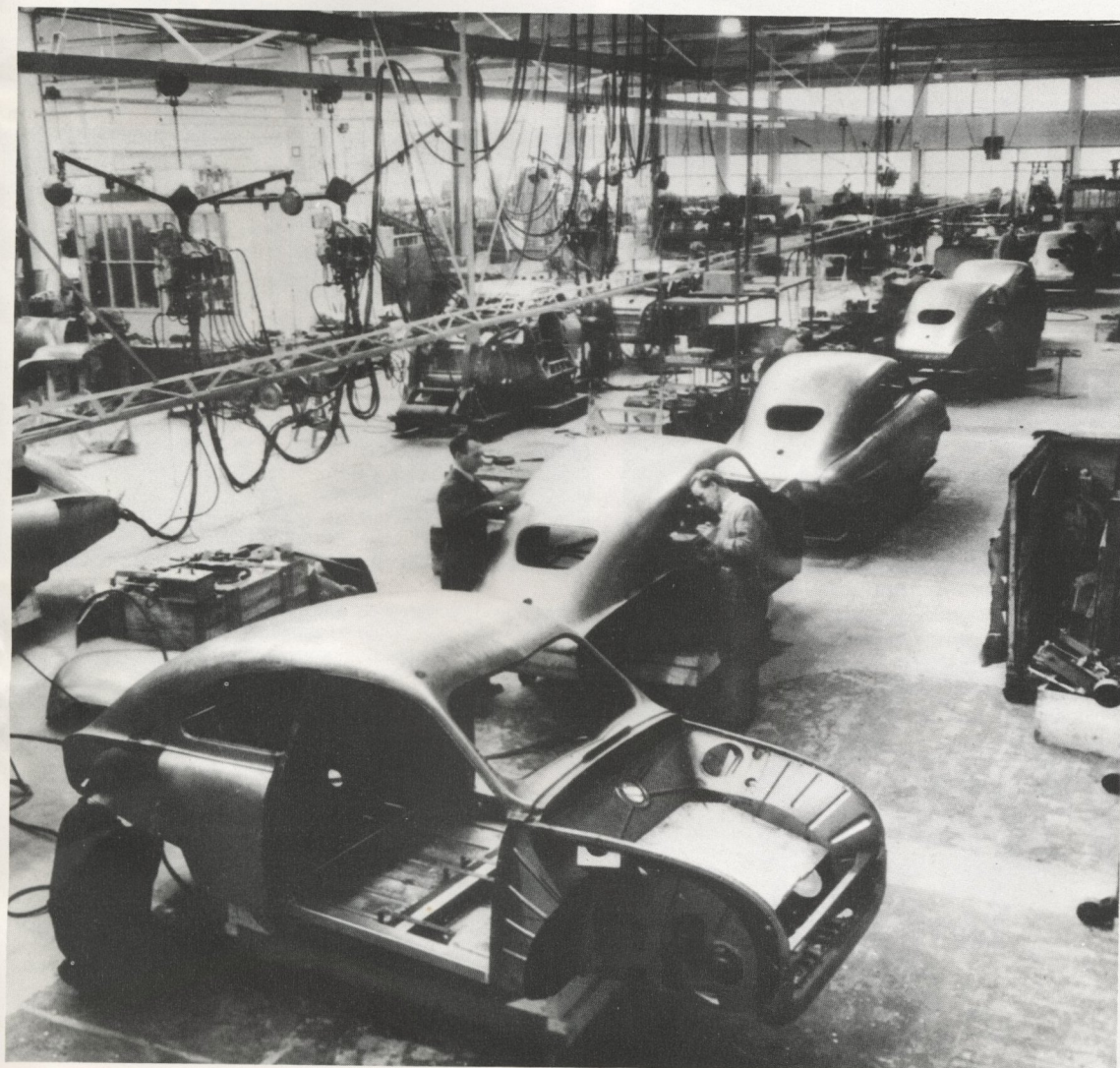
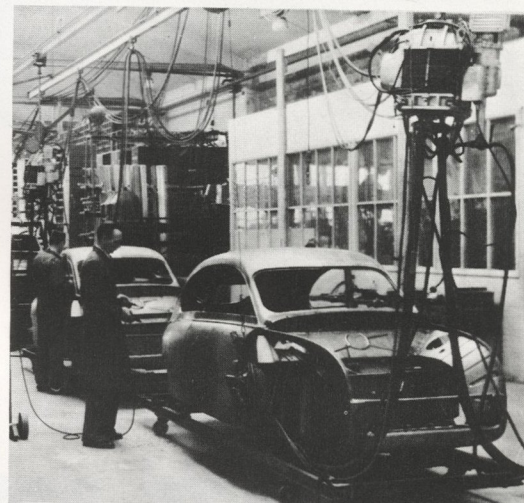






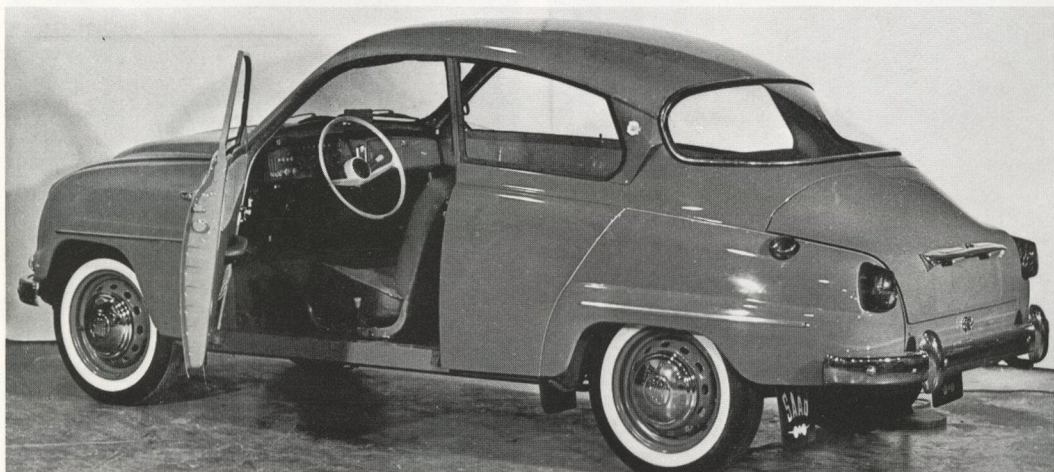
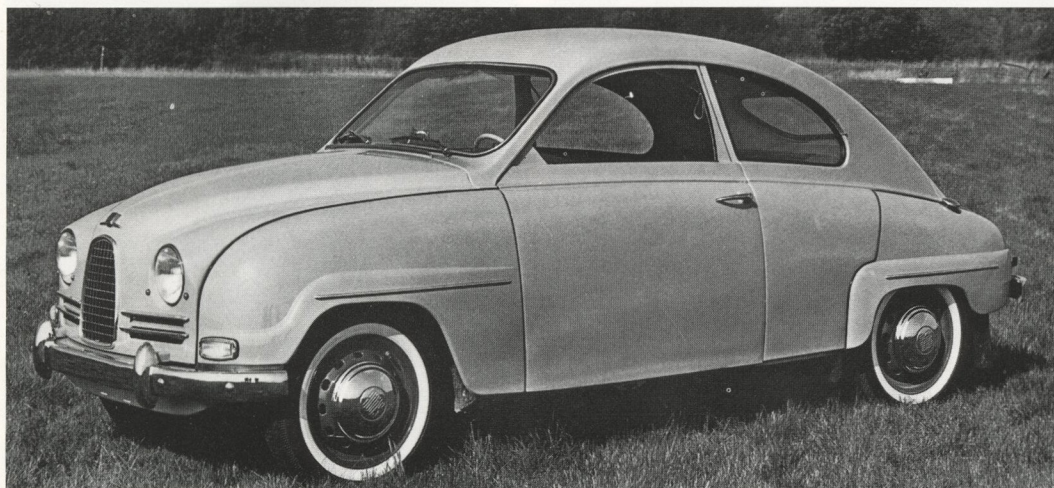
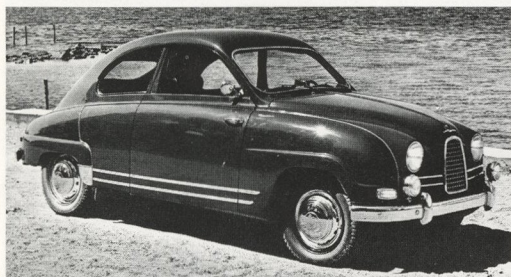
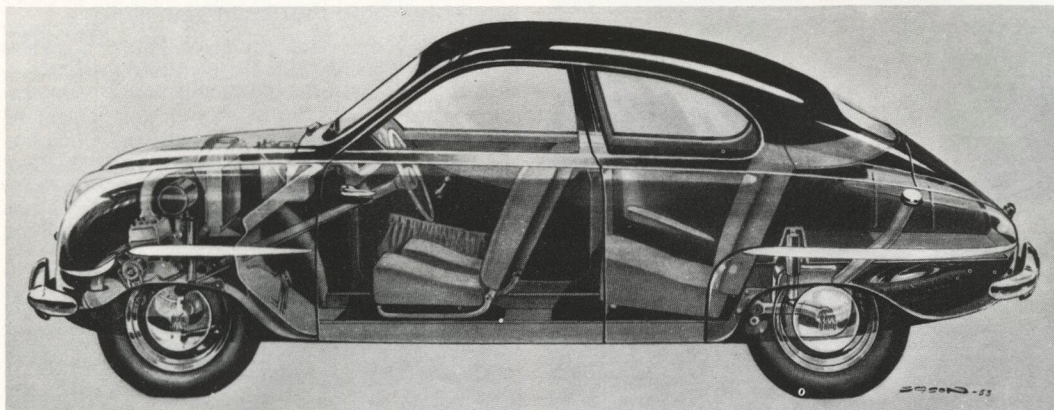
almost wrecked the Trollhättan sluices had to pass a bridge rated for only 10 tons and was finally found to be packed up-side down when it eventually was in place at the factory".

While Saab was busily working on Project 92, Gunnar V Philipson, the Dkw importer and owner of Sweden's largest chain of car dealerships, had just returned from a visit to the German factories and



found everything in ruins. To him it was obvious that it would take many years before he had any cars to sell. Owner of an assembly plant, used in pre-war days to make Dodge cars, he contemplated producing a car of his own, but heard about Saab's plans. A contract whereby Philipson would receive the exclusive





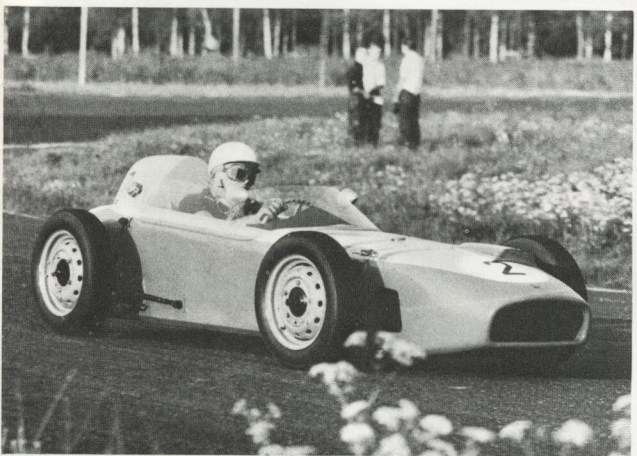
The photos on this page show the **Saab 92** evolution from 1953 to '60. In 1953 the back window was enlarged, front seats got curved backrest, several new colours were added to the original green, and at last an outside trunk opening was introduced (Sason's illustration, top). The next year with the 92B model the engine power was increased to 28 hp, the heating/ventilation system improved, the wheels were equipped with ventilation holes and chrome trims added over wheelarches. On March 6, 1954 the 10000th Saab was manufactured; the production rate had been increased to one car every 27 minutes.

Much more important and numerous were the new features of the **Saab 93** model, introduced in December 1955: longitudinal 3-cylinder in line engine of 748 cc and 33 hp, improved cooling, new transmission, coil instead of torsion spring suspensions, U-shaped rigid rear axle, increased wheelbase and tracks, restyled front end with different grille and wings. In 1957 came the 93B, with improved brakes and electrical system as well as a curved one-piece windscreen; during that year a new car rolled out every 17 minutes, representing an annual volume of 10000 units; overall manufacturing area reached 42000 sqm. To the basic 93B model were added in 1958 (2nd top-down photos) the Granturismo 750 version, produced in small series for export with 45 hp engine, 4-speed gearbox and more luxurious interior, and one year later the station wagon version Saab 95. At the same time Saab 93B became 93F with several improvements among which front-hinged doors (third, from top). It was superseded in February 1960 by **Saab 96** featuring a 841 cc, 38 hp engine; a re-designed body rear end with much larger back window, trunk and backseat; a new instrument panel (bottom). During the next five years many detail improvements were introduced: for instance, in 1962 the GT 850 (later known as Saab Sport in Europe and Montecarlo 850 in America) was equipped with a separate lubrication three-carb engine developing 52 hp, plus front disc brakes.

Opposite page, left: first Saab competition entries and first successes in the European rally championships (from top): Greta Molander wins the Women's Cup at the Montecarlo Rally in 1951, a Saab 93 at the '56 Sweden Rally, the experimental Saab Formula Junior designed by Rolf Melde in 1960, Erik Carlsson's overall win at the '62 Montecarlo Rally (repeated the next year).

Front page, right: evolution of the **Sonett** in chronological sequence. Under this name, in 1954/55 Rolf Melde designed — mainly as a hobby — a rakish, speedy, two-seater roadster, shown at the 1956 Stockholm Motor Show and remained a one-off car (photo no. 1). The idea was revived later, though in different form: in the early sixties Sixten Sason and independent designer Björn Karlström separately worked on a sports coupé concept that was to become the Sonett II. Sason's design was rather over stylized (sketches 2 and photo 3) and, therefore, Karlström's more reasonable configuration was preferred (4); it was later re-styled into Sonett III by Italian coachbuilder Sergio Coggiola (5). A partial explanation for Sason's defeat in this challenge may be found in his typical utilitarian approach which led him to retain most of the Saab 96 sedan under-body plus windscreen frame: as a result the waistline was exceptionally high for a sports coupé.





rights to sell the Saab car was drawn up. It had the form of a gentlemen's agreement and the wording makes interesting reading. The specification was a four seater, four wheeled passenger car: no more, no less and no price mentioned! But Philipson ordered two years' full production, 8000 cars, and added a handsome (and dearly needed) down payment.

Four thousand cars a year sounds ridiculous today, when even giant factories, making cars by the million, find it difficult to make profits. Even in the immediate post war years this was a very low rate of production, but Saab did not want to commit themselves to too big an outlay for the production of a car that very likely could prove a failure. The Swedish car market at that time was estimated at around 40,000 units a year, and no maker had ever succeeded in capturing more than 10% with a single model. High profits were not expected, the first thing was to get the factory going.

On the 10th of June 1947, the Saab 92 prototype was shown to the Swedish press, but the car was far from finished. It was not until the summer of 1949 that the first pilot run of 20 cars left the Trollhättan factory. It soon proved impossible to meet the planned production of 4000 a year — in 1950 only 1,200 cars were made, and when an improved 92-B model was introduced in autumn 1952, only 5,300 had been made of the original. During these early years buyers could have it in any colour they liked, provided they liked it green: the only colour available at that time.

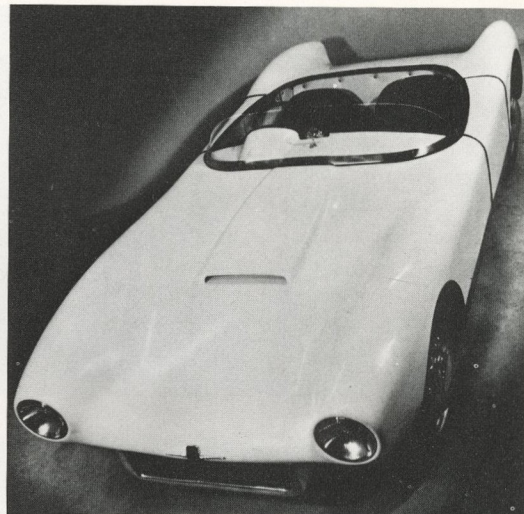
#### Saab 92 development to date

The engineering team was not happy with the 92. The cost-cutting measures and the inevitable mistakes made during the forced design period had produced a car inferior to what they knew it could have been. But as long as Mr. Philipson could sell every car being made and had long waiting lists as well, management understandably did not listen.

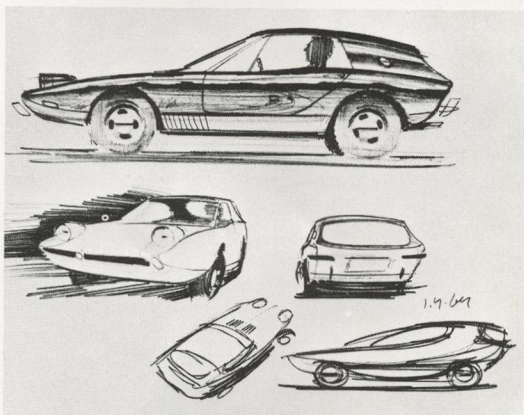
Only a few months after series production of the 92 had started it was entered in a Swedish rally, and most surprisingly it won! In the capable hands of test-driver Rolf Melde, victories were repeated and Saab won the Swedish Rally Championship in 1953 as well as the Ladies class in the European Championship.

Saab's engineers had chosen front wheel drive purely from ideas of efficiency, concentrating the mechanical parts to one end of the car and leaving the rest to the passengers' comfort. That front wheel drive also should give excellent road-holding and handling, particularly during tough rally driving, came as a surprise. And Ljungström was still highly critical of the car's handling. It used independent

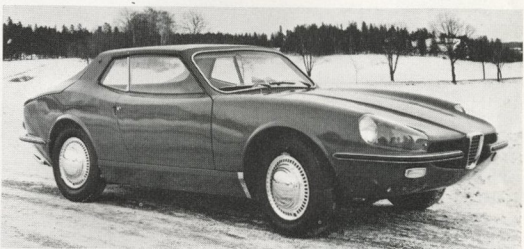
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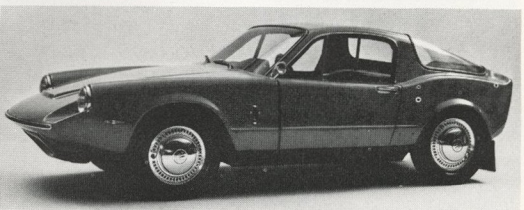
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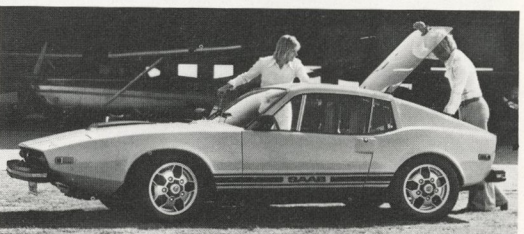
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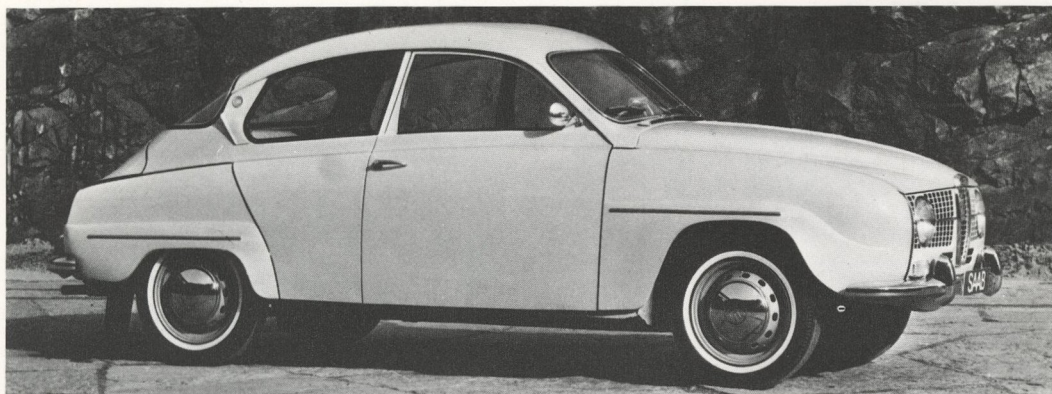
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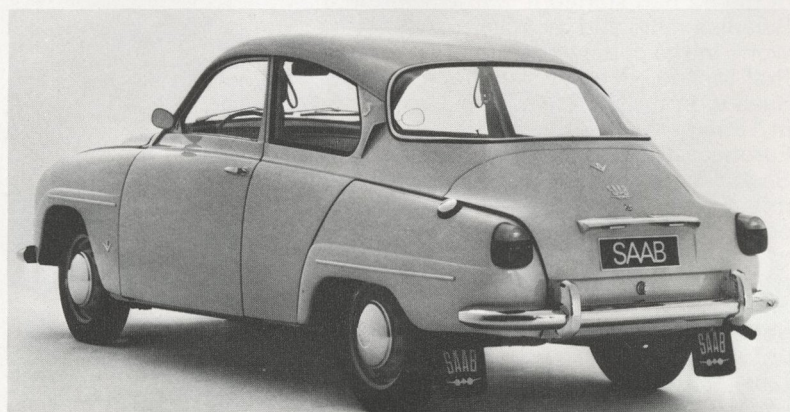






rear suspension, which at the start looked like a good idea, but which in connection with a very narrow rear track (only 108 cm) gave oversteering problems. Not until the Saab 93 was introduced in December 1955, did the engineers get the permission to remedy this serious design flaw, by giving it a rigid rear axle.

The Saab 93 was in many respects a totally new car, and the first one with which the engineers were reasonably satisfied. The two-cylinder engine was replaced by a three-cylinder unit, it had a cooling fan, a new transmission and numerous improvements in detail. The year 1955 also marked a great increase in the production of Saabs. In 1954 a new engine factory at Gothenburg had been opened and the Trollhättan works had been extended. In 1957 almost 10,000 cars were produced and 14,000 in 1958. The 93 also became Saab's first export venture. A first small batch of cars were sent to the Usa in 1956. Sales were limited to a few Northeastern states, where climatic conditions were thought to show off the best points of the car. In contrast to many other European manufacturers who shipped over lots of cars, without much thought of after sales service, Saab built up a small, but serious dealer network within the boundaries they could oversee, sent over people to teach dealers how to service this odd fwd two-stroke, and

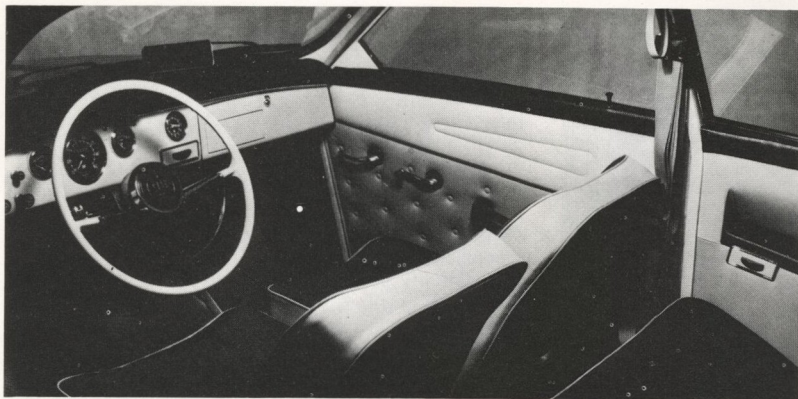


provided sufficient spare parts depots. This cautious approach has proved its worth — while many of the big sellers from the fifties are all but driven out of the States, Saab is in a safe position with steadily increasing sales.

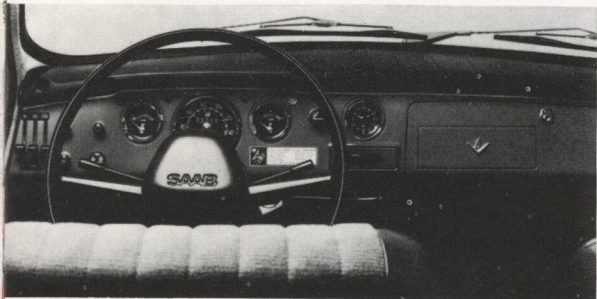
**Rolf Melde**, who so miraculously won the National Cup in Saab's first year of production, would play an important part in Saab's future. He was employed in 1946 as an engine specialist, but he soon became responsible for most of the testing and development work. Only his youth impeded him from the official title of chief development engineer in these early years. An eminent driver and engineer, Melde

has that rare understanding of cars that you would only find in a top GP mechanic. In those early days he was road tester, mechanic, engine designer and, through his rally victories, PR man — all in one. His car sense has influenced all Saab models, from the old two-stroke to today's 99, and it is to a great extent thanks to him that all Saabs are driver's cars, appealing to the expert driver. Melde was a great believer in the two-stroke engine and Ljungström, even in this day, can see a lot that speaks for it. The trouble is that, to make a two-stroke perfect, it would cost as much, or even more, than to make a four-stroke. At any





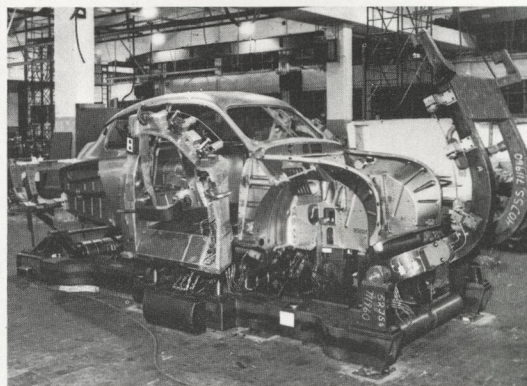
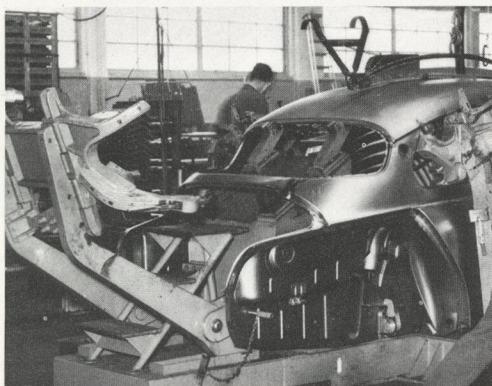
Evolution of the Saab 96 continues on facing page. In 1965 it was the turn of the front end to be radically redesigned: the relocation of radiator in front of the engine — whose power was increased in different stages to 46 hp (55 hp on the Sport/Montecarlo) — called for a 13 cm longer front overhang with modified grille, wings and bumpers (above); in January production topped the 250,000th Saab mark. From 1967 until the 2-stroke engine was eventually dropped, Saabs were available also with the 4-stroke Ford (Germany) built V-4 of 1500 cc and 65 hp. In '68, the 96 V-4 incorporated about twenty rather important changes including enlarged windscreen and back window (centre and bottom), while production of the Montecarlo was discontinued. On record for 1969 is a further restyling of the front end and, since then, the bodywork of the Saab 96 and 95 has remained substantially unchanged to-date (in photos below, the '75 models).



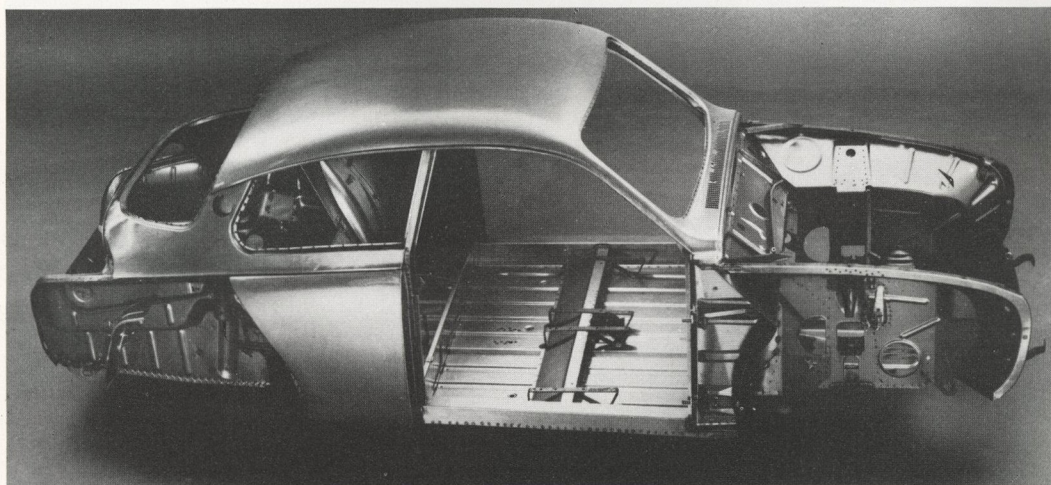
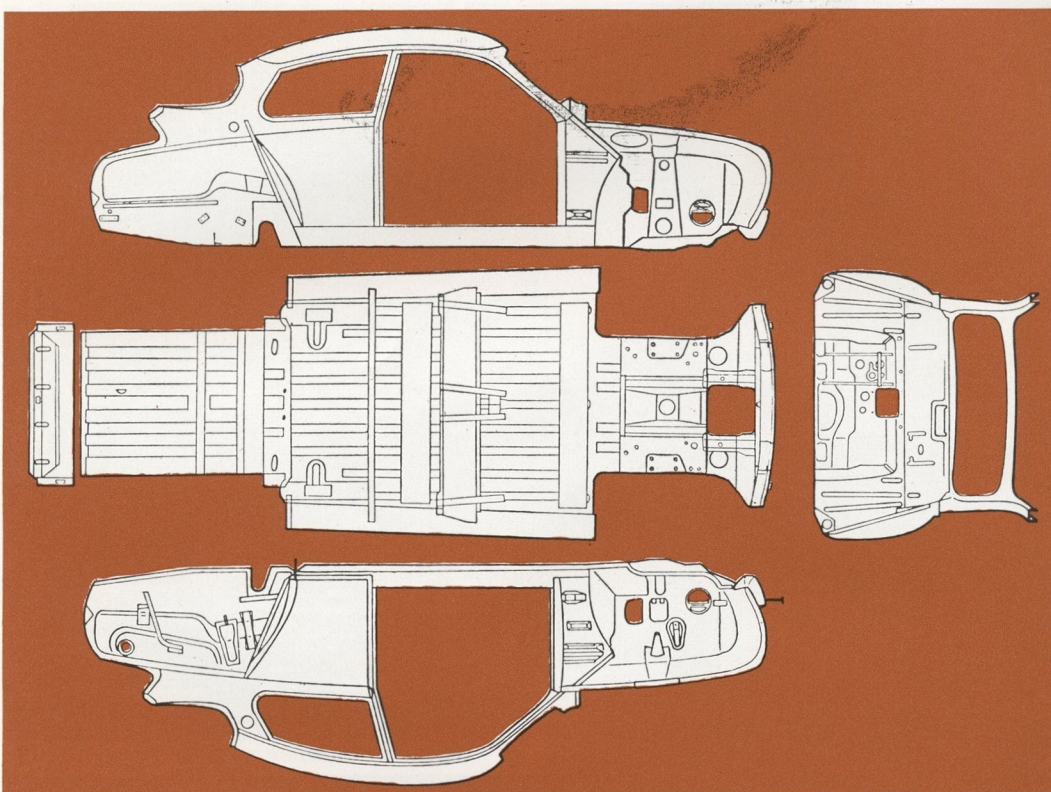
The three photos above show the functional and aesthetic evolution of instrumentation, controls and interior trimming: from top to bottom, the Saab 96 interiors in 1967, 1968 and 1970 (very much similar to present cars).







Shown on this page are two of the Saab 96 body assembly fixtures in 1960-64, and the present body-in-white after the 1965 and '68 changes: quite evidently, the body structure has remained basically unchanged in over 20 years of production as the modifications introduced from time to time were limited to outer panelling. In the Saabs 92-93 the markedly tapered rear end made any internal stiffening of the sides unnecessary; in 1960 this section of the bodywork was redesigned — to increase roominess, luggage compartment space and visibility — by widening out the sides, raising the roof and enlarging the backlight opening. Production technologies dictated the need to cut the roof panel at back window top edge; torsional and bending (=rollover protection) stiffness were retained by doubling the side



rate, it was obvious to Saab in the late fifties, that they were fighting a losing battle. Customers simply did not like the 'put-put' two-strokes.

The three cylinder 93 of 1956 was an improvement, but it was still rather underpowered, still produced its 'put-put' sound (although in a rather nicer way) and gave out an oil-smelling exhaust! 1960 saw the arrival of the Saab 96 with the engine capacity increased from 748 cc to 841. In 1966, the introduction of three carburetors made a great improvement. But all the same, sales fell: the public had got tired of two-strokes.

In the meantime Rolf Melde developed a very sophisticated bench testing procedure, through which he tested all competing engines to the point of destruction. At the time, this was publicized as a way of proving how good the Saab engine was in comparison with others. The truth of course, was that Saab engineers were learning about four-strokes and they were not overly impressed with what they saw. One engine that got the Saab approval was the German Ford V4, originally made for the 1962 12M. It also had the advantage of fitting neatly in place of the three-cylinder unit then under the bonnet of Saab 96. Instead of investing in a fourstroke engine of their own, which would have taken several years to develop, an arrangement was made with Ford. Thanks to modifications insisted upon by Melde, the Saab version of Ford's V4 has proved to be one of the most reliable engines ever, whereas in contrast the German original had some teething troubles.

The 96 V4, introduced in 1966, was an instant success and saved the shaky Saab car division: In Sweden, Saab car sales had fallen drastically: from a high of 29,000 in 1964, to 26,000 in 1965 and 19,000 in 1966. The last figure included about 8,000 V-fours. The two-stroke was kept in production for a couple of years more, but the sales figures only proved what a last minute salvation the V4 was. In 1967 only 500 two-strokes were sold,



panellings and interconnecting them with boxed-section cross members above and below the back opening. One of the structure and design features that has been maintained during all these years is the windscreen opening incorporated in the roof panel, especially the unique A-pillar with a cold-drawn 2,5 mm inner section bar tying up the roof with the bulkhead. When the windscreen was enlarged in '68 this inner section bar was prolonged about 70 mm to retain the A-pillar previous bending stiffness.

Under any climatic condition, the Saab 96 still plays a leading role in international rallies. On this page the car in various events from 1964 to 1971 (in spite of appearances, thanks to the driver's skill, the car in most critical attitude did not turnover and stayed on the road).

compared to almost 24,000 V-fours. In 1968, registration figures showed 28 two-strokes sold and over 30,000 V-fours.

The 96 V4 is still in production and until 1972 outsold the newer and more modern Saab 99 on the Scandinavian markets; in Finland, where Saabs have been assembled since 1970, the 96 V4 is the bestseller. Quite a tribute to Sixten Sason's 30 year old design.

With one of the chief engineers a successful competitions driver, it is no surprise that the story of Saab, also is a story of motor sport achievements, culminating in Erik Carlsson's overall wins in the 1962 and 1963 Monte Carlo Rallies and the RAC Rallies of 1960, '61 and '62.

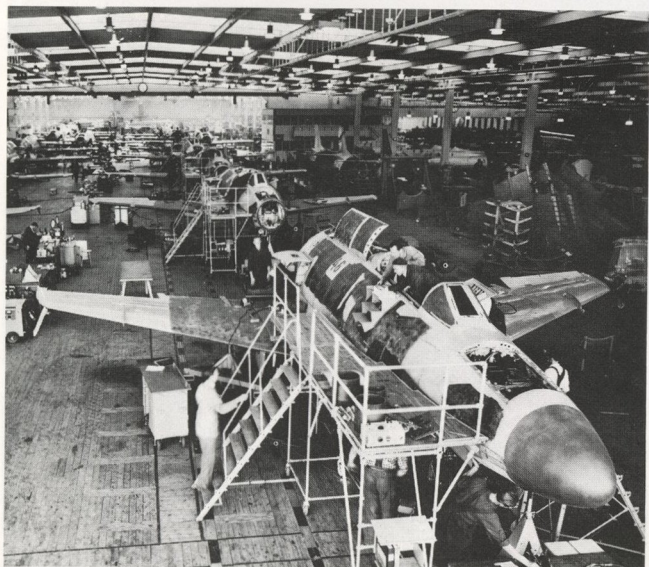
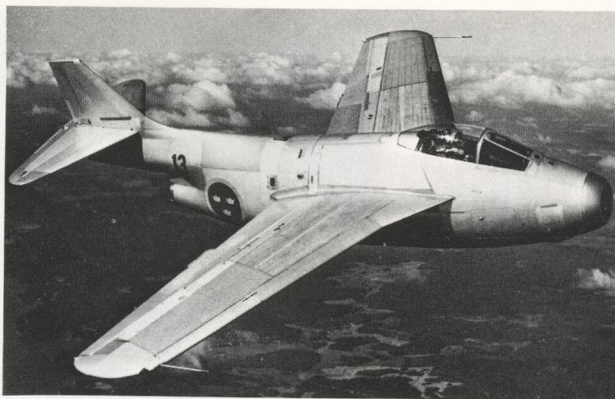
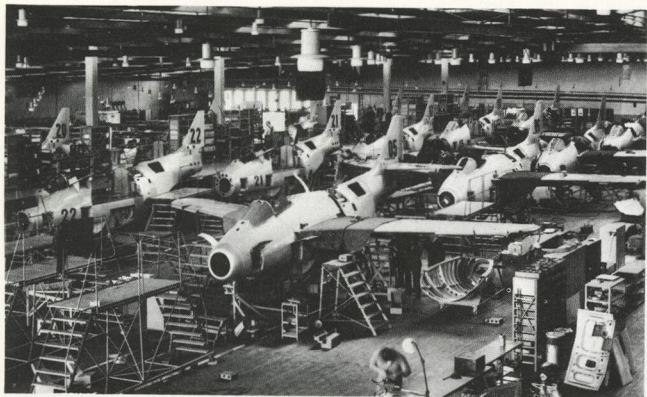
"Competition activities have helped us tremendously over the years", Gunnar Ljungström says. "Not only did they make a small car factory known all over the world, but particularly help us in our relations with suppliers of components. In the beginning, Saab was not considered an important customer, but as soon as our rally victories became known, we noticed a very different attitude. Suddenly, the suppliers wanted to listen to our requirements. In the resulting publicity, their reputation was at stake too. The competitions department has also always been an extension of our normal testing facilities. We have learnt a lot there. No factory can keep a permanent check on the quality of every single part of their cars, but through the day-in-day-out competition activities, we very quickly found out any weakness in the production models".

Although endeared with excellent road-holding and handling qualities, the standard Saab 93 and 96 were far from high performance cars. Rather embarrassing in view of the repeated rally victories. To cash in on these there were always plans of more sporting Saab models and some were built, like the Monte Carlo (commemorating Erik Carlsson's wins) and other tuned versions of the standard model.

*(text follows on page 30)*

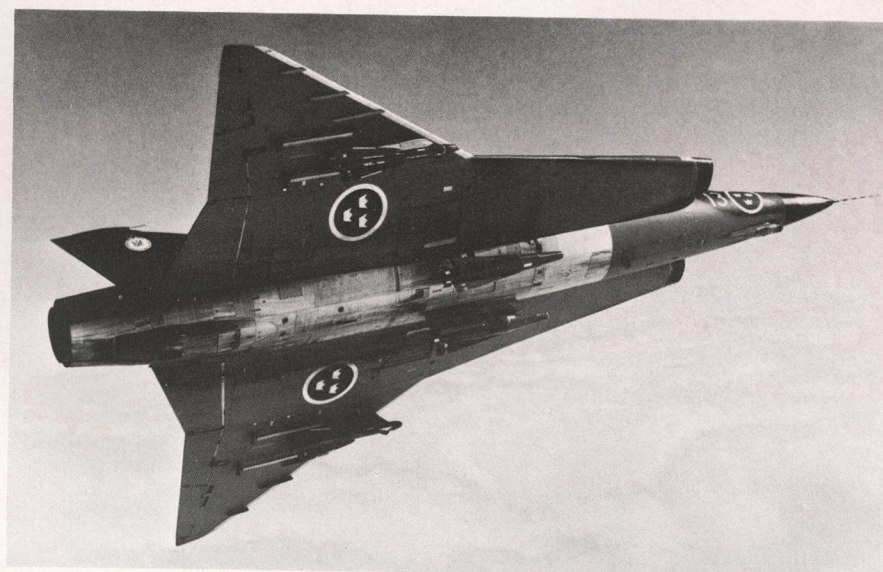
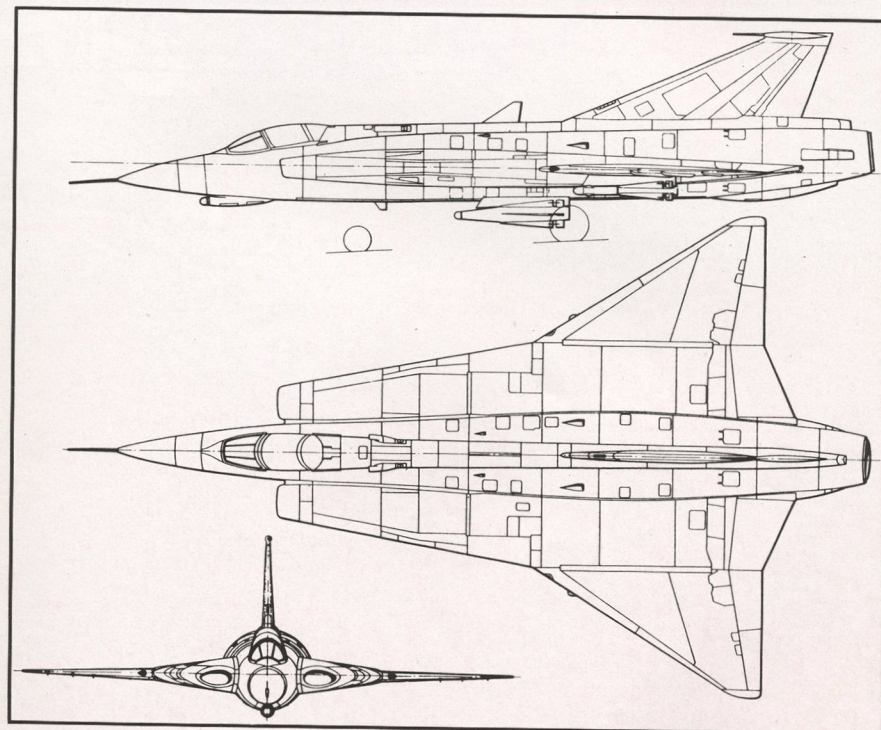
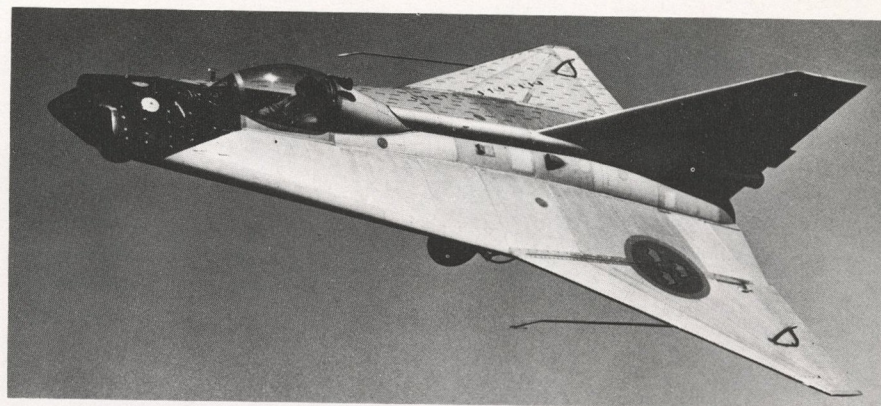








After the F-86 Sabre and the MiG 15, the **Saab 29 Tunnan** (previous page, top and center) was the first swept-wing jet fighter of Western Europe. First flight in September 1948; built from 1951 to '56 in a total of 661 units, the Saab 29 was the backbone of Swedish air defense until 1959 as day fighter, photographic reconnaissance and attack aircraft. With a top speed of 1050 km/h, in 1954/55 the Tunnan established two world records over 500 and 1000 km closed circuit distances. Our photos show the J29F version powered by a Svenska (Volvo) Flygmotor AB built De Havilland Ghost turbojet with Swedish afterburner giving a total thrust of 2800 kg. Designed from 1949 and first flown in November '52, the **Saab 32 Lansen** is a transonic two-seater



aircraft powered by an afterburning Rolls Royce/Sa Avon giving a thrust of 4500 kg, intended to replace the Saab 18 first in all-weather attack (A32A version, above) and since 1957 also in photographic reconnaissance missions. In 1958 a more powerful version entered service as all-weather fighter (J32B, bottom left). In all, 450 Lansen were built up to 1960.

On the right and on the next page, the **Saab 35 Draken** which made its first flight on October 25, 1955. The unique double-delta wing configuration of this first Swedish supersonic fighter was thoroughly tested at low speeds with the Saab 210 research prototype, (the photo above shows this 1:1.4 scale flying model of the Draken, with flow visualization by woolen tufts on starboard side).

Powered by the same 6500 kg-thrust RR Avon as the Saab 32B, the first version of the Draken J35A has a level top speed of Mach 1.8 and an initial climb rate of 200 m/sec. Later, several other versions (some of which are still in production) were built — fighters, all-weather attack, photographic reconnaissance and two-seat trainers — totalling 629 units at the end of 1974.







1940

1942

1943

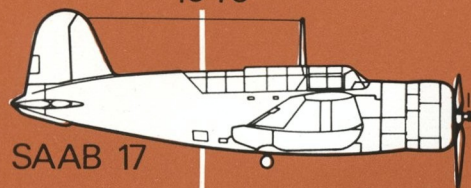
1944

1945

1946

1947

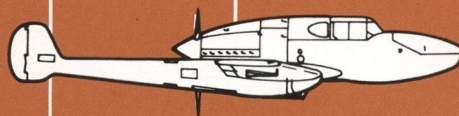
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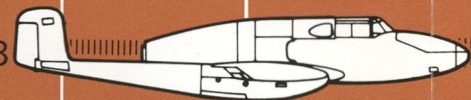
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322

SAAB 21A

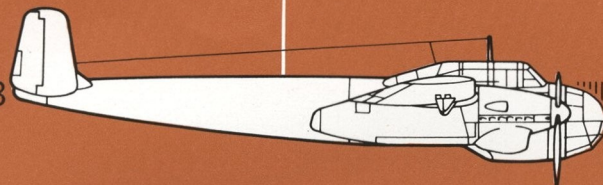


298

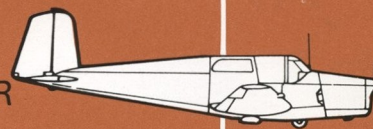


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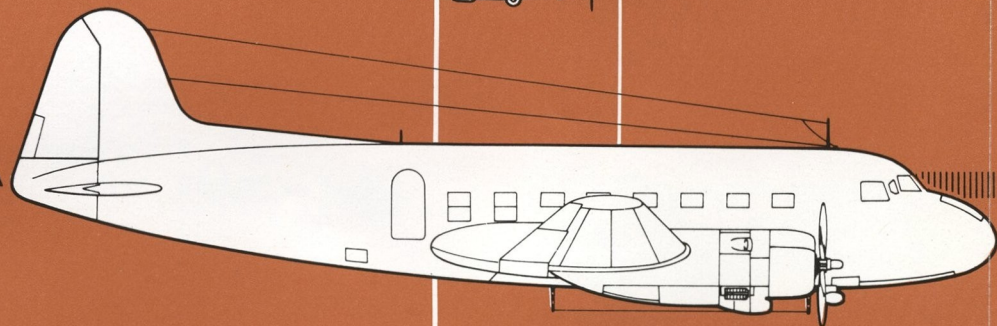
SAAB 18



SAAB 91 SAFIR

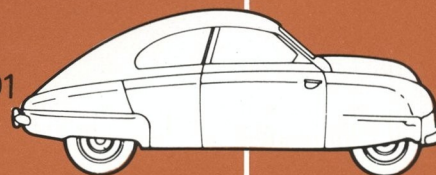


SAAB 90 SCANDIA



# the saab saga

SAAB 92001

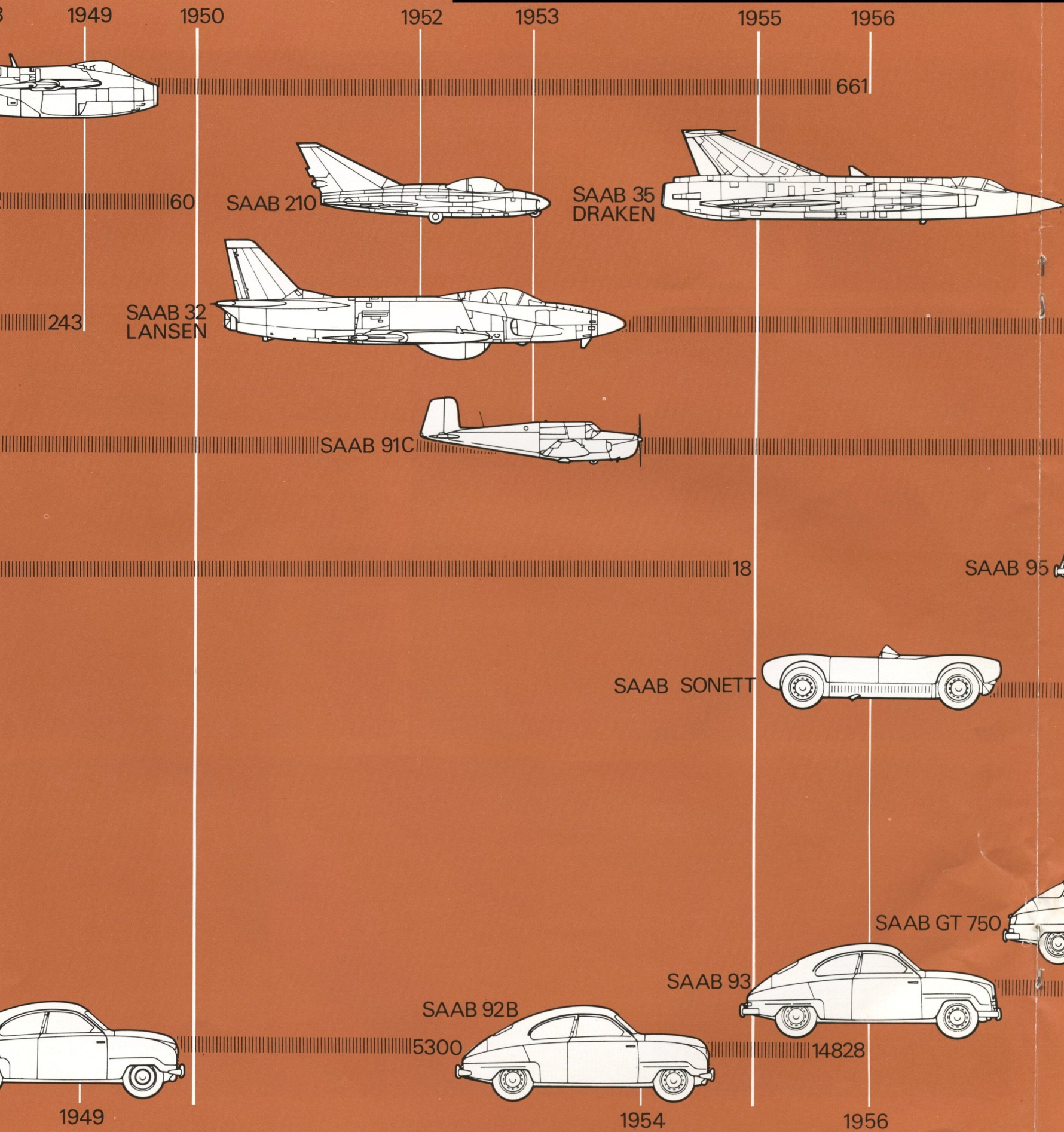


1945

SAAB 92









1960

1963

1966

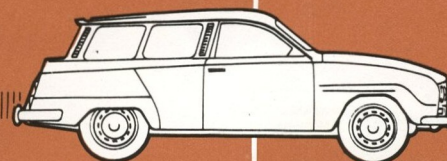
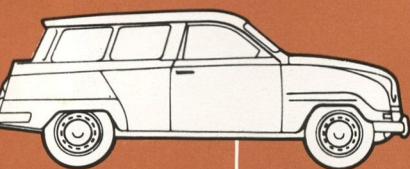
SAAB SK 60

SAAB 105

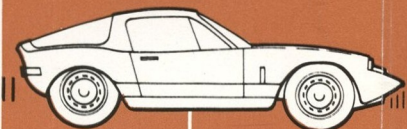
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SAAB 37 VIGGEN

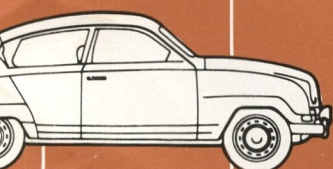
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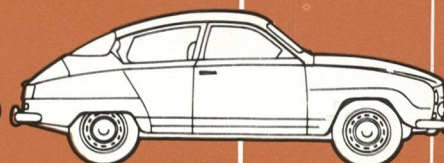
SAAB SONETT II



SAAB 99

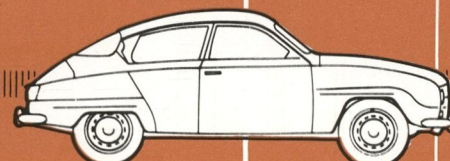
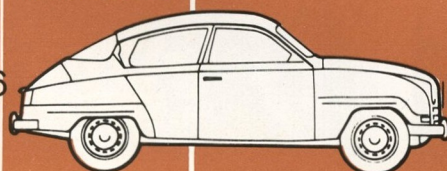


SPORT/M.CARLO 850



52731

SAAB 96



1958

1959

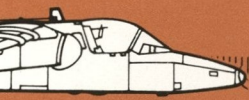
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1962

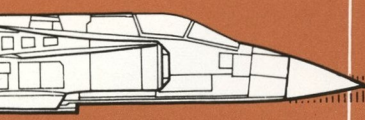
1965

1966





191



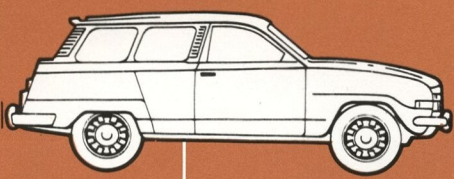
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210  
(ord)

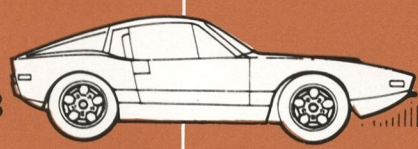


SAAB  
SAFARI/SUPPORTER

106  
(ord)



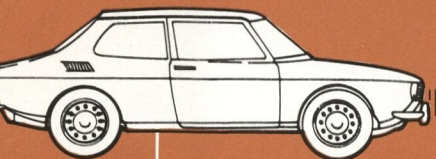
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1868

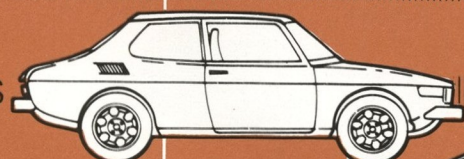
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SAAB SONETT III



226196

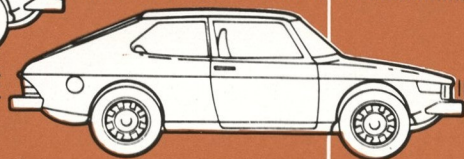
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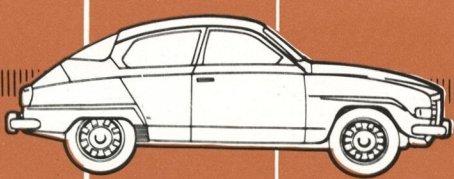
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1190

SAAB 99 COMBI COUPE



12141

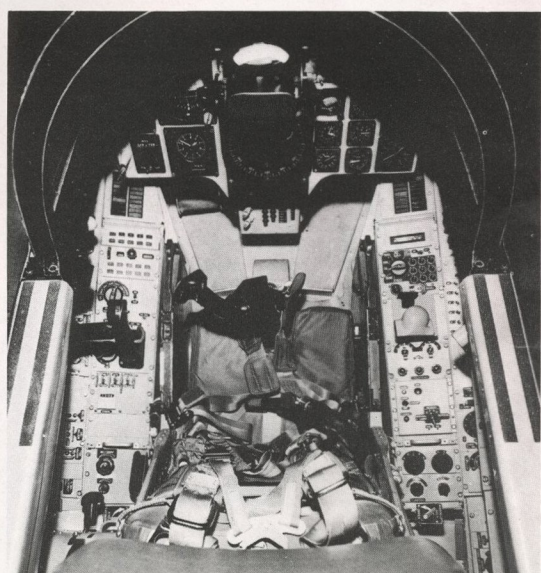
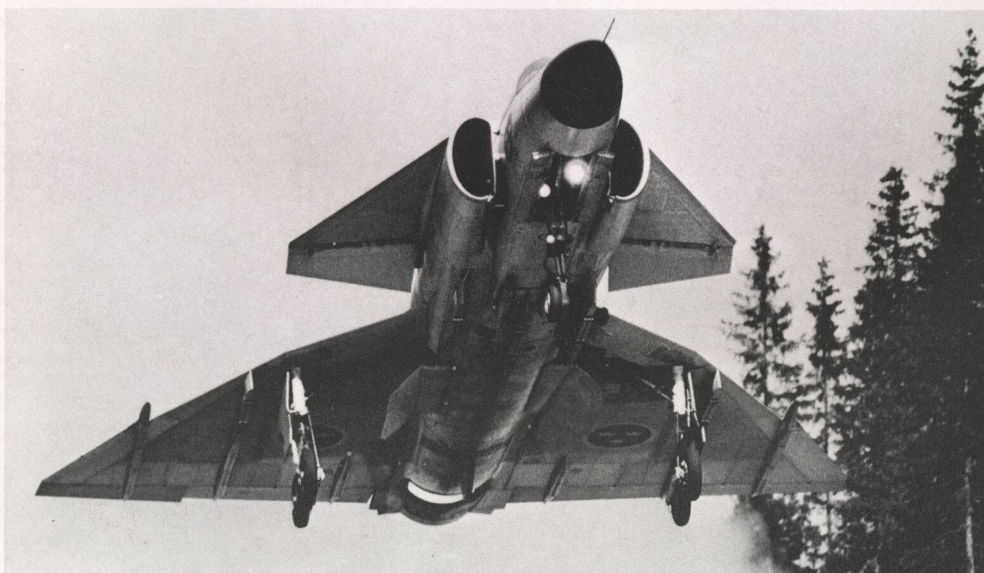
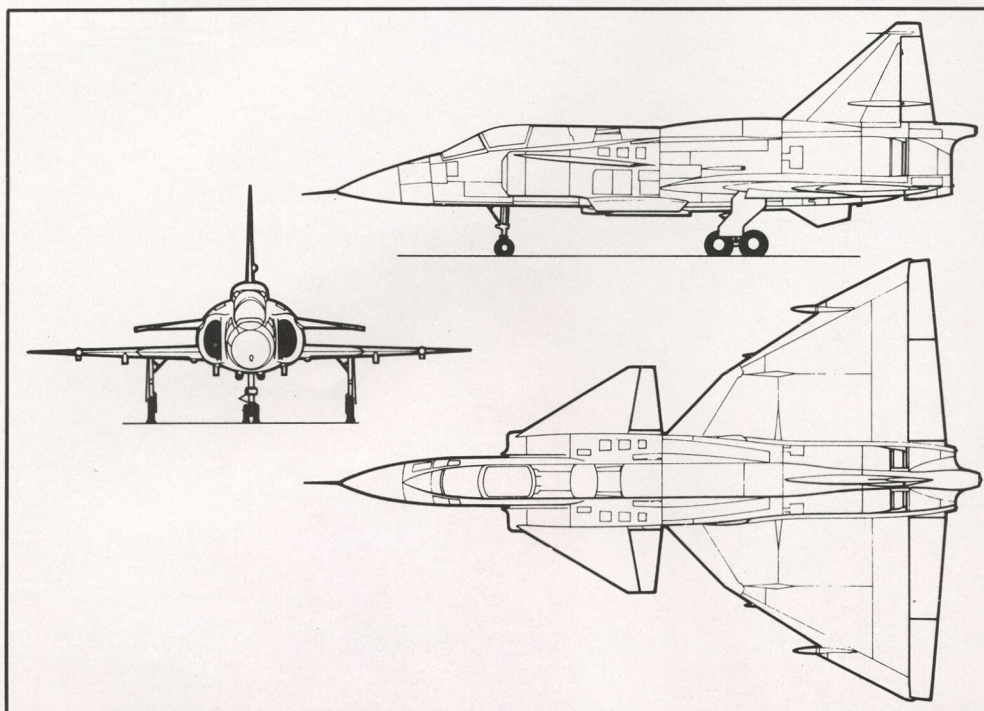
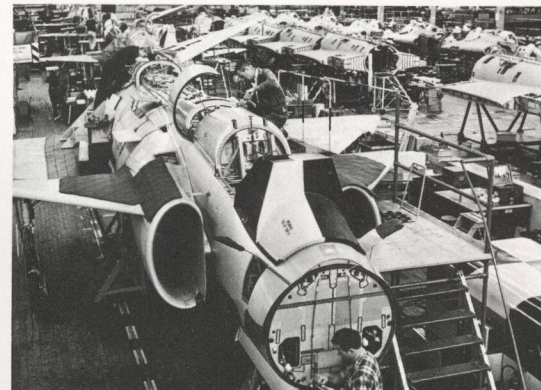
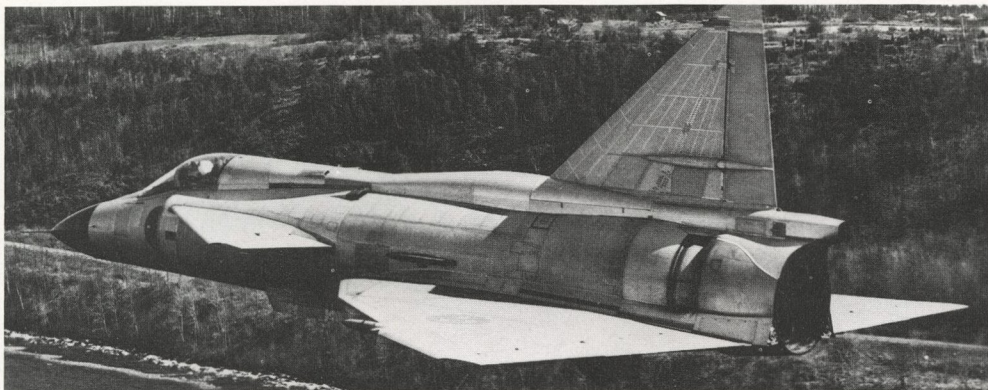


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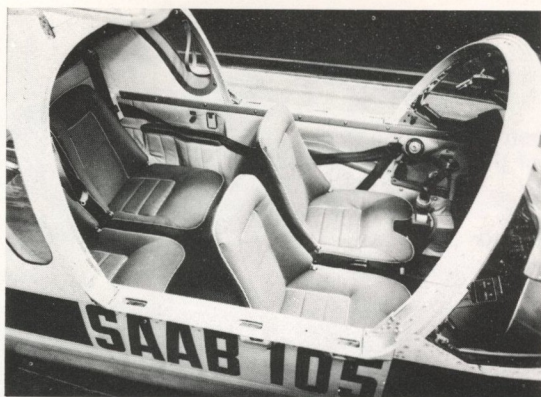




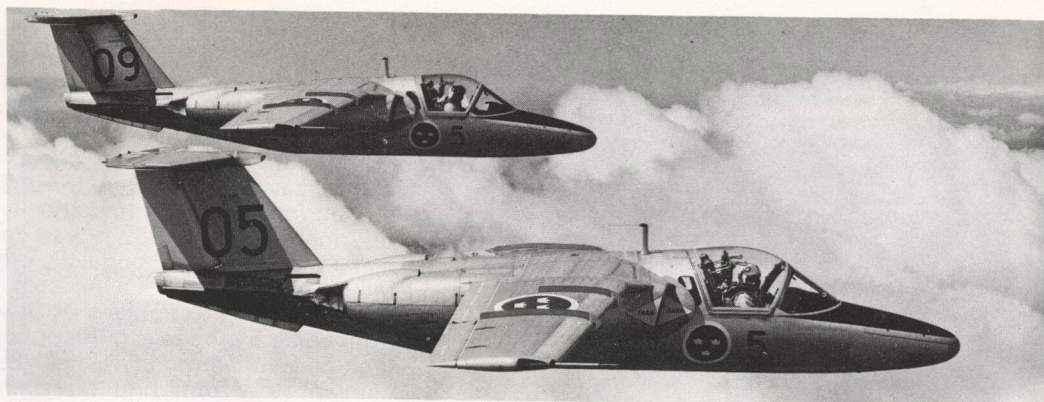








The **Saab 37 Viggen** (two previous pages) is one of the world most advanced military air crafts today in service. Design work began in 1961, first flight in '67, produced since '71. The Saab 37 is a multi-purpose integrated system, designed as a standard flying platform to be built in four versions, (attack, interception, reconnaissance and training) by utilizing the same airframe, engine and basic equipment for the three combat roles, the difference between versions being limited to certain specialized tactical equipment. Equipment flexibility, however, enables the attack version to perform fighter missions and vice-versa. The Viggen combines Mach 2 and 2 min to 11,000 m performance with stol characteristic (400 m takeoff - 500 m landing) thanks to the powerful Pratt & Whitney/Sfa JT8D turbofan with afterburner (12,000 kg thrust) and the unique high-lift canard layout featuring a nose delta with flaps in combination with a main delta wing. Equally advanced is its avionics, based on a miniaturized Saab-Scania digital computer.



The **Saab 105** is a multi-purpose twin jet, initially developed as a private venture (first flight 1963), later adopted for training and light attack by the Swedish Air Force and designated Sk60.

This first Saab 105 version is powered by two Turbomeca Aubisque engines; in 1966-69 150 units were delivered. For liaison purposes or navigation training the two ejection seats may be replaced with four fixed seats (above left). A later version, 105XT (first flight 1967) using the more powerful General Electric J85 engines, is in service with the Austrian Air Force. Presently in production is the Saab 105G (center, first flight 1972) with several aerodynamic and equipment improvements.



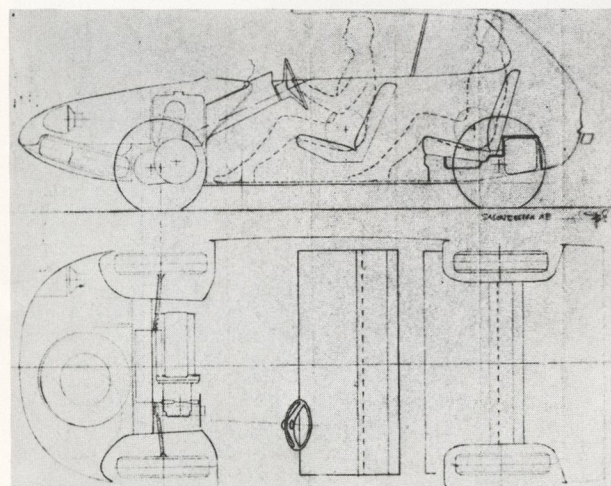
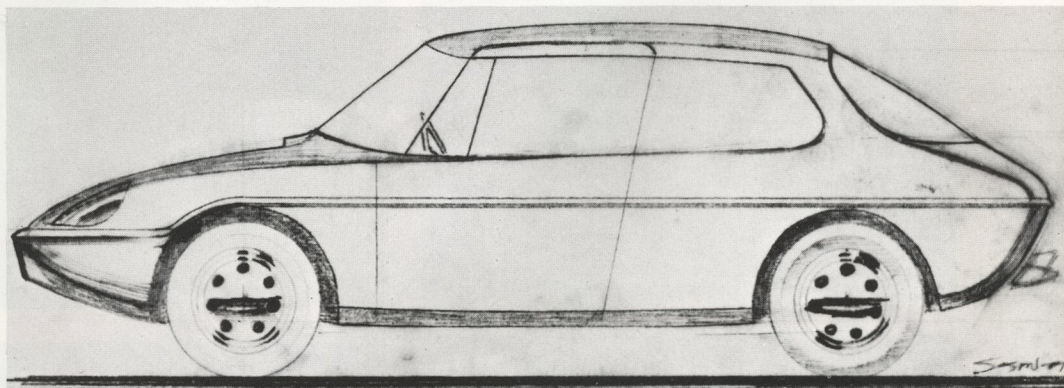
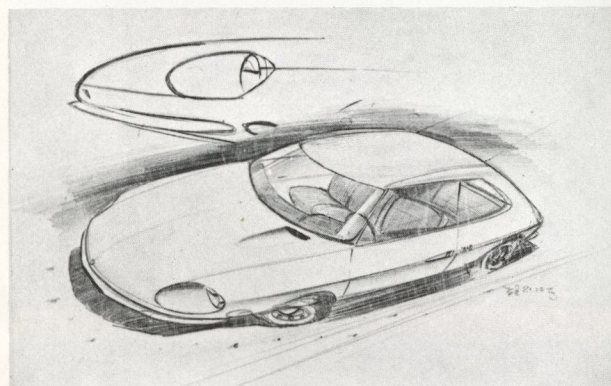
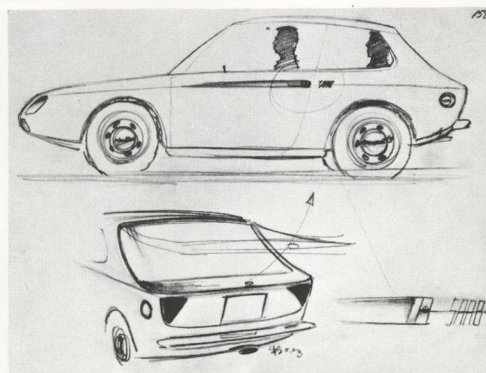
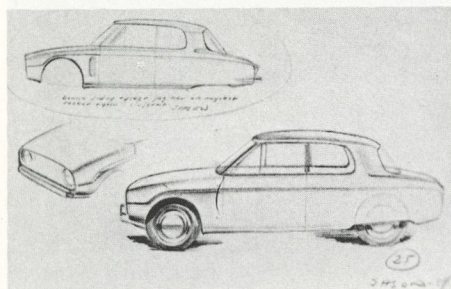
The **Saab Safari/Supporter** (bottom right, first flight 1969) is a light piston-engined 2+1 seater stol aircraft mainly intended for military basic training and utility purposes. Fully aerobatic — powered by the Lycoming 10-320, 160 hp or 10-360, 200 hp engines — the aircraft may be fitted with a tricycle or tailwheel (ski) landing gear.



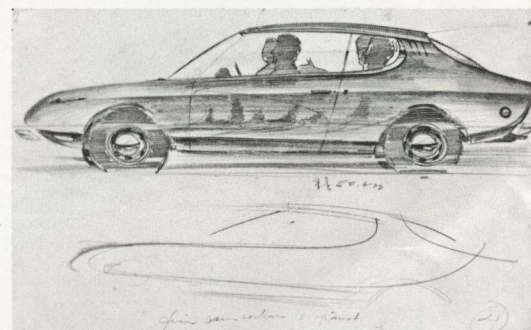
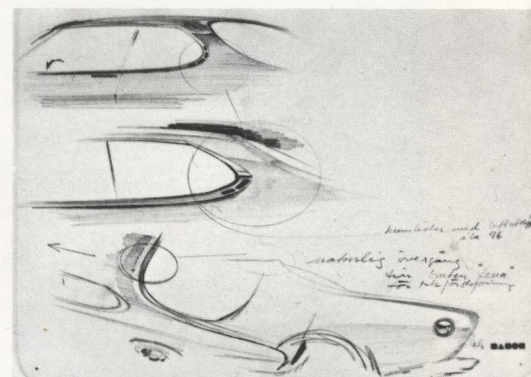
## Design of the Saab 99

Already in the early fifties, just after Project 92 successfully had got into production, Saab engineers began discussing a successor. As can be seen from Sixten Sason's many sketches of this period, several ideas were tried. They ranged from city-cars to stationwagons, but finally around 1962 it was decided to make the new Saab model an ordinary family saloon.

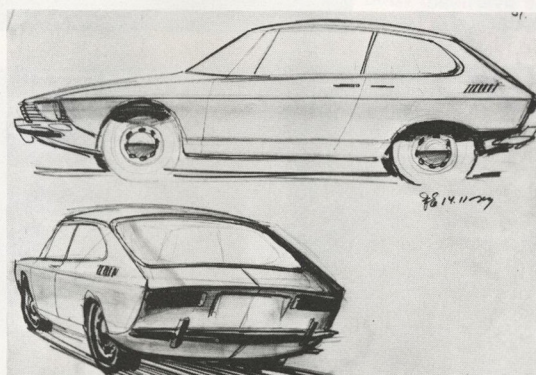
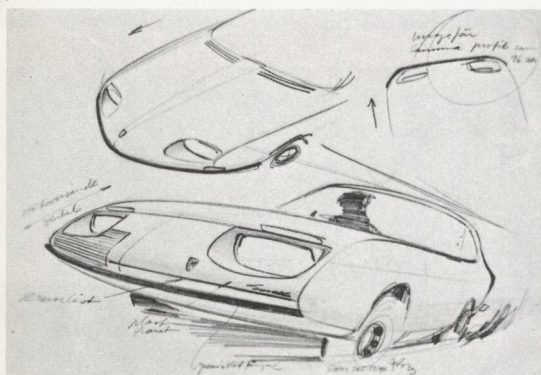
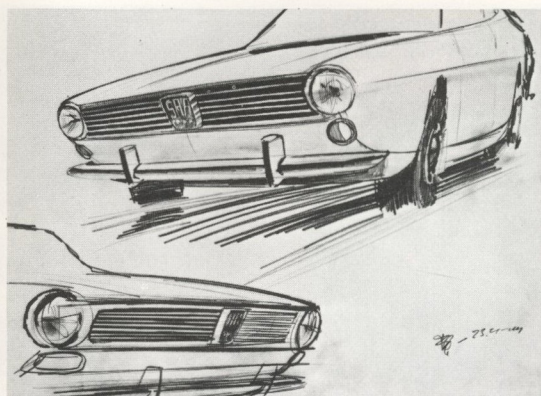
It is interesting to notice that Sason, apart from some freak ideas influenced by the then current Detroit style, had the wedge concept (low front, high rear) in mind from the start. Never one for pretty show off styling presentations, many of Sason's sketches are essentially, almost unprofessionally drawn, but they show some very advanced ideas for their time. When first shown to the public in 1967, the 99 was still a forerunner of the present low nose, high back fashion. But his design was practically finished by 1958. At this time Sixten Sason was running his own independent industrial design firm, being a consultant to Electrolux, Husqvarna and other well known Swedish firms as well as to Saab. His stamp of function before form has been put on some very familiar household appliances



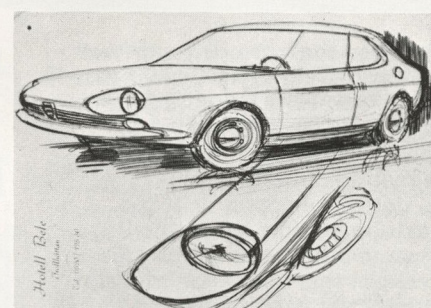
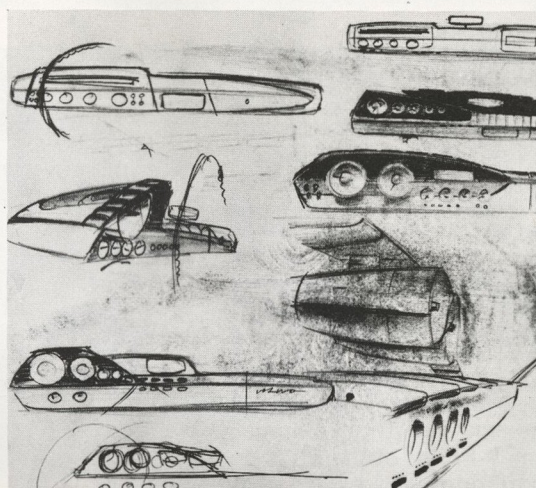
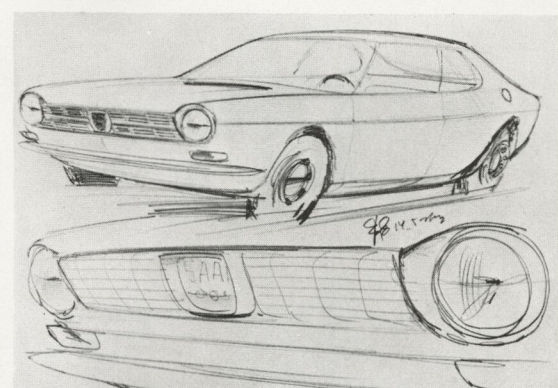
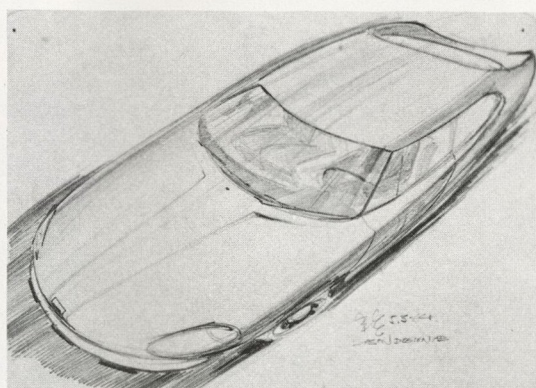
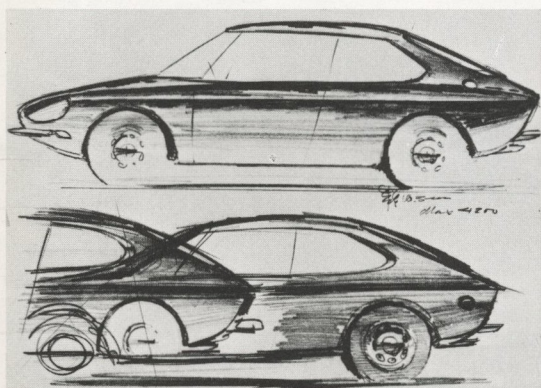
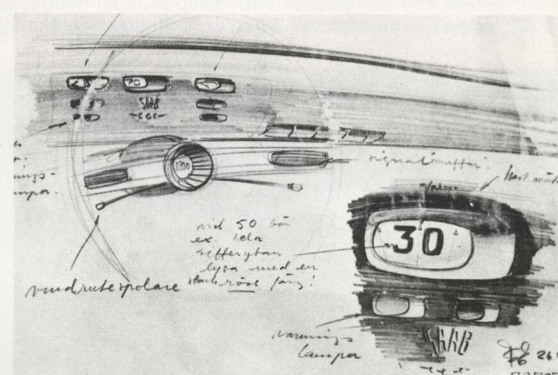
such as vacuum cleaners and sewing machines as well as on buses and trains. In 1960, when design of the 99 was in its preliminary stages, a young man of 18, **Björn Envall** was hired as an assistant to Sason. Today leader of Saab Design Center, Envall came to play an important part in the 99 evolution — particularly in the final stages, when Sason due to ill health had to exert less effort. For a small factory like Saab a new model is a bold venture — a failure would in all probability have wrecked the company. To earn back the development costs the car has to be in production for many years, it has still to win customers after competitors have introduced second or third generation models. To most managements this would cause the utmost







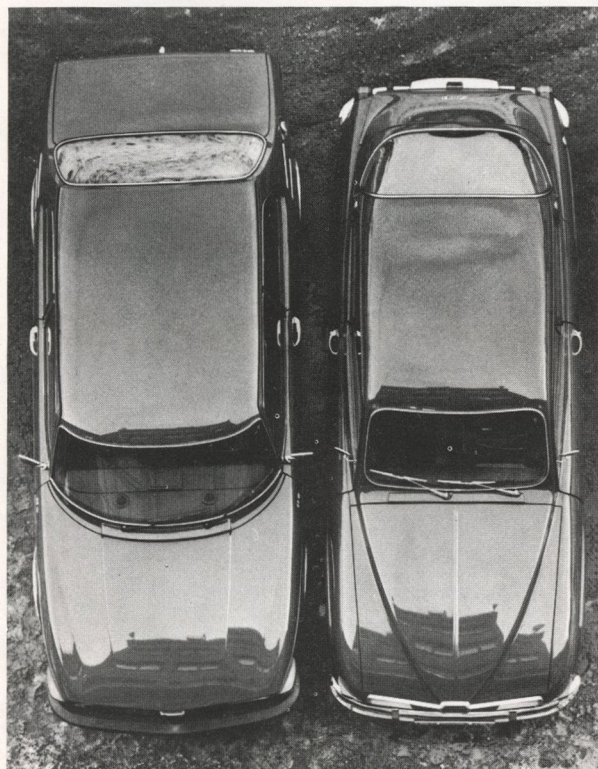
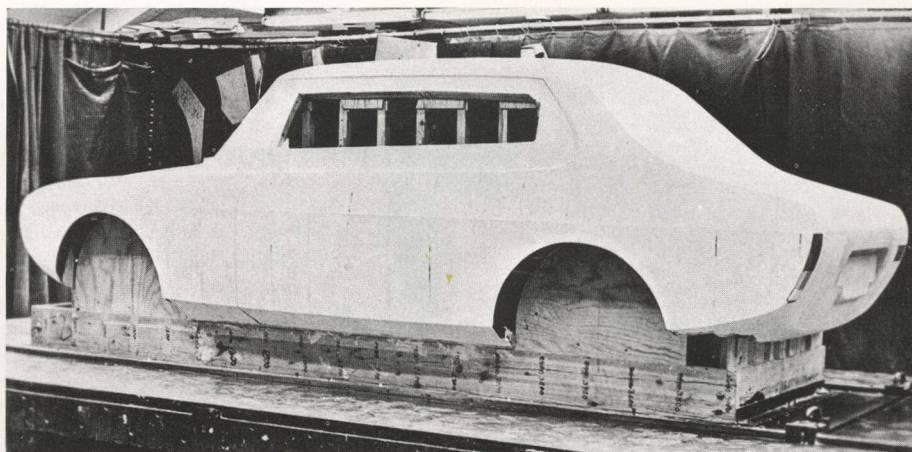
On these two pages, some sketches of particular significance in the Saab 99 styling evolution. A comparison between the first drawing (1954, top left) and the double-sized side view (1959), both by Sixten Sason, evidences just how much his taste had evolved during those five years, freeing itself from the styling vogue of the time and, also, how the form features of the 99 — e.g. the wedge-like profile of body sides and the markedly curved windshield — were already clear-cut at the end of the '50 s. All the other drawings of later dates signed by Björn Envall, are mainly related to the front and rear end styling characterization process that ended in 1963. Dated the same year is a design exercise called 'Canard' (bottom left layout) to which some of these sketches refer and which affected the aesthetic evolution of the Saab 99.





The sketched styling proposals on previous pages found their three-dimensional realization in the five small-scale models shown here. The first from the left (emphasized in the photo below) anticipates the final body shape shown (top and bottom) in two stages of its full-scale development. From 1965 to '68 road tests continued with camouflaged prototypes until November 1967, when the Saab 99 was unveiled to the public. Before production release the grille was modified to incorporate rectangular headlamps and point out the center badge (in color, an early production Saab 99 and its interior).

In spite of the 20-year gap, the formal evolution from the 96 to the 99 is consistent and compatible with Saab's visual image, as the overhead view (below) showing dimension comparison and family look proves.

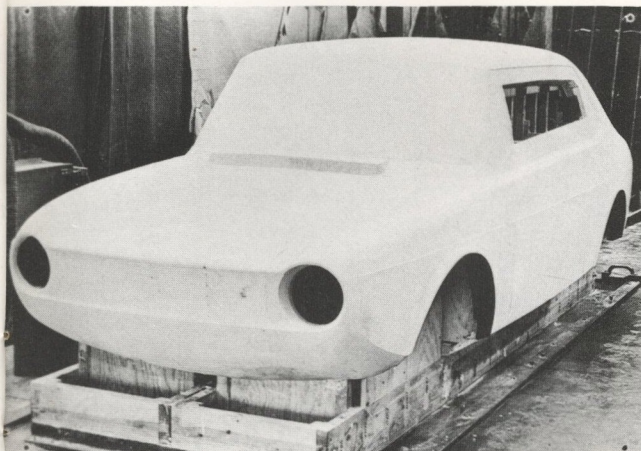


caution, to stick to the orthodox and well proven. Saab takes a different approach: the only justification for a small factory is to make a distinctive, and in certain respects superior, product to those made by the mass manufacturers. Much of the design philosophy of the original 92 can be recognized in the 99. There is the same strong accent on aerodynamics, but this time kept within bounds to permit better visibility and generous interior dimensions. All in all the Saab 99 is a good example of industrial design at its best. An unusually wide track in relation to wheelbase and a high roof line in combination with space saving front wheel drive, has given it accommodation that compares favourably with many

bigger cars. The elbow width of the rear seat is one cm wider than that of the Mercedes 200-series and the knee roominess is equally generous. In spite of these box-like general dimensions, Sason and Envall have managed to give the body graceful lines, that at the same time makes it distinctly personal and soberly ageless. And even more surprising, have retained almost as good a drag coefficient as that of the super streamlined 92, 0.37 as for the 0.35 of the 92. Typical of the aerodynamic efficiency of the 99, is also the exceptionally low wind noise and the excellent straight line stability. Detail design of the 99 is equally unorthodox and typical of the 'driver's



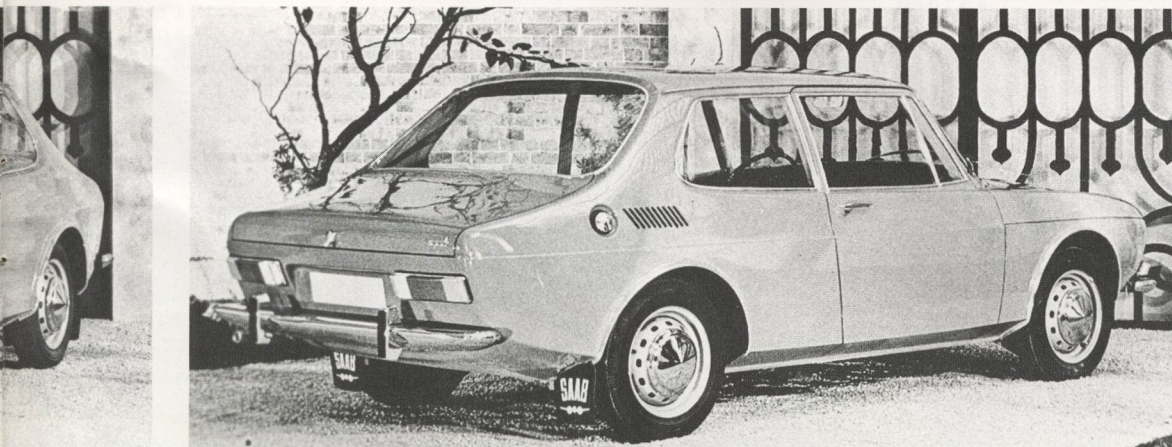




On next two pages, the Saab 99 body shell (partially cut-away in the two-color photos to better evidence structural details) and relevant main assembly stages.

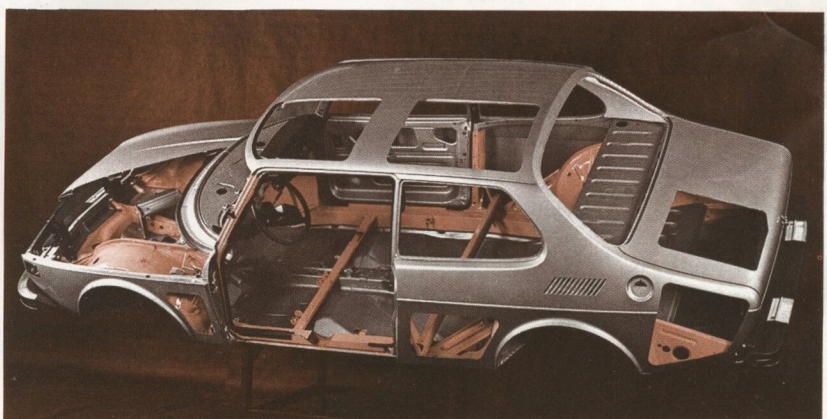
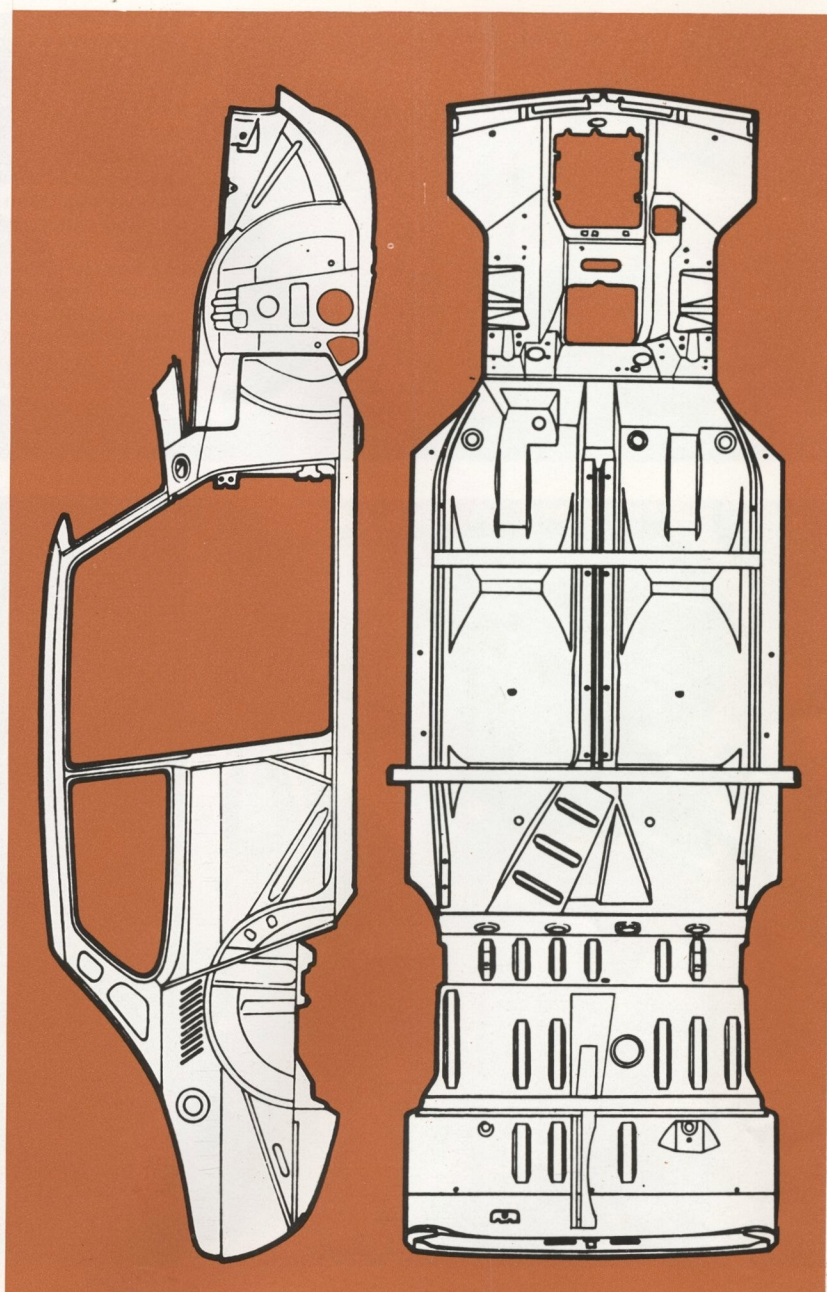
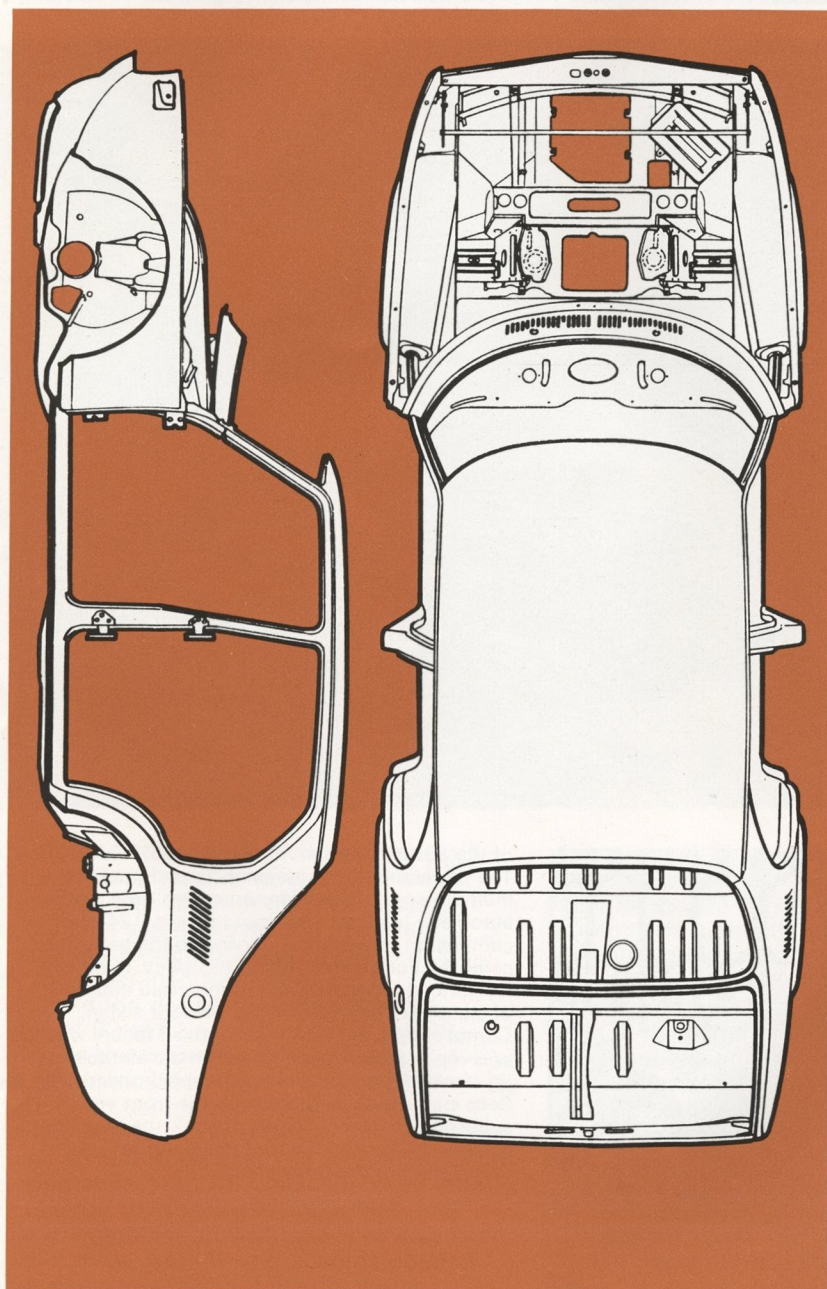
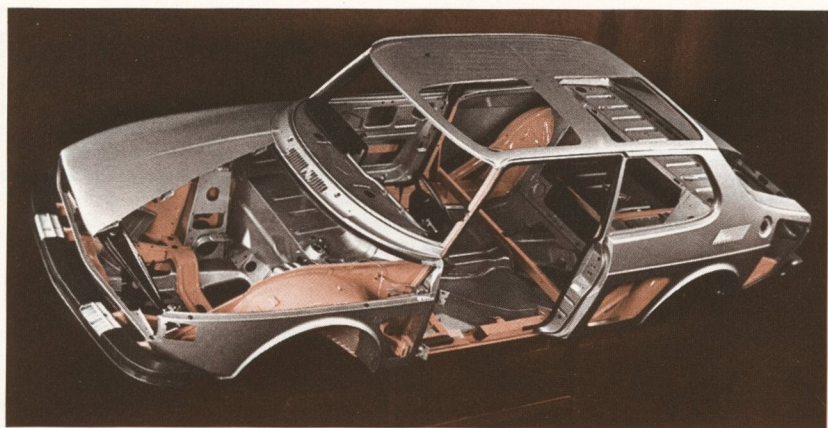
As regards body structure design, what has been said about Saabs 92/96 apply also to the 99. The construction solution adopted for the backlight opening is the same. Also for the windshield, due account was taken of the positive experience acquired with the A-pillar section bar built-in between roof panel and windshiled frame. The need to improve visibility without reducing the overall torsional stiffness and rollover protection, imposed a modification of the A-pillar: its cross section shape was in fact re-designed to provide the connection surfaces for the windshield glass and the door weatherstrip, yet featuring protective-safety rounded-off. Different static and dynamic body tests (see page 37) proved that the structural effectiveness of

the 99 pillars is superior to the 96. The windshield frame stiffness in both models is further evidenced by the fact that the U.S. standard requirements on windshield retention in 30 mph barrier tests were met by simply glueing the rubber weatherstrip to the body. The Saab 99 body is an interesting design also from the viewpoint of production methods and toolings. At the starting time of the Saab 99 assembly lines, 75 millions of Skr had been invested in up-dating and rationalizing the Trollhättan factory. Besides a new pressing plant (the most modern in Europe at that time), the primer application by electrophoresis method, an overhead storage/shunting yard between production lines by means of dual duty conveyors, plus new method of underbody sealing compound application (the body being upside-down) by means of air-free high-pressure spraying, must be added the specific assembly technologies

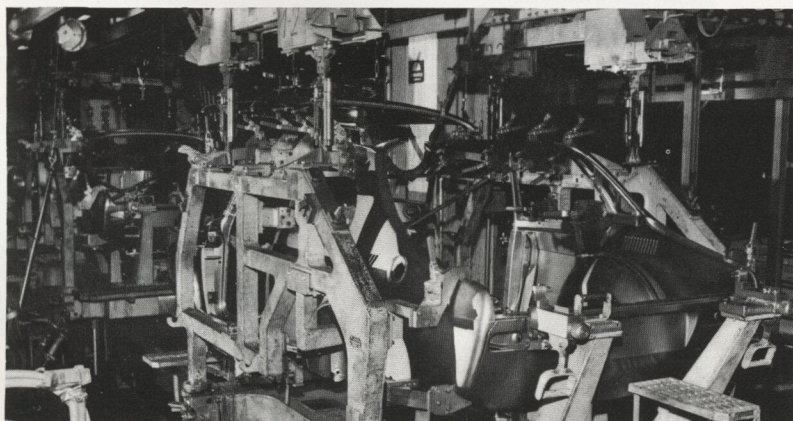
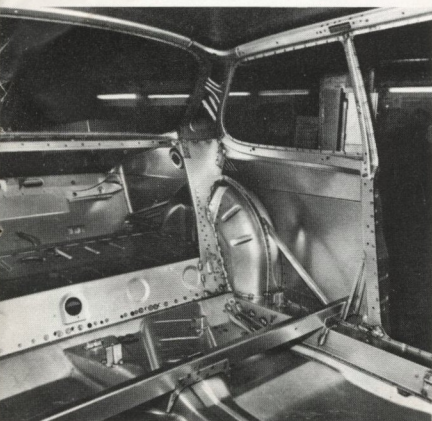
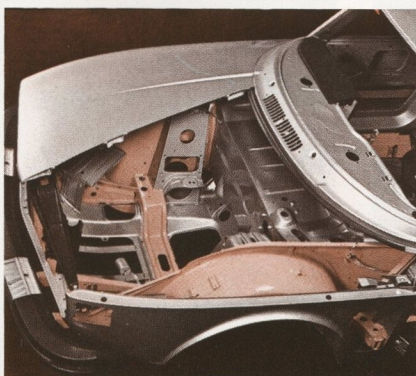
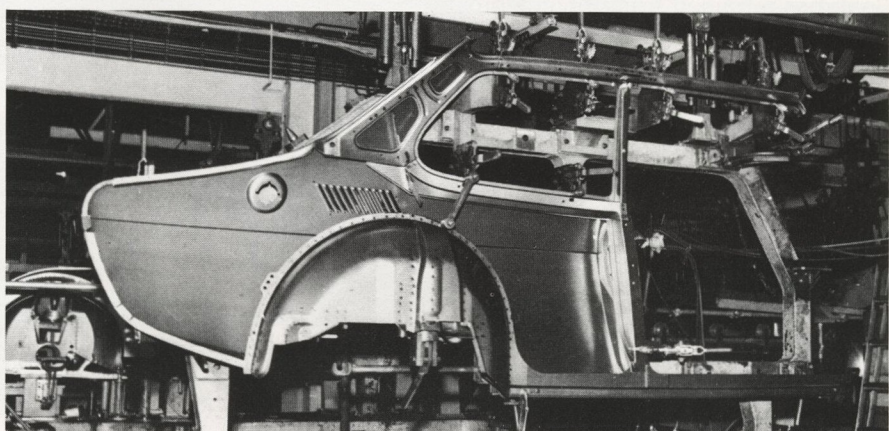
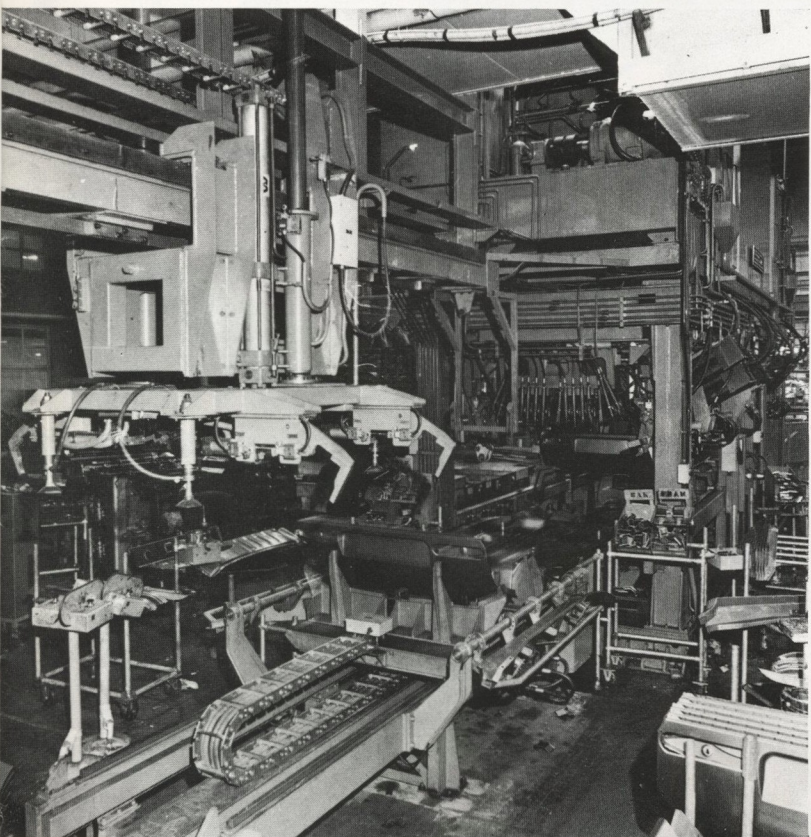
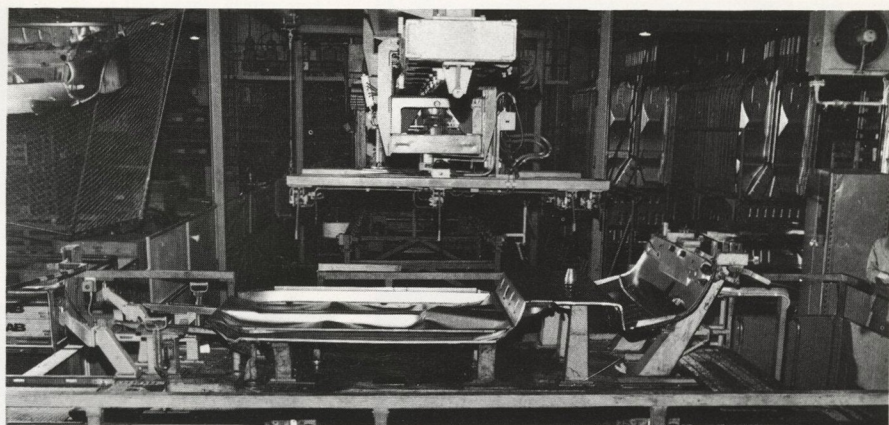
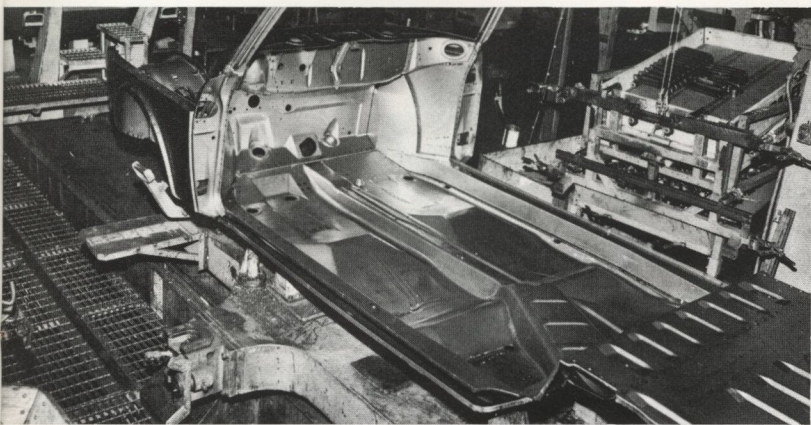


of the 99 body as shown on page 35. The underbody floor assembly is performed by a multiple-spot presswelder operating on 4 stations: automatic loading, 136-spot tacking, 124-spot completion, mechanical transfer to the gate-line carousel. For greater tooling flexibility, relatively low-priced expansion and rationalized addition of standard body derivatives (4-door sedan, Combi coupé, etc.), the earlier fixed fixture method was replaced by a gate-line with transferable jig trucks, where onto the assembled underbody/floor are welded in succession the front end subgroup (with windshield frame), the two side subassemblies and the roof panel, up to completion of the body shell.





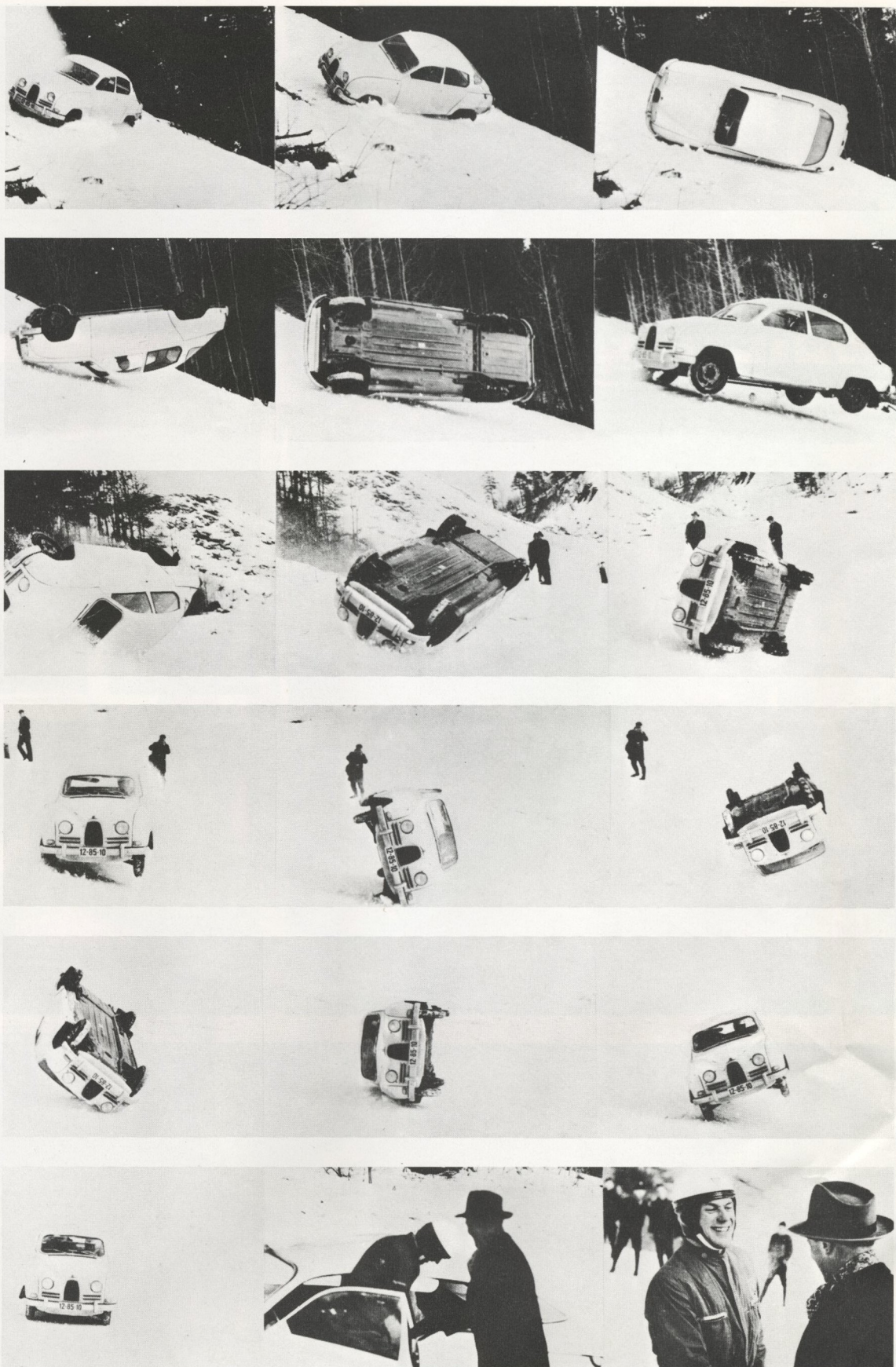




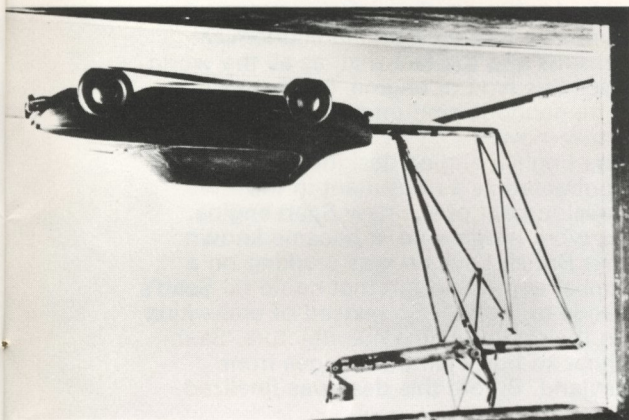


attitude' of Rolf Melde and his associates. The driver's seat has not only generous length adjustment but can also be raised, lowered or tilted to get a perfect position for any size of driver. Instruments and controls are laid out in perfect ergonomic fashion, with ideas gained from aircraft experience. The rear seat is collapsible in stationwagon fashion, vastly increasing the already generous luggage compartment, should the need arise. There are separate heating ducts to the rear seat and to the rear window defroster — controls for these are cleverly placed between the front seats, where they can be reached both by driver and rear passengers. In the updating of successive versions, Saab has refrained from the customary gimmicks, instead offering valuable extras as standard equipment. Typical are the impact-absorbing bumpers, front seats with integral head restraint, electrically heated driver's seat, headlight washers and wipers: all at their time world firsts. In the beginning all Saabs were green, today a great emphasis is placed on colour schemes with harmonized interior trimming. With very small outward differences from one model year to another, one or two distinctive new colours each year give the status-seeker an opportunity to show that he owns the latest model. The Swedish artist Pierre Olofsson, a noted abstract painter and great friend of Sason has for many years had the job of dreaming up new and exciting colours every season. In his typical bohemian fashion he explains how he evolved one of the colours that became the hit of that season: "You take one part cream, one part cheap brandy and one part green Chartreuse: tastes bloody awful, but man what a marvelous colour".

The 99 was planned at the same time as a four-stroke replacement was thought necessary for the original Saab model. In this case, with a completely new car, that was to share practically no parts with the previous, it was thought more to the point to design and manufacture an engine of Saab's own. A two-stroke, of course, was out of the question, but the Wankel was just about beginning to become of serious interest to most car manufacturers. This alternative was seriously considered and Rolf Melde, who has now left the company, told me recently that this was one of the hardest decisions he ever had to make during his career with Saab. In the end it was thought that the Wankel possessed too many of the two-stroke disadvantages, that Saab were so familiar with. As in the two-stroke the inlet and outlet are regulated by the piston, with consequent difficulties in lubrication and sealing. For once, Saab chose the orthodox approach, in deciding on a normal in-line four-

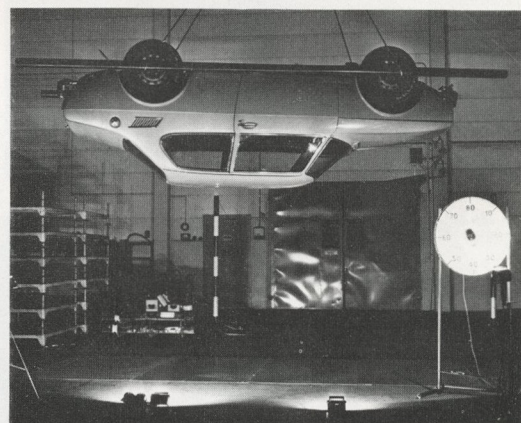
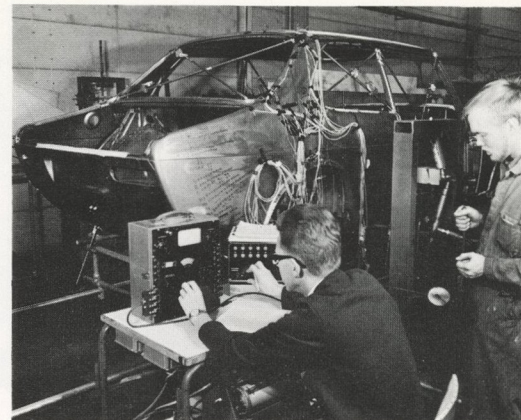




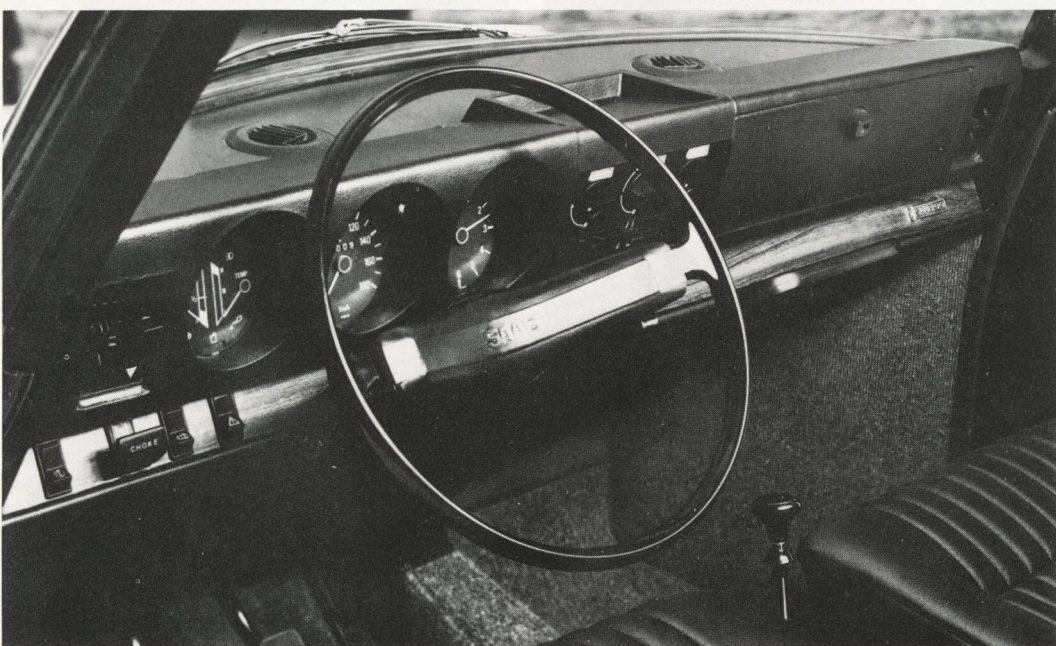
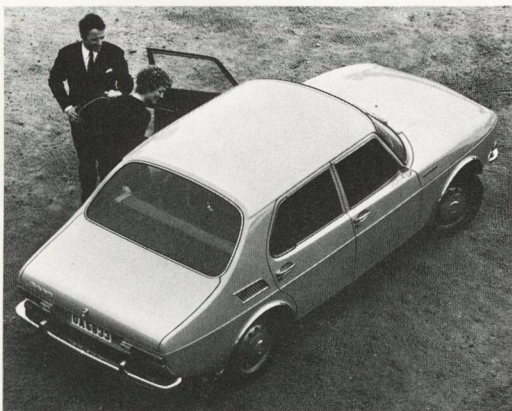
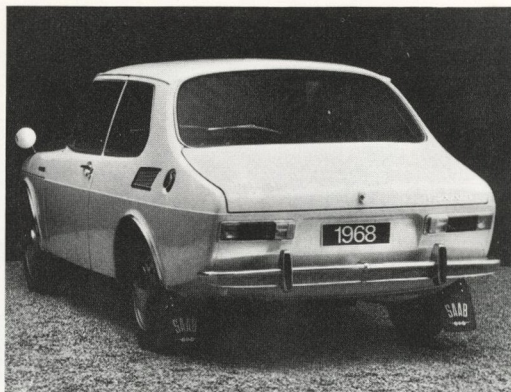


Windtunnel tests in 1964 on a 1 : 5 scale model having an almost identical shape to the production Saab 99 of today (above) showed a drag coefficient of 0.36, a practically negligible lift and a good directional stability even in gusty crosswinds, thanks to the favorable weight distribution and center of thrust location. The aerodynamic tests also established the correct positioning of air inlets/outlets, exhaust pipe for optimum gas dispersion and rear bumper (away from the body) for minimization of rear end fouling.

On these two pages, some of the many static and dynamic tests conducted on Saab cars mainly to verify body structure efficiency (already explained in previous captions). Spectacular evidence of its prerogatives was provided in February 1962 during a TV program on safety, when Arne Ingier 'drove' a Saab 96 down a ski jump near Oslo in a roll-over test. The bending stiffness of Saab 99's roof pillars was demonstrated in a wheels-up drop test from a height of 2 m. The 99 body shell torsional stiffness on test bench showed an average figure of 850 kgm/1°. In the light of such performances the results of head-on crash tests may even be taken for granted.





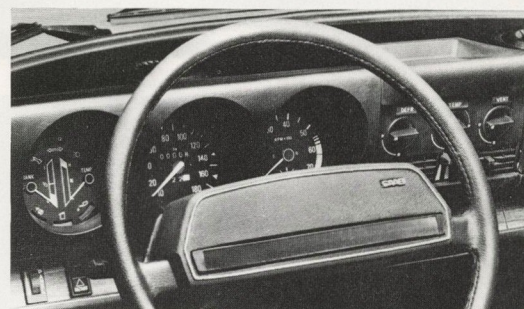
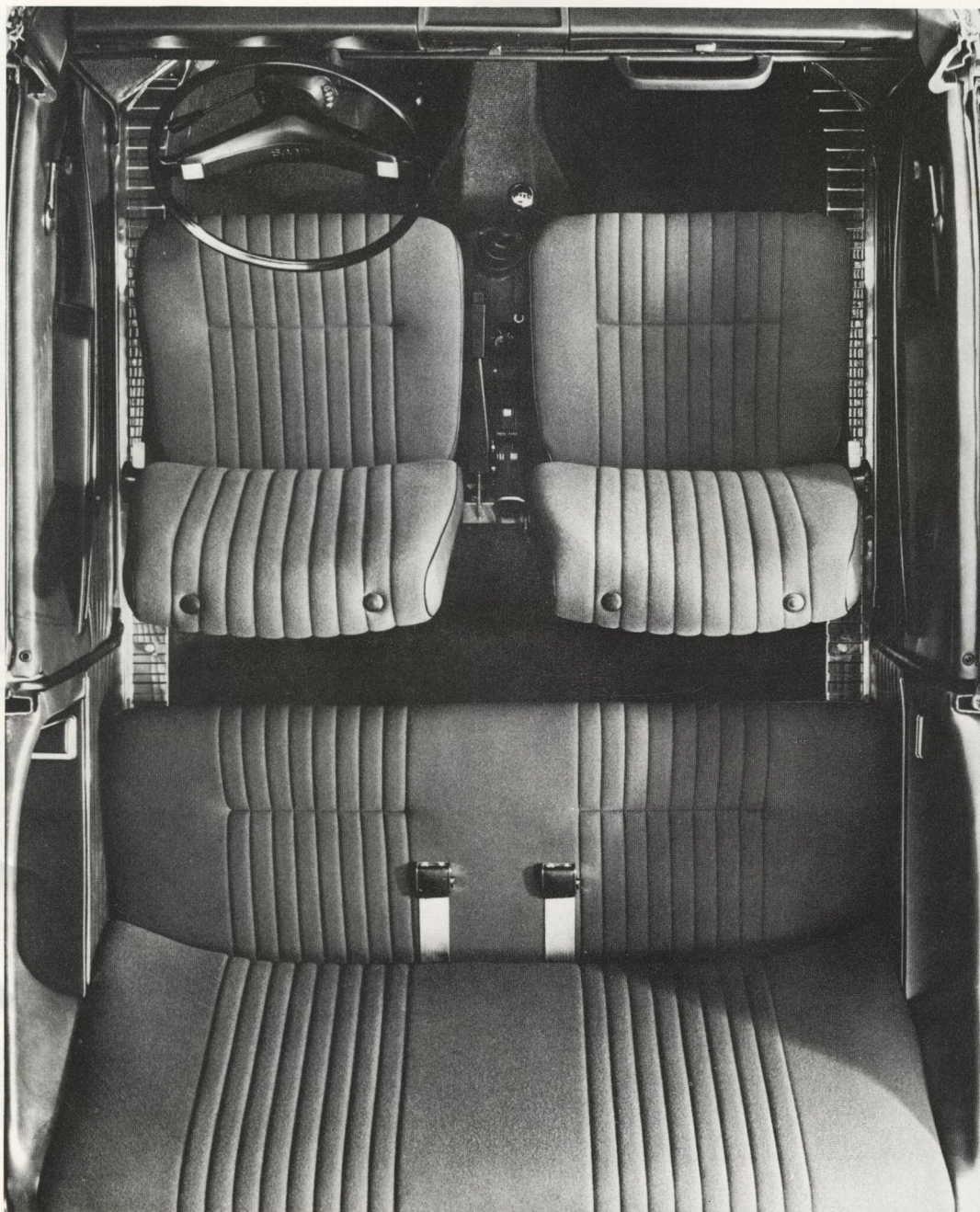


cylinder four-stroke reciprocating engine. A choice based on sound economical reasons and the fact that, as all the world uses this type of engine, it is backed by a tremendous amount of experience and know-how.

The English engine designer Ricardo was contracted as a consultant in the development of the new Saab engine. As work progressed, it became known that British Leyland was working on a similar engine design that could fill Saab's needs to the full. So instead of embarking on their own engine manufacture, Saab chose to buy their 99 engines from Leyland. Before this deal was finalized

however, Saab insisted on taking part in the development work. In Trollhättan laboratories the British engine was subjected to Rolf Melde's extremely severe testing procedures and numerous improvements were incorporated, to the benefit of both Saab and British Leyland who, as has been said by technical director Harry Webster, never had conceived of methods quite such tough. The Saab 99 was first shown to the public in autumn 1967 a full year before series production was started; this unusual procedure was decided upon so that the final road testing of the car could be made on public roads. Sixtem Sason died few months before this preview. Since its introduction the 99 has been produced in steadily increasing numbers and in several versions — first with the original 1.7 litre British built engine, later with a 1.85 litre that could also have an electronically controlled fuel injection. In 1972 Saab started building their own 2-litre version of this engine in Sweden





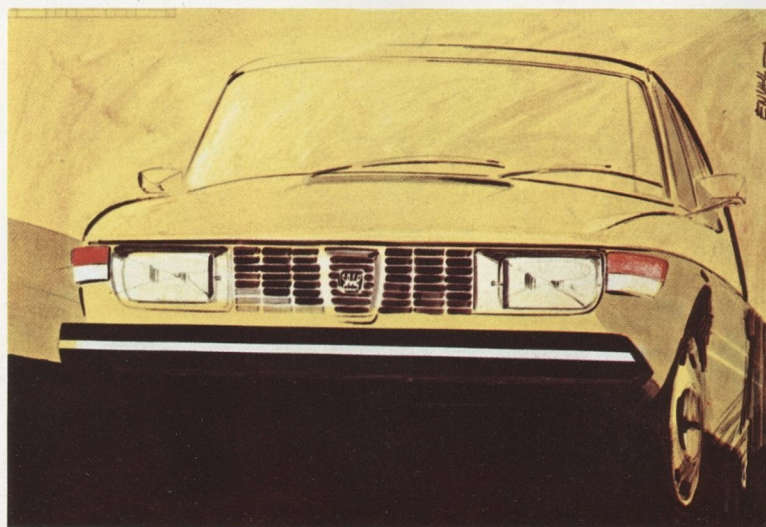
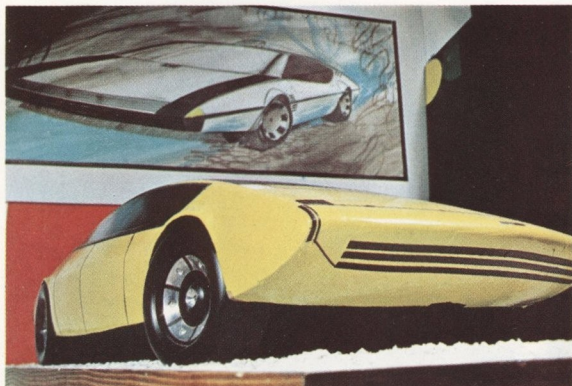
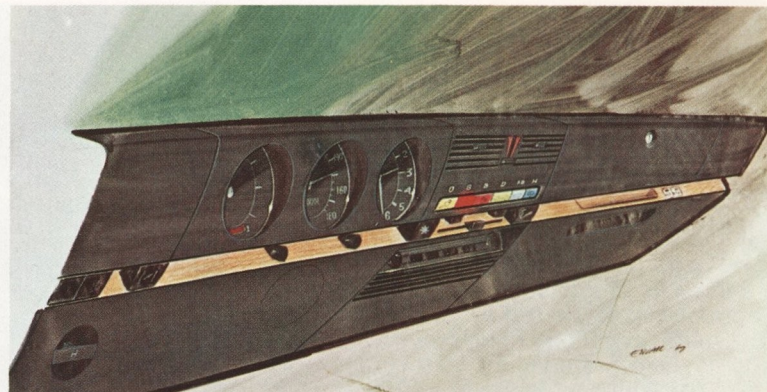
On these two pages, the milestones in the Saab 99 evolution from 1968 to '72.

Main technical and dimensional specifications of **Saab 99** at production starting time (top left photos) : 4 cylinders in-line engine of 1700 cc and 80 hp at 5200 rpm, front wheel drive, 4-speed freewheel gearbox with floor mounted lever, coil spring suspensions with front A-arms and rigid rear axle with trailing arms plus Panhard rod, disc brakes all-around with diagonally split dual circuit, 165 SR 13 tires; wheelbase 247 cm, front track 139 cm, rear track 140 cm, overall length 435.5 cm, width 167.5 cm, height 144 cm, unladen weight 1070 kg, top speed 155 km/h. In 1969, an export version with fuel-injection 1850 cc, 95 hp at 5200 rpm engine and automatic transmission was introduced. Since 1970, the 99L sedan body is available — for the first time in Saab's history — also in the four-door version. Two years later, to the 99 range was added the **Saab 99 EMS** (its body's main distinguishing features are highlighted in the photos above) powered by the Swedish-built 110 hp 2-liter engine, which from 1974 equips the full range in 3 different outputs.

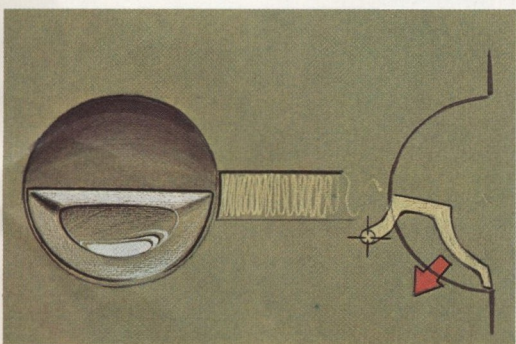
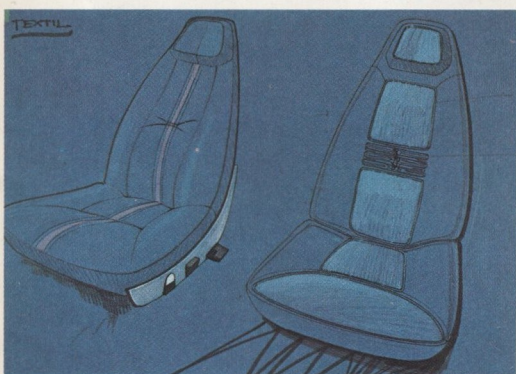
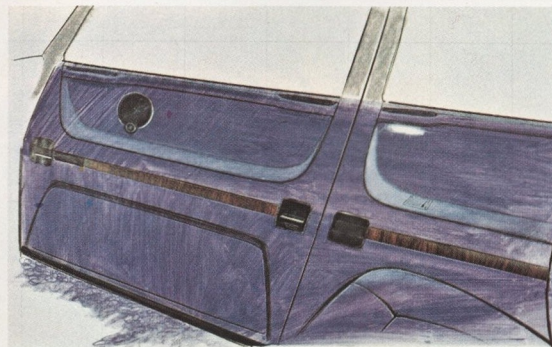
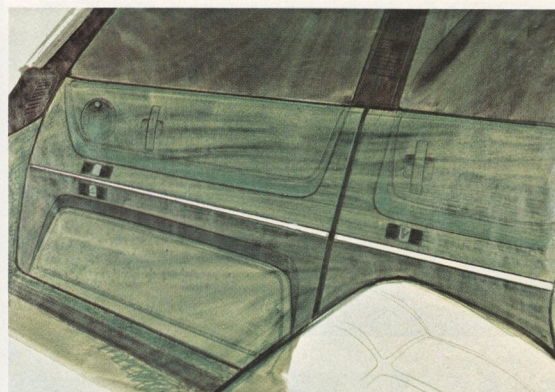
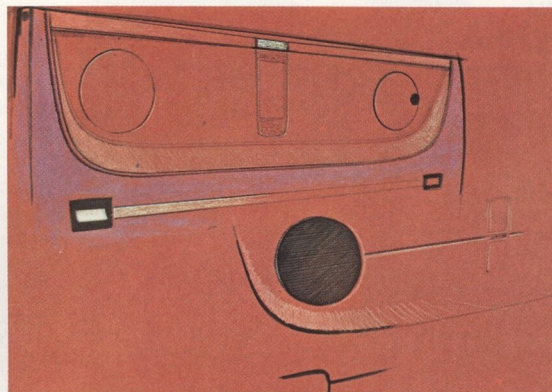
As regards the standard version interior, the photos on these two pages show its evolution from 1969 to '71, year in which the present



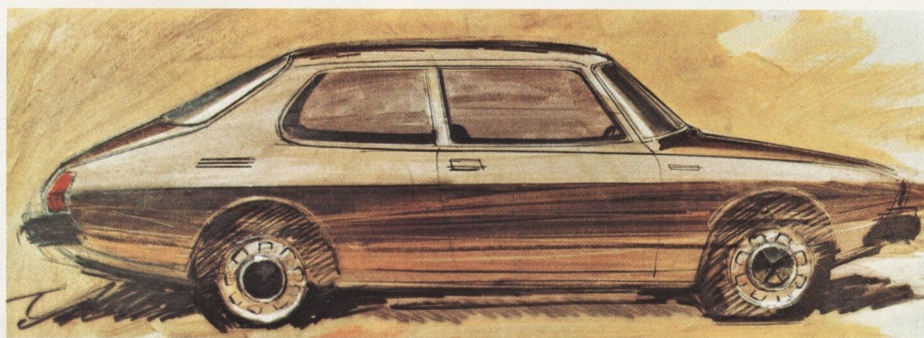
instrument panel was introduced. Other innovations followed: in 1972, the electrically heated driver's seat; in 1973, the moulded fiberglass integral roof-lining providing heat and sound insulation as well as impact-absorbing padding; in 1974, the front bucket seats with built-in headrest and the improved heating/ventilation system with back window defroster outlets.



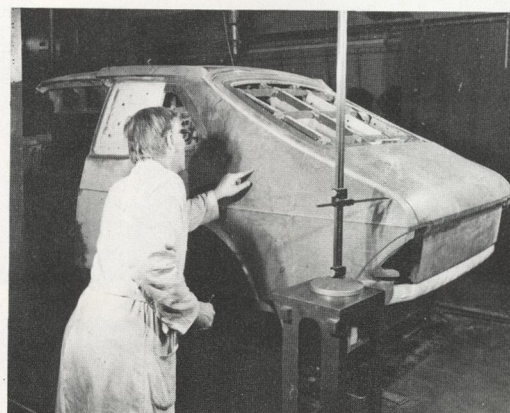
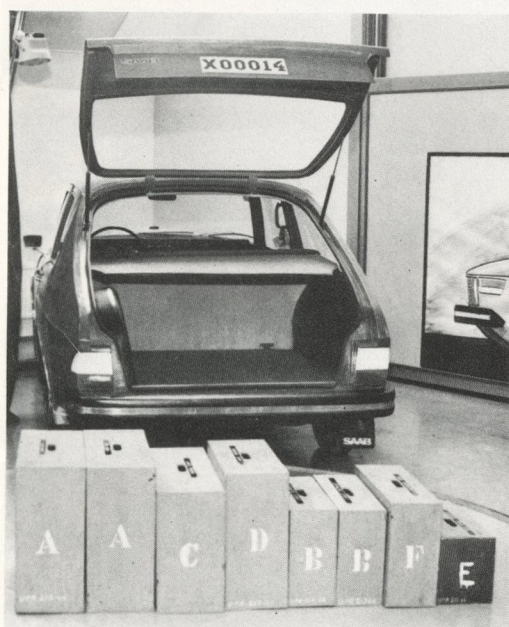
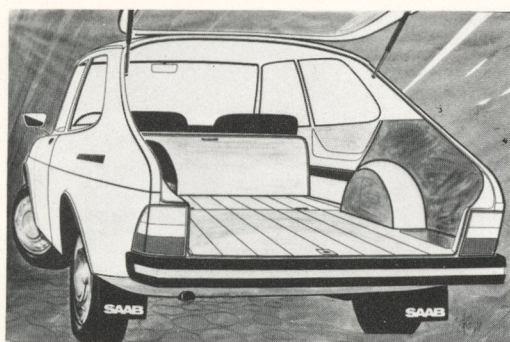




In this pictorial account, a five-year activity of the Saab Design Center, its main hall being shown on opposite page (standing at center, its director Björn Envall). Around this photo, some features introduced from '70 to '72: Sonett III wheel, later redesigned for the EMS; new instrument panel; new energy-absorbing bumpers and front side-lights. Sketches on this page show some styling proposals for the Combi Coupé.





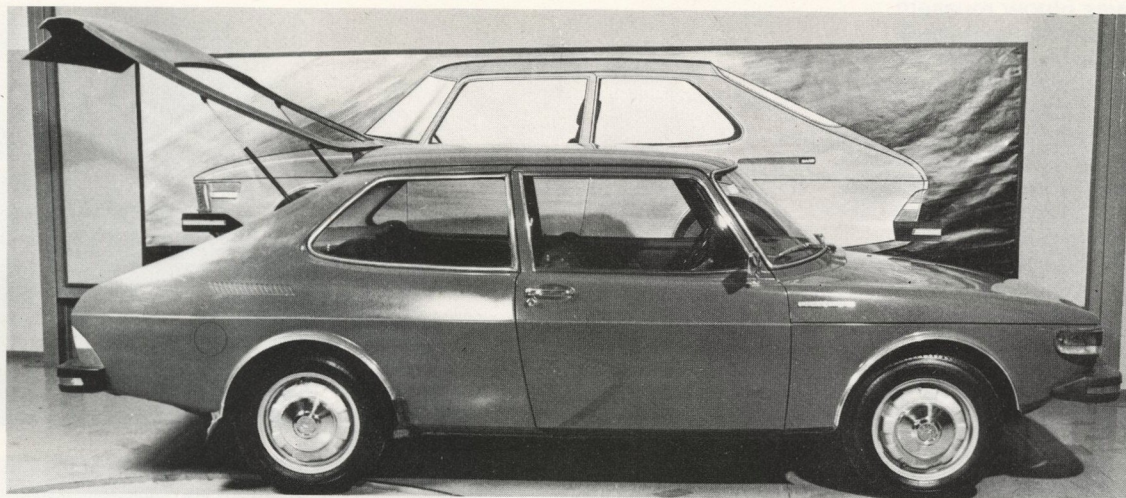


and by 1974 had completely phased out the British Leyland engines. This was the direct result of a merger with the old and established Scania-Vabis Company in January 1970. Scania-Vabis' experience as a maker of road vehicles stretches back to 1897, but although a number of passenger cars were made in the early history of the company, it has in later years concentrated efforts to the building of high quality heavy commercial vehicles and diesel engines. The merger not only gave the two companies, increased financial strength, it also set the stage for better exploitation of their joint resources in the fields of research and product development. And it gave Saab the opportunity to build their own engine in the Scania engine plant at Södertälje. The Saab-Scania 99 engine is based on the Leyland design but it is modified to a great extent: no parts are interchangeable between the two engines. Today it is available in a standard carburettor version as well as a fuel injection version used in the performance EMS model. The basically clean 99 engine of today meets all European emission standards by a wide margin, and with fuel injection it needs no catalyst to fulfill the stringent US standards (both Federal and Californian).

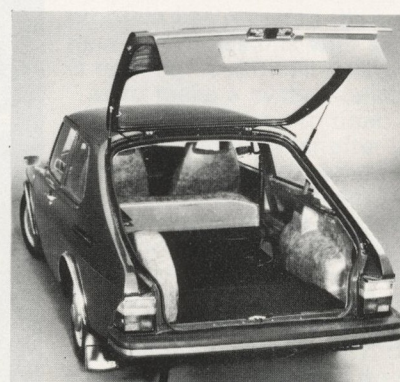
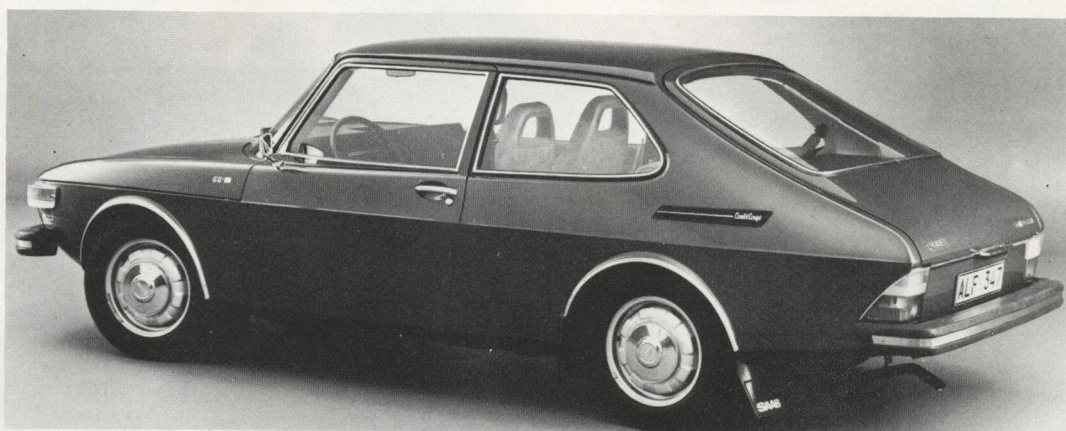
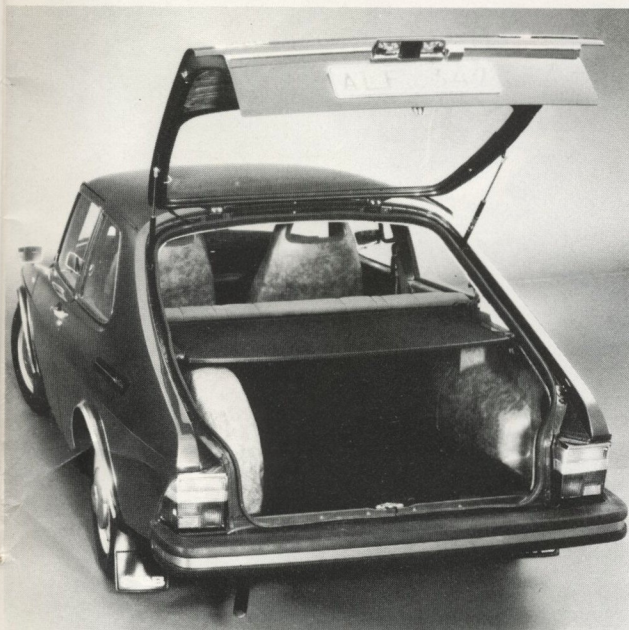
#### Saab safety

Safety has become a key word when Swedish cars are discussed, perhaps safety and security is part of the Swedish national character, as witnessed by ambitious social security schemes, strictly enforced speed limits and the obligatory use of seatbelts starting in 1975. To Saab, safety was a top priority long before Ralph Nader and current safety legislation, as can be seen from the immensely strong 92 bodywork, or the unique diagonally-split brake system incorporated in 1964. Today, safety is the main headache of most manufacturers, its cost and complexity ruining many of the small ones. **Henrik Gustafsson**, Saab's present technical director, with responsibility for today's and tomorrow's cars, is not very worried. The legislation being put forward around the world is well within the possibilities of Saab, most of the measures are already incorporated in the present cars. "But", says Henrik Gustafsson, "I would like to see the legislators become more cost conscious. To put cost and effect in relation. There are for instance proposals to make anti-lock brakes compulsory. As far as we can see, these will cost several hundred dollars per car. Even in a small country like Sweden, this would involve an annual outlay for motorists of nearly 100 million dollars. For the same amount of money you could build some 200 km of new motorways or install lighting on most existing ones. I just wonder which

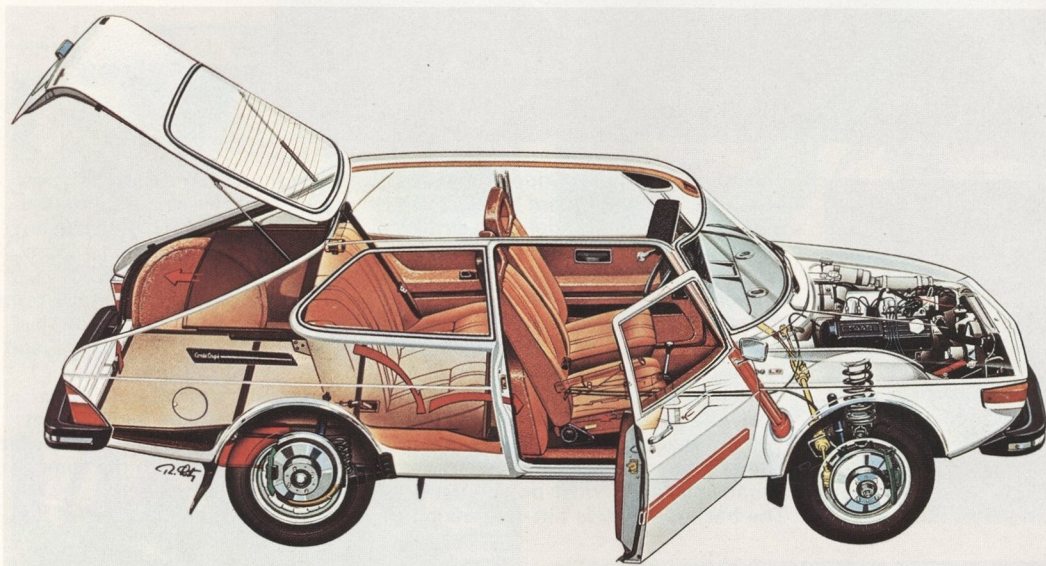




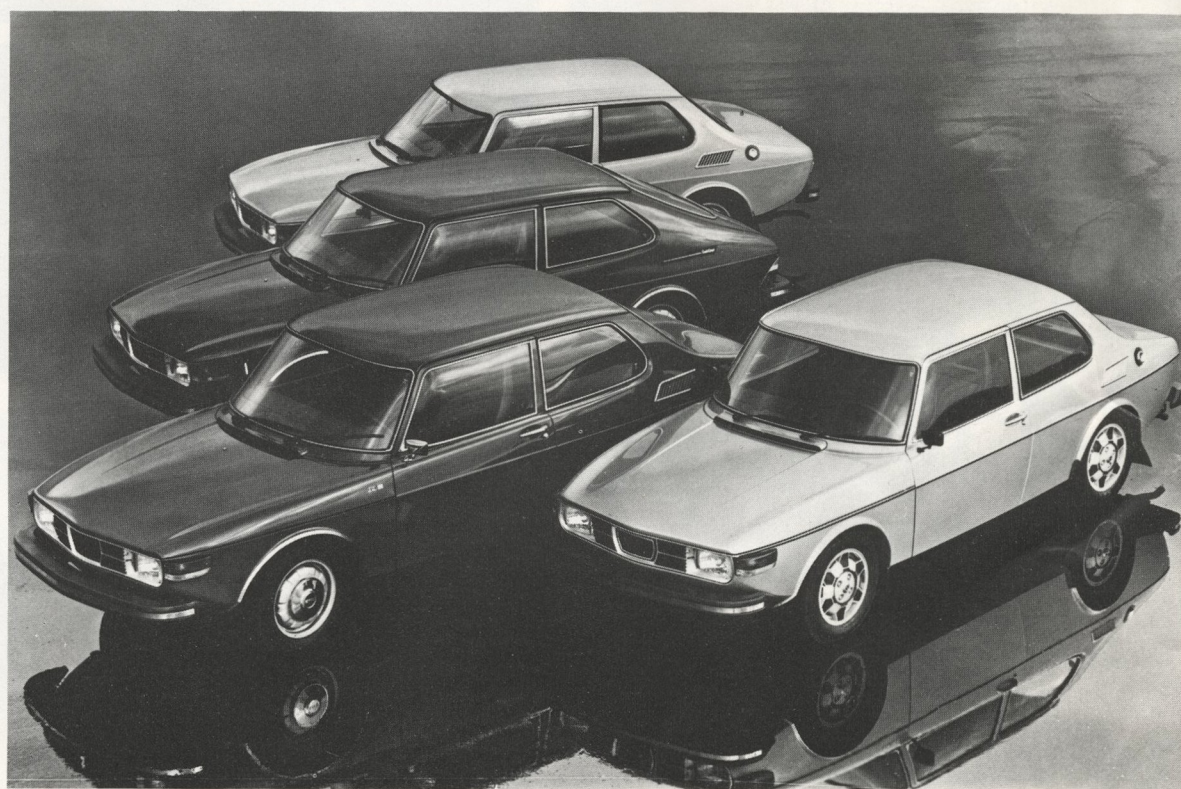
Facing page : Combi Coupé main design stages through the chronological sequence of the different full-size models : from first clay model to interior buck, from master model until structural mockups for methods and tooling development. Plotting of body surface plans for master model construction was accelerated by using the 'Formela' method (developed by Saab Aircraft division as of 1945) for dimensional outline measuring directly from the clay model and electronic data processing (Datsaaba) in mathematical form. This new 3-door version was unveiled to the press in August '73 and introduced on the Swedish market early in '74. The re-designed body rear end, 10 cm longer, does not upset interior roominess yet provides a markedly greater loading space (1.5 cu.m after folding away the rear seat ; 184 cm long, 92 cm high, 101 cm wide at wheelboxes, trunk floor at 53 cm above ground). The rear compartment is completely lined with the same sound-insulating vinyl-polyurethane of door and side trim panels. The back window is dirt-free owing to its aerodynamic shape.







The Combi Coupé features are highlighted by this phantom drawing. The same view concerning the 4-door sedan is shown on the following two pages along with some of the functional details of the Saab 99 range having greater significance from the standpoint of sound engineering and design: the electrically-heated bucket seat with built-in headrest, the rear window warm-air defroster, both 1974 features; the headlamp washers and wipers introduced in 1970, which have become mandatory on all cars registered in Sweden from the '74 models; the energy-absorbing bumpers, consisting of compressible cellular plastic blocks fitted between a sturdy aluminum section and the rubber casing, introduced in 1972 and later strengthened to protect the car body in collisions up to 8 km/h.







Pictures on these two pages show the basic range of Saab cars for the 1975 model year.

measure would save more lives". Henrik Gustafsson thinks that in the United States, for example, too much emphasis is placed on barrier crash tests — which are not so realistic — and too little on preventive safety, better steering, handling and brakes. In Europe it is often the other way around. Like everybody else, Saab is experimenting with air bags, but so far the engineers are pessimistic. Even if they could be made to work, they will chiefly offer protection in one single type of accident: that corresponding to a head on barrier crash. So far the well established and thoroughly tried 3-point seat belt is much more efficient. Particularly on a cost-effect basis. Saab's own in-depth accident investigation



program has revealed the value of reducing injuries in collisions with seat-belts. "There is nothing so difficult", Gustafsson says, "as to make a system reliable, when it is not used from time to time. Air-bags will have to sit there, year after year, to become effective only once, perhaps after a long time. So far I can only see small advantages in the air bag, but you never know what they might develop into". On emission control, Gustafsson can see the reason why such strict rules have to apply in cities like Los Angeles, or for that matter in any big city. But is it really economically feasible to go to such



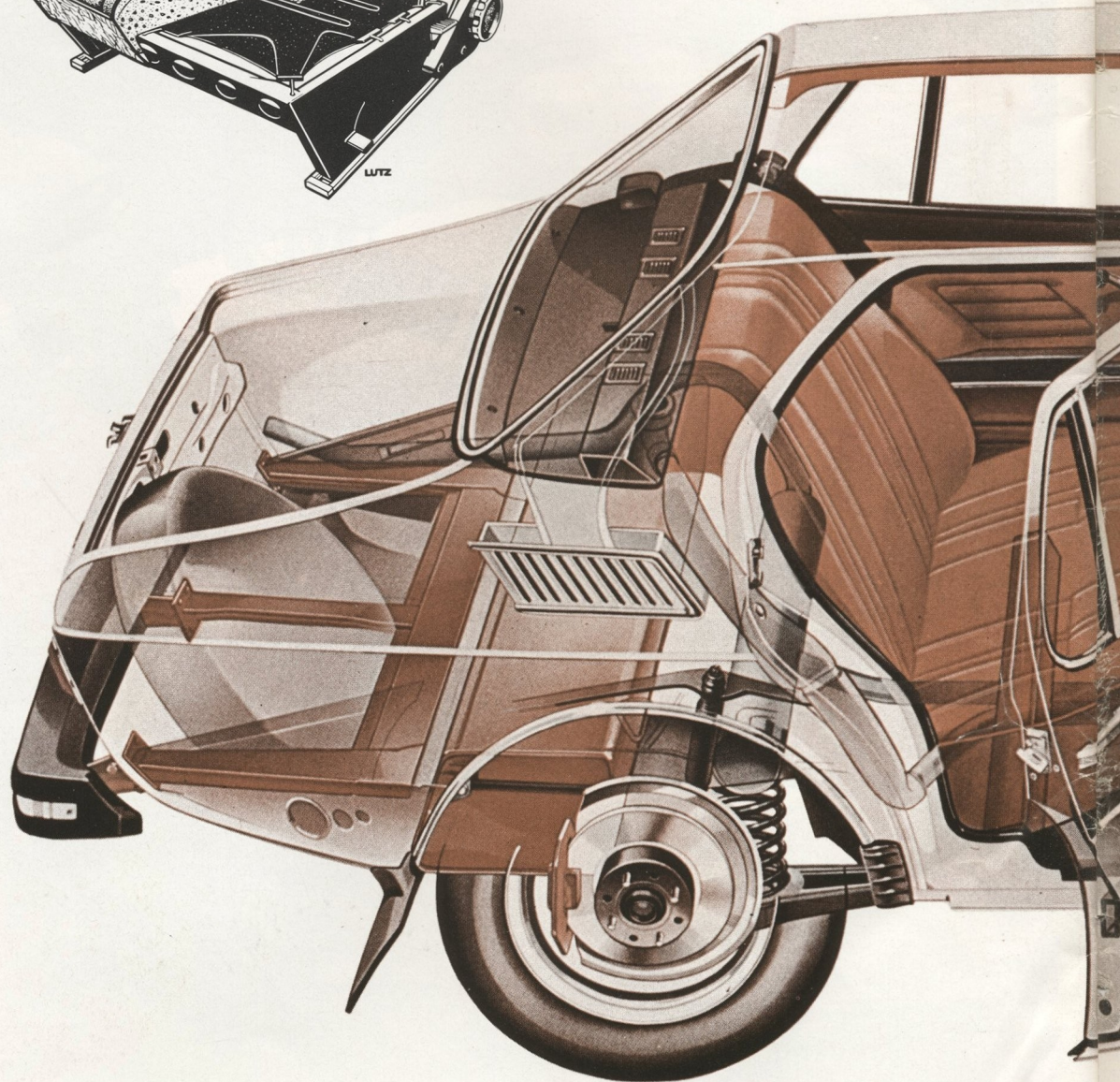
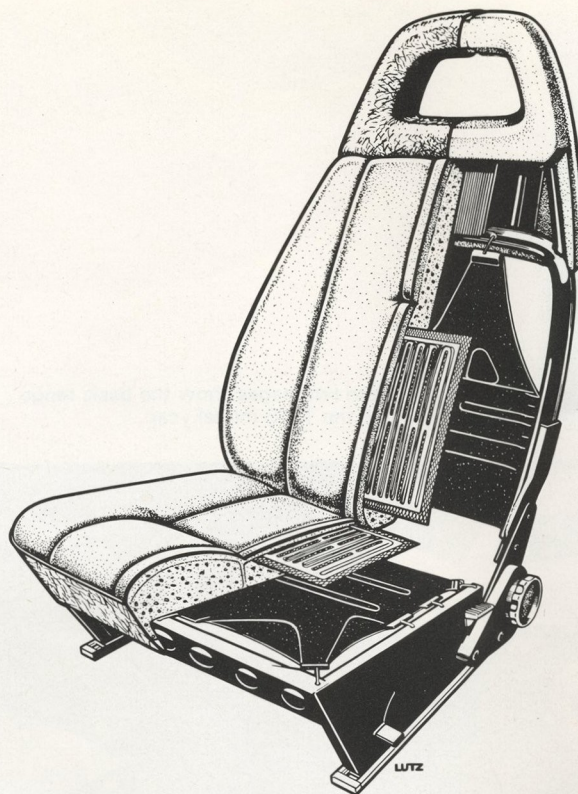
lengths with cars that are mainly used out in the country? "I would like to see different standards, for different driving conditions".

It has often been hinted that the severe Swedish safety legislation, by far the most extensive outside USA, has come about to protect the traditionally safety conscious Swedish car makers. "On the contrary", Gustafsson says. "As the majority of our cars are exported, we are the ones to be hurt most. We have to build our cars to meet the costly Swedish specification, also when they are sold in markets where no such legislation exists".

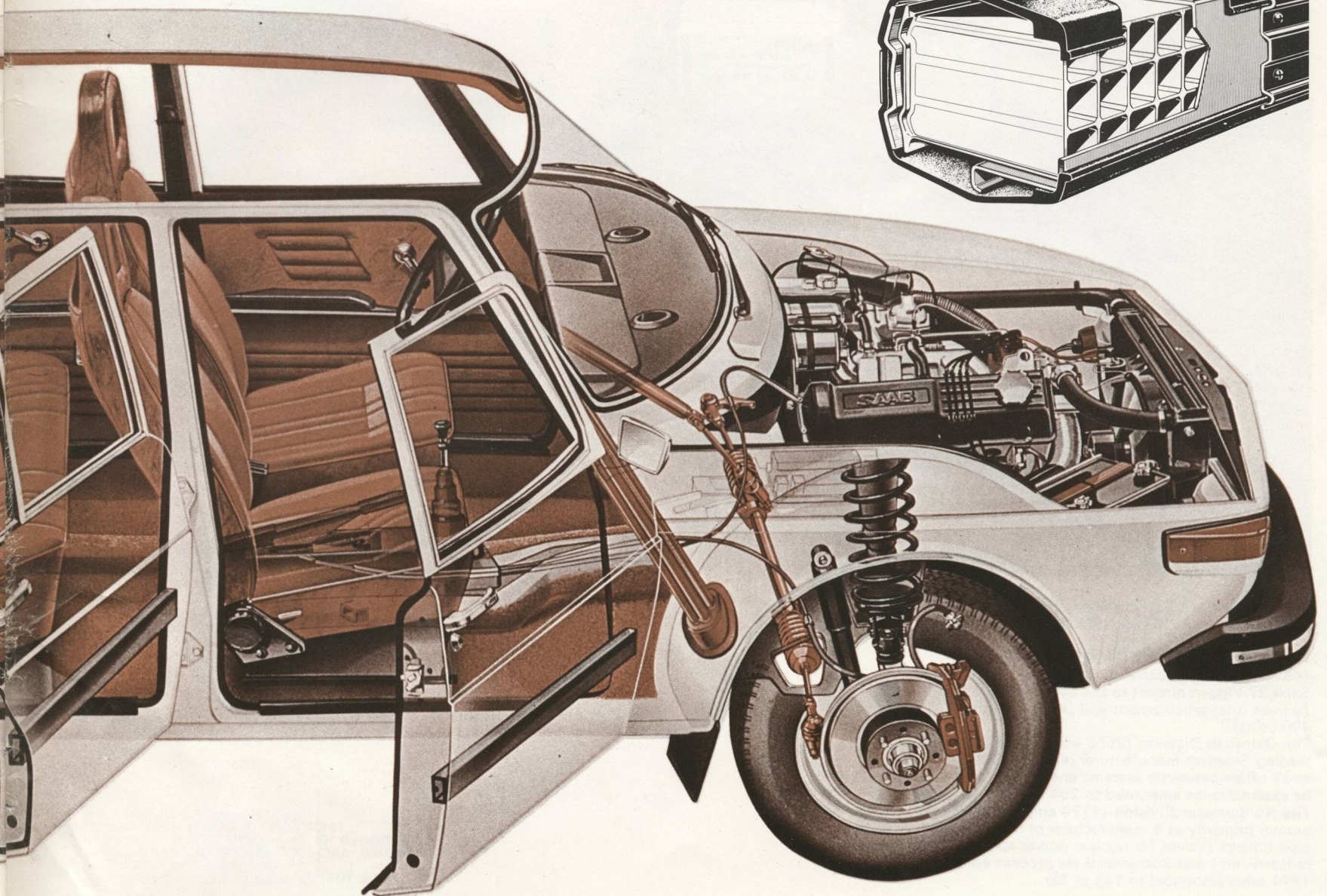
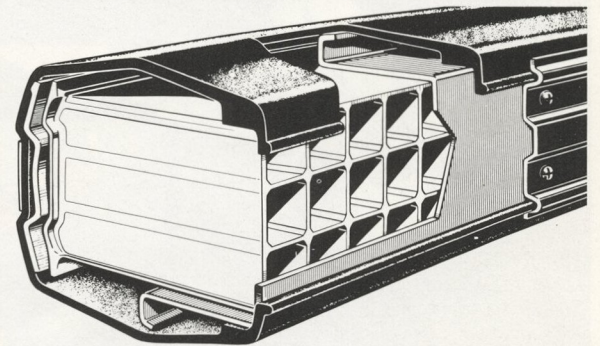
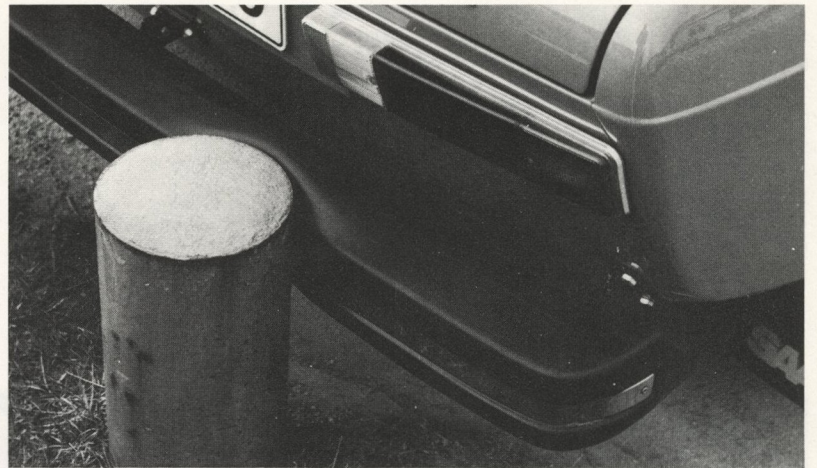
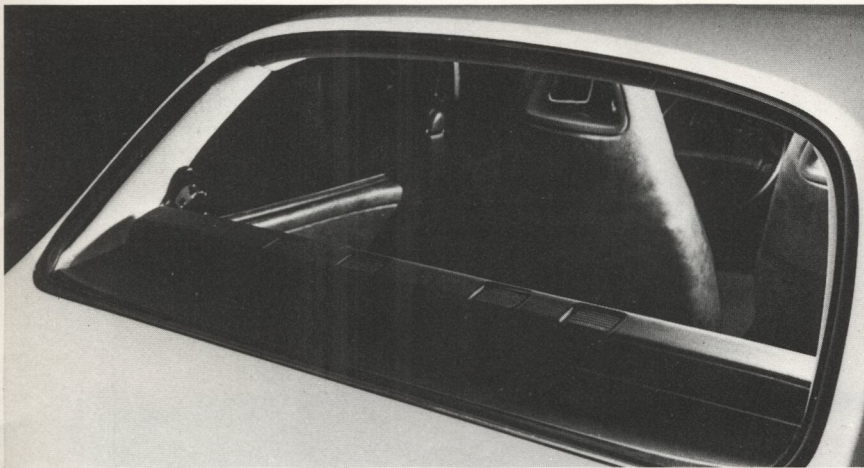
Gunnar Ljungström, who for all practical purposes can be named the father of the Saab car, is today officially retired, but he is still called upon by the company, bringing his vast experience to the younger generation that is taking over. His tall, lean figure and bright blue eyes give him a boyish appearance that completely conceals his age, and his soft, distinctive voice has nothing of an old man's hesitancy. In all his life he has been outspoken, often to the embarrassment of company PR men who frowned on hearing the chief engineer criticize the cars he had created. But his critical mind and irrevocable attitude towards management, who at times thought second best to be good enough, is what has made one of the world's smallest car manufacturers, one of the most reputable.

Today Gunnar Ljungström takes a deep interest in the evolution of society, particularly in the part taken by the motor car and transport in general. His thoughts are often controversial and must by no means be taken as Saab's official views. But the thoughts of an eminently experienced engineer and grand old man, are well worth listening to; two years before the energy crisis of 1973-74 he said: "We stand at the beginning of a period when we will have to reduce our demands. The present day automobile is over ambitious, it is made to fulfill needs that it rarely is called upon to do. And this is reflected in its excessive cost. If we limited speed potential, we would not need such expensive chassis designs, we could forget about 100 kph barrier crash tests. A roomy car for four or five, simple in its design and with a low performance". "Long journeys would have to be made by public transport, this is both cheaper and more restful. It is the qualities needed for long journeys that make a car expensive. And you spend five times as much petrol using your own car, as you would travelling by bus. I don't believe in the collapse of individual motoring, but I believe in a development within narrower limits than today".

Jan Ullén









This photo displays the range and variety of the technologically advanced Saab-Scania Group products. Consolidated sales during the 1974 amounted to 6553 million Skr, an increase of 21 percent over the preceding year sales. Foreign markets accounted for 42 percent of total sales.

The contribution to this total by the Scania Division (14520 employees) was of 2947 m Skr, having produced 18300 trucks & buses, 5500 diesel engines and 58400 gasoline engines plus 96100 gearboxes for Saab cars.



In 1974 the Saab Car Division (9633 employees) manufactured 92600 cars, total sales amounting to 2167 m Skr.

The 838 m Skr. sales of the Aerospace Division (4910 employees) consisted largely of deliveries of Saab 97 Viggen aircraft to the Swedish Air Force (whose total procurement will probably exceed 400 units).

The Datasaab Division (2558 employees) is the leading Swedish manufacturer of large as well as small office computer systems and software; in 1974 its external sales amounted to 294 m Skr.

The Nordarmatur Division (1174 employees) is known primarily as a manufacturer of high-quality pipe fittings (valves for nuclear power stations, pulp industry, etc) and instruments for process control; 1974 sales amounted to 143 m Skr.

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