DAF SB 200 DO
city bus chassis


STATION H.S.
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AB-44-75

J.Oldenkamp

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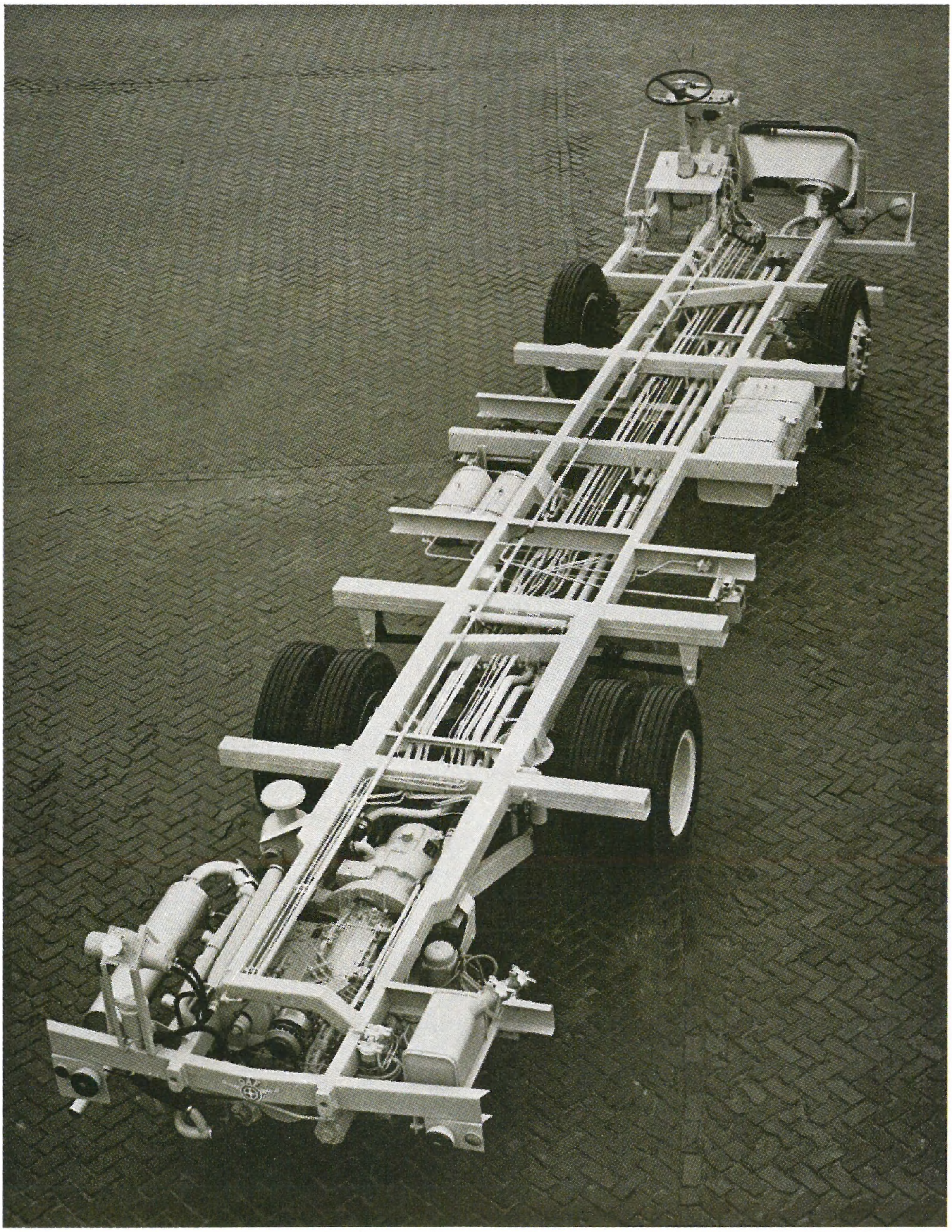


28 June 1966 was a red-letter day for DAF. This was the day on which Mr. W. A. V. van Doorne, in the presence of a large number of people, officially handed over the first standard bus on the new SB 200 DO chassis to Mr. W. Ybema, General Manager of Amsterdam City Transport.
The municipalities of Amsterdam, The Hague, Rotterdam and Utrecht have meanwhile placed several repeat orders.

Now the first city buses built on DAF SB 200 DO chassis have entered service in the four largest cities of Holland, Amsterdam, The Hague, Rotterdam and Utrecht, and have already become a striking sight on the city streets, a cherished ambition of both various transport operators and the manufacturers, viz. a considerable degree of standardisation, has been realised.
In 1963 the municipal transport departments of Amsterdam, The Hague and Rotterdam set up a joint committee to look into the question of bus standardisation. After exhaustive studies the committee produced plans for a standardised city bus the following year. At a later stage Utrecht joined the committee and from that moment also took part in the technical talks which proved necessary to work out exactly what was required in details.
Needless to say, close contact was maintained with the motor industry during these talks since only by proper discussion of operating, maintenance and manufacturing experience was it possible to reach the best possible solution for all parties concerned.
To enable the advantages of standardisation to be exploited as much as possible, the committee worked on the principle that the buses intended for the various cities should all be identical down to the most minute details.

Advantages of standardisation
Standardisation was accordingly the basis of the entire project. The advantages which accrue to both operators and manufacturers are obvious, viz.

1
Vehicles incorporating the practical experience of the operators and thus suiting their requirements.

2
Vehicle and parts conformity allows quick, efficient and inexpensive maintenance.

3
The buses can be lent by one operator to another, even for one day only, without inconveniencing passengers or drivers in the slightest.

Right at the start, before standard buses had been developed, the regular exchange of experience with regard to construction and maintenance proved most advantageous, so that good results may now be expected from the exchange of ideas between operators with similar operating conditions now that the standard buses are actually in service.
By carefully analysing the joint experience with buses already in service in the four cities, the committee was able to draw the necessary conclusions and it was afterwards possible to reach agreement on all matters of detail; experts were consulted to advise on styling and the choice of colours.

Comfort and safety basic design features
When planning the basic design the members of the committee regarded comfort and safety as the most important features. The following points were held in mind:

1
Road safety
To start with, a number of points which have a direct bearing on road safety, viz. dual-circuit brakes, rapid acceleration to avoid delaying other traffic, a striking livery to reduce the risk of collisions and easily visible but not excessively bright rear and stop lights. Further, a number of factors which make driving easier or more pleasant and therefore have an indirect bearing on road safety, viz. good vision at all times for the driver obtained inter alia by a non-reflecting single-piece windscreen, a large area of glass in the entrance doors, well located mirrors and powerful headlights. Other points are automatic transmission, power steering, sensibly located controls, a comfortable driver's seat, good suspension, heating and ventilation of sufficient capacity, measures to prevent the exhaust gases of other vehicles entering the interior and sound insulation to cut the noise level inside the bus to the absolute minimum.

2
Safety and comfort of passengers
The suspension, heating, ventilation and sound insulation factors mentioned above also affect passenger comfort. Some other aspects of passenger safety and comfort are: a device to prevent the bus moving off when the entrance doors are open and a device to prevent passengers alighting from the bus being caught between the doors, comfortable, well designed seats, safety pads on the seat backs to avoid facial injury on emergency braking, plenty of hand grips and rails for standing passengers and smooth acceleration and stopping.

3
Safety and comfort of other road users
The design of the bus should also take into account other road users. The following points have already been mentioned in another context: sufficiently powerful acceleration and braking so that the bus does not disrupt the traffic flow, a striking livery and powerful lights. Care should also be taken to avoid the production of annoying exhaust gases.

4
Efficient operation
Minimum waiting times at bus stops and high average speeds are desirable. This can be favourably influenced by an interior arrangement ensuring quick ingress and egress, rapid issue of tickets and proper passenger flow. Rapid acceleration is also an important factor.

5
Vehicle life
The bus should have a life of at least 10 years with a minimum of maintenance.

Body design and interior arrangement
The committee formulated a number of definite requirements based on the general factors. Firstly, with regard to the body.
The standard bus should have a capacity of 32 seats and 64 standing places, and an overall length of approximately 11.50 m.

The wide, easy entrance cuts waiting time at bus stops. This is particularly so when dual flow entry is adopted, separating passengers already in possession of a ticket from those who have to purchase a ticket from the driver. The low entrance height is very noticeable.

The entrance and exit doors have a considerable bearing on the location of the chassis components and the dimensions of the chassis. The two exit doors promote passenger flow and also do much towards cutting the time spent at stops.

It is considered that the present operating conditions in the four cities require the use of a one man operated bus with maximum passenger capacity based on the customary ratio of two standing places for every seat.
Since the engine is mounted behind the rear axle, a greater length than 11.50 m would mean that the maximum permissible rear axle load of 10 tons would be exceeded. A double entrance door has been employed to cut waiting time at bus stops. Moreover, dual flow entry can be obtained if required, i.e. passengers already in possession of a ticket are separated from those who have to purchase a ticket from the driver.
To prevent the advantage of rapid entry through the wide entrance being nullified by delays in passengers alighting from the bus and passing along the bus, there is a double-width exit between the axles and an additional single-width exit behind the rear axle. The exit doors are so located that about two-thirds of the passengers leave the bus via

the centre exit and the rest via the rear exit.
The wide entrance necessitated a front overhang of 2.67 m, and the engine location behind the rear axle a rear overhang of about 3.30 m. A wheelbase of 5.54 m was accordingly obtained. The width of the bus is 2.50 m.
To afford standing passengers sufficient vision, the top of the window frame at the rear axle is 1.70 m above the floor. As a result of the sloping floor, this height is greater in front of the rear axle and smaller behind it. Although it was possible to obtain a floor height of 62 cm at the entrance with the engine behind the rear axle, a floor slope of 3.5% and air suspension, tests showed that the resultant step height arrangement of 36-26 cm or 32-15-15 cm was not so practical for purposes of easy entry as an arrangement of 32-18-18 cm, giving a floor height of 68 cm. The floor slope was accordingly fixed at about 3%.
It has been found that such a floor slope involves no difficulties or inconvenience for the passengers. The height of the exit steps was determined in a similar fashion.
The arrangement is vastly superior to that employed on existing vehicles, as can be seen from the following chart.

Floor height at:	*entrance*	*centre exit*	*rear exit*
old	88-96 cm	88-100 cm	N/A
new	68 cm	82 cm	93 cm

The height of 32 cm finally chosen for the first step is the minimum height possible in view of the air suspension and taking into account legal regulations and kerb heights.

Chassis requirements
The committee decided the following requirements with regard to the chassis.

1
Engine
A large engine with an output of at least 150 DIN hp was regarded as essential. It is generally realised that a diesel engine which has to develop its full power tends to produce smoke.
Proper adjustment and good maintenance of the fuel system can also help to eliminate the annoyance caused by the emission of smoke from the exhaust in densely populated areas with many narrow streets. For, although it has now been proved that diesel exhaust gases are not a health danger, it is indeed necessary to avoid the nuisance caused by such gases.
A large engine with a reserve of power was also preferable from the point of view of engine life and maintenance costs.
Moreover, rapid acceleration was required. Despite the fact that average speeds are continuing to drop in towns, a bus needs good acceleration to enable it to join other traffic with a minimum of delay after starting off from bus stops. Only in this way can a minimum journey time be achieved. Practical tests were held to establish the acceleration times required for a city bus to enable it to keep up with other traffic.
These times are as follows:

0-30 km/hr in 8 sec when empty
0-30 km/hr in 14 sec when fully laden

With a maximum speed of 55-60 km/hr, the high engine output is used to achieve impressive acceleration and not a high maximum speed. There were really only two possible locations for the engine, viz. under the floor between the axles or under the floor behind the rear axle. It was decided to put the engine behind the rear axle, mainly because this enabled a lower entrance to be achieved.

2
Gearbox
Various factors affect the choice of gearbox, the most important being passenger and driver comfort, ease of operation, acceleration, maintenance costs and the price of the gearbox.
Practice shows that jerky gear changes are difficult to avoid with both conventional gearboxes and semi-automatic units.
Passengers making their way to their seats and standing passengers find these jerks inconvenient. Moreover, gear changes involve a loss of 1-2 seconds acceleration time, which is definitely a disadvantage in city traffic.
Also in view of the fact that the driver should be able to devote his full and undivided attention to the traffic in busy city streets and should therefore be relieved of all unnecessary work, a fully automatic gearbox was selected.
It is expected that a fully automatic gearbox will have a favourable effect on engine life, though fuel consumption will probably be somewhat higher than with a semi-automatic gearbox.

3
Steering
The steering was an important point of discussion. To avoid unnecessary driver fatigue, light steering had to be employed. Steering effort measurements were made on empty and laden buses to establish criteria.
The steering effort was measured on a bus at a speed of 10 km/hr while the steering wheel (diameter 500 mm) was turned to its lock at a given speed. This test clearly indicated that the front axle load was not the only criterion of the steering effort required but that other factors, such as front axle design, etc., were also very important in this respect.
Measurements were made to determine the maximum acceptable steering effort, also on a bus with adjustable power steering.
The bus was driven by a number of drivers selected in consulation with the medical officers, these drivers having found it physically difficult to drive buses with heavy steering.
As a result of all these tests and measurements it was

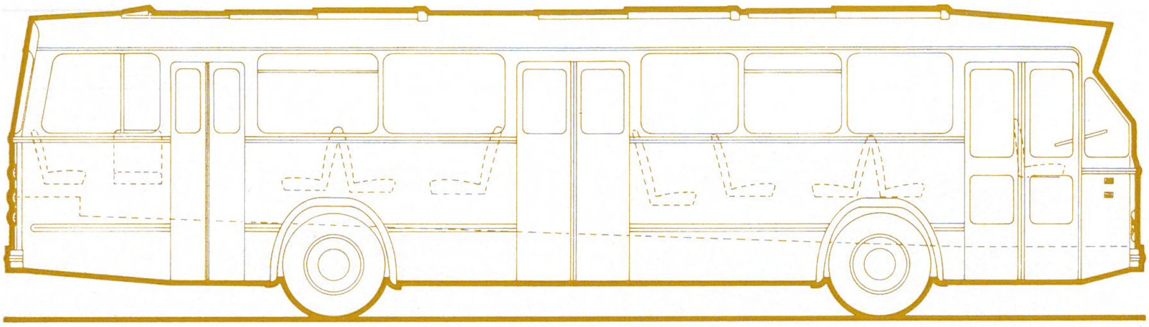
To ease the driver's task as much as possible, a special study was made of the driver's seat, the arrangement of the controls and instruments and the vision.

found that all existing mechanical steering gears required too much steering effort and that power steering was essential.

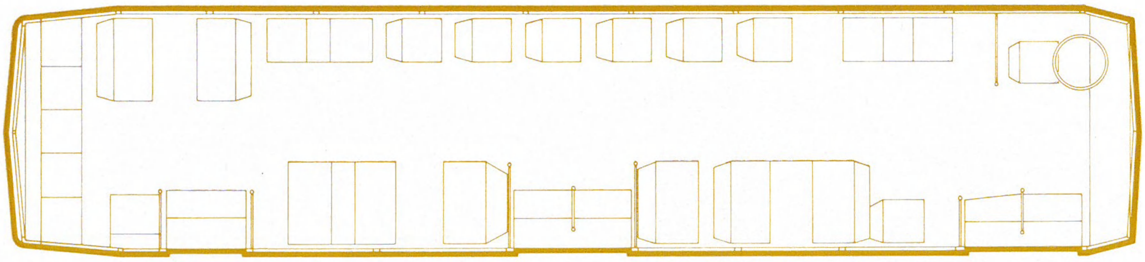
4
Suspension
Air suspension was selected since it affords a high degree of passenger and driver comfort.
Moreover, air suspension permits a low floor height which does not vary according to the load.
Although it is possible for maintenance costs to be higher than in the case of leaf springs, the body is less exposed to vibration and stresses.

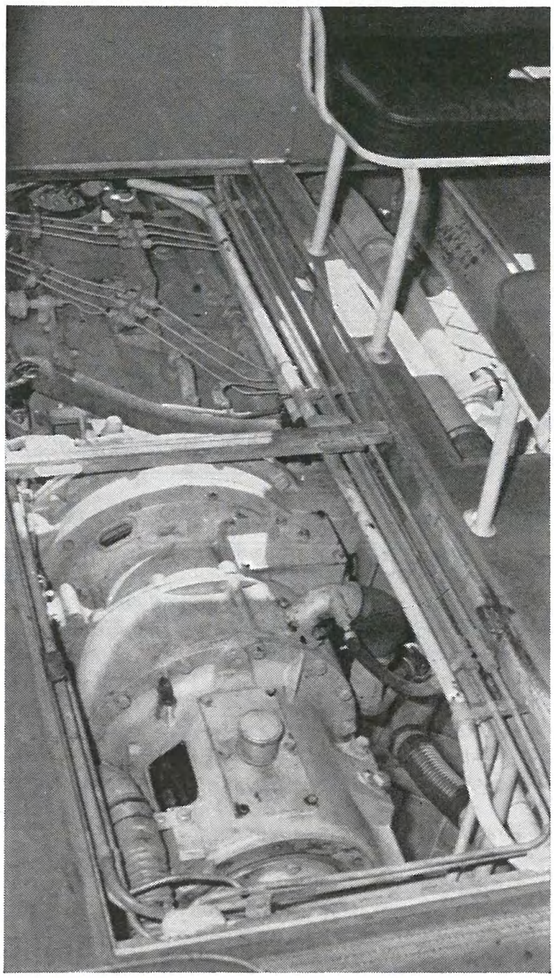
The DAF SB 200 DO
Needless to say, much time elapsed before DAF were able to produce a prototype incorporating all the requirements mentioned. The prototype was developed in very close co-operation with the Standardisation Committee of the four major cities. The numerous orders already mentioned indicate that the DAF SB 200 DO is fully up to expectations. Not only Dutch cities are interested in this city bus chassis. The SB 200 DO and indeed the entire standardisation project have also been the subject of considerable expert interest abroad.

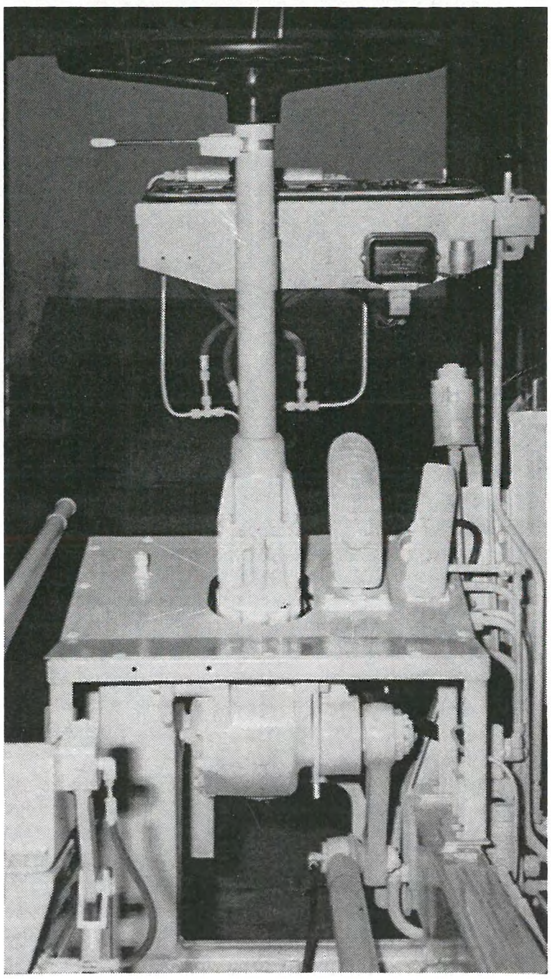
Dimensions and weights
The dimensions and permissible axle loads of the chassis are such that it is suitable for a body with 32 seats and 64 standing places forming an integral unit with the chassis. The various components are located so as to permit an arrangement with a double entrance ahead of the front axle, a double exit amidships and a single exit behind the rear axle. The chassis is flat-topped and slopes upwards slightly towards the rear. The chassis height is accordingly 0.66 m at the entrance, 0.71 m at the front axle and 0.87 m



The bus has 32 seats and 64 standing places. There is a double entrance door ahead of the front axle, a double-width exit between the axles and a single-width exit behind the rear axle.







The fully automatic Voith Diwabus transmission is unit-mounted against the longitudinally installed DAF DO 680 horizontal diesel engine, which is easily accessible from all sides.

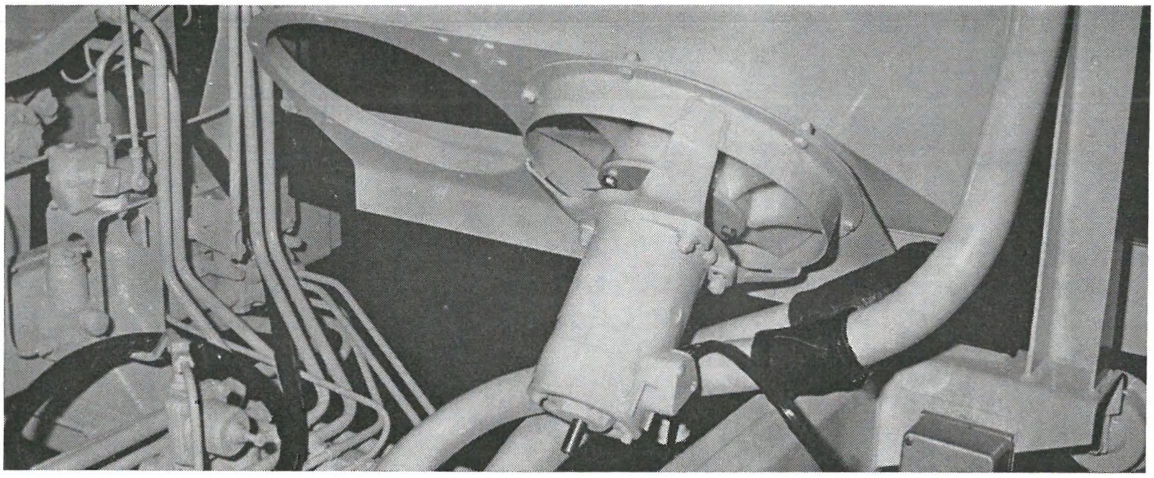
The clutch pedal is eliminated by the use of fully automatic transmission.

at the rear axle.
The electrically welded chassis with box-section longitudinal members has an overall length of 11.35 m and a wheelbase of 5.54 m. The front and rear overhang are 2.60 m and 3.21 m, respectively. The large wheel turning angle of 45° enabled a turning circle of 19.60 m to be achieved, measured at the centre of the outer front wheel.
The I-section front axle is rated at 6300 kg. With the standard 10.00 x 20/16 ply tyres this is reduced to 6000 kg. Since the DAF 2255 rear axle employed has a rating of 10,000 kg, the maximum permissible chassis weight is 16,000 kg.
The kerb weight of the chassis is 5490 kg, with 1495 kg on the front axle and 3995 kg on the rear axle.
The weight of the bus complete with the standard bodywork is 9200 kg.

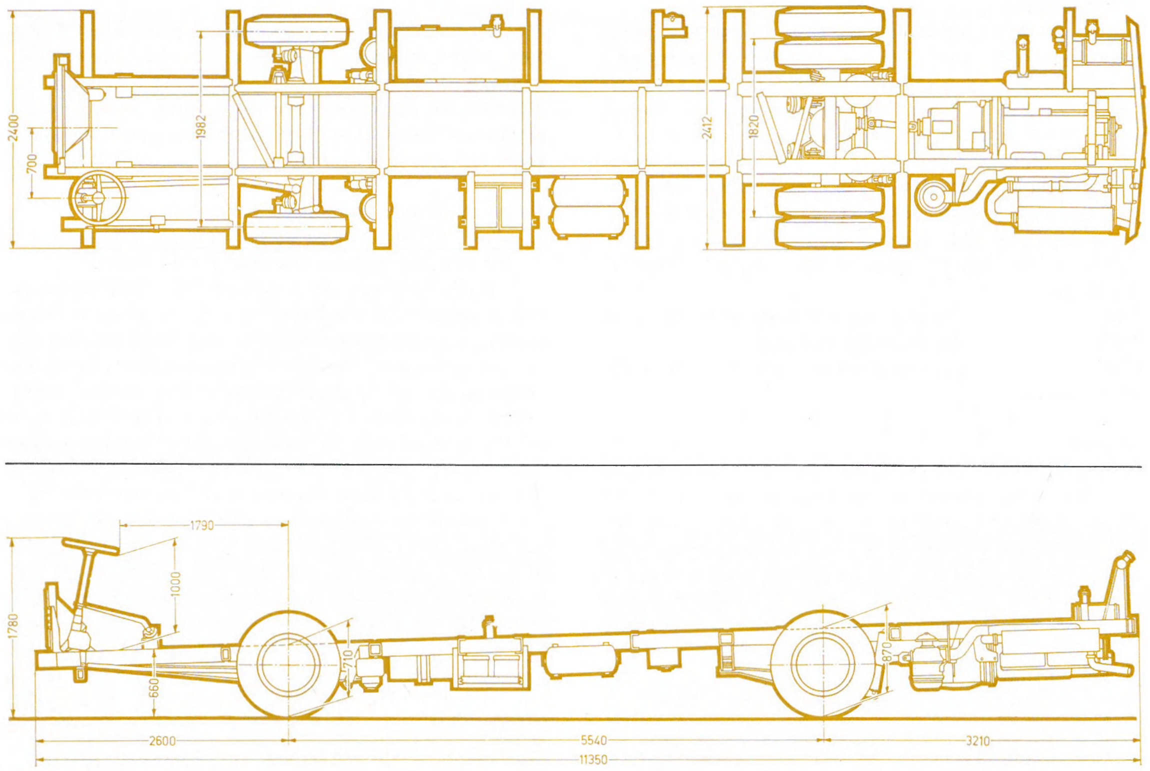
Engine
The bus is fitted with the DO 680 horizontal diesel engine. This 6-cylinder direct-injection engine has a bore and stroke of 127 mm and 146 mm, respectively, and a piston displacement of 11.1 litres. With its compression ratio of 15.75 : 1 the engine develops a maximum output of 180 SAE hp at 2000 rpm, while the maximum torque of 68 SAE kgm is attained at 1100 rpm. These SAE figures correspond to 163 DIN hp and 64 DIN kgm at the same engine speeds. To cut the emission of smoke to a minimum, the engines of the chassis for the four municipalities are governed at 150 DIN hp.
The fuel injection system consists of an injection pump with mechanical governor and 4-hole injectors.
Besides the camshaft, the water pump, injection pump and compressor are also driven from the timing gears. The alternator and the pump for the power steering are driven by means of V-belts. Both the engine and the various components mentioned are easily accessible, much facilitating daily maintenance.
The location of the engine and its accessories at the rear of the chassis necessitated the incorporation of a large number of lines between the front and rear, so as to provide the connections with the radiator, steering gear pump, controls, etc. situated at the front of the chassis. These lines are logically placed between the longitudinal members, thus saving time during maintenance and repairs.
The lubrication system, which incorporates a centrifugal oil filter, also illustrates the efforts made to reduce maintenance costs. Experience has shown that the use of a centrifugal filter enables the oil change intervals to be lengthened. Daily maintenance is simplified by the automatic system by means of which the oil level in the sump is always kept at the correct level. With a sump capacity of 18 litres the lubrication system has a total capacity of 25 litres.
So as to maintain the most suitable engine temperature, the engine is equipped with an automatic cooling fan driven by an electric motor. This motor is switched on and off by a thermal switch according to the temperature of the coolant.
The electrical system is supplied with current by a 24 Volt, 1500 Watt alternator. The two batteries each have a capacity of 135 amp/hr. As the engine is located a considerable distance from the driver, a starter motor cut-out is employed. This makes it impossible to operate the starter while the engine is running.

Fully automatic transmission
The DAF SB 200 DO has Voith Diwabus transmission of the 200 S type unit-mounted against the engine.
The Voith Diwabus transmission is a fully automatic hydro-mechanical transmission incorporating a torque converter, with a power divider which acts as a differential, and planetary gear forward and reverse drive. In the low speed range (up to about 30 km/hr) the power is transmitted along both a hydraulic and a mechanical path. As the speed increases the part of the power transmitted hydraulically is gradually reduced. In the Voith Diwabus unit the characteristic advantage of a torque converter – the availability of full engine power from the moment the vehicle is driven off – is utilised efficiently in conjunction with purely mechanical drive at higher speeds.
Forward drive, neutral and reverse drive are selected by means of a lever. Once the required position has been obtained, operation is fully automatic.
When driving off from stationary the reduction ratio is 5.1 : 1 in forward drive and 3.5 : 1 in reverse drive.
When the speed is reached at which the drive is purely mechanical the reduction ratio is 1.39 : 1.
The transmission is connected to the rear axle by a short, one-piece propeller shaft with needle bearing universal joints. The single-reduction rear axle has a hypoid crown wheel and pinion, and the reduction ratio is 4.625 : 1. The engine, transmission and rear axle enable the bus to accelerate from 0-30 km/hr in 12 secs when fully laden. At the maximum speed of the engine under load, viz. 2000 rpm, a speed of 60 km/hr is achieved.

Air suspension at front and rear
The front axle is connected to the chassis frame by two longitudinal arms 2.65 m in length.
The longitudinal arms, which serve to transmit braking forces to the chassis frame, are pivot-mounted at a point 1.80 m ahead of the front axle. The two arms are connected by a transverse member 0.85 m behind the front axle.
The two bellows of the air suspension are located 1.60 m apart from each other between this transverse member and the chassis frame. Also attached to the transverse member are the cables preventing excessive deflection of the suspension.
Just ahead of the front axle there is a transverse rod which absorbs transverse forces. Good lateral stability is conferred by two levelling valves in conjunction with the considerable distance between the two bellows.
The levelling valves are designed so as not to act on slight up and down movements of the axle.
Another factor promoting lateral stability, a point to which



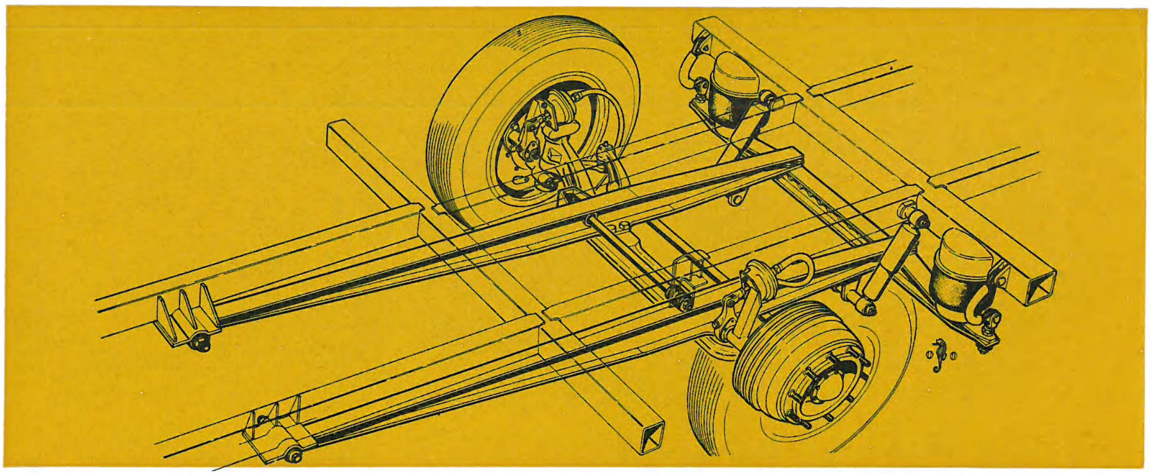
The radiator and the automatic electrically driven fan are located at the front of the chassis.



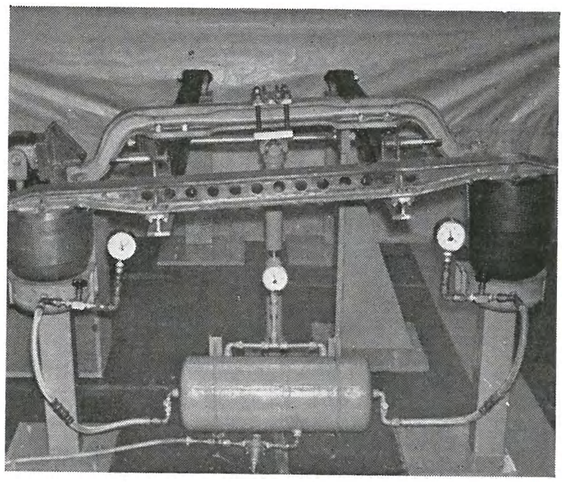
The principal dimensions of the DAF SB 200 DO chassis and the location of the main components.

special attention has to be paid in the case of chassis with air suspension, is that the air bellow mounting points were placed as far out as possible. The attendant design problem was solved by means of the above-mentioned transverse member, which, needless to say, is sufficiently rigid.
To check the effectiveness of the design adopted, DAF erected a torsion test bench, upon which the axle and suspension were exposed to continuous lateral stresses. It should be noted that with this design the axle also functions to a certain extent as a stabiliser.
The rear suspension differs from that at the front inasmuch that at the rear the two longitudinal arms are attached to a transverse spring. Together with the rigid rear axle body and the non-flexing longitudinal arms, the transverse spring, which is located 1.00 m ahead of the rear axle, gives lateral stability at the rear of the chassis. On the rear axle there is a single levelling valve.
Braking and acceleration forces are transmitted from the longitudinal arms to the chassis frame through the transverse spring.
The rear suspension also incorporates a transverse rod which locates the axle and the two longitudinal arms laterally. At the rear there was no particular difficulty in supporting the air bellows, as they are situated fairly close to each other, this being a relatively simple and stable arrangement.
The tests were consequently centred on the revolutionary transverse spring which, apart from transmitting braking and acceleration forces, also takes up lateral forces and carries part of the weight of the bus. As for the front axle, a test bench was constructed for the rear axle. In this case the load was simulated with a pulling device and lateral stresses with an oscillating device.
Both front and rear axles are provided with double-acting telescopic shock absorbers which make a great contri-

The front axle is connected to the chassis frame by two longitudinal arms. The transverse member linking the longitudinal arms enabled the air bellows to be mounted far apart, thus increasing lateral stability.



The forces exerted in service on the transverse member of the front suspension were reproduced on a test bench where the axle and suspension were subjected to continuous torsional stresses. ▷



bution to the riding comfort of chassis with air suspension. The suspension system employed by DAF has all the above-mentioned advantages of air suspension, while disadvantages such as lack of lateral stability, etc. have been eliminated.

Steering and brakes

Largely on account of the 6000 kg front axle and the steering effort shown to be required with this axle rating, it was decided to fit power steering to reduce driver fatigue.

The mechanical part of the steering gear is of the recirculating ball type. With the ratio of 22.7 : 1, the number of steering wheel turns from lock to lock is 5; a steering effort of 4 kg is required when the front wheels are pointing straight ahead and 9 kg at lock.

The air brake system consists of two completely separate circuits, one for the front axle and the other for the rear axle.

There are two air reservoirs, each with a capacity of 40 litres.

The compressed air required for the operation of the automatic transmission and the door safety devices is obtained from the rear axle circuit, while the air required for the air suspension and the operation of the doors comes from the front axle circuit.

Charging valves protect the air brake system against leakage through the auxiliaries. Moreover, the air line for the operation of the doors is provided with a shut-off cock.

Two air pressure gauges are fitted on the instrument panel to indicate the pressure in each of the brake circuits.

As an additional precaution there are two warning arrows which appear in the driver's field of vision when the air pressure drops below the permissible minimum.

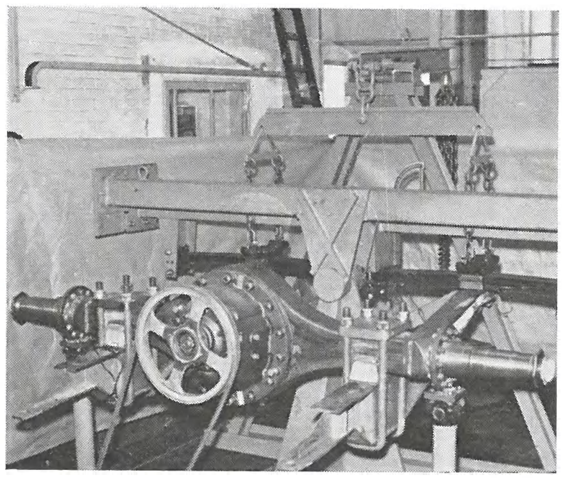
The brake drum diameter and lining width are 16½ in. x 5 in. and 16½ in. x 7 in., respectively, at front and rear, the lining thickness being 18 mm.

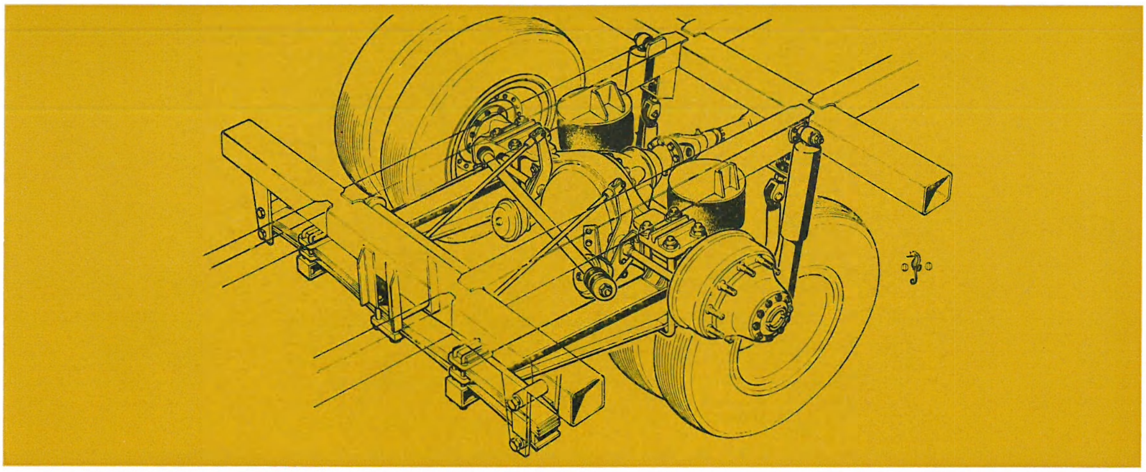
The brake lining area is 2400 sq. cm. at the front and 3350 sq. cm. at the rear, giving a total brake lining area of 5750 sq. cm.

The brake shoes are expanded by 'S' cams which are operated through slack adjusters by diaphragm-type brake chambers.

The handbrake, which operates mechanically on the rear wheels and is completely independent of the service brakes, incorporates a special mechanical device to facilitate application.

The revolutionary leaf spring forming part of the rear axle suspension was also thoroughly tested on a test bench. In this case the load was simulated with a pulling device and lateral stresses with an oscillating device. ▷





The transverse leaf spring is an important part of the rear suspension since it transmits braking and acceleration forces, takes up lateral forces and carries part of the weight of the bus.

Automatic chassis lubrication

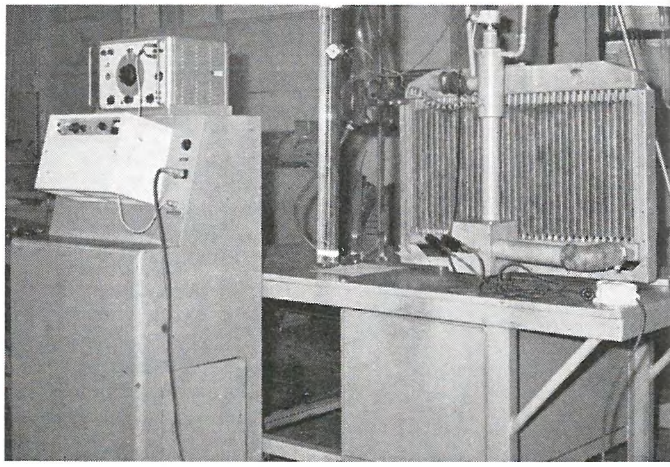
The designers of the SB 200 DO endeavoured to cut daily maintenance to the absolute minimum. This is clearly indicated by the automatic sump topping-up system previously mentioned. Another example is the automatic chassis lubrication of a type which has already proved its value in service on many other chassis. The main supply line is fed with oil from a tank which is unit-mounted together with an electrical gear-type pump and a relay box. From the main supply line the oil is distributed to all points requiring lubrication.

A particular advantage of the system employed is that the amount of oil despatched to each lubrication point can be adjusted individually. Besides the sending unit for the electrical speedometer, the lead which sends an electrical impulse to the relay box of the lubricating oil pump every 100 km to put the pump into operation is also located on the gearbox output shaft. After running for a fixed period of about 30 seconds, the pump motor is switched off automatically. When the automatic chassis lubrication system is in operation, a warning lamp lights up on the dashboard.

Except for the clevises in the handbrake linkage, all chassis lubrication points are served by the automatic chassis lubrication system. This also applies to the six lubrication points of the bus doors.

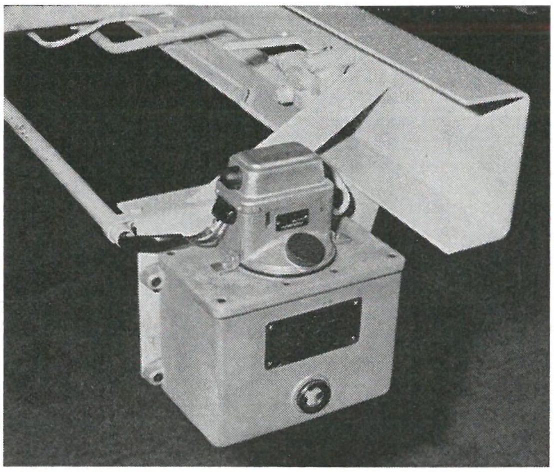
Experience of the bus in service

The new bus has now been put into service on a number of routes in the four cities. The public finds it much superior to the older buses, not only because of the entirely different body design but also on account of the excellent riding comfort conferred by the smooth acceleration and braking and the good suspension.



Various components which are exposed to vibration were tested on test benches simulating such vibration. For instance, the radiator was tested in this manner at a predetermined coolant temperature and pressure.

To enable useful road tests to be carried out, the prototype was fitted with a dummy body with the rigidity of self-supporting bodywork. The design of the SB 200 DO was perfected with the aid of this strange-looking vehicle.



The centre of the automatic chassis lubrication system: the tank, pump and relay box.

Public and drivers pleased with new city bus
('Het Vrije Volk')

H.T.M. on the right path with new red buses
('Het Vaderland')

Standard bus a big success
('GEVU-Klanken')

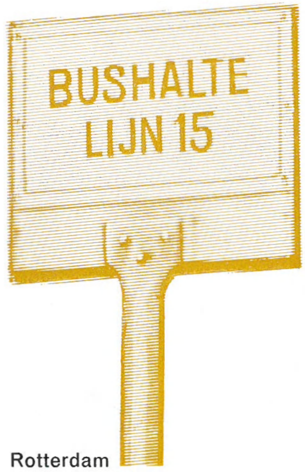
Press Comments

'Public and drivers are most enthusiastic about the latest additions to the fleet', commented the newspaper 'Het Vrije Volk' last March on the subject of the DAF SB 200. 'The public is full of praise. A frequently heard opinion is that the bus is comfortable and gives a good ride. Old people in particular are very pleased with the low steps of the double-width entrance. All the passengers like the second exit at the rear, which at long last enables a proper passenger flow to be achieved. It is not surprising that most drivers are satisfied with the new bus. They had quite a large say in its design. Their requirements and wishes were taken into account as much as possible. Even the medical officers of the undertakings were consulted so as to ensure that the drivers would be able to do their work with the maximum of comfort and efficiency. All the movements which the drivers have to make in the course of their duty were grouped in the smallest possible working area. All the control knobs are within easy reach. In busy peak-hour traffic the new bus is a real success. The drivers have found that it keeps up with other traffic better. The powerful engine and automatic upward 'gear-changes' cut loss of time to a minimum. The bus has a fierce acceleration.
The drivers praise the striking manoeuvrability, which is particularly important in the narrow city streets. Corners can be taken more sharply, thanks to the larger wheel turning angle. Apart from all practical advantages the new bus is also an asset in the grey city scene on account of its attractive appearance.
The bus benefits from its beautiful lines and claret livery'.

The newspaper 'Het Vaderland' had the following to say about the DAF SB 200 last January:
'Without any fuss the H.T.M. (The Hague Tramways) have taken the first step towards the complete standardisation of the bus fleet in The Hague. This meets with the general satisfaction of both the public and the drivers, it has been found, for the new bus makes a quick and efficient service possible.
Public reaction is unanimously favourable. Enough has already been said about the improved ingress and egress, better vision and smooth air suspension. With their 180 hp engines the new buses are so fast that they cannot be used on a route in conjuction with older vehicles, at least not during the day, as they would catch up with them and disrupt the schedules. The experience of Amsterdam, which had the new buses earlier, was of use to the engineering department of the H.T.M. The drivers had to become accustomed to the automatic gearbox, which makes engine braking rather less effective than in the case of the older buses. This difference has to be overcome by the smooth, powerful brakes and some adaptability on the part of the driver. However, the new bus presents no difficulties of a technical nature. Much attention has been paid to driver comfort. An enquiry showed that most drivers have very strong ideas about the ideal seating position and the location of the controls. The driver's seat is upholstered with a perforated vinyl with ventilating properties.
To conclude: the heating of the driving compartment. The drivers said they would like to buy the man who had thought that out a drink. This may certainly be regarded as an accolade'.
'GEVU-Klanken', the house magazine of Utrecht Municipal Transport, published the comments of three bus drivers on the new standard bus, the DAF SB 200.
'Driver G. van Haren is enthusiastic about the riding qualities of the standard bus. He thinks its easy manoeuvrability is a most notable point. According to him the steering is as light as that of a good private car. The bus patiently picks its way through the narrow streets in the city centre. Moreover, it has a firm grip on the road. On brick-paved roads drivers have to brake very carefully in some of the older types of bus as they tend to slip at the rear even when the road surface is only slightly damp. This does not affect the standard bus at all.
When the brakes are applied it clings to the road. The automatic gears, which make fast acceleration possible are of great advantage. They enable the bus to join the flow of traffic faster and more easily when leaving a bus stop. The driver is able to keep both his hands on the steering wheel and devote all his attention to the traffic. For the passengers this means jerk-free transportation. This is also promoted by the air suspension which gives some people the sensation of floating. Summarising his impressions, Mr. van Haren describes the standard bus as a progressive development and the ideal answer to the demands made by present-day traffic on public service vehicles. He hopes that the good characteristics of this bus are here to stay.
Driver A. W. Hoencamp is no less enthusiastic than his colleagues. We studied the arrangement of the driving compartment together. The driver's seat affords excellent support and is designed to avoid driver fatigue. Both the cushion and the squab are adjustable, independently of each other, enabling drivers of the most diverse build to find a comfortable position. The control panel is very conveniently located in relation to the driver. Mr.Hoencamp regards the proper storage place for the driver's cap and satchel as a pleasing detail. He says such things show that the designers thought about the driver. The heating is also good, both for the passengers and for the drivers. Not everybody worried about keeping the driver warm in the past!
Seated behind the steering wheel the driver has an excellent view forwards and to either side. The wide front doors, which consist largely of glass, give a better view than the doors on the older types of bus. In this long bus Mr. Hoencamp particularly regards the wide central exit, where two passengers can alight at the same time, as a great improvement. In the peak hours it promotes rapid passenger flow at the bus stops. Mr. Hoencamp thinks the claret livery of the standard bus is most attractive and he praises the tasteful use of the same colour in the interior.

Amsterdam

Many of the points mentioned in the other interviews also covered the experience of Mr. J. Pols. One subject was discussed with him in further detail, viz. the extra passenger comfort provided by the standard bus. The easy ingress is of great benefit to the passengers. The high steps on many other buses make entering and leaving the bus a problem, especially in the case of old people and other people who may be restricted in their movements for one reason or another.
Just think of small children and mothers who have to clamber in and out of a bus with a heavy shopping bag, a child on one arm and a pushchair in the other hand. This problem has been solved very well in the standard bus. The engine is mounted at the rear and the floor slopes down from back to front. This enabled an entrance with two low steps to be achieved. The passenger can now reach the floor of the bus with three steps from the pavement. The floor slope over the length of the bus is so slight that it does not inconvenience standing passengers during the journey. This important improvement and all the other excellent provisions in the standard bus cause Mr. Pols to say with absolute conviction that the bus should have been available ten years earlier.
'GEVU-Klanken' conclude by stating that Utrecht Municipal Transport are very pleased with the new bus.



Rotterdam

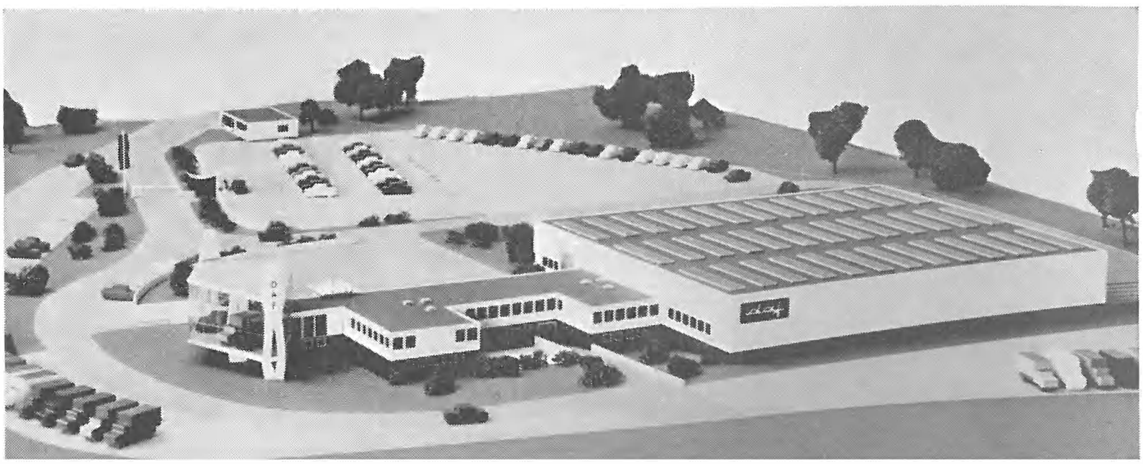
The Hague

Utrecht

Van Doorne's Automobielfabrieken N.V. at Eindhoven

Headquarters of DAF Belgium at Aartselaar near Antwerp

Headquarters of DAF France at Survilliers near Paris



Headquarters of DAF Germany at Erkrath near Düsseldorf

VAN DOORNE'S AUTOMOBIELFABRIEKEN N.V. EINDHOVEN HOLLAND