Mission of the Central Railway Workshop of Malines.

The central railway workshop of Malines constitutes an important element in the maintenance chain of the Belgian National Railways' rolling-stock : it takes care of the overhauls and accidental repairs of all passenger-cars (2.400), electrical multiple unit-stock (347), electric locomotives (206) and Diesel rail-cars (94).

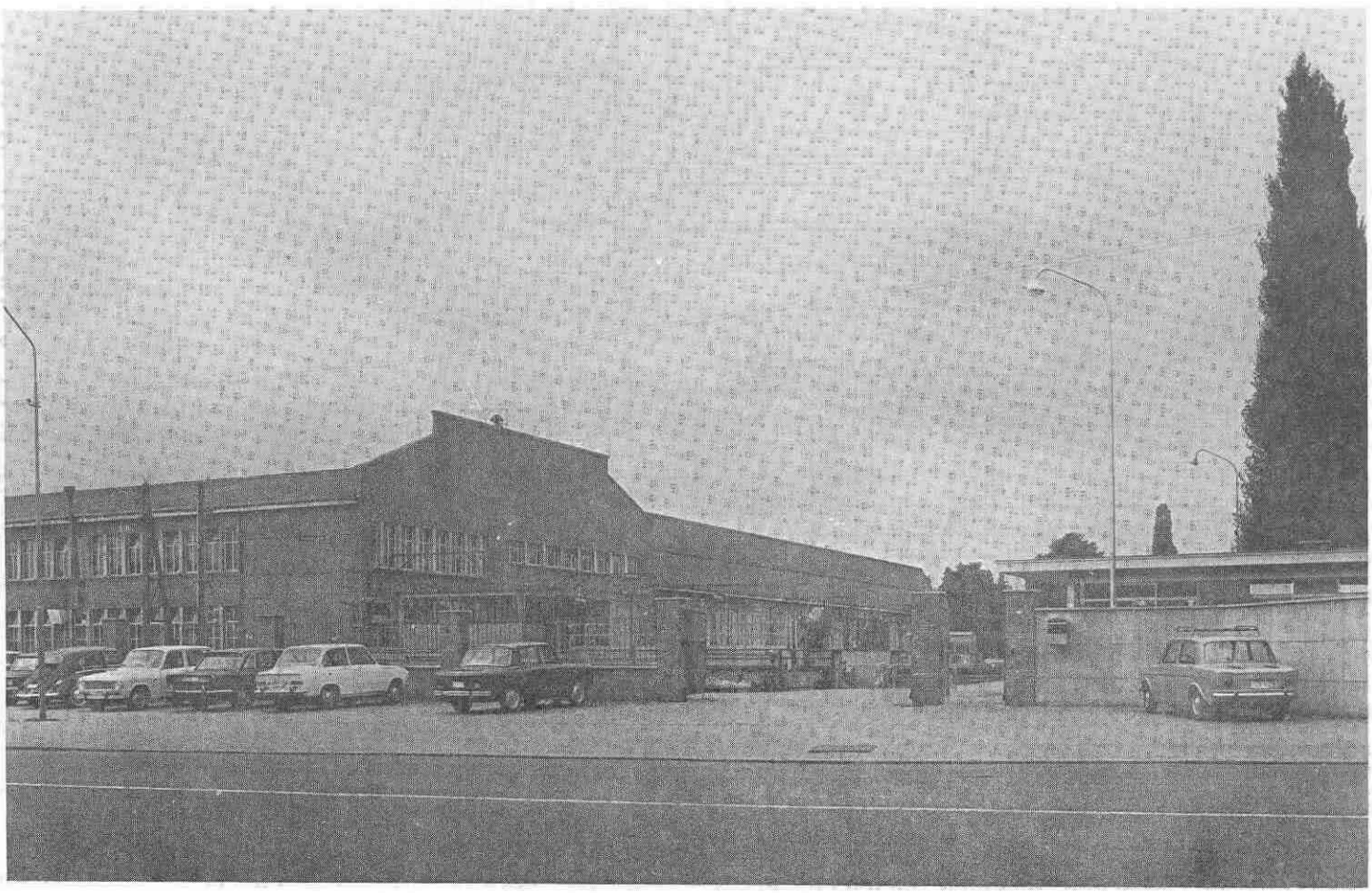
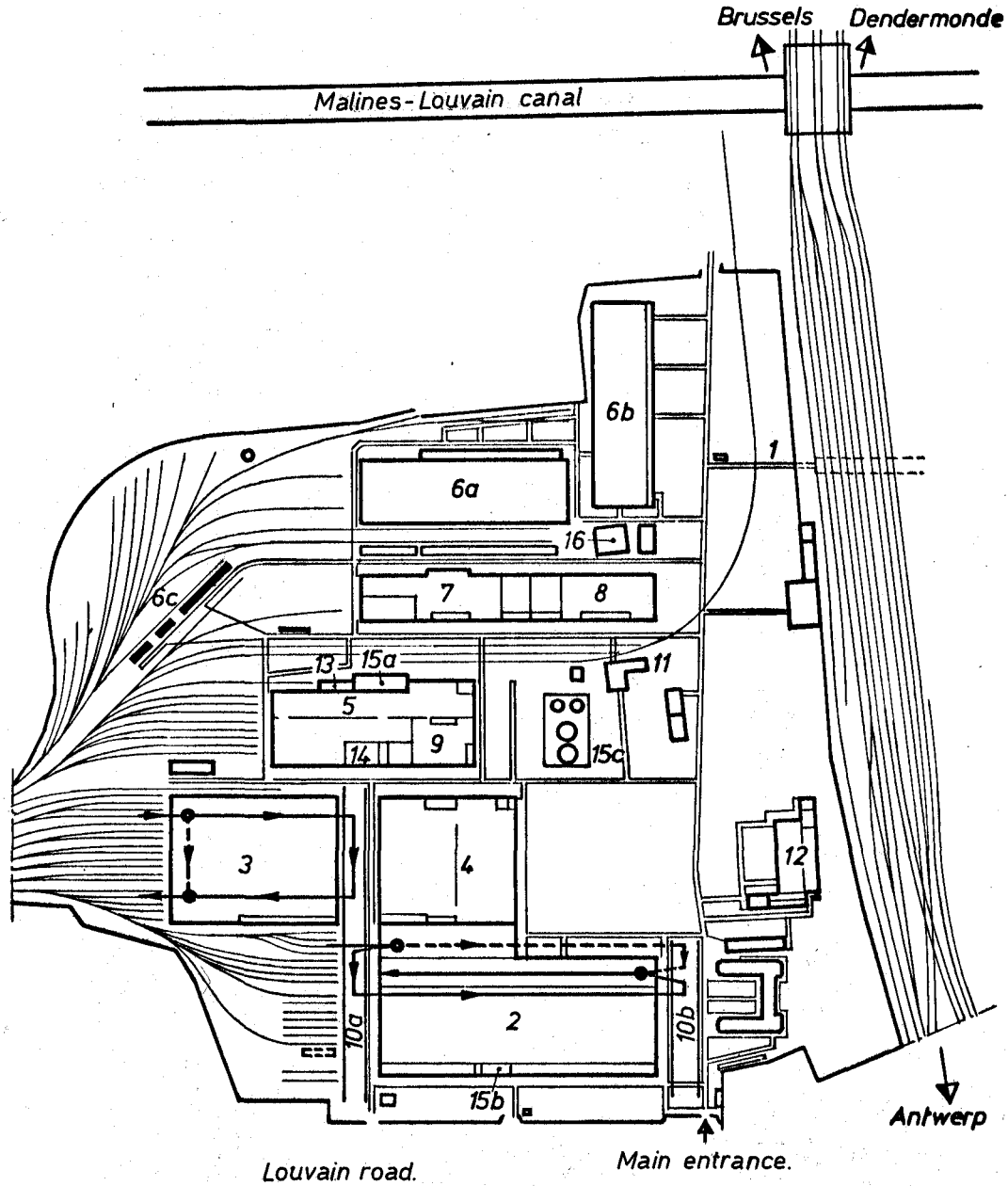


Photo No. 1 : Main entrance to the central workshop.



Schematic diagram No. 1 : General layout of the central railway workshop of Malines.

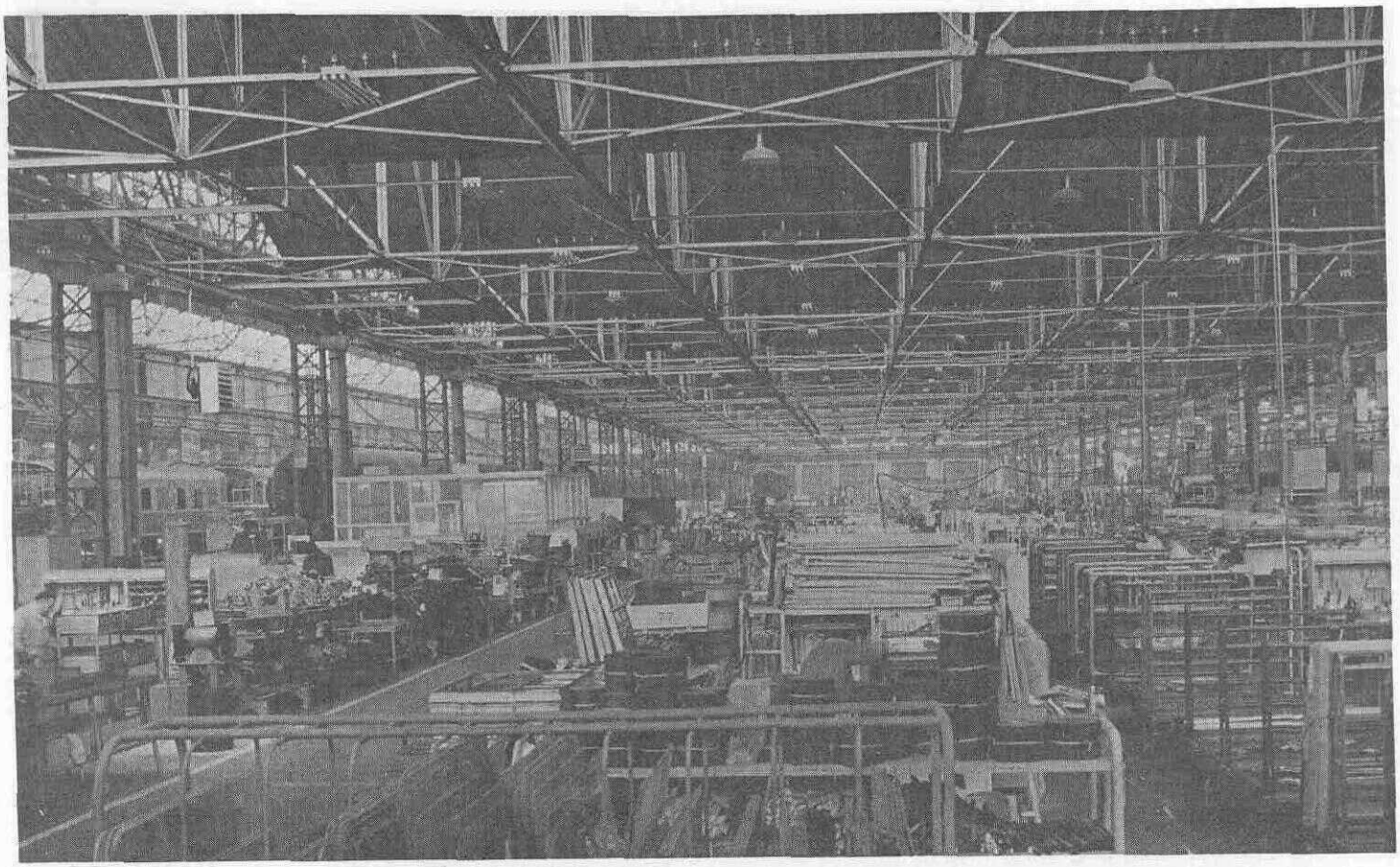


Photo No. 2 : Overall view of the passenger-car overhaul workshop.

Located along the Brussels-Antwerp railway line and accessible directly from the Malines passenger station by a tunnel for pedestrians (reference mark 1, diagram 1), it is also linked by rail to the Muyzen goods station.

Its total area of more than 36 ha. is distributed roughly as follows : one-third buildings, one-third tracks and one-third parks and gardens.

Its popular designation « ARSENAL » stems from the fact that originally (in 1835) the repairs to railway equipment were carried out by personnel, previously employed in a military establishment. It is the oldest railway workshop in the country and probably on the Continent of Europe.

Its plants are of relatively modern design : four-fifths of the buildings having been destroyed during Word War II, they were reconstructed according to the latest technical developments.

The carriage bodies and bogies of the passenger-cars (in workshop ref. mark. 2) and those of the electrical multiple unit stock (in workshop ref. mark 3) are overhauled on the discontinuous line principle, by which the unid to be repaired occupies a number of consecutive stands during a given period (one or more days). In these two overhaul shops the carriage-line (thick arrow on diagram) and the bogie line (dotted arrow) have a common starting point, the lifting stand. The two lines meet at the stand where the carriage bodie is reassembled on the bogies.

For electric locomotives (workshop ref. mark 4) and Diesel railcars (workshop ref. mark 5) the limited number of units being overhauled simultaneously does not permit discontinuous line organisation : these engines remain at the same stand during practically the whole of their repair time (this applies also to passenger-cars and electrical multiple unit stock undergoing an accidental repair).

Each of the 4 overhaul shops has its own sub-lines for repairs to the components : buffing- and traction gears; roller bearing units; braking mechanisms; outer bays and doors; inside layouts; electrical equipment. However, the repair of some components is centralised in a few specialised sections :

— upholstered seats are repaired in the trimming section of the passenger-car overhaul shop (ref. mark 2) which also comprises a timber sawmill and a nickel-plating, chromium-plating, cadmium-plating and anodic oxidation section;

— all the wheel set repair operations for vehicles undergoing overhaul are carried out in the wheel section; this section forms part of the workshop ref. mark 4 (The activities of the « wheel section » is shortly to be extended to the repair of all wheel

sets of passenger cars, electrical multiple unit stock, diesel rail-cars and electric locomotives including those of units undergoing maintenance in the line workshops; in this connection a thorough reorganisation and quasi-complete reequipment of this section is now in progress);

- in this same workshop (ref. mark 4) is located the rewinding section for traction motors and generators, including the construction of the armature sections.

The numerous spares and raw materials as well as articles of general use intended both for the needs of the werkshop and those of the other departments — more than 30,000 articles in all — are stored in the main storage depôts (ref. marks 6a and 6b), while inflammable products or those likely to catch fire are stored in some premises (6c) located in a zone more or less remote from the other buildings.

Some of these spares are produced by the workshop itself, which for this purpose has its foundry

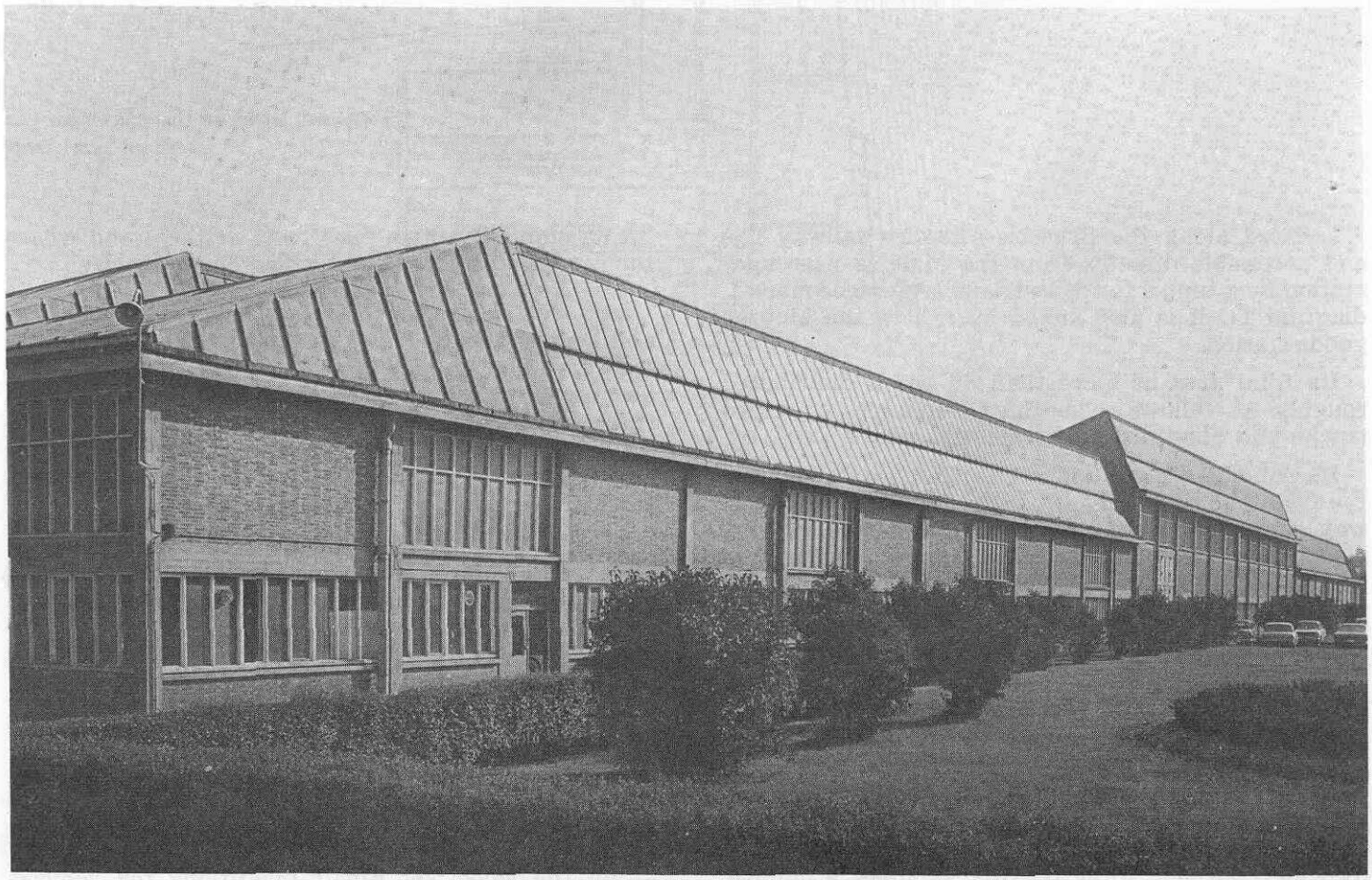


Photo No. 3 : One of the main storage depôts of the Central Workshop of Malines.

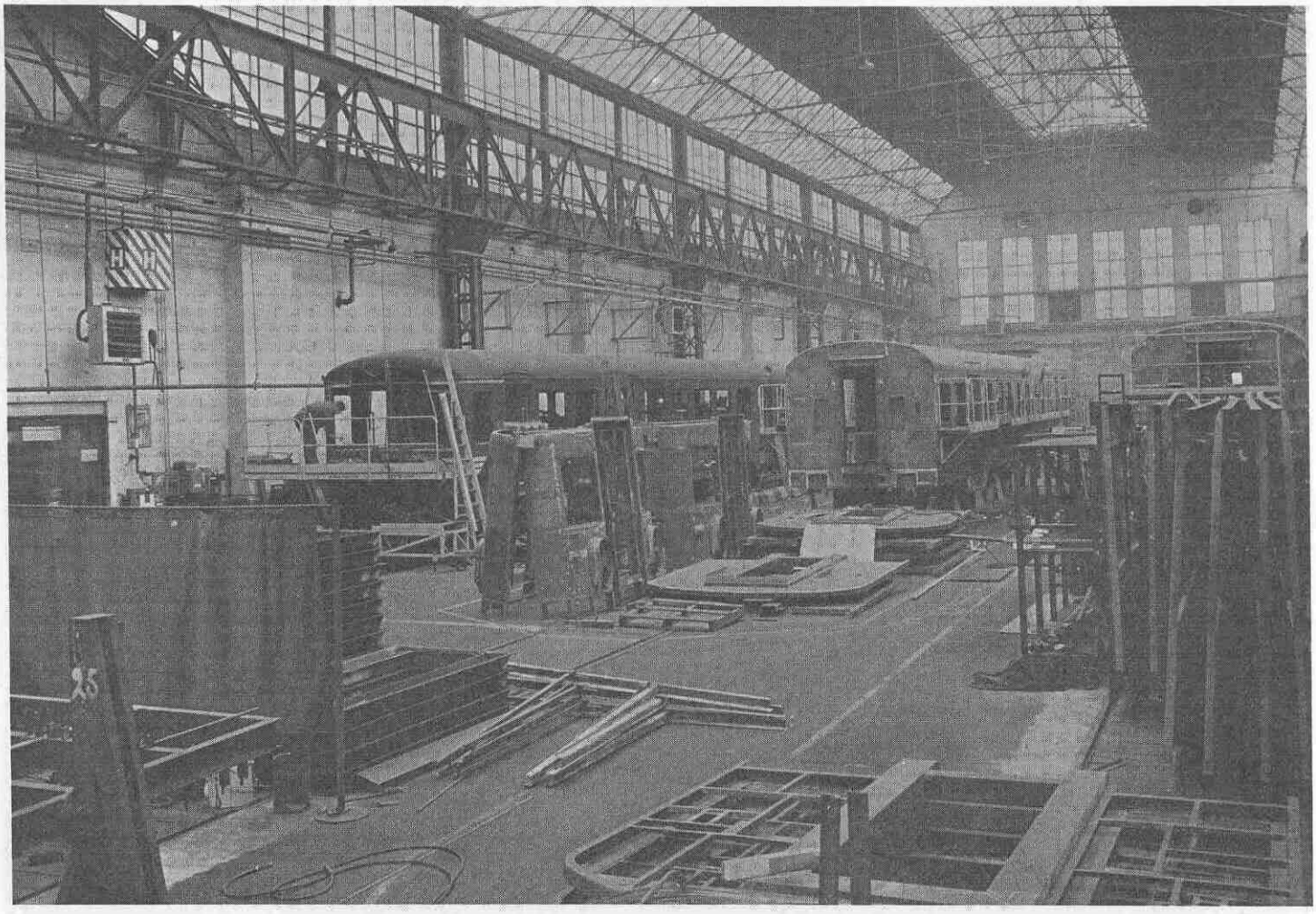


Photo No. 4 : Double electrical rail-cars under construction.

(ref. mark 7), a forging department (ref. mark 8) and a machine-tool shop (ref. mark 9).

Note :

The organising principle whereby the different categories of vehicles (passenger cars, electrical multiple unit stock, diesel rail-cars and electric locomotives) are repaired in separate workshops, is the result of an evolution over many years; if this organisation presents some advantages, it leads nevertheless to multiplication of the equipment, cutting the latter's output, and to a destandardization of the working methods. A thorough investigation is at present under way, the object of which is the organisation of common lines for repairs to all these categories of vehicles. A first phase of this large-scale reform, the development of a single traction motor overhaul sub-line, has already been completed; the centralisation of all the bogie overhaul lines and sub-lines, on the one hand, and of those of the carriage-bodies, on the other, is now in process of preparation.

Rolling-stock Construction.

With its considerable industrial equipment, the Central Workshop is able to utilize the available personnel for the construction of modern railway material during reduced repair programme periods. In this way, during the period when steam locomotives were being replaced by electric and Diesel traction units, the following were constructed by the Central Workshop of Malines : some 1,200 containers, 170 all-steel passengers-cars, 20 double electric railcars, 7 triple Diesel railcars, 8 postal railcars, 150 freight cars and several special cars (test cars and medical coaches).

The rationalisation of the working methods and of the repair programmes having in turn resulted in manpower availabilities, a new series of 12 double electric railcars fitted with a thyristor (chopper) starting equipment was taken in hand recently. The final units of this series have now reached the finishing stage.

Equipment of the Central Workshop of Malines

The Central Workshop has an extensive network of railway tracks : about 7 km of tracks inside the shops and more than 15 km of acces tracks. The latter include an electrified section of 2.6 km, which enables the electrical rolling-stock to reach the workshops by its own means and to effect trial runs at limited speed in a straight line over a few hundreds of metres.

The shifting of units to be repaired in and between the yards is carried out by means of two wagon travelling platforms with a maximum load of 100 tons (10a) and 60 tons (10b) respectively.

Photo No. 5 : Machine-tool workshop.

Photo No. 6 : Traction motor rewinding section.

Some of the special equipments are listed below :

— mobile spray-painting gantry with infra-red drying gantry;

— bogie cleaning plants :

  — hot water cleaning tunnel;

  — cold-cleaning bath;

— coach heating equipment test plants;

— rewound armature drying and impregnating plants;

— tration motor test floor;

— lifting of electric rail-car bodies by means of two non-synchronized travelling cranes;

— granulation cleaning plants.

Many auxiliary departments ensure the requirements indispenable for the efficient operation of the undertaking : plants maintenance department (11); heavy equipment and machinery maintenance department (12); electrical equipment maintenance department (13).

The electric power from a central distribution station (14) supplies the workshop via 6 transformer units with a total power capacity of 3500 kVA.

Two power plants (15a and 15b) equipped with extra heavy fuel oil (15c) and heavy oil boilers respectively are able to develop a total of 30 million kcal/hour.

Great importance has been attached to the organisation of the internal transportation.

As far as possible, this transportation is carried out by means of pallets : this also applies to the dispatch of merchandise to the other departments of the system.

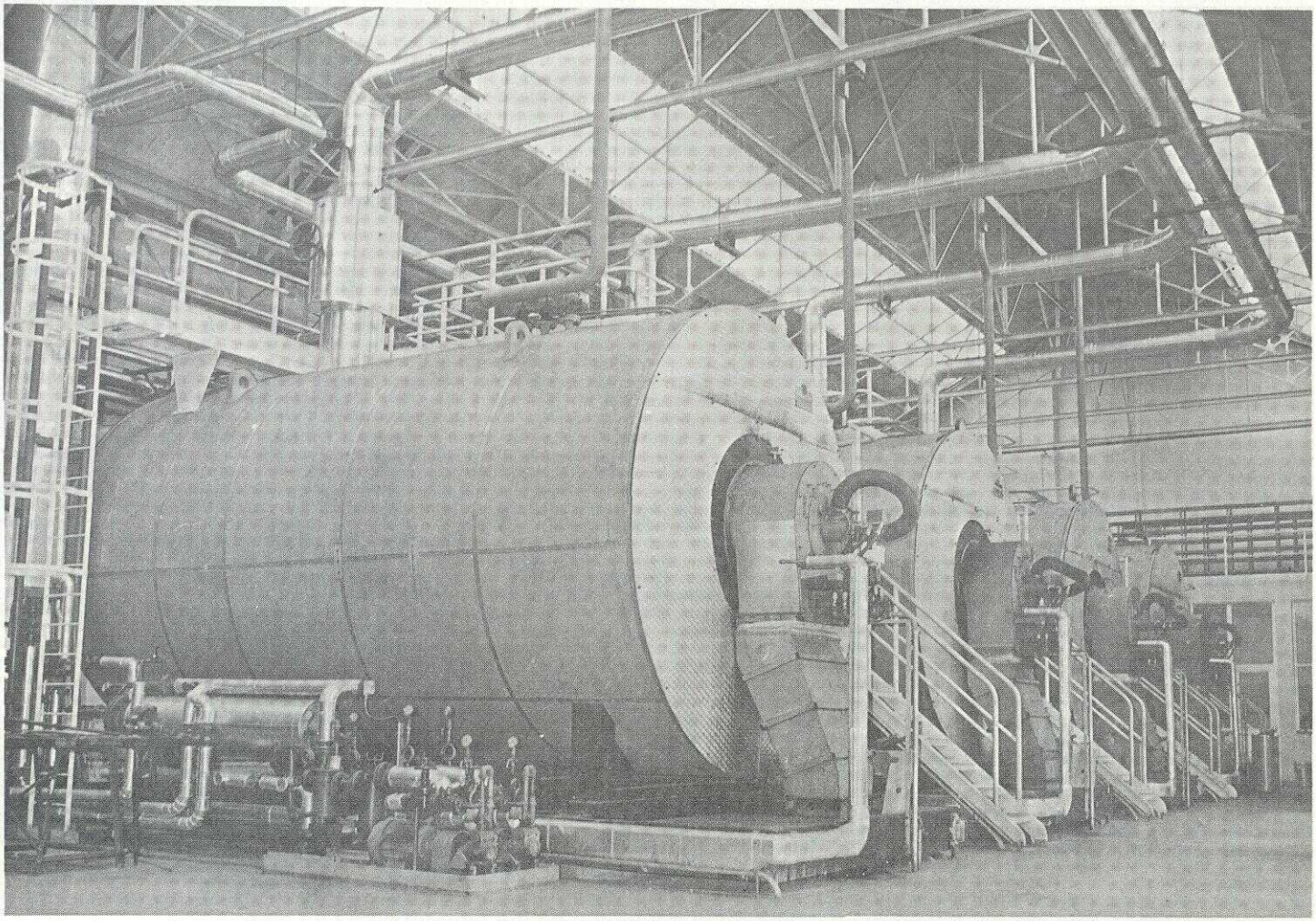


Photo No. 7 : Steam generating plant equipped with extra-heavy fuel oil boilers.

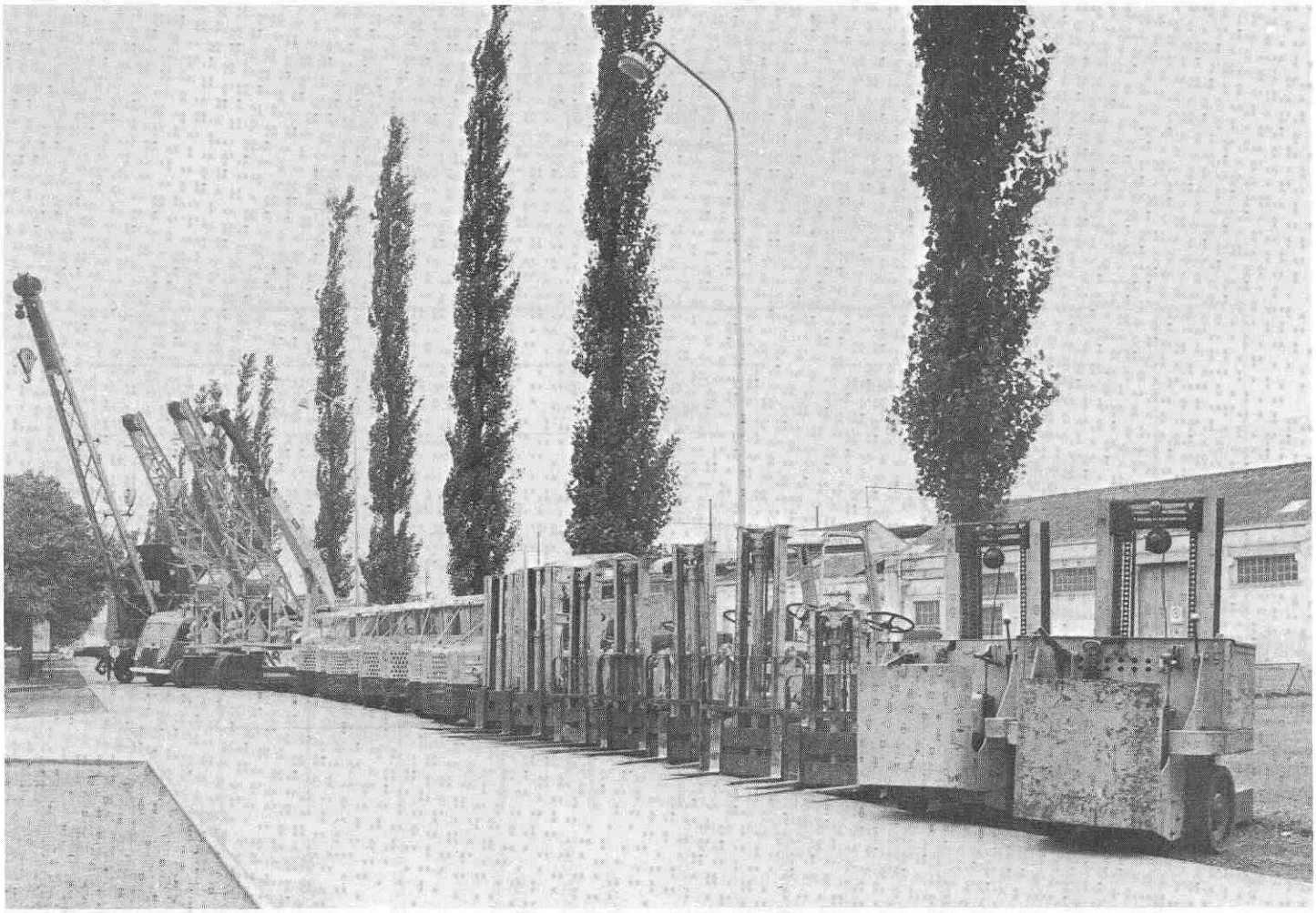


Photo No. 8 : Stock of motorised units for internal transportation.

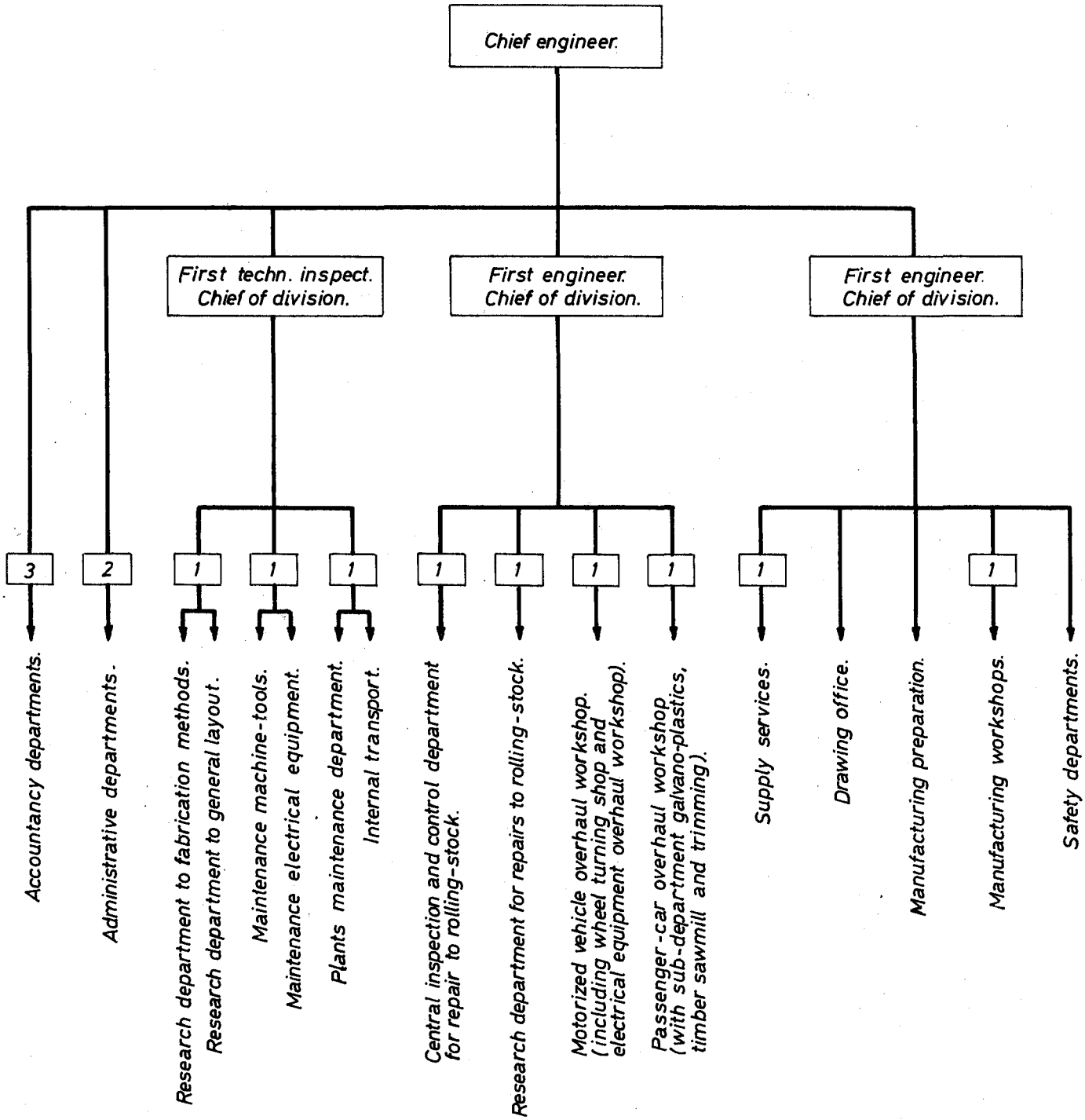
Regular transportation between the stores and the various work yards is ensured by a specially planned motorised convoy, running according to a well defined circuit and timetable. The regular collection of garbage is carried out by another convoy, the containers of which are unloaded directly into a railway truck by means of a travelling bridge crane.

A motorised deduster runs through the various work yards according to a fixed itinerary.

Altogether, the central workshop has at its disposal for internal transportation and various handling jobs 9 elevators, 9 tractors, 102 pony-truck trailers, 4 cranes on tyres and 2 cranes on rails. Apart from the cranes on rails, all the motorised transport media are kept each evening in the maintenance garage (16).

General Organisation.

The schematic diagram below shows the simplified general flow-chart of the Central Railway Workshop of Malines which at present has a personnel composed of 1870 workers, some fifty chief foremen, about one hundred administrative officials and employees and 14 technical officials.



1_Engineer or technical inspector.
2_Departmental secretary.
3_Chief accountant.

Diagram 2 : Simplified general flow-chart of the Central Workshop, Malines.

Organisation of work in the overhaul workshops.

Before (and also during) the dismantling, each vehicle to be repaired is subjected to a thorough inspection in order to determine the overhaul work to be carried out. The « inspectors » who belong to the « main inspection and control department » indicate the jobs to be performed and the materials to be utilized on a « repair estimate », a document on which are preprinted all the operations to be carried out either systematically or regularly.

From this repair estimate, the main department works out the material and work vouchers. The former are passed on to the central stores which supply the auxiliary work yards stores. The work vouchers which contain details of the times allocated to the various opérations, are sent to the planningmen-charge hands who are responsible for the distribution, preparation and correct performance of the job in accordance with the standard progress programme.

Testers, likewise attached to the main department, check by probes the quality and quantity of the jobs performed. After having been repaired each vehicle is subjected to an inspection and a final acceptance test effected by the main department.

The « research department » is in charge, among other things of :

— general analysis of the work flows and layout of the production lines, sublines and workstations;

— detailed analysis and optimal rationalisation of the working methods;

— establishment of graphs showing the succession of the various operations to be performed systematically or regularly in each of the production lines;

— drafting of standard estimates for use by the inspectors; for each operation contained in these standard estimates a « record card » is established showing the « criteria », that is to say the conditions which make the operation in question necessary. This card also contains a detailed list of all the jobs and operations considered as being covered by the working voucher in question;

— determination of the unitary times allocated to each operation to be performed systematically or regularly;

— drafting of the « technical instruction cards » comprising all the information and requirements indispensable for the correct performance of the various repair jobs.