

## The Hässleholm Electric Interlocking Plant.

By Ivar Larsson, District Signal Engineer for the Swedish Govt. Railways.

At Hässleholm, one of Sweden's oldest railway junctions, private railways from Hälsingborg, Kristianstad and Veinge-Markaryd meet the government line Malmö—Stockholm. Already some years ago the growth of the traffic necessitated the rebuilding of the station yard. Since the available space did not permit of making the track yard sufficiently wide, its length had to be increased as well. This resulted in a railway yard of considerable length, as may be seen from the above plan, with a passenger station in front of the station building — adapted also for the dispatch of freight trains — and a freight station at the north end.

It was considered necessary to equip the new station with an interlocking plant partly to give the traffic necessary safety protection, partly to effect a reduction in the number of employees. The extreme length of the station excluded the use of anything but an electrical system. A preliminary project called for two interlocking machines, one for the south end and one for the middle portion and north end. However, an investigation showed that such a solution would not

make possible the desired reduction in personnel. It was then found that one single interlocking machine would be sufficient if certain newly developed devices and arrangements were used. These devices are the so-called track circuits which, among other things, permit the control of the cleared or occupied condition of a track; the illuminated track plan, by means of which the movements of the trains on a track system — located at too great a distance from the interlocking machine to make direct surveillance possible — can be accurately followed; and lastly, the systematic use of track blocking signals, thereby enabling the interlocking to control switching operations even in distant sections of the station yard.

The interlocking machine is located in that portion of the yard where switching operations occur most frequently, this location being most suitable also for the supervision of the movements of the locomotives to and from the roundhouse.

The track switches are divided up into three main groups: the south end, the middle portion and the north end of the station yard. These groups have been

treated differently with respect to their relative positions to the interlocking machine as well as to the varying traffic conditions in the different parts of the station yard.

All the track switches in the south group are manoeuvred from the interlocking machine only. Different switch positions are required for the clearing of the different tracks, making a centralized points control absolutely necessary. Switching of freight trains does not occur in this end of the station yard, only shunting of passenger cars and locomotives. These latter movements, however, are entirely controlled by the distant interlocking machine which can give or refuse permission for certain train movements by means of skotch block signals. Signals of this type have been arranged in sufficient number to regulate all possible switching operations. When set to clear, these signals lock all switches in the cleared track; also track circuits are made use of for locking the points during shunting operations in this section of the track yard, thus preventing the accidental laying over of points under a moving train even though a skotch block signal be set to stop before the train has passed all the points. The track circuits are also used to control the clearance of switching tracks.

The middle points group lies so near the interlocking machine that it can easily be surveyed by the men in the signal cabin. This fact made it unnecessary to arrange track circuits for the entire group, the locking of certain more distant points having been

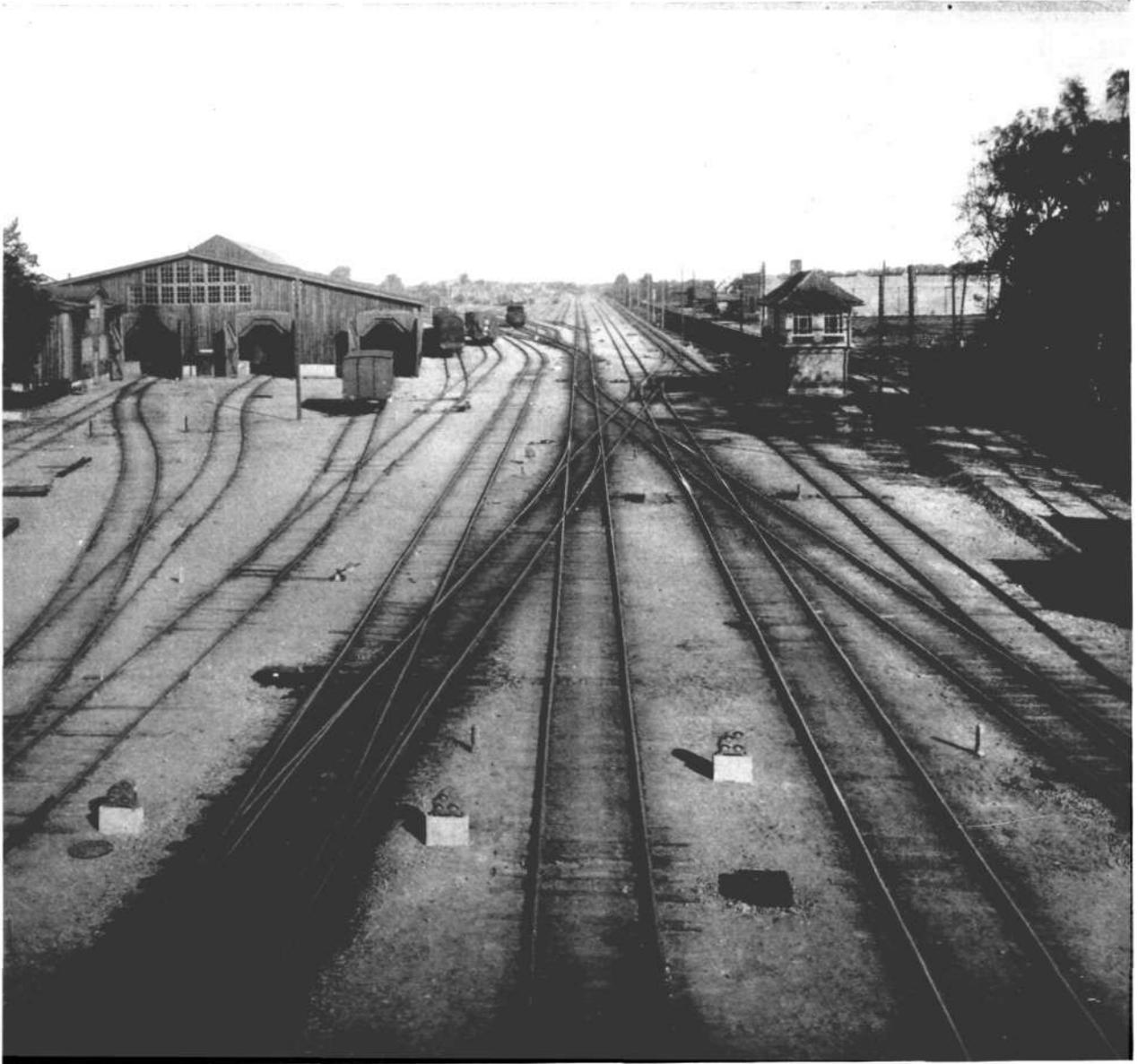
found satisfactory. However, skotch block signals for all shunting operations have been provided here also. As long as such a signal is set to clear, all points under its control are locked, thereby safeguarding the traffic to a certain extent against the laying over of points under a passing train even during shunting operations. The degree of safety is not so large as with track circuits, however, for if a signal is set to stop before the entire train has passed all the points under its control, there is nothing to prevent a point being laid over under the moving train. It was not deemed necessary, however, to introduce track circuits here also; they were therefore omitted for reasons of economy. Varying switching operations as well as the making up of freight trains may take place in this section of the yard.

It was found possible to give the north points group a much simpler formation. Most of the trains pass through on main track no. XIX, only a few freight trains being admitted to the freight yard through this group of points. Since men are always required to take charge of the freight trains immediately upon their arrival, it was found sufficient to provide local manoeuvring and locking for the points. Only a small number of points were put under central control, viz., those that enter the main track running through this group, and those that require setting when switching to or from track XX — the second main track for a future double track line. This track has a steeper grade than the present main track, thus offering

better starting conditions for north-bound freight trains from the passenger station.

The skotch block signals give the interlocking machine such complete control over all train movements within the station yard that it is possible to run the

can be directed to any of the tracks IV to VII, and southbound trains to tracks II to V, VII and VIII in the passenger station yard and to any of the four freight yard tracks; while northbound freight trains can be directed to the freight yard over either of



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View of Station Yard with Signal Cabin at Right.

locomotives to and from the engine house without the aid of an engine pilot.

The number of shunting tracks which can be locked amounts to 128.

A comparatively large number of tracks have been provided, their use for different purposes being optional. From the Govt. Railway line northbound trains

tracks IV to VII in the passenger station yard. For trains entering from private lines the choice is not so large, depending on the limitations of the track system. One of them, however, has an incoming track leading to three passenger station tracks while its freight trains can pass in directly to any of the four tracks in the freight yard. Both of the others have one and two

incoming tracks respectively, freight trains being directed from these tracks to the freight yard by means of switching operations. Outgoing tracks have been provided to about the same extent as incoming tracks. The total number of track combinations amounts to twenty-six.

All the signals in this plant are arranged as light signals. The main signals are of the colour signal type, the skotch block signals being form signals.

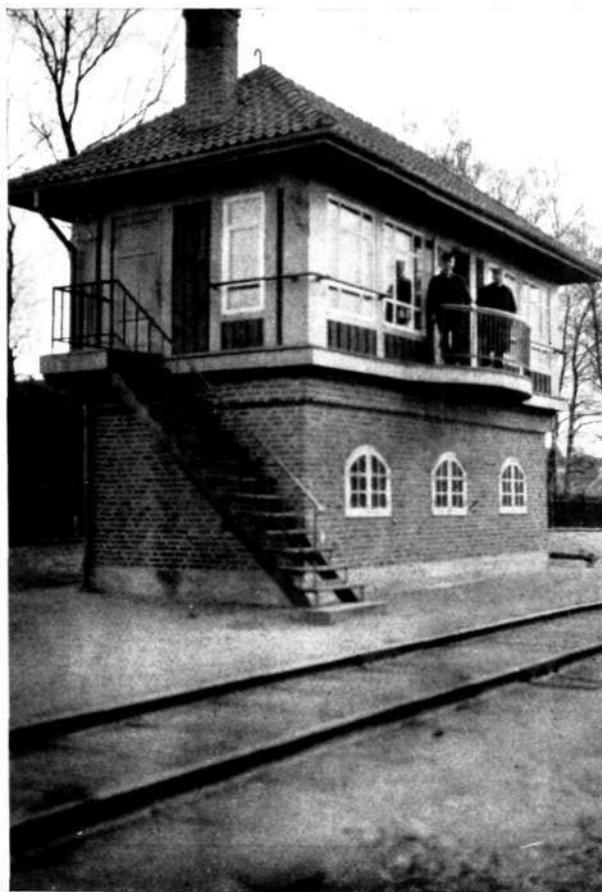
The home signals in clear position show from one to three green lights. Since the number of incoming tracks passing certain signals sometimes exceeds the number of green lights, the track signalling system is not altogether complete, so that two or three green lights sometimes apply to several tracks.

The number of outgoing signals is restricted to one for all tracks leading towards the same line and, in addition, one starting signal for each of the main tracks III and IV (main line of the Govt. Ry.). Only these latter have been placed as has hitherto been customary in Sweden, i. e. in front of the points group to be passed by the outgoing train. The others are set on a level with the home signals. As a result, it is not possible for the locomotive engineer to ascertain whether or not the right track is cleared by merely observing the starting signal, partly because it is placed so far out that it cannot be observed from the point of departure of the train, partly because it shows the same combination of lights for several tracks. However, the engineer can control the outgoing track to a certain extent by means of the skotch block signals which in Hässleholm are so arranged that they show clear by means of two lights on the same perpendicular for regular traffic tracks, and two lights, one above and to the left of the other, for shunting tracks. As a result the skotch block signals play the role of a sort of dwarf starting signals. Thus, the combination of skotch block signals which has been applied in Malmö — described in Vol. III, Nos 1 & 2, page 6, of this journal — has not been duplicated in Hässleholm, neither is it needed, since switching operations occur to a much smaller extent. In cases where an outgoing track can be cleared to several lines from the same station track, it is impossible — by means of the skotch block signals — to ascertain whether the outgoing track leads towards the correct line, but mistakes are not possible since all outgoing tracks must be released by the station master before a signal can be set from the interlocking machine.

The signal cabin is built in two stories. In the first story are placed the power plant and storage batteries;

here, also, is a repair shop and boiler room for the heating plant. The interlocking machine, with the illuminated track plan standing free behind it, is placed in the upper story, the longer wall being lined with relay cabinets.

The interlocking machine comprises thirty-two point locking levers and twenty-five signal levers, with fifteen extra levers for future needs. Forty-four points and skotch blocks and thirteen main signals can be manoeuvred from this machine, while forty-one skotch block signals and ten locally set points can be locked by means of the point locking levers. As far as the



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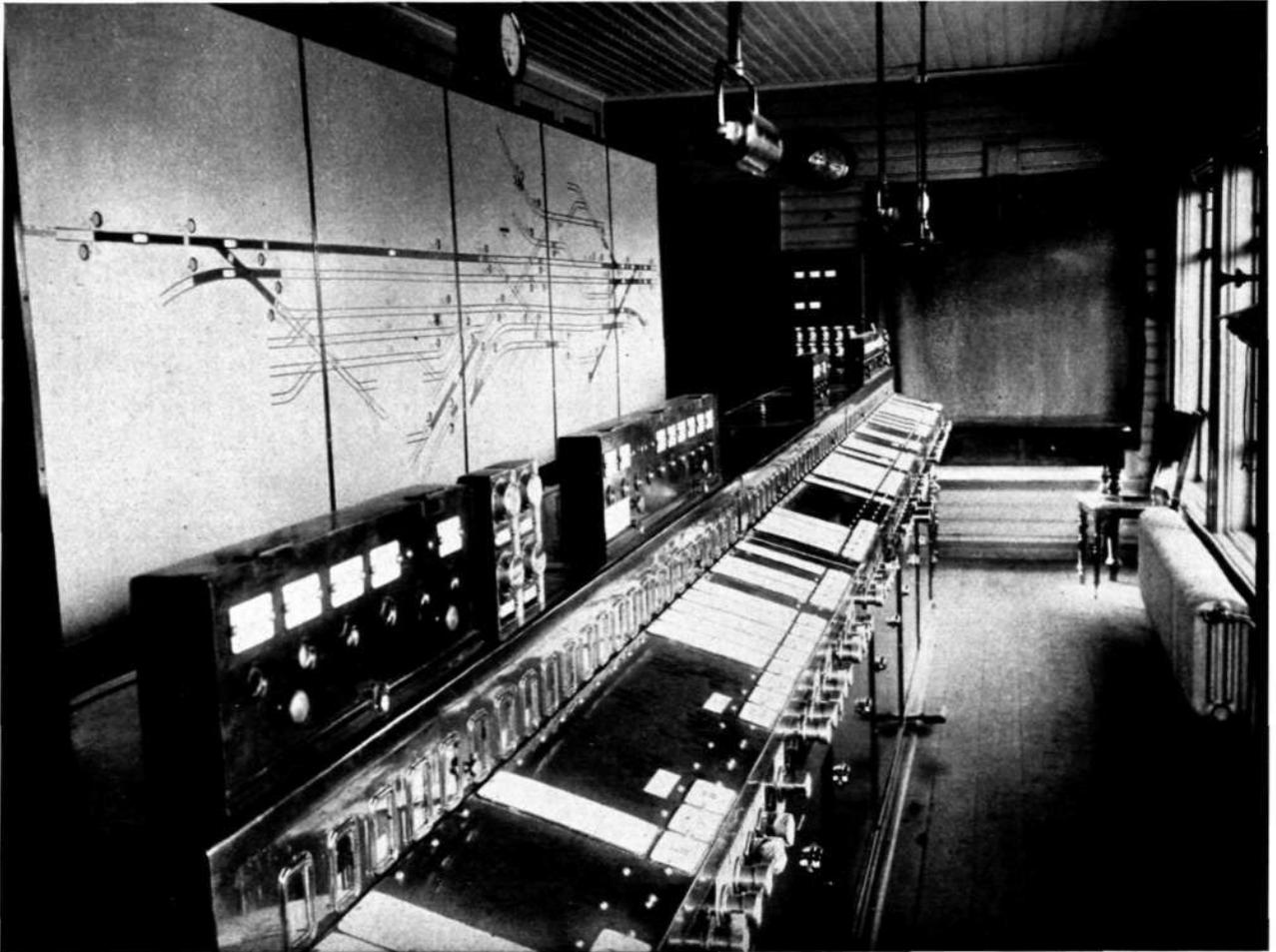
The Signal Cabin.

track system will permit, two points are manoeuvred by the same lever, the points being connected in parallel and functioning simultaneously. The interlocking machine is of an entirely new construction and differs considerably from the former Ericsson type, one of its most prominent characteristics being the absence of a mechanical interlocking gear. All necessary combinations of control locking between the various levers are accomplished electrically by means

of locking magnets which act directly on the levers. Control of the points is obtained by means of special A. C. relays mounted outside of the interlocking machine. The operating of the point levers is accomplished with two different motions — first, the knob is given a turn of  $75^\circ$ , which starts the motor or motors, after which the points must be completely laid over to their new position, in which they close a control cir-

tion of providing — in co-operation, with an insulated rail — means of preventing premature setting of a point under a train or car. These new functions have made it necessary to increase the angle of rotation of the lever knob from  $90^\circ$  to  $140^\circ$ .

The construction of the signal levers is similar to that of the point levers. In similarity with the older type of signal lever, it is constructed for movement



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Interior View of Signal Cabin showing Interlocking Machine.

cuit and lift the locking magnet, before the knob can be completely turned, this last motion closing the contacts which form a part of the signal circuit and others controlled by this lever. The two locking magnets of the point lever have more functions to fill than in the former style of interlocking machine, since they must firstly take over the function of the mechanical cross locking gear as concerns locking, made necessary by the positions of other levers, secondly, prevent the complete turning of a lever knob until the point is completely laid over and finally retain its old func-

tion in two directions, each one with a  $90^\circ$  angle of rotation.

Special releasing relays with number plates have been arranged on the top of the interlocking machine. These are manoeuvred from special releasing devices in a dispatch shed, thus placing the outgoing and incoming tracks under the control of the train dispatcher. An engaged track is automatically locked by means of track locking, both incoming and outgoing tracks being released by the train itself.

The illuminated track plan repeats all the main

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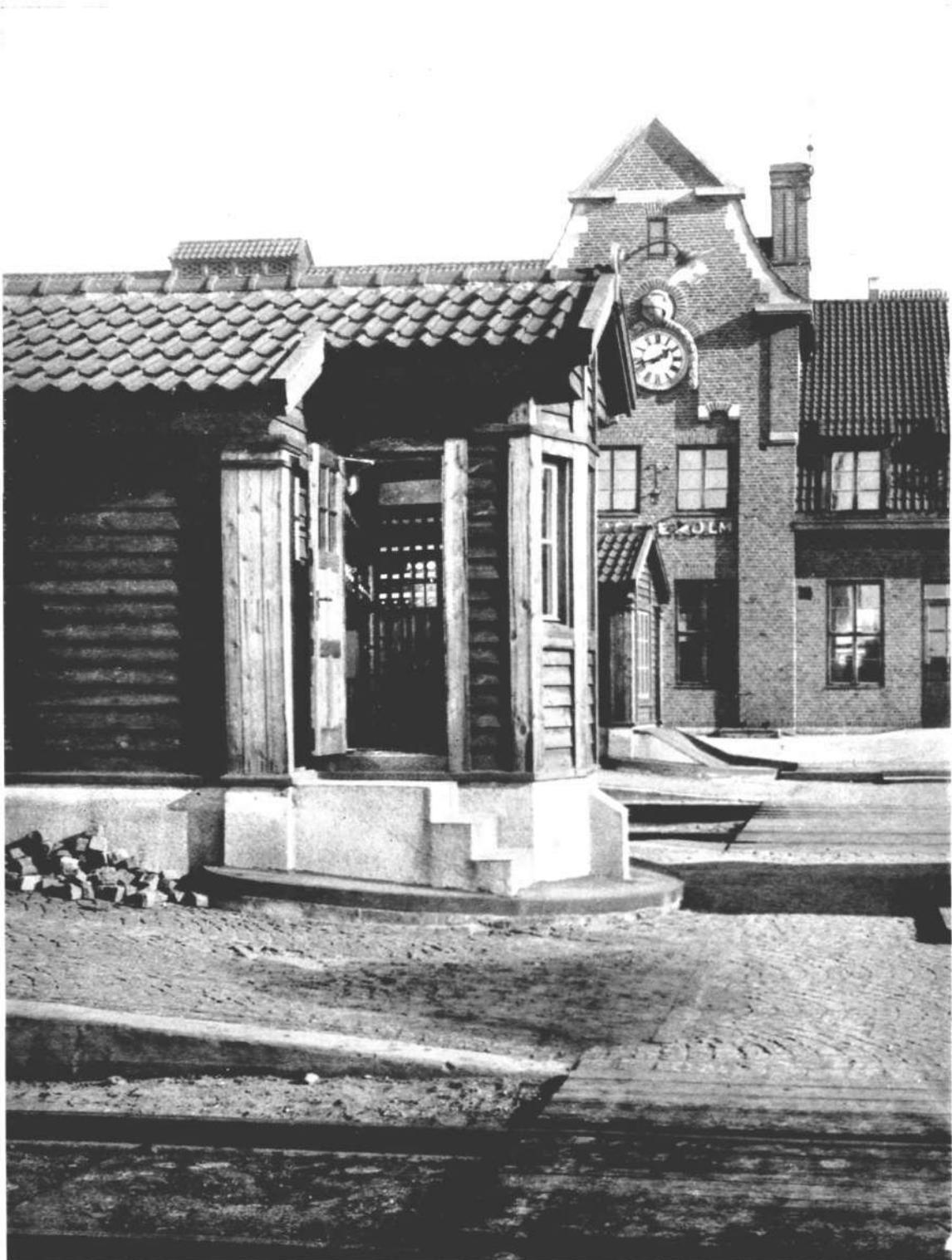
## *L. M. Ericsson*

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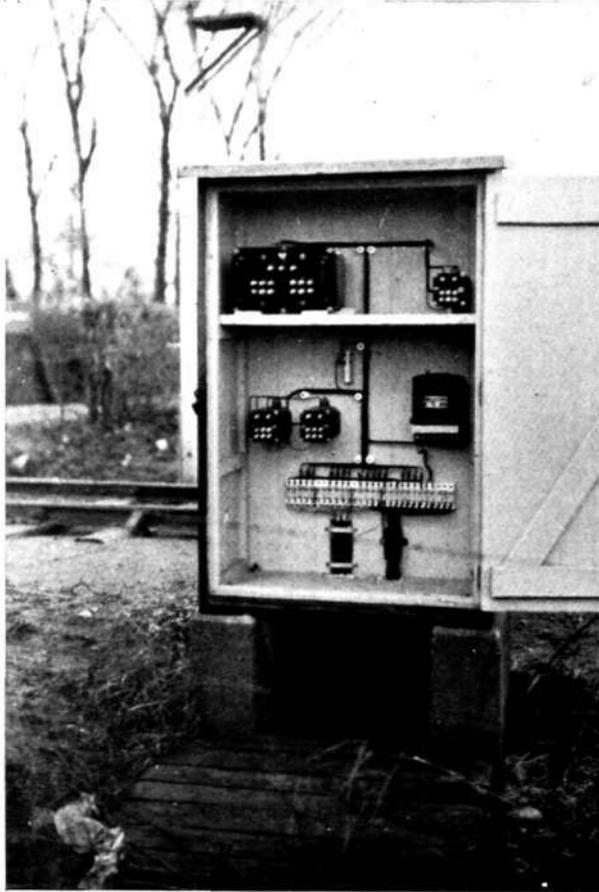
and skotch block signals, an engaged or free track, however, being indicated only for the south points group together with the tracks beyond the same, a small part of the north points group together with the

main track on both sides of the same and the track leading to the locomotive shed. All repeating is done by means of lamps, different signal combinations being indicated by means of varycoloured lamps; a clear



track is indicated by means of a glowing lamp in the window belonging to this track section.

The releasing apparatus are placed in a special dispatch shed on the middle platform. Repeaters in



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Transformer Cabinet.

the form of star indicators, giving the positions of the main signals, have been arranged in this cabin to enable the train dispatcher to ascertain whether or not the right track has been cleared.

Both alternating and direct current is used in the operation of this plant. The city service net supplies a 3-phase 50 cycle A. C. which is transformed down to  $3 \times 190$  volts by means of a transformer placed within the station area. A feeder line runs from here to another transformer in the signal tower; from the secondary winding of this transformer is obtained a current of  $3 \times 190/110/55$  volts. The tension of the lamps in the skotch block signals is 55 volts; in the main signals it is 12 volts, this latter tension being obtained by means of local transformers placed in the immediate vicinity of the signals. The track circuits are fed by an alternating current with a tension of about 2 volts between the rails, this current being transformed up to a tension of about 4.5 volts for feeding the track phase of the track relays in the signal cabin, the local phase being fed by a 110 volt current. Also the point control relays work with two phases, both of 110 volts. Direct current for actuating the switch motors as well as for signal relays, releasing relays, disengaging relays and locking magnets is obtained by means of a mercury-vapor rectifier for the motor current (about 130 volts) and two valve rectifiers for actuating the relays etc. (about 14 volts). Two Nife storage batteries have been provided for use in case of emergency, each one with a capacity of 60 amp. hours, another battery with a capacity of 100 amp. hours for the motor current, and still another consisting of 10 cells connected in series as buffer batteries for the relay actuating current. In case of a break in the city feeder circuit the entire plant can be run by means of a motordriven 3-phase 6.5 kw generator.

The installation of the plant was entrusted to Signalbolaget acting in the capacity of representative for L. M. Ericsson. Work was begun in the fall of 1925, the plant being ready for use in September 1926. Under present traffic conditions, not more than one man per shift is required to manoeuver the interlocking plant.



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Home and Starting Signals.

## Miss Constance Andersson 60 years.

On Nov. 22nd, 1891 Miss Constance Andersson entered the employ of the Ericsson concern — then known under the firm name of L. M. Ericsson & Co. — to that she is now able to look back over more than thirty-five years continuous service. Her unwonted energy and ability as well as a bright disposition spiced with both wit and humour have combined to give Miss Andersson a well-

earned popularity. On January 22nd, Miss Andersson's 60th anniversary, she had the pleasure of receiving the hearty congratulations of department heads and comrades alike, their sentiments being interpreted by a member of the office force who had composed some humorous and appropriate verses for the occasion.

Vad åren sväva framåt i livets lätta dans  
och högtidsdagar firas — i dag går du Constance  
nu uppför långa backen till 60 årens skans  
och ständar se'n däruppe i all din ungdoms glans  
och ger oss av den humor, som i ditt sinne fanns  
och som du väl ju sköter vid varje leverans,  
ty aldrig du förlorat din kända konvensans,  
när som du slungar ut dina skarpa vitsars lans,  
så att man puff kan bliva och falla uti trans,  
för ingen kan ju veta var den träffar någonstans



men är repliken kraftig, som vore den en mans  
och är den även saftig, så har du konvensans  
att alltid söka ge den en fin och prydlig ans,  
så ingen, som blir träffad, kan tappa bort sin sans;  
och nu vi enligt vanan ha gått på vigilans  
att få ihop som hyllning en gåva med substans —  
fast inte någon villa, ty sådan sist ju vanns —  
men blott ett litet minne, som köpts som det befanns,  
och med detsamma följer nu denna reverans  
i form utav en sirlig och hjärtelig romans,

som tolkar våra känslor för L. M. E:s CONSTANCE.