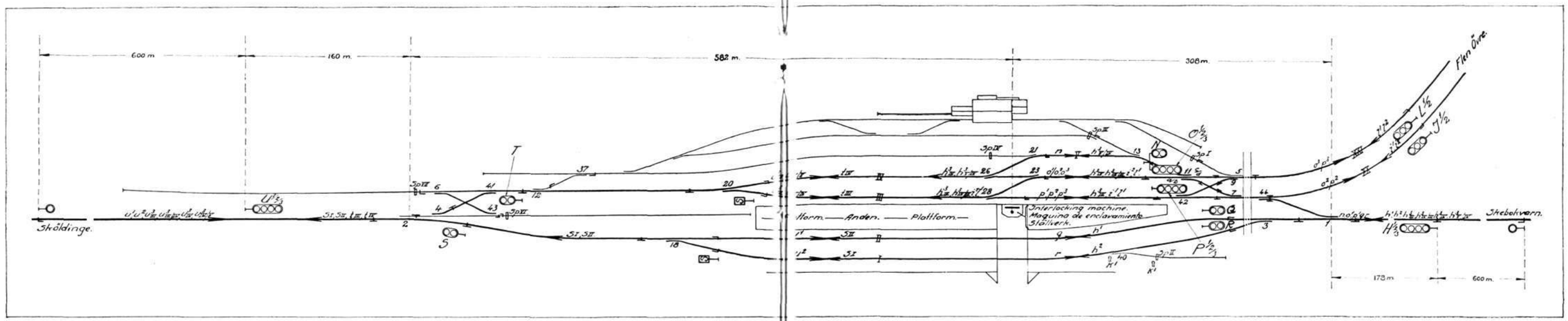
L.M.Ericsson



R 540

Fig. 1. Track Plan of Flen Railway Station.

The Electric Interlocking Plant at Flen, Sweden.

By H. Holmqvist, Signal Engineer for District I of the Swedish Govt. Railways.

The new interlocking plant for the Flen railway station — a typical example of what can well be considered a modern and economical plant for medium sized railway stations — was put in operation in May 1925. The following pages will be devoted to a description of the same, especially with regard to newer devices and arrangements.

R 528 Fig. 2. Signal Cabin.

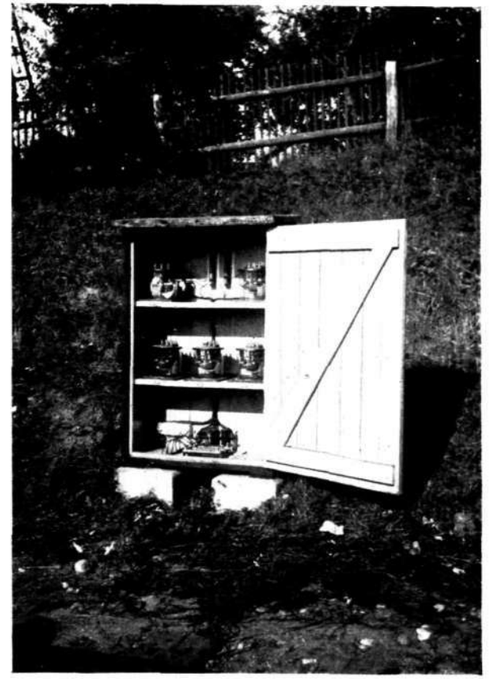
The first project for the modernization of this station included a mechanical interlocking plant with a lever interlocking machine, placed in the vicinity of the station building and under the direct control of the station master. However, it was discovered that such an arrangement would not permit any reduction in the number of hands required, since the withdrawal of the train admitter and the track inspector was counterbalanced by the personnel required to handle the interlocking machine. A new project was then drawn up, calling for an electric interlocking machine located in a signal cabin (see fig. 2) on the station platform, this machine to be taken care of and manipulated by the station master himself. This project was based on the assumption that the station master should clear the tracks and manoeuvre the signals, the clearance at points for the respective tracks to be electrically controlled. All switching operations, on the other hand, were to be taken care of locally, i. e. by means of devices located at the various points in the track yard. It was figured that the installation of such a plant would permit a saving of two men, an assumption which has proved itself correct.

The functioning of the plant is based on the system with insulated track sections, the rails serving as conductors for a current which keeps a track relay energized as long as the track section is free from rolling stock. On account of electrification of the railway, it was necessary in this case to leave one rail unbroken for the passage of the traction current.

An alternating current with a frequency of fifty periods is used for the track circuits, the tension being comparatively low — about twelve volts, transformed down from a 220-volt current. The relays will not function for a current of any other frequency than fifty periods, this being necessary to protect them from the influence of the traction current which has a frequency of about sixteen periods. Track relays and transformers are located in wooden cabinets (see fig. 3) out in the track yard, at the ends of the track sections.

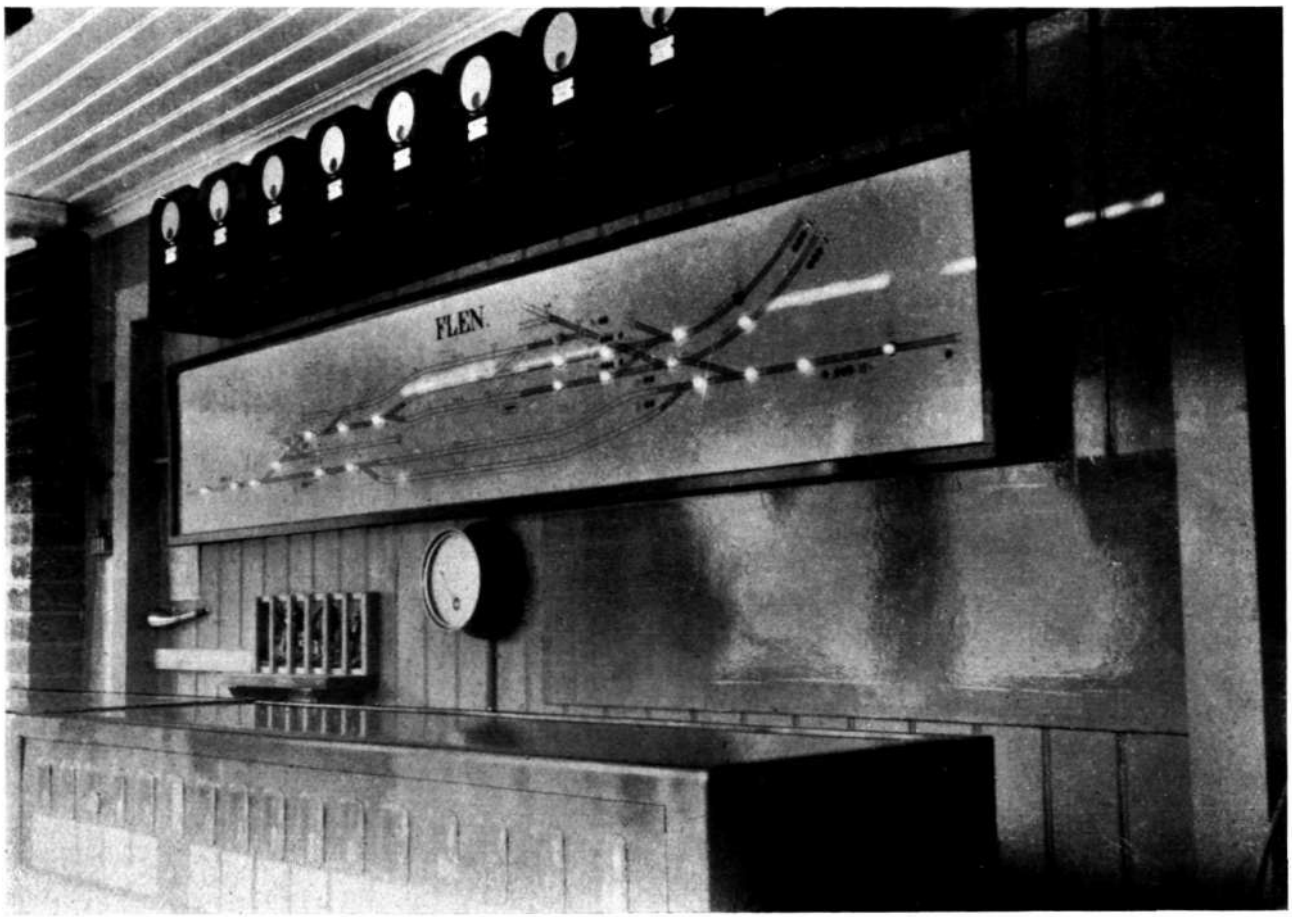
The positions of the track relays are repeated by direct current relays mounted in a relay cabinet in the signal cabin.

The interlocking machine is of the standard L. M. Ericsson electrical type. It is this firm — represented by Signalbolaget — that has delivered the material and built the plant.



R 529 Fig. 3. Relay Cabinet Mounted in Station Yard.

The interlocking machine contains point levers for the central control of those points which require setting for the clearance of the various tracks. All of these point levers are equipped with point locking magnets, making it impossible to move the lever as long as a car is on the track which passes over this point. Further, the contacts in the above mentioned repeating relays. By the aid of an illuminated, transparent track plan placed over the interlocking machine (see fig. 4) it is possible for the station master to ascertain by a single glance which track sections are clear. Behind every track section on the plan there is a little lamp which glows as long as the



R 530

Fig. 4. Illuminated Track Plan.

interlocking machine contains signal levers for incoming and outgoing signals; with regard to the clearing of freight tracks, the same signal combinations are used for several tracks.

The signal levers are so constructed that it is impossible to place any one of them in »clear» position unless all the track sections forming a part of the track in question are free from rolling stock. This condition is obtained by leading the switching current for the signal levers over section is not occupied by one or more cars. As soon as a car enters this track section, the lamp ceases to glow. The lighting and extinguishing of these lamps is controlled by means of the repeating relays in the interlocking machine.

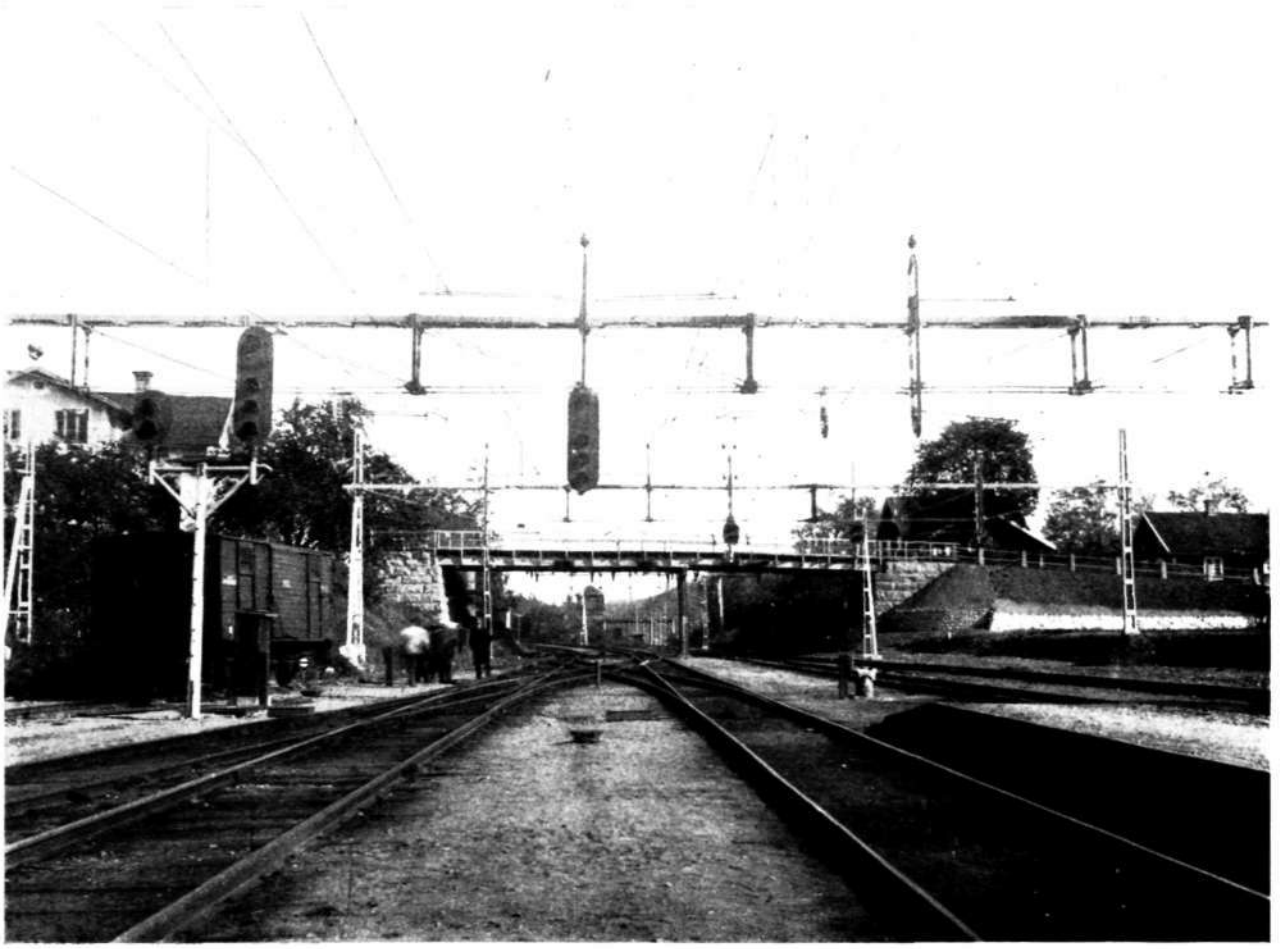
We have already mentioned that the centrally controlled points can also be set locally by hand. For this purpose, the interlocking machine is equipped with a number of relays controlled by means of special levers located beside the

various points out in the track yard. The yard man carries a key which fits into the local point setting device and is turned to the one side or the other, depending on the direction in which the point is to be set. This causes the corresponding relay in the interlocking machine to energize, closing a motor circuit and setting the point. If the point in question forms a part of a previously cleared track, the current to the relays is cut off by means of contacts on the signal levers, any attempt to set the point locally being thus frustrated.

All of the signals in this plant are so-called light signals, visible at a distance of about one kilometre even in strong sunlight. At Flen, the incoming signals and a couple of the outgoing signals are mounted on concrete posts, the remaining outgoing signals being mounted on contact-line poles or suspended from the gantries which support the overhead traction wires (see fig. 5).

The Flen plant is the first in Sweden in which a consistent use has been made of light signals, with which excellent results have been obtained. Light signals have the decided advantage of being almost more clearly discernible in foggy or misty than in clear weather, the opposite being the case with semaphores. Furthermore, the absence of moving parts makes them less liable to get out of order than mechanical signals.

Light signals are especially suitable for elec-



R 531

Fig. 5. Outgoing Signals at North End of Station Yard.

trified railways, as they stand out clearly in the confusion of poles, trusses and traction wires.

The light signals are manoeuvered by the aid of direct current relays which are energized by the setting of the signal levers. The signal current itself is a. c., being transformed in small cabinets placed near the signals.

It can well be said of this plant that it satisfies very exacting demands as to efficiency and convenience, and it is very probable that this type of interlocking plant will be chosen for other stations on the Swedish Govt. Railways. At the present time Signalbolaget is occupied with the installation of similar plants at Herrljunga and Skövde.

Signal arrangements based on the same principle have also been adopted for Tumba and Huddinge. In these cases the previous mechanical interlocking machines have been retained for the setting and locking of the points, but the mechanical signals have been replaced with light signals, controlled from the station platform by the station master. Also, the entire track yard has been divided up into track sections. As long as the two through tracks only are used, no special man is required at the interlocking machine, this being necessary only when the side-tracks are being used or if there is any switching to be done.