

# Electric Interlocking Plant at Sakskøbing Station

CHIEF SIGNAL ENGINEER O G Ø T Z S C H E, C O P E N H A G E N

U.D.C. 626.257

Towards the end of 1945 a new electric interlocking plant was put into service at Sakskøbing Station, and as the plant is the first in Denmark to use the all-relay interlocking machine of LM Ericssons Signalaktiebolag, Stockholm, the following description may be of interest.

The employment of interlocking plants on the Danish private railways, which mostly consist of sections with small traffic, is rather unusual and a few years ago the Lolland Main Line, serving the market towns of Nakskov, Maribo, Sakskøbing and Nykøbing Falster was no exception to the rule, though this line has a comparatively large passenger and goods traffic. For instance, quite a number of special trains are run on the section in the sugar beet season, when the many thousands of tons of beet grown on the fertile fields of Lolland provide the line with large loads.

At the beginning of the war, when traffic and thereby the revenue of the line, after falling off for some years, began again to rise, the management of the line (Det Lolland-Falsterske Jernbaneselskab, the Lolland Falster Railway Co., at Maribo) decided the time was ripe for the introduction of interlocking plants at the more important junction stations. To begin with 3 rural stations were provided with mechanical interlocking plants of fairly simple design.

When the turn came of providing Sakskøbing with interlocking plant it was originally proposed to continue with the same simple type of plant, but the urban character of the station involving considerable shunting and train marshalling, both during and outside the regular traffic, imposed such demands on rapid and labour-saving operation of the plant that this form of construction was not capable of satisfying the requirements of the traffic. Among other things it was required that some of the points could be shifted for train routes from the central apparatus, whereas those same points should be operated on the spot for train marshalling.

The only satisfactory arrangement therefore was the employment of electric interlocking plant and after negotiation with LM Ericsson A/S, Copenhagen, the decision was made for a plant with all relay interlocking machine and in general of about the same type as that of which the Swedish State Railways had ordered 25 in 1941.

Fig. 1  
Station lay-out

X 7416

- ⊙ electric point machine
- ⊠ local switch for same
- electric point lock
- ⊞ electric key central with keys locked in
- ⊞ key locked in
- ⊞ without

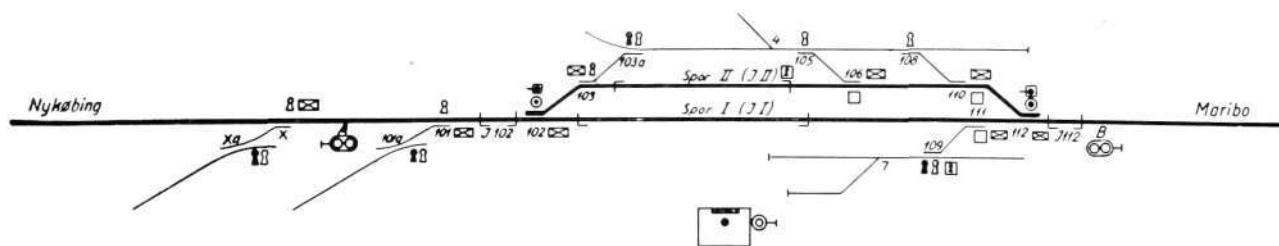




Fig. 2  
Point machine  
with cover removed

X 4440

Among the advantages obtained with the choice of this type of apparatus was that the central apparatus could be housed in the telegraph office with no other reconstruction than the addition of a window bay about 0.8 m deep, an arrangement that would in any case have been necessary to provide a view of the centrally operated points from the central apparatus.

## Execution

An idea of the track system and the lay-out of signals, points and track locks may be obtained from Fig. 1. The figure shows the track diagram for the station operating plan. As may be seen from the diagram the entrance signals are made as daylight lamp signals which can display «danger» and «clear». In these signals the Danish State Railways standardized 30 V 15 W lamps are used.

For central operation of the entrance points 102 and 112, the Signalbolaget point machines with built-in lock are employed. The local operation of these points is done from local switches fitted on stands beside each point. Before local operation can be undertaken release must be given from the central apparatus. Release is notified to the staff on the spot by a control lamp fitted in the local switch lighting up. The mounting of the point machine at the points may be seen from Fig. 2, showing the engine with cover removed.

The centrally operated points are protected against premature shifting in the usual way with insulated rail in connection with track relays that break the circuit to the operating relay of the point when the insulated rail is entered.

In addition to the insulated rails provided before the centrally operated points, protection against signal being given to a train route already containing train is provided by establishing track insulation of the main tracks I and II for the length of the platforms. By means of a track relay connected via the entrance point control relay contacts to the train route to which the points lead, the insulated track is in relation to the giving of signals, so that the signal can only be set at «clear» when the insulated section is unoccupied. As the insulation therefore is not continuous, the acting stationmaster is not freed from supervision of the train routes.

The fixing of the train routes is done by means of two supervisory current blocking relays — one for each signal — which break the operating and unlocking circuits when a signal is changed to «clear».

The train route unlocking is done automatically when the train entering has passed the track insulation at the entrance points and has entered the insulated train route track.

In selecting the method of locking for the individual points various considerations, both economical and technical in respect of tracks and safety, have had to be taken into account.

For points in the immediate neighbourhood of the interlocking machine and for points to sidings used comparatively seldom there is employed key locking on the wellknown key-lock principle by which the insertion of a master key at the interlocking machine ensures the correct setting and locking of the points. The points in the main line tracks are moreover provided with a Bruchsal point lock for fixing the point tongue setting.

For the other points in main line tracks use is made of electric locks of Signalbolaget's point lock type in conjunction with Bruchsal service lock, as may be seen from Fig. 3 where the electric point lock is shown with cover open.

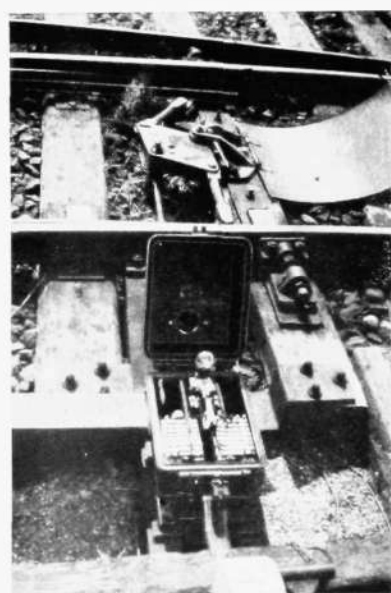


Fig. 3  
Point lock  
with cover open

X 4441



Fig. 4 X 5442  
Key locked points with electric key central

The rest of the centrally locked points are located in sidings and are of such design that fitting with point locks in conjunction with electric locks cannot be done in satisfactory manner, and as these points only occur as safety points, only traversed during shunting, it was decided in this case to have key locking without point locks. Owing to the remoteness of these points from the interlocking machine, however, it was not possible here to make use of the usual arrangement with locking by master key direct at the interlocking machine, and instead there was adopted an arrangement with locking under a lock controlled by electric block magnet («electric key central»), fitted in a box at the points concerned. The electric key central is thus connected with the interlocking machine in that the key for the points must be locked in the key central before signal can be given and it can only be taken out when the signal is again moved to «danger» and by operation of a contact at the interlocking machine the way has been cleared for unlocking. On Fig. 4 may be seen such a key-locked points with their electric key central.

### *The Interlocking Machine and the Internal Equipment*

A brief description will now be given of the interlocking machine and the internal equipment associated with it. A more detailed description of the interlocking machine itself, which as stated is of LM Eriesson's all-relay type, is not called for here, as the machine does not differ from the «press-button interlocking machines» used in Sweden, described in earlier numbers of this Review. It is sufficient to recall that the aim of the design has been to produce a central apparatus for small stations, giving the simplest possible operation, ensuring the interlocking advantages generally achieved with electric interlocking plants and taking up the smallest possible space.

The interlocking machine at Saksjøbing is mounted on a relay cabinet that is placed against the wall facing the platform in the window bay mentioned earlier, Fig. 5. In this way the apparatus takes up very little room in the telegraph office, while the arrangement provides a good view of the track system from the operating position in front of the interlocking machine and at the same time it is possible from the desks to keep an eye on the interlocking machine.

On the right hand side of the relay cabinet there has been provided place for a writing desk where the train journal may be kept.

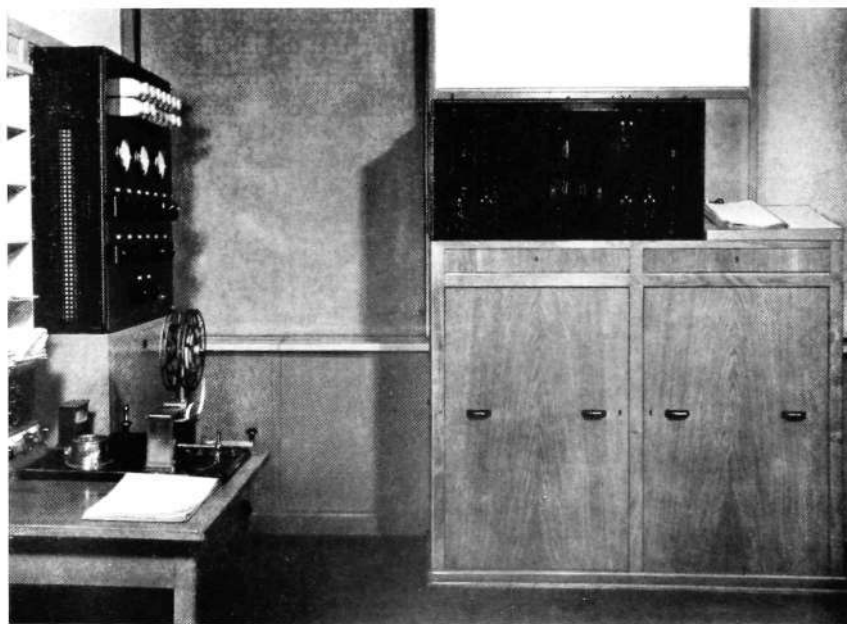


Fig. 5 X 6208  
The interlocking machine at Saksjøbing

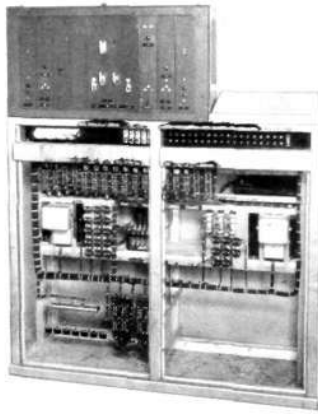


Fig. 6 X 4443  
Interlocking machine and relay cabinet

The relay cabinet is constructed of light oak and is fitted with removable front and sides, so that with these removed a good view and easy access to the relays etc. in the cabinet is obtainable.

The operating and control relays, the auxiliary relays for the centrally operated points and the track occupying relays are made as mantled relays and manufactured by LM Ericsson, Stockholm. The other relays are supplied by A/S Danske Signalindustri, Copenhagen, as unmantled relays designed for suspension on iron supports.

As all the relays, resistances and fuses, as well as the various cable terminals are fitted in the relay cabinet, complete connecting up and testing of the central apparatus and the relay cabinet could be done at Dansk Signalindustri's factory in Copenhagen, thus reducing considerably the work of erection on the spot. Fig. 6 shows the relay cabinet and the interlocking machine before despatch from the factory.

### Current Supply

As regards the current supply plant it should be noted that the current for the point machine motors and point lighting is taken direct from the 220 V railway power network, whereas the other current consumption is provided by a 220/45 V converter, part of it direct over 24 V Nife battery coupled to the same converter. The delivery of current takes place over the distribution panel seen at the left of Fig. 5, from which the points lighting groups are also lighted.

The cost of electricity in Sakskøbing being relatively high, special attention has been given when arranging the plant to keep the current down to a suitably small amount. Thus the daylight lamp signals are generally extinguished except at train times and only the train route lock relays have constant current. It is only when shunting and signalling are proceeding that the converter is run and the generator tension is kept regular in such a way that in addition to the current necessary for daylight lamp signals, control circuits etc. there is delivered suitable charging current to keep the battery charged. The starting and stopping of the converter is done by operation of a contact on the distribution panel in connection with an automatic starter, with a manually operated starter in reserve.

When the management of the line reached the decision to establish an electric interlocking plant at Sakskøbing there was felt some doubt whether such a complicated and finely adjusted plant would operate with sufficient reliability. Now that the interlocking plant has been in service for about ¾ year, operating satisfactorily through the bad weather of winter with snow and frost, it is with full confidence and not without fundamental experience that a start is made with a plant of the same type for the next station on the line to be given interlocking plant, that is Maribo.