

Press-Button Electrical Interlocking Apparatus

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As a step towards rationalisation on the Varberg-Borås-Herrljunga Railway the administration decided in 1933 to introduce safety point and signal installations at a number of the intermediate stations. The question arose how these smaller installations could be made as electrical switching plants similar to the practice followed for some time with the larger stations. In collaboration with L.M. Ericssons Signalaktiebolag, therefore, it was decided that an experimental installation should be put in at Tofta station on the railway in question. The installation was carried out by the railway company's own staff, to plans and specifications drawn up by Signalbolaget and in May 1934 it was ready for service. The installation has thus been in operation for about two years and during the whole time has functioned with complete satisfaction. Later seven more similar installations were put in, the last three being taken into operation during the summer of 1935.

Two tracks are laid down at the stations, see Fig. 1, the switching being made by electrical point machines, operated either centrally or locally. The catch-points and scotch blocks as also the points leading to the sidings in the tracks are for local operation, but are locked from the operating board. The entrance signals are made as daylight signals showing a green light for the main track and two green lights for entrance to sidings.

The interlocking apparatus, Fig. 2, consists of a metal cabinet, $90 \times 32 \times 22$ cm, convenient for placing on the front of the station building, see Fig. 3. To prevent the operating board being tampered with by unauthorised persons, it is provided with a wooden case the wall of which is hinged for raising and is fitted with a glass panel and a lock. The operating board is provided with switches for operating the point machines, the interlockings and the signals, together with control lamps indicating the positions of the signals and for showing the positions of the centrally operated points and interlockings. In addition there are two control locks, one a track lock to cut off current to the operating devices of the point machines and the scotch blocks before a signal can be set at »clear», the other for suspending the inter-dependence of entrance signals to allow of unsupervised shunting.

The light signals are fed normally from the lighting mains over a transformer, feeding the lamps at 12 V. As a reserve for the light signals there is a 34 Ah battery, charged automatically from the mains over a metal rectifier. In case of failure of the lighting mains the reserve battery is connected in by a switch on the operating board.

A signal is set at »clear» by throwing the corresponding switch on the operating board. The »clear» signal then shown is determined by the position

Fig. 1
Track diagram for meeting-station
on a single-track line

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1, 2 centrally and locally operated point
3, 4, 5 locally operated and centrally barred
points
A^{1/2}, B^{1/2} entrance signals
a¹, a², b¹, b² tracks

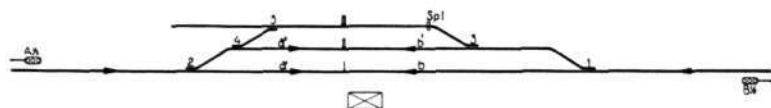
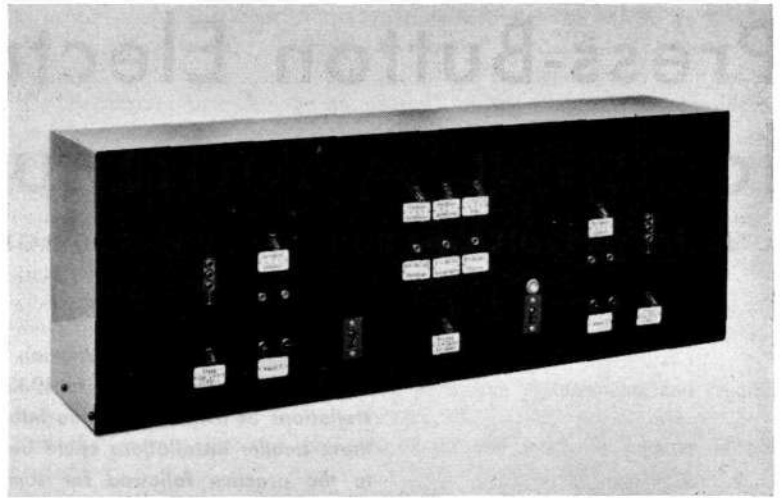


Fig. 2
Switching gear

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of the entrance points. »Clear» signal for the main track cannot be given unless the track is clear for through running. »Clear» signal to sidings may be given irrespective of the position of the points for departure at the other side of the station.

The point machine drives, Fig. 4, are operated by means of relays actuated by press buttons on the operating board, one for the normal position of each set of points and one for switched position. Freedom to switch these points locally is given by throwing a switch in the operating board, whereupon a flash lamp lights up at the local position indicating that local switching can be done. Both point-operating devices are fed direct from the lighting mains. When current is cut off the point machines are operated manually by hand levers. Supervisory current for the motor points is always fed direct from the battery. To prevent alteration of the centrally switched points when rolling stock is on or just coming to them, there is immediately before each point a track circuit connected to a relay. Over contacts on this relay the current is conveyed to the drives of the point machines.

The interlockings are operated by 136 V DC delivered from the lighting mains over a dry rectifier. On current being cut off the interlockings are operated by the corresponding armatures being pressed down by hand. The supervisory current for the interlockings is normally fed over the metal rectifier, thus having a tension of 136 V, reduced to 24 V via a resistance, this being the tension for which the relays belonging to it are constructed. On failure of the lighting mains the supervisory current is obtained from the reserve battery by throwing a switch on the operating board, by which the series resistance is shunted.



Fig. 3
Switching apparatus
mounted on the station building wall

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Special combinations of relays provide that when one of the signals has been set at »clear» for the main track, either a passing train must have entered and left the track thus set, or a train from the opposite direction must have been shunted on to a siding, before it is possible to have »clear» signal in the opposite direction on the main track. Should the order of running for any reason be changed after »clear» signal has been set for the main track, or if the train departs from the station without the insulated track section at the station's other end being passed, the interdependence can be cancelled by switching an emergency contact in the station-master's office. When the station staff is on duty the key intended for unattended running is taken from the operating board and kept in a locked key-cabinet in the station-master's office. The master key for the track locking is in charge of the train dispatcher. When the station

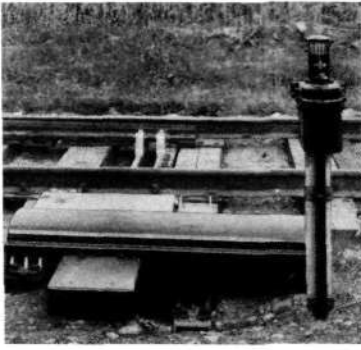


Fig. 4
Point machine with local switch

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is not attended the first-named key is placed on the operating board. The master key for track locking is then locked in the key-cabinet. An emergency switch is placed in this cabinet. As the main signals are not to be locked in »clear» position there is a switch placed outside the case of the operating board, by means of which the main signals can at any moment be restored to »stop».

The cabinet for relays, rectifier, resistances and other electrical equipment, Fig. 5, is located at a convenient spot in the office or the parcels room. As this cabinet should be kept locked and sealed by the signal inspector, the instrument board for meters and fuses is placed where it is easily accessible for reading the meters and changing fuses.

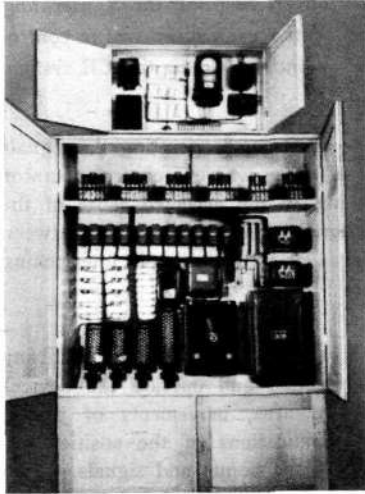


Fig. 5
Instrument cabinet
above, cabinet for meter and fuses
below, cabinet for relays, rectifier, resistances,
etc.

X 3578

The cost of installation of an interlocking system as described above is about the same as for a mechanical installation of the same extent. The advantages with the electrical installation are mainly that the *station is much easier to operate* and *maintenance costs are minimum*. At places where point switchings are few or where the points and the stop-blocks are situated in immediate proximity to the switchgear, the cost of installation can be reduced by replacing the electrical locking by a control lock, the key for which is placed on the operating board, where it is locked by means of the master key before »clear» signal can be given.

Press-button electrical interlocking apparatus has since been delivered by Signalbolaget to a number of privately-owned railways in Sweden and also installed at one railway station in Portugal. This last installation, Fig. 6, controls some thirty points. A further installation of this kind is being supplied in Portugal. In other countries also the press-button electrical interlocking apparatus has begun to receive attention. At Dayton in the USA for instance an installation of this kind and rather large in extent has been supplied by an American firm.

Fig. 6
Press-button electrical interlocking
apparatus at Ermezinde, Portugal
above, track diagram; below, point switches,
track switches and signal switches; on table,
telephone switchboard

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