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## THE LUZERN SIGNAL CENTRE.

By The Editor.

The station in Luzern is the terminus for traffic from the Gotthard, Basel, Zürich and Bern on the standard-gauge lines and the Brünig/Engelberg metre-gauge line. The current building still under construction is part of a ten year programme to replace the old station which was severely damaged by fire on the 5. February 1971. The first signal control was commissioned in 1898 using the Bruchsal 'G' mechanical interlocking system, which linked one main and four shunting signal boxes in the immediate area. From 1935 work began on the replacement of the semaphore signal unit by multi aspect colour light signals, followed in 1950 by the replacement of the mechanical route release system by an electrical system. From 1963 the point rod and wire systems were being replaced by electrical equipment, and in 1969 the junction of Gütsch was built and the tracks linking it to the main station made bi-directional. 1981 saw the start of the rebuilding work for both the main station and the new signal centre, located on the south side of the station, to control the 112 main routes and 362 shunting routes in the Luzern area. The centre became fully operational on 24. April 1988.

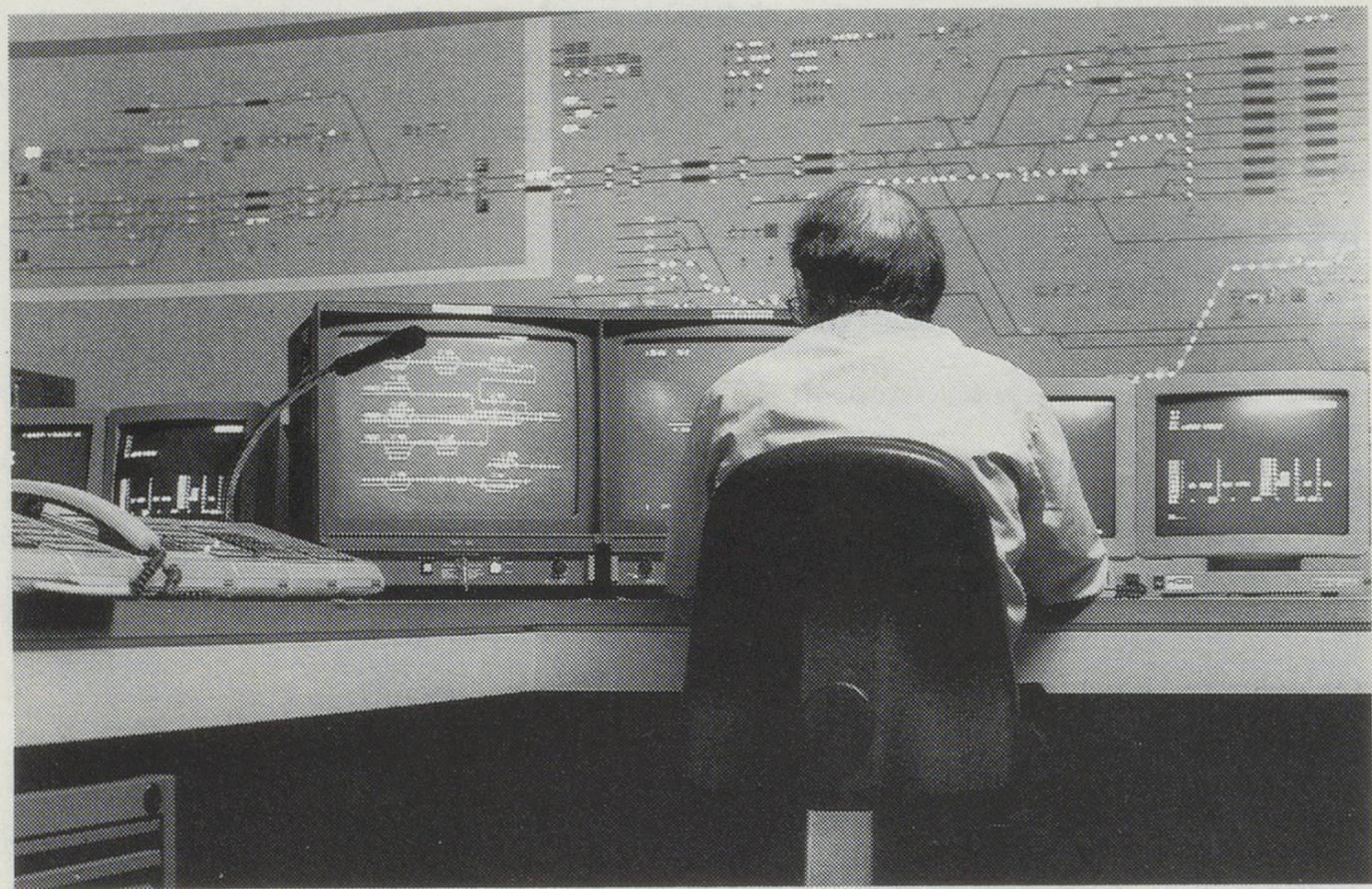


*The main signal control room at Luzern.*

*Photo: Integra Signum. Wallisellen.*

The signal centre has been fitted with the Domino 67 geographical interlocking signal system, designed and built by Integra Signum of Wallisellen, providing a secure selection of both shunting and main line routes. All the trackside equipment is controlled by its own relay set interlinked, according to the track configuration, by 24 core cables. The route request is keyed into the system by the area controller and all points and signals are set

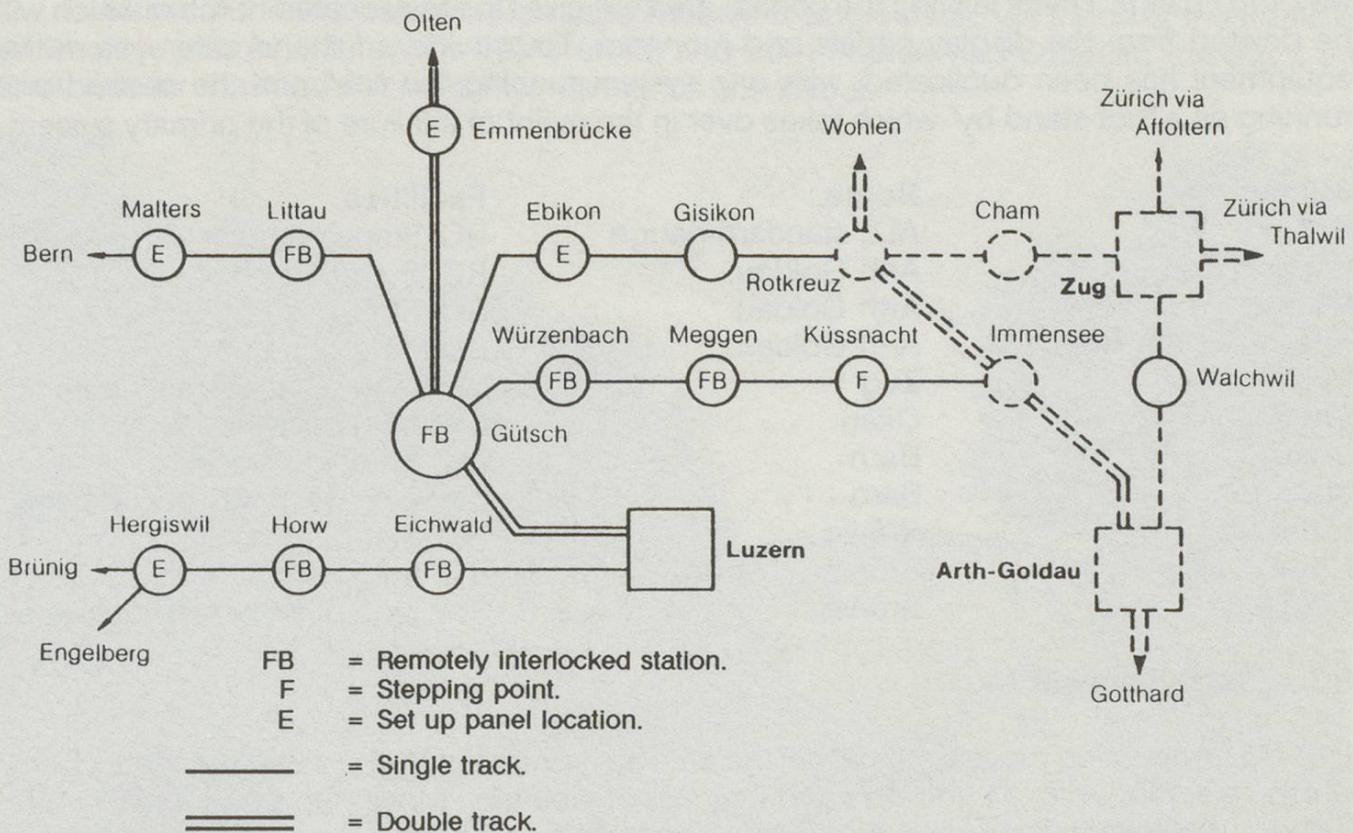
automatically, however, should the route or part of it be already selected the request will be held in the computer memory store until such time as the equipment required becomes free. The stored route requested will be indicated on the 7.0 metre x 1.6 metre Domino mimic panel - located in the main control room - by flashing buttons at the entrance and exit of the route to show that a route has been selected but is held in store pending release of already selected equipment. As part of the route is via double track signalled for running in either direction, special protection is built into the system. Therefore it is not possible to set a route for traffic in both directions over the same track, neither is it possible to set a route to cross an already selected route and clearance between following traffic is carefully regulated. All signals will indicate permitted speed according to the points for route set. The whole concept behind the equipment in the switch-room of the signal centre is that in the event of failure, it will first of all "fail safe" and then can easily be replaced by another plug in assembly.



Controllers display units and Main display panel. Photo: Integra Signum. Wallisellen.

The centre controls: 138 points and their 3 phase AC supply motors, 193 shunting signals, 4 block signals, 28 stop signals, 1 stop signal permanently at danger, 1 distant signal, 88 additional signals and 321 track circuits. As some of the tracks are available for use by either standard gauge or metre gauge rolling stock, special indicators and protection is given. The departure and brake test signal - Bremsprobe und Abfahrtsignale - is fitted to all platforms as are arrival and departure indicators to inform postal and station staff. All the equipment is powered via two rotary convertors, rated at 35 kVA and 20 kVA respectively, supplied by either 440 volts 16.66Hz from the traction supply network or 380 volts 50 Hz 3 phase from the public supply. In the event of a failure of the supply or a voltage drop an automatic changeover sequence goes into operation providing a "No break" supply to the electronic power supply units in the individual equipment racks. All

train movements in the Luzern area are controlled from the signal centre by four control personnel thus providing a smooth flow with minimum delay in communication between the sections. The heart of the system is the multi tasking operational computer which controls the whole area, receiving its instruction via code words entered on the controllers keyboards. Should an invalid or incorrectly entered code be keyed into the computer, it will reject it and flag the monitor to show the reason for that action. The area being controlled by each work station is clearly defined within the computer, thus allowing the allocation of any area to any controller. All instructions actioned by the system will be available for display on any of the full colour monitors. Colour monitors were chosen as this was the best way of showing the complex interlocking at the remote sites. The station announcer is also provided with 2 monitors to show the present location of trains within the control area and also planned train movements.



#### *The Luzern Control area and the remote control stations.*

The route setting equipment allows for the automatic selection and allocation of a pre-programmed route to a particular train prior to its reaching the area. Once the train arrives in the first control section the route will be selected and set up as required. Should a variation to the preferred route be required for the train it will be made when the train triggers the equipment by its arrival in the section. If for any reason a manual route has been set up via the panel it will take precedence over any stored route information. As soon as a train has departed from the section, the next route setting is selected ready for the arrival of the next train. Any variation from the programmed route - for such reasons as track maintenance etc - will be corrected at the first available point on the route. Holds can be placed on the progress of trains through the area to allow for; trains crossing, connecting and waiting for transit passengers or following another train, and once the prerequisites of the hold have been satisfied it will be lifted so that the train may proceed to

the next section. Route settings are programmed and stored to cater for the whole year and the system allows for updates or corrections to be made at any time, the information for the days traffic is assembled by the computer twice daily to prepare for the next part of the schedule.

Another part of the signal system is the train description equipment, which automatically detects and indicates the progress of a particular train from one section to the next. The relevant train number is displayed on the large mimic panel as well as the monitors. A data link is provided to similar equipment located at Arth-Goldau to provide information on all movements to and from either area. Where no automatic equipment is installed a local set up panel has been installed, on which the station staff will set the number for the train before it enters the area. Once the train has entered the section it will pick up the number allocated to it by the local panel and transfer it into the next section as it proceeds on its way into Luzern. Trains leaving the control area will give up the allocated number which will be deleted from the display panels and monitors. To provide a full and safe system the equipment has been duplicated, with one system running "on line" and the second unit running as a "hot stand-by" which takes over in the event of a failure of the primary system.

<b>Station.</b>	<b>Route.</b>	<b>Facilities.</b>
Gütsch	ALL standard-gauge	RC. Stepping point with monitor.
Würzenbach.	Arth Goldau.	RC. Stepping point.
Meggen.	Arth Goldau.	RC. Stepping point.
Küssnacht am Rigi	Arth Goldau.	Stepping point.
Ebikon.	Zug	Stepping point with set up panel.
Emmenbrücke	Olten	Stepping point with set up panel.
Littau	Bern	RC. Stepping point.
Malters	Bern	Stepping point with set up panel.
Eichwald	Brünig	RC. Stepping point.
Horw	Brünig	RC. Stepping point.
Hergiswil	Brünig	Stepping point with set up panel.

RC = remote control.

The shunting movements within the area are controlled by the shunt request system, which caters for up to 14 shunters and their associated train movements and for the traffic between the main station and the engine shed. When a shunter requests either a single route or a series of routes for a prolonged shunting manoeuvre to be set up, he will request that route via a set of keys on his portable radio link, which will be received by the shunt request equipment and registered. The request will be acknowledged via a voice synthesizer built into the shunters radio equipment.

Locomotives "on depot" can be diagrammed via the shunting request system, locomotives entering the depot from either the freightyard or the station will be stabled according to its next duty. The shunting route system will require information concerning the present track on which the respective locomotive is located and the train number of its next duty. When a driver is ready to proceed to the train on which he is booked, he will indicate this fact via a ready button to the shunting route system which will commence the setting of both the route and the signals required to the train. On completion of the shunting movement the route is cleared from the computer and the track made available for another request.

I would like to express my thanks to Herr Kull (Tech Editor) Integra Signum for the information and help that made this article possible.