Railway Signaling

C.B.&Q. Installs Electric Interlocking

Plant is first of six large signaling units in re-arrangement of Galesburg, Ill., terminal facilities

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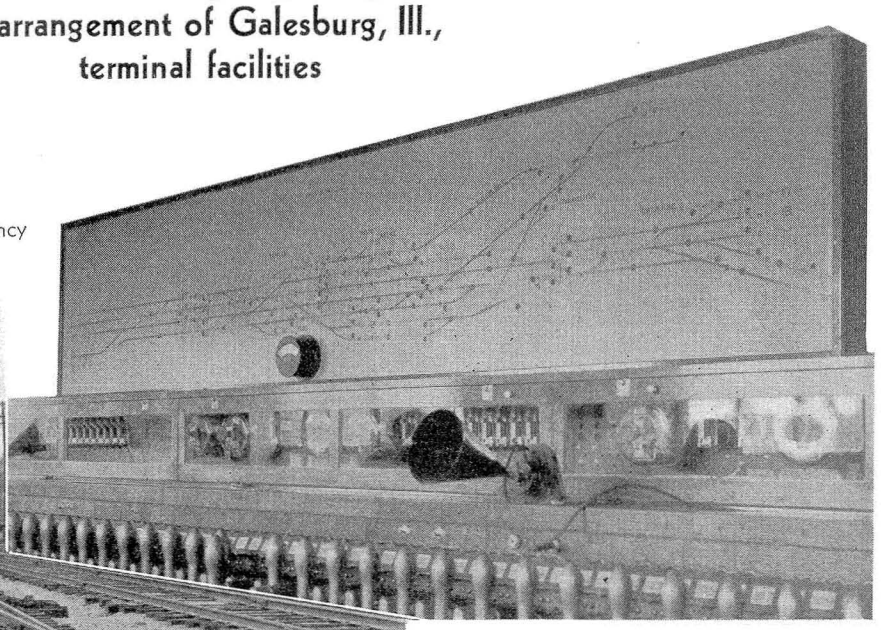
View from east looking toward station

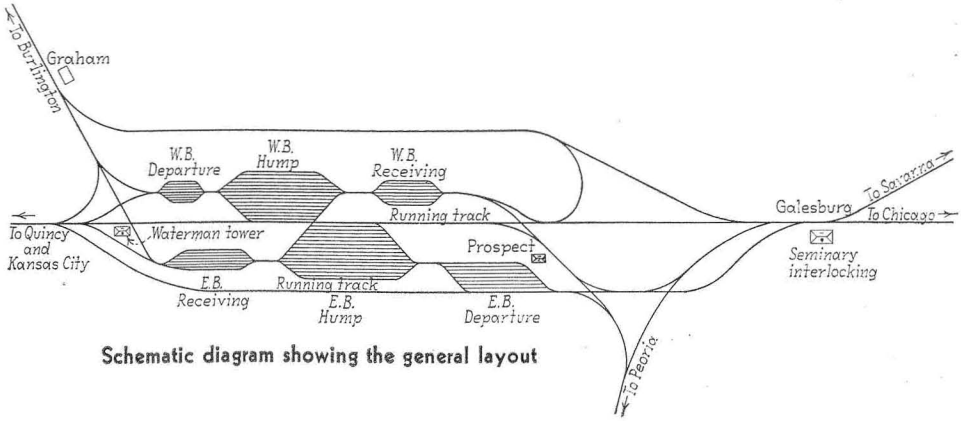


Time releases are mounted above the machine

THE complete re-arrangement of the existing terminal and other facilities at Galesburg, Ill., by the Chicago, Burlington & Quincy, as well as the complete construction of new yards, constitute such a large project as is seldom encountered at any one time by the forces of a railroad. In fact, the Galesburg facilities, when complete will constitute as large, if not the largest combination of yards, shops, timber treating plants and other units to be found at any other location in the railroad world.

The project was naturally divided into numerous units of which the signal department became responsible for the following six:

1. The construction of an interlocking plant at Seminary street to control the operation in the vicinity of the passenger station.
2. The construction of an interlocking plant at Prospect street to control the operation into the receiving tracks of the westbound yard, the leaving tracks of the eastbound yard and junctions with the Peoria and the Kansas City main lines.
3. The construction of a car retarder system in the eastbound hump yard.



Schematic diagram showing the general layout

4. The construction of a car retarder system in the westbound hump yard.

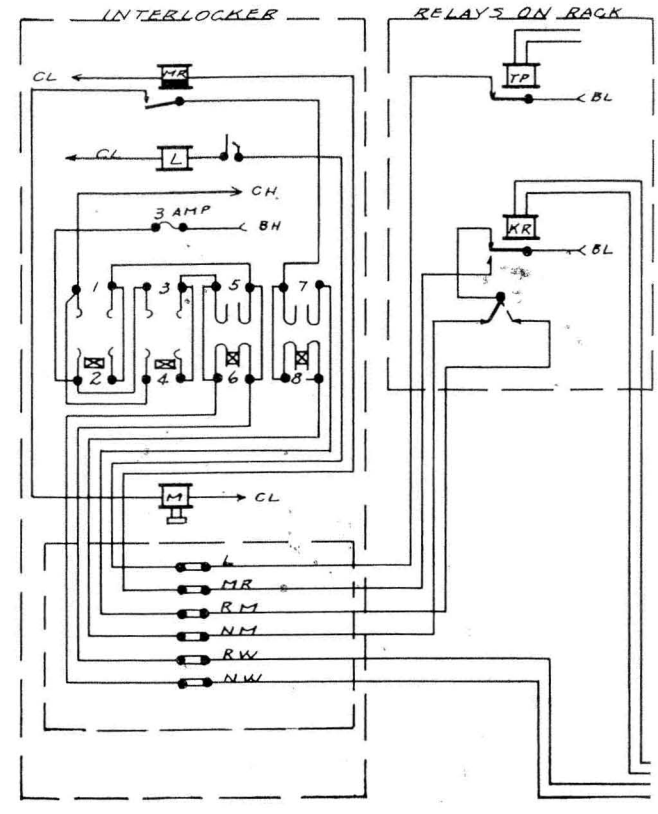
5. The construction of an interlocking plant, known as Waterman, to control the operation into the receiving tracks of the eastbound yard, the leaving tracks of the westbound yard and junctions with the Kansas City and main-line freight double-track connection.

6. The construction of a centralized (two-wire Union code) control of the present Graham mechanical plant which is located at the main line connection of the double-track freight line from Waterman, the control to be at Waterman.

The location of these several units of signal work are shown on the general plan of the entire new facilities. It is the intent of this article to cover unit number one, the new interlocking plant at Seminary street, which was completed and placed in service June 5, 1931. The other units will be covered in subsequent articles as they are completed. This Seminary Street plant is of the all-electric type, designed by and installed by the forces of the signal department according to the detail plans of that department. The interlocking plant is of the General Railway Signal Company manufacture known as the Model-2 battery-indication type, and is the second plant of this type installed by the Burlington in lieu of the Model-2 dynamic-indication type.

The track layout included in the new plant is shown in the accompanying plan. A junction where the double-track line to Davenport, Ia., diverges from the three-track main line to Chicago was formerly handled by a mechanical interlocking with 31 working levers known as Throop tower. The new Seminary plant includes all the function of the old Throop tower and also the switches at both ends of the station track layout, as well as a junction of the Quincy-Kansas City main line, one leg of the Peoria tracks, the roundhouse track and several other yard tracks.

All the passenger trains on the through east and west line, as well as those to and from the other lines out of Galesburg enter and leave the station through this interlocking. Likewise the freight trains to or from the lines to the east and north pass through the plant. Operations are further complicated by handling locomotives to and from the roundhouse. It should be noted that the plant includes several slip switch layouts and that complications are introduced by the fact that one lead crosses the main tracks just west of the tower. The plant consists of 44 switches, 4 double-slip switches, 40 SA searchlight

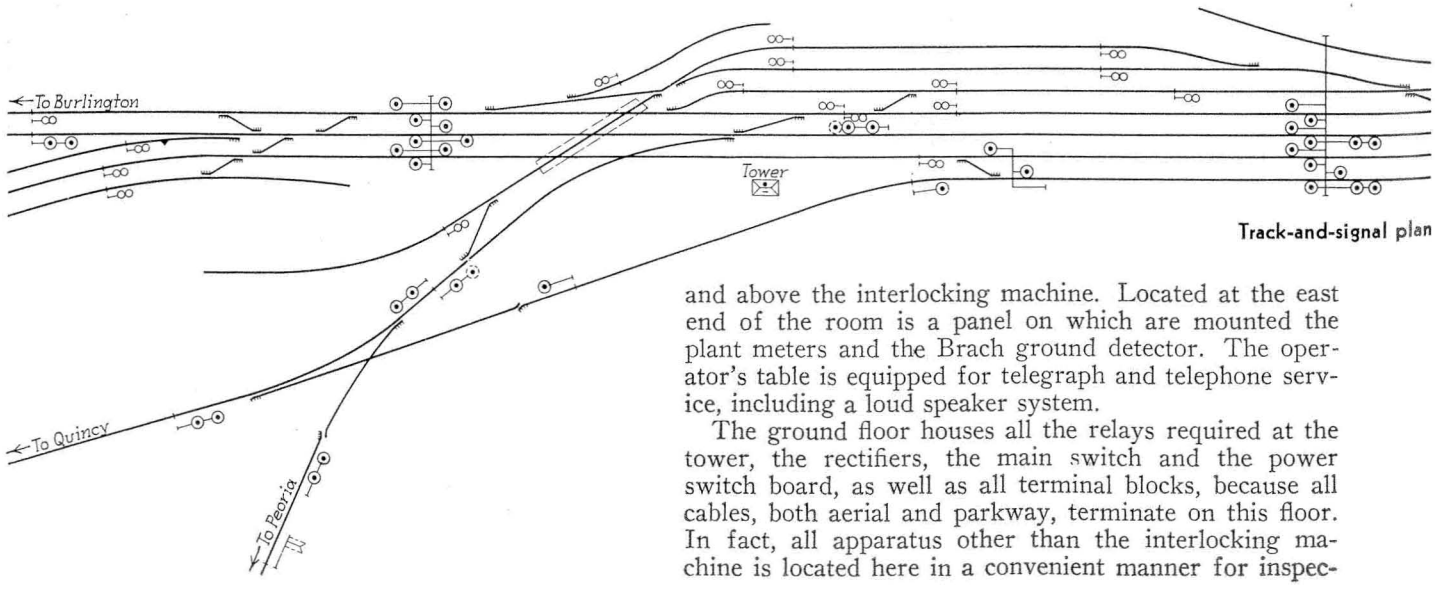


Typical circuit plan

signals on 6 bridges, 12 SA signals on masts and 24 two-light restricting speed (dwarf) signals.

The tower is fireproof, being constructed of brick with a concrete foundation and concrete floors. The building is 36 ft. 8 in. long by 17 ft. 8 in. wide, and includes a basement and two floors, an outside iron stairway affording access to the several floors. The windows are of steel sash construction with the lower section opening outward for ventilation. The tower is heated by the steam furnished from the main heating plant at the roundhouse.

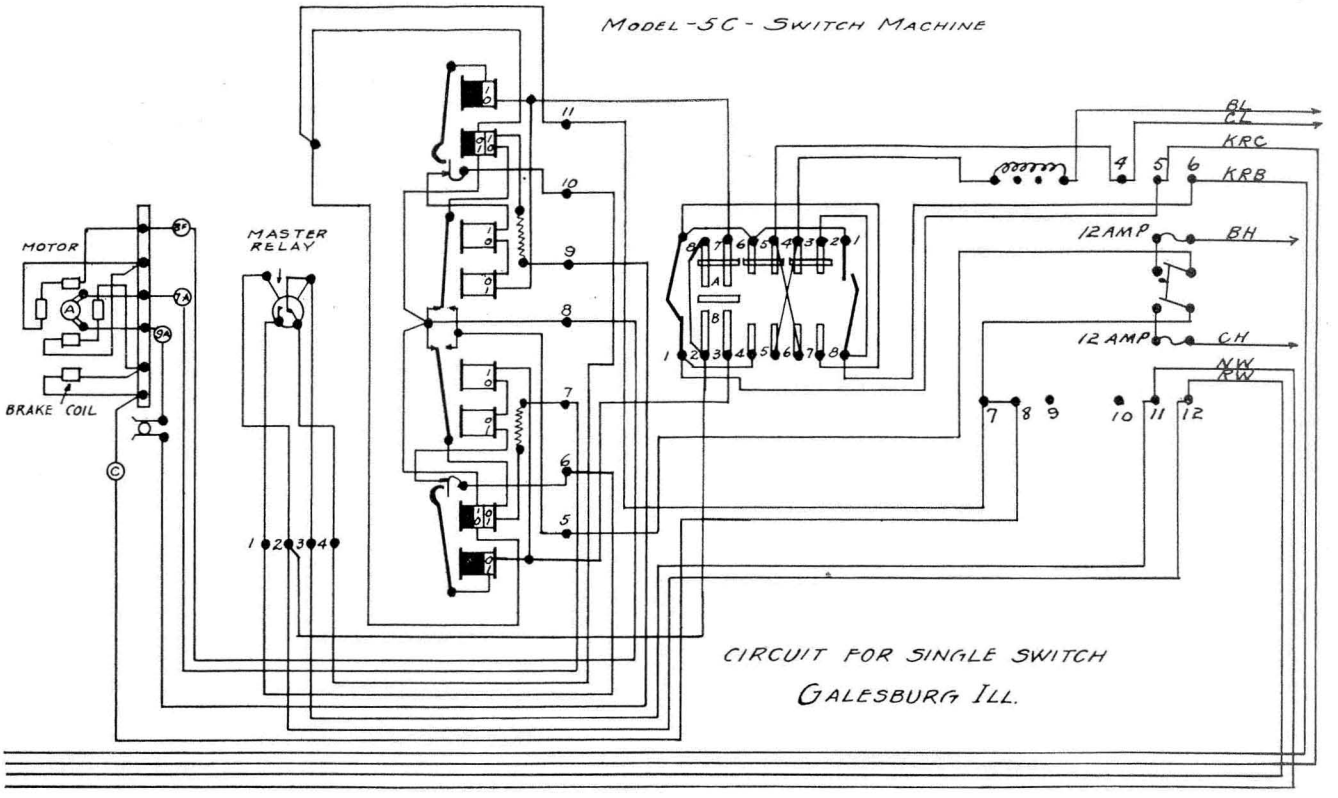
The interlocking machine, located on the second floor, consists of 6 spare spaces and 120 working levers, of which 38 are for switches, 74 for signals and 2 are check levers for the control of reverse operation on the three main tracks east from Galesburg. A large illuminated track diagram supported on pipes is located to the rear



Track-and-signal plan

and above the interlocking machine. Located at the east end of the room is a panel on which are mounted the plant meters and the Brach ground detector. The operator's table is equipped for telegraph and telephone service, including a loud speaker system.

The ground floor houses all the relays required at the tower, the rectifiers, the main switch and the power switch board, as well as all terminal blocks, because all cables, both aerial and parkway, terminate on this floor. In fact, all apparatus other than the interlocking machine is located here in a convenient manner for inspec-



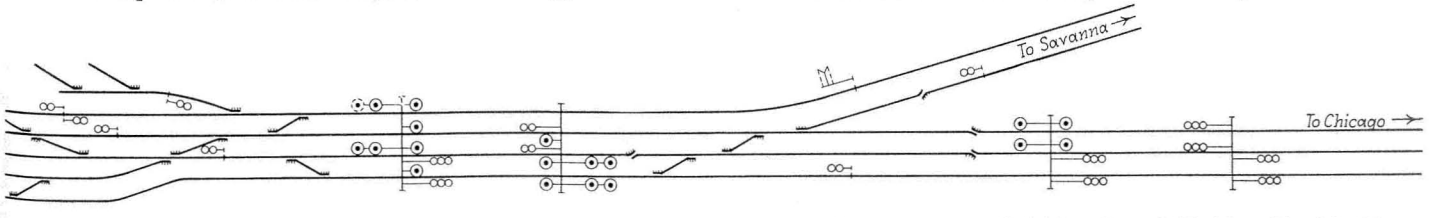
for a single switch

tion and testing. The relay rack is constructed of ½-in. asbestos transite board secured to a frame 1 in. by ⅜ in. angle iron. This rack is so constructed that there are five shelves for relays on each side, facing the room. Each end is equipped with a door which gives access to the interior of the rack where the terminals are located, just back of the relays, and so arranged that the jumper wires pass through small holes to the relays. Wire chases of the same material as the rack run parallel to the shelves on the inside, which are equipped with hinged lids so that all wires laid in them require no pulling through ducts. All cables, both aerial and parkway, terminate inside of the rack, which produces a fireproof housing, convenient and lasting. The rack was constructed by the Railroad Supply Company. The 1,000-ohm neutral relays are the Burlington type made at the Aurora, Ill., signal shop and the polar 1,000-ohm relays are Union Type DP-14. The relays are grouped on the shelves and the shelf is stencilled below each relay so that each relay is easily distinguished.

Located near the relay rack is a large oak panel known as the switch and test board on which are mounted the meters and knife switch for controlling and testing the feed circuits to the various circuits and sections on the plant.

The RP81 Union rectifiers, used to charge the main battery, are mounted on the wall. The RT 425 type, mounted on the top of the switchboard, is used for the track circuits near the tower. An RT21 rectifier, also mounted on the board, is used to charge the lock battery. The line control and other local batteries are charged by Balkite rectifiers, the transformers being mounted on the top of the switchboard. The power-off relays that control the illuminated diagram in case of a power failure are also mounted on this board. Square-D sheet-metal duct is used for all wires running from the relay rack to the switchboard and rectifiers, as well as to the interlocking machine on the floor above.

The basement, originally designed to house the storage battery and heating plant, has three rooms. However, as steam is now furnished from the roundhouse the coal and furnace rooms are used as shop and storage space for the maintainer. The battery room is 15 ft. by 18 ft. 5 in. and is well ventilated by three full-sized windows above the ground line. The three battery racks have three shelves each. The battery for the operation of the switches consists of 112 cells of Exide chloride Type-EMGO-9 cells and the line battery includes six sets of five cells each of Type-KXHS-7 cells. The remaining battery and Balkite rectifier cells occupy the remainder of the space on the racks.



of the controlled territory

Outside Equipment

The track circuits are of the standard d-c. type, fed by field buses with external resistance in each feed lead and adjusted properly to operate a four-ohm relay. Each track circuit group is fed by three KXHS 11-plate storage cells in series, each set being located at a central point with respect to the circuits being fed.

The switch machines are the General Railway Signal Company Model-5-C with the master relay mounted in the same housing as the mechanism. With 110-volts at the terminals, these machines will operate in 3.5 sec.

Relay racks—Note Square D conduit leading to machine on floor above

These machines are located six feet from the center of the track which permits of placing them on the top of the ties, thus eliminating framing.

The parkway cable is brought up through a piece of 3½-in. pipe 2 ft. long set vertical, the joint between parkway conductor and the single-conductor wires extending to the machine being located in this pipe riser, after which the pipe is filled with parolite. A coupling is placed on top of the pipe and a two-inch flexible metal conduit extends to the switch machine.

The high signals are the G. R. S. searchlight Type-SA and are mounted either on signal bridges or ground masts. The top signal in each instance governs the high-speed route, the second signal governs the diverging route and the signal suspended beneath the bridge governs the restricting routes. The circuits employ the complete SS control, as well as with field selection with route release behind any move made by equipment through any part of the plant; signals cannot, however, be cleared until the move is completed.

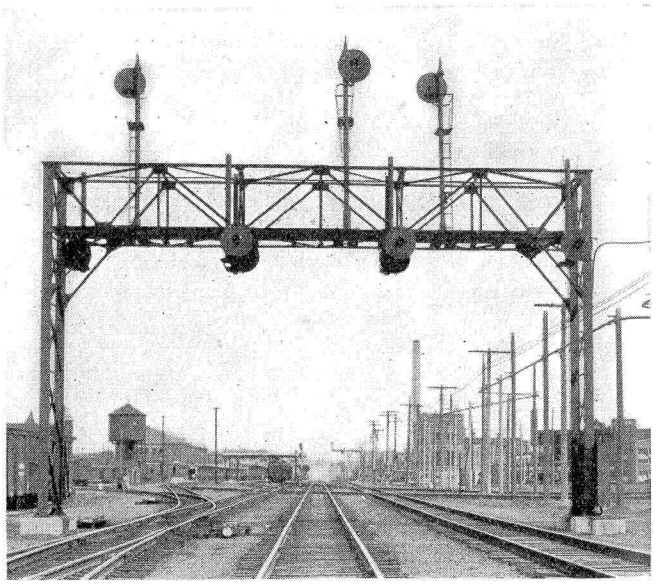
It will also be noted that no call-on signals are used and that for switching moves a push button is located above the lever on the interlocking machine which has to be used jointly with the lever. The combined use permits the signal to display the yellow indication only and is used only for switching moves, all through moves being made by lever only and the regular signal indication. The use of the button-lever combination is permitted to get a switch engine to a train to be switched and for changing road engines.

Cable Distribution

The main runs of the circuit distribution over the plant are all in aerial cable manufactured in straight lay formation. These cables are hung in rings suspended from stranded messengers of 5,000-lb. test which are supported on cedar poles set in line with existing poles of the telegraph line so as to use them as a part of the line. High poles were required to provide adequate clearance. Lead sheath Okonite cable with No. 14 conductors was used throughout the station platform area while the remainder of the aerial cable is of the braided type of C. B. & Q. specification with No. 16 conductors. Several field buses in two-wire copper weather-proof triple-braid cable are carried on the aerial runs. Four of these circuits are for the distribution of the 110-volt d-c. power for switch operation; the circuit for the east end of the plant is No. 2 gage, that for the center portion of the plant is No. 4, and that for the section west of the tower is No. 6, as is also that for the south section of the plant. A separate two-wire cable of the same type with No. 8 conductors is used for the track battery feed of a trap location west of the tower. In addition to the above buses, all of which are for direct-current circuits, there are several local buses for track circuits which run on the line for short distances.

All the conductors from relay boxes to switch machines and ground signals are in Okonite parkway cable made up with lead and steel sheaths. The cable conductors for the switch motor circuits are No. 6 gage, those for switch and signal control circuits are No. 12.

Standard C. B. & Q. wood boxes 5 ft. 10 in. high, 3 ft. 7 in. wide and 1 ft. 4 in. deep are used for instrument housings on the plant. The storage battery also is located in these boxes, excepting in a few instances where small concrete boxes are used. Each signal battery consists of five cells of Exide KXH-7 cells charged by



View looking east toward tower

copper-oxide rectifiers. These boxes are mounted on the poles which support the aerial cable and are thus away from the tracks, thereby eliminating any obstructions within the plant area. The aerial cables run down the poles and terminate in these boxes and likewise the parkway comes up from the ground and terminates in these same boxes.

As this installation is a part of the large yard rearrangement, the costs, and savings which are considerable, are not obtainable until the entire project is completed so that full benefits can be deduced. However, the operating benefits are now apparent in the better and faster handling of the traffic at this point.