

other cause, the counter-electromotive force generated in the secondary circuit is sufficient to cause the relay to open, thus opening the circuit to the electro-pneumatic valve.

When the train has stopped, in order to effect a release of the device, it is necessary, first, to place the brake valve in lap position, second, to move the forestalling valve to the forestalling position, which restores the electrical part of the apparatus to normal, picking up the electro-pneumatic valve and third, to get out on the ground to operate the release cock to the reset position, allowing it to remain there for several seconds, after which time the pressure is restored to the face of the piston of the application slide valve, moving it to the normal position and restoring the device to normal. The release cock may then be placed normal, after which the brakes may be released in the usual manner and the train proceed without restriction. If the reset cock is left, by design or neglect, in the reverse position, the face of the piston controlling the application valve will be again vented to atmosphere when the brake valve handle is moved to the running or release positions so that the apparatus will not assume the clear position.

If the engineman is alert, and desires to avoid an automatic stop at a signal displaying an "approach" or "stop then proceed" indication, he may operate the forestalling valve which permits air to pass from the forestalling reservoirs to the diaphragms of the pneumatic forestalling relay. In this way the contacts of this relay are closed, and as there is a timing element of about 15 sec. on this relay, it will remain closed for that period, giving ample time to forestall when approaching an open-circuited inductor. While the engine relay will always be opened when passing a track inductor in the open-circuited condition, it closes in a very short interval, less than the period of time required for the action of the electro-pneumatic valve, and there will be no brake application initiated.

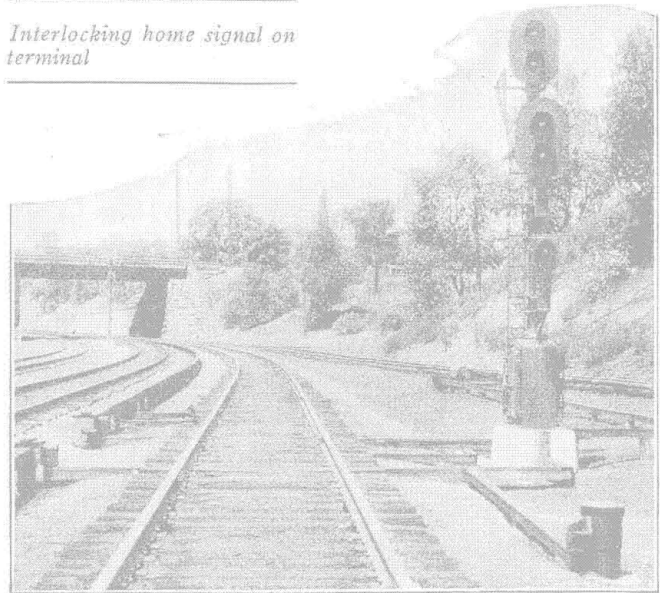
Maintenance and Inspection

The roadside apparatus is maintained and inspected by the regular signal department forces. On the 30-mile section east of Charlottesville it is taken care of by two maintainers and two helpers; on the 95-mile section west of Charlottesville, there are five maintainers and four helpers. The roadside inspection and tests consist of gaging the inductors for proper gage and alignment semi-monthly, testing the integrity of the inductor circuits with a meter and portable dry cell once each month, and testing the insulation resistance of the inductor circuits to ground every three months, and making a monthly service test on each inductor. In making the monthly service test, a car equipped with train control apparatus is attached to one of the regular express trains. An observer rides in the car, which is usually located near the end of the train, and observes the operation of the apparatus when passing over each inductor. Reports of the results of these tests are forwarded to the supervisor and a copy is sent to the superintendent of telegraph and signals for his information and record.



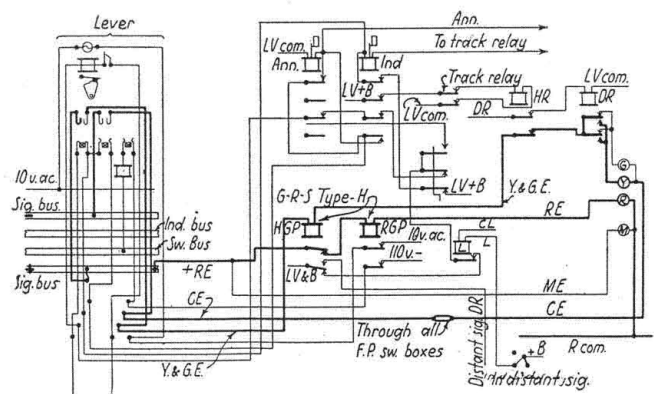
Interlocking tower at Jacksonville, Fla.

Interlocking home signal on terminal



G. N. Replaces Semaphores With Color-Light Signals

DURING 1927, the Great Northern replaced all of the semaphore signaling on its four-track line between St. Paul, Minn., and Minneapolis with color-light signals. Two of these tracks are used normally for freight service and the other two for passenger service. The passenger tracks provide the most direct connection between the Union stations in the two cities and, in addition to the Great Northern, are used by the Northern Pacific, the Chicago & North Western, the Chicago, St. Paul, Minneapolis & Omaha, the Chicago Great Western and the Chicago, Burlington & Quincy. There are five electrical and one mechanical interlocking plants within the



Interlocking signal control circuit showing special lamp indicating relays and control in heavy lines

ten-mile section, these plants governing all four tracks. The passenger tracks only are equipped with automatic signals.

The signaling installed in 1908 was all of the semaphore type, these automatic signals being among the first to be operated with the three-position upper-quadrant aspect. The new color-light signal heads were mounted on the old semaphore signal masts. Clearance restrictions made it impossible to mount these signal heads at the standard height of 12 ft.

