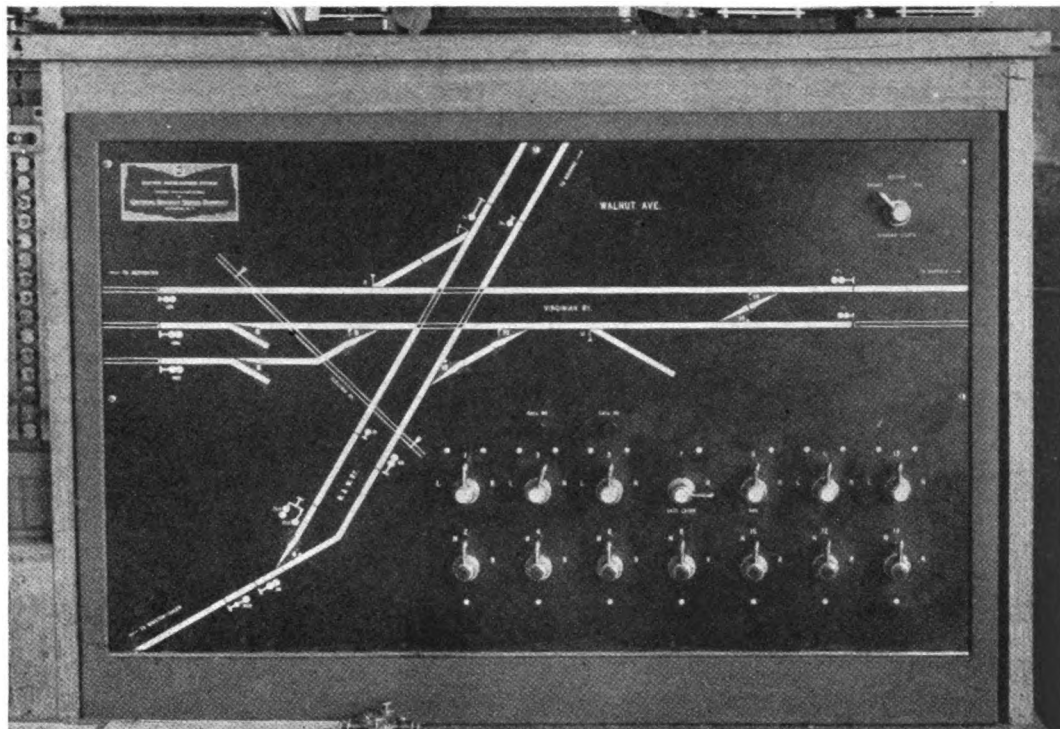


The new interlocking control machine is the panel type with miniature levers



All-Relay Electric Interlocking Replaces Mechanical Plant

THE Virginian Railway has recently installed an electric interlocking to replace a mechanical plant in Roanoke, Va., at a crossing of the single-track main line and a yard switching lead of the Virginian with a double-track line of the Norfolk and Western which extends from Roanoke to Winston-Salem, N.C. The Norfolk and Western handles two scheduled passenger trains each way daily, in addition to a way freight each way daily except Sunday, and a certain number of extra through freights as may be required. The Virginian operates two scheduled merchandise freight trains and a passenger train each way daily, in addition to a number of trains made up exclusively of coal cars which are loaded eastbound and are empty westbound.

Location of Plant

Roanoke is a division point on the Virginian Railway. The New River division over the Appalachian mountains from Roanoke west to Mullens, is operated with electric locomotives.

The Norfolk division east of Roanoke to Norfolk is on grades more favorable, and the operation is with steam locomotives. The Virginian freight yard is south of the tracks and to the west of the crossing. Switch No. 8 connects the east end of the yard to the main track via a lead track running parallel with the main track, and crossover No. 14. Westbound freights

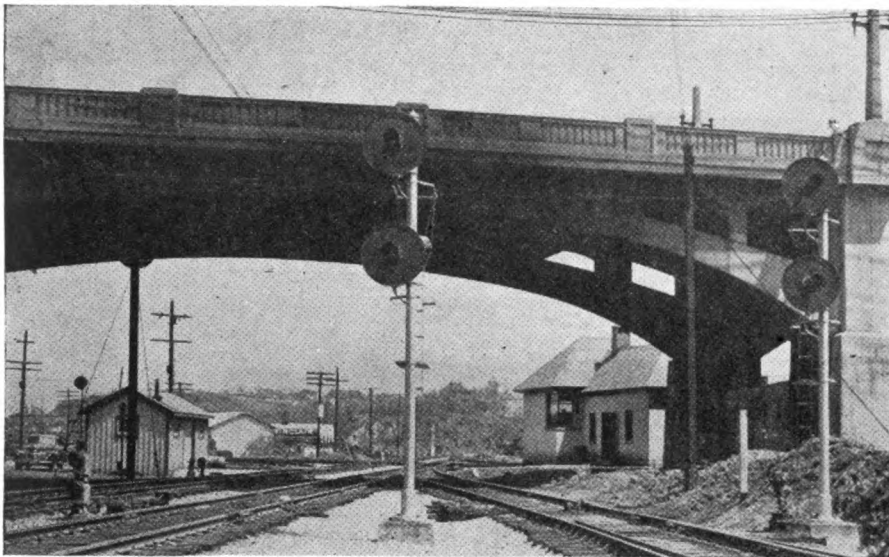
barns and shops of the electric street railway system are located just south of the tracks, and the only connection to these barns and shops is via a single track which extends at grade diagonally across the tracks of the Virginian and the Norfolk and Western. Therefore, the interlocking includes protection for the operations of street cars over this line. Also, as protection for

At a crossing of the Virginian and Norfolk and Western in Roanoke, Va., this new interlocking includes plug-in type relays, four-aspect dwarfs and other modern features

are routed from the main track to the lead track via crossover No. 14 reversed, and then into the yard via switch No. 8 reversed. On the Norfolk and Western the single switch No. 4 is the end of double track which extends from that point to the N. & W. station.

An overhead concrete viaduct carries Walnut avenue over the entire track layout of both railroads. Car

the street-car track, power-operated derails included in the interlocking were installed on the Virginian lead track and on the track from the yard to the lead track. These derails will stop loose cars which may drift eastward on these tracks toward the crossings. Electric locks were installed on three hand-throw switches within home signal limits, as shown on the plan.

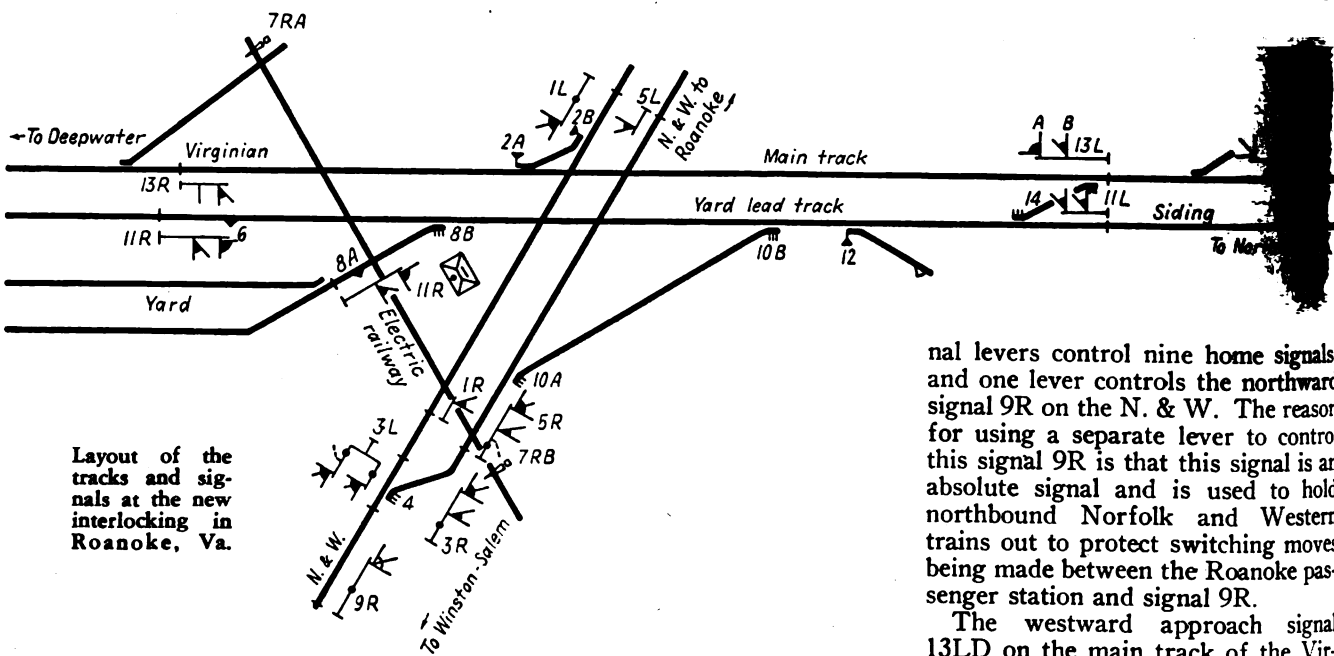


Searchlight dwarf signal 13R and high signals 11R on the Virginian

The new interlocking is the electric type with all-relay control circuits and a panel-type control machine. The panel is 18 in. high and 30 in. long. The track diagram includes lamps to indicate track occupancy. On this diagram, each power switch is represented by a movable point indicator which swings on a pivot to repeat the position of the switch so that the route lined up is indicated by a solid white line 3/16 in. wide.

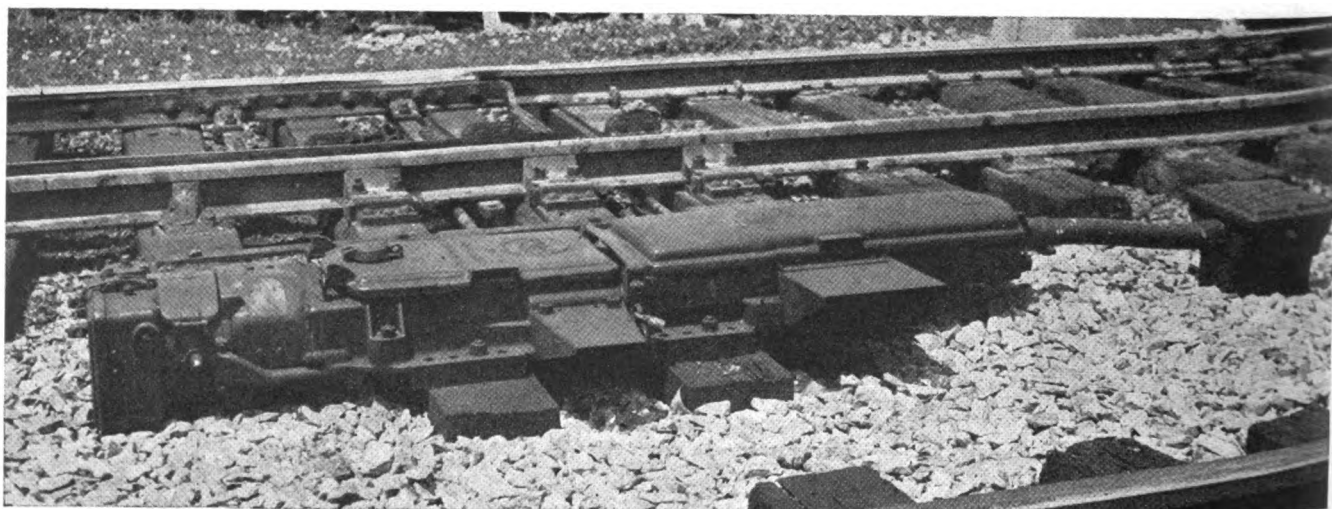
The Signal Levers

The signal levers, which are in the top row, normally stand on center, being thrown to the left to clear a westward signal, or to the right to clear an opposing eastward signal. Opal lamps above the "L" and the "R" positions of each lever are lighted when the signal being controlled has displayed a proceed aspect. Five sig-



nal levers control nine home signals, and one lever controls the northward signal 9R on the N. & W. The reason for using a separate lever to control this signal 9R is that this signal is an absolute signal and is used to hold northbound Norfolk and Western trains out to protect switching moves being made between the Roanoke passenger station and signal 9R.

The westward approach signal 13LD on the main track of the Virginian is controlled to display the yellow aspect.



A typical power switch layout at the new all-relay interlocking at crossing of the Virginian and the Norfolk and Western in Roanoke



The signals on the Norfolk and Western are the position-light type. View shows high signal 5R

low or the green aspect by use of 75 or 180 code in the track circuit between this signal and the home signal 13L. This use of a coded track circuit eliminates the use of line wires to control signal 13LD. The center lever, No. 7, in this row, controls the two gates which are normally closed across the street-car track.

The Conditions to Allow Street Car to Cross

When a street car is to be allowed to cross, all the Virginian and the Norfolk and Western signals must be controlled to the Stop aspect, and the derails set in the derailing position, the track circuits unoccupied, and then the towerman throws lever No. 7 which

Gate lowered over the street railway track under viaduct. Norfolk and Western tracks are in foreground

causes the two gates on the street-car line to be raised to the clear position.

If the interlocking home signal limits on the Norfolk and Western are occupied, the signals controlled by levers No. 3 and No. 5 can be controlled to display the call-on aspect by

positioning the lever and also pushing a button directly above the respective lever.

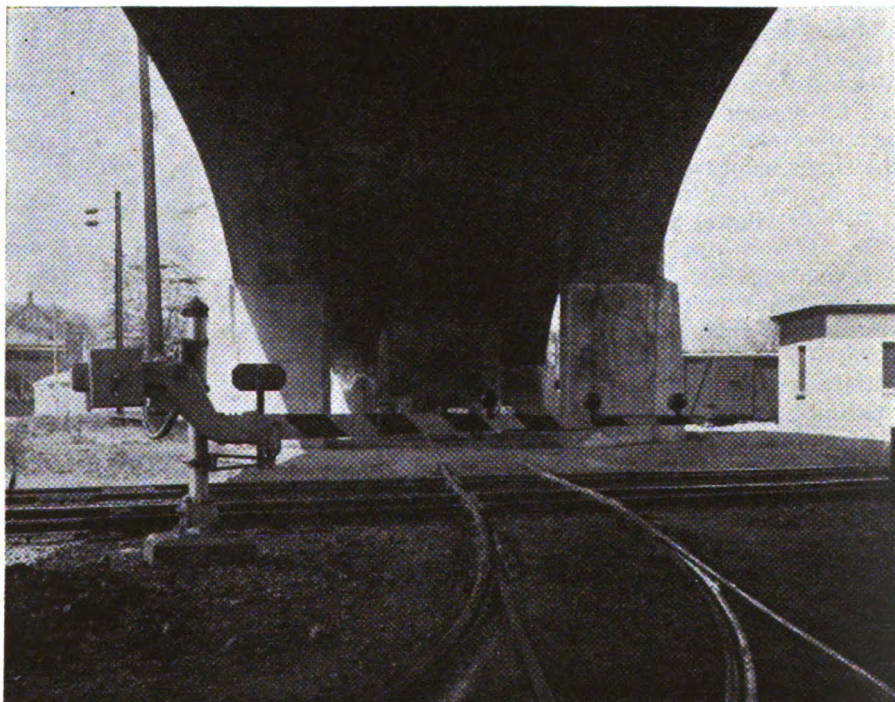
Operation of Switch Levers

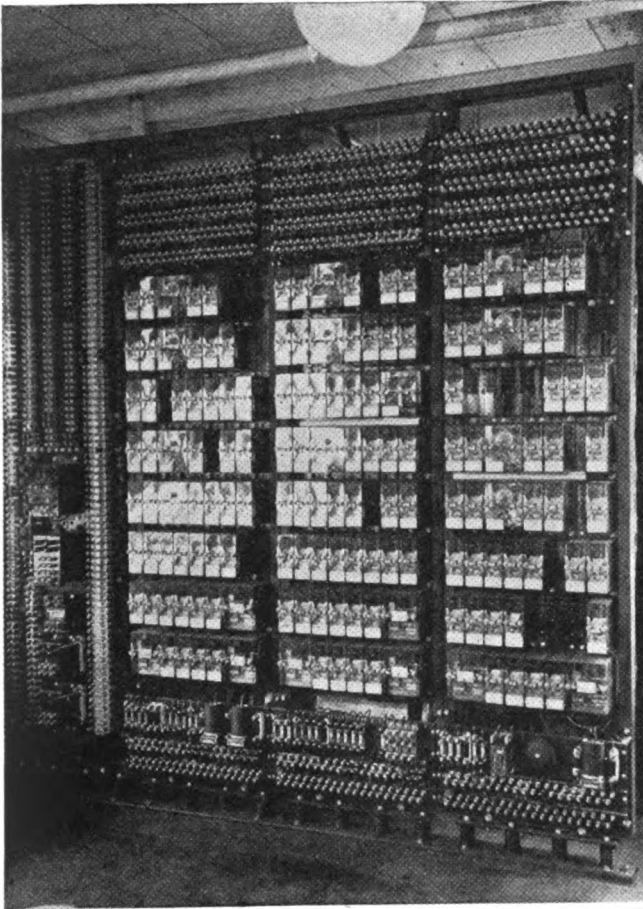
The bottom row includes seven levers for the control of switches, cross-overs, derails and electric locks on hand-throw switches. Single switch 8B and the derail 8A on this turnout are both controlled by lever No. 8. Lever No. 10 controls the switches at the two ends of the connecting track between the northward Norfolk and Western track and the Virginian yard lead.

Below each switch lever there is a small opal lamp which is lighted from the time the lever is thrown until the switch is over and locked. If the lamp stays lighted, the towerman must investigate to determine why the switch has not responded. In the face of the barrel of each switch lever there is a red lamp which is lighted whenever the electric locking is in effect to prevent operation of the switch, even if the lever were thrown. In such a case the switch would not operate after the locking is released. To regain control of the switch, the leverman must restore the lever to the position corresponding to that of the switch.

Plug-in Relays

The relays in the tower are the quick-detachable, plug-in type, and are mounted on three racks, as shown in one of the accompanying pictures. These racks are supported by springs which absorb vibration caused by passing trains. At the signal locations the relays and batteries are mounted in





The relays in the tower are the plug-in type, and are mounted on three racks which rest on springs

sheet-metal cases, as shown in one of the pictures.

The interlocking signals on the Virginian are the searchlight color-light type, and the signals on the Norfolk and Western are the position-light type. The dwarf signals on the Virginian each have two signal units. Westward dwarf 11L displays an aspect of yellow-over-red for the straight track, or red-over-yellow for a diverging move. The high signal 11R on the track coming out of the Virginian yard, displays green-over-red for a route out on the lead track and over the crossover reversed to the single main track.

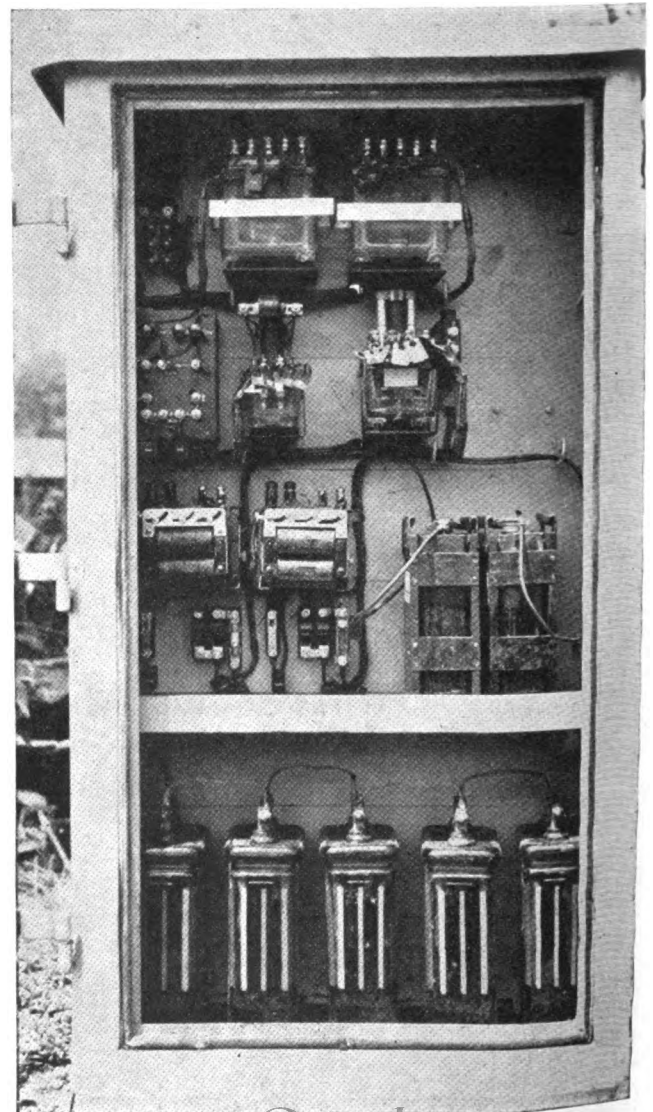
Power Supply

Commercial supply of 110-volt a.c. is available at the tower for operating rectifiers to charge storage batteries. A set of 55 cells of 80-a.h. Exide lead battery feeds the 110-volt d.c. switch machines. A set of 5 cells of the same type battery is provided at each signal. Each d.c. track circuit is fed by one cell of Edison B4H storage battery. Alternating current track circuits are used on the Norfolk and Western and on the Virginian within home signals due to foreign current from the trolley line.

The design and construction of the new tower is interesting. The building is constructed of cinder blocks

with a coating of exterior cement stucco. The building is one story, thus eliminating stairways, as well as reducing the materials required in walls. The operators' room with a floor 2 ft. 6 in. above ground level, is 12 ft. 8 in. by 19 ft. 8 in. In addition to the interlocking machine, this room contains the relay rack, the layout being so planned to facilitate testing and replacements by permitting the man working on the relays to see the control machine at the same time. Large corner windows are provided in this operating room to permit the towerman unobstructed view of trains in all directions. The remainder of the building at ground level consists of one room 10 ft. 11 in. by 11 ft., containing storage batteries, and a room 10 ft. by 10 ft. 8 in. for the heating plant and toilet facilities.

This interlocking was installed by signal forces of the Virginian under the direction of Edward Lockhart, superintendent of telegraph and signals, the major items of equipment being furnished by the General Railway Signal Company.



Interior of instrument case at home signal location on the Virginian, showing relays, rectifiers and the batteries