

Modern Interlocking on the Norfolk and Western

At Roanoke, Va., the Norfolk and Western has installed a large electro-pneumatic interlocking with all-relay controls, and several other modern features, including a control machine with sloping panels

ROANOKE is 253 miles west of Norfolk on the main east-and-west through route of the Norfolk and Western between Norfolk and Cincinnati. From Roanoke, the Shenandoah Valley division extends north 239 miles to Hagerstown, Md., connecting enroute with the Chesapeake and Ohio, Southern, Baltimore & Ohio, Western Maryland and Pennsylvania. Also, from Roanoke, another line extends south 121 miles to Winston-Salem, N. C., where it connects with the Southern and the Winston-Salem Southbound. The new interlocking at Roanoke includes the junctions of these two side lines with the main east-and-west route, as well as station tracks in the new passenger station at Roanoke.

From the general vicinity of the tower, the new interlocking extends about 2,000 ft. west and 1,700 ft. east on the east-and-west main line; 960 ft. north on the Shenandoah line; and 9,060 ft. south on the Winston-Salem line. This entire plant includes 53 high home signals, 32 dwarf home signals, 60 switch machines on 17 single switches, 21 crossovers and 1 m.p.f., and electric locks on 35 hand-throw switches leading to industry spurs. The switch machines are the electro-pneumatic type. The signals are the Norfolk and Western's standard position-light type.

Control Panels Slope

The interlocking machine is of the sloping panel type, said to be the first of its kind to be installed in the

Westbound train from Norfolk main line coming into Roanoke station. The new tower is at the left

United States. The levers are the miniature type, the same as used on C.T.C. machines. The signal levers are in the upper row, and the switch levers in the lower row. These levers are on panels which slope at an angle of 30 degrees up to the bottom of the illuminated track diagram which, slopes up at an angle of 60 degrees. Each lever panel is 18 in. high and 2½ ft. long, so that the 4 panels total 10 ft. for the entire length of the machine. The front edge of the lever panels is 30 in. above the floor. Thus, one of the advantages of this sloping panel arrangement is that a leverman can readily see all the levers and the diagram, and can operate the levers easily when standing or when seated in a conventional office chair fitted

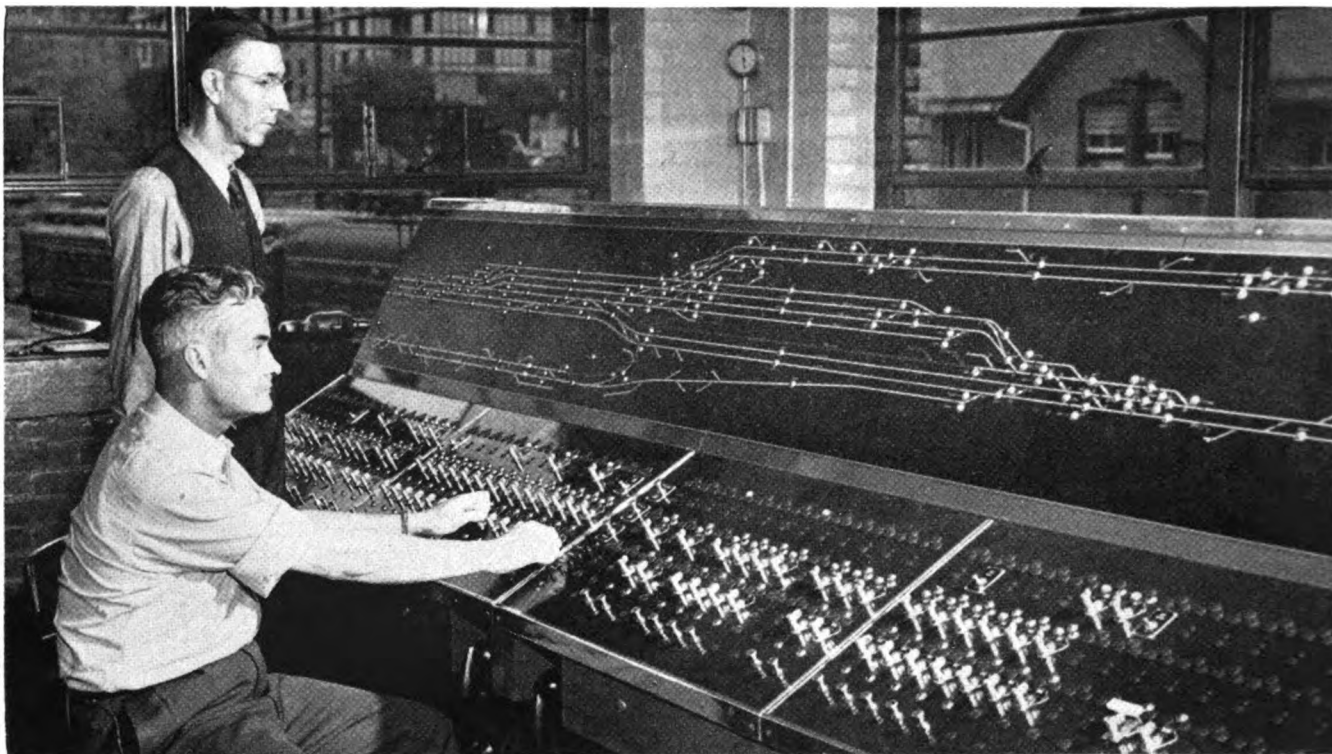
with large casters so that he can roll the chair back and forth.

On the illuminated track diagram, the track-occupancy lamps, which are red, are normally dark, being lighted when corresponding track sections are occupied. On this diagram, each signal is represented by a symbol which includes a green lamp that is lighted when the corresponding signal is cleared. The signal levers normally stand on center, each such lever being thrown to the left to clear its westward signal, or to the right to clear its corresponding eastward signal. A red lamp above the center of each signal lever is lighted when a train accepts and passes the signal. This is an aid to the leverman by informing him when he can put the lever back to the normal position.

Call-On Aspect

If one of the track circuits controlling an interlocking signal is occupied, a call-on aspect can be displayed by positioning the signal lever properly, and then pushing a button below that lever. When the call-on aspect is displayed, a yellow lamp below the lever is flashed. If the train which was occupying the block





The interlocking machine is of the sloping-panel type with miniature levers the same as used on C.T.C. machines

passes beyond the track circuit control of the signal, the call-on aspect is automatically replaced by the better aspect thus made possible, and, at that time, the yellow lamp below the lever stops flashing and is dark.

Switch Reverses Indication

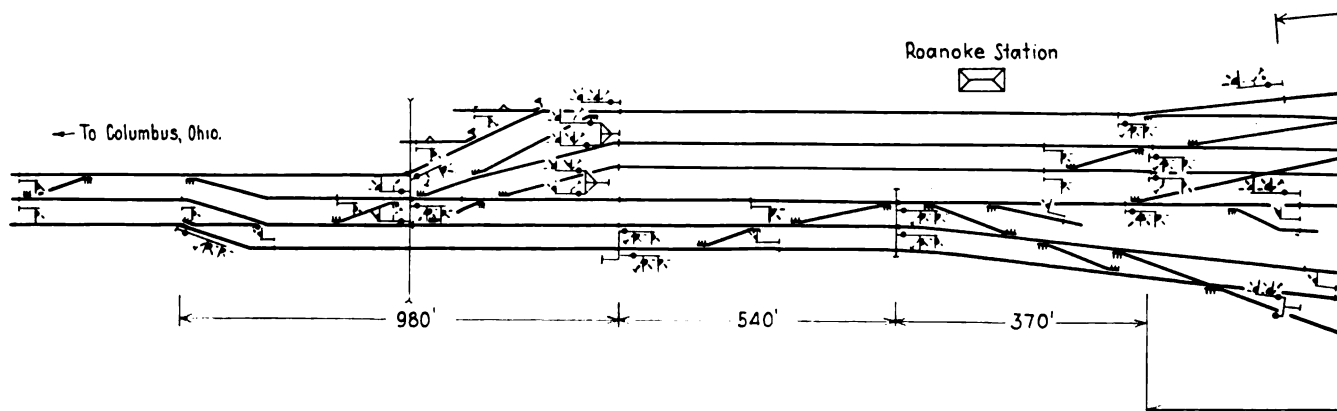
In the center above each switch lever there is a red indication lamp which is lighted when electric locking is in effect to prevent operation

to the operator in quickly determining how the various routes are lined. If a switch is obstructed so that it cannot go all the way over and lock, the red light will flash, and also the lunar white light representing the switch in the track diagram will flash. A green lamp over the normal position of a switch lever is lighted when the switch is normal, and a yellow lamp above the reverse position of the lever repeats the correspond-

ing seven 61-conductor, and one 25-conductor, cables with No. 14 wires, all for controls and indication circuits. Also, there is a two-conductor No. 6 for 110-volt a.c. power distribution.

Cables in Ducts Under Tracks

These cables are underground, in ducts under the tracks, from the basement of the tower to a sheet-metal junction box on the south side



Left half of layout of the tracks and signals in the new electro-pneumatic interlocking at Roanoke

of the corresponding switch even if the lever were thrown. On the track diagram, a lunar white lamp located at each switch or crossover is illuminated when the switch or crossover is in the reverse position. This feature is of considerable advantage

ing position of the switch. On account of the extended area included in this plant, the planning and installation of the wires and cables were major items in the project. For example, going west from the tower, there are eight cables, in-

of the right-of-way. The ducts are 4-in. impregnated fiber, laid in reinforced concrete, 3 in. below, 3 in. above and to the sides of the ducts. There are 16 such ducts in the main run from the tower to the junction box. Westward, from the junction

Gates and flashing-light signals were installed at three crossings in Roanoke as part of construction program



box on the south side of the tracks, the cables are supported in straps from stranded messenger attached to steel posts which serve also as fence posts.

As a part of the new project, electric locks were installed on the hand-throw switches leading to industry spurs, 35 such spurs being located within interlocking home signal limits. Compressed air for the electro-pneumatic switch machines is normally furnished by the motive power department by large shop air compressors. Two standby signal department compressors, rated at 35 cu. ft. per min., driven by 15-h.p. 220-volt a.c. motors, cut in automatically in the event the normal supply drops below 65 lb.

Controls in Five Zones

The control circuits for the plant as a whole are allocated in five zones. Each zone is fed from a separate battery consisting of 8 cells of 240-a.h. lead-acid storage battery.

On the terminal board in the in-

strument room, there is a 10-amp. fuse in each of these 16-volt circuits. Bridged across each fuse is a 10-watt 120-volt lamp. Such a lamp is normally dark, but if the fuse blows, the lamp is lighted, as an indication that the maintainer can readily see when looking for the trouble.

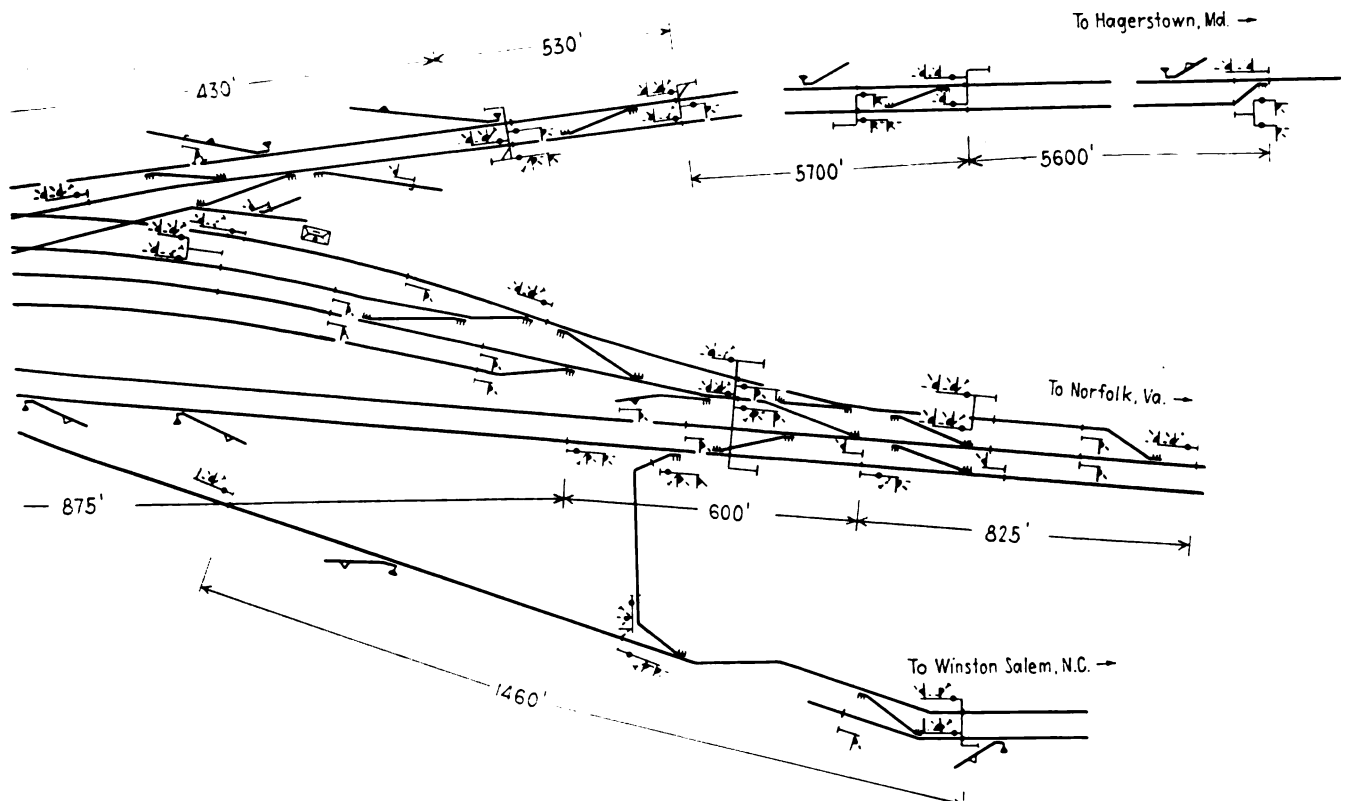
Street Crossing Protection

As part of the construction program, flashing-light signals and crossing gates were installed at three street crossings. This protection at Campbell avenue and Tazewell

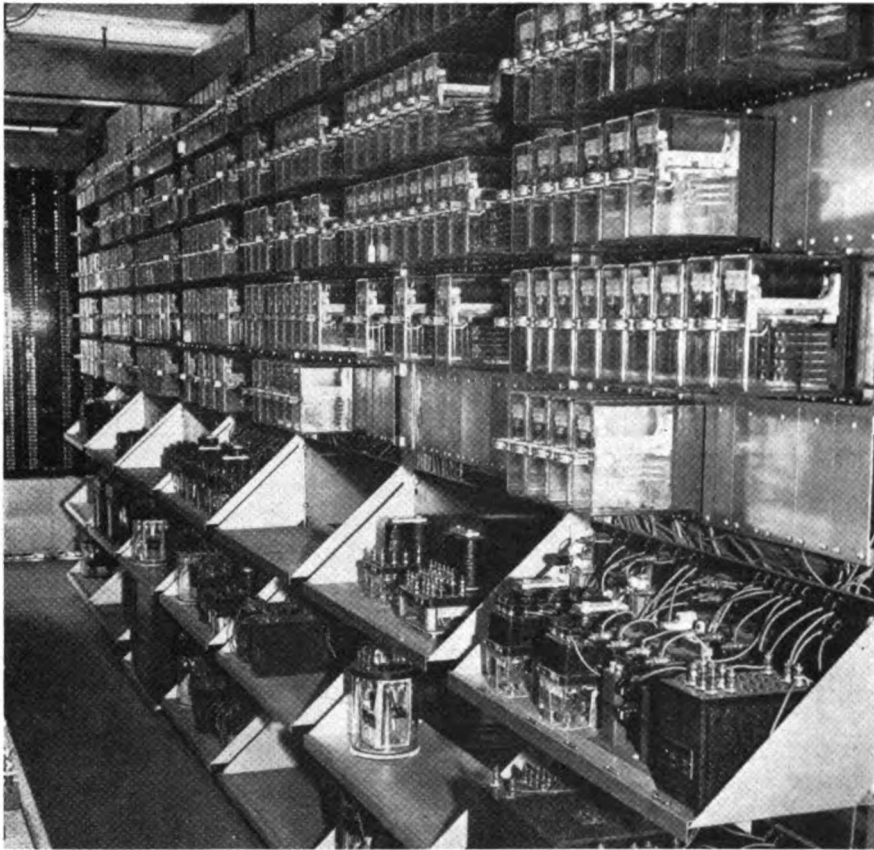
avenue crossings is controlled by a man in a tower located at Tazewell avenue. The flashing signals and gates at Holliday street are controlled automatically by track circuits.

Special Signal

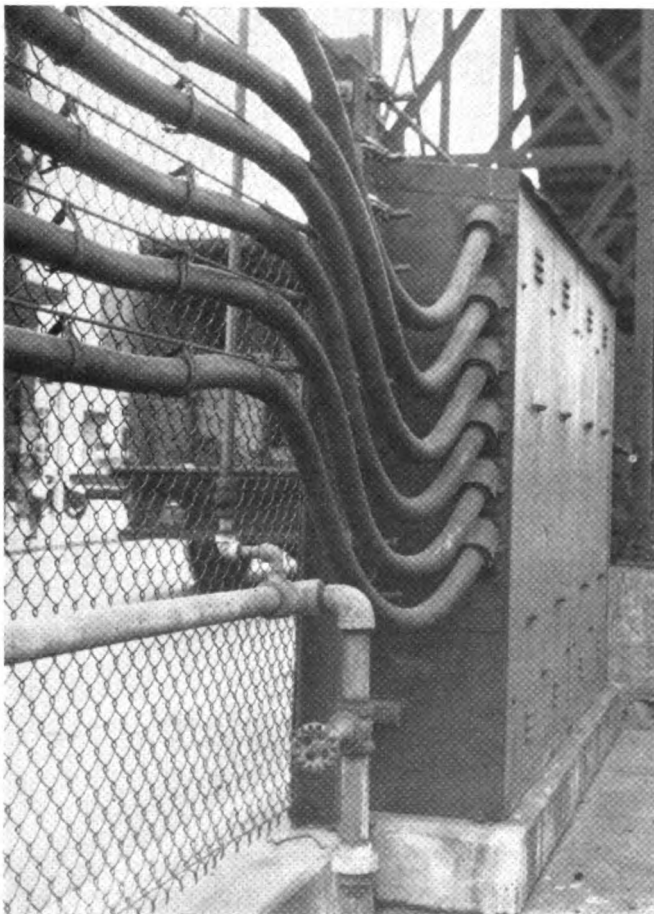
A special signal displays aspects to inform enginemen of approaching trains, that the flashing-light signals are operating, and that the gates are down to protect the crossing which they are approaching. This special signal consists of a lamp including a 75-watt bulb in a Fresnel (barrel type) lens, 8 in. in dia-



Right half of layout of the tracks and signals in the new electro-pneumatic interlocking at Roanoke



The majority of the relays on the ground floor of tower are the plug-in type meter and 8 in. high. This lamp is normally dark, but when mounted 40 ft. above ground on one of the wooden poles of the pole line. The lamp is normally dark, but when both the crossing gates at a crossing are in full lowered position, it is

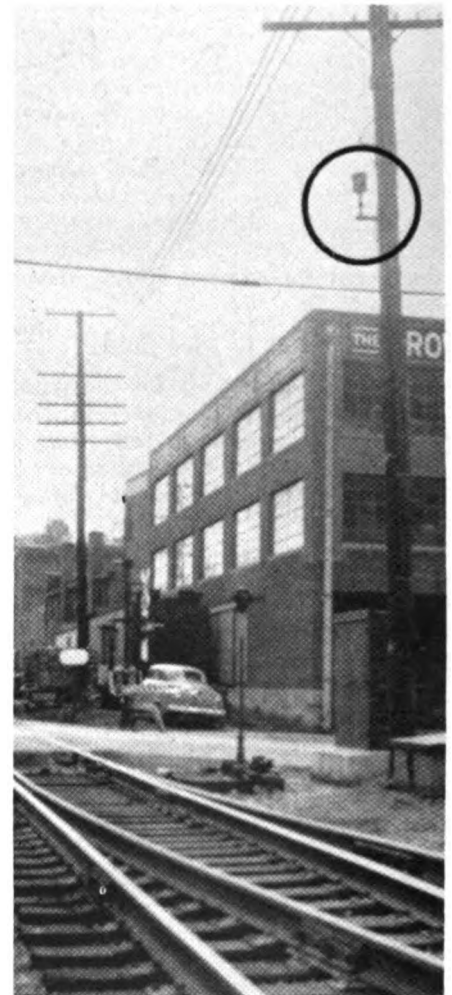


Cables supported in straps from messengers attached to steel posts which also serve as fence posts. View shows cables entering case

lighted to be seen from any angle by enginemen. If this lamp is not lighted when a train is approaching, the engineman is thus warned to reduce speed or stop, as may be required, to provide protection at the crossings. Maximum permissible train speed in this area is 20 m.p.h.

Plug-In Relays

The ground floor of the new interlocking tower is used for housing the relays, rectifiers and other apparatus. Most all the relays are the quick-detachable plug-in type which are mounted on racks as shown in one of the pictures herewith. The wiring between racks and across the



Special signal (encircled) to indicate to enginemen crossing protection is working

aisles is all in sheet-metal chase ways. Solderless connectors were applied on the ends of wires at the terminal boards in junction boxes and in the tower, in the relay racks and in cases, signals and switch machines.

This interlocking was planned and installed by Norfolk and Western forces under the direction of J. A. Beoddy, Superintendent Telegraph and Signals.