New York Central

Installs NX Interlocking at Utica

Modern control replaces 146-lever unit-lever machine which was destroyed by a derailment

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THE electric interlocking at the west end of the passenger station at Utica, N.Y., on the New York Central, was destroyed by a derailment of a freight train on Saturday, February 13, 1943. The derailment was caused by a broken truck side frame on the thirty-first car of a train moving eastward on track 4, which was adjacent to the signal station building. The derailment occurred approximately 1.5 miles west of the signal station but the cars remained in alignment until striking the switches at the interlocking.

The signal station was 15 ft. by 64 ft., of brick and concrete construction up to the window sills on the second story, and of frame construction above. During the derailment, one car was rolled over this building, crushing the interlocking machine and smashing the relay assembly in the lower story.

Location of the Plant

This interlocking controlled the west end of the passenger station layout and the freight yards, the junction between the Mohawk, Adirondack, and St. Lawrence divisions of the New York Central, as well as junctions with branch lines of the New York, Ontario & Western and the Delaware, Lackawanna & Western. The machine was the General Railway Signal Company unit-lever type with 146 working levers for 70 signals, 54 switch machines, 10 movable-point frogs, 2 derails, 3 mechanical locks, and 16 check locks.

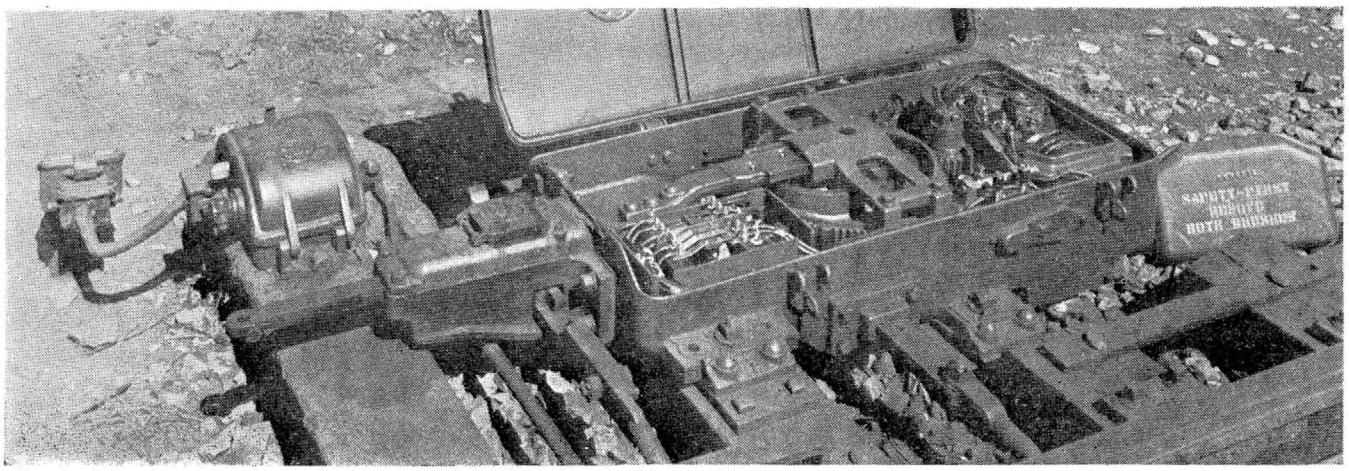
To Keep Trains Moving

The accident occurred after the evening trick maintainer had reported for duty, and before the day maintainer and leader had left. These three men were in the operating room, on the second floor of the signal station, making plans for keeping the switches and signals in operation during the snow storm. As a result of the accident, the evening trick maintainer was killed. The other two maintainers remained on duty, and additional signal help arrived during the night and the next morning. Extra forces from the operating, the track and the signal departments were called. The trains were kept moving the best possible by cranking over the switch motors and then blocking the points.

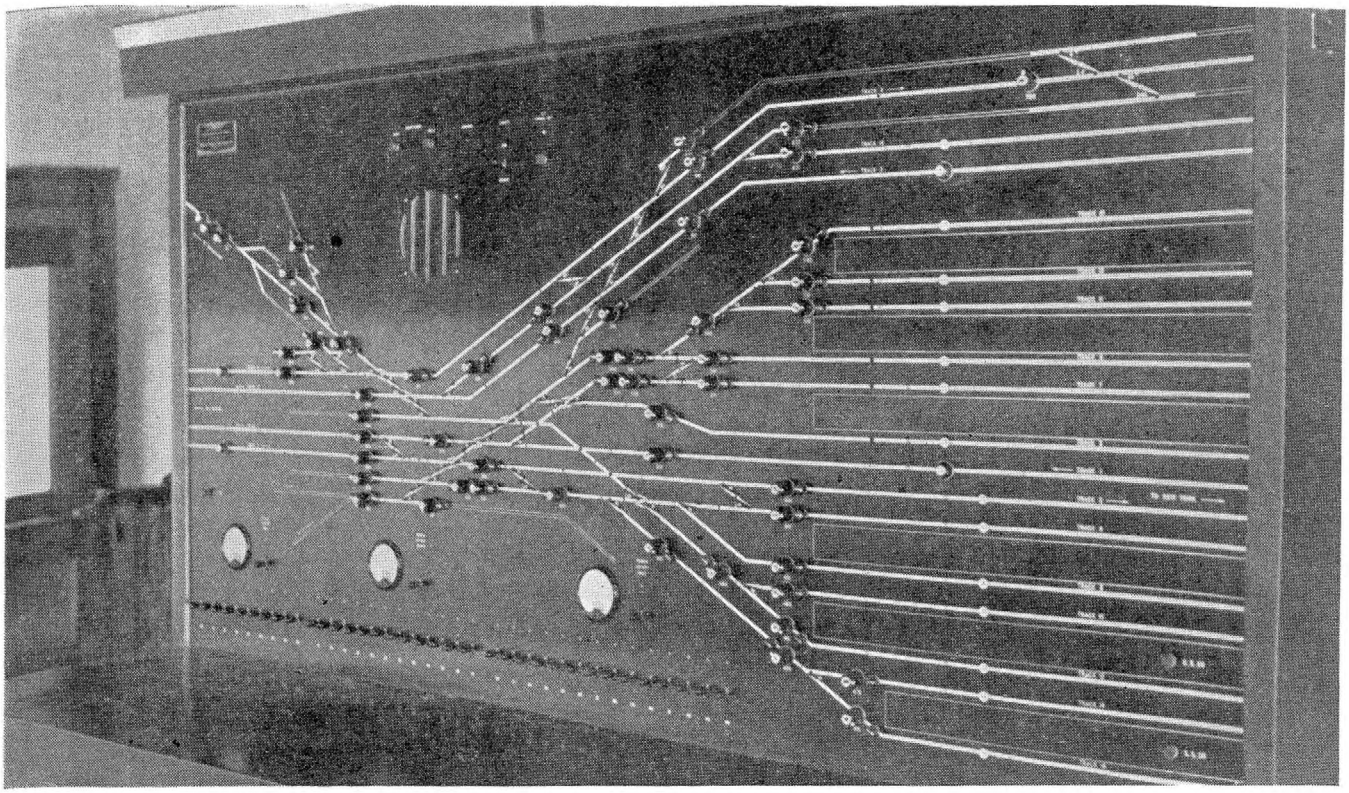
It was snowing and the temperature was above zero at the time of the accident. During the night, the temperature dropped, and by Monday reached 27 degrees below zero. This cold, accompanied by heavy winds, caused considerable hardship to the men who were working continuously outdoors with no shelter. The traffic problem was further complicated by additional switching moves caused by cutting out train equipment which was affected by low temperatures.

Temporary Operating Arrangement

Signal Supervisor, T. V. Ford, who was called from his home at Albany, arrived before 10 p.m. with a scheme for operating the switches from four stations to be established at points on the ground. The maintenance force had a local telephone system in service with an instrument in the leader's headquarters at the undamaged end of the maintenance shop. The trainmaster took over as train director from a desk in this shop, and, as soon



The switch machines were rewired and equipped with new circuit controllers



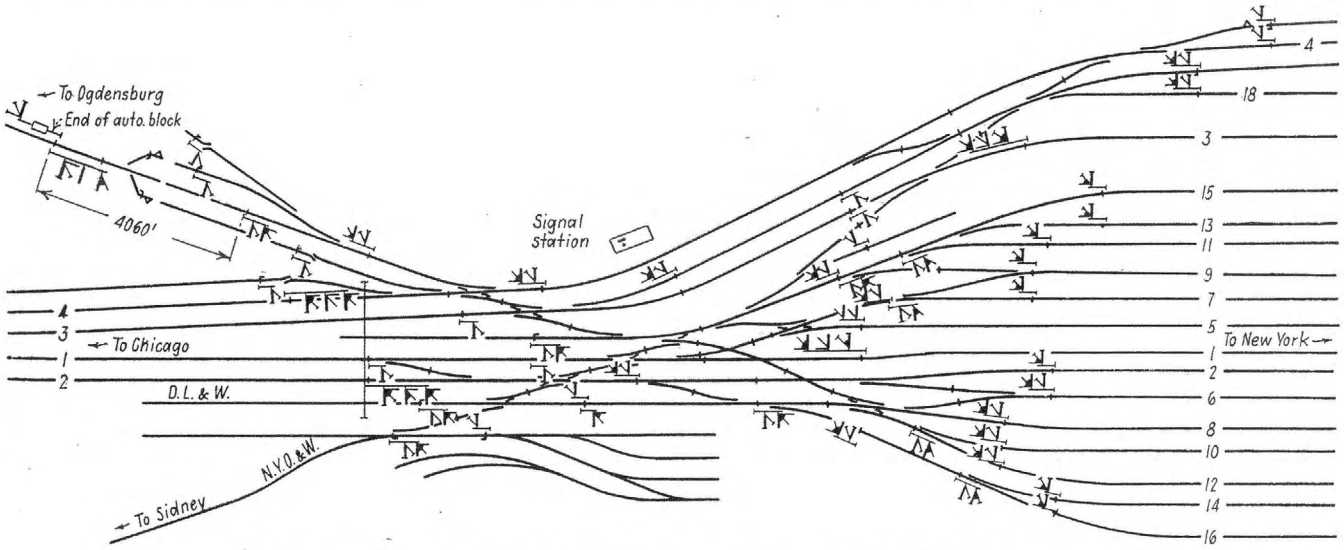
The new interlocking control machine is of the NX type

as the telephone circuits could be bypassed around the demolished building, he was able to communicate direct with the men operating the switches at the four outside stations.

By Sunday morning the drafting room forces had been assembled in the signal engineer's office at Albany, completed until the following Friday. A start was also made on plans for permanent renewal.

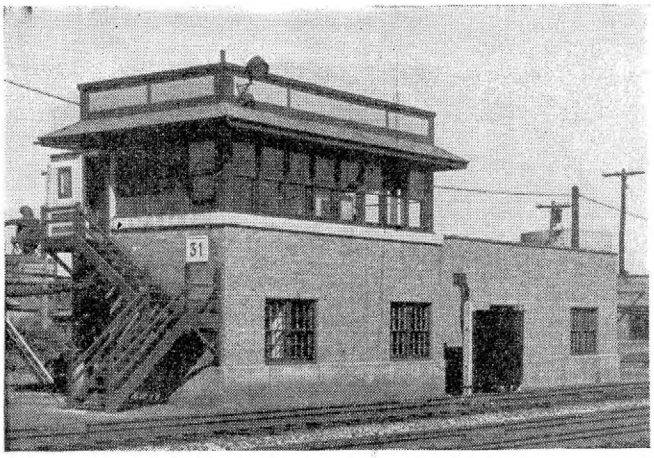
By Monday noon the signal forces were organized into three groups. The local maintenance forces took over the actual operation of the switches on a three trick basis. A second group, consisting largely of inspection and supervising personnel, traced out, connected up and checked the circuits for the temporary signaling. A third group, consisting of such construction men as were available, started recovering wire and units of signal apparatus from the demolished building, clearing the site and getting the foundation work under way for permanent replacements.

By the third day, the weather had moderated slightly, and a start was made on installing head blocks and switch stands on the single switches. When this was completed, it was possible to turn over to the Operating Department for operation by switchmen one of the four ground stations where all of the switch machines had been disconnected. Canvas shelters or gate cabins were furnished as rapidly as practicable for the ground men and loud speakers were connected in on the telephone circuits to expedite instructions for operating switches.



Track and signal plan of the interlocking at the west end of Utica Station

and work was started on circuit plans to provide temporary high signals with track and switch circuit controls for through movements and for movements to and from the principal station tracks. The first plans were issued Sunday night, and each signal was put in operation when ready, although all temporary work was not



As rebuilt, the upper floor of the signal station is only half as long as previously

It was not considered practical under existing conditions to install switch stands and pipe connections for the slip switches and movable point frogs. Quicker and more reliable operation was provided by operating the slips and frogs through the machine motors from the main 110-volt interlocking battery. Knife switches with fuses were placed in the shelters adjacent to the slips. The switch and frog points were held in position by wooden blocks put in place by a track man, checked and, in addition, held by the plunger of the switch machine through the lock rod attached to the front rod of the switch. The signalman, after operating the switches by motor, immediately removed the fuses, then checked the position of the switch before reporting to the director. The fuses were carried in the signalman's pocket at all times except when actually required.

Plans for New Control Machine

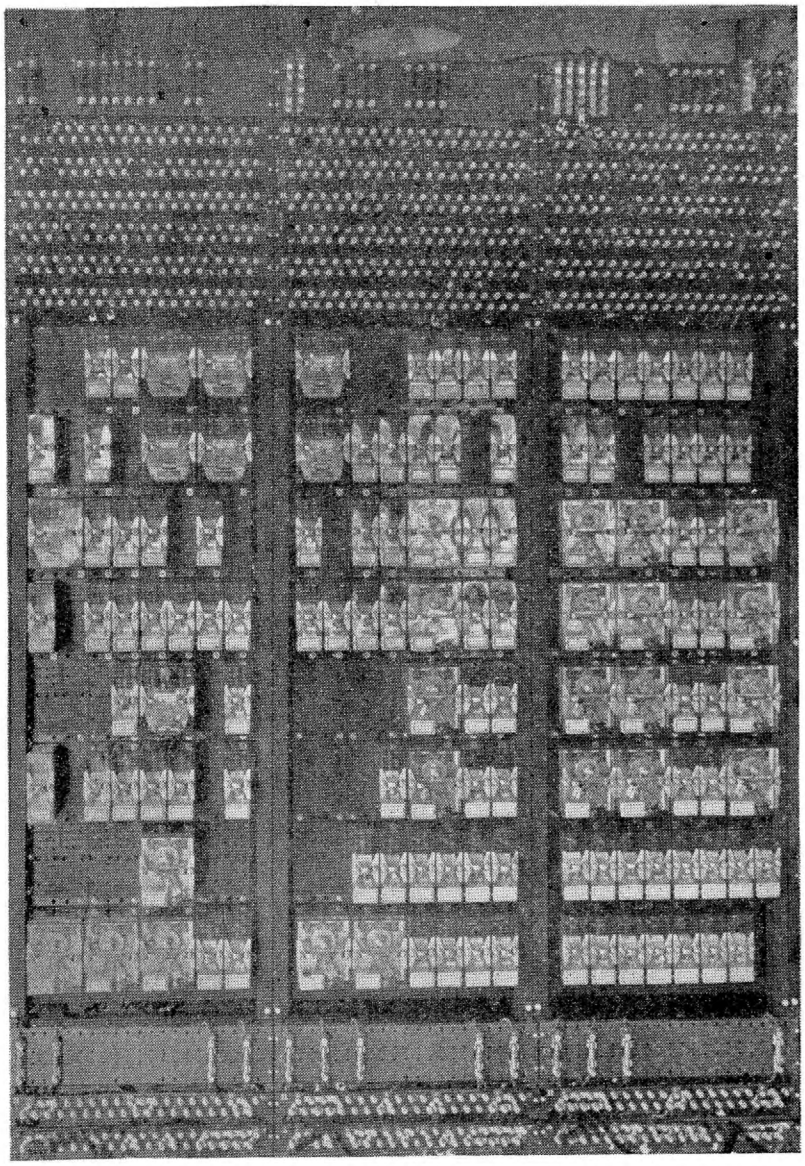
It was determined that a minimum of critical materials would be required by using a model board control machine with Model-B relays. This would also reduce the size of the second floor of the operating building by about one-half.

A study of the track layout in relation to operating requirements determined that two complete double slips could be eliminated and that one other double slip could be changed to a single slip, thereby materially reducing the use of signal materials. The majority of the cable lines and outside wire connections were in good condition and could be reused in their existing positions.

On Monday afternoon, or less than 48 hours after the accident, an order was placed with the manufacturer for the new machine, together with the major relay assembly. It was agreed that the manufacturer would start at once with the standard material, and that plans for the track model would be furnished by the railroad within nine days, and that complete circuit plans would be furnished within 21 days. To do this it was necessary for the railroad signal and engineering drafting room forces to work every day from Sunday, February 14 to Saturday, March 6.

During the period the interlocking plant was out of service, a maintenance renewal program, which had been under way for several months, was progressed. All switch mechanisms were taken out, thoroughly cleaned, cracked cases welded, repainted, and dynamic brakes added. Worn signal mechanisms were replaced.

The signal company proceeded with the shop drawings and secured the materials as rapidly as practicable. Although a major portion of their engineering staff and manufacturing facilities were engaged in war work which could not be set aside, this project was expedited and carried through to completion in accordance with the program. Each part was shipped and installed as soon as ready. The last major item was the operating machine which was completed by the middle of August, immediately transferred to Utica, and was installed, checked and put in service 10 days later. On Sunday, July 25, all parts of the inter-

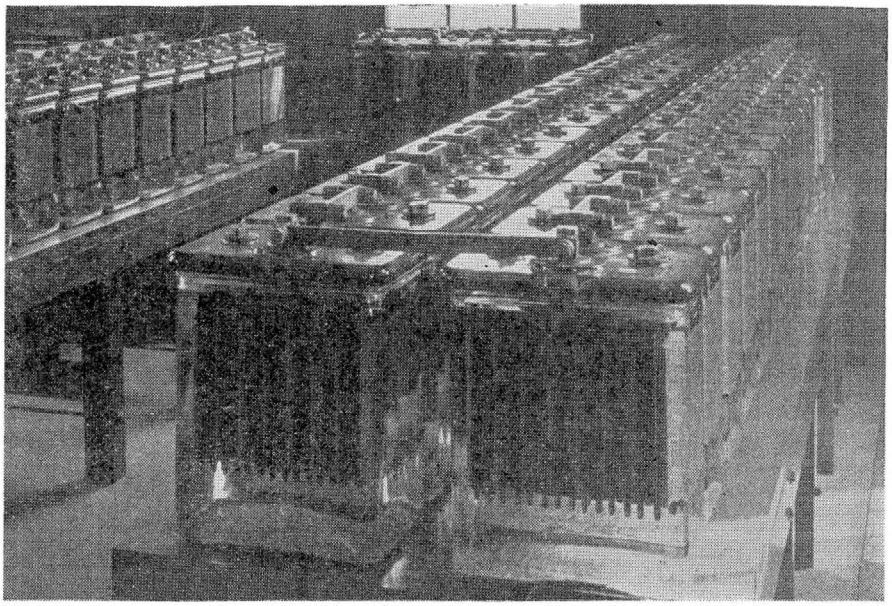


Three typical panels of plug-in type relays

locking were working, and traffic was moving at normal speed by 4:00 p.m. that day. The final service checks and adjustments were completed the following Friday.

NX Type Machine

The new machine is of the type designated by the manufacturer as "Entrance-Exit" or "NX." The control switches and buttons are mounted on the track model. To authorize a train movement, the operator simply presses or turns an entrance button on the lines representing the track where the light indicator shows that a train is approaching or standing, and pushes an exit button on track to which it is desired the movement be made. The proper switches will operate and the signals clear automatically. A push on the "Entrance" knob will initiate a route calling for the top or middle signal unit permitting normal or medium speed, whereas a turn instead of a push on the same knob will initiate a route calling for the bottom unit or restricted speed signal.



The main storage battery includes sixty 280-a.h. Exide lead cells

Initiation and Completion Circuits

Figure 1 shows typical initiation and completion circuits. The suffix "R" in each case is an abbreviation for the word "Relay." The turning of "Entrance" knob 470 to the left will pick up the 470BGZR. Pushing knob 470 will pick up 470GZR, which will stick up through its own front contact and the front contact of the 470TPR and the normal position of 470 entrance knob. With either of these initiation relays picked up and no conflicting route lined up, the exit relay 475XR may then be picked up by pressing 475 exit button, which will stick up through its own front contact as long as 470GZR or 470-BGZR remains up. When 475XR is up, 47WRR, the switch reverse relay, will follow. This relay is a triple coil relay, one coil being for eastward completion circuits, one coil for westward completion circuits and the third coil for test key operation of the switch machine. When the 47WRR

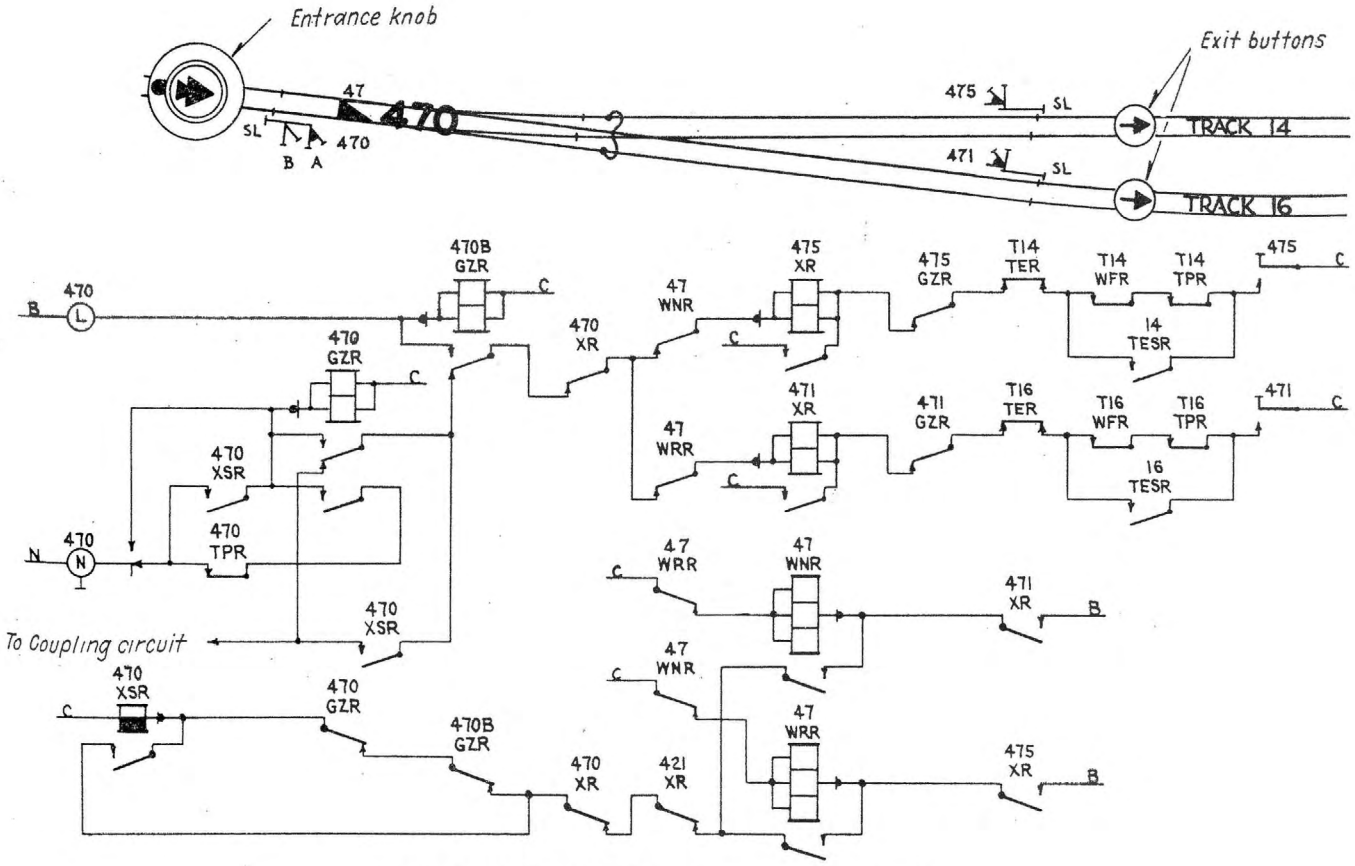


Fig. 1—Eastward initiation and completion circuits

picks up any completion circuit over switch 47 normal will be cut off.

Figure 2 shows switch machine circuits; the switch operating machines are controlled by a compound polar relay, WZPR, located in a

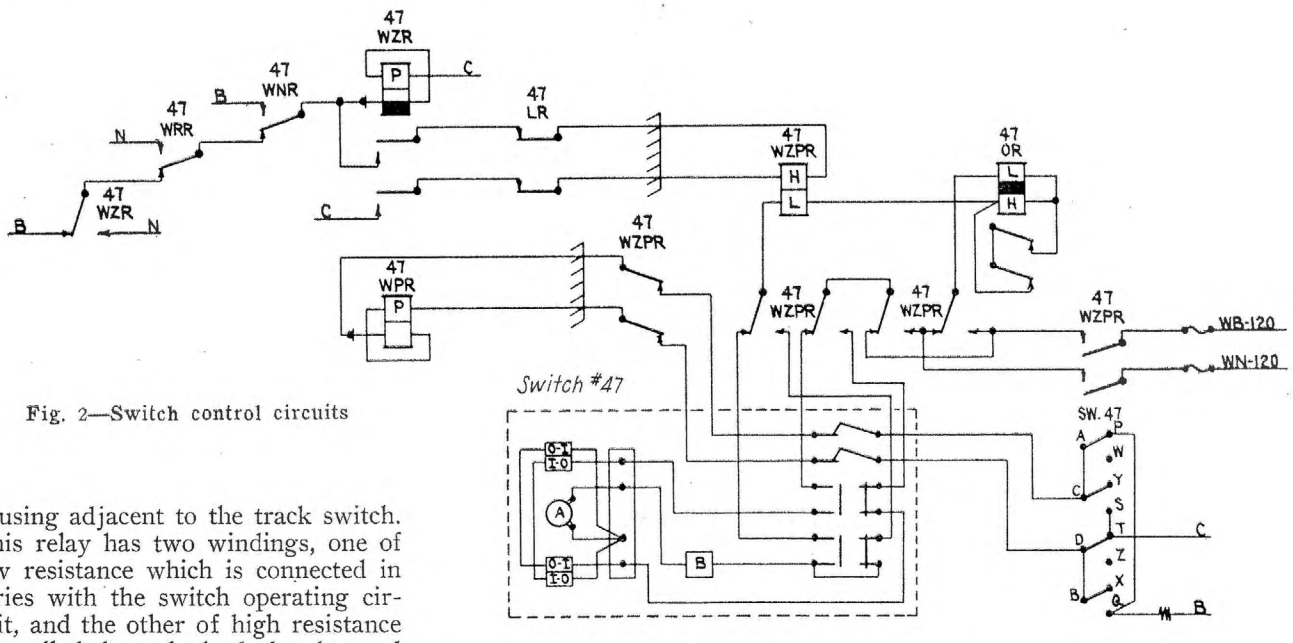


Fig. 2—Switch control circuits

housing adjacent to the track switch. This relay has two windings, one of low resistance which is connected in series with the switch operating circuit, and the other of high resistance controlled through the lock relay and a slow release polar relay shown as WZR. The WZR polar relay takes its position from the WNR or WRR and is held in its last called for position through its own polar contacts. This also keeps the WZPR normally de-energized. When switch 47 is called for reverse, the 47WRR is picked up, energizing 47WZR in the reverse position. If this relay is in the normal position, the reversal of polarity will drive the relay open first, allowing the WZPR to pick up reverse, and supply energy to the switch to operate it reverse. The switch current flowing through the low resistance coil of the WZPR will hold it picked up until the switch has completed its movement. This insures follow-through, once the switch machine has started.

Also inserted in series with the switch circuit is an overload relay shown as 47OR which will cut off switch power if the switch holds up in its operation. The lock relay in the WZPR circuit is controlled through the regular route and approach locking circuits. The WPR switch repeater relay, besides checking the position of the switch, checks the lock rod plunger and checks that power is cut off from the switch machine.

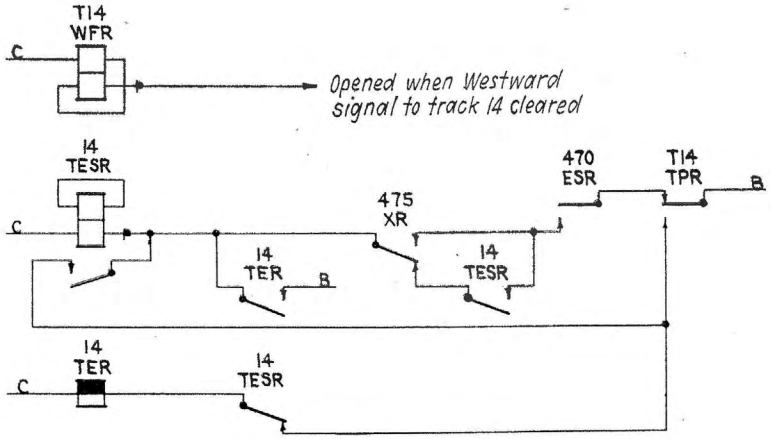


Fig. 3—Direction control circuits

Direction Control Circuits

Figure 3 shows direction control circuits which were installed on all station tracks. These circuits are arranged so that signals can be given for switching both ends of a train simultaneously and also prevent opposing moves when the station track is clear. When a westward signal to a station track at the east end of the station is cleared, T14WFR will open. This will prevent the initiation of any eastward route to that track until such time as the station track has been occupied for a period of three minutes. This time is enforced by the motor time relay 14TER which picks up a stick relay 14TESR and then returns to its normal position. The 14TESR will remain up while the track circuit is occupied. This relay is also picked up when a route to a station track is completed by picking up the 475XR and dropping the route locking relay 470ESR when the track circuit is unoccupied. This permits a following move without waiting for the three minute time to elapse.

Fast Operation of New Machine

The working of the new machine has, with its performance, received general commendation from all concerned. The improvement in train operation is illustrated by the freight interchange. These movements are made between the N.Y.O.&W. or the D.L.&W. tracks on the extreme south of the plant and the N.Y.C. yard on extreme north. With the old machine, such movements were frequently delayed a considerable period when waiting for sufficient gap in through movements on all tracks to operate the individual levers and restore them after the movement. With the new machine, these 22 switches will automatically line up and the signal clear within eight seconds from the time the movement is initiated. Much smaller gaps between trains can thereby be used and valuable time saved.

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N.Y.C. Interlocking

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The major items of signal apparatus for this installation were furnished by the General Railway Signal Company. The installation and circuit plans were prepared by the railroad and the field construction performed by railroad forces. The signal maintenance force was under direct supervision of Assistant Signal Supervisor W. G. Shipman. The circuits for both the temporary and the permanent work were prepared under direction of Circuit Engineer B. E. Brooksby. The field construction and renewal was directed by Assistant Supervisor D. B. Fleming, Jr., and by Foreman H. E. Knapp. The field circuits and signal tests and the service checks after the system was placed in service were made by and under direction of Assistant Engineer J. A. Webb.

This project was particularly notable for the extreme loyalty by the men of all departments. Each man did his best to keep train delays at a minimum. Especially during the unfavorable weather following the accident, continual watch had to be kept for frost bites which frequently appeared on hands or faces.

Accident Caused by Broken Rail

On October 17, 1943, there was a derailment of a passenger train on the Atlantic Coast Line at Bellbluff, Va., which was caused by a broken rail. The following information concerning this accident was abstracted from a report by the Interstate Commerce Commission.

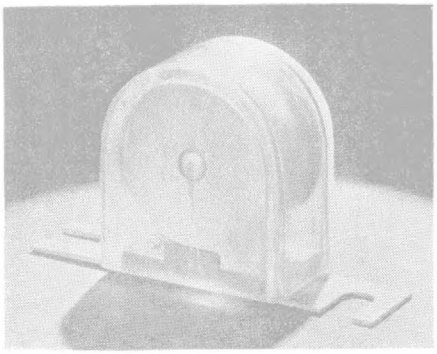
This accident occurred on the northward track of a double-track line equipped with automatic block signaling, signal 80 being located 1,160 ft. south of the point of derailment. A freight train, Extra 1623 North, was stopped by signal 80, because of a Stop-and-Proceed indication, and then moved through the block at a speed of 5 to 8 m.p.h., about 40 minutes before the accident. The crew observed no cause for the restrictive indication and the engineer reported the matter at the first station, and the signal maintainer was called but the derailment to the passenger train occurred before he could start an inspection.

In the meantime, First 76, a northbound passenger train, approached and passed signal 80 which was displaying proceed, and while moving at an estimated speed of 65 to 70 m.p.h., the eighth to the thirteenth cars inclusive were derailed. After the accident a broken rail was found on the west side of the track, this rail being broken into many pieces, 13 of which were recovered.

NEW DEVICES

Lightning Arrester

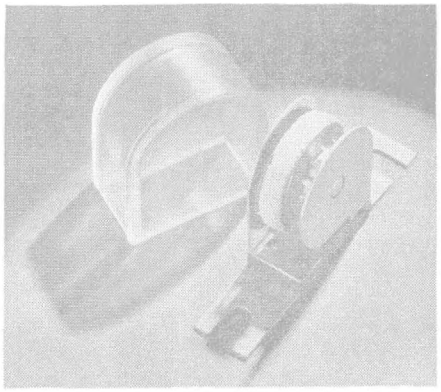
The Westinghouse Electric & Manufacturing Company has developed a new type of lightning arrester for use on signaling circuits, a special feature claimed being that the electrodes of the arrester will not weld together. The arrester can be used on circuits up to 75 volts d-c. or 175 volts a-c. and will handle up to 10,000 amp. of surge current. The arrester was designed to be of reasonable size and limited surge capacity so as to lend itself to mounting on standard Signal Section, A.A.R., terminal blocks. A transparent plastic case permits visual inspection of the gap to determine whether the device is in a satisfactory condition.



Arrester assembled for mounting

Construction of the new device involves an Auto-valve block in series with an air gap, bridged by a Rutile spacer made of titanium dioxide. A surge voltage, initiated by lightning or other means, breaks down the series gap at a consistently low value. This is due to the pre-ionization of the gap surrounding the Rutile spacer. As the surge current is discharged, the valve block throttles off the power follow current and the arrester again becomes an insulator which will withstand more than line voltage.

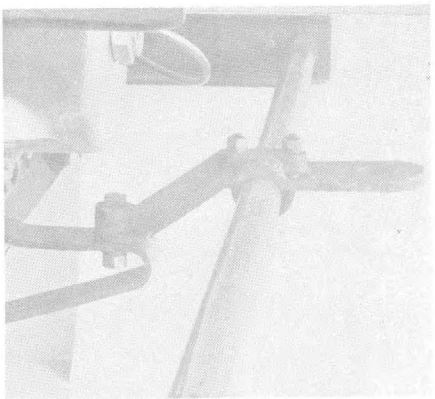
If the arrester is called upon to discharge lightning current beyond its capacity, the Auto-valve block may permanently break down, thus losing its ability to completely cut off power follow current. When this happens, one of the spears on the spear gap will burn away and the circuit will be interrupted. There is not enough metal in the electrode to cause bridging of the gap. Since there are many spears in parallel, the arrester can continue in service and can again flash over. Each time this happens another spear is burned off.



Arrester unit with cover removed

Draw Bars for Motor Car

Fairmont Railway Motors, Inc., Fairmont, Minn., has developed a front-end draw bar for three of its standard large sized motor cars, the S2, Series E, ball bearing engine model; and the S2 Series F and the S2 Series G, roller bearing engine models. The draw bars will fit either the one-speed direct belt-drive cars, or the two-speed gear-driven cars. To install the draw bars on cars requires only the drilling of two holes in the flange of the front cross beam of the frame.



Drawbar applied to car

These draw bars permit the motor car to tow trailer when traveling either forward or backward and eliminate the need for turning the car around when the direction of travel is reversed.