A New York Central Plant in Chicago

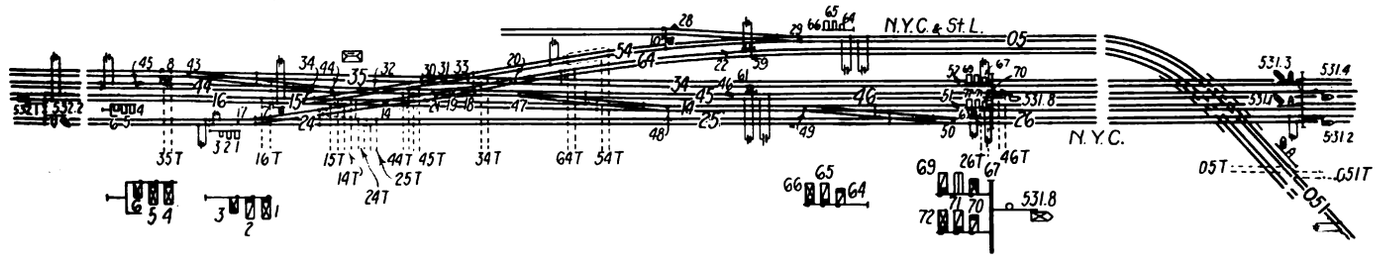
Details of All-Electric Interlocking Controlling an Important Junction with the Nickel Plate

An all-electric interlocking plant has recently been placed in service by the New York Central lines west at 71st street, Chicago. This plant governs a new junction of the four-track main line of the New York Central and the double-track main line of the New York, Chicago & St. Louis, which operates over the tracks of the former company from this junction to the La Salle Street passenger station. This junction is new in the sense that its location has been changed. Prior to the beginning of the track elevation work in this vicinity, the Nickel Plate joined the Lake Shore (now the New York Central) at Grand Crossing, just east of the grade crossing of the Illinois Central with the Lake Shore and the Pennsylvania. In reaching the Lake Shore from the south, the Nickel Plate was forced to cross the Pennsylvania tracks at grade. This complicated set of grade crossings, one of the busiest in the Chicago terminal area, was operated entirely by hand.

Under the track elevation plan, which also provided for a separation of grades between the various roads at Grand Crossing, the Nickel Plate line was carried under the Illinois Central south of the Lake Shore and the Pennsylvania, then under these roads, which are parallel and closely adjacent, and then turning sharply to the west, was brought up to a junction with the New York Central at the grade of the latter. This throws the new junction a considerable distance west of the old. Although the old location had to be abandoned by the Nickel Plate in 1909, it is only within the last four months that it has been possible to use the new location, on account of litigation arising out of the construction work. In the meantime, the Nickel Plate trains have used the tracks of the Chicago, Rock Island & Pacific to reach the La Salle Street station.

The New York Central main line is used by all passenger and freight trains entering the city. The Englewood yard and engine terminal, which is the terminus for all freight runs, is located just west of the limits of this plant. All Nickel Plate passenger trains entering the city use this line. The average daily traffic handled through the plant is about 140 trains. As the high-speed New York Central tracks are on the south side and the Nickel Plate comes up on the north, it is necessary for outbound Nickel Plate trains to cross over three New York Central tracks and inbound trains to cross two tracks. In addition to these movements the layout provides for crossovers between tracks Nos. 1 and 3 and between Nos. 3 and 4, two sets of double-slip switches being provided for this purpose. A complete set of reverse crossovers is also installed. The four home signals on the New York Central and the one on the inbound track of the Nickel Plate have three arms each, one for high speed, one for medium speed and one calling-on arm, although in the case of the westbound slow-speed track No. 3 the middle arm is fixed. Two-arm semi-automatic distant signals are provided for each track, with the exception of No. 4, which is the eastbound slow-speed track, handling only slow-speed movements directly out of the yard.

The new tower is centrally located north of the layout. It is of the standard New York Central concrete block construction with a slate roof. The operating room occupies the second floor, the lavatory, furnace, coal room and instrument room the first floor, and the battery room is located in the basement. The interlocking machine is of the General Railway Signal Company's unit-lever type with closed case, all equipment being either enclosed or attached to the cabinet. It has a 72-lever frame, with 37 working and one spare levers. All levers for dwarf signals and calling-on arms are equipped with mechanical clock-work time releases. The indicator group includes an annunciator, track indicator and stick relay or indicator for the

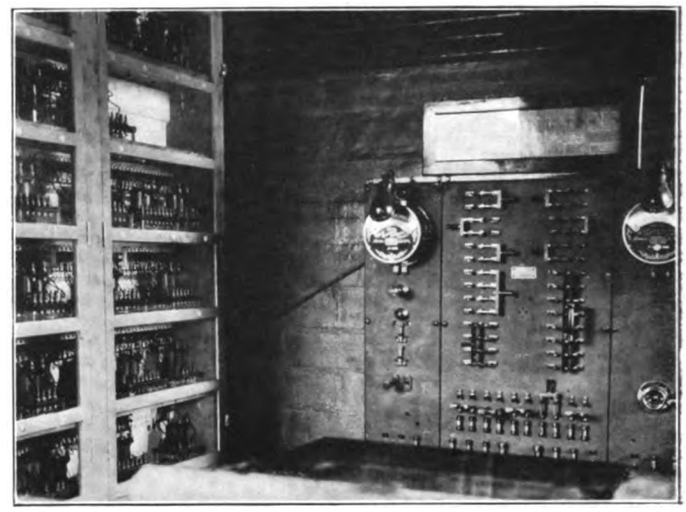


Track and Signal Layout at the Junction of the New York Central, Lines West, and the New York, Chicago & St. Louis at 71st Street, Chicago.

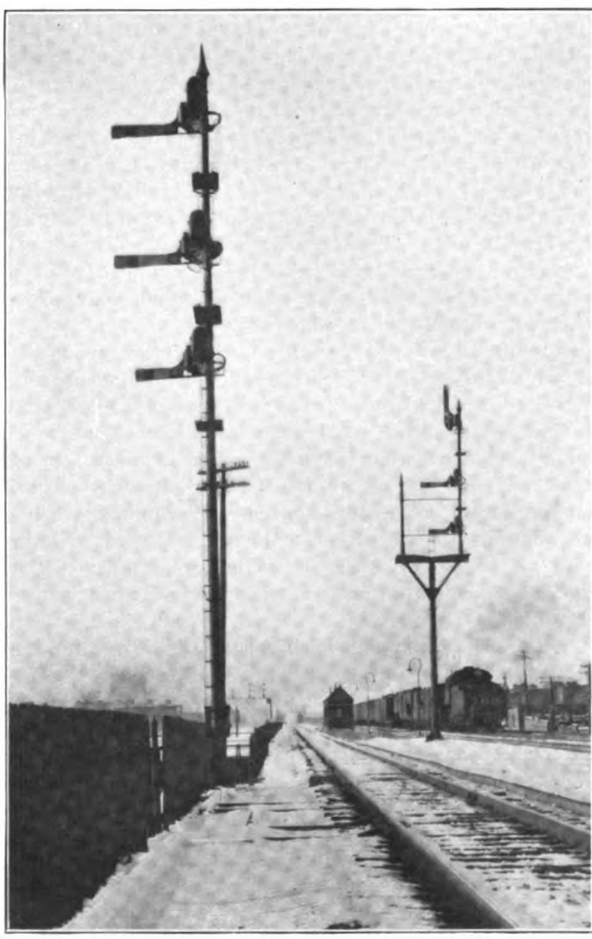
The Concrete Block Tower.

high-speed home signals on tracks 1, 2 and 4, the annunciator being omitted on track 3 on account of its leading directly from the yard. In addition, a track indicator is provided for signal 2, the medium-speed home signal on track 2, and an annunciator and stick indicator for the inbound Nickel Plate track. The operator also has a train describing instrument and a telephone communicating set.

The battery supplying energy for the operation of the plant is of the 120-ampere-hour R. S. A. lead type, 55 cells being used for the operating battery, and two sets of 5 cells each for the low-voltage battery. These cells are all supported on concrete pedestals. The track battery is Edison storage, type B4, 80 ampere-hour, located at the various track sections and housed in wood-lined iron battery boxes. The charging equipment consists of a mercury-arc rectifier with a 20-ampere tube for 110 volts, 60 cycles. The necessary switching arrangement is mounted on one of the three panels of the switchboard in the instrument room. This room also includes a wooden relay case, in which all the relays used in the plant are located. No outside relay locations were required. The current for charging the batteries and for lighting the signals and the tower is purchased from a commercial source. An a. c. relay is so connected in the signal lighting circuit that a failure of the source will connect the lights to the storage battery temporarily.

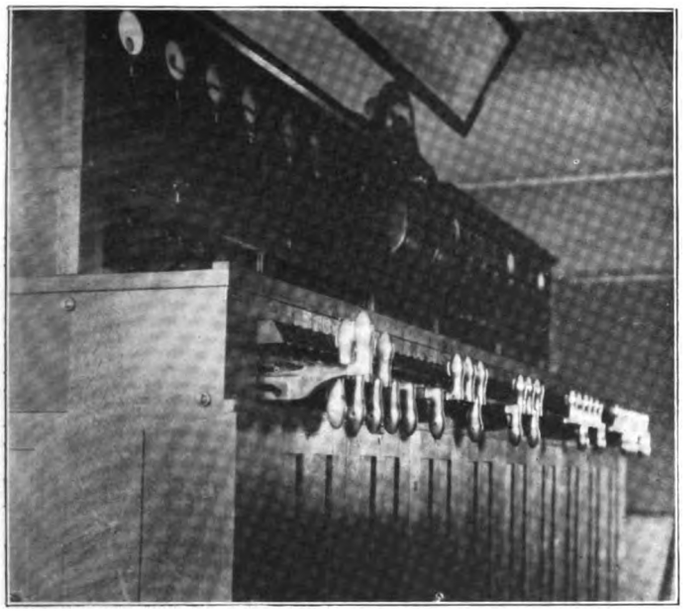


Interior of the Instrument Room, Showing a Portion of the Relay Case and the Switchboard Installation.



The Two Eastbound Home Signal Locations.

The Double Cantilever Bridge Supporting the Eastbound Distant Signal.

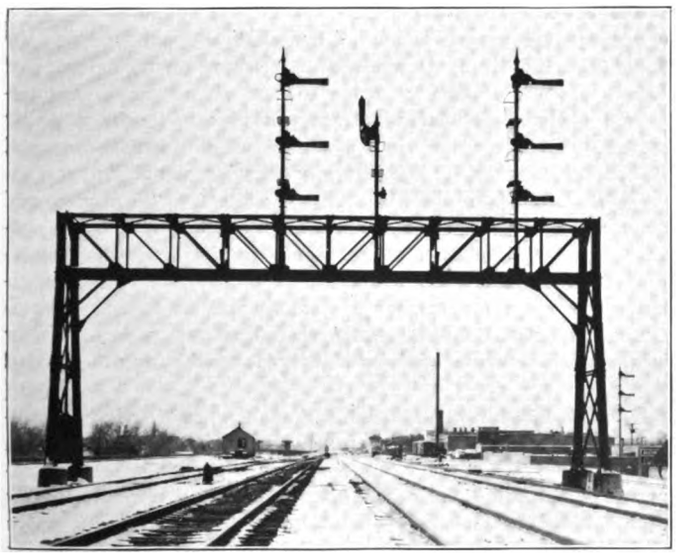


A Portion of the Operating Room, Showing the Machine and Indicator Cabinet.

When the source of current fails a green pilot lamp on the interlocking machine is put out, warning the towerman to notify the maintainer.

The circuits are distributed from the tower in built-up sectional trunking supported on 3-in. by 4-in. concrete stakes with standard trunking carriers. The operating circuits for all switch machines are carried to the function in three conductor cables, giving each function an individual return wire to the machine. The connections to the distant signals are carried in the underground conduit which was laid at the time of the elevation of the tracks to carry all telephone, telegraph, power and signal wires through the terminal area.

All switch machines are of the G. R. S. model 4A and all signals have model 2A mechanisms. No detector bars are used, the plant being equipped with approach, route and sectional electric locking for normal and reverse movements. The signals are electrically lighted with two 10-watt lamps burning in multiple. Split-point derails are used throughout, with the exception of one siding on the Nickel Plate. The westbound home and distant signals on the New York Central are located on four-track bridges, the westbound home and distant on the Nickel Plate and the eastbound home for New York Central track No. 2 are located on single masts, a bracket-arm mast is used for the home signal for track No. 4 and a special type of support is used for the distant signal on track 1 and the automatic signal for track 2 at the extreme west end of the plant. On account of the proximity of the yard tracks on the north, it was not feasible to use a bridge spanning the main tracks, and the wide spacing between tracks 2 and 1, providing for a platform at a suburban station, made it possible to locate a sufficiently wide supporting structure between these tracks to carry cantilever arms extending out over the two tracks. In this way it was possible to locate the signals directly over the tracks which they govern.



Westbound Home Signal Bridge, Showing Nickel Plate Home Signal at Extreme Right.

This interlocking was installed by Supervisor T. E. Kirkpatrick's forces under the direction of F. B. Wiegand, signal engineer. We are indebted for information and courtesies in connection with the preparation of the above description to G. E. Beck, chief signal inspector, and William Dawson, assistant supervisor of signals.

CIRCUIT DESIGN OF TROLLEY CONTACTOR SIGNALS*

BY CARL P. NACHOD.

The ideal safety requirement for contactor block signals is that an accident to the line or signal apparatus should result in the display of the stop signal. In general, however, safety is a relative rather than an absolute term. All circuits, whether track or contactor, can be rendered unsafe by the proper "crosses," including under crosses the application of a foreign current. The highest safety is attained when the probability of such crosses or combinations of crosses is the least.

Trolley contact signal circuits should be normally closed with the current continuously flowing in the "hold-clear" circuit to hold up an armature acting against gravity, the front contact of the armature closing the circuit to display the proceed indication, and the back contact the stop indication. As shown in Fig. 1, which is a circuit of this type, a break or grounding of the line wire or a short or open circuit in the hold-clear relay will result in the display of the stop signal.

In signals operated by the relatively high voltage of the trolley line, usually having the negative side grounded, the circuits should be rendered safe against a dangerous condition produced by the accidental grounding of the line wires, since this is more likely than a cross with the opposite polarity. The possibility of a dangerous condition arising through a cross with positive must still remain, though it is remote, since it is not possible to guard against crosses with both polarities. In Fig. 1, a ground on the line wire will display the stop signal and prevent the armature from picking up to display the proceed signal. If, however, as in Fig. 3, the polarity of the line wire is reversed, grounding of the line will cause the relay to pick up and display a clear signal.

The main object to be attained with trolley contact signals applied to single-track facing protection is to assure that the stop signal has been given against an opposing movement when the running signal clears up for the car to enter the block. There are two methods of doing this. In one, shown in Fig. 4, the lights are in series with each other, the two signals being given simultaneously. This may be called the branched series system and is not normally energized. If the light for the opposing movement is burnt out or open circuited the proceed light could not be given, but if the opposing light is extinguished by shunting or short circuiting, as through a cross, the proceed signal could still be given, which would, of course, result in a dangerous condition.

This circuit is sometimes substituted for the normally energized circuit of Fig. 1, in which the circuit of the hold-clear relay in the opposing signal is opened by the entering car, permitting the opposing signal to go to stop by the droppng of its armature, thus removing the local green light and lighting the local red.

*From a paper prepared for the Joint Committee on Block Signals of the A. E. R. A.