

Semi-Automatic Gates on the Milwaukee

Installation, including flashing lights and bells, is operated automatically by through train movements and manually for switching movements on any track

AN INTERESTING installation of crossing protection has recently been completed by the Chicago, Milwaukee, St. Paul & Pacific on the Chicago Terminal division at Narragansett avenue in Chicago. Two main passenger tracks, two freight mains, and eight yard tracks are involved. Railroad traffic includes 42 passenger trains and 25 to 30 freight movements daily, as well as numerous switching movements. The yard tracks involved at this crossing constitute a portion of the Milwaukee's Galewood yard, which handles the make-up of transfer trains and the routing of cars to freight houses and storage tracks in the city of Chicago.

Narragansett avenue is a heavily traveled street, crossing the Milwaukee tracks at right angles. In addition to normal highway traffic, regularly scheduled trolley buses of the Chicago Surface Lines are routed over the crossing. The trolley buses are operated on schedule about every 15 minutes in each direction through-

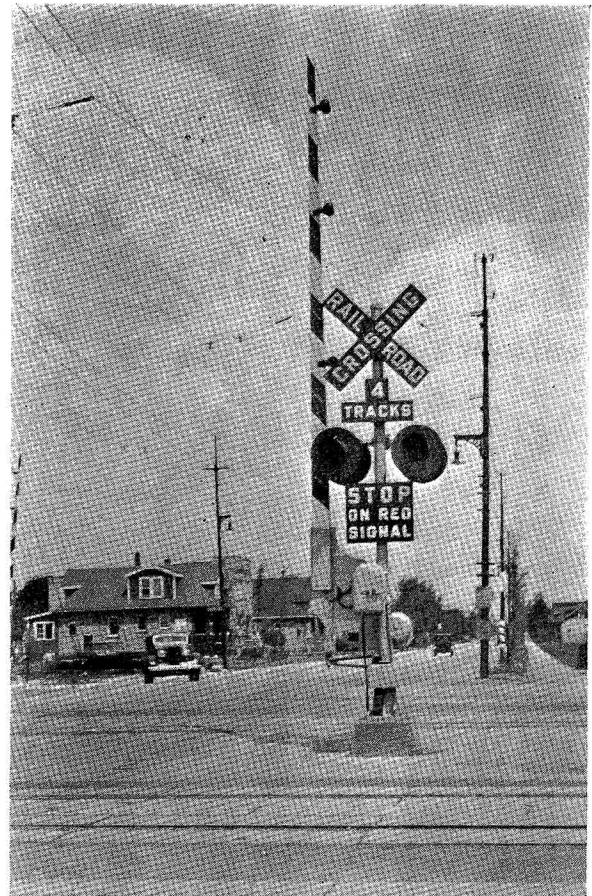
out the major portion of the day. This interval is reduced to about 10 minutes during rush hours in the morning and evening.

Prior to the recent installation, the railroad employed one watchman for each of three tricks at each side of the crossing, and the Chicago Surface Lines employed one man on each trick. Highway protection now includes short-arm gates, flashing lights, bells, and watchmen. In addition, special two-position dwarf signals, interlocked with the crossing protection controls, are provided to govern train movements over the crossing on four freight tracks.

Protective Devices

The railroad tracks in this vicinity extend approximately east and west, while the highway extends north and south. The two passenger mains are on the extreme north, with the two freight mains immediately to the south, as indicated in the accompanying diagram of the crossing layout. South of the two freight mains are the six yard tracks and two additional freight mains. Short-arm crossing gates, each with a single set of flashing-light signals and a bell, are located at the right of the highway,

which is 40 ft. wide, in approach to the crossing for highway traffic in either direction. In addition, an extra short gate arm and a double set of flashing lights, mounted back to back, are provided on the right of the highway to approaching northbound traffic, just south of the westbound freight main, between this freight main and the yard track adjacent on the south. This center gate is operated only when train movements are being made on the two passenger or two northerly freight mains. The gate arms are 18 ft. long. Three lamps are used on each gate arm. One lamp is located approximately 2 ft. from the tip of the gate. The spacing between this lamp and the center lamp is 3½ ft., while the third is located about 5 ft. from the center lamp and about 4 ft. from the curb line. Ten-volt, 18-watt bulbs are used in the gate lamps, as well as in the flashing-light signals. An extra set of flashing lights is located at the left of the pavement on the south side of the track. The purpose of this extra set of lights is to provide protection in case a bus or truck obscures the view of the gate and signals at the right. Two watchmen's shelters are provided, one north and one south of the crossing, on the right to ap-



View looking north showing northward gate between the yard tracks and the main line

proaching highway traffic. A watchman is on duty in each house, this protection being provided 24 hours a day. The special dwarf signals for governing freight train and switching movements are provided for the eastbound and westbound freight mains and for the two yard tracks on the extreme south.

Automatic Control for Passenger Tracks

The control is automatic on the two passenger main tracks, protection being given for both directions on each track by the use of interlocking

crossing track circuits are provided on the two passenger mains. While these circuits are occupied, all control circuits to the gates are broken and the gates remain down.

Manual Control System

In addition to the automatic control installed on the passenger tracks, a comprehensive system of manual control is provided for train movements on the other tracks. A small sheet-steel control box is located in the watchman's shelter north of the tracks. This might be termed a "master" control box. Mounted on the

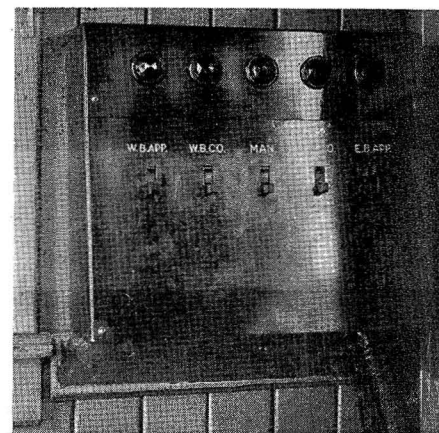
to the fact that the toggle switch is in the cut-out position. Restoration of the toggle switch again cuts out the bell and restores the circuits to normal. The two toggle switches on either side of the center are used for cutting around the westbound and eastbound passenger track interlocking relay contacts in the control of the master crossing relay. The lamp above each of these toggle switches is illuminated red when these switches are reversed and protection is cut out. The center toggle switch provides direct manual control of the crossing protection. The lamp immediately above the manual control



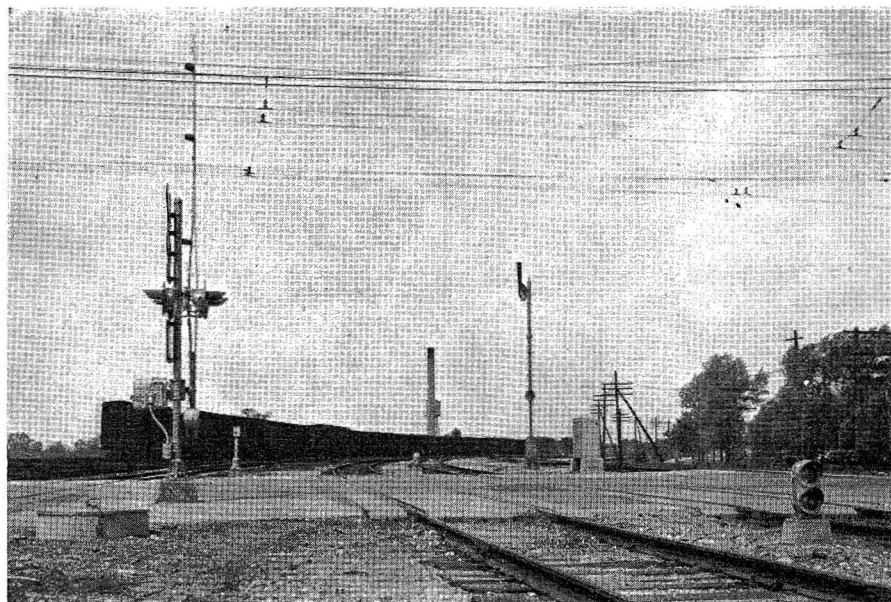
Plan showing location of the gates, the signals, and the control sections

relays controlled by track circuits. On the eastward main the approach is 2,886 ft. for normal direction and 2,595 ft. for reverse direction; on the westward main, 2,595 ft. for normal direction and 2,995 ft. for reverse direction. Annunciators are installed for the benefit of the crossing watchmen. They operate only for trains approaching the crossing on the passenger tracks. The approach control circuits provide a minimum of 30 seconds of protection before the arrival at the crossing of a train traveling 60 m.p.h. This warning time includes 5 seconds of pre-warning, during which only the bells and flashing-light signals operate, approximately 10 seconds while the gates are being lowered, and 15 seconds during which full protection is given by bells, flashing lights and gates. Separate

panel are five indication lights and below them five toggle switches. Two of the lights, one on the extreme right and one on the extreme left, are approach-indicating lights for the main passenger tracks; when a train enters an annunciator circuit the proper indicating lamp is illuminated red and an annunciator sounds. The toggle switches immediately below these lamps are used for cutting out the annunciator bells. The circuits are arranged so that each annunciator bell cuts in again as soon as the annunciator relay is re-energized, thus calling the switchman's attention



Master control cabinet in watchman's shelter on north side of tracks

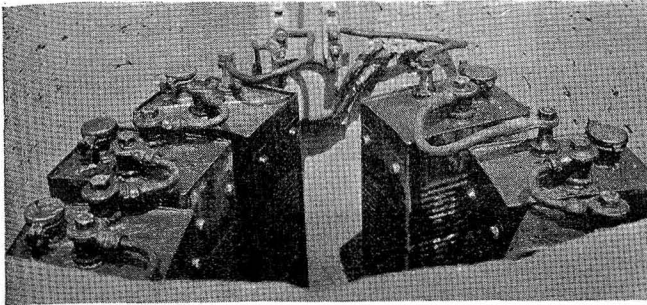


View looking west showing dwarf signal on freight track which displays stop aspect when gates are in the raised position

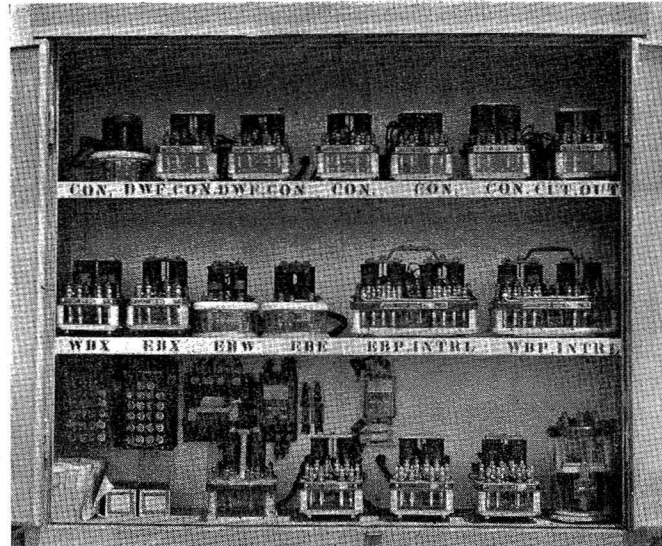
switch is illuminated green and is flashed by the crossing flasher relay when protection is effected for the crossing.

Lamps and toggle switches, for approach indication on the passenger tracks and bell cut-out, respectively, are provided also at the watchman's shelter south of the tracks. In addition, a quick-acting double-pole toggle switch is provided at this lo-

cation, which, when operated, de-energizes the master crossing relay, causing normal protective action by the gates, bells and flashing lights north and south of the crossing. At the same time, the quick-acting and double-pole features are utilized to pick up a normally-de-energized center-gate cut-out relay, which prevents operation of the gate and flashing lights located between the yard tracks and the westbound freight main. This toggle switch is operated when protection is to be effected for the yard tracks only. The cut-out feature for



A welded sheet-metal case west of the crossing houses the relays and other instruments.



The standby storage battery for operation of the gates is housed in a concrete tub.

the center gate prevents highway traffic from being stopped on the yard tracks when protection is to be provided for train movements over these tracks.

In order to further simplify manual operation, another set of controls is mounted in a cast-iron pedestal-mounted box located between the west-bound freight main and the yard tracks, on the opposite side of the highway from the center gate installation. The box is locked with a switch lock. Trainmen may provide protection for yard movements by operation of a quick-acting toggle switch, similar to the one in the shelter south of the tracks (the same type of protection being given), or protection may be established by trainmen for the main freight or passenger tracks by operation of a different (manual) toggle switch, in which case all protective devices, including the center gate and flashing lights, operate.

The manual control switch in the north shelter, the manual toggle switch at the center control station, and the two quick-acting toggle switches, one at the center control

station and one at the south shelter, are all connected in series so that all must be in the normal position before the gates can be raised.

Control for Yard Tracks

For movements on the two main freight tracks and on the two yard tracks on the south, which are not equipped with track circuits, control is in all cases manual. These tracks are each equipped with a dwarf signal which normally displays red as long as the gates are clear; when the gates are lowered each of these signals displays green for a caution-proceed aspect. On the six intermediate yard tracks no track circuits are used. When trains are using these tracks, the gates are controlled manually. Rules require that no train or switch movement on these tracks is to proceed over the crossing without first having stopped and received a proceed hand signal from the watchman.

In all cases when a trolley bus approaches, one of the flagmen must go out on the crossing, observe whether trains are approaching, and give a hand signal. The watchmen and the manual-control arrangement are necessary not only for the protection of the trolley buses but also because the numerous switching movements on the yard tracks made it impracticable to use track circuit control.

The main battery for the operation of the gates includes 9 cells of Edison storage battery Type A10HW, rated at 300 a.h. This battery is charged by an RX-42 rectifier. Each track circuit is fed by three cells of Edison 500-a.h. primary battery. The relays, rectifiers, etc., are located in a sheet-metal case as shown in one of the illustrations. All of these relays are Union DN-11E13 type. On account of the heavy lamp load, two W-10 transformers are used. The flashing-light signals and the gate equipment were furnished by the Western Railroad Supply Company.

This installation was designed and installed by the signal department forces of the Milwaukee, under the direction of L. B. Porter, superintendent of telegraph and signals.

View looking north showing gate in lowered position. Note extra set of flashing-light signals at left of pavement.

