

Southbound passenger train at the crossing with short-arm gate across right-hand section of the paved highway

Automatic Gates on the Illinois Central

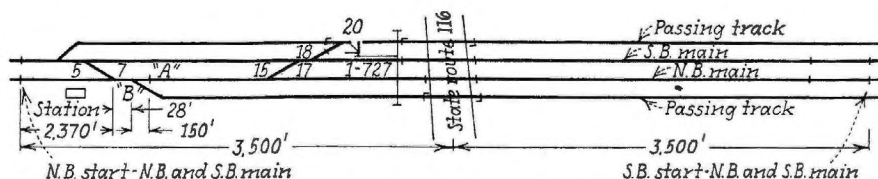
Controls include automatic and manual cut outs used during crossover and switching moves in station area

FLASHING-LIGHT signals, supplemented by short-arm gates, controlled automatically, have been installed to protect a crossing of state highway No. 116 with the Illinois Central near Ashkum, Ill. This highway extends east and west across the state of Illinois. Ashkum is located 73 miles south of Chicago, on the main line of the Illinois Central between Chicago and points south. In addition to the two main tracks, the crossing extends over two sidings, one on each side of the main line at about 16-ft. centers.

Previously this crossing was protected by standard reflectorized cross-buck warning signs. As a part of the program of the State of Illinois to improve highway safety, financed by Federal Government funds, the installation of automatic protection was authorized. Gates were provided in addition to flashing-light signals in accordance with the policy of the Bureau of Public Roads, to the effect that gates should be used at crossings of tracks where high-speed trains are

operated, especially on multiple-track lines. The daily traffic over this crossing includes 20 scheduled passenger trains and 17 freight trains, and several extra freights are operated as required. The tracks in this vicinity are practically level and tangent. The speed of freight trains is about 50 m.p.h., that of steam passenger trains up to 80 m.p.h., and the diesel-electric

950, constructed in accordance with the requirements of the State of Illinois. An 8-in. Mangin mirror reflector is used, the purpose of which is to produce exactly parallel rays of light from the mirror to the roundel, thereby producing an exceptionally effective, intense and accurate beam of light. The red roundel or cover glass is 8 in. in diameter, of which



Track plan of special control sections

Green Diamond is scheduled at 90 m.p.h., but, when late, runs up to 100 m.p.h. in this territory.

Signals and Gates

The flashing-light signals, reflectorized signs and gates are constructed and assembled in accordance with the Signal Section, A.A.R. standards, as shown in the illustrations. As an audible warning, a 12-in. d-c. bell is located on the top of the mast of the signal on the west side of the tracks. The flashing-light units are the Western Railroad Supply Company Type

7¾ in. is effective. Thirty-degree spread lenses are used. The lamps are rated at 10 volts, 18 watts. The signals have lamp units mounted back-to-back.

The gates are the Western Railroad Supply Company Model-10, using General Railway Signal Company Model 2A d-c. mechanisms, adapted for gate service. The centers of the gate masts are 15 ft. from the nearest rail and 6 ft. from the edge of the pavement. The pavement is only 18 ft. wide, and the length of gate arm is such as to locate the tip at the center of the paving.

Each arm is equipped with three lamps equally spaced over the traffic lane. The lamp near the tip end burns steadily from the time the gate starts down until it returns to the vertical position, while the other two are flashed alternately in synchronism with the flashing-light signals. The gate lamp bodies, of cylindrical shape, are made of sheet aluminum, and each lamp weighs only $1\frac{3}{4}$ lb., thus reducing the load on the gate arm. A red, 30-deg. spread lens, 3- $\frac{1}{3}$ in. in diameter, is used in each end of each gate lamp; the lenses are spaced $4\frac{1}{2}$ in., this being twice the $2\frac{1}{4}$ in. focal distance, so that the S-11, 10-volt, 18-watt lamp is at the exact focal point of both lenses.

Sequence of Operation

When a train enters an approach control section, the bell rings and the flashing-light signals operate for a period of 4.5 sec. as a pre-warning, and then the gates are released and lower to a position across the highway in a period of about 13 to 15 sec. The operation of the gates, when being lowered, is retarded in order to allow an automobile, closely approaching, adequate time to clear the gates before the arm obstructs the path of the vehicle.

When the gates are down, the bell ceases to ring. The gate lamps are operated from the time the gate lowers below 88 deg. When the rear of the train clears the crossing, the operation of the flashing-light and gate arm lamps ceases after the gates are raised. This control feature is used to provide warning lamps until the gate arm is entirely clear of the highway, and also to provide a warning if the gate fails to operate from the lowered to the raised position. The gates are raised in about 6 sec., the purpose being to clear the highway as quickly as practicable.

Control Arrangements

Approach track sections for the automatic control of the signals and gates are provided for either-direction operation on each of the two main tracks, these sections being long enough to provide a minimum of 25 sec. warning prior to the arrival of a train at the crossing when the train speed is 100 m.p.h.

On each of the four tracks, there is a separate track circuit over the crossing, and, when any of these track circuits are occupied, the signals continue to operate and the gates remain in the lowered position. This arrangement insures that the protection is in full operation until the rear of a train clears the crossing. For main-line

moves, interlocking relays are used to effect the cut-out control when a train is receding from the crossing. The diagram shows the two sidings, one on each side of the main tracks, at the crossing, as well as the turnout switches and crossovers between the crossing and the Ashkum station.

Time Control

When the gates are lowered for a northbound train movement on the northward main track, and the train stops at the station, short of point A, the gates will be raised after a period of 90 sec., and will not be lowered again until the front of the train passes point A. If such a train stopped to enter the northward siding at switch B, the control of the crossing protection would be cut out and the gates raised, after the northward approach was occupied 90 sec. or until the train cleared the main line and the switch was placed normal. If such a northbound train is to use crossover 15-17, to diverge to the normally southward main track, the gates will be raised if 90 sec. elapse from the time the rear of the train clears the northward main until the head end passes signal 1-727. The gates would lower again after the head end passes signal 1-727. If a northward train is to use crossovers 15-17 and 18-20 to go from the northward main across the southward main

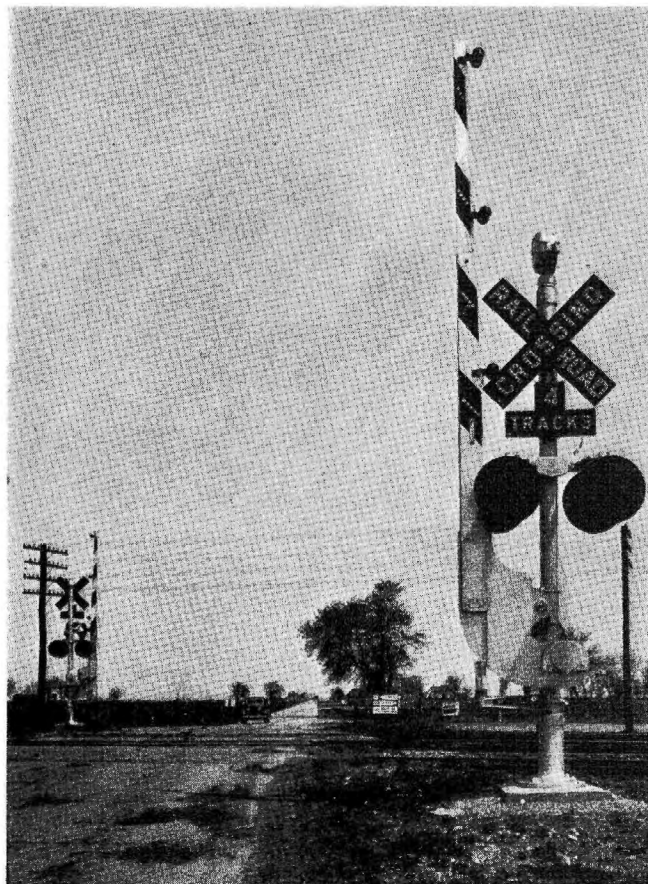
to the siding on the west side, the gates will be raised if the train clears the northward main and does not move through crossover 18-20 after this crossover is reversed for 90 sec. The gate will lower again when the train passes through crossover 18-20.

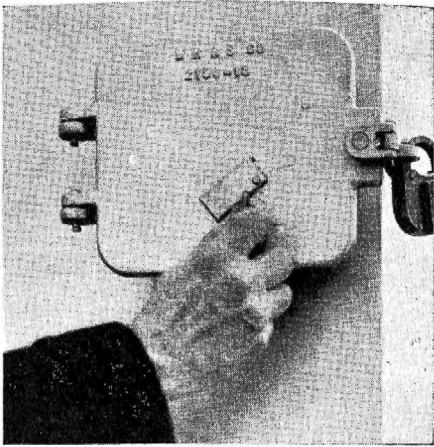
For a northbound move on the normally southward main track and through crossover 5-7, the gates will be raised if the train does not arrive at location A within 90 sec. The gates lower again when the train arrives at A. For a northbound move on the normally southward track and through crossover 18-20, the gates are raised if the train does not move through the crossover within 90 sec. after the switches are thrown. The gates lower again as the train moves through the crossover. The timing controls are accomplished by the use of thermal time-element relays.

Manual Control

When switching moves are being made over the crossing, a member of the train crew may operate the gates manually. A small box on the end of the instrument case encloses a standard switch padlock mechanism, arranged to operate a set of contacts when a standard switch key is inserted through the key hole and turned. By such an operation, the trainman can clear the gates with a train or car standing or moving while making a

View looking east along highway showing gate with the flashing light signal, bell and signs





Operating key switch

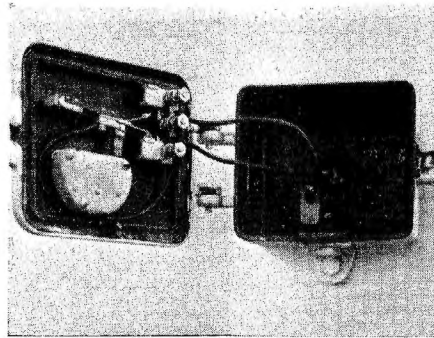
switching move. The gates will stay up as long as the key remains in the turned position in the lock.

The relays and rectifiers for the crossing protection project are housed in a welded sheet-metal case, set on a concrete foundation south of the crossing on the west side of the tracks. The relays were furnished by the Union Switch & Signal Company; the neutral control and track relays being the DN type; the interlocking relays, the DX-13 type; the thermal time-element relays the TH-10 type; and the flasher relay the F-16 type. All the relays are the shelf type.

The energy for operating the signals, gates and gate-arm lights is furnished by a set of six cells of

Exide EMGS-9, 160-a.h. storage battery, which is on floating charge through a Union Type R3V116, two-rate charge rectifier with a W-20 transformer and DNL-46 relay.

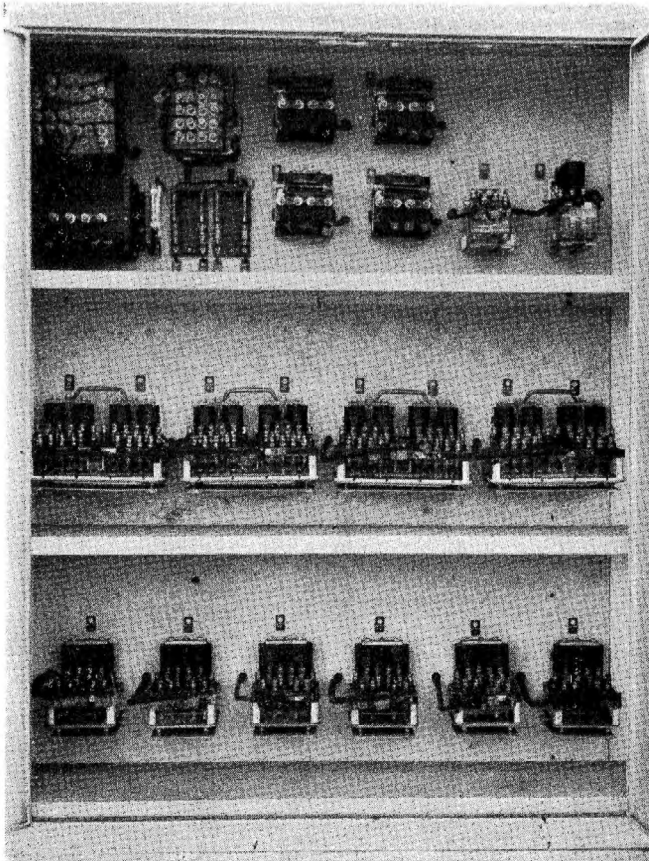
The wiring between the instrument case and the track connections, as well as the signals, is in underground cable. At the signals, the underground cables terminate in a cast-iron junc-



Mechanism of key switch

tion box, mounted on the lower section of the mast. From this box, single-conductor insulated wires run through a section of rubber air hose to the signal mechanism. Also from the junction box, flexible single-conductor insulated wires extend through loom conduit to the gate arm for connections to the lamps.

This crossing protection was planned and installed by signal department forces of the I.C.



Interior of sheet metal instrument case at the crossing

I. C. C. Permits Removal of Derails

THE Interstate Commission, on May 18, issued a decision No. 28,000 (Sub. No. 11) and an order authorizing the Southern to extend Howell interlocking at Atlanta, Ga., to include two additional switches, to remove four main track derails, and relocate two signals. An abstract of the report follows:

"This interlocking plant is used by the Southern, the Nashville, Chattanooga & St. Louis, and the Seaboard Air Line. The proposed changes affect movements only on the Southern tracks. The Southern urges that the proposed changes will effect operating economies, facilitate the movement of freight trains and yard locomotives, and increase the safety of operations. Approval of the changes is opposed by the Order of Railroad Telegraphers and the Brotherhood of Locomotive Firemen and Enginemen, on the ground that safety of operation would be decreased, although no witnesses or evidence were produced by the last-named organization. The case was duly heard, briefs and oral argument were waived, and the case was submitted on the record.

"The trackage involved in the proposed changes is the double-track freight line which diverges toward the Southern's Inman yards from its double-track main line. The two switches involved, which are located at the junction of the freight line and main line, are now normally set to permit movements over the main line, and hand-operated. This requires, in movements to and from Inman yards, that trains must stop and the switches be thrown by a member of the train crew. Under the proposed plan the limits of the interlocking plant will be extended to include those switches. The removal of the hand-thrown switches at the junction is clearly shown to be in the interest of safe operation. Several employee witnesses testified in favor of their removal. It is shown that ordinarily trains approaching these switches do not come to a complete stop. It is customary for a trainman to run ahead of the locomotive to open the switches, and after the train has passed through for the rear-end trainman to close them and then run to catch the train. Within the past few months an employee was injured when he fell while running to catch his train after closing the switch, and employees have requested the management to make changes which will avoid the necessity of using