

Illinois Central Installs

Modern Protection at Crossings

in Memphis, Tenn.

Flashing-light signals and gates, controlled automatically, with manual control, improve safety and expedite street traffic

THE Illinois Central has recently completed an installation of protection at 13 street crossings in Memphis, Tenn. Seven of these crossings are protected by conventional flashing-light signals, controlled automatically. The six other crossings, protected by gates as well as flashing-light signals, form a very interesting group because they are located in the heart of the city, between the business district and the heavily travelled Riverside drive, along the Mississippi River. Careful engineering was required on account of the close clearance problems, and the necessity for the protection to harmonize with the city planning program.

The tracks, which extend north and south parallel with the river front, are at the base of a steep slope, ascending east for about 300 ft. to a plateau on which the main business section of the city is located. The city hall, library, post office and other important public buildings of noteworthy size and architecture, are located along Front street which is the first north-and-south street along the top edge of the plateau. These buildings are surrounded by spacious lawns and parks which extend down the slope west toward the railroad and river front.

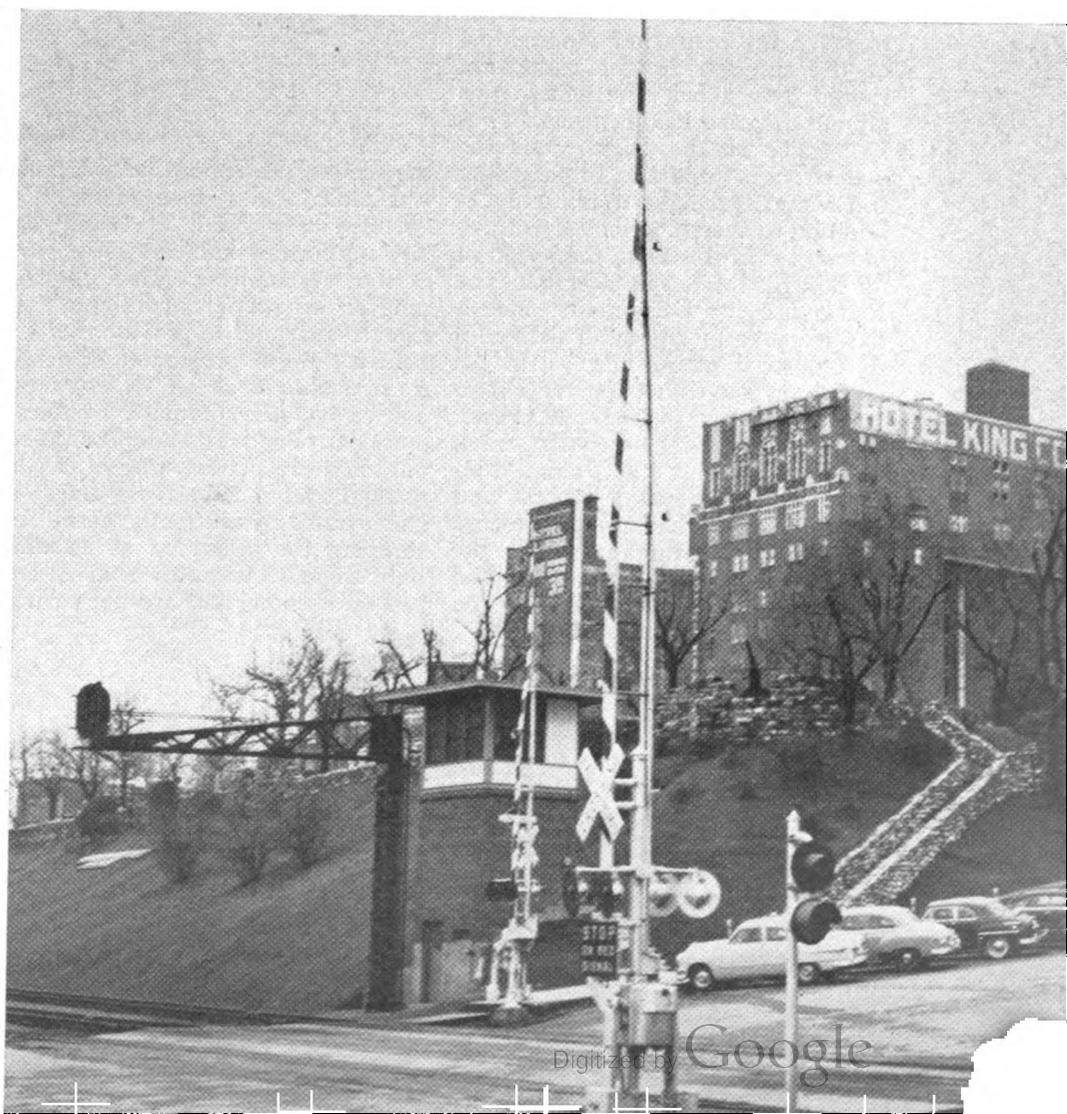
Three east-and-west streets Union, Monroe and Court avenues, descend from the business section down the slope and across the tracks to connect with Riverside drive, which, as shown on the plan, runs north and south along the tracks. The three east-and-west avenues, as mentioned above, are used primarily by passenger automobiles going in either direction between Riverside drive and the business section. Thus the vehicular traffic on these streets is

at reasonably low speed. On the other hand, Riverside drive is a boulevard by-pass around the business section of the city, and therefore, this drive carries considerable traffic. Riverside drive, approaching from the south, is along the west side of the tracks. At Jefferson avenue this drive crosses the tracks, runs along the east side of the track to Adams avenue, and then angles off up grade to the east. Adams and Poplar avenues cross the tracks at grade, as

shown on the plan. These streets lead to mills and warehouses on the west side of the track, down toward the river. Thus these crossings are used by trucks to a greater extent than by passenger automobiles, the total traffic being small compared with that on Riverside drive.

In addition to the two main tracks of the Illinois Central, the St. Louis-San Francisco has an industrial switching track along the I.C. tracks so that three tracks are involved in each of the six crossings. The two I.C. tracks through this area extend on south about one half mile to the passenger station, and then on south through the city. These tracks, although used primarily by passenger

Control tower is on north side of Court St. and east of tracks





The space was so restricted that the hoods were removed

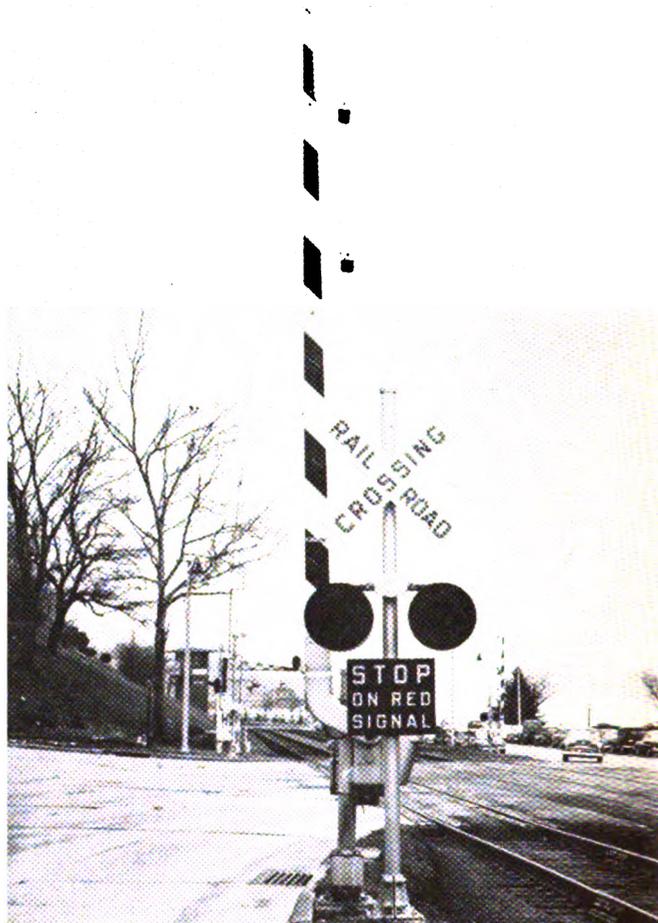
ceed toward the crossing for some appreciable time.

The track circuits for automatic control of the crossing protection are arranged in the customary manner, so that an approaching train causes

trains routed through the station, also handle some few through freights as well as switch engines to serve the many industries. Most of the through freight trains are routed over a belt line which runs around the east side of the city. Thus I.C. traffic on the tracks along the waterfront is limited to 10 passenger trains and 3 freight trains daily in addition to switching moves to serve industries. In this area, the speed of all trains is limited to 20 m.p.h. The Frisco uses its track about once a day to make pickups and deliveries to industrial plants and yards. All such train movements on the Frisco track are limited to 10 m.p.h. or less.

Previously, for many years, each of the six crossings, at Union, Monroe, Court, Jefferson, Adams and Poplar avenues has been protected by part-time watchmen on the ground. On account of the increased volume of motor vehicle traffic on

Looking south on Riverside Drive at Jefferson street

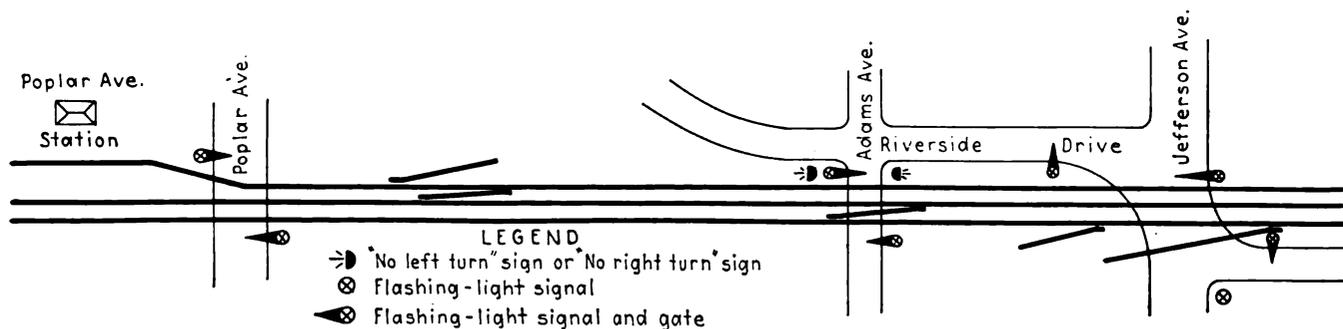


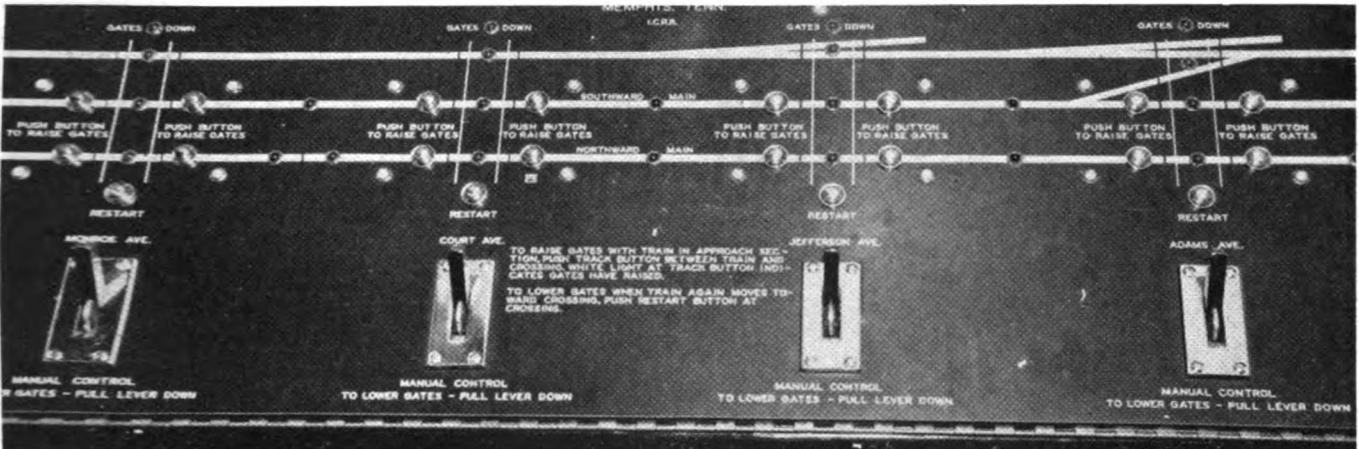
the streets, protection by watchmen was difficult and sometimes not as effective as desired. Therefore, the city authorities and representatives of the railroad cooperated in planning an installation of flashing-light signals and gates to provide the best known form of protection, of a uniform character at all six crossings, and to include automatic track circuit control with superimposed manual controls. The purpose of the manual control is to avoid delays to street traffic by raising the gates, and stopping the operation of flashing-light signals, if trains stop in approach sections and are not to pro-

the flashing-light signals and pedestrian bells to start operation at least 25 seconds before the arrival of the train at a crossing. About five seconds after the signals start to flash the gates are released and are lowered to the down position at least 20 seconds before a train arrives.

The superimposed manual control includes a control machine in a new brick tower on the north side of Court street just east of the tracks. This building was especially designed to blend in with the background of lawns and parks on the slope up to the public buildings.

The panel of the control machine





The panel of the manual control machine has control buttons, levers and indication lamps

is 16 in. wide and 6 ft. 10 in. long. On this panel a diagram represents the tracks, with lamps which are lighted to indicate occupancy of corresponding track circuits. At each street crossing there is a separate short track circuit on each track which extends for the width of the street and about 20 ft. to 30 ft. beyond in each direction. When a train occupies such a track circuit the flashing-light signals and the gates stay down regardless of manual control.

Operation of Gates

When a train approaches, the flashing-light signals operate, and the gates are lowered in the usual manner, all by automatic track circuit control. Operation of the flashing-light signals and lowering of gates at each crossing are repeated by the flashing of a small red indication lamp at the top of the control panel, between the two light-weight lines representing each respective street crossing. If the train stops in an approach section, then the automatic time cut-outs operate, which, after a predetermined time release the gates and flashers, thus allowing normal flow of traffic. This may be further relieved by manual control, if conditions require.

A small outlying passenger station is located east of the tracks, just north of Poplar avenue. When a south-bound passenger train approaches, the crossing protection is started in

operation, and gates are lowered at Poplar, Adams and Jefferson avenues. When making the station stop for the Poplar avenue station, the train stops with the locomotive about 50 ft. or more north of the north line of Adam street. After the man in the tower sees that the train has stopped, he pushes the button, on the southward "track" in approach to the symbol for Jefferson avenue. This causes gates to be raised at Jefferson avenue and the flashers to then stop operating. At the same time, a small white lamp near the button pushed, is lighted as a reminder that manual control for this track section is in effect. In the meantime with the gate raised, the street traffic is free to move over Adams avenue and Jefferson avenue. The towerman watches the train, when the engineer "whistles off," the towerman pushes the "restart" buttons; one in the symbol for Adams, and the other in the symbol for Jefferson. This sets the flashing-light signals in operation and lowers the gates. The "restart" button; for each crossing on the panel is located below the track lines and between the two vertical lines representing the edges of the street.

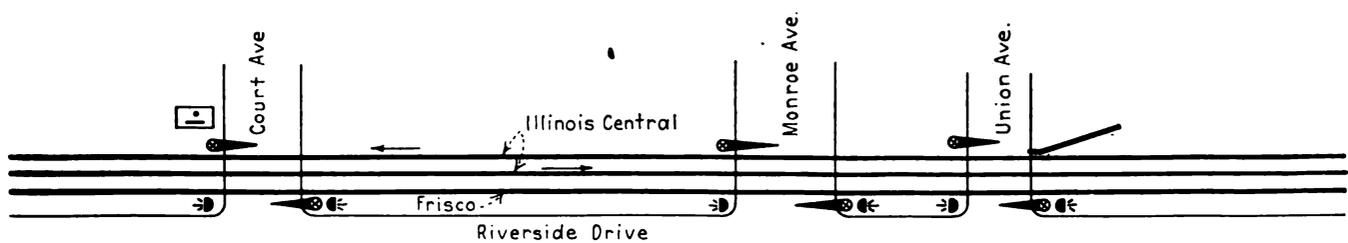
At various times during each day, the switch engines which set out and pick up cars on side tracks, make moves on the main tracks which require the towerman to take over control of the crossing protection as explained above. This applies for

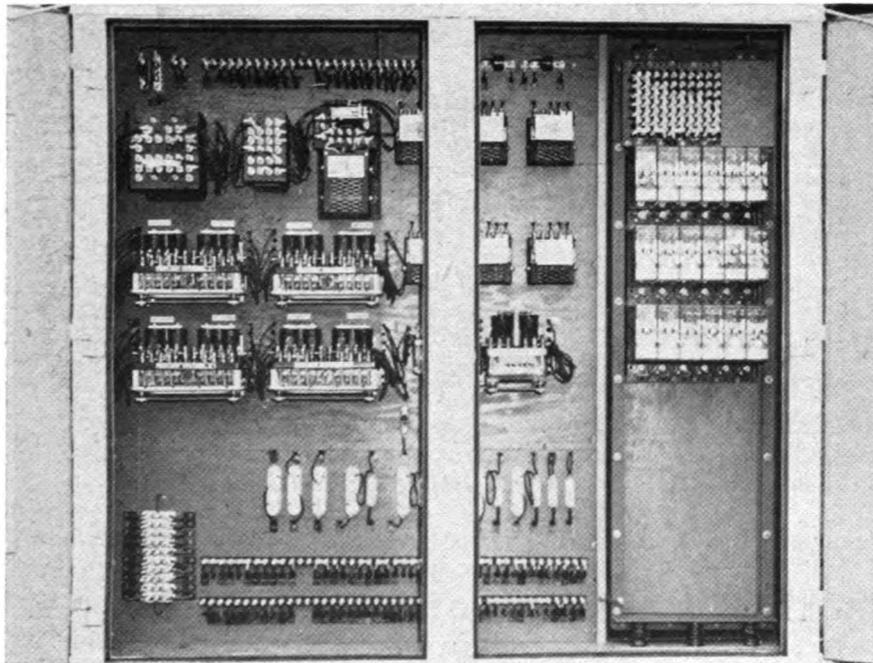
switch engine moves in either direction on both Illinois Central main tracks.

Toggle Lever Control

As shown in the picture of the control panel, there is a toggle type lever below the symbol for each street crossing. If an insulated motor car is being operated on either track, the towerman can cause the flashing-light signals to be operated and the gates to be lowered at any crossing, merely by lowering the lever for that corresponding crossing. After the motor car passes the crossing, he raises the lever, to raise the gates and cut out flashers. All of this form of control is independent of track circuit occupancy. If a train on a track circuit has put the gates down, operation of the lever for that crossing will not raise the gates.

The third track in this area belongs to the St.L.-S.F. and is used about once a day by a switch engine to transfer a cut of cars for delivery to a yard or industry. These moves are at slow speed so that automatic approach track circuit control was not considered necessary. Therefore the only track circuits on this track are the ones at the crossings. Each such circuit extends the width of the street and a short distance beyond in each direction. Occupancy of such a circuit causes the flashing-light signals to operate and the gates to go down at that crossing. Also, when the towerman sees a St.L.-S.F.





At the crossings the relays are in sheet-metal cases

switch engine approaching one of the street crossings, he operates the toggle lever for that crossing which starts the operation of the protection at that crossing. A rule requires that enginemen of the St.L.-S.F. are not to proceed onto a crossing until after he sees that the gates are down.

Exact Location of Gates

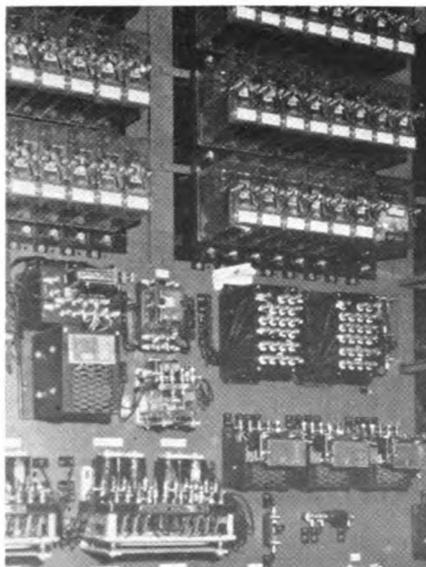
On account of the various circumstances with respect to grades, curves and curb lines at the different crossings, special study was required to determine the location for each of the masts on which flashing-light signals and gates are mounted. At Union, Monroe, Court and Jefferson avenues the space on the west side of the tracks is so restricted, that hoods were omitted from the flashing-light signals in order to secure standard 8-ft. clearance to center of nearest track as well as clearance of the street. The mast for the westward gate at Union avenue was set 17 ft. 6 in. from the center of the nearest track, in order to clear a storm sewer grating and a lamp post. Both the gate arms at Union avenue are 40 ft. long.

At Jefferson avenue, Riverside drive crosses the tracks at an angle. In order to secure standard clearance from the track, the mast for the northward gate on Riverside drive had to be located about 50 ft. in approach to the point at which the street line intersects the nearest rail. The center line of the mast is 1 ft. 3 in. from the street side of the curb. At this location the flashing-light signals were mounted on a separate mast in order to come within clearance limits of the track on one side

and street on the other. Special counter weights were also required to give proper clearance of the track with gates in lowered position. Similar complications were solved with respect to the southbound gate for this long-angle crossing.

In order to allow westbound automobiles in Jefferson avenue to turn right and go north onto Riverside drive, while the railroad crossing protection was in operation, the westward flashing-light signal and gate is located on the south side of this street at a distance of 11 ft. 6 in. from center of nearest track and the tracks are protected and a clear lane provided for right hand turns into Riverside drive. This gate arm is 40 ft. long.

An automatically controlled "No Right Turn" sign, with flashing yel-



Instrument rack in tower

low light above it, is mounted on a separate mast at the east side of Riverside drive just south of Union, Monroe and Court avenues. A "No Left Turn" sign is located on the west side of Riverside drive just south of Adams avenue.

The approach control of the protection is accomplished by 670-ohm Union type DX-13 interlocking relays using two such relays for each track at each crossing. There are supplemented stick circuits as required for manual and automatic cutouts. The "left" side of one interlocking relay, for example, is controlled by approach circuits from the north, and the "right" side of that relay is controlled by the short track circuit over the crossing. Then for second relay the "left" side is controlled by the short track circuit over the crossing, and the right by the receding track circuits. These receding track circuits would of course be "approach" track circuits for a reverse move.

The relays for controlling the two-rate charge of storage cells are the Union type DNL46. The flasher relays are the Union type FN16. Relays, other than those mentioned above, are the General plug-in type B.

The storage battery at each crossing, for operating the gates, consists of eight 160-a.h. cells. A set of five 80-a.h. cells feed the controls. Each track circuit is fed by one 80-a.h. cell. These are all Exide, Manchex type cells. These batteries are on floating charge from Fansteel rectifiers.

The circuit from the housing to each gate motor is No. 9. A similar circuit of No. 9 wire feeds the lamps, which are normally fed from a.c., but are switched to battery in case the a.c. fails. There is no pole line in this territory and therefore "line" controls, which are No. 14 wire, are buried cable. The outer protection of cable includes steel tape, except that the No. 9 single-conductor for connections to rail has no such tape. The insulated wire and cable for this project was made by The Okonite Company. The solderless connectors used in the wiring in cases and housing were made by Aircraft-Marine Products, Inc.

This project of crossing protection was wired and installed by signal department forces of the Illinois Central under the supervision of F. C. Brown, signal supervisor, and under the direction of H. G. Morgan, signal engineer. The gates and flashing-light signals were furnished by the Western Railroad Supply Company, and the relays by the Union Switch & Signal Co. and the General Railway Signal Co.