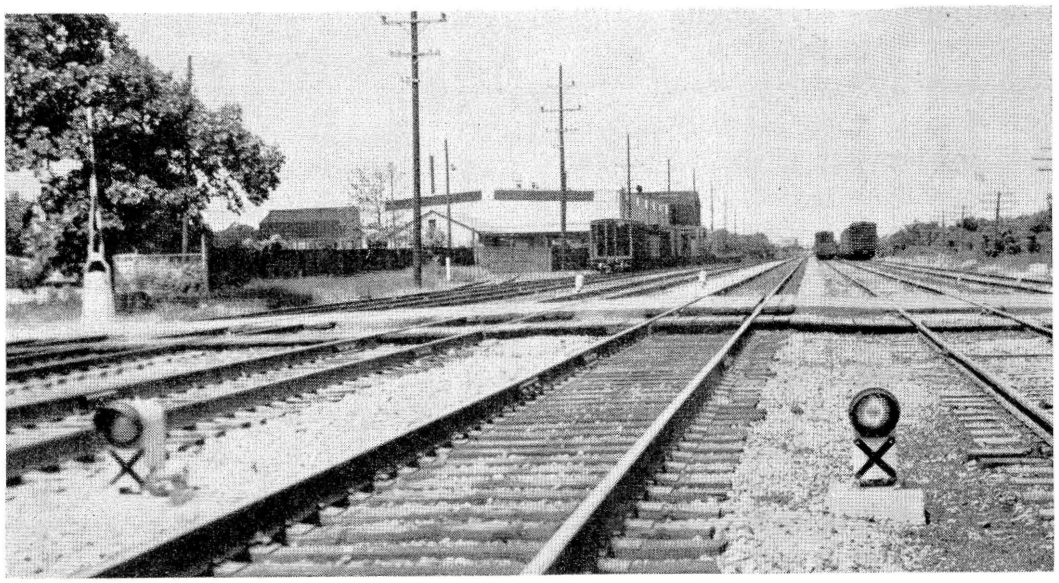


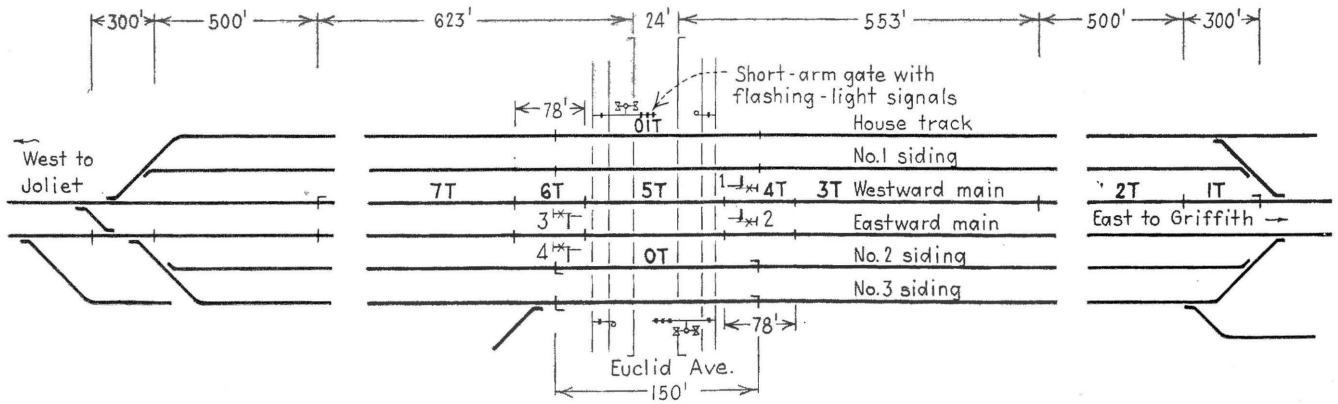
The "X" designates these dwarfs as being controlled by the crossing gates and signals

Signals for Trains at Highway Crossings

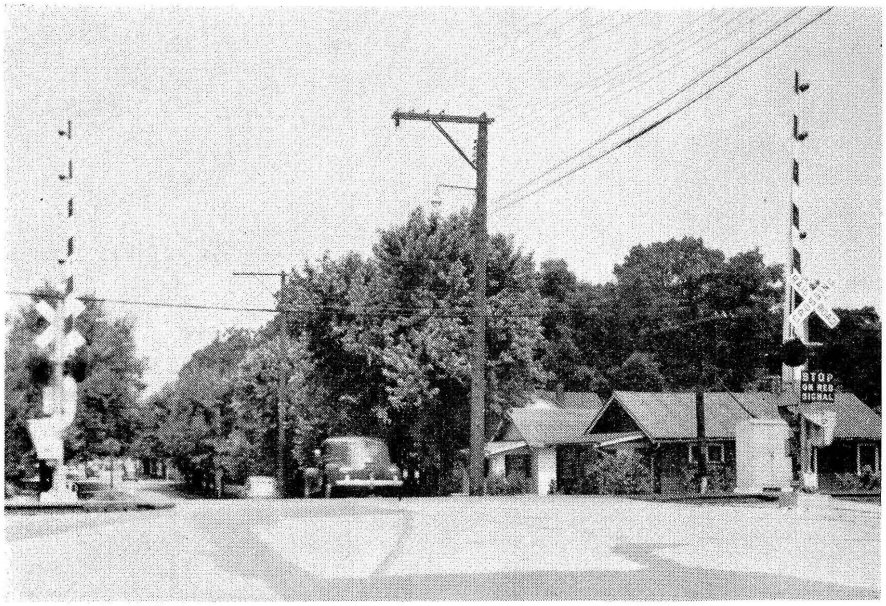
Elgin, Joliet & Eastern uses speed measuring sections to shorten approaches for slow-speed trains--Time cutouts to raise gates if trains stop--Dwarfs to govern trains if gates are not down

ON several highway crossing signal protects, the Elgin, Joliet & Eastern has included special features, such as speed-measuring section and time cutouts, as well as dwarfs signals to govern trains. The objectives of these features are to make it practicable to operate gates with exclusively automatic controls, and thus overcome local circumstance which otherwise might preclude the use of gates or necessitate manual control.

At Euclid avenue in Chicago Heights, Ill., new short-arm gates with flashing-light signals were installed at a crossing which had previously been protected by flagmen. Chicago Heights is on the double-track main line of the E. J. & E. between Joliet, Ill., and Gary, Ind. About 28 freight trains and 16 switching moves are operated over this crossing every 24 hours. The E. J. & E. crosses the Chicago & Eastern Illinois and the Chicago Milwaukee & St. Paul, in Chicago Heights. Therefore, many of the E. J. & E. trains stop to set off or pick up cars in interchange with these other roads. The layout of tracks is shown in Fig. 1. Westbound trains which have no stops to make in Chicago Heights may operate through this territory and across the crossing at Euclid avenue at speeds of up to 30 m.p.h. When a westbound train approaches at normal speed, the crossing protection is set in operation when the train enters track circuit 2T, which provides a



Track and signal plan of the crossing protection at Euclid avenue in Chicago Heights



Gates and signals at Main street crossing in Hobart, Ind.

total approach control of 1,053 ft. long.

In normal operation; for a preliminary warning period of 5 seconds, the bell rings, and the lamps are operated in the flashing-light signals and on the gate arms. Then the gates are lowered which requires about 8 seconds, and at the same time, the dwarf signal No. 1, located 75 ft. from the center of the pavement, changes its aspect from red to green.

On the other hand, if a westbound train is approaching at a slow speed preparing to stop on the approach section 2T to set out cars, the street traffic on Euclid avenue would needlessly be delayed if the crossing protection is set in operation and the gates lowered. Therefore, before the train gets to the approach section 2T, its speed is measured as the front trucks traverse track circuit 1T. This is done by a time-element relay. If the speed is 10 m.p.h. or less, the approach track circuit 2T is automatically excluded from the control of the crossing protection. Therefore, when the locomotive and train enters track circuit 2T, the crossing protection is not set in operation, and the dwarf signal No. 1 continues to display the red aspect. If the train continues toward the crossing, when the front trucks enter "cut-in" track circuit 3T, the crossing protection is set in operation and the gates are lowered. At the same time, the aspect of dwarf signal No. 1 changes from red to green.

Time Cut-Out

On the other hand, if a train stops so that it occupies track circuit 3T for two minutes or more, then the aspect of dwarf No. 1 changes from green to red. Then after 20 sec. the gates are raised. This 20-sec. period provides for a circumstance in which a train, having started from a stop, is closely approaching the crossing. In such an instance, the gates stay down until the train has had time to occupy the track circuits 4T and 5T, thus holding the gates down—or to stop short of the crossing.

At More Than 10 M.P.H.

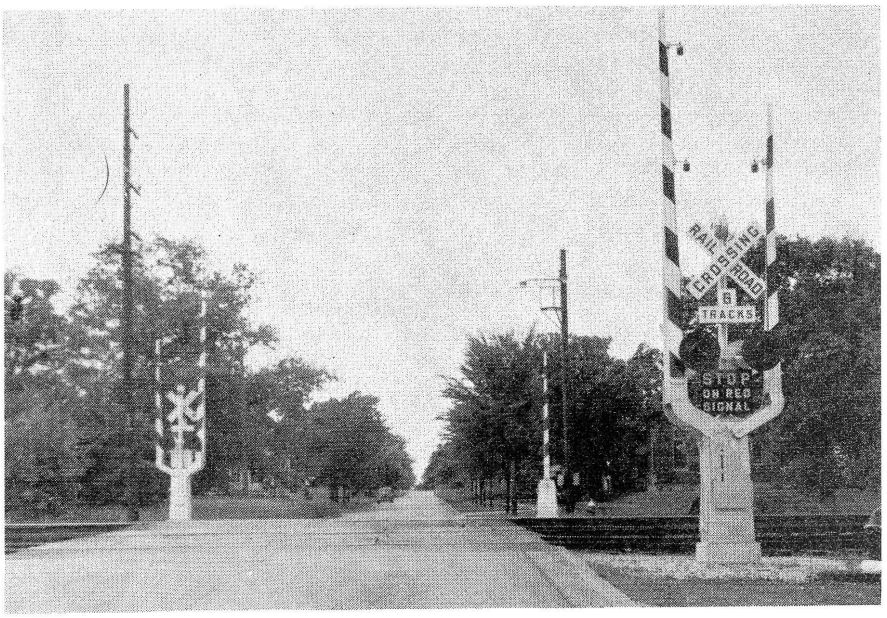
The following explanation refers to a westbound train which had approached at more than 10 m.p.h. and therefore had set the crossing protection in operation and lowered the gates when it entered track circuit 2T. In such an instance, a time-measuring period is started when the train enters track circuit 2T, and, if two minutes expire before the train enters track circuit 4T, the aspect of dwarf signal No. 1, changes from green to red, just the same as explained above when discussing track circuit 3T.

When the gates have been raised and crossing protection has been cut out because a westbound trian stops on an approach track circuit, then, when that train is ready to proceed over the crossing, it must approach slowly and stop with the front truck of the locomotive opposite the dwarf signal No. 1 which is 75 ft. from the center of the street pavement. With the wheels at this location, they are to the west of "yellow" insulated poionts which mark the east end of a track circuit 4T. Shunting this track circuit initiates operation of the crossing protection. After the gates are down, the aspect of dwarf singnal No. 1 changes from red to green. The cut-out controls, either with respect to speed-measuring or time cut out, are brought into effect because of the pick up of a stick relay, "WSR", which, when picked up, holds through any of the approach track circuits, on the westward track, down.

For eastbound train movements on the eastbound main track, the controls for the crossing protection operated in a manner correspondingly the same as that explained above. If a train is operated against the normal direction of traffic, rules require that the speed not exceed 15 m.p.h.

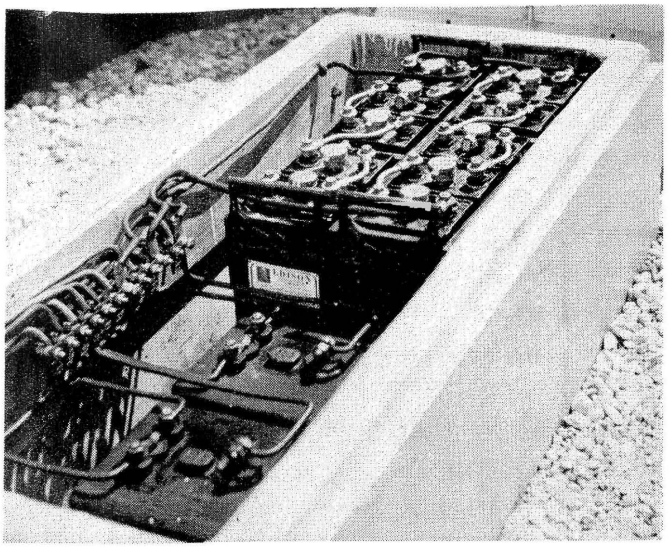
Beading To Improve Shunt

On the westbound track, when any of the three track circuits at the crossing, 4T, 5T or 6T is occupied,



Gates and signals at Euclid avenue crossing in Chicago Heights, Ill.

the gates are held down irrespective of any special cut outs. On the house track and on each of the three sidings, a track circuit about 150 ft. long extends across the street and about 63 ft. beyond in each direction. When such a track circuit is occupied, the crossing protection is set in operation and the gates go down. When a train is pulling into a siding or a switching move is being made on the house track, the rules require that the locomotive (or leading car), be stopped on the track circuit and short of the pavement, until the crossing protection is in operation and the gates are down. This house track and these sidings are used infrequently, so that the rails may be rusty. Therefore, in order to insure proper shunting of these track circuits, small beading of stainless steel are welded on the running surface of the rail. This beading is on both rails for a distance of 5 ft., and then there is a gap of 6 ft. before starting the next 5 ft. section with beading, and so on. This practice, of skipping sections of rail, reduces the cost of the welding, and yet provides plenty of welded sections to insure shunting.

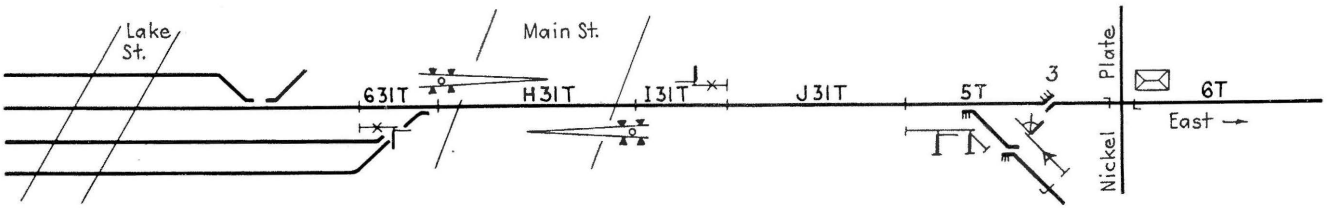


Storage battery and rectifier cells in concrete box at typical project

Project at Hobart, Ind.

In Hobart, Ind., the Elgin, Joliet & Eastern has installed flashing-light signals and short-arm gates at Main street and Lake street crossings, which were previously protected by watchmen part time. The track and signal plan at Hobart is shown in Fig. 2. This project includes several special control features in addition to the schemes discussed previously. Hobart project is on a single-track main line extending 25 mi. from Porter, Ind., to a yard on the E. J. & E. main line at Griffith, Ind., and the traffic over the crossings includes about 8 freight trains and 14 switching moves daily. Most all of these trains stop at Hobart to set out or pick up cars.

In normal operation, the crossing protection is set in operation at Main street when a westbound train crosses the Nickel Plate and enters track circuit 5T. In many instances, westbound trains approach slowly and stop at the interlocking tower to pick up waybills for cars to be picked up. If such a train occupies track circuit 6T more than 17 sec. (equivalent to 10 m.p.h. or less), then track circuit 5T is cut out of the westward approach control for the protection at Main street. When the train does proceed toward the crossing, the protection is set in operation when the train enters track circuit J31T.



Track and signal plan of crossing protection at Hobart, Ind.

Interchange between the E. J. & E. and the N.Y.C.&St.L. is via the wye lead which connects to the E. J. & E. main line at the interlocked switch. When this switch is reversed for a N. Y. C. & St. L. transfer movement, contacts in the switch circuit controller set up circuits which cut track circuits 5T and J31T out of the control for the crossing protection. Therefore, as a cut of cars is shoved westward or pulled westward out of the turnout, the protection at Main street is not set in operation, and the westward dwarf continues to display red.

Stop Short of Crossing

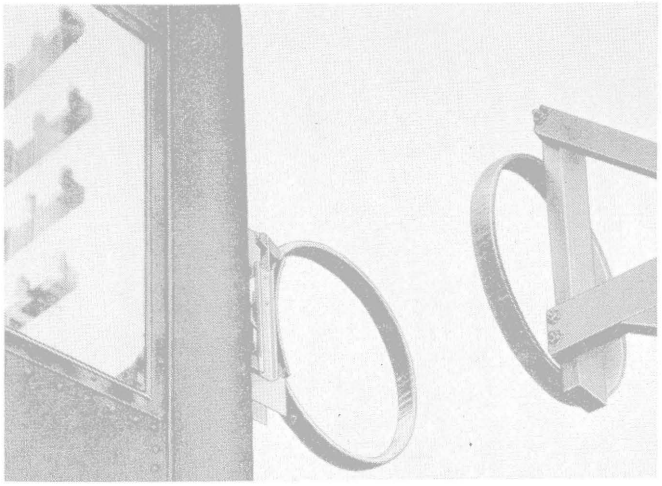
The locomotive or leading car is stopped on that portion of track circuit 131T short of the dwarf signal, and this sets the crossing protection in operation. When the gates are down, the aspect of the dwarf changes from red to green. This stop, for a westward interchange move, is of no consequence because such a stop is necessary to permit a trainman to open the switch just west of Main street leading to the side track on which the cars are to set out. When this siding switch is thrown, contacts in the switch circuit controller establish circuits which cut track circuits G31T, H31T and J31T out of the westward approach control for the protection at Lake street.

The circuits thus established will be retained either by the switch reversed or while track circuit G31T, which includes the fouling on the turnout, is shunted. Thus if the switch is placed normal before the rear car clears the turnout, the cut out control holds. In this control arrangement, when the siding switch is reversed, contacts in the switch circuit controller pick up the stick relay ASR which sticks up through any of the track circuits down. The crossing protection is not set in operation because the stick relay is up.

Return to Normal

If the interchange move goes all the way into the side track and the switch is closed, the circuits return to normal. Then, if the locomotive is to return eastward, and the switch from the siding to the main track is open, the protection at Lake street will not be set in operation, because the track circuits G31T, and east thereof, are out of the westward

(Continued on page 568)



Wayside and car - carried coils used with inductive train-identification system

plifier and indicating relay. A separate amplifier and relay are used for each identification frequency.

The system operates by means of the magnetic field or inductive coupling between the wayside and car-carried coils. When a tuned coil on a train is opposite the wayside coil installation, the coupling from wayside to train coil and back from the tuned train coil to the wayside receiver coil causes the indicating relay for this particular tuning frequency to operate. The selective tuning of the electronic circuit associated with each indicating relay prevents the other relays from being operated. The equipment will respond properly no matter how high or low the train speed may be and even if the train should stop at the identification point. The relay circuit can be furnished to restore to normal automatically in some predetermined short time after passage of the train, or for manual resetting by a pushbutton.

Special circuits are included in the amplifier to make the equipment immune to false tripping by metal that may come close to the wayside coil or by stray magnetic or electric fields. There is no appreciable radiation from the transmitter and consequently no interference with other equipment or with identification of trains on adjacent tracks. The induction field becomes negligibly small at distances more than two or three times its diameter from the transmitter coil. Where trains are made up of multiple-unit cars, the car-carried coils can be furnished as separate, demountable units, each complete with its condenser pretuned to one frequency and arranged so that the coil can be replaced with one of another frequency. Thus, a pool of coils can be maintained at points where trains originate, and each train equipped with a coil of the proper identity before starting its run. Where trains are pulled by one locomotive, a coil can be mounted permanently on the locomotive with a tuning selection key located in the cab for the engineman to effect the proper identification.

SOLDERING FLUX

(Not Illustrated)

DIVISION Lead Company, 836 West Kinzie Street, Chicago 22, has announced a new liquid soldering flux, known as Divco No. 229, which is said to eliminate practically all cleaning and burnishing of metal parts usually necessary before soldering can be done. It is usable on copper, brass, bronze, nickel, cadmium, zinc, tin, galvanized iron, steel, monel. Full particulars are available from the manufacturer.

INSULATED GROMMET

(Not Illustrated)

ANNOUNCEMENT has been made by the Automotive Rubber Company, Inc., 8601 Epworth Boulevard, Detroit 4, Mich., of a newly-designed metal-formed grommet, completely covered with rubber, for insulating blanked holes in metal to prevent cutting, chafing, shorting and rattling of wires, cables, conduits and tubing, which pass through the holes. Known as the Arco Sta-Put series 3120, the principal advantages are said to be that it can be installed easier and faster than grommets previously offered, and that it holds in position at all times. Installation from the face of the hole is another feature, and an expanding hand tool is available to roll and force the curled prongs tight against the under-surface, assuring a positive secure fit. Further information is available from the manufacturer.

On the "J"

(Continued from page 556)

controls for Lake street. Time cut outs, similar to those used at Chicago Heights, as explained previously, are also included in this Hobart project.

Dwarf Signal Rule

The dwarf signals used on these crossing protection projects are the type SA, arranged to display either red or green. Below each signal there is a large letter "X" which designates it as a signal associated with crossing protection, and as having nothing to do as an automatic signal or as an interlocking signal.

The bulletins and time table instructions explain that a green aspect on such a signal indicates that the crossing protection is operating properly, and that a red light may indicate that the crossing is not protected and therefore, care must be exercised to prevent accidents to highway vehicles and pedestrians.

These crossing signal projects were planned and installed by railroad forces under the jurisdiction of F. G. Campbell, chief engineer, and under the direction of W. K. Waltz, signal engineer. The flashing-light signals and gates at Euclid avenue in Chicago Heights were furnished by the Griswold Signal Company, and those at Main street and Lake street in Hobart were furnished by the Western Railroad Supply Company. The dwarf signals and relays were made by the General Railway Signal Company. Transformers and rectifiers were made by Fansteel. At each crossing, the gate motors are fed from a set of 10 cells of 160-a.h. Edison storage batterry at Main and Lake, and 240-a.h. at Euclid. Six of these cells are used also to feed control circuits. These batteries are on floating charge through Fansteel Balkite rectifiers. Each track circuit is fed by three cells of 500-a.h. Edison primary battery. The buried cable on these projects is double No. 8 for the motor feeds and single No. 8 for track connections. The insulated wire and cable was furnished by the Okonite Company.

The crossing protection described above at Chicago Heights, Ill., was installed in accordance with order of the Illinois Commerce Commission and that at Hobart, Ind., pursuant to ordinances of the Common Council of that city.