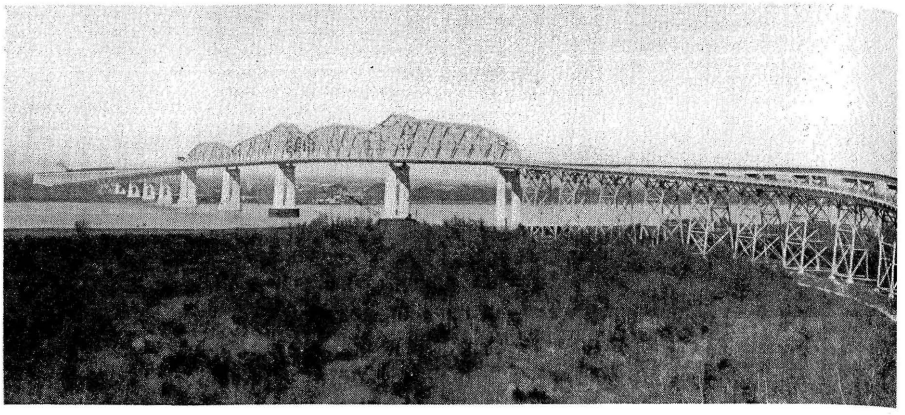
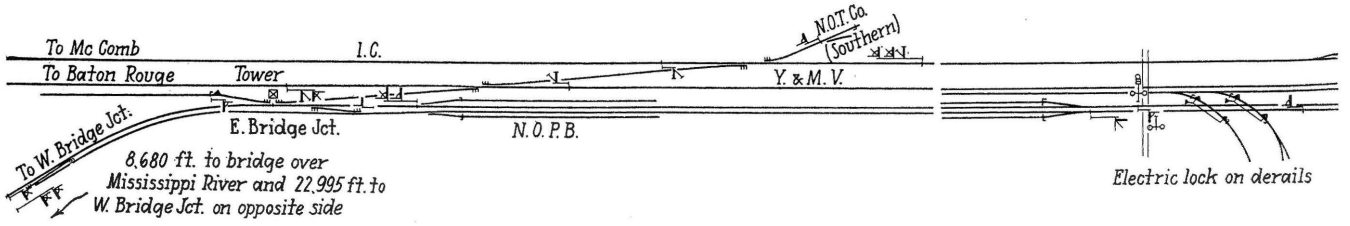
New Electric Interlocking at the Mississippi River Bridge



View of bridge from west side of the river

THE interlockings and automatic signaling installed on the new Mississippi River bridge and its approaches, at New Orleans, La., form an important part of this gigantic project. Although the Mississippi was bridged at Memphis, Tenn., as long ago as 1892, the greater depth of water, and still greater depth to stable foundation material, proved effective obstacles to bridge construction south of Memphis for many years, so that it was not until 1928 that a bridge was built at Vicksburg, Miss. Although the need for a bridge at New Orleans has been far more urgent, the formidable financial problems proved insurmountable until a loan was obtained from the Reconstruction Finance Corporation in 1932. At normal water level the river is about 3,360 ft. wide at the bridge location. The main bridge or river crossing, 135 ft. above the water, is 3,524 ft. long, and with the two approaches the entire structure is 22,995 ft. long, in other words, 4.3 miles. Thus the new bridge is the largest and by far the most costly bridge to span the Mississippi.

Projected originally by the New Orleans Public Belt, a municipally-owned terminal railroad, the project was advanced through the agency of two amendments to the state constitution of Louisiana, one ratified in 1928 empowering the city of New Orleans to issue $20,000,000 in bonds secured by a lien against the terminal property, and a second approved in 1930 authorizing the state legislature to appropriate $7,000,000 toward the cost of the bridge on the condition that provision be made for highway traffic, which is to be handled free of all tolls. The bridge will be used by the trains of the Southern Pacific under the terms of a contract entered into by the Morgan's Louisiana & Texas and the Texas & New Orleans, guaranteed by the Southern Pacific and approved by the Interstate Commerce Commission. The bridge is located about 3.3 miles west of the business center of the city, or about 9 miles upstream (following the meanderings of the river) from the foot of Canal street.



Routing of Trains to Use the Bridge

Because of the low level of the land bordering the river and the requirement of the United States engineers that the river spans provide a clear headroom of 135 ft. above high water level, it was necessary to construct approaches of unusual length. Thus with a track grade of 1.25 per cent, compensated for curvature, the east approach viaduct has a length of 8,680 ft., and the west approach 10,791 ft.

The principal rail lines into and out of New Orleans from the west are the Texas & Pacific and the Southern Pacific. Under the previous arrangement, all trains to and from the west were ferried across the river. The S. P. ferry slip on the east side of the river is located about 2,500 ft. upstream from the new bridge, from which point the S. P. line extended to a connection with the I. C., over whose tracks the S. P. trains are operated into and out of New Orleans. The S. P. also has a line extending on down the west side of the river to yards and docks at Westwego on the river front opposite the city of New Orleans. Now that the bridge is complete, the S. P. trains connect with the new line of the N.O.P.B., at West Bridge Junction, and operate on this line over the bridge and to

and Signaling at New Orleans

Automatic signal location on the westward approach

East Bridge Junction, where connection is made to the same line of the I.C., as used previously en route to and from New Orleans.

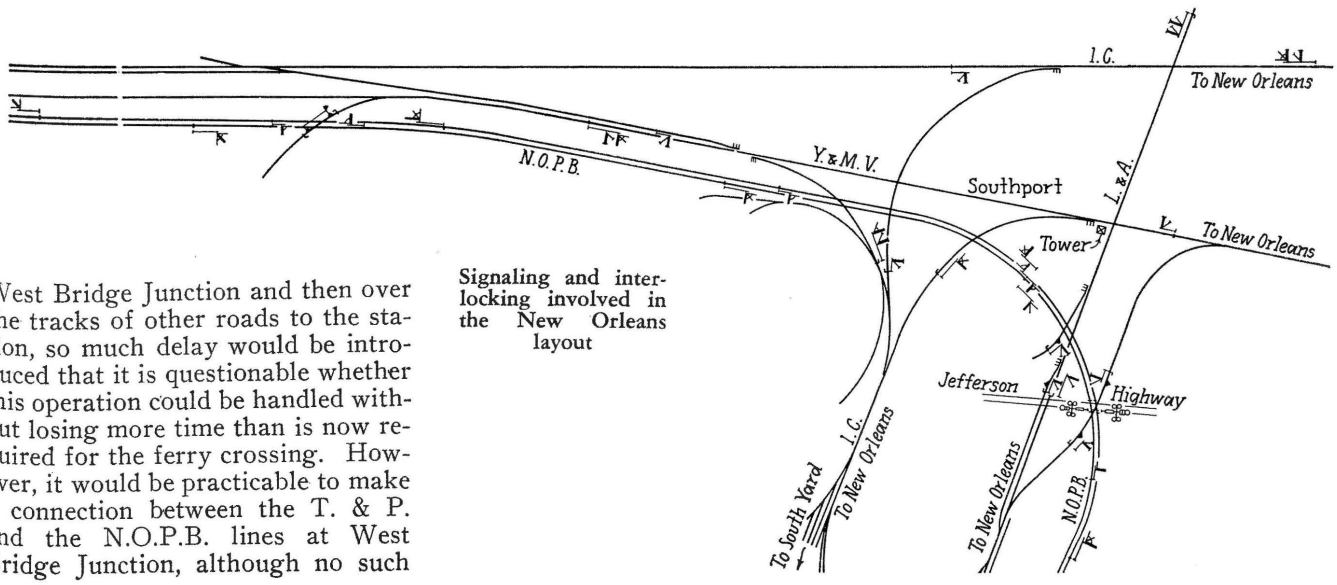
On the west bank of the river, the main line of the Texas & Pacific runs practically parallel with the S.P. line and at West Junction is about 300 ft. east of it so that the T. & P. line crosses the new N.O.P.B. double-track line in the limits of the new interlocking. The T. & P. line extends on south to a ferry and freight terminal located in the vicinity of the business section of the city, the T. & P. having its own yards and station on the New Orleans side. The location of the T. & P. station is such that if the T. & P. trains were operated over the bridge from West Bridge Junction and then over the tracks of other roads to the station, so much delay would be introduced that it is questionable whether this operation could be handled without losing more time than is now required for the ferry crossing. However, it would be practicable to make a connection between the T. & P. and the N.O.P.B. lines at West Bridge Junction, although no such connection is included in the new track layout of the new interlocking.

Signaling and Interlocking

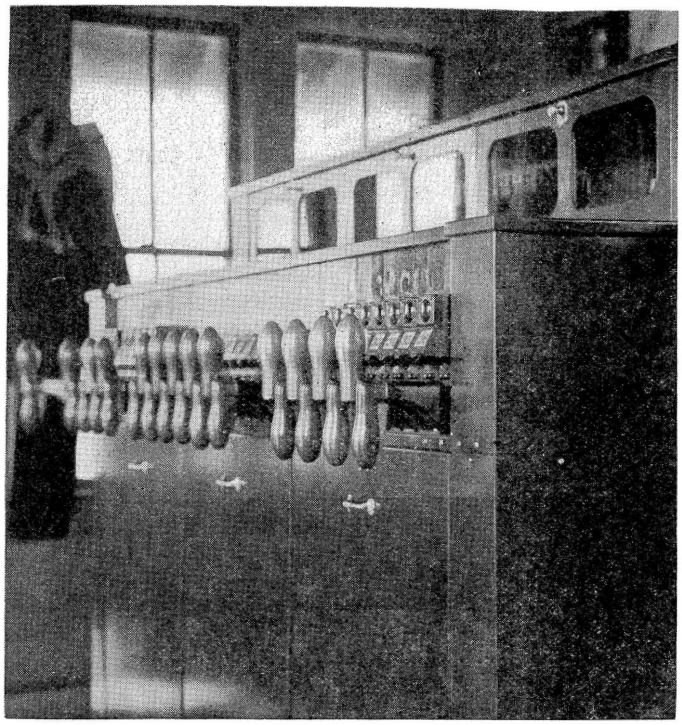
The railroad over the new bridge is a part of the New Orleans Public Belt. The new double-track line, constructed as a part of the bridge project, begins at West Bridge Junction on the west side of the river to connect with the Southern Pacific and from there extends up over the bridge and down the east approach to East Bridge Junction where a connection is made to the Illinois Central lines. The new N.O.P.B. double-track line extends on eastward for 2.8 miles to the Southport plant of the I.C where it crosses a freight line of the I.C. and the Louisiana & Arkansas, and then turns south and joins the original tracks of the N.O.P.B., which extend along the water front on the New Orleans side to connect with numerous industries, docks, etc., as well as all of the railroads entering New Orleans.

The Texas & New Orleans, S.P. Lines, installed a 32-lever General Railway Signal Company electric interlocking at West Bridge Junction as well as the automatic signaling on the two approaches and over the bridge between West Bridge Junction and East Bridge Junction.

The Illinois Central installed a new 32-lever G.R.S. electric interlocking at East Bridge Junction, automatic signals on the N.O.P.B. between East Bridge Junction and Southport, and at Southport the old I.C. interlocking was replaced by a new 56-lever G.R.S. electric interlocking, which includes the func-

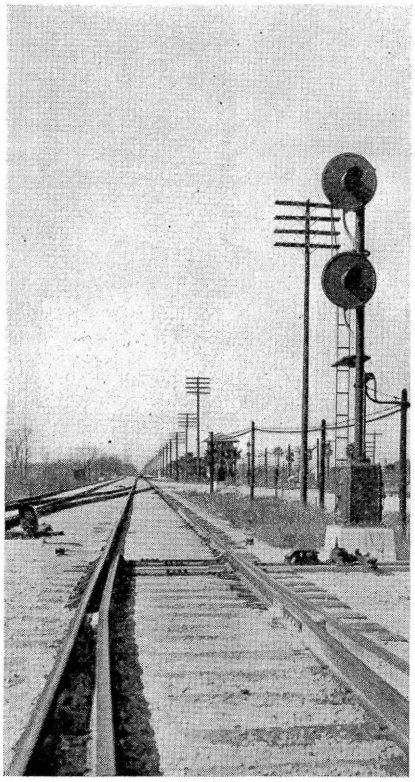


Signaling and interlocking involved in the New Orleans layout



Interlocking machine at the East Bridge Junction plant

tions in the old plant as well as the new functions introduced by the crossings made between the new N.O.P.B. double-track line with the six tracks of existing lines. As a part of the installation between East Bridge Junction and Southport, hand-operated derails, pipe-connected to T-10 stands equipped with electric locks, were installed to protect the I.C. industry tracks which branch off to the south and cross the new double-track line of the N.O.P.B. Likewise, the new signaling included the installation of flashing-light signals at two highway-rail road crossings on the N.O.P.B.



Westward home signal on N.O.P.B. at E.B. junction

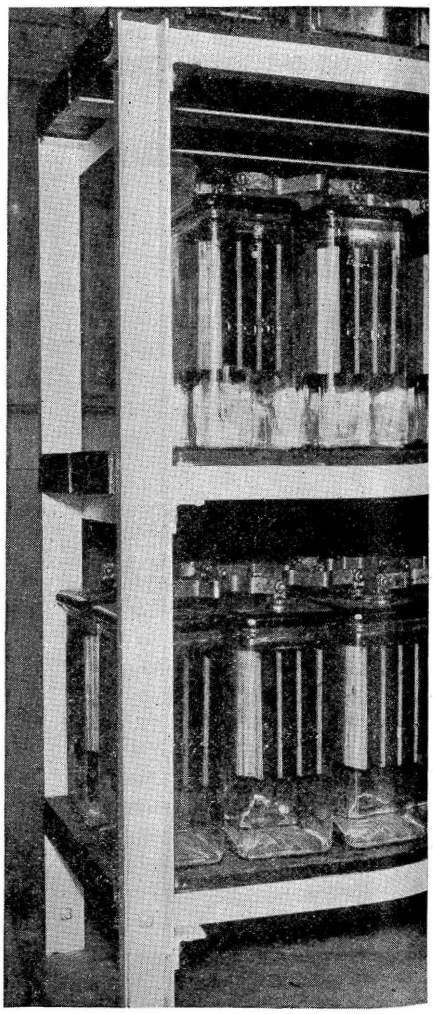
The Southport Interlocking

The previous electric interlocking at Southport, installed in 1912, consisted of protection for the crossing of the single-track line of the L. & A. with the two single-track lines of the I.C., as well as a turnout leading from each of the I.C. tracks to Southport yard and an interchange connection between the southbound I.C. and the L. & A. The old plant included main-line derails for both directions on the L. & A., as well as for the normal direction on each of the I C. main tracks.

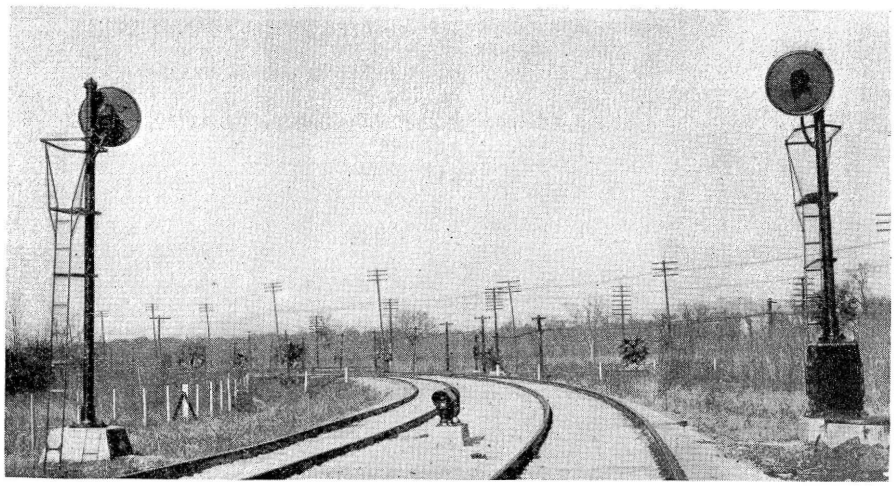
The I.C. track nearest the tower was formerly the single-track main line of the Yazoo & Mississippi Valley, and the I.C. had its single-track line as illustrated. When the I.C. absorbed the Y. & M.V., the operation of trains in this territory was changed to use the Y. & M.V. track as a southbound main and the former I.C. track as a northbound main. This explains why the two I.C. tracks are so far apart.

The old G R.S. Model 2 electric interlocking machine had 31 working levers and 5 spare spaces. As this machine had been in service for 23 years, and could not readily be enlarged to accommodate the necessary additions, it was retired. Likewise, the old tower, together with the relay racks, battery, etc., was retired. The new tower of frame construction is located just west of the old tower.

The new interlocking machine, of the General Railway Signal Company, Model-2, has 46 working levers and 10 spare spaces. The power switch machines and semaphore signals on the L. & A., are operated on 110-volts d-c., using the standard G.R.S. dynamic indication system with individual cross-protection relays. The white light behind the number plate of each lever is illuminated to indicate that the corresponding signal is indicating "proceed." The red lamp unit above the lever number is the "out of correspondence" light, and is lighted from the time a lever is operated until the corresponding switch or signal assumes the position corresponding to that of the lever. The lamp behind the lever number on each switch lever is lighted at such times as the track circuits involved in the locking of the corresponding switch are



Battery in the new tower at Southport



Home signals on the Public Belt at the Southport plant

unoccupied; in other words, at all times when it is logical to operate the corresponding switch.

An electric time lock, set at 20 seconds, is provided for the lever of each signal for which approach locking is not used, as for example, all of the dwarfs as well as the home signals on the L. & A.

The illuminated track and signal diagram is 3 ft. 8 in. long and 2 ft. 8 in. high, and is mounted over the interlocking machine. The miniature lamps are normally extinguished, but are lighted to indicate occupancy of the separate track circuits throughout the area of the plant. This diagram was made by the Western Railroay Supply Company.

Relay and Battery Room

The ground floor of the tower is used to house the relays, rectifiers, battery, etc. The relay racks are made up of angle-iron framework, using 3-in. angle-iron for the uprights and 1½-in. for the shelf supports. The shelves, made of 1-in. by 11¼-in. pine boards, are spaced 15 in. vertically; a 1 in. by 8 in. pine board is used as the terminal board on which bakelite-based A.A.R. terminals are mounted, six terminals en bloc. The relays are shelf-type each equipped with a spring mounting base. The majority of the relays are the Union Type-DN-11. All of the wiring between the terminals on the relay rack and into the interlocking machine is run in conduit.

The main operating battery consists of 55 Exide EMGS-7, 120-a.h cells, which are on floating charge through an R.P.-41 Union rectifier rated at 1.25 amp. at 120 volts, the normal charging rate being about 0.6 amp. The low-voltage battery for control and lock circuits consists of 5 DMGO-9 cells charged by an RX-11 rectifier.

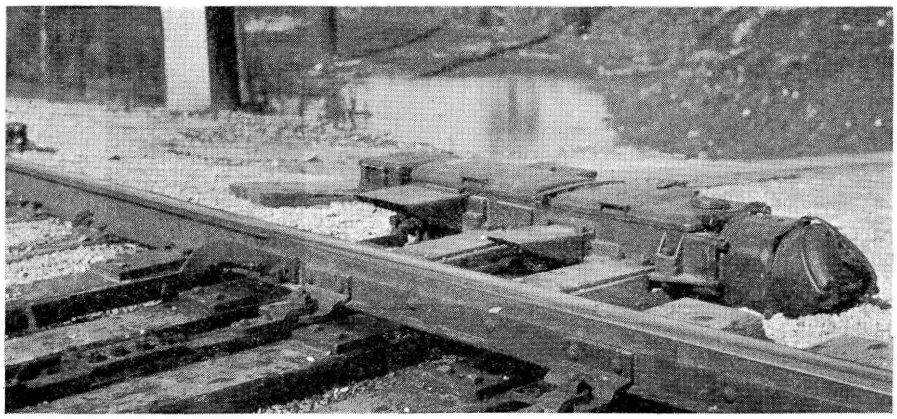
The storage battery in the tower is located in battery racks made up with 3-in. channel-iron uprights and 2-in. angle-iron cross pieces with 3-in. treated planks for shelves. The shelves are spaced 2 ft. 1½-in. vertically so as to allow adequate space above the cells to facilitate inspection. The battery is located in the same room with the relays.

Each track circuit is fed by one DMGO-9 cell charged by an RX-10 rectifier. Stand-by battery is also provided at the locations where light signals are used, as well as at the crossing signal locations.

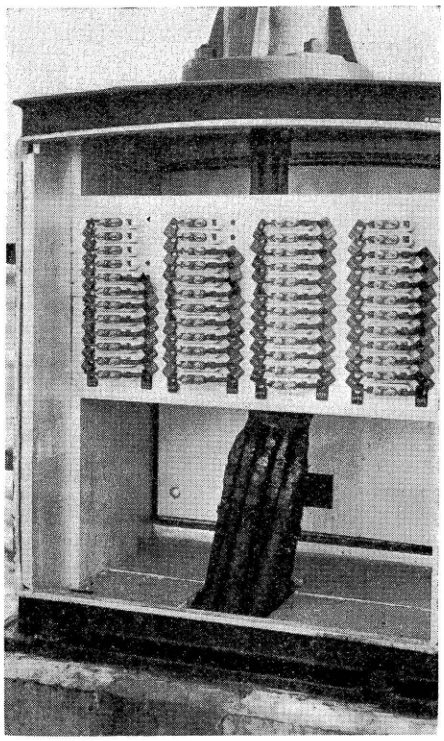
The main wire runs over the plant area are in Okonite manufactured aerial cable, with woven covering, supported from stranded ⅝-in. Copperweld messengers run on short creosoted pine poles set not more than 75 ft. apart. These cables terminate in large junction boxes at central points, from which underground cables extend to the signals, switches and track connections. Accompanying illustrations show typical aerial cables and the interior of one of the junction boxes. As will be noted from the view, the underground cables are brought up through a hole in the concrete foundation, with the outer protecting covering extending up into the case where the ends of this protection are taped and painted to prevent moisture from getting back into the cables. The 110-volt a-c. is distributed over the plant on open line wires run on cross arms at the top of the cable posts.

Track Connections

Standard I.C. bootleg outlets are used at the rail connections. A two-conductor No. 9 Okosheath cable, without lead sheath or steel tape covering, runs underground and up through a hole in the concrete foundation where the wires are connected to two ½-in. through bolts, which



Power switch layout at E. B. junction—Note plates extending from rail to machine



The outer protective covering of the cable extends to the terminal board

are insulated from the case, and extend to the outside where the seven-strand Copperweld cables are bolted on and extend to plug connections in the rail. This same type of construction, i. e., using the insulated through bolts, is used for connections between switch circuit controllers and the rails for shunting circuits.

Signals and Switch Layouts

The power switch machines are the G.R.S. Model-5A equipped for operation on 110 volts d-c. Standard lock and point-detector rods are connected to I.C. type front rods. The Bossert type switch adjuster is used for the throw rod. The underground cables are brought into a cast-iron terminal box integral with the switch machine. The front four ties of each switch layout are equipped with the Racor-type adjustable rail braces riveted and welded to 1 in. by 7 in. tie plates. A special tie plate extension is used on each switch machine tie to make a rigid connection between the switch machine and rail and eliminate any lost motion in the rods.

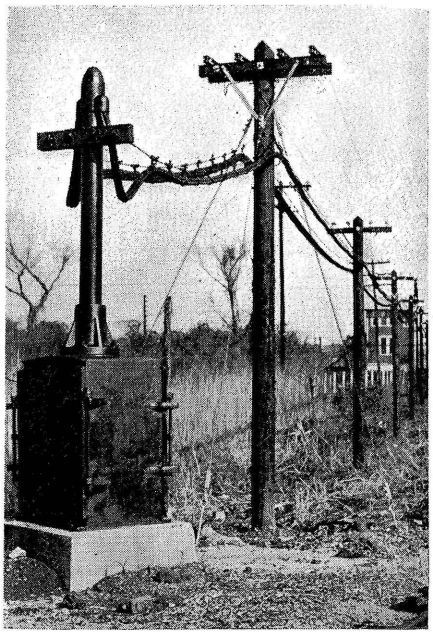
The high signals, as well as the dwarfs, are of the Union searchlight type operating on low-voltage d-c supply. A typical location, including a dwarf as well as high signals, is shown in one of the illustrations. The signal lamps are normally lighted from the a-c. supply, but a stand-by storage battery is provided to take the load in case of an a-c. outage.

Protection at Crossings of Industry Tracks

At three locations between Southport and East Bridge Junction, a single-track industry track of the I.C. crosses the new double-track line of the N.O.P.B. At each of these crossings a Hayes derail was installed on the I.C. and located 50 ft. from the N.O.P.B. track in each direction of approach. These two derails are pipe connected to a Union T-10 switch stand which is equipped with a G.R.S. electric lock stand. When a switching crew wants to use one of these tracks, the conductor telephones to the towerman to get a lineup, and, if time is available, the towerman operates a knife switch which puts battery on the switch lock, thus unlocking the device so that the trainman can operate the derails. While the derails are off the track, the signals in the approach are held at stop.

Highway Crossing Protection

The highway crossing protection installed at the crossing of Jefferson highway with the new double-track line of the N.O.P.B., consists of standard A.A.R. Signal Section flashing-light signals with illuminated STOP signs. These signals are controlled automatically by track circuits using interlocking relays in the usual manner, for operation by trains in either direction on each track. The same general type of



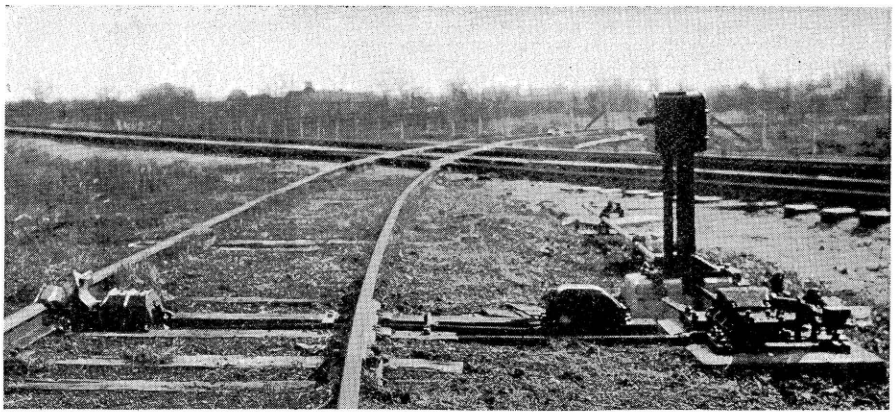
Aerial cables for outside wiring are run on a separate pole line

an installation of crossing signals was made at the Severn Avenue crossing of the N.O.P.B. line.

East Bridge Junction Plant

The new track layout at East Bridge Junction includes four crossovers, two turnouts and eight home signals, which are controlled by 28 working levers in the new G.R.S. electric interlocking located in a new tower at this location. Color-light signals and Model-5A switch machines are used throughout and in general the construction is very similar to that previously explained as applying to the Southport plant. The design and construction of both the Southport and the East Bridge Junction plants were handled by the signal forces of the Illinois Central.

The G R.S. electric interlocking at West Bridge Junction, as well as the automatic block signaling on the approaches and on the bridge, was designed and constructed by signal forces of the S.P. and as this work was not completed until after the I.C. program was in service complete details of the S.P. construction are not as yet available.



Industry and secondary crossing tracks include hand-throw derails with electric locks