

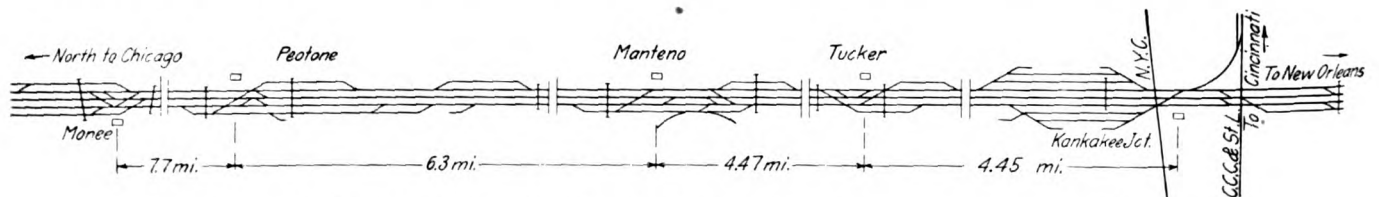
North Bound Home Signal Bridge at Peotone

Signaling Increases Capacity of Three Tracks

Center Track Signaled Both Ways, With Interlocking Allows Fast Trains to Pass Slow Ones

THE AUTOMATIC SIGNALING and interlocking plants will play an important part in handling the traffic on the 21-mile stretch of third track now nearing completion on the Illinois Central between Monee, Ill., and Kankakee. The outstanding feature of this installation is the fact that the routing of trains on the three tracks is left to the towermen, conflicting moves on the middle track which is signaled for both directions of traffic being prevented by electrically interlocked circuits between the towers. The flexibility with which the routing may be changed prevents stops and delays and is thus considered to be the most important characteristic of the system as contrasted to three-track installations on

This district is just south of the four-track Chicago suburban zone, and in addition to the Illinois Central traffic also handles all trains of the Cleveland, Cincinnati, Chicago & St. Louis between Kankakee and Chicago. An average of approximately 32 passenger and 58 freight trains are handled in this territory daily. The preponderance of traffic is northbound between 4 a. m. and noon and southbound for the remainder of the 24-hour period. This section of the line, then double track, was equipped in 1906 with two-arm lower-quadrant semaphore automatic signals, which are now being replaced by three-color indication light signals. The installation of automatic block color-light signals extends north of



Track Plan Showing All Passing Tracks and Crossovers Between Monee and Kankakee

other roads with established hours for certain directions of traffic, and which are broken only on written train orders from the dispatcher.

The two outside tracks are signaled for the normal direction of traffic, the blocks being approximately one mile in length, while the middle track is signaled with one-mile blocks for both directions of traffic. As shown in the track diagram this territory is split up by five interlockers, the track layouts and the crossovers being so arranged at these plants that a towerman can divert a train from either outside track to the center track or the reverse. The advantage of this arrangement is that, for example, with a slow freight going north on the outside track a following passenger train can be switched over to the middle track to pass the freight and then be switched back to the normal northbound track at the next plant. As the middle track is signaled in both directions, it may be used for southbound trains in the same manner.

Monee on the four tracks to Olympia Fields, a distance of six miles. At the four new interlockers and also at Kankakee Junction, single unit color indication light signals are used for the home signals. An article describing the reconstruction of this line, including the reduction of grades and the addition of the third track, was published in the *Railway Age* of December 16, 1922, page 1123.

Train Movements Controlled by Traffic Direction Signals

An interesting feature of this installation is that no set rule is established for direction of traffic on the middle track, the routing of trains on the three tracks being left to the levermen in charge of the interlockers. The advance signals on the middle track, which govern movements out of the interlockers, are considered as "traffic direction" signals. An explanation of the control of these signals will show how the duplex signaling of the middle track increases the track

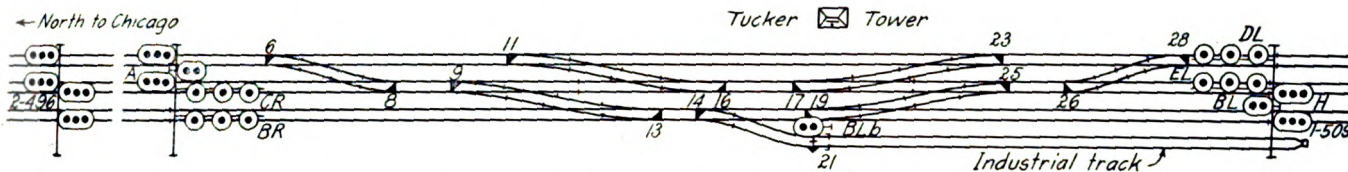
capacity of this 21-mile, three-track section. The fundamental characteristic of this installation, in contrast to other similar installations, is that the control and operation of signals for the middle track at adjacent interlockers, is so interlocked electrically as to prevent conflicting train movements, the presence of the train preventing a change in the signal routing.

When a leverman desires to switch a train over from an outside track to the middle track all signals of the plant governing movements to the middle track must be placed at danger. In order to reverse the lever to clear the advance signal governing the entrance to the middle track it is necessary to get an "unlock" from the leverman at the tower in

the time each train passes and the time of its arrival at the next tower, also indicating which track the train used. A separate telephone line of two No. 9 copper wires has been placed on the signal pole line with telephones in each of the five towers, this circuit being used primarily for direct communication between towers. In addition to this line a telephone in each tower is connected to the regular telephone dispatching circuit.

All Signals Are the Light Indication Type

The automatic block signals on this installation are the three-color light indication type of the Union Switch & Signal Company, Type R. The "red" light on the bottom indicates

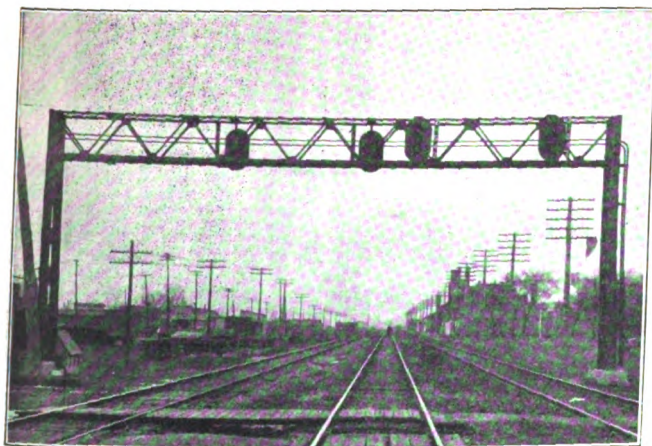


Track and Signaling Plan of the Interlocking Plant at Tucker, Ill.

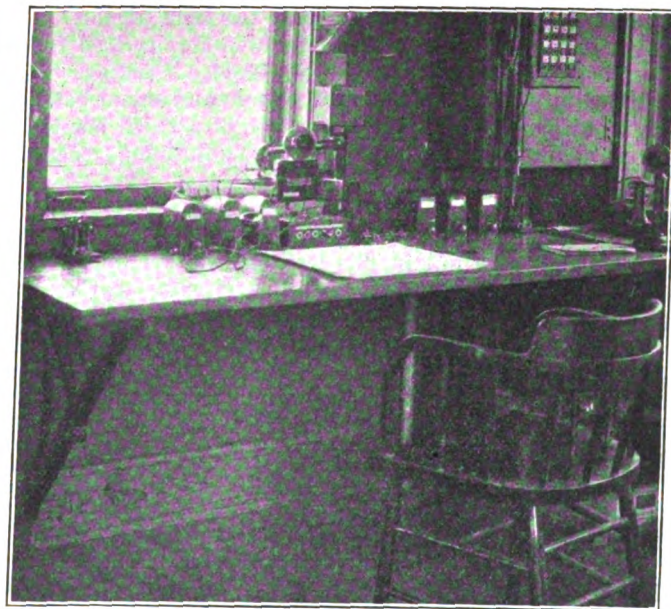
advance. For example, to clear the northbound signal A at Tucker, the leverman at Tucker (see signaling plan) must first phone to the leverman at the Manteno interlocking, requesting an "unlock"; when the Manteno leverman pushes the button marked "unlock from Tucker," a lamp at Tucker indicates that all is clear. The Tucker leverman must then reverse the lever A before the button at Manteno is released. This lever A remains in the reversed position until a change in the direction of traffic over the middle track becomes necessary.

If a following train is to use the middle track and the leading train has passed the first automatic block signal

"stop," the immediate block is occupied; the middle light, which is yellow, indicates "caution," the second block is occupied; and the top light, which is green, indicates "clear," meaning that two or more blocks are unoccupied. Only one of these lights can be illuminated at once. However, the flash over from one indication to the other is so quick that the signal is not dark for a perceptible time. These signals are designed for long range daylight or night indication; even under adverse conditions of the sun shining into the lens



Typical Automatic Block Signal Location



The "Unlock" and "Permissive" Buttons Are Located on the Operator's Table

No. 2-496, the leverman calls the Manteno interlocker, asking for a "permissive," at the same time holding his own "permissive to Manteno" button in. As soon as the Manteno towerman pushes his button marked "permissive from Tucker," the traffic direction signal A governing the entrance to the middle track will again be cleared automatically. For train movements southbound over the middle track, a separate set of buttons performing similar functions is used.

It should be understood that the only possible opposing train movement onto this middle track must be made from the next interlocking. As the lock circuit between the two towers, controlling the operation of the levers, is broken through all the intervening track relays, a signal indication permitting a reverse move cannot be given until the middle track between the two plants is entirely unoccupied.

The towermen are required to set down on a record sheet

a minimum range of 4,000 ft. is assured, while at night the indication can be seen readily for miles. At the same time, on account of the signal being mounted so low, an engineer in a locomotive cab can see the indication plainly up to the time he is within 75 ft. of the signal.

In contrast to the automatic block signals, the home signals at the interlocking plants are the single unit, three-color indication, search-light signals, made by the Hall Switch & Signal Company. In this signal but one electric lamp is used, the three-color indication being secured by one inch colored roundels mounted in a movable vane at the focus of the lens and operating in a plane parallel to the lens. The

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lens of this signal is 10 in. in diameter, surrounded by a shield disk 3 ft. in diameter.

All signal lights are ordinarily illuminated by alternating current at 8 volts. This 8-volt circuit is fed through the front contacts of a 110-volt a.c. vane relay which is normally energized. However, in case the a.c. supply should be cut off the vane relay drops and throws the lights on the 10-volt signal storage battery. As soon as the line is again energized the lights are switched back to the a.c. feed automatically.

All signals on the installation are mounted on four-track signal bridges. In order further to increase the contrast between the automatic signals and the home signals the three-color automatic signals are mounted on a line above the bottom girder of the bridges while the home signals consist of three of the search-light signals mounted one above the other at 5 ft. spacing, the bottom one being on a line with the bottom girder of the bridge.

Local Control Circuits of Automatics

The track circuits extend from signal to signal, the maximum length being 6,000 ft. The red light for the danger indication is energized through a back contact of the 2-ohm track relay when released due to a train in the block. When the train passes out of the immediate block this relay is picked up, thus breaking the back contact which extinguishes the red light and then making a front contact, which illuminates the yellow light giving the caution indication. This circuit is fed through a back contact of the 640-ohm line relay; therefore as soon as the train passes out of the second block, the line relay picks up, the yellow light is extinguished and the green light is illuminated, giving the "clear" indication.

Two cells of 84 a.h. Exide battery connected in multiple are used for each track battery. All the light signals and the line circuits at a signal bridge location are operated from a battery of two sets of five cells of the 84 a.h. storage cells connected in multiple. Each track battery and signal battery is kept under floating charge by the use of a Leich non-tune double wave type rectifier with an adjustable external rheostat for each rectifier.

The Pole Line and A. C. Feed

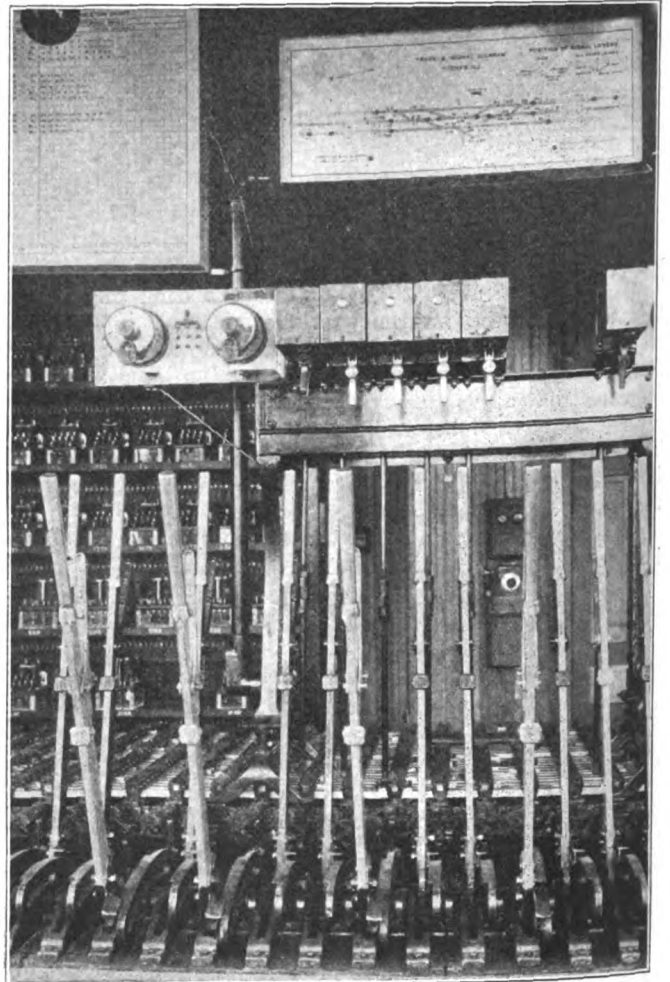
The signal pole line in this territory was rebuilt and an additional cross-arm added. All line circuits are No. 12 weatherproof copper clad. The R.S.A. standard dead-end construction, using strain insulators, was used at all signal locations. No. 14 insulated solid copper wire is tapped to the line wire "pig tails" and is carried in a made-up cable to carbon block arresters on the board mounted in the center of the relay box.

The 440-volt a.c. feed for the floating battery charge is carried on the two No. 6 copper wires on the top arm on the field side. Alternating current at 2,300 volts is purchased from the power company at Matteson, Monee, Bradley and Tucker. This voltage is cut down to 440 volts by a transformer for the signal line feed. At each signal location is a small 120-v. air-cooled, outdoor type transformer to reduce the voltage to 110 volts for the operation of the rectifiers and lighting transformers. Sectionalizing switches are placed at each power feed so that the line can be cut off, cut through or fed from either end.

Four Electro-Mechanical Interlockers Installed

Electro-mechanical interlocking plants were installed at Tucker, Manteno, Peotone and Monee to handle the crossovers, and the passing track and industry switches. These machines are all of the same size, with a 36-lever mechanical and an 8-lever electrical unit. The three tracks continue straight through each of these plants with a crossover for each direction between both the northbound and the middle track and also between the southbound track and the middle

track, as is shown in the layout of the Tucker plant. The layout of the crossover permits parallel simultaneous movements to or from the middle track and outside tracks. The main line crossovers are 378 ft. long, using No. 18 frogs, which permit train movements at a comparatively high speed. At Monee, the four tracks from the north converge to three tracks. At Kankakee Junction on the south end of the three-track section, additional levers were added to the existing electric plant to provide for the three-track to two-track junction. With the installation of these interlockers all main line switches entering the middle track in this three-track territory are operated by the towermen, with the exception of two sets of crossovers at Kankakee junction which are locked



Electro-Mechanical Interlocking Machine at Tucker

with electric switch locks controlled by the Kankakee junction towerman.

All switches are handled by mechanical levers, pipe-connected. No derails are used on the main tracks, but Hayes type derails are used at the industry tracks. The electric levers are used for the signals, and as the switches are lined up for the several routes, selection is made to the proper signal. Thus a single electric lever may be used for several signals and in one case an electric lever operates five signals. This illustrates the economy of the electro-mechanical machine over the straight mechanical type, which would require a lever for each signal and in addition an electric lock for the home signal levers.

At the interlockers the signals used for back-up moves and train movements out of passing and industry tracks, are the two-color-light dwarf type, which is mounted between tracks on horizontal concrete foundation. The signal case was designed to incline four degrees from the vertical, mak-

ing it possible to receive a better close up indication. The interlocking machines are all Union Switch & Signal Company electro-mechanical Type S-8.

No Trunking Used

It is noticeable that no wooden trunking was used except for the bootleg connections to the rail on either the automatic signals or the interlockings. All wires from the tower to the relay boxes are carried in factory made cables of No. 14 copper insulated wire. Where highways cross the tracks in the limits of an interlocking, the cables are carried over the highway, being supported on each side by a 25-ft. steel pole. Parkway cable buried 18 in. below the base of the rail is used for all rail connections.

The wiring on all signal bridges is carried in galvanized iron conduits, Crouse-Hinds condulets being used at all turns and outlets.

The installation of these interlocking plants and automatic signals was handled entirely by signal department forces of the Illinois Central.

Louisville & Nashville Authorized to Issue Stock Dividend

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION on February 24 issued an order authorizing the Louisville & Nashville to issue \$45,000,000 of capital stock to be distributed as a dividend on condition that certain holdings of stock of affiliated carrier companies shall not be disposed of without first procuring permission from the commission, and that no expenditures made prior to October 1, 1922, shall hereafter be capitalized by the issue of bonds or other securities to reimburse the treasury.

By a report and order in this proceeding entered December 17, 1921, the commission disposed of so much of the company's application as related to its first and refunding mortgage bonds, but deferred consideration of its request for authority to issue \$53,000,000 of capital stock, or such portion thereof as the commission might permit, by distributing the same pro rata among its stockholders as a dividend. Additional evidence has been recently submitted in support of the proposed stock dividend.

No objection to the granting of this part of the application was presented.

The company has an authorized capital stock of \$125,000,000, of which \$72,000,000 was outstanding. On September 30, 1922, its funded debt unmatured account showed a book liability of \$244,074,595, of which \$41,190,535 was held by or for the applicant and \$202,884,060 was actually outstanding.

The unmatured funded debt actually outstanding as of that date was more than 2.81 times the par value of its outstanding stock. The amount of such debt, however, will be less than twice the par value of its outstanding stock after the distribution of the stock dividend authorized.

To justify the proposed stock dividend the applicant contended that a stock base of at least \$125,000,000 is necessary to enable it to meet its present and future financial requirements, including the refunding of outstanding bonds, without exceeding the 3 to 1 ratio prescribed in its first and refunding mortgage. This contention assumes, the commission said, that its pecuniary needs are to be met largely, if not entirely, through bond issues, but it may be that a substantial portion of its capital needs can be met, hereafter as heretofore, by appropriations from income or surplus.

The applicant urged that the stock dividend should be authorized because a great part of its income, which might

have been paid to its stockholders, has been used to improve and add to its properties. In this connection it asserts that the amount of its outstanding stock is small in comparison with the extent, value and importance of its properties, and that its surplus far exceeds the amount of the proposed dividend. It presented evidence to show that its investments aggregated \$153,363,800 on June 30, 1902, and \$371,453,832 on September 30, 1922—an increase of \$218,090,032; that \$216,555,626 of this increase was on account of road and equipment (including \$1,939,865 improvements on leased railway property) and \$1,534,406 thereof on account of securities and other assets; and that between those dates there was an increase in its capitalization of but \$125,408,512.

Since there is evidence, the report says, that no proceeds of capital stock or of long-term obligations, issued prior to June 30, 1902, were in its treasury on that date, the record establishes that the applicant expended and charged to its investment accounts, during the period stated, \$92,681,520 which has not been capitalized. The balance sheet as of September 30, 1922, shows a book surplus of \$82,912,437, investments aggregating \$371,453,832, and total assets of \$432,068,206.

The company contended that it has the absolute legal right to distribute, in the form of a stock dividend, its entire surplus, regardless of the nature of the assets of which it consists, but the commission holds that it should authorize the capitalization of those assets of the carrier only which have been provided and which are intended for continuing productive use in the service of transportation. Such assets are referred to as "capitalizable assets." Regarding these the commission says in part:

The book investment of the applicant in affiliated companies on September 30, 1922, was \$22,564,217, of which \$18,385,158 was invested in stocks. We are of the opinion that, ordinarily a carrier may properly capitalize investments in the stock of another corporation where and only where, the latter is the owner of operated railway property and the carrier's holdings are sufficient and essential to give it control of that corporation and it appears that such control will probably be permanent. Since our order herein will prevent the applicant's disposing of any stock of the Nashville & Decatur Railroad Company or of the Central Transfer Railway & Storage Company without first procuring permission from us in this proceeding, its present holdings of stock in these companies will be treated as capitalizable assets. The applicant holds a majority of the stock of the Nashville, Chattanooga & St. Louis and of the Louisville, Henderson & St. Louis, and may be permitted to capitalize these holdings under the rule above stated. Special circumstances justify our authorizing it to capitalize its stock holdings in three other companies. The applicant and the Southern Railway Company are joint and equal owners of all the stock of the Woodstock & Blocton Railway Company, and operate their respective trains over its road, each retaining for itself the revenues earned and bearing its proportion of the cost of maintenance and of jointly operated switching service. They are the virtual owners of the properties of this company. The applicant holds two-thirds, and the Chesapeake & Ohio one-third, of the stock of the Lexington Union Station Company and they jointly use its property. In order to encourage the construction and use of union stations, a carrier may properly be allowed to capitalize its actual investments in the stocks of union station companies, whether or not its holdings give it control. And, for similar reasons, the applicant will be granted authority to capitalize its holdings of stock in the Missouri & Illinois Bridge & Belt Railroad Company. It holds 9.09 per cent, and other carriers the remainder, of the stock of that company, the properties of which are used by them to cross the river at St. Louis. The applicant's book investment in the stocks of these seven companies is \$13,641,416. Our order will contain a provision concerning the stocks of the five companies last mentioned similar to that relating to the Nashville & Decatur stock. The applicant has consented to such a provision. The present record does not justify the finding that the applicant's investments in the stocks of other affiliated companies are capitalizable.

The applicant's balance sheet as of September 30, 1922, shows \$72,000,000 of capital stock and \$202,884,060 of long-term obligations actually outstanding; and the applicant concedes that \$10,995 of government grants should also be treated as a capital liability. Its actual capitalization on that date may therefore be stated as \$274,895,055. The nominally issued and nominally outstanding