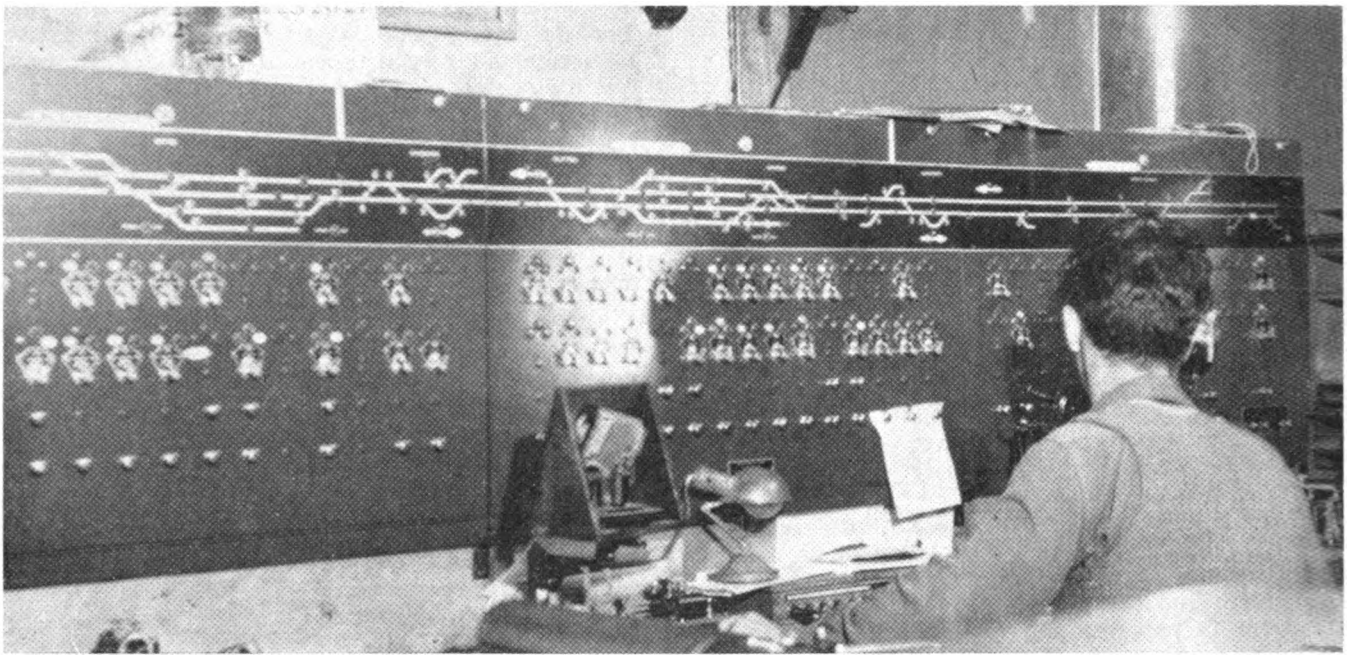


This machine at Gilman controls the C.T.C. on the 20 miles of two main tracks

Double-Track C. T. C. on Illinois Central

Train operation by signal indication in both directions on both tracks on 20-mile section, handling about 100 trains daily

THE Illinois Central has installed centralized traffic control on 20 miles of two-track main line between Otto, Ill. and Gilman. Here the line traverses prairie country with very light grades, not exceeding 26 ft. per mile. In this 20 miles the line is tangent except for two ½-deg. curves near Ashkum, and a ¾-deg. curve at North Gilman.

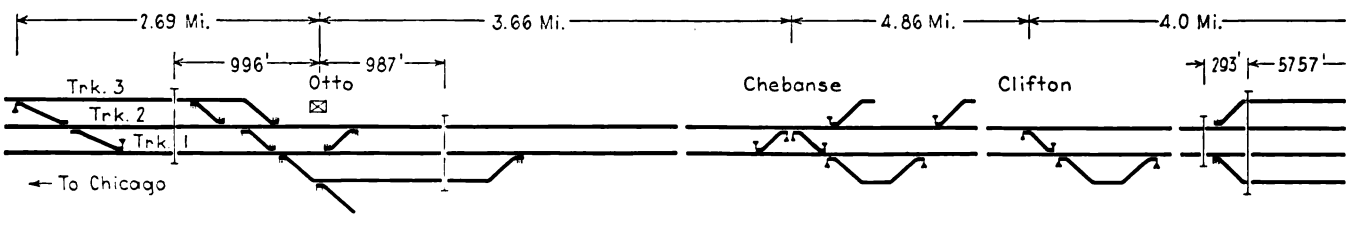
From Chicago south to Otto, 60 miles, the I.C. has three or more main tracks. Double track extends south from Otto through Gilman and on south through Centralia on the route through Memphis to New Orleans and other Southern cities. At Gilman a single-track main line branches off to the southwest extending 215 miles through Springfield, Ill. to St. Louis, Mo.

The 20-mile section of double track between Otto and Gilman must handle not only the trains on the north-and-south, Chicago-Centralia-Memphis-New Orleans route, but also the trains on the Chicago St. Louis route. For this reason an increased capacity of the two tracks between Gilman and Otto as compared with the two tracks south from Gilman is essential.

Of a total of approximately 100 trains on the Otto-Gilman territory, the daily schedule includes 20 passenger trains and 16 scheduled freight trains. Coal and other dead freight are handled in extra trains; about 50 to 65 such trains being operated daily; thus the total number of trains daily may range from about 85 to 100 or more.

Same Problem Back in 1924

So far as the number of trains is concerned, the problem in this territory was approximately the same 25 years ago as it is now. At that time the Illinois Central was one of the forerunners in the practice of authorizing train movements by sig-



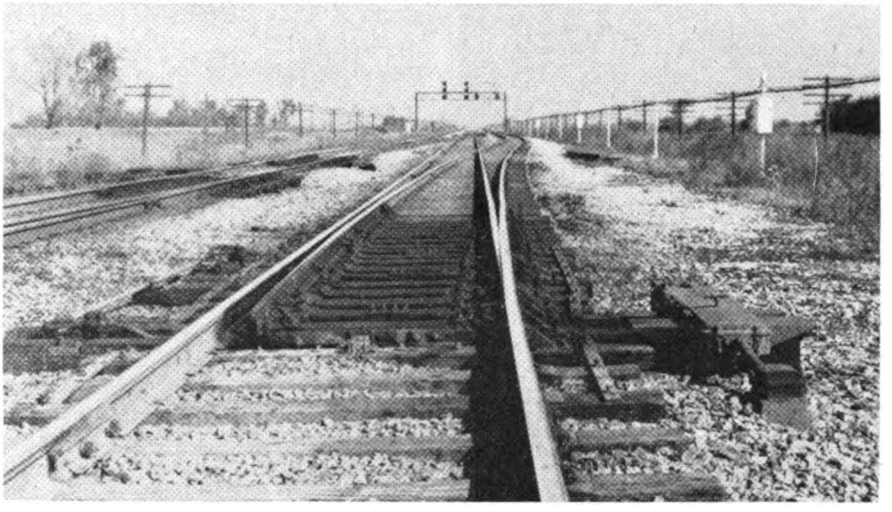
Track plan of the C.T.C. showing the power switches and hand-throw

nal indication, without train orders. As a new practice at that time on double track, the Illinois Central in 1924 signaled both tracks for train movements in both directions on the 20 miles between Otto and Gilman. As a means of diverging trains to make run around moves, crossover interlockings were installed at Otto, Chebanse, Clifton, Ashkum and North Gilman, located about five miles apart. In those days maximum speed was 60 m.p.h. for passenger trains and 30 m.p.h. for freight trains. At such speeds satisfactory run-around moves could be made in the average 5-mile spacing between the crossover interlockings. Otto, Chebanse and Clifton were of the electro-mechanical type, and the one at North Gilman was all-electric.

During the financial depression of the 1930's, traffic was reduced to the extent that the interlockings at

Map of Otto-Gilman section

Chebanse, Clifton and North Gilman were closed, and later were removed from service. However, the track layouts were unchanged and switches equipped with electric locks. This left controlled points at Otto, Ashkum and Gilman spaced about ten miles apart. In 1940 spring switch mechanisms for leaving the yard at North Gilman were installed at the leaving end of sidings.



Power switch machine at end of three tracks in the layout at Otto

When operating these interlockings to line up for run-around moves, the levermen at these interlockings were under the direction of the dispatcher at Champaign, 47 miles south of Gilman. As train speeds increased, there was greater difficulty in coordinating operations of the interlockings to make run-around moves to the best advantage. Increased operating expenses at these interlockings were also an important factor.

C.T.C. Installed

Therefore, a decision was made in 1951 to install centralized traffic control. New electric switch machines were installed at the crossover switches to replace mechanical pipe operations at the interlockings at Otto and Ashkum. Signals controlled by C.T.C. were installed as shown on the plan.

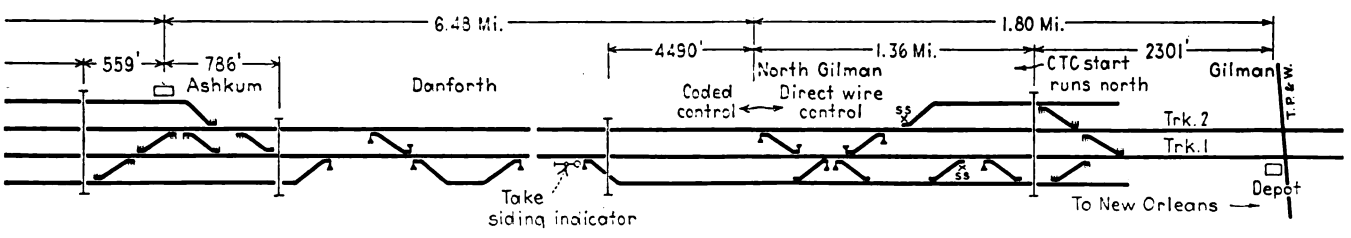
One passing track extends south from Otto, and two passing tracks extend north from Ashkum. The power switches at one end of each siding are in the limits of interlocking layouts. The switches at the far ends of these sidings were equipped, in 1924, with electric switch machines and signals controlled remotely from the nearest interlocking.

At each of the five locations, Otto, Ashkum, North Gilman and the two outlying ends of sidings, the switch machines, signals and traffic locking are now consolidated to form a traffic control system between Otto and North Gilman operated by line-code equipment from the new centralized traffic control machine in the office at Gilman. The traffic control system between North Gilman and Gilman is by direct wire. This office also contains the panel-type interlocking machine for the control of an interlocking at the crossing of the Illinois Central with the Toledo, Peoria and Western just south of the depot.

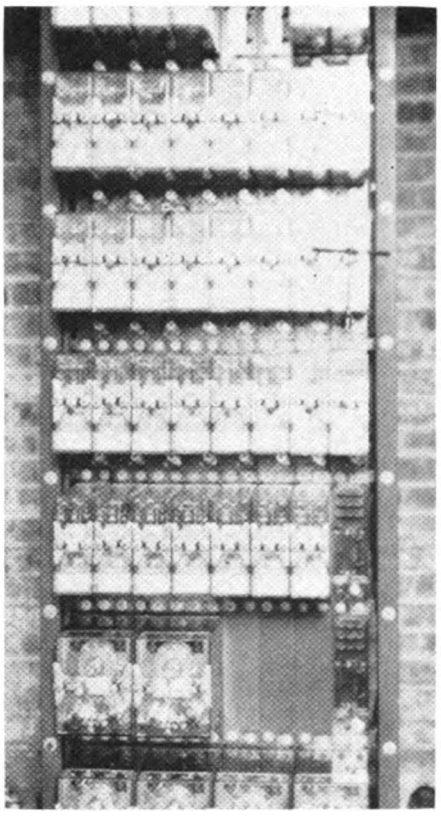
The operator in charge of the C.T.C. machine has a complete "picture" on his illuminated track diagram to see the location of and progress being made by all trains in the Otto-Gilman territory and approaches thereto. Under the general supervision of the dispatcher, this operator can control the switches and signals on the entire territory to coordinate operations of trains most effectively, on a minute-to-minute basis. Cooperation between this C.T.C. operator at Gilman and the leverman of the interlocking at Kankakee has reduced delays to trains going from the double-track north to three-track at Otto, or from three-track south to two-track.

Delays on Branch

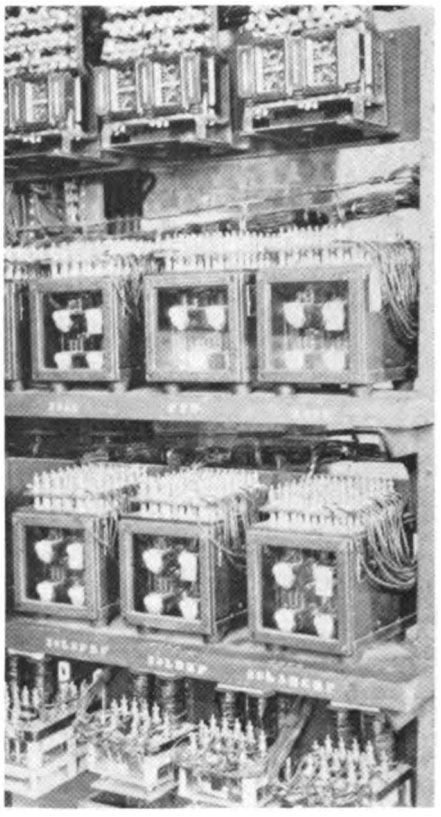
A branch line extends west from Otto to stone quarries and on to Bloomington, Ill. Previously there was delay in getting branch line



switch with electric locks on the entire territory



Plug-in relays at Otto



Line code equipment at Otto

trains through the interlocking at Otto, thus causing delays to through main line trains. With the C.T.C. these delays have been reduced decidedly. Also an important item is that the C.T.C. results in a saving of about $16,000 annually in operating expenses at each of the towers which were closed, such as at Otto and Ashkum.

Equipment Added

The signals throughout this territory are the color-light type just the same as they were prior to the change-over to C.T.C. The home signals are the triangular color-light type, and the automatic signals are the vertical type. Signals are equipped with 10-volt, 18 plus 3.5 watt double-filament lamps. These lamps are fed from a.c., being normally lighted. If the a.c. fails, the lamps are cut over to feed from storage batteries, with approach control to save the batteries.

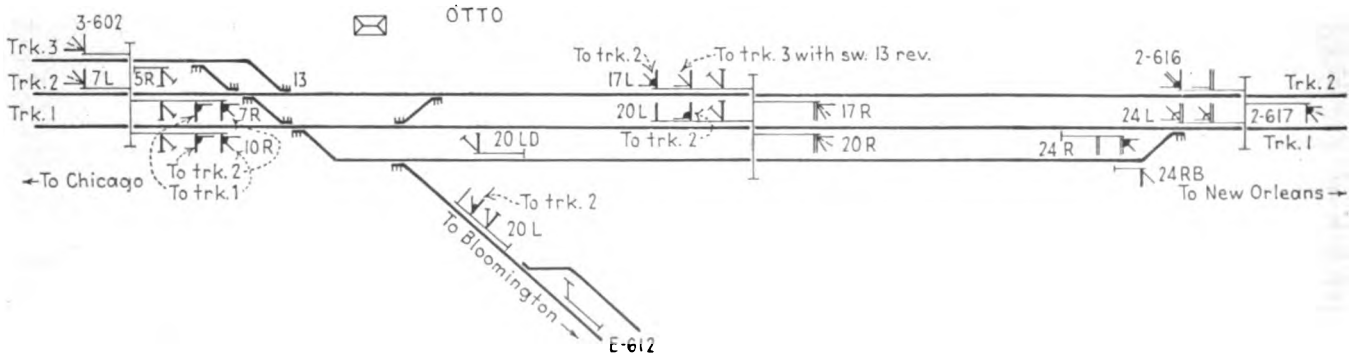
Fourth Aspect is Flashing-Yellow

As installed in 1924, the automatic blocks were properly spaced for train stopping distance and therefore three aspects—red, yellow and green—were adequate. As train speeds increased through the years, braking distances increased to more than the lengths of some of the blocks. Therefore a change was made to three-block, four-aspect signaling so that two blocks are available for train stopping distance. In this four-aspect system, when a signal displays red, the next signal in approach displays yellow, and the next signal displays flashing yellow. When displaying such an aspect, the lamp in the yellow unit of the signal flashes 40 times per minute, being so controlled by a flasher relay.

Home signal indications are given by three light-signal heads in a vertical row, as shown in one of the pictures herewith. The traffic-direction signals for one direction are mounted on the opposite side of the bridge from the interlocking home signals for the other direction. The traffic-direction signals are the vertical color-light type, and they differ from automatic block signals, only in the fact that they have no number plates.

As installed in 1924, the interlocked crossovers between main tracks, and the turnouts from double-track to three-track at Otto, were No. 18, which are good for diverging train moves at 30 m.p.h. Therefore, for a diverging move, the home signals can display the medium speed aspect, and the approach signal displays the approach-medium aspect. This gives an engineman information so that he can bring his train up to and through the No. 18 turnouts at the speed for which they were designed. In more recent years when installing new rail, new No. 20 crossovers and turnouts have been installed to replace some of the old No. 18. These new No. 20 turnouts are good for diverging moves at 40 m.p.h. At Otto for example, the medium-speed aspect on home signals and the approach-medium aspect on approach signals applies only to diverging routes good for 40 m.p.h. Information to this effect is given in the time table. Thus aspects and rules are consistent to direct enginemen to use these No. 20 turnouts and crossovers to an advantage.

The track circuits are the d.c. type with 2-ohm relays. The line control relays are rated at 670 ohms and are each controlled by a two-wire polarized line circuit. A two-wire traffic direction circuit is used for each track in the overall block between Otto-Ashkum or Ashkum-North Gilman. These circuits and



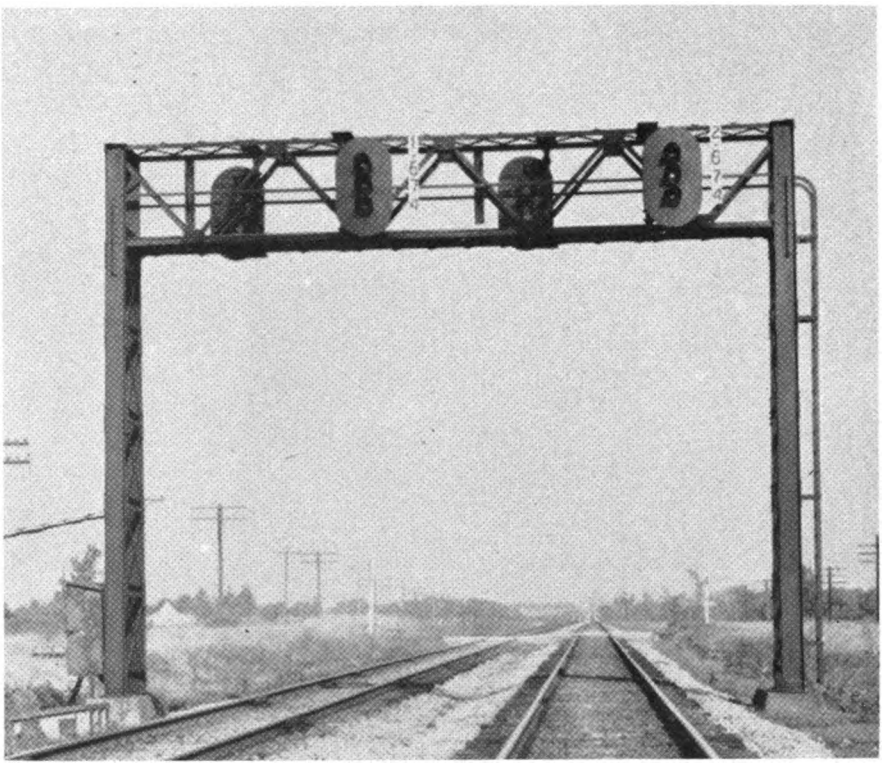
Track and signal plan of entire Otto layout which is now part of the C.T.C. controlled from Gilman

relays are essentially the same as they were before the changeover to C.T.C.

At Otto, Ashkum and North Gilman completely new local circuit networks were installed, centering at the old tower buildings. Line coding equipment in each tower controls the "plant" as a part of the C.T.C. system controlled from the machine at Gilman.

The code equipment, relays and batteries are in the ground floor rooms of the old interlocking towers. Consideration has been given to the removal of the upper floors and if done the buildings will be one story high. At each layout such as Otto, the 1951 program included the installation of entirely new circuit control networks, including G.R.S. Co. plug-in relays which are on a panel as shown in one of the pictures.

The line code equipment and relays associated therewith at each layout such as Otto, are of the shelf type, made by the U.S.&S. Co. This equipment is mounted in racks built by the Illinois Central signal forces. Uprights of these racks are 2 in. by 6 in. with back panels of 1 in. by 8 in. boards. Shelving is made up of 2-in. by 10-in. boards. On the back of each code relay rack is a battery bus of No. 6 wire which forms a complete loop around the back of the rack. Each relay taps off this line individually, so that disconnecting one relay does not break the battery circuit. Solderless terminals made by Aircraft Marine Products Corp. are used on all the new wiring. Wires go direct to code units, relays, rectifiers, etc., thus eliminating the use of terminal boards on the racks.

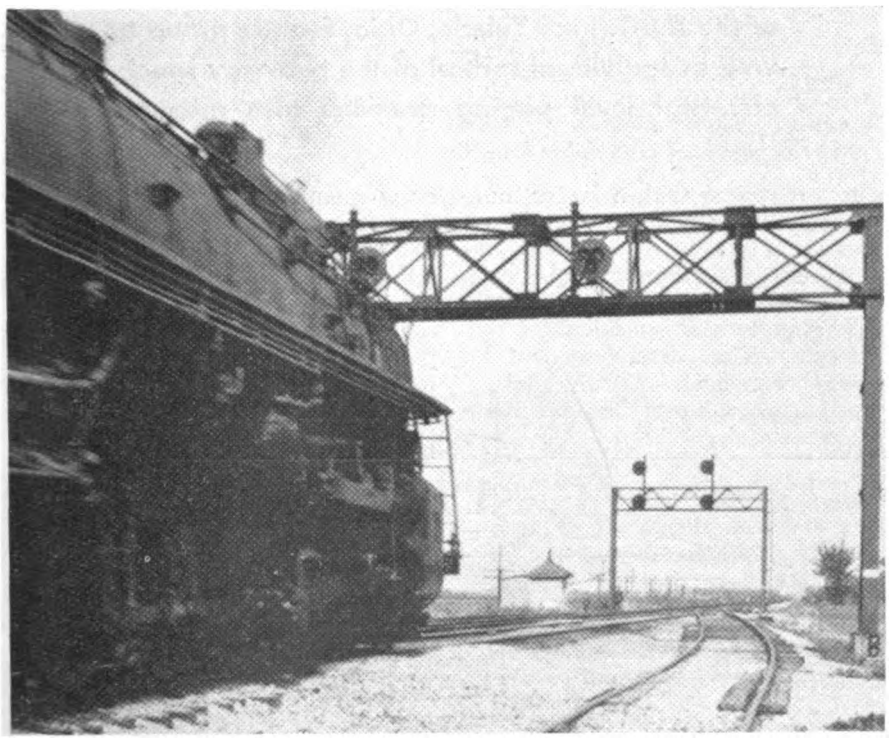


Signals for trains in both directions of both main tracks

At locations such as the Otto interlocking layout, new storage batteries were installed. Each switch battery consists of 12 cells of 160-a.h. In the "tower" is a set of 10 cells of 80-a.h. battery to feed local relay and control circuits and also the code equipment. These batteries are the lead type made by Exide, and are on floating charge from Fansteel rectifiers.

When constructing the signal system in 1924, a new pole line was constructed for signal circuits. This line has creosoted pine poles spaced 132 ft., and carries two 10-pin arms. Two No. 6 copper wires with braided weatherproof covering originally carried 440-volt a.c. power. New power taps were later installed and the 440 volts was reduced to 110 volts. Two No. 9 bare copper wires are for a telephone circuit. The signal line control circuits and the traffic direction circuits are on No. 12 Copperweld wire with braided weatherproof covering. When installing the C.T.C. in 1951, two new No. 8 Copperweld wires with $\frac{3}{64}$ in. Neoprene covering were installed for the code circuits.

Work on this project was done by railroad forces under the supervision of H. G. Morgan, Signal Engineer. A. A. Freiberger, signal supervisor, had direct charge of the construction work, and W. H. Scoles and C. B. Vincent were crew foremen on the wiring work. The coding equipment, the C.T.C. control machine and relays associated therewith were furnished by the Union Switch & Signal Co. Switch machines, their associated relays and all the relays in the circuit networks, which are the plug-in type, were furnished by the General Railway Signal Co.



North end of Ashkum siding is in C.T.C. control