Single-Track with C.T.C.

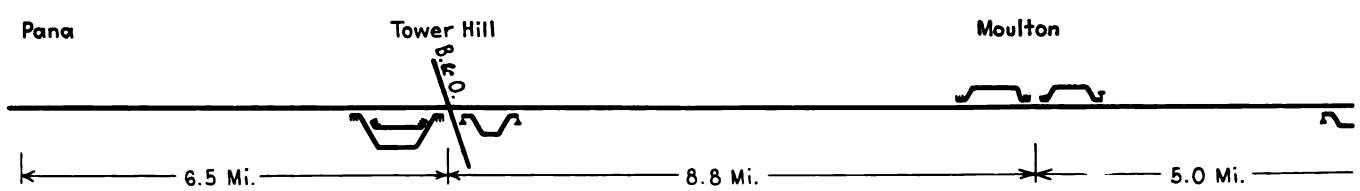
THE New York Central has installed centralized traffic control on 39 miles of single-track main line between Mattoon, Ill., and Pana, where 38 to 41 trains are operated daily. This is part of the 252-mile Illinois division between Indianapolis, Ind., and St. Louis, Mo., all of which is double track, except 40 miles between Sandford and Mattoon yard, and 38 miles between Karl, just west of Mattoon, and Pana.

In the 39 miles between Mattoon and Pana, six mechanical interlockings previously included the operation of one switch at end of double track and a total of 14 mechanical switches at ends of sidings; and also power switches at ends of sidings were controlled from the nearest interlockings. The 1950 project, herein being discussed, involved the removal of these six mechanical interlockings, power switch machines being installed to operate the 13 switches formerly in the mechanical plants, and the installation of a C.T.C. system, with a machine in the dispatcher's office, to control the switches at the end of double track and the sidings, as well as the signals at these switches. Now, with the new C.T.C. system, the dispatcher controls the switches and signals directly. With information shown on the illuminated track diagram on the C.T.C. machine, the dispatcher can watch the progress being made by trains, and, therefore, on a minute-to-minute basis, he can control switches and signals to make closer meets. Thus, by direct control, train movements are closely coordinated to save time. The levermen formerly employed at these interlockings were needed for similar work elsewhere on this railroad.

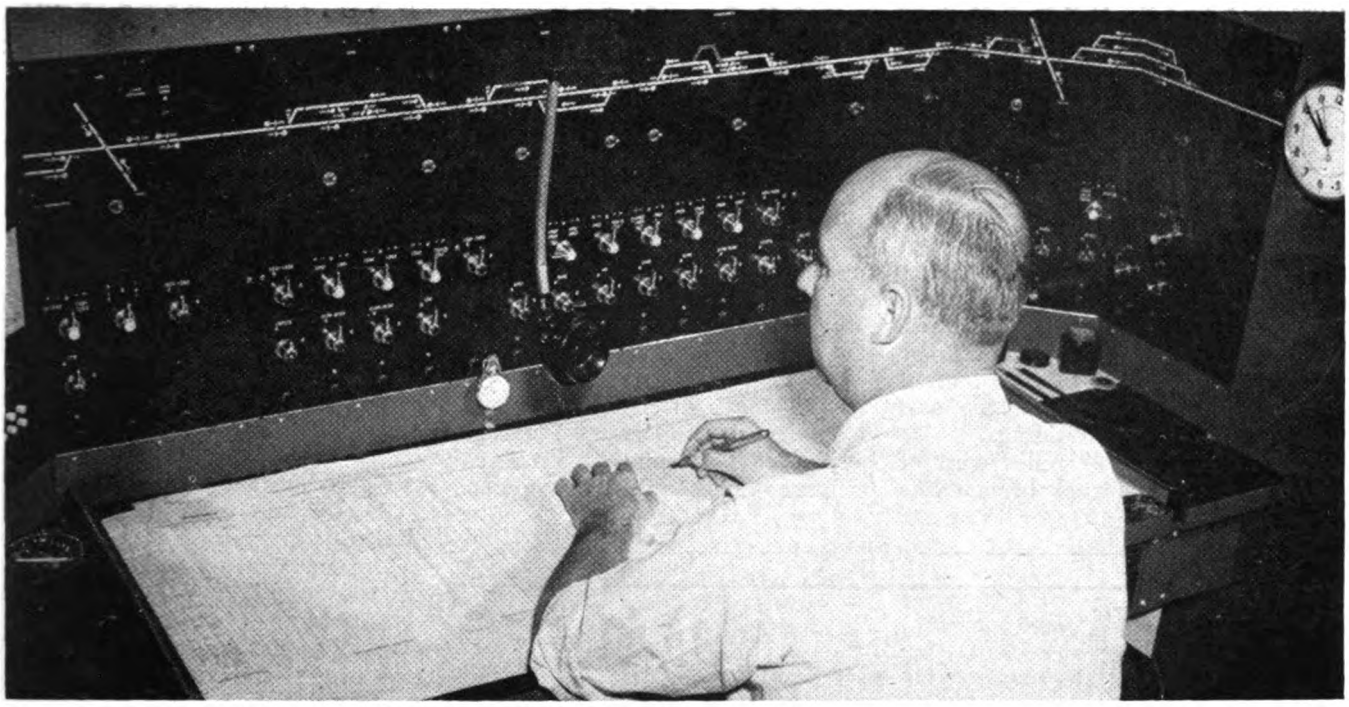
The 1950 program between Mattoon and Pana included changes at the various interlockings as follows:

At Karl, about 1 mile west of Mattoon station, a single-track branch line of the Illinois Central crosses the New York Central. The mechanical interlocking, which had been in service at this crossing, was removed. Signals for authorizing train movements on both roads are now controlled as part of the C.T.C., which also includes the control of a new power switch machine at the west end of double track, previously operated as part of the interlocking.

At Gays, 7 miles west of Mattoon,



Track plan showing sidings and railroad crossings on 39 miles of



New power switch machines and signal shown in picture on opposite page are now controlled by the dispatcher's centralized traffic control system thus replacing mechanical interlockings which were controlled locally

Handles 40 Trains Daily

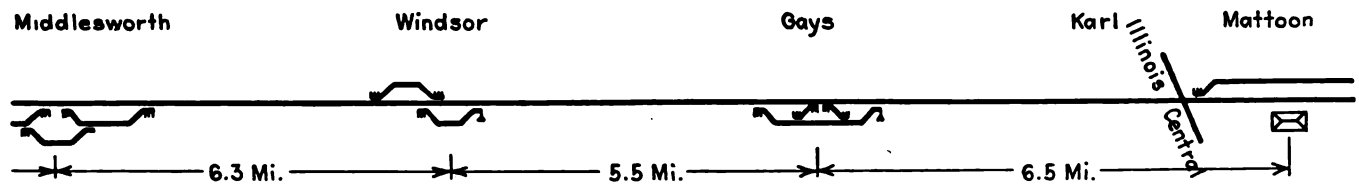
A change from six locally controlled mechanical interlockings at sidings, to power switches, included in dispatcher-controlled system, coordinates train operations and reduces operating expenses

there are two crossovers between the main track and the siding at a point near the center of the siding which is 8,200 ft. long. The old mechanical interlocking at these crossovers was removed. New power switch machines and signals at these crossovers are included in the new C.T.C. A power switch machine and signals, previously in service at the west end of the siding, and controlled from the interlocking at Gays, are now controlled by the C.T.C., as is also the electric lock on the hand-throw switch at the east end of the siding.

At Windsor, 13 miles west of Mattoon, there was a mechanical interlocking which included two switches, one at the east end of a siding, 5,000 ft. long, west of the station, and one at the west end of a 2,000 ft. siding, known as a commercial track, located east of the station. A power switch at the west end of the siding was controlled from the interlocking. The mechanical interlocking was removed, and power switch machines and signals at these switches are now included in the C.T.C. A power switch and signals at the west end of the siding, previously controlled from the interlocking, are now controlled by the C.T.C., as is also an electric lock at the hand-throw switch at the east end of the commercial track.

At Middlesworth, 19 miles west of Mattoon, there was a mechanical interlocking which included a switch at the west end of the eastward siding and a crossover between the main track and westward siding, the east end of which extended also to a pocket track. This mechanical interlocking was removed, and three power switch machines and signals were installed which are controlled by the C.T.C. A power switch at the east end of the eastward siding, formerly controlled from the interlocking, is now controlled by C.T.C., as is also an electric lock at the hand-throw switch at the west end of the westward siding.

At Moulton, 24 miles west of Mat-



single-track centralized traffic control between Pana and Mattoon

toon, there was a mechanical interlocking, including a switch at the west end of the westward siding, and a switch at the east end of the eastward siding. This interlocking was removed, and two power switch machines were installed which, with the power signals, are now controlled by C.T.C. A power switch and signals at the west end of the eastward siding, formerly controlled from Moulton interlocking, are now controlled by C.T.C., as is also an electric lock at the hand-throw switch at the east end of the westward siding.

At Tower Hill, 33 miles west of Mattoon, a single-track branch line

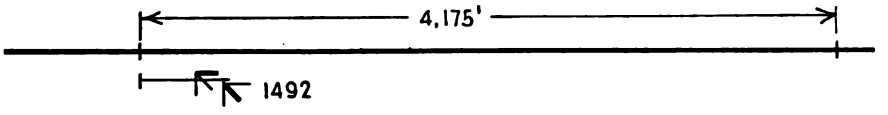


Diagram showing grade signal aspect

of the Baltimore & Ohio crosses the New York Central. A mechanical interlocking, formerly at this location, included protection for this crossing and also two switches leading to two sidings west of the crossing. This interlocking also included remote control of two power switches and signals at the west end of the two sidings. The mechanical interlocking was removed. The signals for directing Baltimore & Ohio train movements over this railroad crossing are now controlled by C.T.C. from Mattoon. Also the New York Central signals and two new power switch machines at the siding switches are controlled by C.T.C., as also are the switches and signals at the west end of the two sidings.

The automatic block signaling, previously in service on this territory, remains the same. Thus, the change, primarily, was to place the control of siding switches and signals at these switches in the C.T.C. system, rather than in interlockings at the various sidings.

Track Circuits on Sidings

This project includes track circuits on sidings which are used to control not only the track-occupancy indication lamps on "sidings" on the control panel, but also these track circuits are included in the control of signals. When a switch is reversed, the signal governing movements into that siding is cleared to display the aspect Red-over-Red-over-Yellow, and the approach signal displays Yellow-over-Red-over-Green, rule 284. With this information, an engineer can bring his train up to and through the turnout at the speed for which it was designed, rather than approaching prepared to Stop. If the siding is occupied, the Red-over-Red-over-Yellow aspect can be displayed on the home signal, but the approach signal displays Yellow-over-Red, with the bottom light not burning. The No. 10 turnouts at ends of sidings are good for 15 m.p.h., and the No. 16 turnouts and ends of double track are good for 30 m.p.h.

Dwarf Signal Aspects

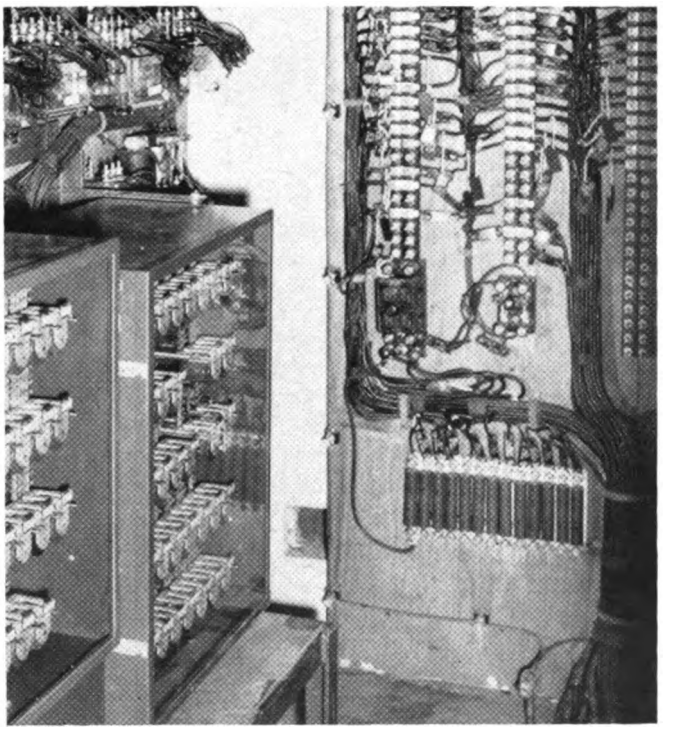
The leave-siding dwarf signals can be cleared to display Green if two or more blocks ahead are unoccupied. If only the first block is unoccupied, the aspect is Yellow-over-Red. If the first block is occupied, such a dwarf can be cleared under directional control to display Yellow to direct a train on the siding to get under way and pull out behind a train of the same direction prepared to stop short of train ahead.

Eastward signal 1492 is on a heavy eastward ascending grade, so that, if a train stopped at this signal, it would be difficult to start. Therefore, this signal is equipped with a second unit to display Red-over-Yellow as an aspect to authorize a tonnage train to pass at slow speed without stopping. This aspect is controlled directionally, and a leading eastbound train must pass beyond the first cut section—4,200 ft.—before the aspect of signal 1492 changes from Red to Red-over-Yellow.

Train Listener

On one of the line poles on this grade, there is a special box known as a "listener", which includes a microphone and a selector connected to the dispatcher's telephone circuit. When the dispatcher figures that a certain train should be "on the hill", he sends out a control to cut in the microphone which picks up the sound of the train if it is approaching or passing. Thus, the dispatcher has information in addition to that shown by the track occupancy lamps on the C.T.C. panel. There are two track-occupancy lamps for each section of main track between sidings, so that the dispatcher knows when a train is half way between sidings.

At Karl, just west of Mattoon, the Illinois Central makes switching moves over the crossing. During such periods, the New York Central signals cannot be cleared for moves over the crossing. Therefore, if the I.C. is making switching moves when there is an N.Y.C. train coming, the dispatcher presses a button which causes a loud-sounding electric op-



Interior of the instrument house at Karl, showing line code equipment wiring and terminal board

erated air horn to blow at the crossing, thus requesting the I.C. train crew to clear the crossing. If the approach section is not cleared, a time element must operate before N.Y.C. trains can operate over the crossing.

110-Volt Switch Machines

The switch machines are equipped with 110-volt d.c. motors. The reason for using 110-volt machines is that they operate quickly and with considerable force. These machines operate the switches in about 3 seconds. If there is snow, ice or a chunk of coal between the stock rail and switch point, the dispatcher can control the switch to operate back and forth until the obstruction is broken up and smashed out, so that the point will close and lock up. This saves numerous delays, especially in winter. These switch machines are the Model 5C without dual control. On each switch machine there is a safety button under the crank. When a maintainer is ready to work on a switch, he pushes this button, which prevents operation of the switch machine until he restores the button.

At each power-operated siding switch, there is a set of 60 cells of lead storage battery, rated at 16 a.h., which supplies 110-volts to the switch motor. At each field station, there is a set of 12 cells of lead type storage battery, rated at 120-a.h., which feeds the line code equipment. At each power switch location and at each intermediate signal, a set of 6 cells of 120-a.h. lead type storage battery feeds the local circuits and line circuits, and serves also as standby feed for lamps at some locations.

Insulated Boxes

One cell of the same type feeds each track circuit. The batteries at switches and signal locations are in precast, sectional type, concrete boxes, lined with a layer of Celotex insulation and set in the ground about 18 in. to 2 ft. Tests made during coldest weather showed a minimum of 26 deg. F. in these boxes. At each power switch layout, the relays, code equipment and other apparatus are located in a Permacrete precast, sectional type concrete house, 6 ft. by 6 ft. or 6 ft. by 10 ft. with a telephone compartment in one end.

The signal lamps are the single-filament type rated at 8 volts, 18 watt. The voltage at each lamp is adjusted to 7.8 volts. The lamps are approach lighted, and are replaced at the end of a burning period of approximately 600 hours. This practice has practically eliminated failures due to burnouts in service. A Fansteel rectifier unit is connected across each lamp to prevent damage by lightning. Raco Clearview arresters are used on other circuits. The line relays are rated at 200 ohms, and there is a 100-ohm approach lighting relay in series with each line circuit. The track relays are rated at 4 ohms. Throughout this territory, a program is underway to replace old relays with modern Type B plug-in relays, 50 per cent of this program being completed.

Telephones Available

The signal line control circuits are on No. 10 weatherproof Copperweld line wires which were previously in service. As part of the C.T.C. project, two new No. 10 weatherproof Copperweld line wires were added on the lower crossarm for the C.T.C. code line.

Telephone booths, or boxes, are located at Karl, Gays, Windsor, Moulton, Tower Hill, and at all the outlying power switches and hand-throw main track switches equipped with electric locks. Also, phones are located in various stations. Some of these phones are on a block line, and some can be plugged into message or dispatcher's telephone circuit, but on the average, there is a phone and a motor-car set-off approximately every road mile. Each maintainer has a portable phone that can be connected at each signal, relay house, etc.

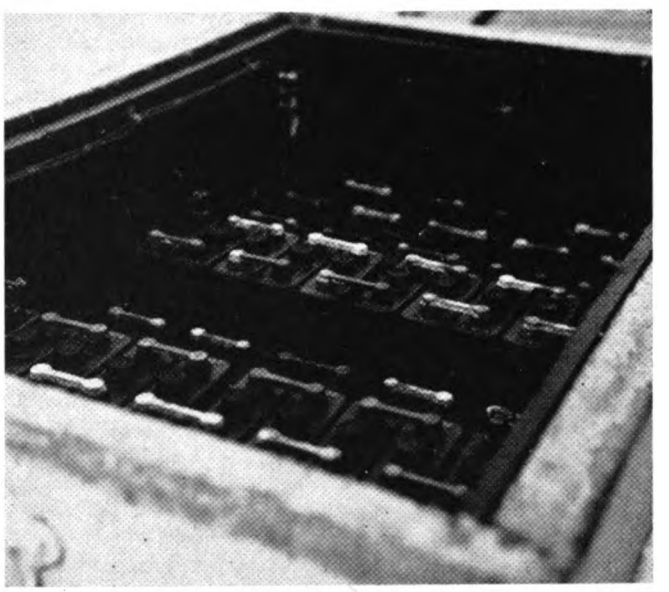
Operations of motor cars in this territory are authorized by the dispatcher by use of the written Form M, which in effect is practically the equivalent of a train order. A maintainer must have a Form M to go from one place to another, and when he arrives there, and has his car off the track, he reports, "in the clear". A check indicated that a man using a motor car, such as a signal maintainer, would lose about 15 to 20 per cent of his time to get orders to move from one place to another.

Truck for Maintainer

As practically all of the switch and signal locations are accessible from the highway, two of the maintainers on this C.T.C. territory have been furnished ½-ton pick-up type motor trucks. These trucks have open beds with a closed cab. The maintenance foreman has a sedan delivery type truck.

During the installation of the C.T.C., the construction forces were provided with 1.5-ton trucks for transportation of men and materials. A Farmall-Cub type tractor was used for many purposes, such as to fill in around foundations, and to pull a low-hung trailer to haul materials on the road or right of way. When stringing line wire, the reels of wire were placed on the trailer and paid out as the tractor pulled the trailer along.

This centralized traffic control project was planned and installed by railroad forces under the jurisdiction of J. J. Corcoran, signal engineer, New York Central System, at Cleveland, and A. M. Gilbert, assistant signal engineer, at Cincinnati. The signaling equipment, including the C.T.C. system and control machine, was furnished by the General Railway Signal Company.



Switch machines operate on 110-volts d. c. from batteries such as shown here