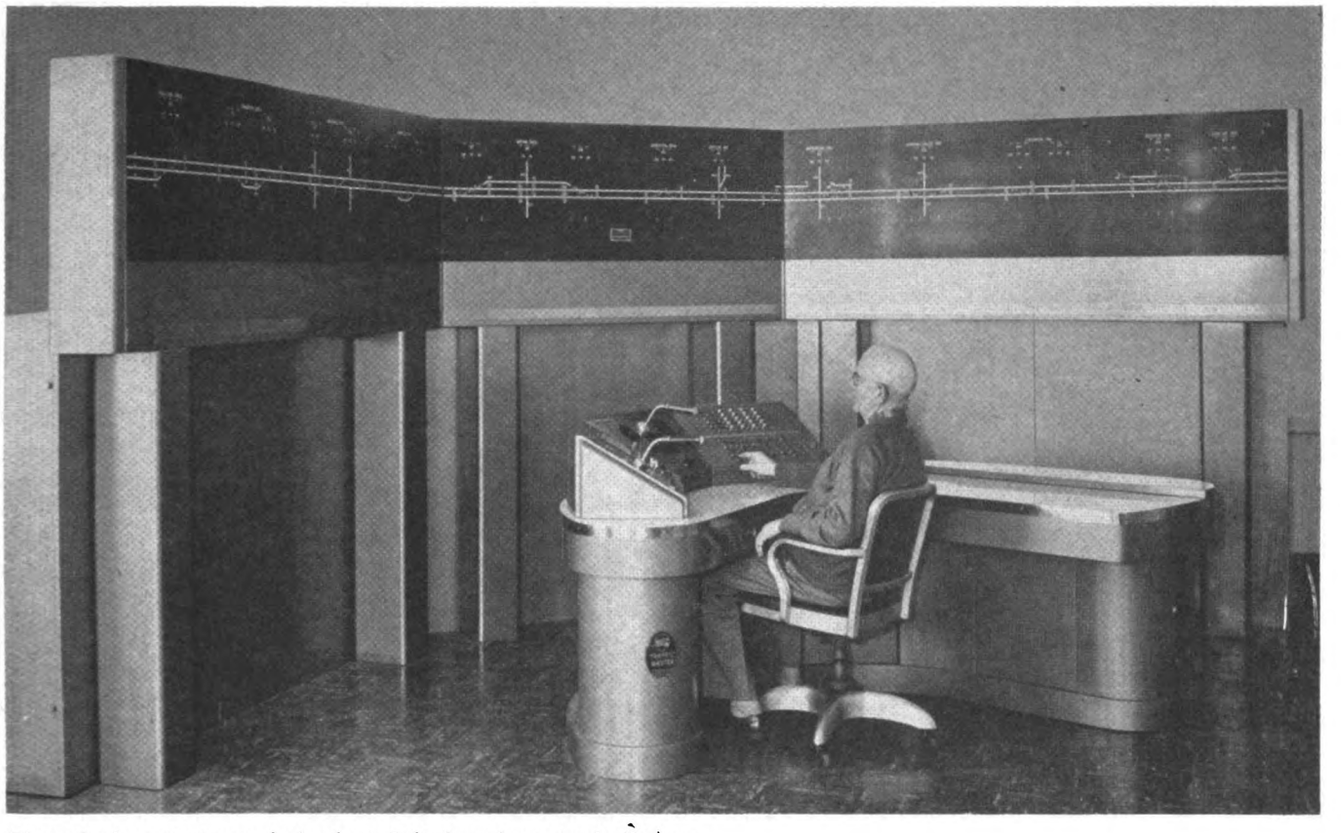


Dispatcher's seat at console is about 8 ft. from large track diagram

Pushbutton CTC Machine on NYC Is First of Its Kind

Now dispatcher sits at a small console which has a set of switch and signal push buttons that, by selection, can be used to control switches and signals at any of numerous layouts on entire division

BETWEEN Toledo, Ohio and Elkhart, Ind., the New York Central is changing to two main tracks all the way on 133 miles, of which 30 miles was previously 4-track, and 21 miles was 3-track. Adequate capacity to handle 80 trains daily on the two remaining tracks is being secured by installing Syncroscan centralized traffic control with signaling for train movements both ways on both tracks, just like two single-track lines side by side. Power-operated crossovers are located an average of 12 miles apart, so that idle sections of either main track can be used to run fast trains around slower ones, thus keeping all trains moving. These practices are somewhat the same as those used in other similar projects recently completed on this railroad. The novel feature in this Toledo-Elkhart project is the new and unique type of CTC control machine.

On conventional CTC machines, the illuminated track diagram extends across the top of the panels; the switch and signal levers being mounted on the same panels below the symbols for each controlled field location. Therefore, in such conventional practice, the requirements for the track diagram has been the controlling factor in determining the length of the control machine. Such a machine for the Toledo-Elkhart project would have been about 18½ ft. long.

Separate Diagram Solves Problem

In contrast, the control machine for this new NYC project is of a special type, the first of its kind; designed to be so compact that the dispatcher can manipulate the entire machine from a seated and stationary position. This compactness was attained by two new practices; (1) removing the illuminated track diagram (including all indications) from the control machine, and placing it on a separate large sized panel. Successful accomplishment of this objective lead to the second new practice; (2) use of one set of push buttons which, by selective control, can be used to control the switch and corresponding signals at any one of 18 layouts on the entire 133 miles.

By using these new practices, the controls for all the switches and signals on the 133 miles of double track are now concentrated on an operating panel area 14 in. high and 20 in. wide on the dispatcher's console at Toledo.

The illuminated track diagram is a separate large-sized panel mounted

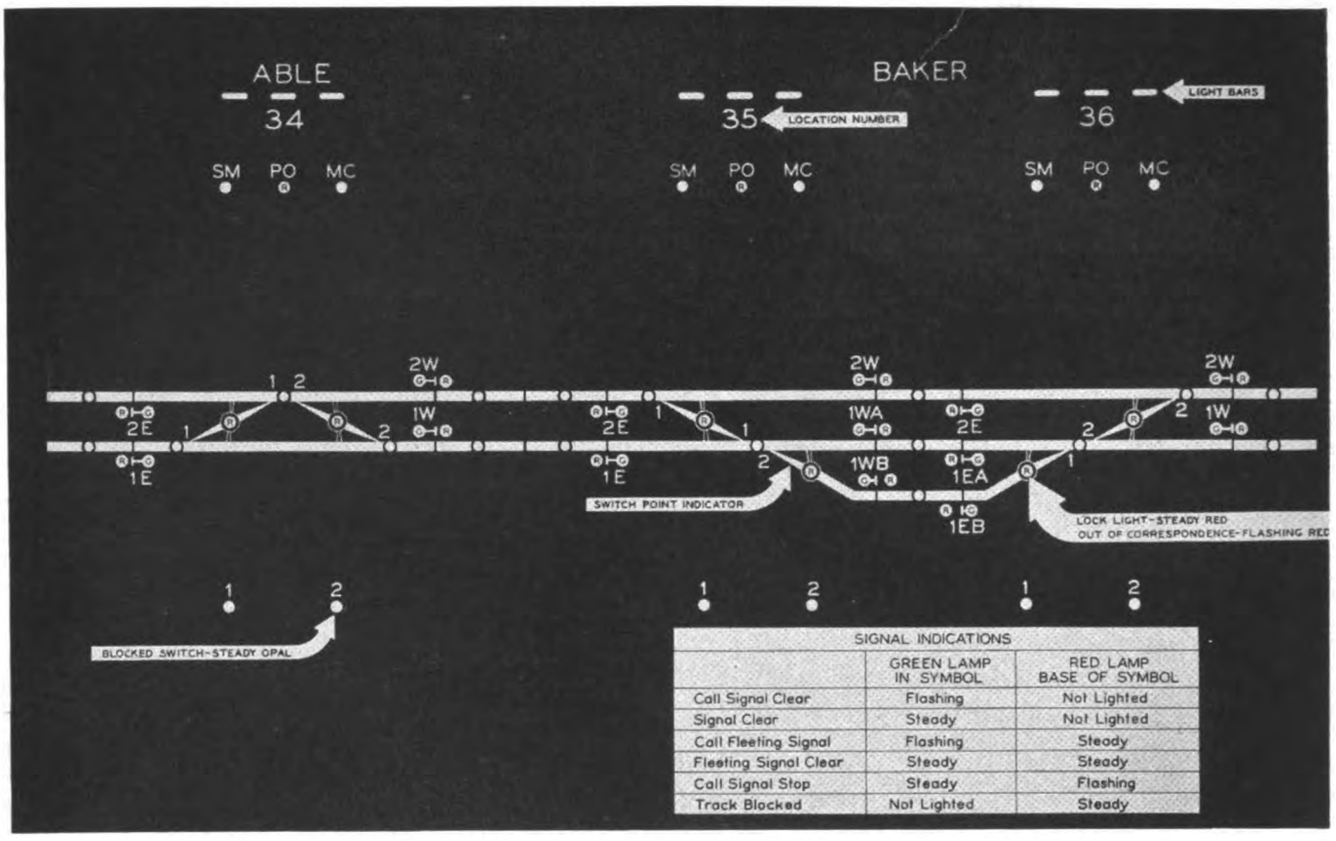


Fig. 1—This typical section of track diagram illustrates four new features

at a level 5 ft. above the floor line. Each section of this diagram is 24 in. high. The center section is about 6 ft. long, and the side wings are each about 7¼ ft. long, totaling about 20 ft. The track diagram is in plain view about 8 ft. from the dispatcher, seated in his chair at the control console.

Let's Look at the Track Diagram First

The panels of this track diagram are black, each track being represented by an engraved white line ¼ in. wide. Lamps set in the track lines, are lighted when a train occupies a corresponding section of track. Power switches and crossovers are represented on the diagram by movable switch-point indicators. A red lamp, located in each switch-point indicator, flashes when the switch is not in the position called for. When it burns steadily it indicates the switch is locked because: (1) the signal governing movements over the switch is clear, or (2) the OS track section (within the limits of that switch) is occupied by a train, or (3) time locking, at the field location of that switch, is in effect after the governing signal has been cleared and then put to stop by lever control. Thus, a steady red light, referred to as the "lock light," means that the switch is not free to be moved.

On the diagram each home signal is represented by a symbol which includes a lamp that is normally dark, thus indicating that the corresponding signal is at "stop." The lamp flashes green when control is sent out to clear that signal. This flashing green changes to steady green when the signal has cleared for an established route.

Now Let's Look at the Control Console

The dispatcher's operating panel is divided into two areas. The upper area contains "Location Selection Panels," each panel carrying five "Location Buttons" with associated indication lamps, corresponding with each field location track layout such as "Able 34" on the track diagram. Five such buttons and lamps are in a vertical row on each panel, which is 2 in. wide and 6¾ in. high. Thus, for the 18 field locations in the 133 miles between Toledo and Elkhart, 4 such small panels are required with a total area of 6¾ in. high and 8 in. wide.

The lower row of operating panels, each one measuring 2 in. wide and 6¾ in. high, are numbered consecutively 1, 2, etc. Each panel has six push buttons including "N" to control a switch to the normal position and "R" to control a switch to the reverse position; "S" to control a signal to stop, "W" to clear a westward signal, and "E" to clear an eastward signal. The button with no letter at the bottom of the panel is the code start button.

To Line Up a Route

For example, say that an eastward train on the work siding at Baker is to be routed out of this siding and eastward on the No. 1 track, which is the lower one shown on the diagram. The switch and signals to be controlled are in the No. 36 field location. Therefore, the dispatcher reaches to the upper portion of his console panel where he pushes location-selection button No. 36. The lamp adjacent to this button is lighted and, on the track diagram, the three bar lamps are lighted above the figure "36," thus indicating to the dispatcher that he can now control the switches and signals at that field location.

Then, on control panel No. 1, he pushes the "R" switch button, and at location 36 on the track diagram the switch indicator moves to display a full width white line for the track line-up desired. Thus the dispatcher, by glancing at the dia-

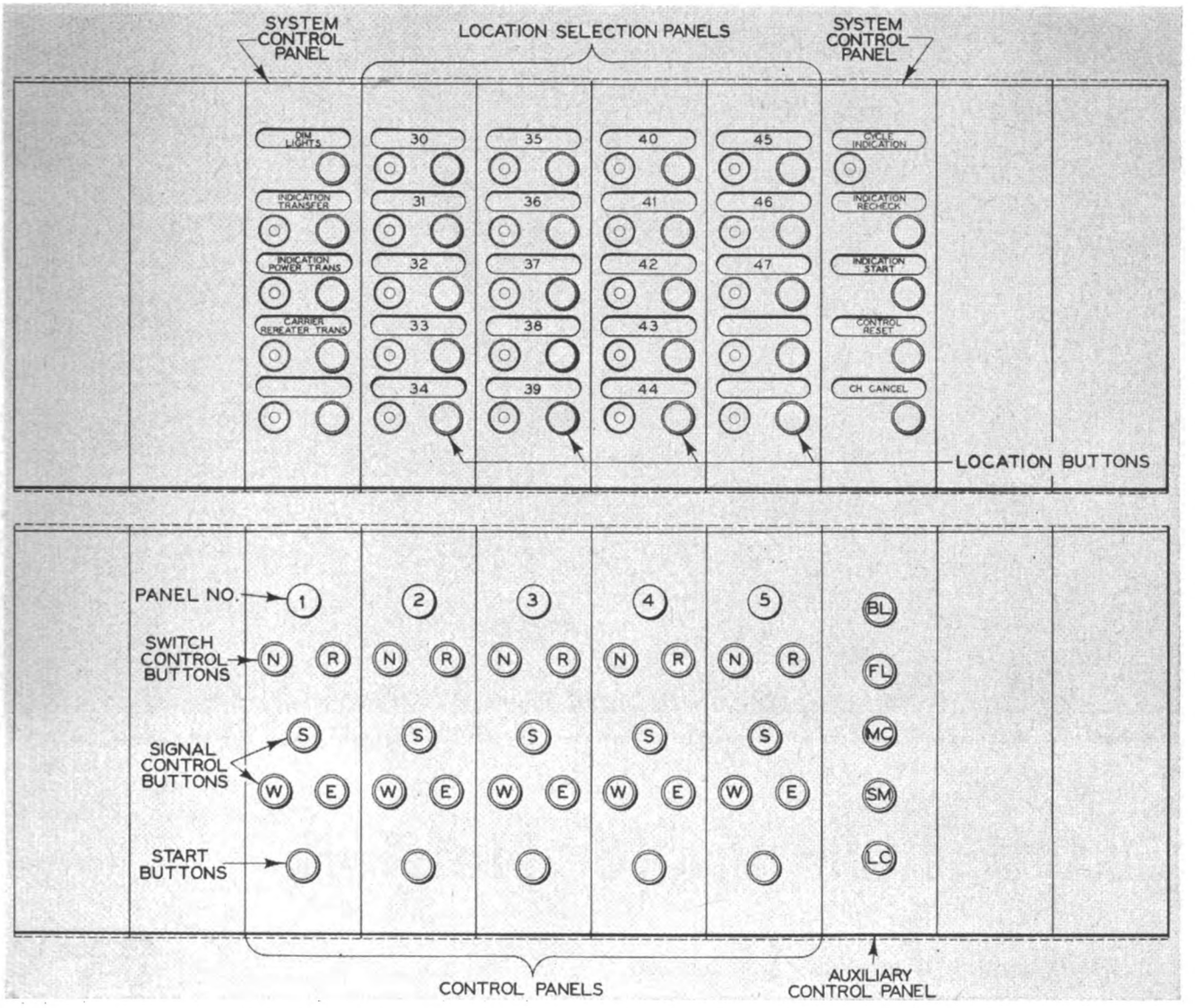


Fig. 2—The switch and signal control buttons can be made to control any field station by pushing a numbered button

gram, has a pre-check that his manipulation thus far is correct for the route desired. Then he pushes button "E" for signal 1EB at location 36, and next he pushes the code-start button at the bottom of the panel, thus transmitting the control codes to the field location. In the meantime, on the diagram, the red indication lamp in the moveable-point indicator, representing switch 1 at location 36, flashes until the switch is over and locked in the position called for, then the lamp burns steady red. Also the green lamp in the symbol for signal 1EB at location 36 flashes until the aspect of the signal changes to clear, at which time the lamp in the symbol burns steady green.

What If There Are Two Switches

Say that an eastbound train on the work siding at location 36 is to be routed out of the east end of this siding, then over the crossover reversed, and on eastward track 2, which is the top one as shown on the diagram. The dispatcher reaches to the upper row of operating panels, where he pushes location-selection button 36.

On control panel 2 in the lower row, he pushes the "R" button for control of crossover 2 to the reverse position; then on control panel 1 he pushes the "R" button for control of switch 1 at the east end of the siding, to the reverse position. He then pushes signal button E on panel 1. Next he pushes the code-start button on control panel 1, thus transmitting the control codes to field locations 36. The switch and crossover are operated, and signal 1EB clears, indications being returned to the control machine as previously discussed. If an installation included a track layout in which three single switches or crossovers would be included in a route, then the control console would be equipped with three control panel units.

An item of importance in the manipulation is that the pushing of the code-start button cancels the location-selection, and extinguishes the location lamps; both on the selection panel and on the track diagram. Thus, no further action is required to cancel a previously selected location and any other location can now be selected.

If a signal which has been cleared is to be taken away, the dispatcher pushes the location-selection button, and then, on the corresponding control panel, pushes the "S" button which causes the red lamp at the base of the signal symbol on the track diagram to flash. He then pushes the code-start button. The signal aspect will be changed from clear to stop, as is indicated by the

(Continued on page 37)

CTC Machine on NYC

(*Continued from page 25*)

fact that the green light in the signal symbol and the red light at the base of the symbol are extinguished.

Fleeting Control

If it is anticipated that two or more following trains will use the same straight through main-line route, fleeting operation of signals can be set up so that when one train has passed through, the signal will again clear for the next train, without further action by the dispatcher. Say that fleeting control is to be set up at field location 34 for eastbound trains on track No. 1 (the lower track shown on the diagram). With all switches and crossovers normal, the dispatcher pushes location selection button No. 34, then the "FL" button on the auxiliary panel, while also pushing the "E" button on control panel 1. Such a call for fleeting is indicated by a flashing green in the signal symbol, and a steady red at the base of the symbol. When the signal has cleared, the flashing green in the symbol changes to a steady green, and the red light at the base of the symbol stays steady red as a reminder to the dispatcher that fleeting control is in effect.

Blocking Control Is New Idea

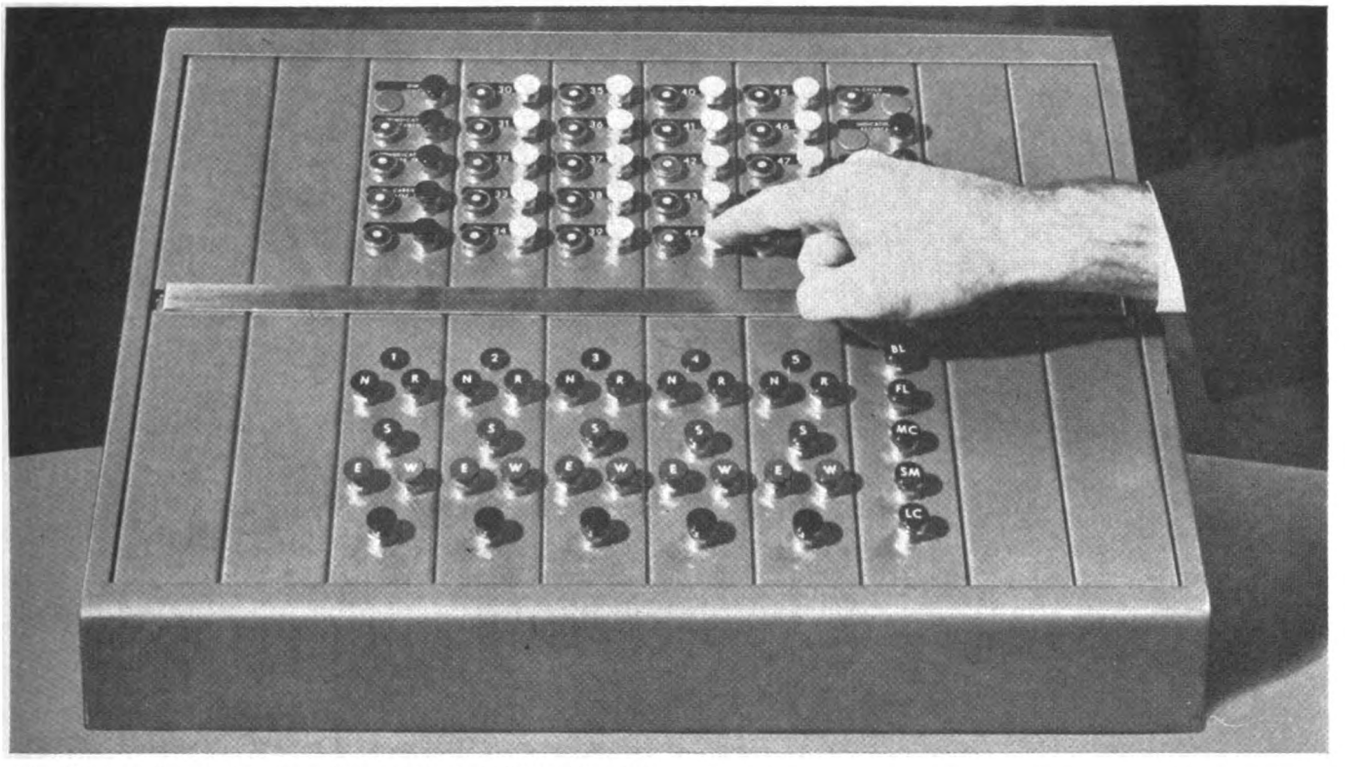
In territories controlled by previous conventional forms of CTC machines, if certain switches, crossovers or sections of track are to be "out of service" while replacements or other work are under way, operation of such switches or crossovers, or clearing of signals is prevented by placing "blocks" on the levers. This is called "blocking."

A special new idea, first applied in the CTC machine at Toledo, is that "blocking" is accomplished by manipulation of controls, including the "pulling" of buttons, the result being that absolute safety is accomplished by interlocking between circuits.

For example, if the 6 miles of No. 2 track (upper one as shown on Fig. 1) is to be used exclusively by on-track power tampers for a period of four hours, this section of track can be "blocked." To set up this "block," the dispatcher pushes the location selection button 34 then he *pulls* the signal control button for signal 2W at location 34, at the same time, while pulling this button, he pushes the blocking button "BL." On the diagram the red indication lamps are lighted at the base of the symbols for signals 2W at location 34 and 2E at location 35 to indicate that blocking is in effect, so that no signal can be cleared to permit a train to enter this section of track 2. This blocking remains in effect until cancelled by the dispatcher, which is done by pushing the location selection button, then simultaneously *pulling* both the blocking button and the appropriate signal button. Blocking of this track section could also have been accomplished at location 35.

If the crossover 1 at Able is to be blocked in the normal position, the dispatcher pushes location selection button 34. Then on control panel 1 he *pulls* the "N" switch button and pushes the blocking button BL at the same time. On the track diagram, an opal lamp is lighted below the indicator for crossover No. 1 at Able, thus indicating that blocking is in effect. As long as this blocking is in effect the crossover cannot be operated. To remove this switch block, the dispatcher pushes location-selection button No. 34 then simultaneously he *pulls* both the blocking button BL and the switch button N in panel 1.

This new and unique type CTC control machine, as well as the other signaling equipment being installed on the Toledo-Elkhart projest, were designed and made by the General Railway Signal Company.



Dispatcher pushes button to apply controls to field location 44