



Courtesy of Tucson Daily Citizen

The dispatcher now controls a larger territory than is possible with conventional CTC machines. He does so by sitting in his chair at one

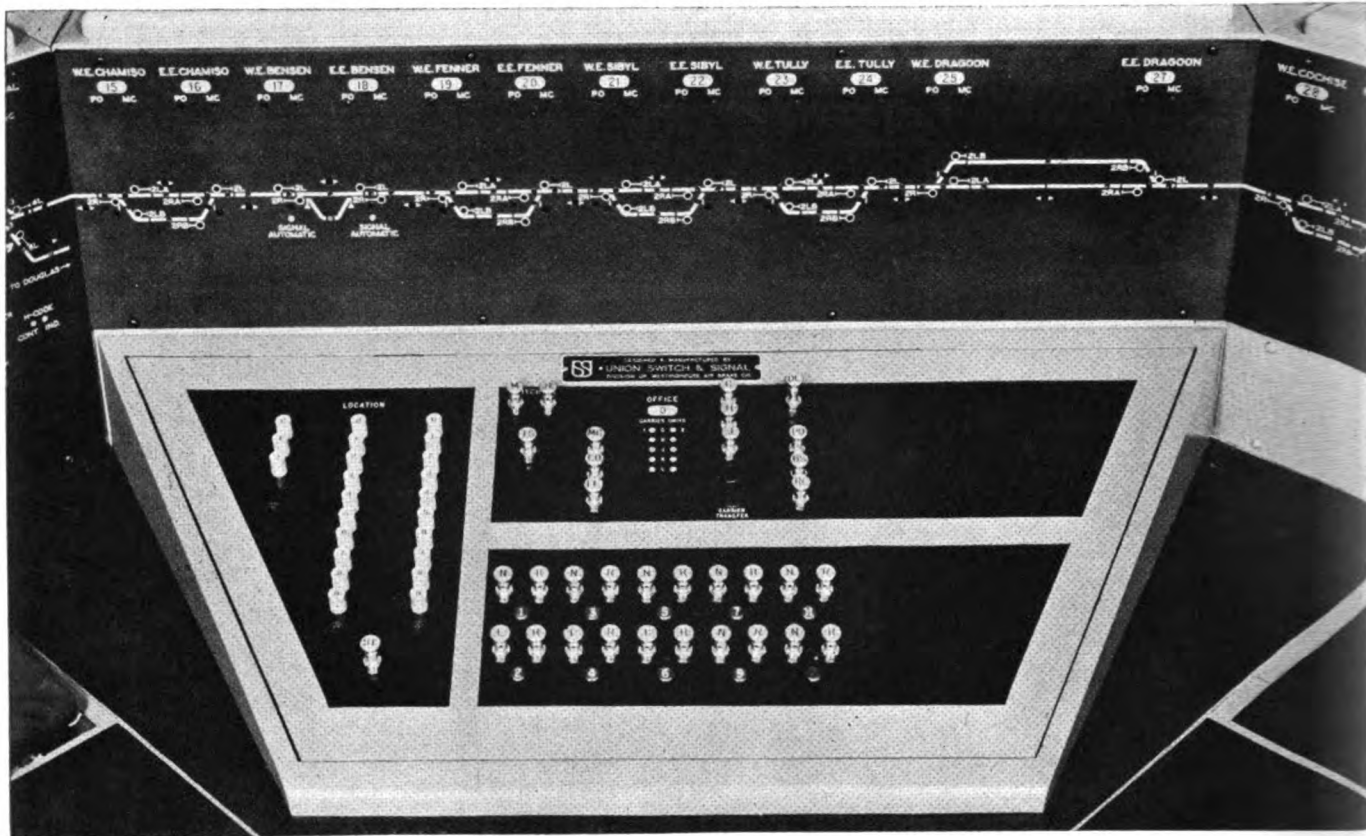
position and need not move around to various portions of the machine. All pushbuttons are located on a central panel within easy reach.

Pushbutton Console for CTC

SIX RAILROADS have ordered eight of these new pushbutton CTC machines (see table). Known as TCC (traffic control center), this machine was developed by Union Switch & Signal—Division of Westinghouse Air Brake Co. The control machine is made up of basic 3-ft modular units consisting of a track diagram section, desk portion and base. Units can be put together to form a "U" or an "L" shaped control machine. All units have plug couplings and there are no relays in the control machine. Cable runs from the machine to the rack-mounted relays in separate cabinets.

TCC INSTALLATIONS (IN SERVICE OR ON ORDER)

| Railroad | Territory | Miles |
|----------|-----------------------------------|-------|
| CN | Hornepayne, Ont.—Nakina | 132 |
| CN | Foleyet, Ont.—Capreol | 148 |
| CP | Moose Jaw, Sask.—Swift Current | 110 |
| C&O | Hampton Roads Transfer, Va.—Grove | 20 |
| DM&IR | Missabe and Iron Range Division | 104 |
| L&N | Mobile, Ala.—Michoud, La. | 127 |
| SP | Tucson, Ariz.—Gila | 128 |
| SP | Tucson, Ariz.—Anapra, N.M. | 270 |



Location buttons are at left. Function control buttons are at bottom half of console and auxiliary panel pushbuttons are above it.

For extended sections of CTC territory, the track diagram panels may be stacked one on top of another.

The CTC territory is divided into a number of "locations." A location may include only the switch and its associated signals at the end of a siding, or it may include several switches or crossovers and signals in multiple track territory.

The control console contains a location selector, several function control panels and an auxiliary control panel. The location selector, which is on the left side of the control console, contains two columns of ten pushbuttons, one column each for the "tens" and "units" of the location number. Location 35, for example, is selected by pushing button number 3 in the tens column and button number 5 in the units column. A "hundreds" column is also available if required. Selecting the location connects the function control panels to the appropriate switches and signals at that location.

A function control panel consists of two pairs of pushbuttons; one pair controls a switch or crossover normal or reverse and one pair clears the signals right or left. The total number of these function control panels required is only the maximum that are re-

quired for any one location. Generally this is six or less. These panels are only 2 in. by 6 in.

The auxiliary control panel (same size as function control panel) controls such items as fleeting, maintainer's call, snow melters, carrier transfer, indication panel light dimming, OS bell cutout, etc.

Track Diagram Panels

The track diagram panels are in 3-ft sections, which may hold from five to seven passing tracks, depending, of course, upon the particular territory controlled. The white track diagram line is 3/32 in. wide. Miniaturized one-color spotlight-type indication lamps are set into this panel. Indications given are as follows: track occupancy—amber; switch or lock—lunar white; clear signal—green within the signal symbol; fleeting—steady red below the signal symbol; in time—flashing red below the signal symbol. Flashing the lunar white switch position lamp or the green signal clear lamp indicates a route in storage.

Above the track diagrams are names over each of the individual locations, as well as a number for that location. A power-off indication lamp and maintainers' call lamp are also located at these location points on the

track diagram panel. When a dispatcher has selected a particular location which he desires to control, a white indication lamp is lighted behind the location number, so that the black number shows on a white background. This informs him that he now has control of that location.

Either a 40 or 57 pen graph may be installed in any 3-ft desk section to the right or left of the slanting control console. A communication unit takes up the space normally occupied by one of the 3-ft track diagram sections, plus the base. A Western Electric 63A selector, loudspeaker, and communications keys and jacks are provided. This communications unit may be located in any lower row of the track diagram, except that panel immediately to the rear of the control console portion.

To Line a Route

Referring to the diagram of location 35 and location 36. When a train approaches signal 2R, the track occupancy lamp is lighted amber. To select a route from signal 2R over switch 1 reverse, the dispatcher presses the location buttons 3 in the tens column and 5 in the units column. This causes the indication panel

behind the No. 35 to be lighted white. He presses switch button 1R and signal button 2R. A lunar white reverse switch position lamp in the track diagram adjacent to switch 1 will flash, indicating that he has called for this switch reverse. The green signal repeater lamp in the 2R signal symbol will flash, indicating that he desires to clear this signal. At this point the controls are stored in the machine. To initiate control code to location 35, the dispatcher presses the ST button, which is below the two rows of location buttons. When the code is sent from the machine, the white location indicator lamp No. 35 will be extinguished.

This indicates, as far as the dispatcher is concerned, that his push-buttons are now disconnected from location 35 and he may immediately select another location for control. When switch 1 has reversed and is locked in the reverse position, the flashing lunar white reverse switch position lamp will burn steady, and the flashing green signal repeater lamp will also burn steady. The signal is now clear and the route is locked. As the train passes signal 2R and occupies the OS section, a bell will sound (if the dispatcher has not pulled the bell cutout pushbutton) and an amber lamp will be lighted in the OS section. As the train passes signal 2R, the green signal repeater lamp is extinguished, indicating that the signal in the field has gone to Stop. As the train clears the approach section to signal 2R the amber indication lamp is extinguished in that section, and after the train has left the OS section and is to the right of signal 2LB, the OS amber indication lamp will be extinguished. As long as the switch is in the reverse position, the lunar white reverse switch position indication lamp will burn steady.

If the dispatcher desires to return switch 1 to normal, he again presses the location buttons 3 in the tens column and 5 in the units column. This action lights location indication 35 white. He presses switch button 1N and the lunar white normal switch position indication lamp will flash to indicate the dispatcher has called for the normal position. The steady burning lunar white reverse switch position indication lamp will be extinguished. Next he presses the code start button to send control codes to location 35 that extinguishes the white location indicator lamp behind 35. As soon as

the switch has been positioned normal, the flashing-lunar white switch position indication lamp (switch 1) will be extinguished, thus the dark panel at that location indicates that the switch is normal and signal 2R is at Stop.

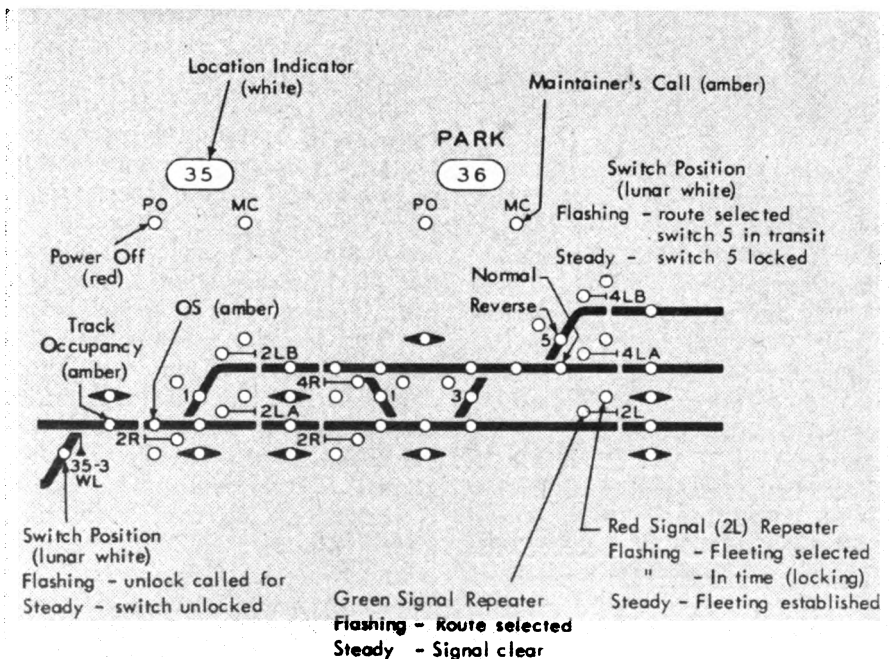
Assume now that the dispatcher desires to advance the train, which is now on the secondary main, over crossovers 1 and 3 normal and switch 5 normal. These are at location 36, known as Park. The dispatcher pushes location buttons 3 in the tens column and 6 in the units column, and the number plate at Park is illuminated white. He presses signal button 4R. Immediately, lunar white switch position indication lamps will be lighted and burn steady in the track diagram showing crossovers 1 and 3 normal and switch 5 normal. The green signal repeater lamp 4R will flash to indicate that the dispatcher has called for a clear signal. Again he presses the code start button (ST) and the white location indication lamps behind the number plate 36 will be extinguished. When the signal is cleared in the field, the flashing green signal repeater lamp in the signal symbol 4R will burn steady. The signal is now clear and the route is locked. As the train proceeds over the route, track occupancy lamps will turn amber indicating the

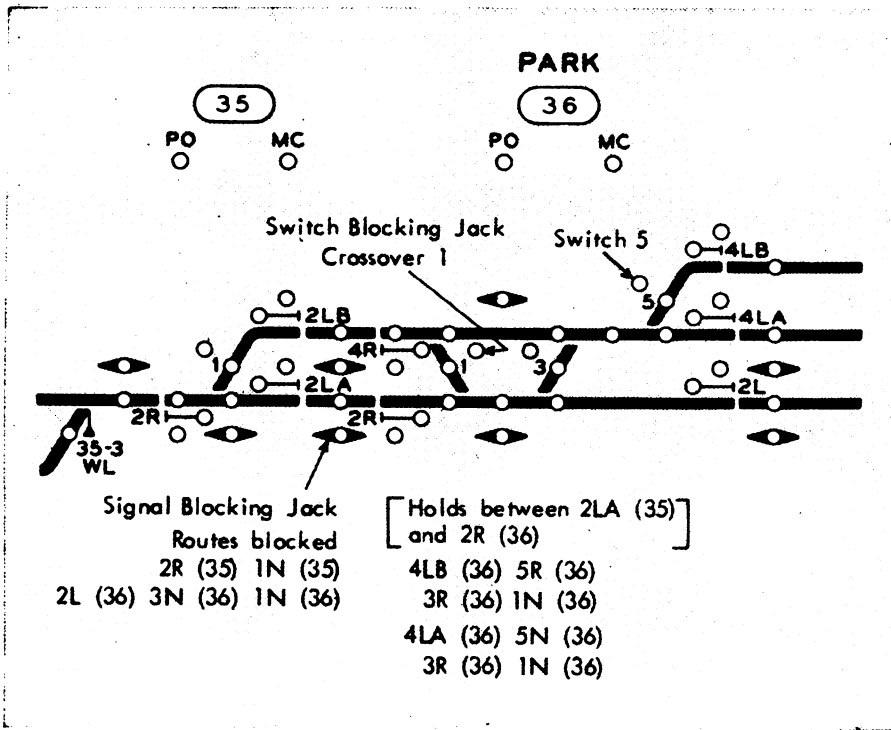
passage of the train, and will be extinguished as the train leaves each track circuit. When the train passes signal 4R, the steady green signal repeater lamp is extinguished.

Assume that the dispatcher had inadvertently cleared signal 4R and that he now desires to cancel this signal. To do so, he again pushes location buttons 3 and 6 to select that location. He then pulls signal button 4R. The steady green signal repeater lamp in signal symbol 4R is extinguished, and the red signal repeater lamp at the base of this signal symbol 4R flashes. Also, the red signal repeater lamp at the base of signal symbol 4LA flashes. Although the controls are now stored in the machine, the flashing aspects indicate that the signals are in time. Pressing the ST button extinguishes the white lamps behind the number plate at Park (36). The red signal repeater lamps at signals 4R and 4LA continue flashing. The route remains locked until the expiration of this time locking. When the time has expired and the route is unlocked, these flashing red signal repeater lamps are extinguished. Also, the lunar white normal switch position lamps in the track diagram at crossovers 1 and 3 and switch 5 are extinguished.

To set up fleeting or non-stick control for signal 2LA at location 35, the

TRACK DIAGRAM SHOWING INDICATION LAMP ASPECTS





TRACK DIAGRAM SHOWING SWITCH SWITCH AND SIGNAL BLOCKING JACKS

dispatcher pushes location buttons 3 and 5. Then he presses signal button 2L, holds it down and presses the FL, or fleeting button. As he does so, the red signal repeater lamp at the base of signal symbol 2LA is lighted steady and the green signal repeater lamp in signal symbol 2LA flashes. The lunar white switch position lamp in the main track burns steady to indicate that switch 1 is normal and locked. The dispatcher then presses the code start button ST. When signal 2LA is cleared and the route is lined and locked, the green signal repeater lamp burns steady. As the train passes signal 2LA at location 35 the OS track occupancy lamp is lighted amber, and the green signal repeater lamp in signal symbol 2LA flashes. As soon as the train passes the first intermediate signal to the left of signal 2R (at location 35) the green signal repeater lamp at 2LA again burns steady, indicating that signal 2LA has climbed from Stop to a less restrictive aspect. The red signal repeater lamp at the base of signal 2LA burns steady to indicate that this signal is on fleeting control.

To cancel the fleeting control for signal 2LA and retain the clear signal for a second train, the dispatcher pushes location buttons 3 and 5 to select that location. Holding down the signal button 2LA, he pulls the FL or fleeting button. This extinguishes

the red signal repeater lamp at the base of signal symbol 2LA. He releases the 2LA signal button and the FL button. He presses the code start button and the white location light is extinguished. The second train in approach to signal 2LA will receive a clear signal. However, when it has passed signal 2LA, the green signal repeater will be extinguished.

If the dispatcher desires to provide protection for a motor car, or a work train, he can do so by blocking. To do this he inserts a red blocking plug in a jack covering the area between the home signals where the train or motor car is operating. For example, assume a motor car operator wants to go to a set-off location between westward home signal 2LA at location 35 and eastward home signal 2R at location 36. The dispatcher would then put a blocking plug in the jack below the track diagram between these signals. The jack is outlined by a double-headed black arrow. After inserting the plug, he cannot clear signal 2R (at location 35) over switch 1 normal. Also, he will not be able to clear signal 2L (36) over crossovers 3 and 1 normal at 36. Neither can he clear signal 4LA (36) over switch 5 normal, crossover 3 reverse and crossover 1 normal. Likewise he can't clear signal 4LB (36) over switch 5 reverse, crossover 3 reverse and crossover 1 normal.

If in place of a motor car, a work train was in the same area, and the dispatcher desired to protect it, he would insert the blocking plug at the same point. However, prior to inserting this plug, he would have had to clear a signal into the area to let the train in. The dispatcher can, however, clear signal 2LA (35) or signal 2R (36) to let the train out of the area without removing the block. If, for track maintenance work a switch or crossover is to be blocked, either normal or reverse, he inserts the blocking plug in the appropriate jack after he has controlled the switch to the desired position. For example, if he desires to block crossover No. 1 at location 36 in the reverse position, he would select location 36 and reverse the crossover, at which time the lunar white switch position lamp in the crossover would be lighted to indicate that the crossover had been reversed. He would then insert a blocking plug in a jack adjacent to the numeral 1 on the track diagram at the crossover. With this blocking plug in the jack, the dispatcher cannot control the crossover to the normal position.

If the dispatcher desires to unlock an electrically locked switch, for example, 35-3WL at location 35 as indicated on the diagram, he will first press location buttons 3 and 5. Pushing button 3R causes the lunar white switch position indication lamp to flash, indicating that he has asked for the unlock. He then presses the ST button. When the switch is unlocked, the flashing lunar white switch position indication lamp will burn steady.

To transfer carrier code lines from normal to standby, the operation is similar to that for switch and signal control. The dispatcher selects the carrier location, control machine office or other carrier transfer points, by pressing the appropriate selection button. Then he presses or pulls the appropriate carrier transfer button. If the transfer is to be made at the office, this is a direct wire operation and the code start button is not required. If, however, it is at one of the remote locations, he also presses the ST button to control the field unit to make the change-over. Indication lamps on the console portion of the machine indicate which office carrier unit normal or standby, is in operation. Field carrier transfer indications are shown on the track diagram panels at their associated field locations.