

CTC signals clear automatically on the N&W's line to Cincinnati. The control machines for the two lines are at Portsmouth.

The N&W has modified its signals to color position signals, the center unit in the top arm no longer being used. The lower arm displays a center red light or two yellow diagonal lights.



CTC Signals Clear Automatically

● Automated CTC on the Norfolk & Western clears signals without manual attention except when making meets, passes or handling unusual operating conditions. The main line of N&W's Scioto division extends westward from Williamson, W.Va., to Portsmouth, Ohio. From Portsmouth the line extends generally northward to a terminal at Columbus, Ohio, and generally westward to a terminal at Cincinnati.

One Dispatcher Controls Trains

Normally one dispatcher's position handles train movements on the entire division. During the first trick Monday through Friday, while track forces are working and local switching operations are in progress, an additional dispatcher is used. This additional dispatcher handles the Portsmouth-Cincinnati line, thus permitting the regu-

The N&W has developed circuitry to clear CTC controlled signals automatically in advance of a train. A dispatcher need only clear the entering signal into CTC territory and arrange meets. Seventeen months of satisfactory service prove the feasibility of approach clearing CTC signals.

lar dispatcher to concentrate on the line between Williamson and Columbus.

The 96-mile single track, Cincinnati line has CTC all the way. There are 11 controlled sidings with power operated switches. Of the 13 scheduled trains, eight operate when the system is clearing signals automatically.

When the additional dispatcher is not stationed at the Portsmouth-Cincinnati machine, the sequence of events is as follows: When the single stroke approach bell sounds, the regu-

lar dispatcher goes to the machine and clears the entering signal to CTC territory in the normal manner. Thereafter the signals clear sufficiently in advance of the train so that the engineer will always receive a green aspect if track conditions allow. Whenever a train enters the block of the approach signal to a home signal giving a stop indication, a vibrating bell sounds until acknowledged by the dispatcher. This indicates that appropriate action must be taken if stopping of the trains is to be avoided.

(Note: The track indication relays,

CTC SIGNALS *continued*

“-TK”, are non-vital repeaters of the relays in the control machine. These relays are normally down and are picked up when the track section is occupied.)

When a train enters track circuit 1T, for example, the clearing of signal 118R is initiated. The reason it is done at this time is to establish direction: the circuit is completed only if signal 112R is clear. Thus signal 118R will not clear for a train receding from 1T to the left.

Reading the circuit of relay 118R from right to left, signal clearing relay 118R will be energized if, in the positive side of the relay:

- 120L is down (no attempt being made to clear opposing signal 120L)
- 6, 7 and 8TK down (track sections unoccupied)
- 1TK up (track section occupied)
- 112RGK up (signal 112R clear)
- 120LGK down (opposing signal 120L not clear)
- 118L down (no attempt being made to clear opposing signal 118L), and in the negative side of the relay
- 118LGK and 118RGK down (signals not clear)

When relay 118R picks up, it will cause code to be sent out to clear signal 118R. The signal will clear only to yellow at this time, since signal 120R is still red.

Track sections 6, 7 and 8T are

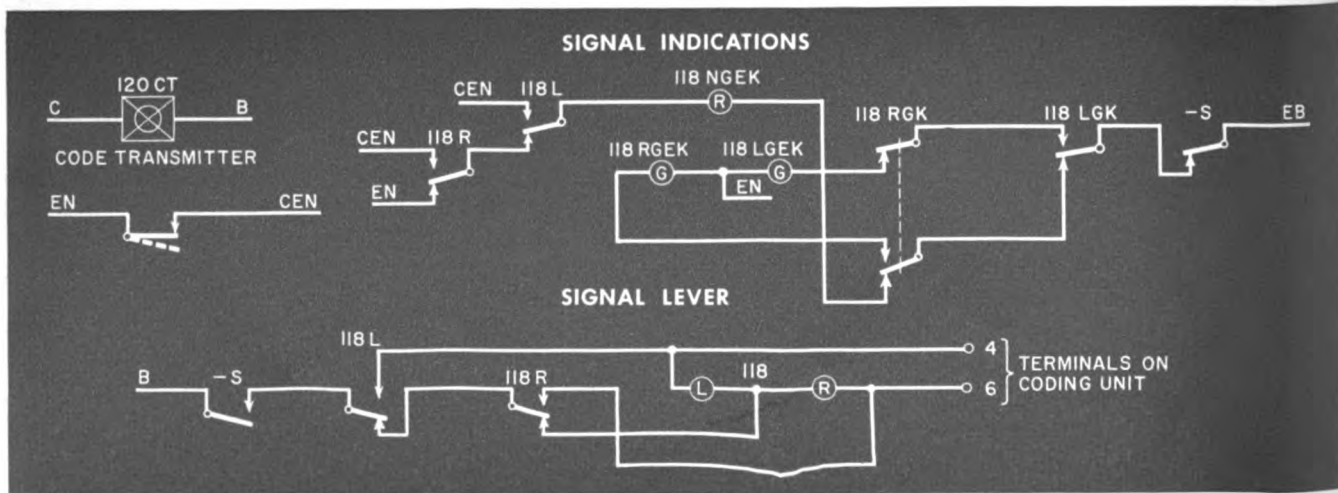
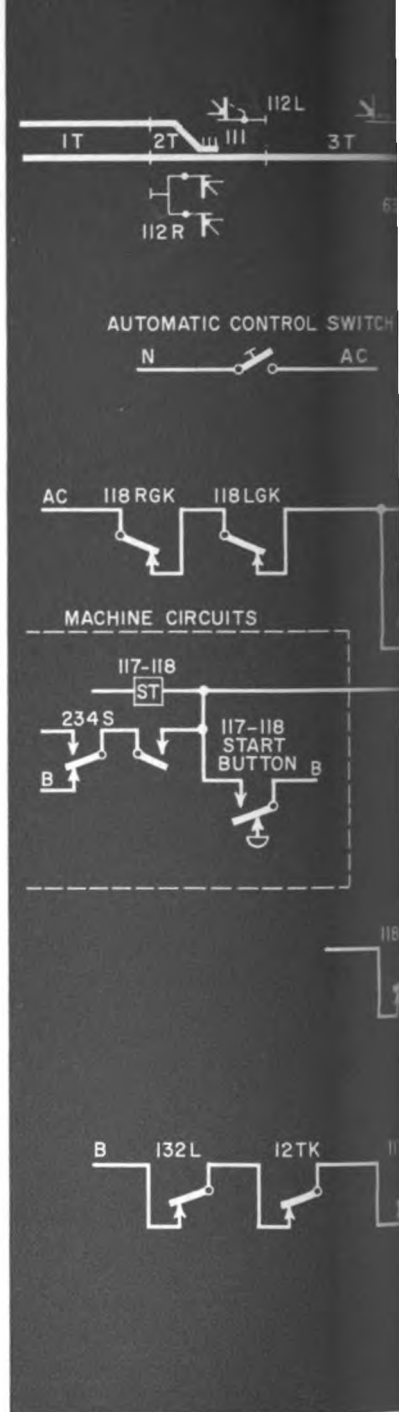
checked unoccupied so that code will not be sent out needlessly, even though field safety circuits would keep the signal from clearing. Note that if the above conditions are fulfilled, relay 118RLP will pick up momentarily until 118R opens its back contact. This pulses the code starting relay 117-118, which sticks up. This action is the same as if the code starting pushbutton was pushed.

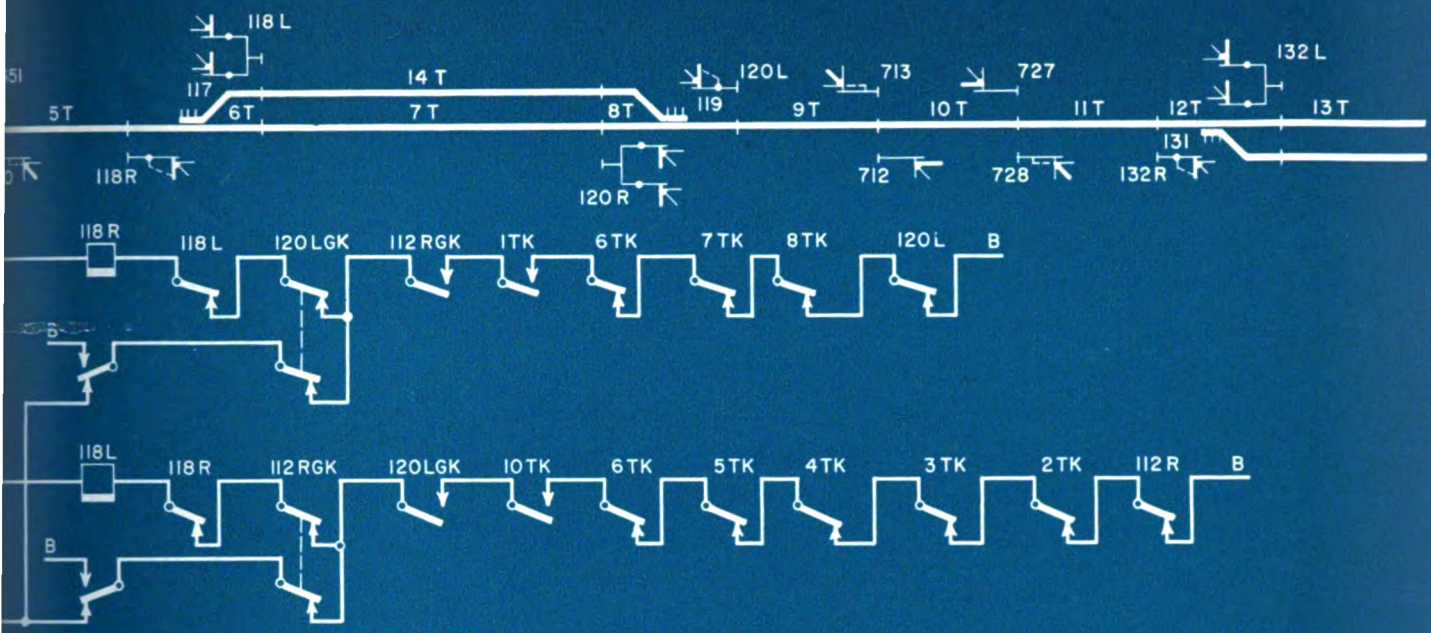
Stick Circuits Needed

Note also that a stick circuit maintains relay 118R energized. If there was no stick circuit on 118R, and if there was a delay in sending out the code because the code line is busy, the train might pass signal 112R, causing it to go to stop, and leave track section 1T, either of which would open the circuit to relay 118R. This would prevent signal 118R from clearing automatically.

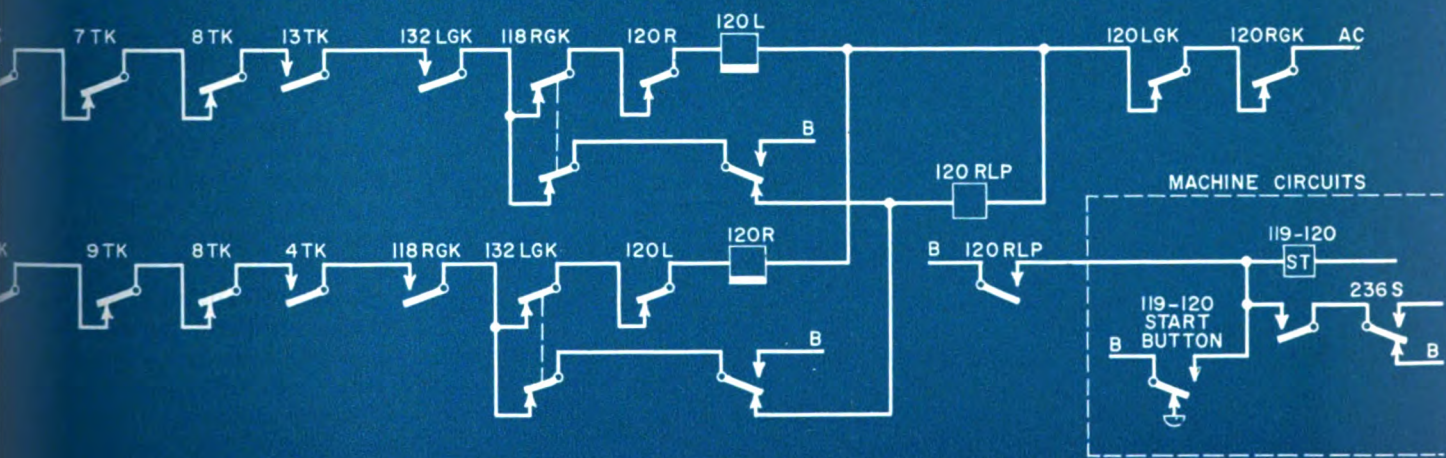
When signal 118R indicates clear, relay 118RGK picks up, releasing relay 118R. As the train proceeds to track section 4T, the clearing of signal 120R is initiated. If track conditions allow, signal 120R will clear in time for the train to receive a green aspect at signal 118R.

The common return “AC” (Automatic Common), goes to negative battery through a switch. Opening this





NORFOLK & WESTERN RAILWAY AUTOMATIC SIGNAL CLEARING CIRCUITS FOR TRAFFIC CONTROL TERRITORY



switch disconnects all the automatic circuitry and the operation reverts to manual control. It is not necessary to open this switch while making a meet under automatic operation, as the signal levers and code starting pushbuttons are in parallel with the automatic signal clearing relays.

The signal indication circuits were modified only to include contacts of the signal clearing relay in the circuit of the normal indication lamp—NGEK. The NGEK is illuminated steadily while the signal is at stop. When, as in the previous example, signal clearing relay 118R picks up, and until the signal clear indication

relay 118RGK picks up, the 118 NGEK flashes. The flashing is accomplished by breaking the negative return of the lamp over a contact of a 120 rate code transmitter, (120 alternations per minute). When the signal indicates clear and relay 118RGK picks up, the green lamp 118RGEK is illuminated steadily.

In the signal lever control circuits, when signal clearing relay 118R picks up, the circuit is completed to coding unit terminal 6 (when code sending relay —S picks up), the same action as if the signal lever had been positioned to the right. The opening of the back contact of relay 118R in this

circuit removes battery from the actual lever.

The bell ringing circuits illustrate the method used to cause a bell to sound as the train approaches a signal giving an approach indication. Suppose in our example that signal 118R had not cleared (as would be the case if track section 7T was occupied). When the train enters track section 4T, and the indication code is received, delivery relay —D will energize 4TK. If track section 5T is not occupied, and the signal clear indication relay 118RGK is down (signal not clear), the bell ringing relay BZ will be pulsed when the make-before-

