

Small Flat Top Console for Controls And Separate Diagram for Indications

This is article No. 3 in series on "Modern Systems of Signaling Controls and Circuits." The first article, about a new interlocking control machine on the Reading, was published in the October issue. The second article, in the December issue, explained new features in the centralized traffic control systems being installed on the New York Central. Watch for other articles in this series—Editor

SEVERAL IMPORTANT FEATURES are included in a new interlocking which the Southern Pacific, Lines in Texas and Louisiana, has installed at the west end of a new classification yard in Houston.

This interlocking is four miles east of the Houston passenger station on the main line to New Orleans. The track layout at the interlocking is arranged so that trains enter and leave this end of the yard without being required to stop. About 20 in-

Use of route network circuit, in combination with turn-and-push levers, indicates track line-up before pushing signal lever, thus avoiding delays, for release of time locking

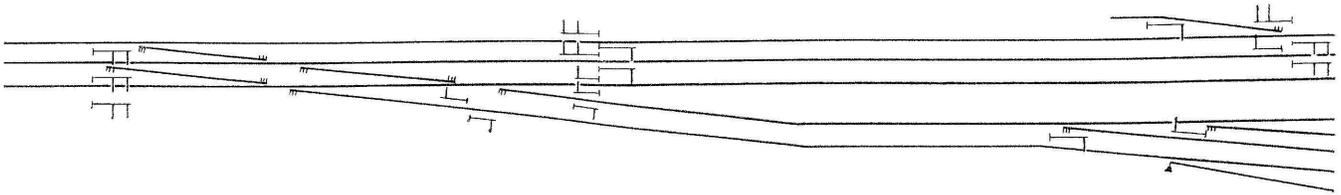
coming and 20 outgoing road trains are handled through this interlocking daily. These trains arrive from, and depart to, five radiating routes: (1) west through San Antonio to the Pacific Coast; (2) north to Corsicana and Dallas; (3) northeast to Shreveport; (4) south to Galveston; and (5) southwest to Victoria and Brownsville. This interlocking includes 20 single switches, 1 movable point frog and double slip switches, and 9 crossovers that are power operated, 73 signals, and electric locks on 3 hand-throw switches.

During the past 10 years Houston has grown rapidly so that the population of the metropolitan area is now over a million people. To serve industries and the docks at the port,

the Southern Pacific delivers about 350 cars daily, and picks up the same number of cars to bring them back to the yard. Six passenger trains are operated daily. Counting passenger trains, road freight trains, transfers to other roads and industries, as well as switching moves; more than 300 routes are set up in a normal 24-hr. day, through this interlocking.

Desk Type Control Console

The track layout is not only extensive but also includes several separate areas; therefore, on frequent occasions, several routes are set up and are being used at one time. Thus, there was a necessity



THIS TRACK AND SIGNAL PLAN extends also across the next page . . .

for an interlocking control machine that could be manipulated quickly and accurately. To meet the first requirement, the decision was for a small-sized control panel with the levers all within arm's reach of a man seated at the machine. To accomplish this result, for such a large interlocking, a decision was made to place nothing on the panel but the actual levers, without indications of any sort.

Accordingly, the panel on the control console was reduced in size so that it is only 28 in. by 64 in., and the actual area occupied by levers is only 26 in. by 60 in. This panel is mounted like the top of a flat-top desk, except that it slopes slightly toward the leverman. The levers are the turn-push type with a vertical shaft extending from the center of the turn button down through the panel to contacts in the machine. Each signal lever normally is on center, being turned clockwise 45 deg. to clear corresponding westward signal or signals, and being turned 45 deg. counter-clockwise to clear corresponding eastward signals. In some instances a lever to the right clears any one of four or five signals, depending on the track line-up. Similarly, the same lever to the left could clear one of several signals. Thus, only 32 signal levers are required to control a total of 73 interlocking home signals. For reasons to be discussed later, the manipulation of each signal lever requires not only that the lever be rotated but also, after certain observations are made, the lever is pushed.

When a switch lever is in the normal position, the edge is 45 deg. to the left of "12 o'clock." Such a lever is rotated clockwise to place it 45

deg. right of "12 o'clock" to control the corresponding switch to the reverse position. Switch levers are manipulated by turning and then by pushing.

On the panel, the levers are in four horizontal rows. The top row and the third row are switch levers, and the second and fourth rows are signal levers. In general the locations of levers on the panel correspond approximately with the locations of respective switches and signals on the ground, as well as on the model board.

Line-of-Light Track Model

As explained previously no switch or signal indications are shown on the control panel; this matter of indications being taken care of completely and efficiently by a large sized illuminated track model 33 in. high and 96 in. long, suspended from the ceiling, about 6½ ft. from the leverman's position at the panel.

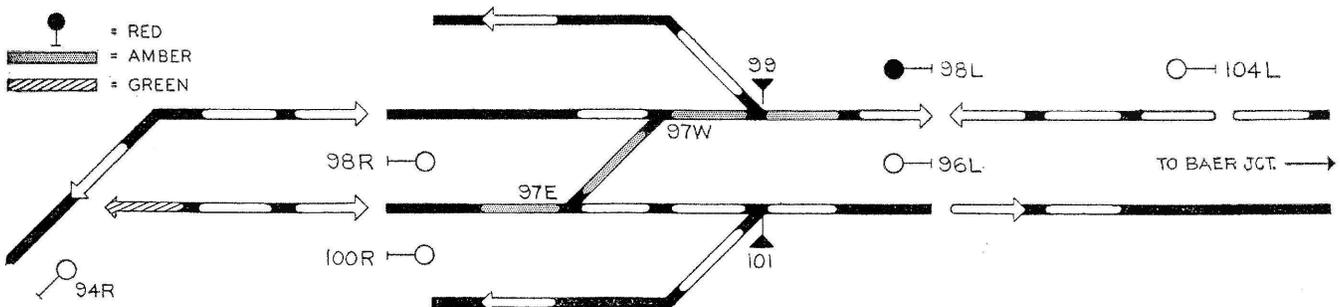
The surface of this track model is made of steel plate, painted non-reflecting black. Each track is represented by a white line ¼ in. wide on the face of the panel. One inch slots were cut in panel and filled with translucent plastic pieces backed by units containing two lamps with colored filters, thus each slotted section can be illuminated either of two different colors, and these lights can be flashed to indicate certain conditions.

The turn-and-push operation of the levers, as previously explained, in combination with a network of circuits and route indications on the model board, allows the leverman to select and verify the correctness of a route before he pushes the signal

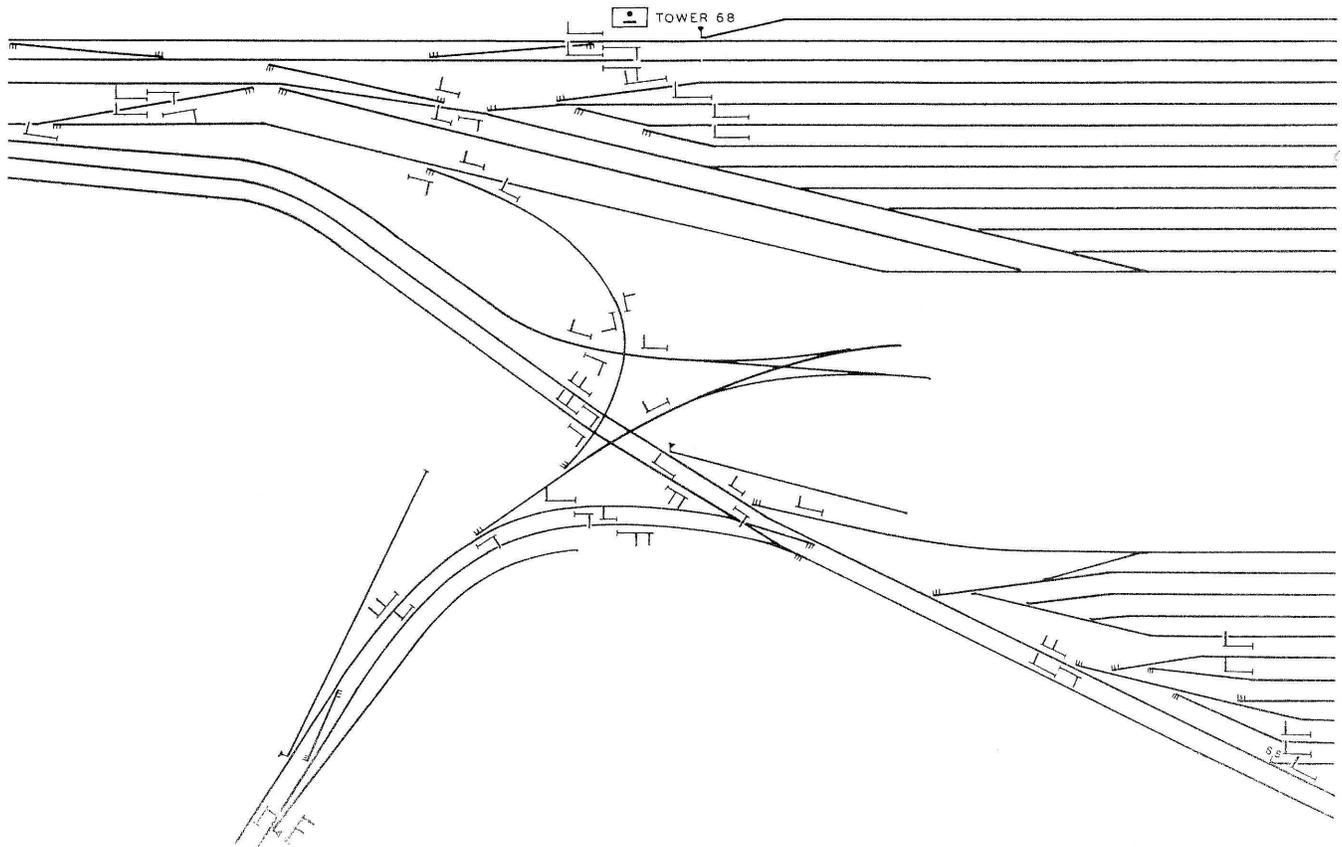
lever and inaugurates any locking which, in the event of an incorrect route, would result in a delay.

If a switch lever, for example, is thrown from normal to reverse, an amber light will flash 75 times per minute in the line-of-light section which represents the turnout or crossover on the diagram. Then when the lever is pushed, the control goes out to operate the switch machine. As long as the switch is in transit, flashing amber indications are in effect in the line-of-light sections which represent the normal as well as the reverse position of the switch. When the switch is over and locked in the position called for by the lever, the switch indication line-of-light sections are extinguished. The same manipulation applies to control of other switches which may have to be operated to complete the track line up for a proposed route.

After all the switches are positioned as required for a route, the leverman turns the signal lever. This causes three indications on the model board: (1) a red light appears in the symbol for the corresponding signal; (2) steady burning amber light in line-of-light sections extend through the switches to indicate the position of each switch and the next line-of-light section beyond to indicate that part of the route; and (3) a section of line-of-light representing the exit point of the proposed route is lighted as a green arrow pointing in the direction of exit. The leverman then observes these indications, to be sure that the signal, the track line up and exit, are as he intended. If so, he then pushes the signal lever. This locks the switches and sends out a control to clear the signal, as is indicated by a



INDICATIONS FOR A track line-up from signal 98L via crossover reversed; signal not yet cleared



... thus this large interlocking includes numerous switches and signals

change from red to green in the symbol for the corresponding signal.

As a train approaches, track occupancy is indicated by red light in the line-of-light sections which represent the approaches. Then, as the front trucks pass the signal, the light in the symbol for the signal changes from green to red. As the train proceeds through home signal limits, sections of line-of-light are lighted red to repeat occupied track sections, except that the sections of line-of-light which indicate position of switches stay amber. When the rear of the train clears home signal limits, the red light in the symbol for the signal is extinguished. The signal lever must be restored to normal. Switch levers may be left in the position last used until a change is called for on some future track line up.

If a signal that has been cleared is to be "taken away," the lever for the signal is turned to the normal position (on center) and is pushed. The light in the symbol for the signal changes from green to red, and the red flashes until the electric time locking period expires. Then all lights involved in this route will go dark, which is the normal condition.

If the electric lock on a hand-throw switch in interlocking limits is to be released, the leverman turns the lever for that lock. Then the re-

verse out-of-correspondence line-of-light, representing this switch, will flash amber. When the leverman pushes the lever, the lines-of-light representing both the normal and reverse will be flashed. This indicates that the electric lock is unlocked, and this flashing indication continues until a trainman opens the switch and throws it to the reverse position. If a train on a main track is to make a move over a hand-throw switch reversed, the home signal can be cleared by operating the signal lever, turn-and-push, at the time that the leading wheels of the locomotive or leading car are occupying a track circuit approx. 100 ft. long in approach to the signal. This necessitates that the train must be moving very slowly or must be stopped on the 100 ft. circuit. This insures that moves from main track over a hand-throw switch reversed will be at slow speed.

Plug-In Relays

In this interlocking the relays for vital circuits such as track, line and locking circuits are the Model PN-50B plug-in. The relays for the route network are the quick-acting style KP, mounted in racks. Indication lamps on the model board are controlled by style L relays in a glass-door case.

The home signals in this interlocking are searchlight type dwarfs. Track circuits are the conventional, normally-energized d.c. type using 4 ohm relays. The switch machines are the style M-3 with 110-volt d.c. motors. The 17 switch machines in the south area are operated by a set of 57 cells of 80 a.h. Exide lead storage battery, and the 20 switch machines in the area near the tower and west are operated by a set of 85 cells of Edison B6H storage battery. The four low voltage machines located west of tower are operated by a set of 24 cells of Edison B6H storage battery. These batteries are charged by rectifiers which are fed through General Electric constant-voltage transformers. An automatic ground detector arrangement, including indicators on the control machine, was installed in connection with each of the 110-volt batteries.

This interlocking was planned and constructed by railroad forces under the direction of W. R. Smylie, Signal Engineer. H. E. Daigle, Office Engineer, was in charge of circuit design; and D. W. Morris, Supervisor of Signal Construction, had charge of field work. The equipment, including control machine, model board, relays, signals and switch machines, was furnished by the Union Switch & Signal Division of Westinghouse Air Brake Co.